Ndzilo Coal (Pty) Limited

Roodepoort Colliery II

DRAFT

Basic Assessment Report (BAR) and Environmental Management Programme (EMPr)

Compiled in terms of Appendix 1 and Appendix 4 of the amended Environmental Impact Assessment Regulations, 2014 (Government Notice 982) (EIA Regulations, 2014) and submitted as contemplated in Regulation 19 of Chapter 4 of the EIA Regulations, 2014

For
The application for an Environmental Authorization in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), Amended Environmental Impact Assessment Regulations 2014, Government Notice R983 of Listing Notice 1 2014

(DMRE Reference No.: MP 30/5/1/1/3/12977 MP)

March 2022

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Report Type: Draft BAR/EMPr

Project Title: Roodepoort Colliery II Mining Permit project.

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Reviewed by: T. Shakwane, B.Sc. Hons. Pr.Sci.Nat and Registered EAP

Version: Draft

Date: March 2022

Disclaimer:

The results and conclusions of this report are limited to the Scope of Work agreed between Geovicon Environmental (Pty) Limited and Ndzilo Coal (Pty) Limited for whom this report/ investigation has been conducted. All assumptions made and all information contained within this report and its attachments depend on the accessibility to and reliability of relevant information, including maps, previous reports and laboratory results, from the Client and Contractors. All work conducted by Geovicon Environmental (Pty) Limited is done in accordance with the Geovicon Standard Operating Procedures.

Declaration:

I hereby declare:

1. I have no vested interest (present or prospective) in the project that is the subject of this report as well as its attachments. I have no personal interest with respect to the parties involved in this project.

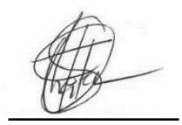
2. I have no bias with regard to this project or towards the various stakeholders involved in this project.

3. I have not received, nor have I been offered, any significant form of inappropriate reward for compiling this report.

(Electronic signature)

P. Sekgukulu, BSc. Hons. (Candidate. Natural Scientist no: 147103)

This report was reviewed by:



(Electronic signature)

T. Shakwane, B.Sc. Hons. (Professional Natural Scientist no: 117080)

EXECUTIVE SUMMARY

Ndzilo Coal (Pty) Limited proposes to mine coal and pseudocoal on a portion of portion 6 of the farm Roodepoort 439 JR, situated within the Kwaggafontein Magisterial District. Roodepoort Colliery II is situated approximately 27.1 kilometres southeast of KwaMhlanga town.

The proposed mining permit area falls within the Witbank coalfield, where the seams are at a shallow depth, with the lowest seam seldom reaching 100 metres in the deepest lying parts of the field. The strata in which the coal seams occur consist predominantly of fine, medium and coarse-grained sandstone with subordinate mudstone, shale, siltstone and carbonaceous shale. Ideally there are seven coal seams with varying degrees of persistence numbered from below as No. 1, No. 2, No. 3, No. 4 lower, No. 4 upper, No. 4 A and No. 5 Seams. The opencast mining will be undertaken using the conventional truck and shovel mining technique with concurrent rehabilitation.

The life of this resource at the planned mining rate is 24 months, which includes a pre-production build up phase aimed mostly at establishing the box-cut and other related mining infrastructures. All R.O.M coal from the proposed mining permit area will be stockpiled on site. No coal processing (washing) will be undertaken; hence, no coal discards will be generated from the proposed mining permit area. However, crushing and screening will be conducted.

The mining related infrastructures such as the mobile offices, hard-park, storm-water management facility and stockpiling facilities will be placed at the mining permit area. Furthermore, an in-pit water storage and in-pit coal storage was decided upon. A surface pollution control dam and ROM will; however, be considered and constructed should the in-pit storage facilities not be sufficient during mining.

In view of the above, Ndzilo Coal (Pty) Limited has lodged a mining permit (Reg. No.: 2019/615422/07) with the Department of Mineral Resources and Energy (Mpumalanga Regional Office) in accordance with the relevant guidelines and regulations under the Mineral and Petroleum Resources Development Act, 2002 as amended.

In addition to the above, the National Environmental Management Act, 1998 (Act 107 of 1998), (NEMA) requires that any person or entity that intends to undertake activities listed in the NEMA listing notice regulations (Government Notices No. 983, 984 and 985) as amended in 2017 before undertaking such activities. Activities that will require an environmental authorisation in terms of the above-mentioned acts were identified and are listed in a table contained in this report.

According to the NEMA EIA Regulations 2014, an application for an environmental authorisation for the above triggered listed activities, (environmental authorisation) must be submitted to a competent authority in line with the requirements of the above-mentioned regulations. The Department of Mineral Resources and Energy (eMalahleni Office) is the competent authority for the above-mentioned application.

Regulation 19 of the amended NEMA Regulations requires that if a BAR process must be applied to an application, the applicant must submit a basic assessment report and an EIR/EMPr to the competent authority which has been subjected to a public participation process and which reflects the incorporation of comments received, including any comments of the competent authority. In view of the above, a draft BAR and EMPr report which concerns assessment of environmental impacts and a programme for management of the impacts for the proposed activities at the Roodepoort Colliery II, was compiled and submitted in terms of the NEMA EIA Regulations, 2014 for review and commenting by the public including the competent authority. The environmental impact assessment, which results will thereof be

detailed in the final report, will be undertaken in compliance with the accepted plan of study described in the above-mentioned basic assessment report as well as studies requested by the interested and affected parties during the public and participation process.

PART A

BASIC ASSESSMENT REPORT

SECTION ONE

Introduction

1. INTRODUCTION

1.1 WHO IS DEVELOPING THE BAR AND EMPR?

1.1.1. Name and contact details of the Environmental Assessment Practitioner (EAP) who prepared the BAR and EMPR

EAP: Mr. Ornassis Tshepo Shakwane

Professional registration:

SACNASP: 117080

EAPASA: 2019/1763

IAIA Membership No.: 3847

Company: Geovicon Environmental (Pty) Limited

Postal Address:

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MIDDELBURG, 1050

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Cell No.: 082 498 1847

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1.1.2. Expertise of the EAP who prepared the BAR and EMPR

Geovicon Environmental (Pty) Limited is a geological and environmental consulting company. The company was formed during 1996, and currently has more than 20 years' experience in the geological and environmental consulting field. Geovicon Environmental (Pty) Limited has successfully completed consulting areas in the Mining sector (coal, gold, base metal and diamond), Quarrying sector (sand, aggregate and dimension stone), industrial sector and housing sector. Geovicon Environmental (Pty) Limited has undertaken contracts within all the provinces of South Africa, Swaziland, Botswana and Zambia. During 2001 Geovicon Environmental (Pty) Limited entered the field of mine environmental management and water monitoring.

Geovicon Environmental (Pty) Limited is a Black Economically Empowered Company with the BEE component owning 60% of the company. Geovicon Environmental (Pty) Limited has three directors i.e. O.T Shakwane, J.M. Bate and T.G Tefu.

Mr. O.T Shakwane obtained his BSc (Microbiology and Biochemistry) from the University of Durban Westville in 1994, and completed his honours degree in Microbiology in 1995. Mr O.T Shakwane has also completed short courses on environmental law and environmental impact assessment with the University of North West's Centre for Environmental Management. He has worked with the three state departments tasked with mining and environmental management i.e., Department of Water and Sanitation (Gauteng and Mpumalanga Region), Department of Mineral Resources (Mpumalanga Region) and Department of Agriculture, Conservation and Environment (Gauteng Region). Mr. Shakwane has been in the consulting field since 2004 and has completed various areas similar to the proposed Roodepoort Mining Permit area as an environmental assessment practitioner. Mr Shakwane

is the environmental assessment practitioner for the environmental impact assessment for the proposed Roodepoort Mining area.

Over the past years Geovicon Environmental (Pty) Limited has formalised working relationships with companies that offer expertise in the following fields i.e., Geohydrology, Civil and Geotechnical Engineering, Geotechnical Consultancy, Survey and Mine Planning and Soil & Land Use Consultancy. Geovicon Environmental (Pty) Limited is an independent consulting company, which has no interest in the outcome of the decision regarding the Roodepoort Mining Permit Area's basic assessment process

1.1.3. Who will Evaluate and Approve the BAR and EMPR?

Before the proposed project can proceed, an EAP must compile an application for an environmental authorisation for the proposed project. An impact assessment (basic assessment process) must be undertaken in support of the application for an environmental authorisation. The basic assessment process will determine the potential environmental impacts that may result from the proposed project and an environmental management programme will be compiled to provide measures for mitigation against the identified impacts. The above-mentioned application must be made to the competent authority and in terms of section 24D (1) of NEMA, the Minister responsible for mineral resources is the responsible competent authority for this application. In view of the above, the application for the environmental authorisation for the proposed project was submitted to the Department of Mineral Resources and Energy (DMRE), Mpumalanga Regional Office for their consideration and decision making.

In the spirit of co-operative governance and in compliance with the requirements of NEMA and the MPRDA, the competent authority may, during the processing for the environmental authorisation application, consult with other organs of state that administers laws that relate to matters affecting the environment relevant to this application. Note that during the public participation process for the proposed project, the EAP will also consult with the below listed state authorities.

The organs of state that are to be consulted may include the following:

Mpumalanga Tourism and Parks Agency (MTPA)

Department of Mineral Resources and Energy, Mpumalanga Regional Office (Competent Authority).

National Department of Agriculture, Forestry and Fisheries, Mpumalanga Regional Office (Commenting Authority).

South African Heritage Resources Agency (Commenting Authority).

Note; however, that this list is not exhaustive as more organs of state may be identified by the competent authority and EAP during the public participation process.

1.2. DETAILS OF THE APPLICANT

1.2.1. Name of the Applicant

Ndzilo Coal (Pty) Limited

1.2.2. Name of the Project

Roodepoort Colliery II

1.2.3. Postal Address of Applicant

Ndzilo Coal (Pty) Ltd

PO Box 90512

Garsfontein

Gauteng,

0181

1.2.4. Responsible Person

Mr Mojalefa Douglas Mongwe

1.2.5. Contact Person

Mr. Bongani Zulu

Tel: +27 (12) 472 0253

1.3. DESCRIPTION OF THE PROPERTY (LOCATION OF THE PROJECT)

1.3.1. Regional Setting

The Roodepoort Colliery II is situated within the Kwaggafonein Magisterial District approximately 27.1 kilometres southeast of KwaMhlanga town, 11.8 kilometres east of Loopspruit town, and 25.7 kilometres southwest of Gemsbokspruit. Access to the mine is via a network of unnamed farm roads connecting to R573 north of the area and to R568 west of the area. See Figure 1, for the regional setting of Roodepoort Colliery II and Table 1 for the distance and directions of towns around the Roodepoort Colliery II.

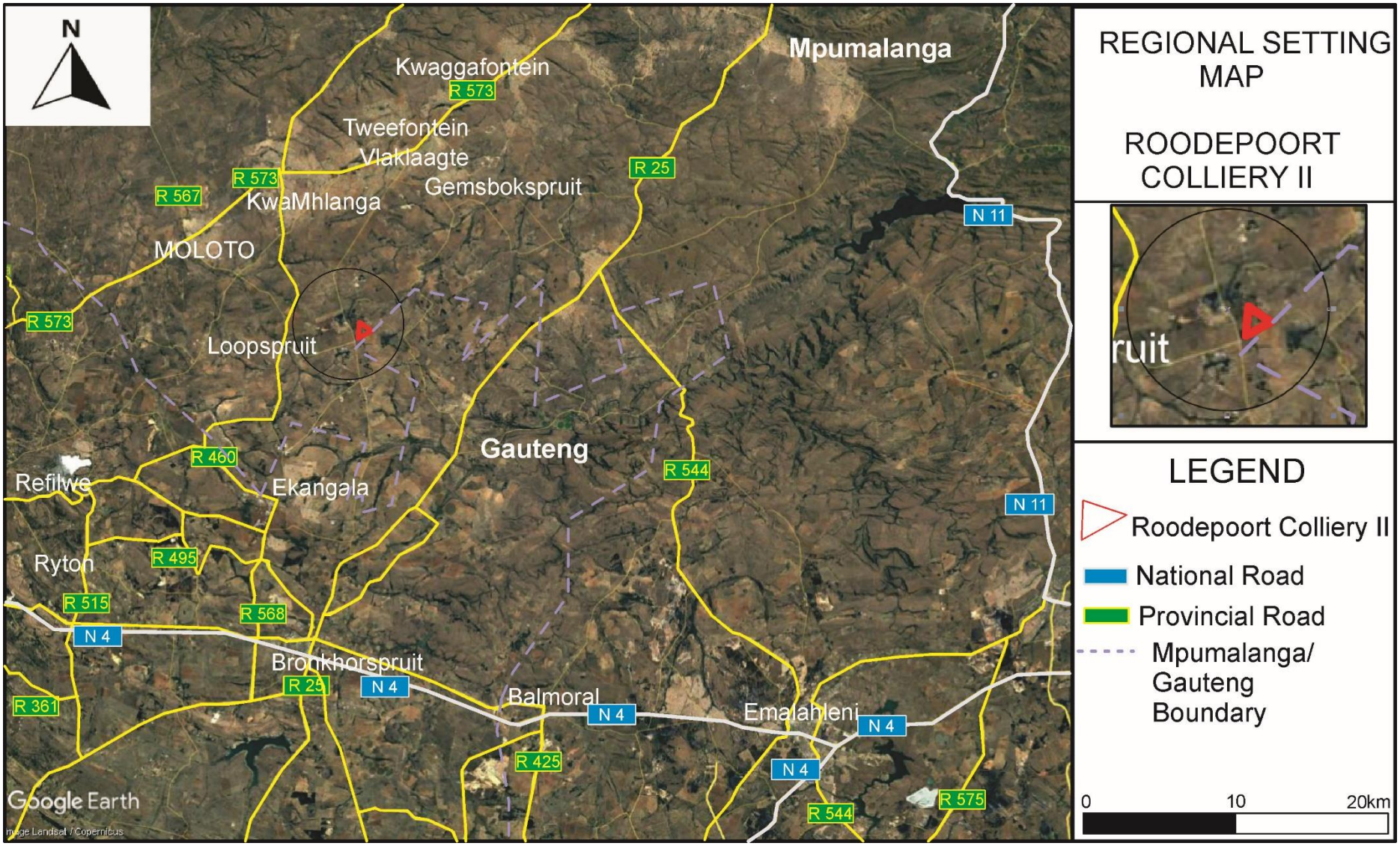


Figure 1: Regional Setting for Roodepoort Colliery.

1.3.2. Physical Address and Farm Name of the Mining Area

Roodepoort Colliery II is situated on a portion of portion 6 of the farm Roodepoort 439 JR, southeast of KwaMhlanga, Mpumalanga.

1.3.3. Magisterial District & Regional Services Council

- Magisterial District: Kwaggafontein Magisterial District, Mpumalanga
- District Municipality: Nkangala District Municipality
- Local Municipality: Thembisile Hani Local Municipality

1.3.4. Direction and Distance to Nearest Towns

Table 1: Direction and Distance to Nearest Towns.

TOWN	DIRECTION	DISTANCE (KM)
KwaMhlanga	South East	27.1 km
Loopspruit	East	11.8 km
Vlaklaagte	South West	23.8 km
Gemsbokspruit	South West	25.7 km
Moloto	South East	27.5 km

1.3.5. Locality Plan

Refer to Figure 2 for the locality plan of the Roodepoort Colliery II area.

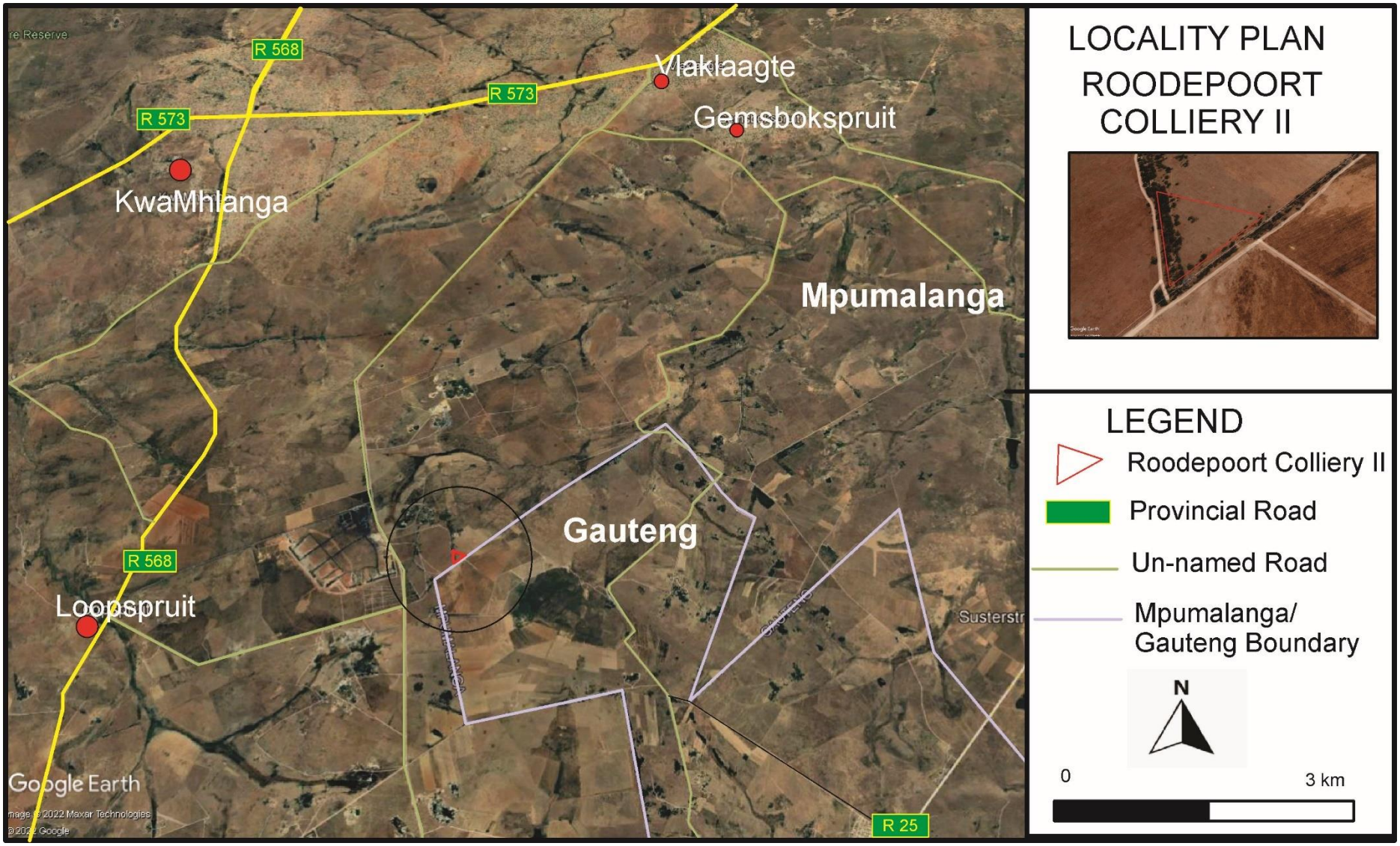


Figure 2: Locality Plan.

1.3.6. Land Tenure and Use of Immediate and Adjacent Land

Land tenure for the properties within and immediately around the mining permit area is indicated on Table 2 and Figure 3 below. The land in the area is mainly used for agricultural purposes. Adjacent land is used for mining, limited crop production, grazing and wilderness purposes.

Table 2: Schedule of properties listing surface ownership within and surrounding Roodepoort Colliery II.

FARM NAME AND NUMBER	21 DIGIT SURVEYOR GENERAL CODE	DESCRIPTION OF SUB-DIVISION	SURFACE OWNER
Roodepoort 439 JR	T0JR00000000043900006	**Portion 6***	National Government of the Republic of South Africa.
Roodepoort 439 JR	T0JR00000000043900005	Portion 5	National Government of the Republic of South Africa.
Rooidraai 440 JR	T0JR00000000044000001	Portion 1	National Government of the Republic of South Africa.

***Portion** on which the mining permit area is applied for, also refer to **Appendix A** regulation 2(2) plan and **Appendix B** Deed's list of direct farm owners.

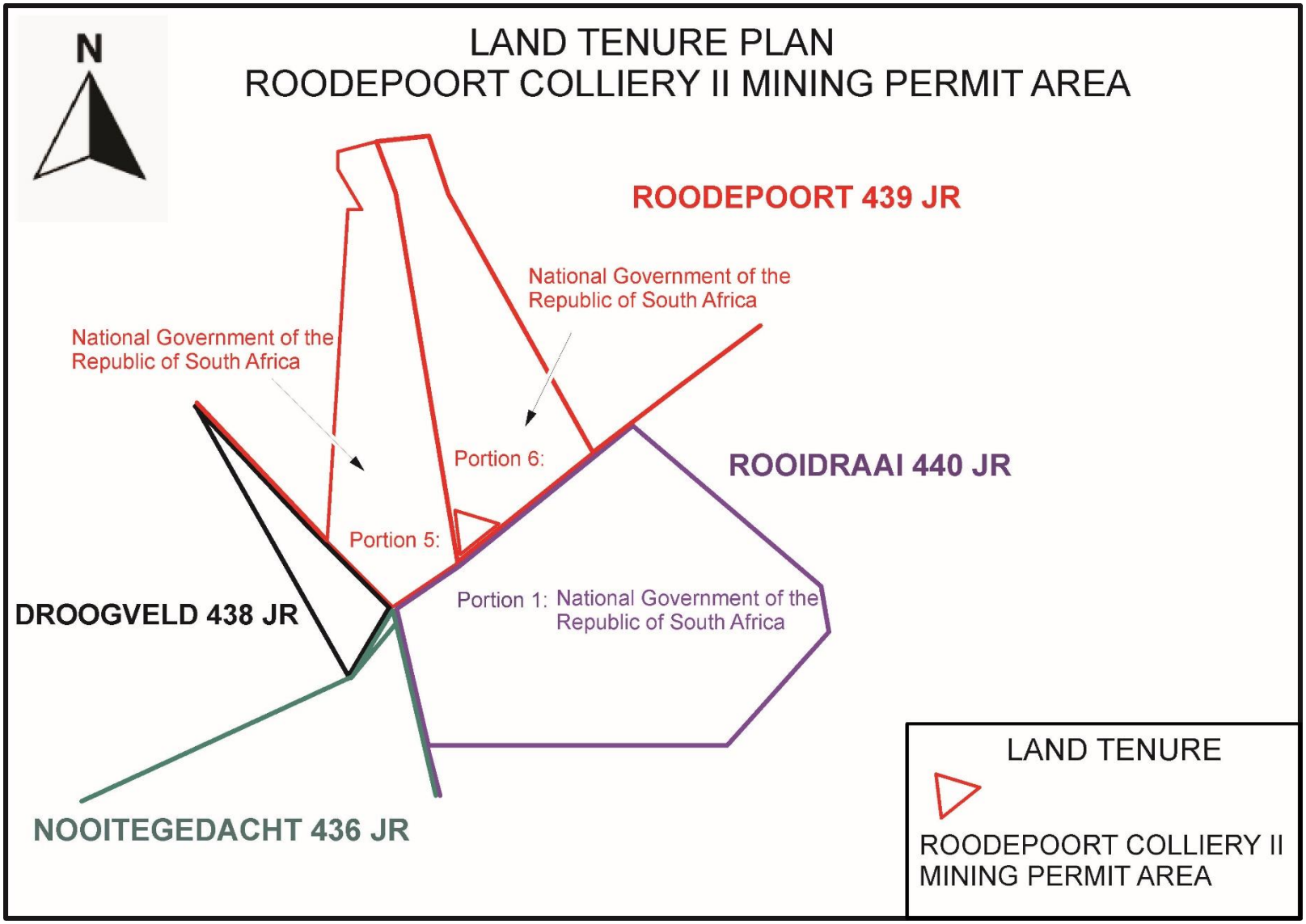


Figure 3: Land Tenure Plan for the Roodepoort Colliery II area.

SECTION TWO

Description of the Scope of the proposed Project

2. DESCRIPTION OF THE SCOPE OF THE PROPOSED PROJECT

2.1. LISTED ACTIVITIES AND SPECIFIED ACTIVITIES

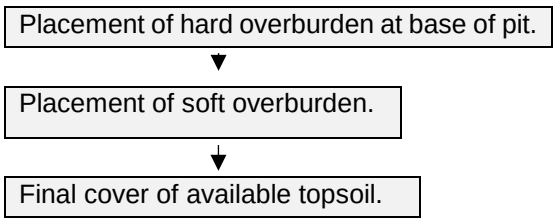
In terms of the NEMA, the proposed Roodepoort Colliery II will result in the conducting of activities that are considered as listed activities. In terms of the above-mentioned legislations, none of the above-mentioned listed activities can be conducted without an environmental authorisation. In view of the above, Ndzilo coal (Pty) Limited has submitted an application for an environmental authorisation for all listed activities to be conducted at the proposed Roodepoort Colliery II to the competent authority (DMRE). This section will give a description of the listed activities that will be included in the application for an environmental authorisation. Table 3 is compiled as prescribed by the DMRE, EIR and EMPr template and reflects all project activities applied for.

2.2. DESCRIPTION OF THE PROPOSED PROJECT

Mining will be conducted by opencast methods, using truck and shovel lateral rollover mining technique. A competent mining contractor will be contracted to conduct the opencast mining at the proposed Roodepoort Colliery II opencast mining permit area.

Access to the opencast will be via a ramp to the initial box cut. The ROM coal will be transported by truck via roads.

The soft overburden will be removed by mechanical methods. The hard overburden will be drilled, blasted and then removed by mechanical methods. The materials will be drilled and blasted prior to removal. Replacement of overburden material into the mining pit will be according to the following sequence:



Surface infrastructure that will be constructed includes, box-cut for the opencast mining activities, overburden material stockpiles. Coal from Roodepoort Colliery II will be transported directly to clients for further processing. Water from the pit will captured in an in-pit sump and water from the sump will be used for dust suppression. Where the in-pit sump is not sufficient enough to temporary store water; as an alternative, a pollution control dam will be constructed on surface to store water from the opencast pit.

These activities will be undertaken on a portion of portion 6 of the farm Roodepoort 439 JR.

Table 3: Proposed Roodepoort Colliery II Listed Activities.

NAME OF ACTIVITY (E.g. For prospecting - drill site, site camp, ablution facility, accommodation, equipment storage, sample storage, site office, access route etc…etc…etc E.g. for mining, - excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors,etc…etc…etc.)	**Aerial extent of the Activity Ha or m²**	**LISTED ACTIVITY (Mark with an X where applicable or affected).**	**APPLICABLE LISTING NOTICE (GNR 983, GNR 984 or GNR 985)**
Excavations Blasting Stockpiles Dam Loading Hauling and transport Water supply boreholes Mobile offices Ablution Workshops Crushing and screening plant Stormwater control Berms Roads Pipelines	5 ha	Activity 21	GNR 983
The clearance of an area of 5 hectare for mining	5 ha	Activity 27	GNR 983

2.2.1. Target Minerals

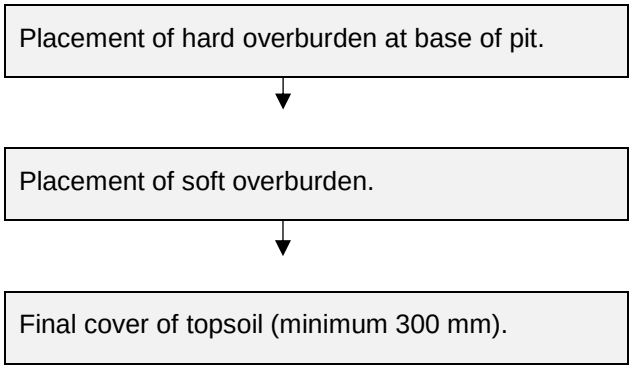
Coal and Pseudocoal

2.2.2. Mining Method Used at the Roodepoort Colliery II Area

Mining will be conducted by opencast methods, using truck and shovel lateral rollover mining technique. A competent mining contractor will be contracted to conduct the opencast mining at the proposed Roodepoort Colliery II opencast area.

Access to the opencast will be via a ramp to the initial box cut. The ROM coal will be transported by truck via roads.

The soft overburden will be removed by mechanical methods. The hard overburden will be drilled and blasted and then removed by mechanical methods. Coal and pseudocoal will be drilled and blasted prior to removal. Replacement of overburden material into the mining pit will be according to the following sequence:



2.2.3. Planned Life of Project

The current estimated life of the proposed Roodepoort Colliery II is 2 years (24 months).

2.3. ROODEPOORT COLLIERY II SURFACE INFRASTRUCTURE DESCRIPTION

2.3.1. Access

There is a good network of tarred roads connecting to unnamed gravel roads from the mine with surrounding towns. Access to the mine is via a network of unnamed farm roads connecting to R573 north of the area and to R568 west of the area.

2.3.2. Power Generation

Diesel powered vehicles and machinery will be used for the proposed project.

2.3.3. Water Supply Infrastructure

Water will be required at the proposed mining permit area for the purpose of supplying potable water and for dust suppression. Water will be sourced from the borehole or via a water supplier for portable water whereas dust suppression water will be obtained from the pit. Alternatively, water may be sourced from the Local Municipality.

2.3.4. Stockpiling facilities

Stockpiling facilities includes overburden stockpiles (Hards and Softs), topsoil stockpile and an R.O.M facility.

2.3.5. Workshops and Buildings

Mobile office containers will be utilised. All machinery will be maintained at an offsite workshop. Should emergency repairs be required the repairs will be conducted on site on areas covered with tarpaulins.

Mobile office containers will be utilised. All machinery will be maintained at an offsite workshop. Should emergency repairs be required the repairs will be conducted on site on areas covered with tarpaulins.

Refer to Figure 4 for the infrastructure layout plan and Figure 5 for box-cuts' layout plan

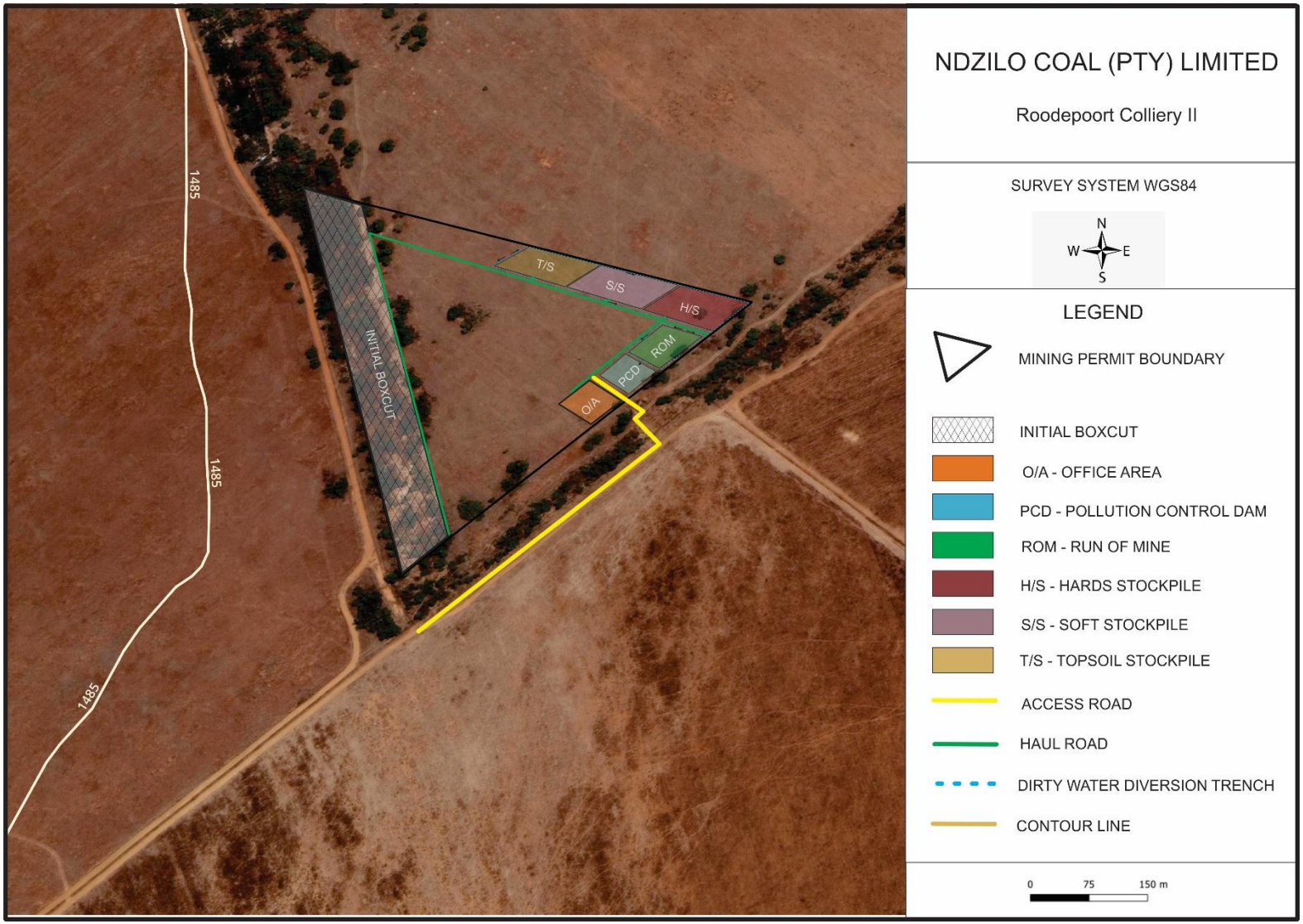


Figure 4: Surface layout plan, see attached **Appendix C** for an A3 format.

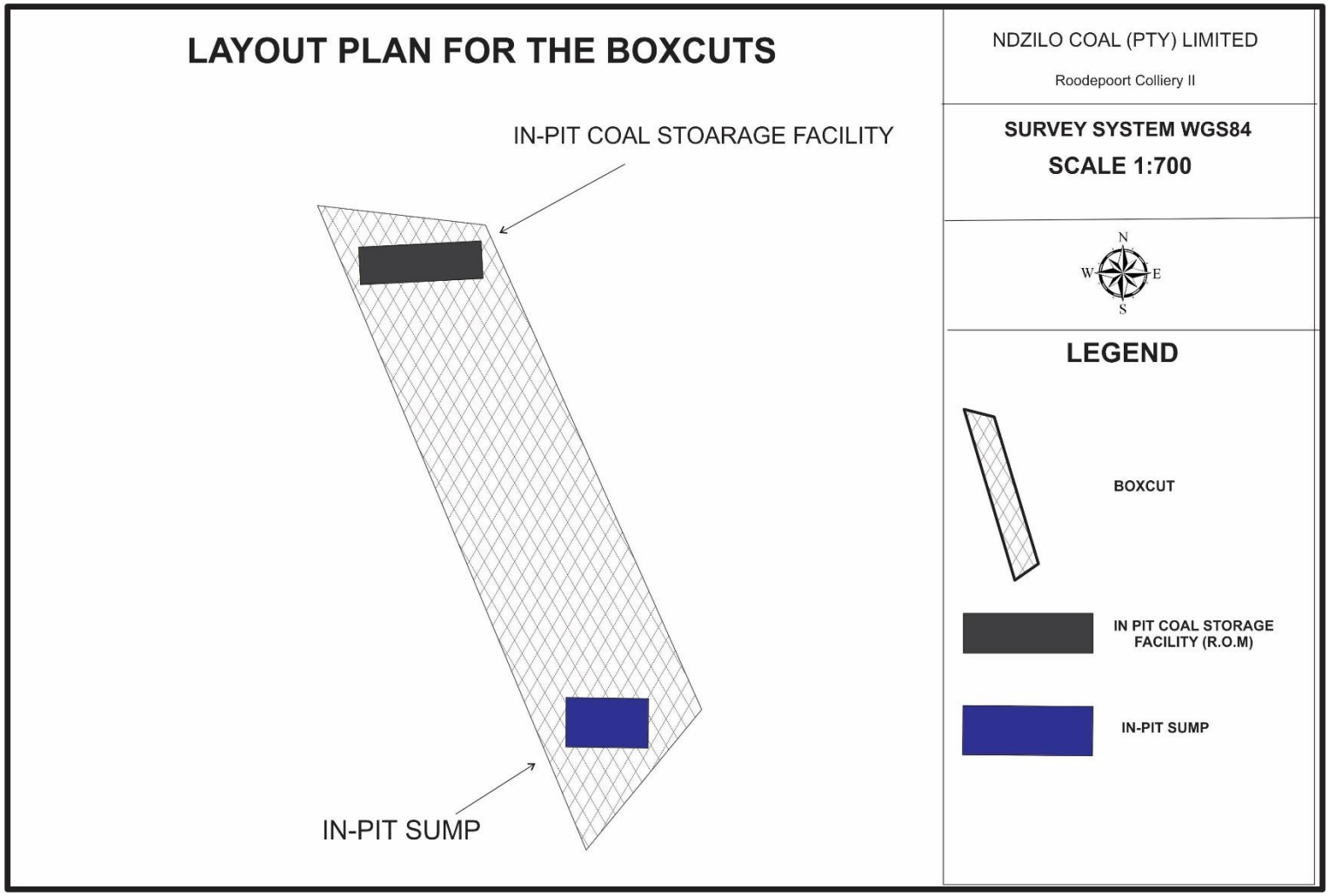


Figure 5: Layout plan for the boxcut.

2.3.6. Waste Management

2.3.6.1. Waste Identification and Management

The proposed mining operation will generate the following waste types i.e.: electronic waste, hazardous waste, general waste, recyclable waste and sewage waste. A waste management procedure will be compiled and implemented by the mine, which will ensure that a waste inventory that may contain all waste including waste not indicated in section of the report is compiled and filed.

Hazardous Waste

Hazardous waste is any waste that contains elements or compounds that may have a detrimental impact on health and the environment if not disposed or handled correctly. This waste generally consists of oil, grease, chemicals, paints, their containers and any materials/substances contaminated by these.

General Waste

This is waste that does not contain any hazardous materials. Note that domestic waste, which will be generated from the proposed project, is considered as general waste. Domestic waste includes plastics, discarded food waste, cans, cardboard and packaging, polystyrene, building rubble, etc.

Electronic Waste

This waste includes products nearing the end of their "useful life" and may include computers, VCR's radio's, copiers and fax machines and telephones.

Recyclable Waste

This waste include material that is collected on the mine for reselling, re-use or recycling purposes. Recyclable materials are divided into the following:

- Scrap metals;
- Papers;
- Used printer cartridges etc.

2.3.6.2. Waste Management Facilities

Hazardous Waste

Hydrocarbon waste will be collected in drums for storage. The removal of the drums or any other appropriate receptacle will be undertaken by a waste disposal company, for disposal at a registered licensed waste disposal site. The drums will be placed on protected concreted ground. Chemical toilets will be used for the management of sewage waste generated on site and will be maintained by a suitable contractor. Skips will be used to temporary store scrap materials and a reputable scrap collector will deployed to collect scrap.

General Waste

The general waste that will be generated is domestic waste and will be collected in drums and disposed of at a registered domestic waste disposal site.

2.3.7. Roodepoort Colliery II Method Statement

In terms of the DMRE BAR and EMPR template, Ndzilo Coal (Pty) Limited must describe the methods and technology to be employed for the proposed project. In view of the above, a method statement for each phase of the proposed project has been provided. This identifies all actions, activities or processes associated with the proposed mining operation.

2.3.8. Construction Phase

The following mine surface infrastructures will be established, namely:

- Access and haul roads
- Office containers
- In-pit Sump
- Material stockpiles (topsoil, softs, hards and ROM)
- Box-cut

2.3.9. Operational Phase

During the operational phase, coal and pseudocoal will be mined in a systematic manner to remove the available coal seams. All overburden material removed will be stockpiled in such a manner that concurrent rehabilitation can be undertaken by replacing the said material in the correct sequence into the mined-out cuts.

Water Pollution Management Facilities

Roodepoort Colliery II will operate on the strategy of maximising the utilisation of “dirty water” in the mining area and will have a policy of zero discharge of contaminated water. The water accumulated in the pit will be pumped into the sump. The water from the in-pit sump and the pit will be utilised to suppress dust in areas where dust may emanate. Where the in-pit sump is not sufficient enough to store water, as an alternative, a pollution control dam will be constructed on surface to store water from the opencast pit. Furthermore, a sump collecting water around the stockpiling area will be developed, this sump will be operated empty and will be kept dry, water from this sump will be utilized for dust suppression.

Potable water Plant

There will be no potable water treatment plant at Roodepoort Colliery II. Drinking water will be obtained from the nearby water supplier or borehole.

Transport

Mine officials and senior skilled employees will use their own vehicles for all transport requirements. Where necessary a bus services will be made available to transport other employees from their residences to their working place. Normal light delivery vehicles will be utilised to transport employees to the opencast mining areas.
A number of haul roads will be constructed around the mine for the transportation of coal from the opencast areas and coal from the pit will be transported by trucks.

Housing

No houses or hostels will be established on the mining areas.

Storm water management

Overburden material will be used as berms to divert storm water away from the mining areas. Roodepoort Colliery II will practice a policy of clean and dirty water separation where dirty water is contained and stored in the in-pit sump and the sump in the stockpiling area and this water will be re-used for dust suppression.

2.3.10. Decommissioning phase

Infrastructure areas

The retention or demolition of mine infrastructure presents a significant cost and should be considered at the purchasing and planning stages. The market value of infrastructure will change over the life of the operation and the degree to which the infrastructure is maintained during the operational period should reflect the intended post-closure use. The decommissioning phase should be considered during upgrades of mine infrastructure, with the aim to remove upon closure. The following should be available during decommissioning of infrastructure:

- A list of the areas and mine infrastructure that require decommissioning;
- A description of strategy, timing, and the techniques preferred to remove and dispose of mine's infrastructure;
- Consultation with Interested and Affected Parties in regards to retention of mine's infrastructure.

Monitoring and reporting

The water quality monitoring program will be continued, until it can be shown that water quality (surface and groundwater) is both stable and within acceptable guidelines and limits, as determined by the relevant State Departments. Frequency of monitoring will remain monthly for the surface water monitoring points and three monthly for groundwater monitoring points for the first three years after closure. Thereafter, the frequency for surface water monitoring points will decrease to 3-monthly and the groundwater monitoring points to 6-monthly. This will again be reviewed after a further 2 years.

Long term stability

Rehabilitation will be ongoing during the operational phase. The shaping of the pits will allow for the re-establishment of natural runoff patterns.

2.3.11. Final Rehabilitation

No roads will remain in place after the decommissioning phase. Note that the access and haul roads will be graded during this phase, in order to remove any fine carbonaceous material build-up on the roads during mining activities. The said roads will then be ripped to the depth of 300 mm, at 90° to the inherent slope, and seeded with a recommended seed mix. Any carbonaceous material removed from the said roads will be dumped in the final void before the said voids are leveled. After leveling the said voids, the areas will be seeded and conform to the rest of the rehabilitated areas.

2.3.12. After Closure Phase

The rehabilitated area will be monitored until closure of the site. After the decommissioning of the site and if it can be determined that the site is stable, an environmental authorisation for the decommissioning of the site and a closure certificate will be applied for in terms of the relevant laws.

SECTION THREE

Policy and legislative context

3. POLICY AND LEGISLATIVE CONTEXT

3.1. CONSTITUTION OF THE REPUBLIC OF SOUTH AFRICA (ACT NO. 108 OF 1996)

Section 24 of the Constitution of the Republic of South Africa (Act No.108 of 1996) states that everyone has the right:

a) to an environment that is not harmful to their health or well-being; and

b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that;

(i) prevent pollution and ecological degradation;

(ii) promote conservation; and

(iii) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.

In terms of Section 24 of the Constitution of the Republic of South Africa (Act No.108 of 1996), everyone has the right to an environment that is not harmful to their health or well-being. In addition, people have the right to have the environment protected, for the benefit of present and future generations, through applicable legislations and other measures that prevent pollution, ecological degradation and promote conservation and secure ecological sustainable development through the use of natural resources while prompting justifiable economic and social development. The needs of the environment, as well as affected parties, should thus be integrated into the overall project in order to fulfil the requirements of Section 24 of the Constitution. In view of the above, a number of laws pertaining to environmental management were promulgated to give guidance on how the principles set out in section 24 of the Constitution of the Republic of South Africa (Act No.108 of 1996) would be met. Below are laws applicable to the proposed project that were promulgated to ensure that section 24 of the Constitution of the Republic of South Africa (Act No.108 of 1996) is complied with.

3.2. NATIONAL ENVIRONMENTAL MANAGEMENT ACT

Section 24(1) of the NEMA states:

“In order to give effect to the general objectives of integrated environmental management laid down in this Chapter [Chapter 5], the potential consequences for or impacts on the environment of listed activities or specified activities must be considered, investigated, assessed and reported on to the competent authority or the Minister of the Department of Mineral Resources, as the case may be, except in respect of those activities that may commence without having to obtain an environmental authorisation in terms of this Act.”

In order to regulate the procedure and criteria as contemplated in Chapter 5 of NEMA relating to the preparation, evaluation, submission, processing and consideration of, and decision on, applications for environmental authorisations for the commencement of activities, subjected to environmental impact assessment, in order to avoid or mitigate detrimental impacts on the environment, and to optimise positive environmental impacts, and for matters pertaining thereto, Regulations (EIA Regulations, 2014) were promulgated. These Regulations took effect from the 4th of December 2014.

In addition to the above, Section 28 of the NEMA includes a general “Duty of Care” whereby care must be taken to prevent, control and remedy the effect of significant pollution and environmental degradation. This section stipulates the importance to protect the environment from degradation and

pollution irrespective of the operations taking places or activities triggered / not triggered under GNR 983, GNR 984 and GNR 985.

In view of the above, an environmental impact assessment is being undertaken to comply with the requirements of the NEMA and the NEMA EIA Regulations, 2014. The NEMA EIA Regulations of December 2014 determines requirements to be met in order to obtain an environmental authorisation. This report has therefore been compiled in compliance with the above regulations.

3.3. NATIONAL ENVIRONMENTAL MANAGEMENT AIR QUALITY ACT

The National Environmental Management: Air Quality Act (Act No.39 of 2004) (NEM: AQA) focuses on reforming the law regulating air quality in South Africa in order to protect the environment through the provision of reasonable measures protecting the environment against air pollution and ecological degradation and securing ecological sustainable development while promoting justifiable economic and social developments. This Act provides national norms and standards regulating air quality management and control by all spheres of government. These include the National Ambient Air Quality Standards (NAAQS) and the National Dust Control Regulations (NDCR). The standards are defined for different air pollutants with different limits based on the toxicity of the pollutants to the environment and humans, number of allowable exceedances and the date of compliance of the specific standard.

On 22 November 2013 the list of activities which result in atmospheric emissions which have or may have a significant detrimental effect on the environment, including health, social conditions, economic conditions, ecological conditions or cultural heritage was published under GN R893 in Governmental Gazette No 37054, in terms of Section 21(1)(b) of the NEM: AQA.

The proposed will not trigger any of the activities listed under the above-mentioned Regulations, however Ndzilo Coal (Pty) Limited must ensure that emissions from their activities complies with the standards as set in the above-mentioned regulations.

3.4. THE NATIONAL HERITAGE RESOURCES ACT

The National Heritage Resources Act (Act No. 25 of 1999) (NHRA) focuses on the protection and management of South Africa's heritage resources. The governing authority for this act is the South African Heritage Resources Agency (SAHRA). In terms of the NHRA, historically important features such as graves, trees, archaeology and fossil beds are protected as well as culturally significant symbols, spaces and landscapes. Section 38 of the NHRA stipulates the requirements a developer must undertake prior to development. In terms of Section 38 of the NHRA, SAHRA can call for a Heritage Impact Assessment (HIA) where certain categories of development are proposed.

A HIA is the process to be followed in order to determine whether any heritage resources are located within the area to be developed as well as the possible impact of the proposed development thereon.

The Act also makes provision for the assessment of heritage impacts as part of an EIA process and indicates that if such an assessment is deemed adequate, a separate HIA is not required.

Measures will be undertaken to ensure that requirements in terms of the HIA are complied with where necessary.

3.5. NATIONAL ENVIRONMENTAL MANAGEMENT BIODIVERSITY ACT (ACT 10 OF 2004) (NEMBA)

The National Environmental Management: Biodiversity Act (Act No. 10 of 2004) (NEMBA) provides for the management and protection of South Africa's biodiversity within the framework established by NEMA. The Act aims to legally provide for biodiversity conservation, sustainable, equitable access and benefit sharing and provides for the management and control of alien and invasive species to prevent

or minimize harm to the environment and indigenous biodiversity. The Act imposes obligations on landowners (state or private) governing alien invasive species as well as regulates the introduction of genetically modified organisms. The Act encourages the eradication of alien species that may harm indigenous ecosystems or habitats. The NEMBA ensures that provision is made by the site developer to remove any aliens which have been introduced to the site or are present on the site.

The NEMBA also provides for listing of threatened or protected ecosystems, in one of four categories: critically endangered, endangered, vulnerable or protected. The purpose of listing protected ecosystems is primarily to conserve sites of exceptionally high conservation value.

The Act supports South Africa's obligations under sanctioned international agreements regulating international trade in specimens of endangered species, and ensures that the utilization of biodiversity is managed in an ecological sustainable way.

The BAR and EMPR has been complied to ensure that all applicable requirements prescribed in the NEMBA are complied with.

3.6. MPUMALANGA NATURE CONSERVATION ACT (ACT 10 OF 1998)

The Mpumalanga Nature Conservation Act, No. 10 of 1998, aims to consolidate and amend the laws relating to nature conservation within the province and to provide for matters connected therewith. Provincial legislation relevant to biodiversity conservation comprises of two Provincial Acts, the Mpumalanga Nature Conservation Act (Act 10 of 1998) and the Mpumalanga Tourism and Parks Agency Act (Act 5 of 2005). In relation to nature conservation, the province has developed the Mpumalanga Biodiversity Sector Plan (MBSP). This plan has been jointly developed by the Mpumalanga Tourism and Parks Agency (MTPA) and the Department of Agriculture, Rural Development, Land and Environmental Affairs (DARDLEA). The MBSP takes its mandate from the South African Constitution, the National Biodiversity Act (10 of 2004) and the Mpumalanga Nature Conservation Act 10 of 1998. Areas identified under the MBSP as sensitive were identified and where applicable measures will be proposed for ensuring that the areas are not degrade by the proposed project activities.

3.7. MINERAL AND PETROLEUM RESOURCES DEVELOPMENT ACT (MPRDA): ACT 28 OF 2002

The Department of Mineral Resources and Energy (DMRE) is responsible for regulating the mining and minerals industry to achieve equitable access to the country's resources and contribute to sustainable development. The Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002) (MPRDA) requires that an EIA be conducted and that the EMP be drafted for the mitigation of impacts identified during the environmental impact assessment for a mining project. During December 2014, the "One Environmental System" was implemented by Government which initiated the streamlining of the licensing processes for mining, environmental authorisations and water use. Under the One Environmental System, The Minister of Mineral Resources, will issue environmental authorisations in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) for mining and related activities. The Minister of Environmental Affairs will be the appeal authority for these authorisations. In view of the above the application for the environmental authorisation for the proposed project was submitted to the Department of Mineral Resources as the competent authority.

3.8. NATIONAL WATER ACT (NWA): ACT NO. 36 OF 1998

The National Water Act (Act No. 36 of 1998) (NWA) is the primary regulatory legislation, controlling and managing the use of water resources as well as the pollution thereof in South Africa. The NWA recognises that the ultimate aim of water resource management is to achieve sustainable use of water

for the benefit of all users and that the protection of the quality of water resources is necessary to ensure sustainability of the nation's water resources in the interests of all water users. The NWA presents strategies to facilitate sound management of water resources, provides for the protection of water resources, and regulates use of water by means of Catchment Management Agencies, Water User Associations, Advisory Committees and International Water Management. The National Government has overall responsibility for and authority over water resource management, including the equitable allocation and beneficial use of water in the public interest. Further, an industry can only be entitled to use water if the use is permissible under the NWA. The enforcing authority on water users is the Department of Water and Sanitation (DWS).

Further, Regulation 704 of the NWA deals with the control and use of water for mining and related activities aimed at the protection of water resources.

Measures will be undertaken to ensure that requirements in terms of the NWA and the GN 704 are complied with where necessary.

3.9. NATIONAL ENVIRONMENTAL MANAGEMENT: WASTE ACT (ACT NO. 59 OF 2008)

The National Environmental Management: Waste Act (NEMWA) requires that all waste management activities must be licensed. According to Section 44 of the NEMWA, the licensing procedure must be integrated with an EIA process in terms of the NEMA.

The objectives of NEMWA involve the protection of health, wellbeing and the environment. The NEMWA provides measures for the minimisation of natural resource consumption, avoiding and minimising the generation of waste, reducing, recycling and recovering waste, and treating and safely disposing of waste.

Measures will be undertaken to ensure that requirements in terms of the NEMWA are complied with where necessary.

3.10. 3.10 EIA GUIDELINES

A number of national and provincial EIA guidelines were published by different departments. These guidelines are mainly aimed at assisting relevant stakeholders by providing information and guidance and giving recommendations on a number of aspects relating to the environmental impact assessment process. The guidelines can be used by the competent authority, applicant and the EAP during the EIA process. It is therefore important that the EAP and the person compiling a specialist report must have relevant expertise when conducting the environmental impact assessments.

A number of guidelines were consulted during the compilation of this report and these include amongst them the following i.e., Guidelines on the Need and Desirability, Department of Environmental Affairs and Tourism Integrated Environmental Management Guidelines, Department of Water and Sanitation's Best Practice Guidelines and the Western Cape Provincial Department of Environmental Affairs and Development Planning Guidelines on Public Participation.

SECTION FOUR

Need and desirability of the proposed activities

4. NEED AND DESIRABILITY OF THE PROPOSED ACTIVITIES

4.1. MOTIVATION FOR THE NEED AND DESIRABILITY OF THE PROJECT

In terms of the EIA Regulations the need and desirability of any development must be considered by the relevant competent authority when reviewing an application. The need and desirability must be included in the reports to be submitted during the environmental authorisation application processes.

The section of the BAR and EMPr will indicate the need and desirability for the approval of the BAR and EMPr for Roodepoort Colliery.

This project is crucial in ensuring that Ndzilo Coal (Pty) Limited maintains job employment and coal production rates at Roodepoort Colliery II to supply the local and the export markets.

Ndzilo Coal (Pty) Limited expects that substantial benefits from the project will accrue to the immediate project area, the sub-region and the province of Mpumalanga. These benefits must be offset against the costs of the project.

The potential benefits of the proposed project are:

- Highly significant benefits to the province of Mpumalanga in terms of the long-term coal supply. Long-term coal supply contracts bring about needed job creation and other local, provincial and national socio-economic benefits.
- Potential reduction in crime as a result of job creation.
- Local growth in the economy of the towns of KwaMhlanga, Loopspruit, Vlaklaagte, Gemsbokspruit, and surrounding areas, and for local businesses.
- Economic benefits for contractors and other suppliers of goods and services.
- Economic opportunities and other potential benefits for land owners from compensation for impacts.

Through the life of mine employees will be developed in terms of skills development and career progression; small businesses will be established and sustained and the mine will support community infrastructure development and poverty eradication.

This BAR recommends that Ndzilo Coal (Pty) Limited, and also its contractors, follow the approach of maximising and enhancing benefits rather than merely focussing on reducing or avoiding negative impacts, and that all opportunities for additional benefits to local land owners be actively pursued.

Based on the environmental assessment conducted as described in this Report, there are no environmental impacts associated with the proposed project that cannot be mitigated.

SECTION FIVE

Motivation for the preferred development footprint

5. MOTIVATION FOR THE PREFERRED DEVELOPMENT FOOTPRINT

5.1. CONSIDERATION OF ALTERNATIVES

The National Environmental Management Act 107 of 1998, Environmental Impact Assessment Regulations, 2014 requires environmental reports (Scoping Report and Environmental Impact Assessment Report) to identify alternatives for projects applied for. In terms of the above-mentioned regulations an alternative in relation to a proposed activity, refers to different means of meeting the general purpose and requirements of the activity, which may include alternatives to the (a) the property on which or location where it is proposed to undertake the activity; (b) the type of activity to be undertaken; (c) the design or layout of the activity; (d) the technology to be used in the activity; (e) the operational aspects of the activity; and (f) the option of not implementing the activity.

Ndzilo Coal (Pty) Limited intends on undertaking an opencast mining operation namely Roodepoort Colliery II. A number of alternatives were considered for the proposed mining operation. This section of the report will highlight the alternatives considered for the mining operation activities at Roodepoort Colliery II.

5.1.1. Location Alternatives

The location of the proposed development is the most suitable due to its ideal location in terms of the requirements for coal mining. Therefore, no alternatives in relation to the location of the mine were considered.

5.1.2. Design/ Layout Alternatives

Site layout alternatives considered include the following i.e.:

Dirty water dams:

Two alternatives were considered i.e., in-pit water storage and surface pollution control dam. Due to space limitation (5 ha mining permit area) the in-pit water storage was decided upon. A pollution control dam will; however, be considered and constructed should the in-pit storage facility not be sufficient for the water generated during mining. The third alternative includes building the PCD outside the mining permit area due to space limitation.

Access:

Two alternatives were considered i.e., expansion of the existing road and constructing a new road. Since the proponent would like to limit their pollution footprint, the existing access road was decided upon. Should permission for using the existing road not be obtained, a new road will be designed and constructed for access to the mining permit area.

Coal stockpiling facility:

Two alternatives were considered i.e., in pit coal storage and surface coal storage. Due to space limitation (5 ha mining permit area) the in-pit coal storage was decided upon. A surface coal storage facility will however be considered and constructed should the in-pit storage facility not be sufficient for the coal generated during mining. The third alternative includes building the coal storage facility outside the mining permit area due to space limitation.

Topsoil and overburden stockpiling facility:

Two alternatives were considered i.e., placing the stockpiling facilities outside the mining permit area and placing the stockpiling facilities inside the mining permit area. Due to space limitation (5 ha mining areas), placing the stockpiling facilities outside the mining permit area was decided upon. Placing stockpiling facilities within the permit area will be considered if the first alternatives is rejected by the competent authority.

5.1.3. Transport Alternatives

In terms of the proposed Roodepoort Colliery II the most viable option to accessing the site will be via unnamed farm roads connecting to R573 north of the area and to R568 west of the area.

5.1.4. No Go Option

Should the project not commence, the following will result i.e.:

The mine will not commence, which will result in the potential labour force losing their employment opportunity and all support that the mine would have provided to the local businesses will also cease.

Roodepoort Colliery II has supply contracts for the type of materials that is available in these reserves, hence should the mine not commence, and the mine will not be able to honour their supply contracts. This will have serious impacts on the ability of the mine continue with their business.

Accordingly, the consequences of not proceeding with the proposed project will have a detrimental impact on the current and future labour force, the surrounding previously disadvantaged communities, the owners of the mine, and the coal export market. This may ultimately have an impact on the region as a whole, due to a loss of revenue and due to a loss in taxes.

5.2. Concluding Statement

Based on the above, the proposed coal and pseudocoal mining operation, situated on a portion of portion 6 of the farm Roodepoort 439 JR with the surface infrastructure placed outside of the 5-ha mining permit boundary and an in-pit water and coal storage facility accessed via the R36 road, is preferred for the proposed mining project.

5.3. Details Of The Public Participation Process Followed and Results Thereof

Public participation is the cornerstone of any EIA process. The principles of the NEMA govern many aspects of EIA's, including public participation. The general objectives of integrated environmental management laid down in the NEMA include to "ensure adequate and appropriate opportunity for public participation in decisions that may affect the environment". The National Environmental Management Principles include the principle that "The participation of all interested and affected parties in environmental governance must be promoted, and all people must have the opportunity to develop the understanding, skills and capacity necessary to achieve equitable and effective participation, and participation by vulnerable and disadvantaged persons must be ensured", which basically means that the person responsible for the application (EAP) must ensure that provision of sufficient and transparent information on an ongoing basis to stakeholders are made to allow them to comment, and to ensure that the participation of previously disadvantaged people like women and the youth are undertaken.

In terms of the EIA Regulations, 2014, when applying for environmental authorisation, the Environmental Assessment Practitioner managing the application must conduct at least a public participation process where all potential or registered interested and affected parties, including the competent authority, are given a period of at least 30 days to submit comments on each of the basic

assessment reports, EMPR, scoping report and environmental impact assessment report, and where applicable the closure plan. In this case a Basic Assessment Report (BAR) is considered.

This section of the BAR and EMPR will give an explanation of the public participation process taken in order to comply with the above-mentioned requirements. A number of public participation guidelines were published in a bid to assist persons responsible for the environmental authorisation applications. As much of the available guidelines were used in determining the public participation process, in guiding the public participation process of the proposed project.

Geovicon Environmental (Pty) Ltd on behalf of Ndzilo Coal (Pty) Limited is applying for an environmental authorisation for the proposed Roodepoort Colliery II. The application for the environmental authorisation is undertaken in terms of the process as laid out in part 2 of Chapter 4 under the NEMA EIA Regulations, 2014. The above-mentioned regulations requires that an applicant for an environmental authorisation submit a BAR and EMPR to the competent authority after having subjected the reports to a public participation process.

In view of the above, a public participation process was initiated for the proposed Roodepoort Colliery II. The public participation process for the proposed project was designed to provide sufficient and accessible information to interested and affected parties (I&APs) in an objective manner to assist them to:

- raise issues of concern and make suggestions for enhanced benefits;
- contribute local knowledge and experience;
- verify that their issues have been captured;
- verify that their issues have been considered in the technical investigations; and
- comment on the findings of the EIA.

The following were conducted in undertaking of the public participation process for the proposed project.

5.3.1. Registration and BAR Phase

The public participation process commenced with the provision of potential Interested and affected parties (I&AP's) 30 days to register as interested and affected parties and to comment on the draft BAR and EMPR.

The registration and commenting process started on the 04th of March 2022 and ended on the 04th of April 2022.

5.3.1.1. Notification of potential interested and affected parties

The following methods of notification were used to notify the potential interested and affected parties of the opportunity to register during the public participation process for the proposed project:

- On the 04th of March 2022, notices were posted in the Mpumalanga press which is distributed around all the towns found near the mining permit area, informing the public that the draft BAR and EMPR is in Phumula library. The notices were compiled in compliance with the requirements of Regulation 41(3) of the EIA Regulations, 2014.
- Written notices were sent to all surface owners and lawful occupiers of the land on which the proposed mining will be undertaken.
- Site notices inviting the public to register as interested and affected parties were also used to invite comments on the draft BAR and EMPR from the public.

- The draft BAR and EMPR was also submitted to all the commenting authorities for their comments.
- A copy of the draft BAR and EMPR was placed in the Phumula library (KwaMhlanga).

5.3.1.2. Registered Interested and Affected Parties

The following are currently registered as interested and affected parties for the Roodepoort Colliery:

- Department of Mineral Resources and Energy, Mpumalanga Regional Office (Competent Authority),
- Department of Water and Sanitation, Mpumalanga Regional Office (Commenting Authority)
- National Department of Agriculture, Forestry and Fisheries, Mpumalanga Regional Office (Commenting Authority)
- Mpumalanga Tourism and Parks Agency (Commenting Authority)
- South African Heritage Resources Agency (Commenting Authority)
- Roodepoort Colliery II, immediate land owners and lawful occupiers
- Ward 10 Councillor (Thembisile Hani)

5.3.1.3. Proof of Consultation

Proof of the above-mentioned consultation and results; thereof, will be included in the final BAR and EMPr.

5.3.1.4. Finalisation of Interested and Affected Party Database

On expiry of registration period, the database of interested and affected parties will be finalised. All parties who indicated the interest of being registered as interested and affected parties will be added to the list of interested and affected parties.

Note: All organs of state, which have jurisdiction in respect of any aspect of the proposed project and the competent authority are automatically registered as interested and affected parties.

5.3.2. Draft Basic Assessment Report

The draft BAR and EMPr is made available for commenting to all relevant stakeholders during the above-mentioned registration phase of the proposed project's public participation process.

5.3.2.1. Comments, Issues and Responses on the Draft Basic Assessment Report

The comments and issues that will be raised by the interested and affected parties will be addressed and included in the final BAR and EMPr.

5.4. ENVIRONMENTAL ATTRIBUTES (BASELINE INFORMATION)

5.4.1. Geology

5.4.1.1. Regional Geology

5.3.1 Geology

The Roodepoort Colliery II area falls within the Witbank Coalfield of the well-known Middle Ecca stage Coal Province. Several coal mines have been, or are operating within this coalfield.

The Roodepoort Colliery II area is situated in close proximity to current small- and large-scale operating collieries, which have an impressive history of exploration and mining activities, associated with them. The geology, sedimentary deposition and mineralogy of the coal seams within the Witbank Coalfield are well understood.

5.3.1.1 Witbank Coalfield

The Witbank coalfield extends The Witbank coalfield extends over a distance of 180 km from Brakpan/Springs in the west to Belfast in the east and about 40 km in a north-south direction. The Witbank Coalfield includes the districts of Benoni, Nigel, Brakpan/Springs, Delmas, Dryden, Bronkhorstspruit, Kendal, Ogies, Witbank, Middelburg, Arnot and Belfast encompassing a surface area of approximately 7 200 km^2. The Witbank Coalfield has a boundary with the Highveld coalfield to the south, the South Rand coalfields to the southwest and the Eastern Transvaal coalfield to the southeast.

The Witbank coalfield is the centre of the coal mining industry in South Africa. It has been mined since the year 1890 and is presently producing more than 50% of the South African coal production, and will remain of great importance for the economy for a considerable time.

The coal seams of the Witbank coalfield are at a shallow depth, with the lowest seam seldom reaching 100 metres in the deepest lying parts of the field. Due to erosion of the sediments, all that remains of the Karoo System in this area is that portion from the lower part of the Middle Ecca Stage to the Dwyka tillite. Within the Witbank coalfield, the Karoo System un-conformably overlays the Witwatersrand System, the Waterberg System and the Bushveld Igneous Complex.

The strata in which the coal seams occur consist predominantly of fine, medium and coarse-grained sandstone with subordinate mudstone, shale, siltstone and carbonaceous shale. Ideally there are seven coal seams with varying degrees of persistence numbered from below as No. 1, No. 2, No. 3, No. 4 lower, No. 4 upper, No. 4 A and No. 5 Seams. See **Error! Reference source not found.**

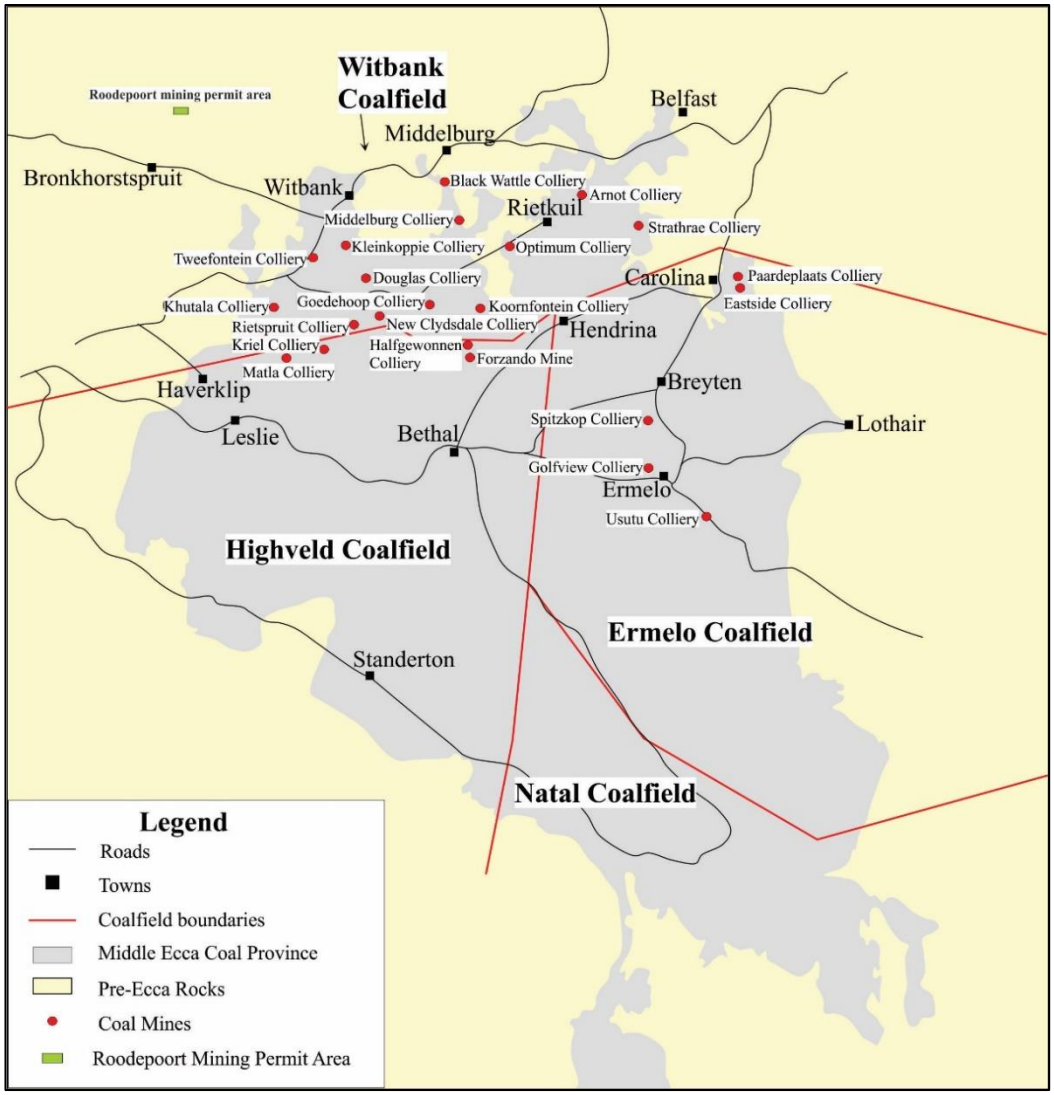


Figure 6: Location of the mining permit area in the identified coalfields of South Africa.

5.4.2. Climate

5.4.2.1. Regional Climate

Roodepoort mining permit area falls within the summer rainfall region of South Africa, in which more than 80% of the annual rainfall occurs from October to March. Eighty five percent of the rain falls during summer thunderstorms occurring every 3 - 4 days in summer. They occur in the form of conventional thunderstorms, are usually of short duration and high intensity and accompanied by lightning, strong winds, and sometimes hail. 68.5.

5.4.2.2. Mean Monthly Rainfall and Evaporation

The mean annual precipitation of the area is shown in the graph below, Figure 7.

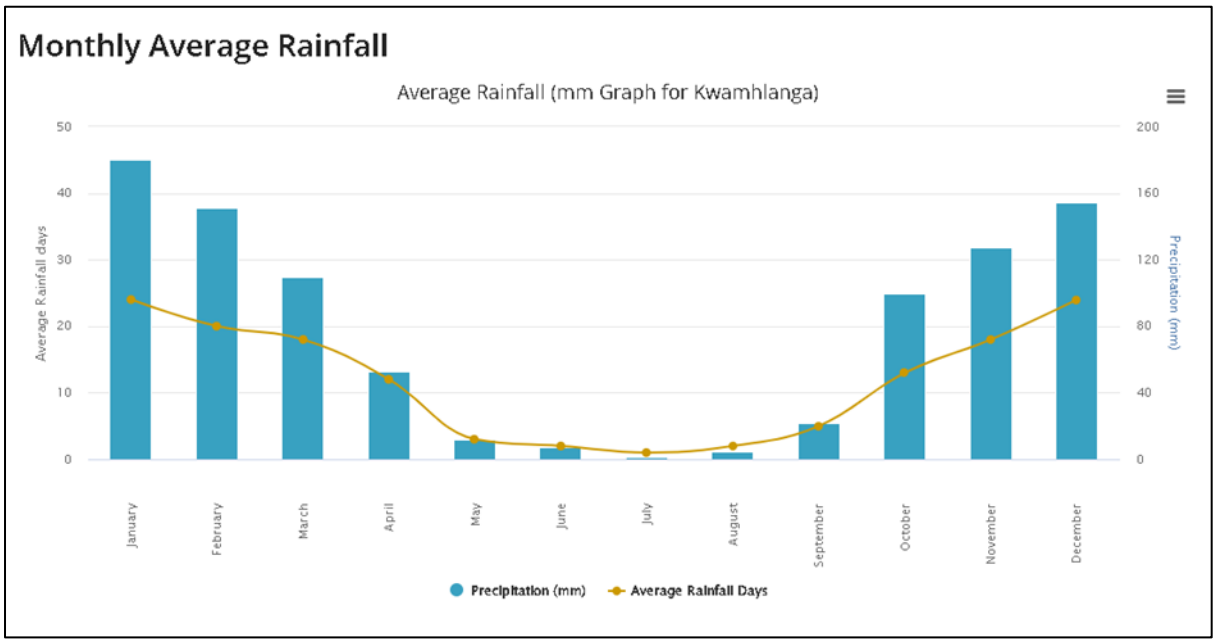


Figure 7: Average rainfall

5.4.2.3. Climatic Water Balance

The mean monthly temperatures, obtained from the World weather online are presented in Table 4.

Table 4: Wettest years between November and April

Month	Day	Night	Rain Days
January	28°C	17°C	24
February	28°C	17°C	20
March	27°C	16°C	18
April	24°C	13°C	12
May	22°C	11°C	3
June	18°C	8°C	2
July	19°C	7°C	1
August	22°C	10°C	2
September	27°C	13°C	5
October	28°C	15°C	13

November	28°C	16°C	18
December	28°C	17°C	24

5.4.3. Extreme weather conditions

The area is prone to host extreme events on a regular basis. These events include the following:

- The area is prone to drought conditions.
- Regular frost occurs during the winter months.
- Rainfall occurs as scattered thunderstorms.
- Strong gusty winds prior to and during thunderstorms.

5.4.4. Topography

The elevation of the surrounding area is relatively flat with height of 1485m above mean sea level (Figure 8). The surrounding area is considered undulating and consists of hills and valleys, often with streams in the valleys and pans in the hills.

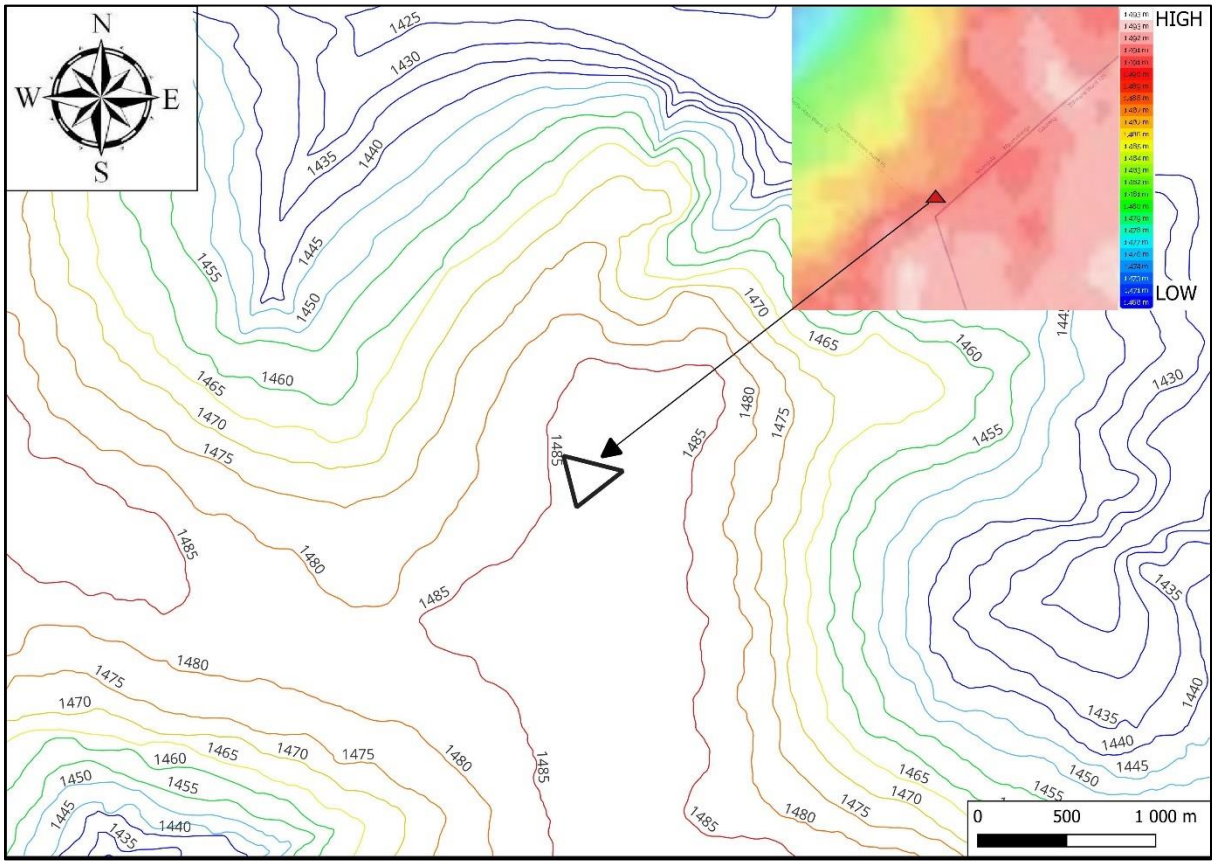


Figure 8: Elevation

5.4.5. Soil

The Roodepoort Colliery II fall within the SVcb 12 Central Sandy Bushveld which is dominated by well-drained, deep Hutton or Clovelly soils often with a catenary sequence from Hutton at the top to Clovelly on the lower slopes; shallow, skeletal Glenrosa soils also occur. Land types mainly Bb, Fa, Ba, Bd and Ac.

Land capability

The land capability classification adopted by the Chamber of Mines (2007) recognises four classes, viz. Class I (wetland), Class II (arable land) Class III (grazing land), and Class IV (wilderness land). The land capability in the Roodepoort Colliery II area falls within Class II.

5.4.6. Land-Use

The land in the area is mainly used for agricultural purposes. Adjacent land is used for mining, limited crop production, grazing and wilderness purposes.

5.4.7. Archaeological and Cultural importance

According to the National Web Based Environmental Screening Tool Report from the Department of fisheries, forestry and environmental, the Roodepoort Colliery II mining permit area falls within the low archaeological and cultural importance.

5.4.8. Agricultural aspect

The adjacent farms are used for crop production; however, the mining project is too insignificant to have detrimental impact on agricultural activities around the area. The mining permit holder must nonetheless implement the mitigation measures recommended in the EMP to avoid impact on surrounding areas.

5.4.9. Natural Vegetation/Plant Life

The vegetation unit in which the proposed Roodepoort Colliery II area falls within, is the "Central Sandy Bushveld" or SVcb 12 vegetation unit/ecosystem in the savanna biome of South Africa and the associated vegetation is listed below:

Important Taxa Tall Trees: *Acacia burkei* (d), *A. robusta*, *Sclerocarya birrea* subsp. *caffra*.

Small Trees: *Burkea africana* (d), *Combretum apiculatum* (d), *C. zeyheri* (d), *Terminalia sericea* (d), *Ochna pulchra, Peltophorum africanum*, *Rhus leptodictya*.

Tall Shrubs: *Combretum hereroense*, *Grewia bicolor*, *G. monticola*, Strychnos pungens.

Low Shrubs: *Agathisanthemum bojeri* (d), *Indigofera filipes* (d), *Felicia fascicularis*, *Gnidia sericocephala.*

Geoxylic Suffrutex: *Dichapetalum cymosum* (d).

Woody Climber: *Asparagus buchananii*.

Graminoids: *Brachiaria nigropedata* (d), *Eragrostis pallens* (d), *E. rigidior* (d), *Hyperthelia dissoluta* (d), *Panicum maximum* (d), *Perotis patens* (d), *Anthephora pubescens*, *Aristida scabrivalvis* subsp. *scabrivalvis*, *Brachiaria serrata*, *Elionurus muticus*, *Eragrostis nindensis*, *Loudetia simplex*, *Schmidtia pappophoroides*, *Themeda triandra*, *Trachypogon spicatus*.

Herbs: *Dicerocaryum senecioides* (d), *Barleria macrostegia*, *Blepharis integrifolia*, *Crabbea angustifolia*, *Evolvulus alsinoides*, *Geigeria burkei*, *Hermannia lancifolia, Indigofera daleoides*, *Justicia anagalloides*, *Kyphocarpa angustifolia*, *Lophiocarpus tenuissimus*, *Waltheria indica*, *Xerophyta humilis*.

Geophytic Herb: *Hypoxis hemerocallidea*.

Succulent Herb*: Aloe greatheadii* var. *davyana.*

Biogeographically Important Taxa (Central Bushveld endemics)

Graminoid: *Mosdenia leptostachys*.

Herb: *Oxygonum dregeanum* subsp. *canescens* var. *dissectum*

5.4.10. Animal life

The proposed Roodepoort Colliery area is situated in the Central Sandy Bushveld ecosystem, therefore the animal species that are likely to occur within the ecosystem, primarily inhabits the bushveld habitat. In accordance with the above-mentioned land uses certain species can occur within and in the surrounding areas of the proposed Roodepoort Colliery area. All animal species lists mentioned in the tables below have been obtained from the web-accessible Virtual Museum Animal Demography Unit. The proposed Roodepoort Colliery area is situated over the 2528DB quarter degree square grid. The tables below represent the possible occurrence of animal species found within the perimeters of the 2528DB quarter degree square grid and is not restricted to the proposed Roodepoort Colliery area.

Table 5: List of Mammals species that occur in the 2528DB quarter degree square grid (Mammal map, Animal Demographic Unit).

	Species code	Family	Scientific name	Common name	Number of Red list category
1	211850	Bovidae	*Aepyceros melampus*	Impala	Least Concern
2	211990	Bovidae	*Alcelaphus buselaphus caama*	Red Hartebeest	Least Concern (2008)
3	212190	Bovidae	*Antidorcas marsupialis*	Springbok	Least Concern (2016)
4	212020	Bovidae	*Connochaetes gnou*	Black Wildebeest	Least Concern (2016)
5	212030	Bovidae	*Connochaetes taurinus*	Blue Wildebeest	Least Concern (ver 3.1, 2017)
6	212040	Bovidae	*Connochaetes taurinus taurinus*		Least Concern (2016)
7	212160	Bovidae	*Damaliscus pygargus phillipsi*	Blesbok	Least Concern (2016)
8	216040	Bovidae	*Kobus ellipsiprymnus*	Waterbuck	Least Concern (ver 3.1, 2016)
9	213120	Bovidae	*Oreotragus oreotragus*	Klipspringer	Least Concern (2016)
10	216020	Bovidae	*Oryx gazella*	Gemsbok	Least Concern (2016)
11	216370	Bovidae	*Redunca arundinum*	Southern Reedbuck	Least Concern (2016)
12	215700	Bovidae	*Sylvicapra grimmia*	Bush Duiker	Least Concern (2016)
13	213850	Bovidae	*Taurotragus oryx*	Common Eland	Least Concern (2016)
14	213860	Bovidae	*Taurotragus oryx oryx*	Cape eland	Least Concern (2016)

15	214120	Bovidae	*Tragelaphus strepsiceros*	Greater Kudu	Least Concern (2016)
16	198600	Canidae	*Canis mesomelas*	Black-backed Jackal	Least Concern (2016)
17	199410	Canidae	*Vulpes chama*	Cape Fox	Least Concern (2016)
18	113300	Cercopithecidae	*Chlorocebus pygerythrus*	Vervet Monkey	Least Concern (2016)
19	114040	Cercopithecidae	*Papio ursinus*	Chacma Baboon	Least Concern (2016)
20	207010	Equidae	*Equus quagga*	Plains Zebra	Least Concern (2016)
21	191660	Felidae	*Caracal caracal*	Caracal	Least Concern (2016)
22	192040	Felidae	*Felis nigripes*	Black-footed Cat	Vulnerable (2016)
23	192800	Felidae	*Leptailurus serval*	Serval	Near Threatened (2016)
24	193900	Felidae	*Panthera pardus*	Leopard	Vulnerable (2016)
25	211830	Giraffidae	*Giraffa giraffa giraffa*	South African Giraffe	Least Concern (2016)
26	127730	Gliridae	*Graphiurus (Graphiurus) murinus*	Forest African Dormouse	Least Concern
27	195840	Herpestidae	*Atilax paludinosus*	Marsh Mongoose	Least Concern (2016)
28	196100	Herpestidae	*Cynictis penicillata*	Yellow Mongoose	Least Concern (2016)
29	197700	Herpestidae	*Suricata suricatta*	Meerkat	Least Concern (2016)
30	197750	Hyaenidae	*Hyaena brunnea*	Brown Hyena	Near Threatened (2015)
31	197770	Hyaenidae	*Proteles cristata*	Aardwolf	Least Concern (2016)
32	151730	Hystricidae	*Hystrix africaeaustralis*	Cape Porcupine	Least Concern
33	158810	Leporidae	*Pronolagus randensis*	Jameson's Red Rock Hare	Least Concern (2016)
34	106400	Macroscelididae	*Elephantulus intufi*	Bushveld Elephant Shrew	Least Concern (2016)

35	106410	Macroscelididae	*Elephantulus myurus*	Eastern Rock Elephant Shrew	Least Concern (2016)
36	182580	Molossidae	*Sauromys petrophilus*	Roberts's Flat-headed Bat	Least Concern (2016)
37	143879	Muridae	*Acomys sp.*	Spiny Mice	
38	144040	Muridae	*Acomys (Acomys) spinosissimus*	Southern African Spiny Mouse	Least Concern
39	145359	Muridae	*Aethomys sp.*	Veld rats	
40	145390	Muridae	*Aethomys ineptus*	Tete Veld Aethomys	Least Concern (2016)
41	217970	Muridae	*Aethomys namaquensis*	Namaqua Rock Mouse	Least Concern
42	218020	Muridae	*Gerbilliscus brantsii*	Highveld Gerbil	Least Concern (2016)
43	218030	Muridae	*Gerbilliscus leucogaster*	Bushveld Gerbil	Least Concern (2016)
44	147110	Muridae	*Lemniscomys rosalia*	Single-Striped Lemniscomys	Least Concern (2016)
45	147479	Muridae	*Mastomys sp.*	Multimammate Mice	
46	147490	Muridae	*Mastomys coucha*	Southern African Mastomys	Least Concern (2016)
47	148270	Muridae	*Mus (Nannomys) minutoides*	Southern African Pygmy Mouse	Least Concern
48	151019	Muridae	*Otomys sp.*	Vlei Rats	
49	151102	Muridae	*Otomys auratus*	Southern African Vlei Rat (Grassland type)	Near Threatened (2016)
50	150360	Muridae	*Rhabdomys pumilio*	Xeric Four-striped Grass Rat	Least Concern (2016)
51	145229	Muridae	*Tatera sp.*		

52	201180	Mustelidae	*Aonyx capensis*	African Clawless Otter	Near Threatened (2016)
53	203170	Mustelidae	*Mellivora capensis*	Honey Badger	Least Concern (2016)
54	136549	Nesomyidae	*Dendromus sp.*	African Climbing Mice	
55	136590	Nesomyidae	*Dendromus melanotis*	Gray African Climbing Mouse	Least Concern (2016)
56	136620	Nesomyidae	*Dendromus mystacalis*	Chestnut African Climbing Mouse	Least Concern (2016)
57	136709	Nesomyidae	*Steatomys sp.*	Fat Mice	
58	136780	Nesomyidae	*Steatomys pratensis*	Common African Fat Mouse	Least Concern (2016)
59	107300	Procaviidae	*Procavia capensis*	Cape Rock Hyrax	Least Concern (2016)
60	168090	Pteropodidae	*Eidolon helvum*	African Straw-colored Fruit Bat	Least Concern (2016)
61	160740	Soricidae	*Crocidura cyanea*	Reddish-gray Musk Shrew	Least Concern (2016)
62	161460	Soricidae	*Crocidura mariquensis*	Swamp Musk Shrew	Near Threatened (2016)
63	162890	Soricidae	*Suncus infinitesimus*	Least Dwarf Shrew	Least Concern (2016)
64	207690	Suidae	*Phacochoerus africanus*	Common Warthog	Least Concern (2016)
65	207740	Suidae	*Potamochoerus larvatus*	Bush-pig	Least Concern (2016)
66	207810	Suidae	*Potamochoerus porcus*	Red River Hog	

Table 6: List of Reptile species that occur in the 2528 DB quarter degree square grid (Reptile Map, Animal Demographic Unit)

#	Species code	Family	Scientific name	Common name	Red list category
1	1570	Agamidae	*Acanthocercus atricollis*	Southern Tree Agama	Least Concern (SARCA 2014)
2	1460	Agamidae	*Agama aculeata distanti*	Distant's Ground Agama	Least Concern (SARCA 2014)
3	1490	Agamidae	*Agama atra*	Southern Rock Agama	Least Concern (SARCA 2014)
4	3700	Amphisbaenidae	*Monopeltis infuscata*	Dusky Worm Lizard	Least Concern (SARCA 2014)
5	4560	Colubridae	*Crotaphopeltis hotamboeia*	Red-lipped Snake	Least Concern (SARCA 2014)
6	4600	Colubridae	*Philothamnus hoplogaster*	South Eastern Green Snake	Least Concern (SARCA 2014)
7	3120	Cordylidae	*Cordylus vittifer*	Common Girdled Lizard	Least Concern (SARCA 2014)
8	3130	Cordylidae	*Smaug vandami*	Van Dam's Girdled Lizard	Least Concern (SARCA 2014)
9	5250	Elapidae	*Elapsoidea sundevallii media*	Highveld Garter Snake	
10	5270	Elapidae	*Naja annulifera*	Snouted Cobra	Least Concern (SARCA 2014)
11	5300	Elapidae	*Naja mossambica*	Mozambique Spitting Cobra	Least Concern (SARCA 2014)
12	580	Gekkonidae	*Chondrodactylus turneri*	Turner's Gecko	Least Concern (SARCA 2014)
13	320	Gekkonidae	*Lygodactylus capensis*	Common Dwarf Gecko	Least Concern (SARCA 2014)
14	370	Gekkonidae	*Lygodactylus nigropunctatus*	Black-spotted Dwarf Gecko	Least Concern (SARCA 2014)
15	400	Gekkonidae	*Lygodactylus ocellatus*	Spotted Dwarf Gecko	Least Concern (SARCA 2014)
16	450	Gekkonidae	*Pachydactylus affinis*	Transvaal Gecko	Least Concern (SARCA 2014)

17	490	Gekkonidae	*Pachydactylus capensis*	Cape Gecko	Least Concern (SARCA 2014)
18	3490	Gerrhosauridae	*Gerrhosaurus flavigularis*	Yellow-throated Plated Lizard	Least Concern (SARCA 2014)
19	1880	Lacertidae	*Pedioplanis lineoocellata lineoocellata*	Spotted Sand Lizard	Least Concern (SARCA 2014)
20	4130	Lamprophiidae	*Aparallactus capensis*	Black-headed Centipede-eater	Least Concern (SARCA 2014)
21	4260	Lamprophiidae	*Atractaspis bibronii*	Bibron's Stiletto Snake	Least Concern (SARCA 2014)
22	4320	Lamprophiidae	*Boaedon capensis*	Brown House Snake	Least Concern (SARCA 2014)
23	4380	Lamprophiidae	*Lycodonomorphus rufulus*	Brown Water Snake	Least Concern (SARCA 2014)
24	4400	Lamprophiidae	*Lycophidion capense capense*	Cape Wolf Snake	Least Concern (SARCA 2014)
25	5050	Lamprophiidae	*Prosymna sundevallii*	Sundevall's Shovel-snout	Least Concern (SARCA 2014)
26	4910	Lamprophiidae	*Psammophis brevirostris*	Short-snouted Grass Snake	Least Concern (SARCA 2014)
27	4960	Lamprophiidae	*Psammophylax rhombeatus*	Spotted Grass Snake	Least Concern (SARCA 2014)
28	4540	Lamprophiidae	*Pseudaspis cana*	Mole Snake	Least Concern (SARCA 2014)
29	4070	Pythonidae	*Python natalensis*	Southern African Python	Least Concern (SARCA 2014)
30	2520	Scincidae	*Panaspis wahlbergii*	Wahlberg's Snake-eyed Skink	Least Concern (SARCA 2014)
31	2450	Scincidae	*Trachylepis punctatissima*	Speckled Rock Skink	Least Concern (SARCA 2014)
32	2510	Scincidae	*Trachylepis sp. (Transvaal varia)*	Skink sp. 1	

33	2480	Scincidae	*Trachylepis varia sensu lato*	Common Variable Skink Complex	Least Concern (SARCA 2014)
34	8710	Scincidae	*Trachylepis varia sensu stricto*	Common Variable Skink	
35	5540	Testudinidae	*Stigmochelys pardalis*	Leopard Tortoise	Least Concern (SARCA 2014)
36	3910	Typhlopidae	*Afrotyphlops bibronii*	Bibron's Blind Snake	Least Concern (SARCA 2014)
37	1220	Varanidae	*Varanus albigularis albigularis*	Rock Monitor	Least Concern (SARCA 2014)
38	1230	Varanidae	*Varanus niloticus*	Water Monitor	Least Concern (SARCA 2014)
39	5410	Viperidae	*Bitis arietans arietans*	Puff Adder	Least Concern (SARCA 2014)
40	5390	Viperidae	*Causus rhombeatus*	Rhombic Night Adder	Least Concern (SARCA 2014)

Table 7: List of Butterfly and Moth species that occur in the 2528DB quarter degree square grid (Lepi map, Animal Demographic Unit).

#	**Species code**	**Family**	**Scientific name**	**Common name**	**Red list category**
1	400000		ORDER LEPIDOPTERA	Unidentifiable Lepidoptera	
2	633100	CRAMBIDAE	*Spoladea recurvalis*		
3	520200	EREBIDAE	*Anoba sp.*		
4	522020	EREBIDAE	*Chalciope delta*		
5	522710	EREBIDAE	*Cyligramma latona*		
6	522890	EREBIDAE	*Dysgonia angularis*		
7	522950	EREBIDAE	*Dysgonia derogans*		
8	524330	EREBIDAE	*Grammodes sp.*		
9	524520	EREBIDAE	*Grammodes stolida*		
10	526210	EREBIDAE	*Mocis mutuaria*		
11	517070	EREBIDAE	*Secusio strigata*		

12	655240	EREBIDAE	*Trigonodes exportata*		
13	517850	EREBIDAE	*Utetheisa pulchella*		
14	555940	EUPTEROTIDAE	*Jana tantalus*		
15	543700	GEOMETRIDAE	*Chiasmia sp.*		
16	544825	GEOMETRIDAE	*Chiasmia simplicilinea*	Oblique Peacock	
17	540900	GEOMETRIDAE	*Conolophia conscitaria*		Not Threatened (NT) [not an IUCN category]
18	549540	GEOMETRIDAE	*Isturgia sp.*		
19	659190	GEOMETRIDAE	*Mimoclystia pudicata*		
20	550490	GEOMETRIDAE	*Nassinia sp.*		
21	550540	GEOMETRIDAE	*Nassinia caffraria caffraria*		Not Threatened (NT) [not an IUCN category]
22	550590	GEOMETRIDAE	*Nassinia pretoria*		Not Threatened (NT) [not an IUCN category]
23	634880	GEOMETRIDAE	*Rhodometra sacraria*		Not Threatened (NT) [not an IUCN category]
24	468180	HESPERIIDAE	FAMILY HESPERIIDAE	Unidentified HESPERIIDAE	
25	472101	HESPERIIDAE	*Afrogegenes sp.*		
26	472120	HESPERIIDAE	*Afrogegenes letterstedti*	Brown dodger	Least Concern (SABCA 2013)
27	472310	HESPERIIDAE	*Borbo detecta*	Rusty swift	Least Concern (SABCA 2013)
28	468380	HESPERIIDAE	*Coeliades pisistratus*	Two-pip policeman	Least Concern (SABCA 2013)
29	472170	HESPERIIDAE	*Gegenes pumilio gambica*	Dark dodger	Least Concern (SABCA 2013)
30	473000	HESPERIIDAE	*Kedestes lepenula*	Chequered ranger	Least Concern (SABCA 2013)

31	473010	HESPERIIDAE	*Kedestes macomo*	Macomo ranger	Least Concern (SABCA 2013)
32	473090	HESPERIIDAE	*Kedestes nerva nerva*	Magaliesberg ranger	Least Concern (SABCA 2013)
33	473210	HESPERIIDAE	*Kedestes wallengrenii wallengrenii*	White-streaked ranger	Least Concern (SABCA 2013)
34	471640	HESPERIIDAE	*Metisella meninx*	Marsh sylph	Least Concern (SABCA 2013)
35	471860	HESPERIIDAE	*Metisella willemi*	Netted sylph	Least Concern (SABCA 2013)
36	472200	HESPERIIDAE	*Parnara monasi*	Water watchman	Least Concern (SABCA 2013)
37	472510	HESPERIIDAE	*Pelopidas sp.*		
38	472520	HESPERIIDAE	*Pelopidas mathias*	Black-branded swift	Least Concern (SABCA 2013)
39	472530	HESPERIIDAE	*Pelopidas thrax*	White-branded swift	Least Concern (SABCA 2013)
40	476710	HESPERIIDAE	*Platylesches sp.*		
41	476730	HESPERIIDAE	*Platylesches ayresii*	Peppered hopper	Least Concern (SABCA 2013)
42	476780	HESPERIIDAE	*Platylesches dolomitica*	Spring hopper	Least Concern (SABCA 2013)
43	476880	HESPERIIDAE	*Platylesches neba*	Flower-girl hopper	Least Concern (SABCA 2013)
44	470760	HESPERIIDAE	*Sarangesa phidyle*	Small elfin	Least Concern (SABCA 2013)
45	471170	HESPERIIDAE	*Spialia ferax*	Striped sandman	Least Concern (SABCA 2013)
46	471240	HESPERIIDAE	*Spialia mafa mafa*	Mafa sandman	Least Concern (SABCA 2013)
47	471340	HESPERIIDAE	*Spialia spio*	Mountain sandman	Least Concern (SABCA 2013)

48	472560	HESPERIIDAE	*Tsitana tsita*	Dismal sylph	Least Concern (SABCA 2013)
49	585470	LIMACODIDAE	*Caffricola cloeckneria*		
50	464690	LYCAENIDAE	*Actizera lucida*	Rayed blue	Least Concern (SABCA 2013)
51	458870	LYCAENIDAE	*Aloeides aranda*	Yellow russet	Least Concern (SABCA 2013)
52	459570	LYCAENIDAE	*Aloeides taikosama*	Dusky russet	Least Concern (SABCA 2013)
53	460430	LYCAENIDAE	*Anthene amarah amarah*	Black-striped ciliate blue	Least Concern (SABCA 2013)
54	460620	LYCAENIDAE	*Anthene definita definita*	Steel-blue-ciliate blue	Least Concern (SABCA 2013)
55	459950	LYCAENIDAE	*Aphnaeus hutchinsonii*	Hutchinson's high-flier	Least Concern (SABCA 2013)
56	458480	LYCAENIDAE	*Axiocerses sp.*		
57	458500	LYCAENIDAE	*Axiocerses amanga amanga*	Bush scarlet	Least Concern (SABCA 2013)
58	458810	LYCAENIDAE	*Axiocerses tjoane tjoane*	Eastern scarlet	Least Concern (SABCA 2013)
59	464800	LYCAENIDAE	*Azanus jesous*	Topaz babul blue	Least Concern (SABCA 2013)
60	464820	LYCAENIDAE	*Azanus moriqua*	Black-bordered babul blue	Least Concern (SABCA 2013)
61	463730	LYCAENIDAE	*Cacyreus virilis*	Mocker bronze	Least Concern (SABCA 2013)
62	466030	LYCAENIDAE	*Chilades trochylus*	Grass jewel blue	Least Concern (SABCA 2013)
63	458220	LYCAENIDAE	*Cigaritis mozambica*	Mozambique silverline	Least Concern (SABCA 2013)
64	458270	LYCAENIDAE	*Cigaritis natalensis*	Natal silverline	Least Concern (SABCA 2013)

65	458320	LYCAENIDAE	*Cigaritis phanes*	Silvery silverline	Least Concern (SABCA 2013)
66	456870	LYCAENIDAE	*Crudaria leroma*	Silver-spotted grey	Least Concern (SABCA 2013)
67	463090	LYCAENIDAE	*Cupidopsis cissus cissus*	Meadow blue	Least Concern (SABCA 2013)
68	454470	LYCAENIDAE	*Deudorix antalus*	Brown playboy	Least Concern (SABCA 2013)
69	465010	LYCAENIDAE	*Eicochrysops messapus mahallakoaena*	Cupreous ash blue	Least Concern (SABCA 2013)
70	465240	LYCAENIDAE	*Euchrysops dolorosa*	Sabie smoky blue	Least Concern (SABCA 2013)
71	454150	LYCAENIDAE	*Hypolycaena philippus philippus*	Purple-brown hairstreak	Least Concern (SABCA 2013)
72	451580	LYCAENIDAE	*Iolaus alienus alienus*	Brown-line sapphire	Least Concern (SABCA 2013)
73	453100	LYCAENIDAE	*Iolaus trimeni*	Protea sapphire	Least Concern (SABCA 2013)
74	463230	LYCAENIDAE	*Lampides boeticus*	Pea blue	Least Concern (SABCA 2013)
75	467230	LYCAENIDAE	*Lepidochrysops patricia*	Patrician giant cupid	Least Concern (SABCA 2013)
76	467330	LYCAENIDAE	*Lepidochrysops plebeia plebeia*	Twin-spot giant cupid	Least Concern (SABCA 2013)
77	454380	LYCAENIDAE	*Leptomyrina henningi henningi*	Plain black-eye	Least Concern (SABCA 2013)
78	463950	LYCAENIDAE	*Leptotes sp.*		
79	464050	LYCAENIDAE	*Leptotes pirithous pirithous*	Common zebra blue	Least Concern (SABCA 2013)
80	451070	LYCAENIDAE	*Myrina silenus ficedula*	Common fig tree blue	Least Concern (SABCA 2013)
81	463170	LYCAENIDAE	*Pseudonacaduba sichela sichela*	Dusky line blue	Least Concern (SABCA 2013)

82	453590	LYCAENIDAE	*Stugeta bowkeri tearei*	Bowker's marbled sapphire	Least Concern (SABCA 2013)
83	464490	LYCAENIDAE	*Tarucus sybaris sybaris*	Dotted pierrot	Least Concern (SABCA 2013)
84	464170	LYCAENIDAE	*Tuxentius calice*	White pie	Least Concern (SABCA 2013)
85	464330	LYCAENIDAE	*Tuxentius melaena melaena*	Black pie	Least Concern (SABCA 2013)
86	454520	LYCAENIDAE	*Deudorix dinochares*	Apricot playboy	Least Concern (SABCA 2013)
87	464560	LYCAENIDAE	*Zintha hintza hintza*	Hintza pierrot	Least Concern (SABCA 2013)
88	464605	LYCAENIDAE	*Zizeeria knysna knysna*	African grass blue	Least Concern (SABCA 2013)
89	464720	LYCAENIDAE	*Zizula hylax*	Tiny grass blue	Least Concern (SABCA 2013)
90	506560	NOCTUIDAE	*Agoma trimenii*		
91	410390	NYMPHALIDAE	*Acraea anemosa*	Broad-bordered acraea	Least Concern (SABCA 2013)
92	411660	NYMPHALIDAE	*Acraea caldarena caldarena*	Black-tipped acraea	Least Concern (SABCA 2013)
93	410580	NYMPHALIDAE	*Acraea horta*	Garden acraea	Least Concern (SABCA 2013)
94	411820	NYMPHALIDAE	*Acraea natalica*	Black-based acraea	Least Concern (SABCA 2013)
95	410760	NYMPHALIDAE	*Acraea neobule neobule*	Wandering donkey acraea	Least Concern (SABCA 2013)
96	411830	NYMPHALIDAE	*Acraea oncaea*	Window acraea	Least Concern (SABCA 2013)
97	417970	NYMPHALIDAE	*Brakefieldia perspicua perspicua*	Marsh patroller	Least Concern (SABCA 2013)
98	408530	NYMPHALIDAE	*Byblia ilithyia*	Spotted joker	Least Concern (SABCA 2013)

99	439440	NYMPHALIDAE	*Catacroptera cloanthe cloanthe*	Pirate	Least Concern (SABCA 2013)
100	435220	NYMPHALIDAE	*Charaxes candiope*	Green-veined charaxes	Least Concern (SABCA 2013)
101	433620	NYMPHALIDAE	*Charaxes jahlusa rex*	Pearl-spotted charaxes	Least Concern (SABCA 2013)
102	436040	NYMPHALIDAE	*Charaxes saturnus saturnus*	Foxy charaxes	Least Concern (SABCA 2013)
103	409280	NYMPHALIDAE	*Danaus chrysippus orientis*	African plain tiger	Least Concern (SABCA 2013)
104	432240	NYMPHALIDAE	*Hamanumida daedalus*	Guineafowl	Least Concern (SABCA 2013)
105	439300	NYMPHALIDAE	*Hypolimnas misippus*	Common diadem	Least Concern (SABCA 2013)
106	438280	NYMPHALIDAE	*Junonia hierta cebrene*	Yellow pansy	Least Concern (SABCA 2013)
107	438340	NYMPHALIDAE	*Junonia oenone oenone*	Dark blue pansy	Least Concern (SABCA 2013)
108	438380	NYMPHALIDAE	*Junonia orithya madagascariensis*	African blue pansy	Least Concern (SABCA 2013)
109	415130	NYMPHALIDAE	*Melanitis leda*	Common evening brown	Least Concern (SABCA 2013)
110	420020	NYMPHALIDAE	*Paternympha narycia*	Spotted-eye small ringlet	Least Concern (SABCA 2013)
111	414940	NYMPHALIDAE	*Phalanta phalantha aethiopica*	African leopard	Least Concern (SABCA 2013)
112	438810	NYMPHALIDAE	*Precis archesia archesia*	Garden inspector	Least Concern (SABCA 2013)
113	438840	NYMPHALIDAE	*Precis ceryne ceryne*	Marsh commodore	Least Concern (SABCA 2013)
114	438980	NYMPHALIDAE	*Precis octavia sesamus*	Southern gaudy commodore	Least Concern (SABCA 2013)
115	420150	NYMPHALIDAE	*Stygionympha wichgrafi wichgrafi*	Wichgraf's hillside brown	Least Concern (SABCA 2013)

116	413080	NYMPHALIDAE	*Telchinia burni*	Pale-yellow telchinia	Least Concern (SABCA 2013)
117	413200	NYMPHALIDAE	*Telchinia encedon encedon*	White-barred telchinia	Least Concern (SABCA 2013)
118	414160	NYMPHALIDAE	*Telchinia rahira rahira*	Marsh telchinia	Least Concern (SABCA 2013)
119	413770	NYMPHALIDAE	*Telchinia serena*	Dancing telchinia	Least Concern (SABCA 2013)
120	438050	NYMPHALIDAE	*Vanessa cardui*	Painted lady	Least Concern (SABCA 2013)
121	418400	NYMPHALIDAE	*Ypthima sp.*		
122	418490	NYMPHALIDAE	*Ypthima asterope asterope*	African three-ring	Least Concern (SABCA 2013)
123	418600	NYMPHALIDAE	*Ypthima impura paupera*	Impure three-ring	Least Concern (SABCA 2013)
124	400300	PAPILIONIDAE	*Papilio constantinus constantinus*	Shade swallowtail	Least Concern (SABCA 2013)
125	400530	PAPILIONIDAE	*Papilio demodocus demodocus*	Citrus swallowtail	Least Concern (SABCA 2013)
126	401360	PAPILIONIDAE	*Papilio nireus lyaeus*	Narrow green-banded swallowtail	Least Concern (SABCA 2013)
127	407450	PIERIDAE	*Belenois aurota*	Pioneer caper white	Least Concern (SABCA 2013)
128	407590	PIERIDAE	*Belenois creona severina*	African caper white	Least Concern (SABCA 2013)
129	408170	PIERIDAE	*Belenois zochalia zochalia*	Forest caper white	Least Concern (SABCA 2013)
130	403120	PIERIDAE	*Catopsilia florella*	African migrant	Least Concern (SABCA 2013)
131	403160	PIERIDAE	*Colias electo electo*	African clouded yellow	Least Concern (SABCA 2013)
132	403790	PIERIDAE	*Colotis antevippe gavisa*	Red tip	Least Concern (SABCA 2013)

133	404180	PIERIDAE	*Colotis euippe omphale*	Southern round-winged orange tip	Least Concern (LC)
134	404240	PIERIDAE	*Colotis evagore antigone*	Small orange tip	Least Concern (SABCA 2013)
135	402930	PIERIDAE	*Eurema brigitta brigitta*	Broad-bordered grass yellow	Least Concern (SABCA 2013)
136	405670	PIERIDAE	*Mylothris agathina agathina*	Eastern dotted border	Least Concern (SABCA 2013)
137	403570	PIERIDAE	*Pinacopteryx eriphia eriphia*	Zebra white	Least Concern (SABCA 2013)
138	405610	PIERIDAE	*Pontia helice helice*	Southern meadow white	Least Concern (SABCA 2013)
139	403690	PIERIDAE	*Teracolus eris eris*	Banded gold tip	Least Concern (SABCA 2013)
140	609360	PTEROPHORIDAE	FAMILY PTEROPHORIDAE	Unidentified PTEROPHORIDAE	
141	614410	PYRALIDAE	*Episindris albimaculalis*		
142	621910	SATURNIIDAE	*Epiphora mythimnia*		
143	639470	TINEIDAE	*Ceratophaga vastella*		

Table 8: List of Dungbeetle species that occur in the 2528DB quarter square grid (Dungbettle Map, Animal Demographic Unit).

#	Species code	Family	Scientific name	Common name	Red list category
1	7700150	Scarabaeidae	*Allogymnopleurus thalassinus*		
2	7701060	Scarabaeidae	*Chalconotus convexus*		
3	7701190	Scarabaeidae	*Cleptocaccobius viridicollis*		
4	7701490	Scarabaeidae	*Copris fidius*		
5	7701720	Scarabaeidae	*Copris mesancanthus mesacanthus*		

6	7701730	Scarabaeidae	*Copris mesancanthus transvaalensis*		
7	7701780	Scarabaeidae	*Copris obesus*		
8	7702350	Scarabaeidae	*Eodrepanus fastiditus*		
9	7703780	Scarabaeidae	*Liatongus militaris*		
10	7704090	Scarabaeidae	*Metacatharsius dentinum*		
11	7704870	Scarabaeidae	*Oniticellus egregius*		
12	7705690	Scarabaeidae	*Onthophagus aeruginosus*		
13	7705770	Scarabaeidae	*Onthophagus apiciosus*		
14	7706220	Scarabaeidae	*Onthophagus cribripennis*		
15	7706360	Scarabaeidae	*Onthophagus depressus*		
16	7706540	Scarabaeidae	*Onthophagus fimetarius*		
17	7707410	Scarabaeidae	*Onthophagus obtusicornis*		
18	7707500	Scarabaeidae	*Onthophagus parumnotatus*		
19	7708360	Scarabaeidae	*Onthophagus vinctus*		
20	7708430	Scarabaeidae	*Pachylomera femoralis*		
21	7708680	Scarabaeidae	*Pedaria picea*		
22	7708920	Scarabaeidae	*Phalops wittei*		
23	7709060	Scarabaeidae	*Proagoderus chalcostolus*		
24	7709330	Scarabaeidae	*Proagoderus sapphirinus*		
25	7709500	Scarabaeidae	*Sarophorus latus*		
26	7709549	Scarabaeidae	*Scarabaeus sp.*		
27	7709580	Scarabaeidae	*Scarabaeus (Sceliages) difficilis*		
28	7709610	Scarabaeidae	*Scarabaeus (Sceliages) hippias*		
29	7709650	Scarabaeidae	*Scarabaeus ambiguus*		
30	7709990	Scarabaeidae	*Scarabaeus heqvisti*		
31	7710170	Scarabaeidae	*Scarabaeus nigroaeneus*		

32	7710390	Scarabaeidae	*Scarabaeus rusticus*		
33	7710490	Scarabaeidae	*Scarabaeus subaeneus*		
34	7710630	Scarabaeidae	*Sisyphus alveatus*		
35	7710660	Scarabaeidae	*Sisyphus caffer*		

Table 9: List of Dragonfly and Damselfly species that occur in the 2528DB quarter degree square grid (Odonata Map, Animal Demographic Unit)

#	**Species code**	**Family**	**Scientific name**	**Common name**	**Red list category**
1	664120	Aeshnidae	*Anax ephippiger*	Vagrant Emperor	LC
2	664140	Aeshnidae	*Anax imperator*	Blue Emperor	LC
3	664170	Aeshnidae	*Anax speratus*	(Eastern) Orange Emperor	LC
4	664470	Aeshnidae	*Pinheyschna subpupillata*	Stream Hawker	LC
5	661140	Chlorocyphidae	*Platycypha sp.*	dancing jewels	
6	661180	Chlorocyphidae	*Platycypha caligata*	Dancing Jewel	LC
7	662150	Coenagrionidae	*FAMILY Coenagrionidae*		
8	662290	Coenagrionidae	*Africallagma sp.*	African bluets	
9	662330	Coenagrionidae	*Africallagma glaucum*	Swamp Bluet	LC
10	662410	Coenagrionidae	*Agriocnemis sp.*	wisps	
11	662470	Coenagrionidae	*Agriocnemis falcifera*	White-masked Wisp	LC
12	662530	Coenagrionidae	*Agriocnemis pinheyi*	Pinhey's Wisp	LC
13	662630	Coenagrionidae	*Azuragrion nigridorsum*	Sailing Bluet	LC
14	662720	Coenagrionidae	*Ceriagrion glabrum*	Common Citril	LC
15	663100	Coenagrionidae	*Ischnura senegalensis*	Tropical Bluetail	LC
16	663170	Coenagrionidae	*Proischnura rotundipennis*	Round-winged Bluet	LC
17	663195	Coenagrionidae	*Pseudagrion sp.*		
18	663680	Coenagrionidae	*Pseudagrion assegaii*	Assegai Sprite	LC (Global); VU (RSA)

19	663360	Coenagrionidae	*Pseudagrion gamblesi*	Great Sprite	LC
20	663410	Coenagrionidae	*Pseudagrion hageni*	Painted Sprite	LC
21	663460	Coenagrionidae	*Pseudagrion kersteni*	Powder-faced Sprite	LC
22	663480	Coenagrionidae	*Pseudagrion makabusiense*	Makabusi Sprite	LC (Global); VU (RSA)
23	663820	Coenagrionidae	*Pseudagrion massaicum*	Masai Sprite	LC
24	663560	Coenagrionidae	*Pseudagrion salisburyense*	Slate Sprite	LC
25	663610	Coenagrionidae	*Pseudagrion spernatum*	Upland Sprite	LC
26	664550	Gomphidae	*Ceratogomphus pictus*	Common Thorntail	LC
27	664640	Gomphidae	*Crenigomphus hartmanni*	Clubbed Talontail	LC
28	664830	Gomphidae	*Ictinogomphus ferox*	Common Tigertail	LC
29	665480	Gomphidae	*Notogomphus praetorius*	Yellowjack Longleg	LC
30	665640	Gomphidae	*Onychogomphus supinus*	Lined Claspertail	LC
31	665740	Gomphidae	*Paragomphus cognatus*	Rock Hooktail	LC
32	665780	Gomphidae	*Paragomphus elpidius*	Corkscrew Hooktail	LC
33	660220	Lestidae	*Lestes sp.*	true spreadwings	
34	660410	Lestidae	*Lestes pallidus*	Pallid Spreadwing	LC
35	660360	Lestidae	*Lestes plagiatus*	Highland Spreadwing	LC
36	660300	Lestidae	*Lestes virgatus*	Smoky Spreadwing	LC
37	666750	Libellulidae	*Acisoma inflatum*	Stout Pintail	LC
38	667020	Libellulidae	*Brachythemis lacustris*	Red Groundling	LC
39	667030	Libellulidae	*Brachythemis leucosticta*	Southern Banded Groundling	LC
40	667060	Libellulidae	*Bradinopyga cornuta*	Horned Rockdweller	LC
41	667100	Libellulidae	*Crocothemis sp.*		
42	667130	Libellulidae	*Crocothemis erythraea*	Broad Scarlet	LC
43	667140	Libellulidae	*Crocothemis sanguinolenta*	Little Scarlet	LC

44	667200	Libellulidae	*Diplacodes lefebvrii*	Black Percher	LC
45	667210	Libellulidae	*Diplacodes luminans*	Barbet Percher	LC
46	667220	Libellulidae	*Diplacodes pumila*	Dwarf Percher	LC (Global); EN (RSA)
47	667690	Libellulidae	*Nesciothemis farinosa*	Eastern Blacktail	LC
48	667770	Libellulidae	*Orthetrum sp.*		
49	667780	Libellulidae	*Orthetrum abbotti*	Little Skimmer	LC
50	667860	Libellulidae	*Orthetrum caffrum*	Two-striped Skimmer	LC
51	667900	Libellulidae	*Orthetrum chrysostigma*	Epaulet Skimmer	LC
52	667930	Libellulidae	*Orthetrum hintzi*	Dark-shouldered Skimmer	LC
53	667940	Libellulidae	*Orthetrum icteromelas*	Spectacled Skimmer	LC
54	667950	Libellulidae	*Orthetrum julia*	Julia Skimmer	LC
55	668000	Libellulidae	*Orthetrum machadoi*	Highland Skimmer	LC
56	668030	Libellulidae	*Orthetrum monardi*	Woodland Skimmer	LC
57	668190	Libellulidae	*Palpopleura jucunda*	Yellow-veined Widow	LC
58	668210	Libellulidae	*Palpopleura portia*	Portia Widow	LC
59	668230	Libellulidae	*Pantala flavescens*	Wandering Glider	LC
60	668370	Libellulidae	*Rhyothemis semihyalina*	Phantom Flutterer	LC
61	668420	Libellulidae	*Sympetrum fonscolombii*	Red-veined Darter or Nomad	LC
62	668620	Libellulidae	*Tramea basilaris*	Keyhole Glider	LC
63	668640	Libellulidae	*Trithemis sp.*		
64	668670	Libellulidae	*Trithemis arteriosa*	Red-veined Dropwing	LC
65	668800	Libellulidae	*Trithemis donaldsoni*	Denim Dropwing	LC
66	668870	Libellulidae	*Trithemis dorsalis*	Highland Dropwing	LC
67	668890	Libellulidae	*Trithemis furva*	Navy Dropwing	LC
68	669110	Libellulidae	*Trithemis hecate*	Silhouette Dropwing	LC

69	669120	Libellulidae	*Trithemis kirbyi*	Orange-winged Dropwing	LC
70	669080	Libellulidae	*Trithemis stictica*	Jaunty Dropwing	LC
71	669250	Libellulidae	*Zygonoides fuelleborni*	Southern Riverking	LC
72	669390	Libellulidae	*Zygonyx natalensis*	Blue Cascader	LC
73	669420	Libellulidae	*Zygonyx torridus*	Ringed Cascader	LC
74	666620	Macromiidae	*Phyllomacromia picta*	Darting Cruiser	LC
75	661710	Platycnemididae	*Elattoneura sp.*	African threadtails	
76	661810	Platycnemididae	*Elattoneura glauca*	Common Threadtail	LC
77	661640	Platycnemididae	*Mesocnemis singularis*	Common (Forest/Savanna) Riverjack	LC

Table 10: List of Bird species that occur in the 2530ADU pentad (SABAP 2, Bird Life South Africa).

Ref	Common_group	Common_species	Genus	Species	Status
6	Grebe	Little	*Tachybaptus*	*ruficollis*	
50	Cormorant	Reed	*Microcarbo*	*africanus*	
55	Heron	Black-headed	*Ardea*	*melanocephala*	
57	Heron	Purple	*Ardea*	*purpurea*	
61	Egret	Western Cattle	*Bubulcus*	*ibis*	
72		Hamerkop	*Scopus*	*umbretta*	
80	Stork	White	*Ciconia*	*ciconia*	
82	Ibis	Southern Bald	*Geronticus*	*calvus*	Vulnerable
84	Ibis	Hadada	*Bostrychia*	*hagedash*	
85	Spoonbill	African	*Platalea*	*alba*	
88	Goose	Spur-winged	*Plectropterus*	*gambensis*	
89	Goose	Egyptian	*Alopochen*	*aegyptiaca*	
96	Duck	Yellow-billed	*Anas*	*undulata*	
105		Secretarybird	*Sagittarius*	*serpentarius*	Vulnerable
119	Falcon	Amur	*Falco*	*amurensis*	

122	Kestrel	Greater	*Falco*	*rupicoloides*	
125	Kestrel	Lesser	*Falco*	*naumanni*	
129	Kite	Yellow-billed	*Milvus*	*aegyptius*	
130	Kite	Black-winged	*Elanus*	*caeruleus*	
146	Eagle	Black-chested Snake	*Circaetus*	*pectoralis*	
149	Eagle	African Fish	*Haliaeetus*	*vocifer*	
154	Buzzard	Common	*Buteo*	*buteo*	
168	Harrier	Pallid	*Circus*	*macrourus*	Near Threatened
170	Harrier	Montagu's	*Circus*	*pygargus*	
171	Harrier-Hawk	African	*Polyboroides*	*typus*	
173	Francolin	Coqui	*Peliperdix*	*coqui*	
185	Spurfowl	Swainson's	*Pternistis*	*swainsonii*	
189	Quail	Common	*Coturnix*	*coturnix*	
192	Guineafowl	Helmeted	*Numida*	*meleagris*	
203	Crake	Black	*Zapornia*	*flavirostra*	
210	Moorhen	Common	*Gallinula*	*chloropus*	
212	Coot	Red-knobbed	*Fulica*	*cristata*	
216	Crane	Blue	*Grus*	*paradisea*	Near Threatened
242	Lapwing	Crowned	*Vanellus*	*coronatus*	
245	Lapwing	Blacksmith	*Vanellus*	*armatus*	
247	Lapwing	African Wattled	*Vanellus*	*senegallus*	
250	Snipe	African	*Gallinago*	*nigripennis*	
275	Thick-knee	Spotted	*Burhinus*	*capensis*	
277	Courser	Temminck's	*Cursorius*	*temminckii*	
305	Tern	Whiskered	*Chlidonias*	*hybrida*	
311	Pigeon	Speckled	*Columba*	*guinea*	

314	Dove	Red-eyed	*Streptopelia*	*semitorquata*	
316	Dove	Cape Turtle	*Streptopelia*	*capicola*	
317	Dove	Laughing	*Spilopelia*	*senegalensis*	
318	Dove	Namaqua	*Oena*	*capensis*	
339	Go-away-bird	Grey	*Crinifer*	*concolor*	
343	Cuckoo	Red-chested	*Cuculus*	*solitarius*	
346	Cuckoo	Great Spotted	*Clamator*	*glandarius*	
352	Cuckoo	Diederik	*Chrysococcyx*	*caprius*	
368	Eagle-Owl	Spotted	*Bubo*	*africanus*	
378	Swift	Common	*Apus*	*apus*	
380	Swift	African Black	*Apus*	*barbatus*	
383	Swift	White-rumped	*Apus*	*caffer*	
384	Swift	Horus	*Apus*	*horus*	
385	Swift	Little	*Apus*	*affinis*	
387	Swift	African Palm	*Cypsiurus*	*parvus*	
390	Mousebird	Speckled	*Colius*	*striatus*	
394	Kingfisher	Pied	*Ceryle*	*rudis*	
397	Kingfisher	Malachite	*Corythornis*	*cristatus*	
399	Kingfisher	Woodland	*Halcyon*	*senegalensis*	
402	Kingfisher	Brown-hooded	*Halcyon*	*albiventris*	
404	Bee-eater	European	*Merops*	*apiaster*	
409	Bee-eater	White-fronted	*Merops*	*bullockoides*	
410	Bee-eater	Little	*Merops*	*pusillus*	
412	Roller	European	*Coracias*	*garrulus*	Near Threatened
413	Roller	Lilac-breasted	*Coracias*	*caudatus*	
418	Hoopoe	African	*Upupa*	*africana*	

419	Wood Hoopoe	Green	*Phoeniculus*	*purpureus*	
431	Barbet	Black-collared	*Lybius*	*torquatus*	
437	Tinkerbird	Yellow-fronted	*Pogoniulus*	*chrysoconus*	
439	Barbet	Crested	*Trachyphonus*	*vaillantii*	
440	Honeyguide	Greater	*Indicator*	*indicator*	
443	Honeybird	Brown-backed	*Prodotiscus*	*regulus*	
447	Woodpecker	Golden-tailed	*Campethera*	*abingoni*	
453	Wryneck	Red-throated	*Jynx*	*ruficollis*	
456	Lark	Melodious	*Mirafra*	*cheniana*	
458	Lark	Rufous-naped	*Mirafra*	*africana*	
459	Lark	Fawn-colored	*Calendulauda*	*africanoides*	
468	Lark	Flappet	*Mirafra*	*rufocinnamomea*	
474	Lark	Spike-heeled	*Chersomanes*	*albofasciata*	
488	Lark	Red-capped	*Calandrella*	*cinerea*	
493	Swallow	Barn	*Hirundo*	*rustica*	
495	Swallow	White-throated	*Hirundo*	*albigularis*	
498	Swallow	Pearl-breasted	*Hirundo*	*dimidiata*	
501	Swallow	Red-breasted	*Cecropis*	*semirufa*	
502	Swallow	Greater Striped	*Cecropis*	*cucullata*	
503	Swallow	Lesser Striped	*Cecropis*	*abyssinica*	
504	Swallow	South African Cliff	*Petrochelidon*	*spilodera*	
506	Martin	Rock	*Ptyonoprogne*	*fuligula*	
509	Martin	Brown-throated	*Riparia*	*paludicola*	
510	Martin	Banded	*Riparia*	*cincta*	
513	Cuckooshrike	Black	*Campephaga*	*flava*	
517	Drongo	Fork-tailed	*Dicrurus*	*adsimilis*	

521	Oriole	Black-headed	*Oriolus*	*larvatus*	
522	Crow	Pied	*Corvus*	*albus*	
523	Crow	Cape	*Corvus*	*capensis*	
533	Babbler	Arrow-marked	*Turdoides*	*jardineii*	
545	Bulbul	Dark-capped	*Pycnonotus*	*tricolor*	
552	Thrush	Kurrichane	*Turdus*	*libonyana*	
557	Thrush	Groundscraper	*Turdus*	*litsitsirupa*	
564	Wheatear	Mountain	*Myrmecocichla*	*monticola*	
568	Wheatear	Capped	*Oenanthe*	*pileata*	
570	Chat	Familiar	*Oenanthe*	*familiaris*	
575	Chat	Ant-eating	*Myrmecocichla*	*formicivora*	
576	Stonechat	African	*Saxicola*	*torquatus*	
581	Robin-Chat	Cape	*Cossypha*	*caffra*	
599	Warbler	Willow	*Phylloscopus*	*trochilus*	
604	Warbler	Lesser Swamp	*Acrocephalus*	*gracilirostris*	
618	Grassbird	Cape	*Sphenoeacus*	*afer*	
621	Crombec	Long-billed	*Sylvietta*	*rufescens*	
629	Cisticola	Zitting	*Cisticola*	*juncidis*	
630	Cisticola	Desert	*Cisticola*	*aridulus*	
631	Cisticola	Cloud	*Cisticola*	*textrix*	
634	Cisticola	Wing-snapping	*Cisticola*	*ayresii*	
637		Neddicky	*Cisticola*	*fulvicapilla*	
642	Cisticola	Rattling	*Cisticola*	*chiniana*	
646	Cisticola	Levaillant's	*Cisticola*	*tinniens*	
649	Prinia	Tawny-flanked	*Prinia*	*subflava*	
650	Prinia	Black-chested	*Prinia*	*flavicans*	

654	Flycatcher	Spotted	*Muscicapa*	*striata*	
665	Flycatcher	Fiscal	*Melaenornis*	*silens*	
673	Batis	Chinspot	*Batis*	*molitor*	
682	Flycatcher	African Paradise	*Terpsiphone*	*viridis*	
686	Wagtail	Cape	*Motacilla*	*capensis*	
692	Pipit	African	*Anthus*	*cinnamomeus*	
694	Pipit	Plain-backed	*Anthus*	*leucophrys*	
695	Pipit	Buffy	*Anthus*	*vaalensis*	
703	Longclaw	Cape	*Macronyx*	*capensis*	
706	Shrike	Lesser Grey	*Lanius*	*minor*	
707	Fiscal	Southern	*Lanius*	*collaris*	
708	Shrike	Red-backed	*Lanius*	*collurio*	
709	Boubou	Southern	*Laniarius*	*ferrugineus*	
711	Shrike	Crimson-breasted	*Laniarius*	*atrococcineus*	
712	Puffback	Black-backed	*Dryoscopus*	*cubla*	
715	Tchagra	Black-crowned	*Tchagra*	*senegalus*	
722		Bokmakierie	*Telophorus*	*zeylonus*	
723	Bushshrike	Grey-headed	*Malaconotus*	*blanchoti*	
731		Brubru	*Nilaus*	*afer*	
734	Myna	Common	*Acridotheres*	*tristis*	
735	Starling	Wattled	*Creatophora*	*cinerea*	
737	Starling	Cape	*Lamprotornis*	*nitens*	
746	Starling	Pied	*Lamprotornis*	*bicolor*	
763	Sunbird	White-bellied	*Cinnyris*	*talatala*	
772	Sunbird	Amethyst	*Chalcomitra*	*amethystina*	
784	Sparrow	House	*Passer*	*domesticus*	

786	Sparrow	Cape	*Passer*	*melanurus*	
789	Weaver	Scaly-feathered	*Sporopipes*	*squamifrons*	
797	Weaver	Village	*Ploceus*	*cucullatus*	
799	Weaver	Cape	*Ploceus*	*capensis*	
803	Weaver	Southern Masked	*Ploceus*	*velatus*	
805	Quelea	Red-billed	*Quelea*	*quelea*	
808	Bishop	Southern Red	*Euplectes*	*orix*	
812	Bishop	Yellow-crowned	*Euplectes*	*afer*	
813	Widowbird	Red-collared	*Euplectes*	*ardens*	
814	Widowbird	White-winged	*Euplectes*	*albonotatus*	
818	Widowbird	Long-tailed	*Euplectes*	*progne*	
843	Waxbill	Common	*Estrilda*	*astrild*	
844		Quailfinch	*Ortygospiza*	*atricollis*	
846	Whydah	Pin-tailed	*Vidua*	*macroura*	
852	Whydah	Long-tailed Paradise	*Vidua*	*paradisaea*	
854	Finch	Cuckoo	*Anomalospiza*	*imberbis*	
859	Canary	Yellow-fronted	*Crithagra*	*mozambica*	
860	Canary	Black-throated	*Crithagra*	*atrogularis*	
867	Seedeater	Streaky-headed	*Crithagra*	*gularis*	
872	Bunting	Cinnamon-breasted	*Emberiza*	*tahapisi*	
873	Bunting	Cape	*Emberiza*	*capensis*	
940	Dove	Rock	*Columba*	*livia*	
1035	Korhaan	Northern Black	*Afrotis*	*afraoides*	
1104	Thrush	Karoo	*Turdus*	*smithi*	
1172	White-eye	Cape	*Zosterops*	*virens*	
1183	Lark	Eastern Clapper	*Mirafra*	*fasciolata*	

4142	Sparrow	Southern Grey-headed	*Passer*	*diffusus*	
10877	Pipit	Nicholson's	*Anthus*	*nicholsoni*	

5.4.11. Surface Water

The Roodepoort Colliery area falls within the Olifants Water Management Area (Figure 9). The site is located in the quaternary catchment B32G (Figure 10).

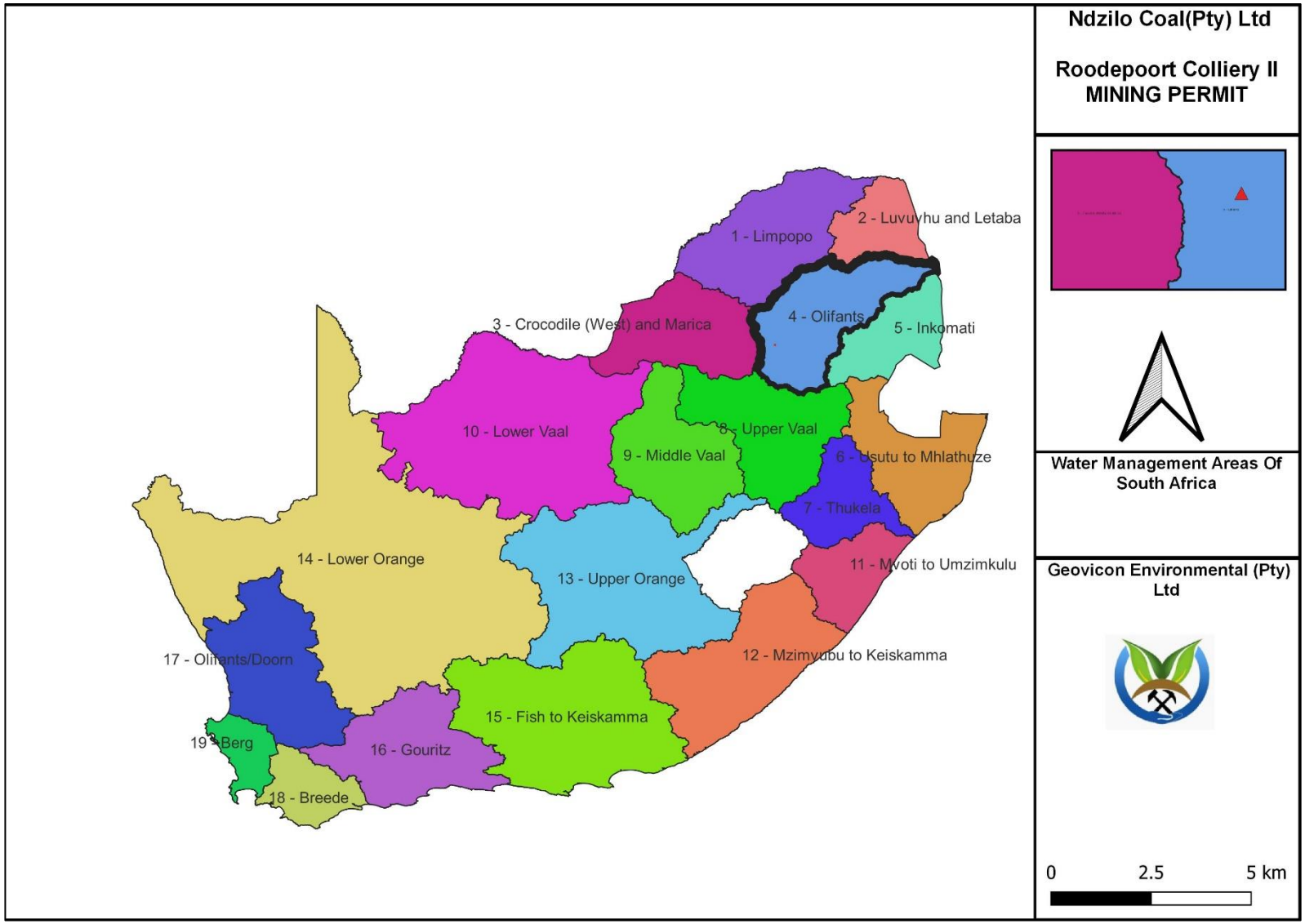


Figure 9: Water management areas.

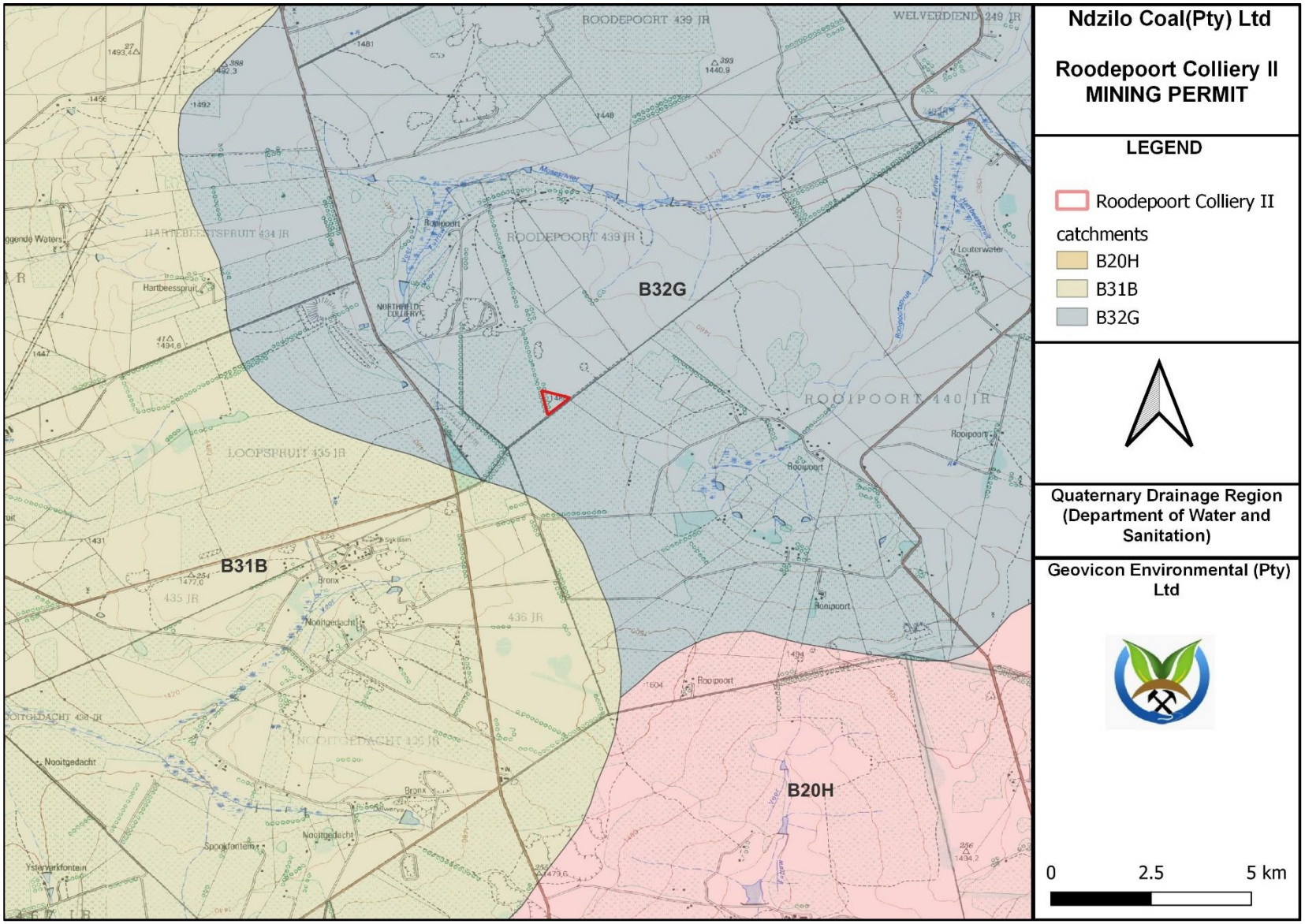


Figure 10: Quaternary drainage

Table 11: Summary of the catchment of the mining permit area

Feature	Value
Catchments	
PRIMARY	**B**
SECONDARY	**B3**
TERTIARY	**B32**
QUATERNARY	**B32G**
AREA_KM2	**974**
MAP_mm	**640.10**
PE_mm	**2168.80**
MASR_mm	**44.60**

River diversions
No river diversions are planned for the mining activities covered by this report.

Water Use

The likely downstream users were determined by examining aerial photography and literature surveys.

The downstream users were therefore considered in the stream. The downstream usage classes are evaluated below:

- Domestic users –local inhabitants may consume this river water and will likely also use the water for laundry.
- Recreational users – it is likely that local inhabitants will swim in the streams.
- Industrial users – there are mining and industrial activities downstream of the proposed operations. However, these operations are not sensitive to poor quality water.
- Aquatic users – the catchments are heavily impacted by agriculture and mining, and sensitive aquatic users are unlikely to be present.
- Irrigation users – the river water is might to be used for small-scale or informal irrigation.
- Livestock – the river water is likely to be used for drinking by livestock.

Water Authority

The catchment area is government water-controlled catchment. The authority in charge is the Department of Water and Sanitation (Mpumalanga Regional Office).

5.4.12. Groundwater

5.4.12.1. Aquifer classification.

According to literature the Karoo Supergroup sediments typically act as secondary aquifers (intergranular and fractured rock aquifers). However, the multi-layered weathering system present on these rocks could prove to have up to two aquifer systems present in the form of a shallow, regolith aquifer with a weathered, intergranular soft rock base associated with the contact of fresh bedrock and the weathering zone; and a fractured bedrock aquifer. These aquifer systems are discussed below.

Saturated Zone

In the saturated zone, at least four aquifer types may be inferred from knowledge of the geology of the area:

- A shallow aquifer formed in the weathered zone, perched on the fresh bedrock.
- An intermediate aquifer formed by fracturing of the Karoo sediments.
- Aquifers formed within the more permeable coal seams and sandstone layers.
- Aquifers associated with the contact zones of the dolerite intrusives.

Although these aquifers vary considerably regarding geohydrological characteristics, they are seldom observed as isolated units. Usually, they would be highly interconnected by means of fractures and intrusions. Groundwater will thus flow through the system by means of the path of least resistance in a complicated manner that might include any of these components.

Shallow perched aquifer

A near surface weathered zone is comprised of transported colluvium and *in-situ* weathered sediments and is underlain by consolidated sedimentary rocks (sandstone, shale and coal). Groundwater flow patterns usually follow the topography, often coming very close to surface in topographic lows, sometimes even forming natural springs. Experience of Karoo geohydrology indicates that recharge to the perched groundwater aquifer is relatively high, up to 3% of the Mean Annual Precipitation (MAP).

Fractured Karoo rock aquifers

The host geology of the area consists of consolidated sediments of the Karoo Supergroup and consists mainly of sandstone, shale and coal beds of the Vryheid Formation of the Ecca Group. Most of the groundwater flow will be along the fracture zones that occur in the relatively competent host rock. The geology map does not indicate any major fractures zones in this area, but from experience it can be assumed that numerous major and minor fractures do exist in the host rock. These conductive zones effectively interconnect the strata of the Karoo sediments, both vertically and horizontally into a single, but highly heterogeneous and anisotropic unit.

Aquifers associated with coal seams

The coal seam forms a layered sequence within the hard rock sedimentary units. The margins of coal seams or plastic partings within coal seams are often associated with groundwater. The coal itself tends to act as an aquitard allowing the flow of groundwater at the margins.

Aquifers associated with dolerite intrusives

Dolerite intrusions in the form of dykes and sills are common in the Karoo Supergroup, and are often encountered in this area. These intrusions can serve both as aquifers and aquifuges. Thick, unbroken dykes inhibit the flow of water, while the baked and cracked contact zones can be highly conductive. These conductive zones effectively interconnect the strata of the Ecca sediments both vertically and horizontally into a single, but highly heterogeneous and anisotropic unit on the scale of mining. These structures thus tend to dominate the flow of groundwater. Unfortunately, their location and properties are rather unpredictable. Their influence on the flow of groundwater is incorporated by using higher than usual flow parameters for the sedimentary rocks of the aquifer.

Unsaturated zone

Although a detailed characterization of the unsaturated zone is beyond the scope of this study, a brief description thereof is supplied.

The unsaturated zone in the proposed mining area is in the order of between 1 and 20 meters thick and consists of colluvial sediments at the top, underlain by residual sandstone/siltstone/mudstone of the Ecca Group that becomes less weathered with depth.

According to the Parsons Classification system, the aquifer could be regarded as a minor aquifer system, but also a sole aquifer system in some cases where groundwater is the only source of domestic water.

5.4.13. Sensitive Landscapes

Ndzilo Coal (Pty) Limited recognises that all streams and wetlands should be treated as sensitive landscapes. To this extent, Geovicon Environmental (Pty) Ltd an independent consultant, undertook a desktop study over the Roodepoort Colliery II area to determine the presence of any sensitive areas. In addition to this, a National Web Based Environmental Screening Tool Report was also generated for the mining permit are in question and is attached as **Appendix D**. According to the study there are sites that resembles sensitive landscapes which were identified in close proximity to the site.

Mucina et al., (2006), is the most recent vegetation unit book for South Africa, Lesotho and Swaziland, it describes the vegetation unit in which the proposed Roodepoort Colliery II area falls as the 'Central Sandy Bushveld" or SVcb 12 vegetation unit/ ecosystem of the Central Sandy Bushveld Bioregion in the savanna biome of South Africa. See figure x for a visual indication (South African National Biodiversity Institute – SANBI; VEGMAP 2018).

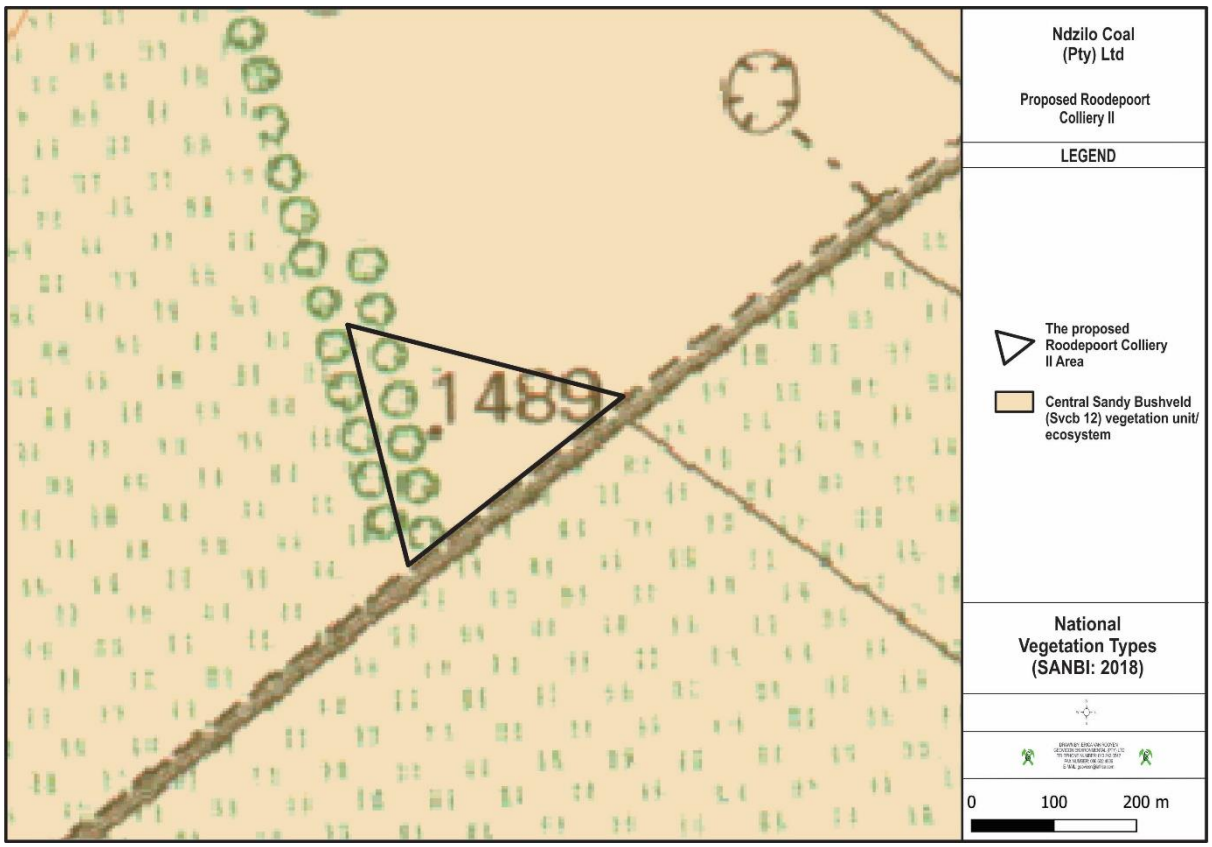


Figure 11: National vegetation units in the vicinity of the proposed Roodepoort Colliery II area

Mucina & Rutherford (2006) describes the vegetation that represent the above-mentioned vegetation unit.

Important Taxa Tall Trees: *Acacia burkei* (d), *A. robusta*, *Sclerocarya birrea* subsp. *caffra*.

Small Trees: *Burkea africana* (d), *Combretum apiculatum* (d), *C. zeyheri* (d), *Terminalia sericea* (d), *Ochna pulchra, Peltophorum africanum*, *Rhus leptodictya*.

Tall Shrubs: *Combretum hereroense*, *Grewia bicolor*, *G. monticola*, Strychnos pungens.

Low Shrubs: *Agathisanthemum bojeri* (d), *Indigofera filipes* (d), *Felicia fascicularis*, *Gnidia sericocephala.*

Geoxylic Suffrutex: *Dichapetalum cymosum* (d).

Woody Climber: *Asparagus buchananii*.

Graminoids: *Brachiaria nigropedata* (d), *Eragrostis pallens* (d), *E. rigidior* (d), *Hyperthelia dissoluta* (d), *Panicum maximum* (d), *Perotis patens* (d), *Anthephora pubescens*, *Aristida scabrivalvis* subsp. *scabrivalvis*,

Brachiaria serrata, *Elionurus muticus*, *Eragrostis nindensis*, *Loudetia simplex*, *Schmidtia pappophoroides*, *Themeda triandra*, *Trachypogon spicatus*.

Herbs: *Dicerocaryum senecioides* (d), *Barleria macrostegia*, *Blepharis integrifolia*, *Crabbea angustifolia*, *Evolvulus alsinoides*, *Geigeria burkei*, *Hermannia lancifolia, Indigofera daleoides*, *Justicia anagalloides*, *Kyphocarpa angustifolia*, *Lophiocarpus tenuissimus*, *Waltheria indica*, *Xerophyta humilis*.

Geophytic Herb: *Hypoxis hemerocallidea*.

Succulent Herb*:* *Aloe greatheadii* var. *davyana.*

Biogeographically Important Taxa (Central Bushveld endemics)

Graminoid: *Mosdenia leptostachys*.

Herb: *Oxygonum dregeanum* subsp. *canescens* var. *dissectum*

Conservation Vulnerable. Target 19%. Less than 3% statutorily conserved spread thinly across many nature reserves including the Doorndraai Dam and Skuinsdraai Nature Reserves.

The proposed Roodepoort Colliery II area is not considered threatened, since the ecosystem threat status confirms that the ecosystem has no threat status.

The proposed Roodepoort Colliery II area is not situated in any National River Freshwater Ecosystem Priority Areas nor in any strategic water source areas of South Africa. The proposed Roodepoort Colliery II area does not contain any wetland areas, it is situated in the Central Bushveld Group 3 wetland vegetation type/ ecosystem (Figure 12)

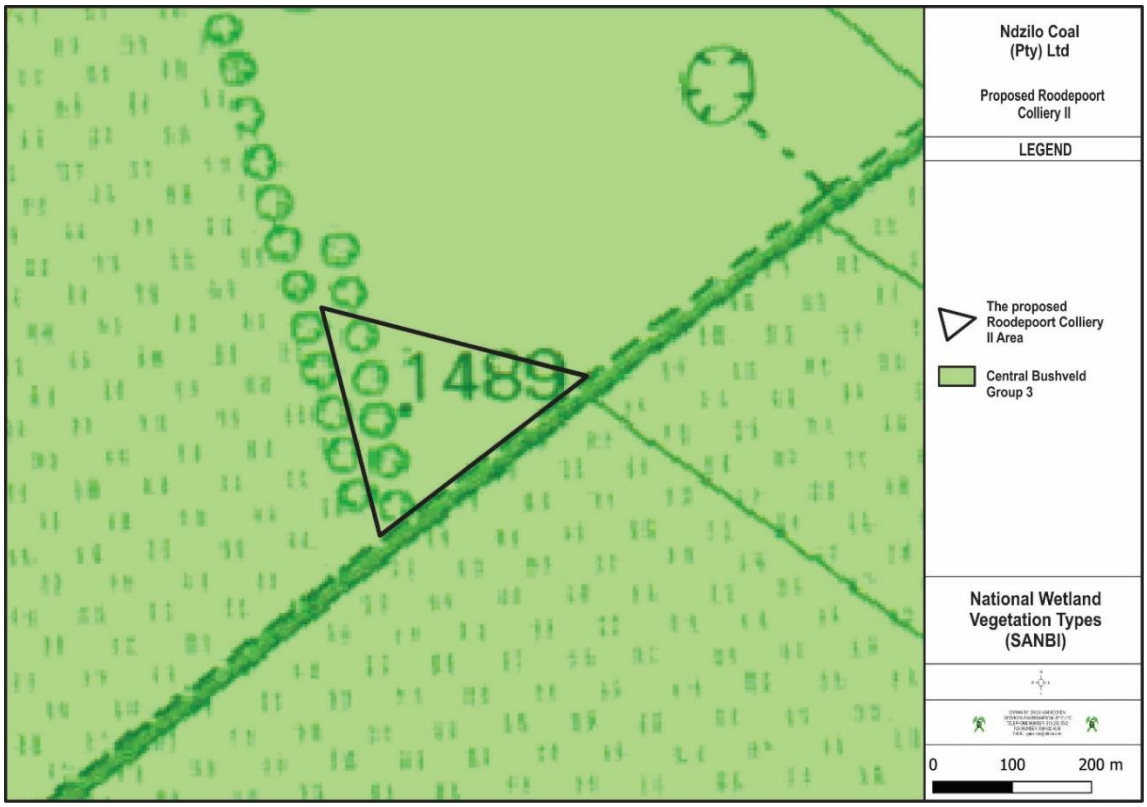


Figure 12: National vegetation types in the vicinity of the proposed Roodepoort II

According to the Mpumalanga Biodiversity Sector Plan (MBSP) GIS based electronic application (MTPA, 2019), the proposed Roodepoort Colliery II area is situated over terrestrial assessment categories of mainly other natural areas and heavily modified areas (Figure 13).

Other Natural Areas are defined as areas that have not been identified as a priority in the current systematic biodiversity plan but retain most of their natural character and perform a range of biodiversity and ecological infrastructural functions.

Heavily Modified Areas are described as areas that are currently transformed and where biodiversity and ecological function has been lost to the point that it is not worth considering for conservation at all.

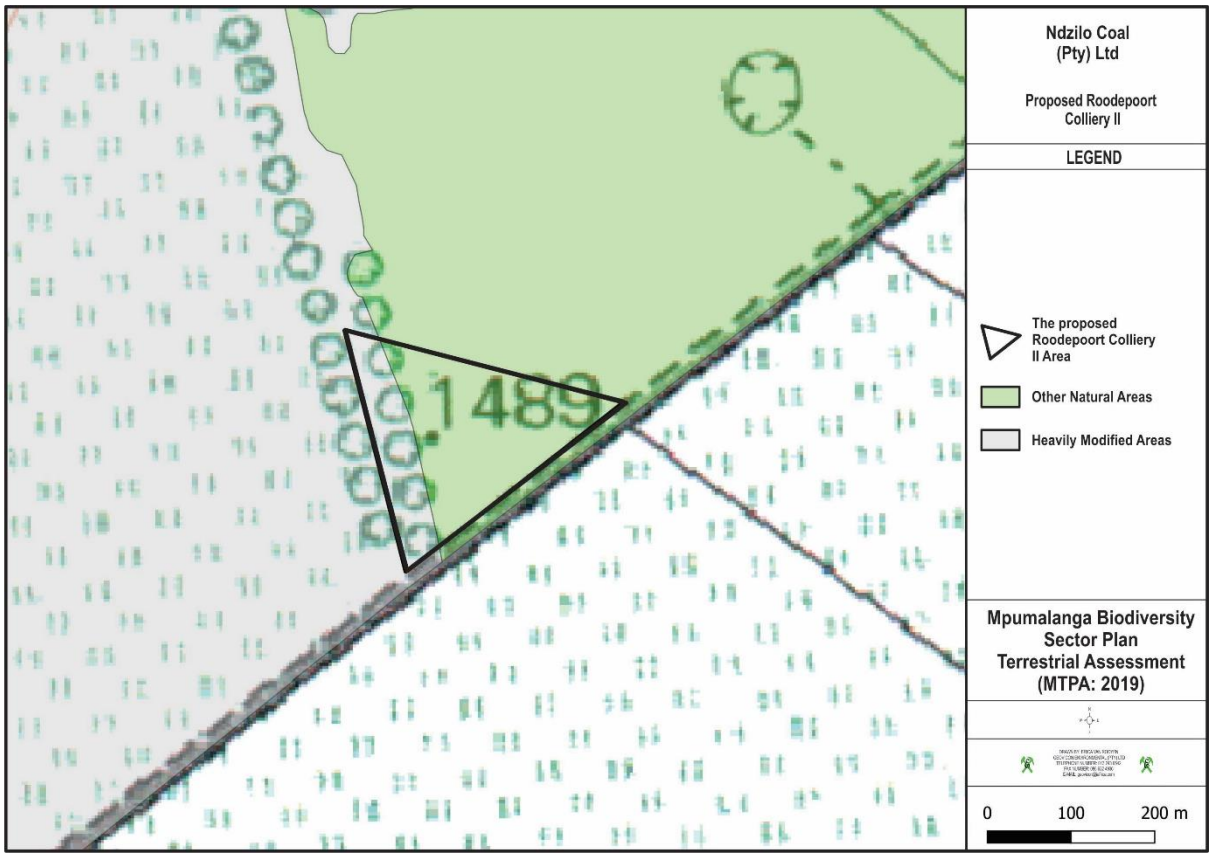


Figure 13: Mpumalanga Biodiversity Sector Plan Terrestrial Assessment for the proposed Roodepoort Colliery II area.

According to the Mpumalanga Biodiversity Sector Plan GIS -based electronic application the proposed Roodepoort Colliery II area is situated over the following freshwater assessment categories, namely other natural areas and heavily modified areas (Figure 14).

Other Natural Areas are areas that have not been identified as a priority in the current systematic biodiversity plan but retain most of their natural character and perform a range of biodiversity and ecological infrastructural functions.

Heavily Modified Areas are described as areas in which significant or complete loss of natural habitat and ecological function has taken place due to activities such as ploughing, building of dams, hardening of surfaces, open-cast mining, cultivation, etc.

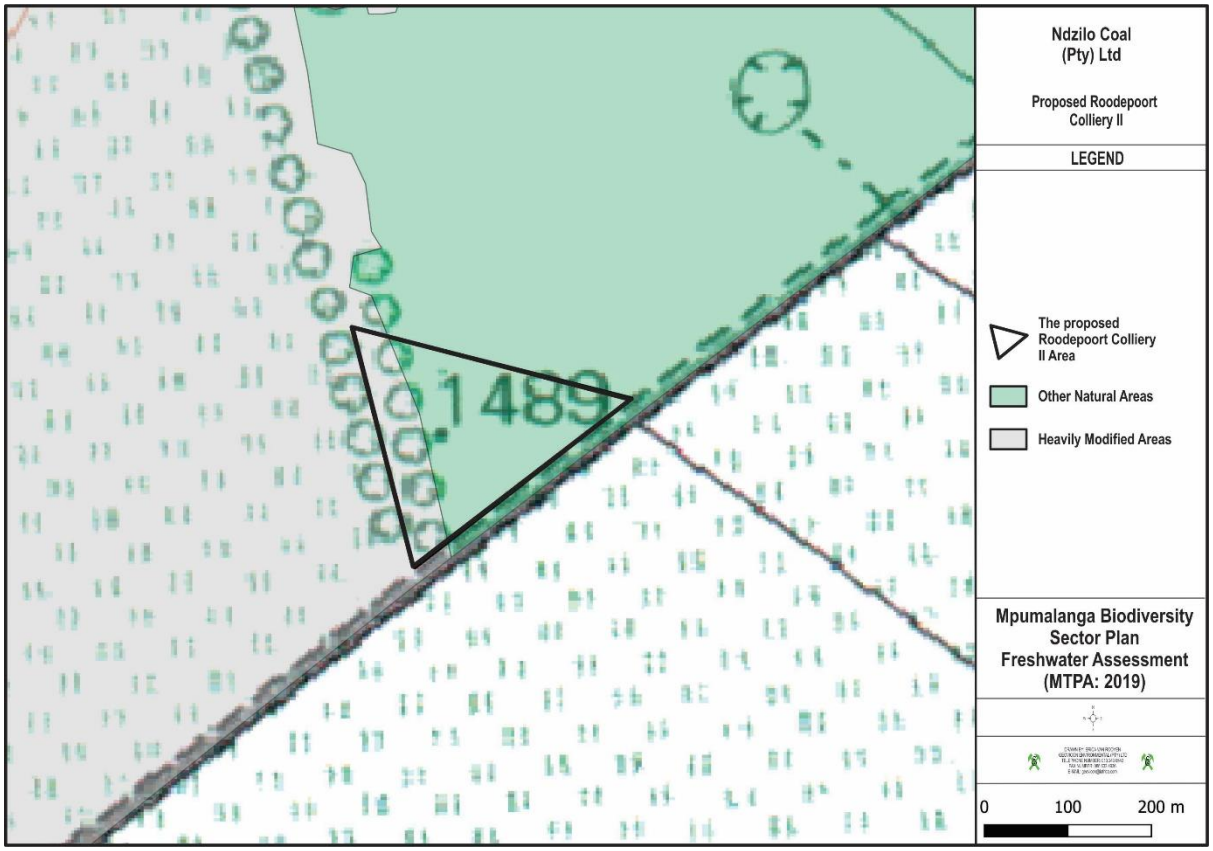


Figure 14: Mpumalanga Biodiversity Sector Plan Freshwater Assessment for the proposed Roodepoort Colliery II area

The proposed Roodepoort Colliery II area is not situated in any South African Protected Areas or any South African Conservation Areas.

5.4.14. Air Quality

Emissions inventory: Construction

Heavy construction is a source of dust emissions that may have substantial temporary impact on local air quality. Building and road construction are two examples of construction activities with high emissions potential. Emissions during the construction of a building or road can be associated with land clearing, drilling and blasting, ground excavation, cut and fill operations (i.e., earth moving), and construction of a particular facility itself. Dust emissions often vary substantially from day to day, depending on the level of activity, the specific operations, and the prevailing meteorological conditions. A large portion of the emissions results from equipment traffic over temporary roads at the construction site.

The temporary nature of construction differentiates it from other fugitive dust sources as to estimation and control of emissions. Construction consists of a series of different operations, each with its own duration and potential for dust generation. In other words, emissions from any single construction site can be expected (1) to have a definable beginning and an end and (2) to vary substantially over different phases of the construction process. This is in contrast to most other fugitive dust sources, where emissions are either relatively steady or follow a discernible annual cycle. Furthermore, there is often a need to estimate area-wide construction emissions, without regard to the actual plans of any individual construction project.

The quantity of dust emissions from construction operations is proportional to the area of land being worked and to the level of construction activity. By analogy to the parameter dependence observed for other similar fugitive dust sources, one can expect emissions from heavy construction operations to be positively correlated with the silt content of the soil (that is, particles smaller than 75 micrometres [µm] in diameter), as well as with the speed and weight of the average vehicle, and to be negatively correlated with the soil moisture content.

Emissions inventory: Mining

Initial operations involve the removal of top- and subsoil with front-end loaders and bull dozers. The exposed overburden, the earth between the topsoil and the coal seam will be levelled and if required, drilled and blasted. The overburden material will be removed down to the coal seam by shovel and truck operation. The topsoil and overburden material will be stockpiled in designated areas on-site for later use in the reclamation processes.

The uncovered coal seam will be drilled and blasted if required. A shovel or front-end loader will load the broken coal onto haul trucks for transport to a temporary storage pile.

During mine reclamation, which proceeds continuously throughout the life of the mine, material from the overburden spoils piles will be used to fill mined-out areas. Topsoil will be placed on the graded spoils, and the land will be prepared for re-vegetation by furrowing, mulching, etc.

5.4.15. Noise

The proposed project area is surrounded by predominantly mining and agricultural activities. Potential noise sources from the area may therefore be emanating from these various sources. The proposed project may contribute towards noise levels through the mining activities with the use of associated infrastructure.

5.4.16. Socio-Economic Status

Thembisile Hani Local Municipality is located in the Nkangala District Municipality of Mpumalanga province, South Africa. It is a semi-urban local municipality consisting of 57 villages within which there are five established townships. This is the second largest Local Municipality in the district and the 6th largest in the province. The Municipality is predominately rural in nature and its main economic sectors include public services, retail, business services and agriculture. The information below about the Local Municipality is obtained from the Integrated Development Plan 2019-2020 from the municipality's website.

5.4.16.1. Population density, growth and location

According to Stats SA (2016 community survey), Thembisile Hani`s population grew from 310 458 people in 2011 to 333 331 in 2016 which accounts for 23.7% of Nkangala's population. The population grew by 1.6% PA between 2011 & 2016. According to the community Survey conducted in 2016 the population has grown to 333 331, the 6th largest population in the province and the 2 in the district after eMalahleni Local Municipality.

The population number is estimated to be 349 588 in 2019 and in the region of 445 939 people by 2030 given the historic population growth rate per annum. Of the total population 52.4% are female and 47.6% are male and approximately 99.2% are Africans. Youth up to 34 years of age is estimated at 68.7% of the population and the number of households grew from 75 634 to 82 740 which amounts to 4.1 people per household and 23% of the total households in Nkangala. Female headed households

are estimated at 46.1% and child headed (10-17 years) households at 0.9 % in 2011. The population is estimated to be 416 262 in 2030.

5.4.16.2. Major economic activities and sources of employment

The Municipality is predominately rural in nature and its main economic sectors include public services, retail, business services and agriculture, Figure 15.

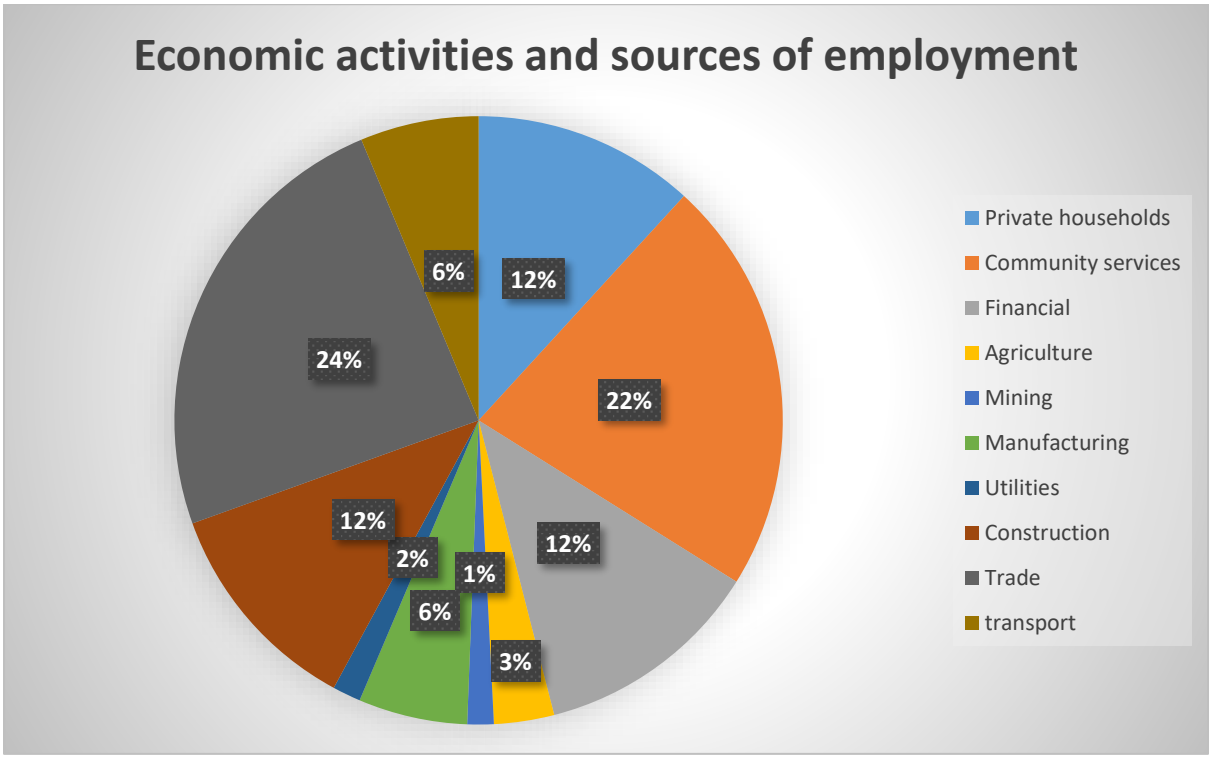


Figure 15: Economic activities and sources of employment.

SECTION SIX

Environmental impact assessment

6. ENVIRONMENTAL IMPACT ASSESSMENT

6.1. ENVIRONMENTAL IMPACT ASSESSMENT PROCESS FOLLOWED

6.1.1. Approach to Environmental Impact Assessment

The term 'environment' is used in the broadest sense in an EIA. It covers the physical, biological, social, economic, cultural, historical, institutional and political environments.

An Environmental Impact Assessment is a good planning tool. It identifies the environmental consequences of a proposed project from the beginning and helps to ensure that the project, over its life cycle, will be environmentally acceptable and integrated into the surrounding environment in a sustainable way.

6.1.2. Environmental Impact Assessment Process Followed

Under Section 24 of the National Environmental Management Act (NEMA), the Minister promulgated the regulations pertaining to environmental impact assessments (EIA Regulations, 2014) under Government Notice No. 326 in Government Gazette 38282 of 4 December 2014. These EIA regulations repealed the 2010 EIA regulations and therefore any process relating to environmental authorisations must be undertaken under the EIA Regulations, 2014.

Chapter 4 of the EIA Regulations, 2014 deals with the provisions for application for environmental authorisation. In view of the above, Ndzilo Coal (Pty) Limited is obliged to comply with provisions of Chapter 4 for the intended environmental authorisation application for the activities (listed activities) within the proposed project.

Part 2 of chapter 4 of the EIA Regulations, 2014 contemplate process to be undertaken for the application for environmental authorisation for the proposed project, which is the BAR process. The process to be followed is describe below.

6.1.2.1. Pre-application consultation with the Competent Authority

In terms of section 24D (1) of the National Environmental Management Act, 1998 (Act 107 of 1998), the Minister responsible for mineral resources is the competent authority for environmental matters relating to mining and associated activities. In view of the above, the application for the environmental authorisation for the proposed project was submitted to the Department of Mineral Resources (DMRE), Mpumalanga Regional Office for their consideration and decision making.

6.1.2.2. BAR Phase

In compliance with Regulation 19 of the EIA Regulations, 2014, the BAR and EMPR will be submitted to the competent authority within 90 days after the acknowledgement of the environmental authorisation application.

As part of the public participation, the draft BAR and EMPR was made available to the commenting authority, potential registered interested and affected parties for their comment for a period of 30 days during the EIA phase.

6.1.2.3. Information Gathering

Environmental baseline data has been obtained via desktop studies, pertaining to surface water, geohydrological data, topographical analyses, soil surveys, vegetation surveys, wetland surveys and geological conditions. Weather data was acquired from the World Weather Service. The data accumulated and analysed is sufficient to gain a baseline indication of the present state of the environment. The use of this baseline study for impact assessments is thus justified and reliable conclusions could be made.

6.1.2.4. Decision on the BAR application

In compliance with Regulation 20 of the EIA Regulations, 2014, the competent authority will within 107 days of receipt of the BAR and EMPR grant or refuse the environmental authorisation.

6.2. ENVIRONMENTAL IMPACT ASSESSMENT METHODOLOGY

The following prediction and evaluation of impacts is based on the proposed Roodepoort Colliery II and associated activities.

The evaluation distinguishes between significantly adverse and beneficial impacts and allocates significance against national regulations, standards and quality objectives governing:

- Health & Safety;
- Protection of Environmentally Sensitive Areas;
- Land use; and
- Pollution levels.

Irreversible impacts are also identified. See Table 12 for the definitions of the criteria and Table 13 for the results of the environmental impact assessment for the mining permit area.

The significance of the impacts is determined through the consideration of the following criteria:

Probability	:	likelihood of the impact occurring
Area (Extent)	:	the extent over which the impact will be experienced.
Duration	:	the period over which the impact will be experienced.
Intensity	:	the degree to which the impact affects the health and welfare of humans and the environment (includes the consideration of unknown risks, reversibility of the impact, violation of laws, precedents for future actions and cumulative effects).

Table 12: The above criteria are expressed for each impact in tabular form according to the following definitions:

Probability	Definition
Low	There is a slight possibility (0 – 30%) that the impact will occur.
Medium	There is a 30 –70% possibility that the impact will occur.
High	The impact is definitely expected to occur (70% +) or is already occurring.
Area (Extent)	Definition

Small	0 – 40 ha
Medium	40 – 200 ha
Large	200 + ha

Duration	Definition
Short	0 – 5 years
Medium	5 – 50 years
Long	51 – 200 years
Permanent	200 + years

Intensity	Definition
Low	Does not contravene any laws. Is within environmental standards or objectives. Will not constitute a precedent for future actions. Is reversible. Will have a slight impact on the health and welfare of humans or the environment.
Medium	Does not contravene any laws. Will not constitute a precedent for future actions. Is not within environmental standards or objectives. Is not irreversible. Will have a moderate impact on the health and welfare of humans or the environment.
High	Contravene laws. May constitute a precedent for future actions. Is not within environmental standards or objectives. Is irreversible. Will have a significant impact on the health and welfare of humans or the environment.

Significance and Risk Category	Definition
Negligible	The impact/risk is insubstantial and does not require management
Low	The impact/risk is of little importance, but requires management

Medium	The impact/risk is important; management is required to reduce negative impacts to acceptable levels
High	The impact/risk is of great importance, negative impacts could render options or the entire project unacceptable if they cannot be reduced or counteracted by significantly positive impacts, and management of these impacts is essential
Positive (No risk identified)	The impact, although having no significant negative impacts, may in fact contribute to environmental or economical health

6.3. RESULTS OF THE ENVIRONMENTAL IMPACT ASSESSMENT

6.3.1. Assessment of the Roodepoort Colliery II impacts/risks

Table 13: Results of the Environmental Impact Assessment for Roodepoort Colliery.

6.3.1.1. Construction Phase

ACTIVITY	NATURE OF THE IMPACT	ENVIRONMENTAL ASPECT	IMPACT ASSESSMENT					MITIGATION MEASURES
			E	P	D	I	S	
CONSTRUCTION PHASES								
Activity 21 of listing notice 1: Any activity including the operation of that activity which requires a mining permit in terms of section 27 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including association infrastructures, earthworks, directly related to the extraction of the mineral resource. **Activity 27 of listing notice 1**: The clearance of an area of 1 hectare or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for the undertaking of a linear activity or maintenance purposes undertaken in accordance with a maintenance management plan.								
Construction of haul and access roads, overburden stockpiles, in pit sump and PCD.	All activities will result in the stripping and removal of the topsoil layer, which will disrupt the soil profile.	Soil/Land capability	Without mitigation					Stockpile the removed topsoil on a topsoil stockpile area which is separate from other overburden materials.
			S	L	S	M	M	
			With mitigation					
			S	L	S	L	L	

ACTIVITY	NATURE OF THE IMPACT	ENVIRONMENTAL ASPECT	IMPACT ASSESSMENT					MITIGATION MEASURES
			E	P	D	I	S	
CONSTRUCTION PHASES								
	The stripping of topsoil will result in the reduction of the land capability of the area.	Land capability	Without mitigation					Strip soils with intact vegetation to retain the soil characteristics and reuse soil during rehabilitation.
			S	M	S	M	M	
			With mitigation					
			S	L	S	L	L	
	All activities will result in the removal of the topsoil layer, which will result in the loss of natural vegetation cover.	Natural vegetation	Without mitigation					The topsoil removed from successive cuts must be used to cover the disturbed areas and these areas must then be seeded with a recommended seed mix to ensure natural vegetation remaining in the soil (seed bank) is re-established.
			S	M	S	M	M	
			With mitigation					
			S	L	S	L	L	
	The formation of overburden stockpiles will result in topographical highpoints, which will alter the local topographical patterns of the immediate area.	Topography	Without mitigation					Ensure that as little space as possible is used for the construction of stockpiling facilities for the overburden material.
			S	M	S	M	M	
			With mitigation					
			S	L	S	L	L	

ACTIVITY	NATURE OF THE IMPACT	ENVIRONMENTAL ASPECT	IMPACT ASSESSMENT					MITIGATION MEASURES
			E	P	D	I	S	
CONSTRUCTION PHASES								
	The constructed workshop, mine infrastructure and overburden stockpiles may be visible from the nearby roads	Topography	Without mitigation					Visual berms will be constructed around the visible parts of the mining area to shield the said mine infrastructure.
			S	M	S	M	M	
			With mitigation					
			S	L	S	L	L	
	All activities will result in the removal of the topsoil layer, which will result in the loss of natural vegetation cover	Vegetation	Without mitigation					All topsoil material to be stockpiled separately at appropriate height. Note that the topsoil will retain its seed bank if stripped with intact vegetation and stockpiled properly.
			S	M	S	M	M	
			With mitigation					
			S	L	S	L	L	
	Surface water emanating from the construction site will contain increased amount of silt, which will contaminate the surface water environment	Surface Water Quality	Without mitigation					Ensure that the dam is designed by a suitably qualified person who will ensure that the dam covers as little space as possible whilst complying with the relevant legal requirements. The mine will be designed and constructed such that all dirty water is drained or pumped to the dam.
			S	M	S	M	M	
			With mitigation					
			S	L	S	L	L	

ACTIVITY	NATURE OF THE IMPACT	ENVIRONMENTAL ASPECT	IMPACT ASSESSMENT					MITIGATION MEASURES
			E	P	D	I	S	
CONSTRUCTION PHASES								
	Surface water emanating from the construction site will contain increased amount of silt, which will contaminate the surface water environment	Surface Water Quality	Without mitigation					Construct berms along the stockpiles and disturbed area to reduce the levels of silt that may report to the nearby stream.
			S	M	S	M	M	
			With mitigation					
			S	L	S	L	L	
	Movement of vehicles over exposed areas will result in the generation of dust. Generated dust will migrate towards the predominant wind direction.	Air Quality	Without mitigation					Conduct dust suppression on haul and access roads on a regular basis. Monitor the dust fall out concentration
			S	M	S	M	M	
			With mitigation					
			S	L	S	L	L	
	Machinery used will generate fumes and noise that may have detrimental effects on the surrounding air quality environment and health of the employees and residents of nearby houses.	Air Quality	Without mitigation					Ensure that the used mine vehicles' exhaust systems are in good repair order. Limit speed of mine vehicles. Conduct dust suppression.
			S	M	S	M	M	
			With mitigation					
			S	L	S	L	L	

ACTIVITY	NATURE OF THE IMPACT	ENVIRONMENTAL ASPECT	IMPACT ASSESSMENT					MITIGATION MEASURES
			E	P	D	I	S	
CONSTRUCTION PHASES								
	Noise generated from construction activities may add to the current noise levels. This may have impacts on local residents.	Noise	Without mitigation					Limit mining activities during day time
			S	M	S	M	M	
			With mitigation					
			S	L	S	L	L	
	Adjacent landowners may be impacted on by dust, noise, vibration, visual impacts and nuisance generated during the construction phase of the proposed opencast areas.	Social	Without mitigation					See mitigation under environmental management section, i.e. air, noise, etc Implementation of the Environmental Awareness Plan for the employees.
			S	M	S	M	M	
			With mitigation					
			S	L	S	L	L	
	Potential increase in crime and petty theft.	Social	Without mitigation					Discourage squatting & recruitment on the opencast areas.
			S	M	S	M	M	
			With mitigation					
			S	L	S	L	L	

ACTIVITY	NATURE OF THE IMPACT	ENVIRONMENTAL ASPECT	IMPACT ASSESSMENT					MITIGATION MEASURES
			E	P	D	I	S	
CONSTRUCTION PHASES								
	The mining operation will create employment opportunities.	Social	Positive					No mitigation measures
Excavation of an initial box-cut	The excavation of the initial box-cut (including the in-pit water and coal storage facilities) will result in the disturbance of the geological profile	Geology	S	L	S	L	L	No mitigation can be undertaken for the predicted impact.
			With mitigation					
			S	L	S	L	L	
	The excavation of the initial box cut (including the in-pit water and coal storage facilities) will result in the formation of topographical voids, which will impact on the local topographical patterns	Topography	Without mitigation					Use material from the following cuts to backfill the voids created by the construction of the initial box-cut and the in-pit water and coal storage facilities
			S	M	S	M	M	
			With mitigation					
			S	L	S	L	L	
	The stripping of soil layers during the excavation of the initial box-cut (including the in-pit water and coal storage facilities) will result in the loss of topsoil. This will further impact on the land use and land capability	Soil/Land Capability	Without mitigation					Stockpile topsoil to appropriate height hence reducing loss of fertility. Use stockpiled topsoil for rehabilitation of the backfilled opencast pit, hence rehabilitated areas can be used for other purposes.
			S	M	S	M	M	
			With mitigation					
			S	L	S	L	L	

ACTIVITY	NATURE OF THE IMPACT	ENVIRONMENTAL ASPECT	IMPACT ASSESSMENT					MITIGATION MEASURES
			E	P	D	I	S	
CONSTRUCTION PHASES								
	The excavation of the initial box-cut (including the in-pit water and coal storage facilities) will result in the removal of natural vegetation due to the stripping of topsoil	Vegetation	Without mitigation					The topsoil removed from successive cuts must be used to cover the disturbed areas and these areas must then be seeded with a recommended seed mix to ensure natural vegetation remaining in the soil (seed bank) is re-established.
			S	M	S	M	M	
			With mitigation					
			S	L	S	L	L	
	Animal burrows and habitats will be destroyed by the activities. This will further result in the migration of animals away from the areas of disturbance.	Animal life	Without mitigation					Rehabilitation of the disturbed areas will encourage the migration of animals back into the destroyed areas.
			S	L	S	L	L	
			With mitigation					
			S	L	S	L	N	
	Rain and runoff water may enter the initial box-cut and the in-pit water and coal storage facility). This will result in the loss of clean runoff water that could report to the nearby water body	Surface Water Quality	Without mitigation					Divert runoff water away from the initial box-cut to the in-pit water storage facility.
			S	M	S	M	M	
			With mitigation					
			S	L	S	L	L	

ACTIVITY	NATURE OF THE IMPACT	ENVIRONMENTAL ASPECT	IMPACT ASSESSMENT					MITIGATION MEASURES
			E	P	D	I	S	
CONSTRUCTION PHASES								
	Contamination of the clean water by the remaining coal and carbonaceous material may result if clean runoff water is allowed to enter the mining pit, which could impact negatively on the surrounding surface water environment if released.	Surface Water Quality and groundwater	Without mitigation					Contain all dirty water from the opencast pit into a polluted water containment facility.
			S	M	S	M	M	
			With mitigation					
			S	L	S	L	L	
	The stripping of soils from the initial box-cut will result in the exposure of soils causing the generation of dust during windy periods. Movement of mine vehicles will also result in the generation of dust. This may ultimately affect the occupants of structures within the impact zone.	Air Quality/Social	Without mitigation					Conduct dust suppression daily on dust generating areas. Enforce appropriate speed limits for the mine vehicles.
			S	M	S	M	M	
			With mitigation					
			S	L	S	L	L	
	Ground vibration and air blast levels from blasting may affect surrounding structures. A distance of 500 meters from the blast is generally accepted as the area of possible negative impact from blasting.	Social/Land Capability	Without mitigation					No structures occur within the distance of 500 m from the mining area, hence blasting is not expected to impact on any structures.
			S	M	S	M	M	
			With mitigation					
			S	L	S	L	L	

ACTIVITY	NATURE OF THE IMPACT	ENVIRONMENTAL ASPECT	IMPACT ASSESSMENT					MITIGATION MEASURES
			E	P	D	I	S	
CONSTRUCTION PHASES								
	This does however not allow Ndzilo Coal (Pty) Limited to blast irresponsibly. Irresponsible blasting may still affect the structures within the surrounds of the mine e.g., fly rock may be problematic if blasting is not done properly	Social/Land Capability	Without mitigation					Conduct blasting according to a blast design designed by a basting expert. This will ensure that the vibration and air blast are within the acceptable limits.
			S	M	S	M	M	
			With mitigation					
			S	L	S	L	L	
	Dust and noxious fumes may be generated during blasting that can affect the neighbouring residents and road users.	Social/Land Capability	Without mitigation					Proper stemming, and delay blasts when prevailing wind is blowing towards the area of concern. Conduct blasting according to a blast design by a blasting expert. A blaster with appropriate qualifications must be used for blasting. This will ensure that the generation of excessive dust and fumes are prevented.
			S	M	S	M	M	
			With mitigation					
			S	L	S	L	L	
		Noise	Without mitigation					

ACTIVITY	NATURE OF THE IMPACT	ENVIRONMENTAL ASPECT	IMPACT ASSESSMENT					MITIGATION MEASURES
			E	P	D	I	S	
CONSTRUCTION PHASES								
	Machine operators in close proximity to machinery and employees in the opencast pit will be exposed to high noise during blasting and operation of mine machinery. These noise levels will attenuate to acceptable levels within a short distance (500 m). Note that no significant noise increases are expected within a 500 m radius of the activities.		S	M	S	M	M	Ensure that the mine employees are issued with earplugs and that they are instructed to use them. Educate employees on the dangers of hearing loss due to mine machinery.
			With mitigation					
			S	L	S	L	L	
	The initial box-cut will be visible from the surrounding area.	Social	Without mitigation					Use the topsoil from the initial box-cut to construct a visual berm around visible areas of the mine.
			S	M	S	M	M	
			With mitigation					
			S	L	S	L	L	
	During individual consultations with the adjacent landowners, raised issues with	Social	Without mitigation					
			S	M	S	M	M	

ACTIVITY	NATURE OF THE IMPACT	ENVIRONMENTAL ASPECT	IMPACT ASSESSMENT					MITIGATION MEASURES
			E	P	D	I	S	
CONSTRUCTION PHASES								
	regard to the blasting, which they envisage will affect structural integrity of their houses.		With mitigation					A structural survey will be done on their houses to identify any cracks or faults present before commencement of the mine
			S	L	S	L	L	
	During individual consultations with the adjacent landowners, raised issues with regard to the blasting, which they envisage will affect structural integrity of their houses.	Social	Without mitigation					A seismograph will be placed at the strategic places to record ground vibration and air blast levels at those places during blasting.
			S	M	S	M	M	
			With mitigation					
			S	L	S	L	L	
	During individual consultations with the adjacent landowners, raised issues with regard to the blasting, which they envisage will affect structural integrity of their houses.	Social	Without mitigation					If it can be proven that the blasting has damaged their houses, Ndzilo Coal (Pty) Limited must compensate for their damages.
			S	M	S	M	M	
			With mitigation					
			S	L	S	L	L	

6.3.1.2. Operational Phase

ACTIVITY	NATURE OF THE IMPACT	ENVIRONMENTAL ASPECT	IMPACT ASSESSMENT					MITIGATION MEASURES
			E	P	D	I	S	
OPERATIONAL PHASE								
Activity 21 listing notice 1: Any activity including the operation of that activity which requires a mining permit in terms of section 27 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including association infrastructures, earthworks, directly related to the extraction of the mineral resource. **Activity 27 of listing notice 1**: The clearance of an area of 1 hectare or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for the undertaking of a linear activity or maintenance purposes undertaken in accordance with a maintenance management plan.								
	Removal and subsequent replacement of topsoil and subsoil material for access to the target coal will result in the disturbance of the geological profile.	Geology	With Mitigation					No mitigation can be undertaken for this impact. The Coal will however be replaced by the overburden material in the mined out opencast pits.
			S	H	P	M	M	
			Without Mitigation					
			S	H	P	M	M	
	Opening of the coal during mining will result in the formation of a void, which will alter the local topographical patterns within the immediate mining area.	Topography	With Mitigation					Ensure that the rehabilitated areas maintain natural slopes and these areas are free draining.
			S	H	P	M	M	
			Without Mitigation					
			S	H	P	M	M	
		Land Capability	With Mitigation					

ACTIVITY	NATURE OF THE IMPACT	ENVIRONMENTAL ASPECT	IMPACT ASSESSMENT					MITIGATION MEASURES
			E	P	D	I	S	
OPERATIONAL PHASE								
	Stripping of top- and subsoil layers during mining will result in the disruption of the soil profile. The soils' physical, chemical and biological properties may be altered due to loss of topsoil through erosion, stockpiling of soils and mixing of deep and surface soils during handling, stockpiling and subsequent placement.		S	M	S	M	L	Systematic removal of coal from the opencast pit.
			Without Mitigation					
			S	M	M	M	M	
	The impact on soils may lead to reduction in the land capability and use.	Land Capability	Without mitigation					Chemical analyses must be conducted to check the properties of soils and a soil specialist must be appointed who will recommend remediation measures that must be undertaken to restore soil properties.
			S	M	S	M	M	
			With mitigation					
			S	L	S	L	L	
	Opencast mining will result in the removal of the topsoil layer, which will result in the loss of vegetation cover. Mining operation may result in the ingress of alien invasive species.	Vegetation	Without mitigation					Create an alien and invasive eradication plan. Stockpile topsoil with its intact vegetation to retain soil properties.
			S	M	S	M	M	
			With mitigation					
			S	L	S	L	L	

ACTIVITY	NATURE OF THE IMPACT	ENVIRONMENTAL ASPECT	IMPACT ASSESSMENT					MITIGATION MEASURES
			E	P	D	I	S	
OPERATIONAL PHASE								
	Disturbance to and/or exclusion of animals currently occupying/utilising the site.	Animal Life	Without mitigation					No unnecessary disturbance of land must be undertaken. Where possible, avoid the distraction of animal habitat. Moreover, rehabilitate the area in such that it will allow animals to migrate back to the land.
			S	M	S	M	M	
			With mitigation					
			S	L	S	L	L	
	There is a risk that mining employees will resort to trapping of wild animals that may still be present on site and surrounding areas.	Animal Life	Without mitigation					No poaching will be allowed on site. Create an environmental awareness plan on biodiversity and educate employees on preserving animals on site.
			S	M	S	M	M	
			With mitigation					
			S	L	S	L	L	
	Formation of a void during mining will result in loss of MAR within the catchments. Surface run-off may result in soil erosion over rehabilitated areas.	Surface Water Quality	Without Mitigation					Ensure that the operational coal covers as little space as possible during mining; hence rehabilitation must be conducted concurrently with mining to ensure that the mined areas are returned to free draining surfaces. Establish vegetation as soon as possible after completion of the soil placement and profiling.
			S	M	S	L	L	
			With Mitigation					
			S	M	S	L	L	

ACTIVITY	NATURE OF THE IMPACT	ENVIRONMENTAL ASPECT	IMPACT ASSESSMENT					MITIGATION MEASURES
			E	P	D	I	S	
OPERATIONAL PHASE								
	Water captured within the pit may contain elevated ion concentrations, which may impact detrimentally on the environment if allowed to enter the natural environment.	Groundwater Quantity	Without Mitigation					All dirty water from the mine will be diverted and captured within the opencast pit. All mining activities will be undertaken outside the 1:100-year flood line.
			S	M	S	L	L	
			With Mitigation					
			S	M	S	L	L	
	Since no mining will be undertaken within the 1:100-year flood line, no wetland is expected to be physically affected by the proposed mine	Groundwater Quality	Without Mitigation					Surrounding boreholes used by residents must be monitored on a quarterly basis. This will determine the extent of the dewatering cone from the opencast pit and any user affected must be compensated by the mine
			S	M	S	L	L	
			With Mitigation					
			S	M	S	L	L	
	During the operational phase, it is expected that the main impact on the groundwater quantity will be dewatering of the surrounding aquifer and loss of groundwater contribution to catchment base flow. Water entering the mining pit will have to be pumped out to enable mining activities to continue. This may cause a lowering of the groundwater table in and around the mine	Groundwater Quantity	Without Mitigation					Mining must be undertaken concurrently with rehabilitation. Only three cuts must be operational at any time during mining, hence reducing the extent of the cone of depression.
			S	M	S	L	L	
			With Mitigation					
			S	M	S	L	L	

ACTIVITY	NATURE OF THE IMPACT	ENVIRONMENTAL ASPECT	IMPACT ASSESSMENT					MITIGATION MEASURES
			E	P	D	I	S	
OPERATIONAL PHASE								
	and hence loss of groundwater to catchment base flow. No privately owned boreholes were identified within the area.							
	Carbonaceous material remaining from the removal of run of mine coal may cause acid mine drainage after rehabilitation of the opencast pit. This may cause more harm on the already damaged groundwater regime.	Groundwater Quality	Without Mitigation					Reduce the exposure of the carbonaceous material to free oxygen. This will be achieved by placing the carbonaceous material at the bottom of the opencast pit and backfill as fast as possible.
			S	M	S	L	L	
			With Mitigation					
			S	M	S	L	L	
	During mining, fine coal, coal and soil dust may accumulate in the workings. This may have health impacts on the employees.	Human Health	Without Mitigation					Employees must be issued with dust masks and instructed to use them. Dust suppression must be undertaken at the opencast pit and all areas where dust may emanate.
			S	M	S	M	M	
			With Mitigation					
			S	M	S	L	L	
	Machine operators in close proximity to machinery will be exposed to noise levels in excess of 85 dB.	Noise	With Mitigation					Issue earplugs to employees and educate on their use and on the effect of noise on their health
			S	L	S	L	L	
			With Mitigation					

ACTIVITY	NATURE OF THE IMPACT	ENVIRONMENTAL ASPECT	IMPACT ASSESSMENT					MITIGATION MEASURES
			E	P	D	I	S	
OPERATIONAL PHASE								
			S	L	S	L	N	
	Some of the social impacts on neighbouring parties relate to noise, visual, air quality deterioration etc. and have been addressed earlier in this section of the impact assessment.	Social	Without Mitigation					No additional mitigation, refer to applicable sections of the impact assessment
			S	L	S	M	L	
			With Mitigation					
			S	L	S	L	L	
	The proposed project will create much needed employment opportunities, which can be enhanced by employing members of the local communities. Capital and operating expenditure on the proposed Coal will benefit the local economy both directly through local buying and indirectly through salaries earned by employees in the area	Social	Positive					No Mitigation Measures
	Potential socio-economic impacts of the mining operation include threat of increase in crime and petty theft	Socio economic aspects	Without Mitigation					Through the environmental awareness plan the employees will be made aware of the impact crime will have on the surrounding farmers and the environment.
			S	L	S	L	L	
			With Mitigation					

ACTIVITY	NATURE OF THE IMPACT	ENVIRONMENTAL ASPECT	IMPACT ASSESSMENT					MITIGATION MEASURES
			E	P	D	I	S	
OPERATIONAL PHASE								
			S	L	S	L	L	
	Blasting of the overburden and coal seams will result in the generation of dust, which may contain fine coal. The dust will migrate towards the wind direction, The dust will also settle on the surrounding vegetation cover. This dust cloud may impact negatively on the nearby residents and wetland areas.	Air Quality	Without Mitigation					During blasting, minimum explosives will be used and the blasting holes will be stemmed. Despite the above, blasting must be done according to a blast design by a basting expert.
			S	M	S	M	M	
			With Mitigation					
			S	S	S	L	L	
	During blasting, noise levels may reach in excess of 130 dBA. Noise, ground vibration and air blast levels from blasting may affected surrounding structures. A distance of 500 meters from the blast is generally accepted as the area of possible negative impact from blasting.	Noise	Without Mitigation					Monitor noise levels to ensure that the required noise levels are maintained within the surrounding areas.
			S	M	S	M	M	
			With Mitigation					
			S	S	S	L	L	
	Visual impacts may result from the proposed Roodepoort Colliery II opencast operation	Visual	Without Mitigation					Ensure that a visual berm is constructed on any visible parts of the proposed mining operation.
			S	M	S	M	M	
			With Mitigation					
			S	S	S	L	L	

ACTIVITY	NATURE OF THE IMPACT	ENVIRONMENTAL ASPECT	IMPACT ASSESSMENT					MITIGATION MEASURES
			E	P	D	I	S	
OPERATIONAL PHASE								
Activity 21 listing notice 1: Any activity including the operation of that activity which requires a mining permit in terms of section 27 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including association infrastructures, earthworks, directly related to the extraction of the mineral resource.								
Operation of the coal stockpile area	The stockpiling of the coal will result in the formation of a topographical highpoint.	Topography	Without Mitigation					The coal at the coal stockpiles will be removed as soon as possible and the area rehabilitated during the decommissioning phase. Rehabilitate the opencast pit concurrently with mining.
			S	M	S	L	L	
			With Mitigation					
			S	M	S	L	L	
	Runoff from the coal stockpiles may contain elevated chemical concentrations, which will impact negatively on the environment if released.	Surface Water Quality	Without Mitigation					Divert all runoff water from the coal stockpiles area to the in-pit sump.
			S	M	S	L	L	
			With Mitigation					
			S	M	S	L	L	
	Rain water entering the coal stockpiling areas will come into contact with coal resulting in the contamination of the water. Allowing the water to seep into the	Ground Water Quantity	Without Mitigation					Use compacted material for the construction of the foundation of the coal stockpile areas and allowing the drainage from the area to report to the in-pit sump
			S	M	S	L	L	
			With Mitigation					

ACTIVITY	NATURE OF THE IMPACT	ENVIRONMENTAL ASPECT	IMPACT ASSESSMENT					MITIGATION MEASURES
			E	P	D	I	S	
OPERATIONAL PHASE								
	groundwater regime will result in the pollution of groundwater.		S	M	S	L	L	
Operation of other mine infrastructure	During transportation and stockpiling of coal, machinery movement and wind blowing over exposed surfaces will generate diesel fumes, soil and coal dust.	Air Quality	Without Mitigation					Place coal stockpiles such that impacts are limited. Limit the size of the coal stockpiles to the recommended size. Keep mine vehicles in good repair order.
			S	M	S	L	L	
			With Mitigation					
			S	M	S	L	L	
	The dust will during windy days form dust clouds and migrate towards the wind direction, which will eventually settle on vegetation cover and surrounding property. This dust cloud may impact negatively on the nearby residents and on the natural vegetation cover.	Vegetation	Without Mitigation					Conduct dust suppression on the roads within the stockpiling area and limit the vehicle activity as much as possible on these roads.
			S	M	S	L	L	
			With Mitigation					
			S	M	S	L	L	
	The coal stockpiles may be visible from a certain distance resulting in a visual impact.	Visual	Without Mitigation					Use visual berms to shield visible parts of the mine.
			S	M	S	L	L	
			With Mitigation					

ACTIVITY	NATURE OF THE IMPACT	ENVIRONMENTAL ASPECT	IMPACT ASSESSMENT					MITIGATION MEASURES
			E	P	D	I	S	
OPERATIONAL PHASE								
			S	M	S	L	L	
	The presence of the coal stockpiles will have an impact on the neighbouring landowners due to the dust and noise generated from the operation of the coal stockpiling areas. Note however, that the coal from the mine will be wet resulting in limited generation of dust if removed soon enough.	Social	Without Mitigation					Conduct dust suppression. Maintain the mine vehicles in good order. Limit the activity within the coal stockpiling area. Conduct dust and noise monitoring and undertake recommendations from the results of such monitoring. Remove coal from the stockpile as soon as possible (if possible, within one to two days of stockpiling).
			S	M	S	M	M	
			With Mitigation					
			S	M	S	L	L	
	The transportation of coal and overburden material (top soils, sub soils and hards) along the haul roads may result in the contamination of virgin land (soil and vegetation) due to spillages along the roads.	Land Capability/ Soil	Without Mitigation					Trucks to obey maximum speed limit to be set by the mine. Construct spillage control measures such as berms along the roads. All roads to be inspected regularly for any spillages. Any spillages will be removed as soon as it is practically possible.
			S	M	S	M	M	
			With Mitigation					
			S	M	S	L	L	
	The transportation of coal and overburden material (top soils, sub soils and hards) along the haul roads may result in the	Land Capability/ Soil	Without Mitigation					Trucks transporting coal to the destined clients must cover the coal with tarpaulins to prevent spillages along the roads.
			S	M	S	L	L	
			With Mitigation					

ACTIVITY	NATURE OF THE IMPACT	ENVIRONMENTAL ASPECT	IMPACT ASSESSMENT					MITIGATION MEASURES
			E	P	D	I	S	
OPERATIONAL PHASE								
	contamination of virgin land (soil and vegetation) due to spillages along the roads.		S	M	S	L	L	
	Leaking oils and fluids from trucks will result in the contamination of soils along the haul and access roads.	Land Capability/ Soil	Without Mitigation					Maintain mine vehicles in good repair order. Emergency repairs to be conducted on protected ground e.g., areas covered with tarpaulins. All roads to be inspected regularly for any spillages. Any spillages will be removed as soon as it is practically possible.
			S	M	S	L	L	
			With Mitigation					
			S	M	S	L	L	
	Spillage from the hydrocarbon fluids storage areas (diesel tanks and oil storage areas) in the mining area may result in the contamination of the soils and nearby streams.	Soil/Surface Water Quality	Without Mitigation					Any accidental spillages to be collected and remedied as soon as possible. Mine must always have oil spill remediation kits at the mine. All new hydrocarbons must be stored on demarcated areas and use thereof must be recorded. All old hydrocarbons must be recycled or disposed of properly.
			S	M	S	M	M	
			With Mitigation					
			S	M	S	L	L	
		Soil/Ground Water Quality	Without Mitigation					Emergency repairs must be conducted on protected ground e.g., tarpaulins.
			S	M	S	M	M	

ACTIVITY	NATURE OF THE IMPACT	ENVIRONMENTAL ASPECT	IMPACT ASSESSMENT					MITIGATION MEASURES
			E	P	D	I	S	
OPERATIONAL PHASE								
	Spillage of hydrocarbon fluids outside the mining area may result in the contamination of the soils, surface and groundwater.		With Mitigation					
			S	M	S	L	L	
	Runoff water from the haul/access roads will contain elevated levels of hydrocarbons and coal contaminated silt loads respectively, which will impact negatively on the environment if released.	Surface Water	Without Mitigation					Hydrocarbons must be separated from the water and silt before their disposal.
			S	M	S	L	L	
			With Mitigation					
			S	M	S	L	L	
	Use of haul and access roads will result in the generation of dust, which may impact negatively on neighbouring landowners, employees and the nearby roads.	Air quality	Without Mitigation					Haul roads must be graded regularly to remove any layer of coal material from the vehicles. Conduct dust suppression on the roads Maintain the roads on a regular basis.
			S	M	S	L	L	
			With Mitigation					
			S	M	S	L	L	
	Employees working in close proximity to mine machinery will be exposed to high	Noise	Without Mitigation					Issue employees with earplugs and instruct them how to use the earplugs.
			S	M	S	L	L	

ACTIVITY	NATURE OF THE IMPACT	ENVIRONMENTAL ASPECT	IMPACT ASSESSMENT					MITIGATION MEASURES
			E	P	D	I	S	
OPERATIONAL PHASE								
	levels of noise, which may in the long term be detrimental to their health.		With Mitigation					
			S	M	S	L	L	
	Employees working in close proximity to mine machinery will be exposed to high levels of noise, which may in the long term be detrimental to their health.	Noise	Without Mitigation					The mine must through the implementation of the environmental, awareness plan encourages the employees to use these earplugs.
			S	L	S	L	L	
			With Mitigation					
			S	L	S	L	N	

6.3.1.3. Decommissioning and Closure Phases

NATURE OF THE IMPACT	ENVIRONMENTAL ASPECT	IMPACT ASSESSMENT					MITIGATION MEASURES
		E	P	D	I	S	
DECOMMISSIONING AND CLOSURE PHASES							
Decommissioning of mining (Site Rehabilitation)							
Activity 21 listing notice 1: Any activity including the operation of that activity which requires a mining permit in terms of section 27 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including association infrastructures, earthworks, directly related to the extraction of the mineral resource.							
Contamination of surface water with silt during rehabilitation.	Surface Water Quality	Without mitigation					Construct and maintain contours/berms around the affected areas.
		S	M	S	M	M	
		With mitigation					
		S	L	S	L	L	
Generation of noise	Noise	Without mitigation					Provide earplugs to employees. Ensure that mine machinery used are in good repair.
		S	L	S	L	L	
		With mitigation					
		S	L	S	L	N	
Generation of dust.	Air Quality	Without mitigation					Dust suppression

NATURE OF THE IMPACT	ENVIRONMENTAL ASPECT	IMPACT ASSESSMENT					MITIGATION MEASURES
		E	P	D	I	S	
DECOMMISSIONING AND CLOSURE PHASES							
		S	L	S	L	L	
		With mitigation					
		S	L	S	L	N	
Hydrocarbon spillages may render the infrastructure areas to be of no agricultural value after mining.	Land Capability	Without mitigation					Remove and dispose of all oil, diesel and grease contaminated surfaces and cover with clean topsoil. Work on protected ground (tarpaulins).
		S	L	S	L	L	
		With mitigation					
		S	L	S	L	N	
Generation of noise.	Noise	Without mitigation					Issue earplugs to employees. Ensure that machinery, equipment and vehicles are regularly serviced. Monitor noise levels in the surrounding communities.
		S	L	S	L	L	
		With mitigation					
		S	L	S	L	N	
Generation of dust	Air Quality	Without mitigation					Conduct dust suppression

NATURE OF THE IMPACT	ENVIRONMENTAL ASPECT	IMPACT ASSESSMENT					MITIGATION MEASURES
		E	P	D	I	S	
DECOMMISSIONING AND CLOSURE PHASES							
		S	L	S	L	L	
		With mitigation					
		S	L	S	L	N	
Contamination of surface water with silt generated from the rehabilitated areas.	Surface Water Quality	Without mitigation					Remove carbonaceous build up on the stockpile area and place at the bottom of the opencast pit. Construct contours on rehabilitated areas.
		S	M	S	M	M	
		With mitigation					
		S	L	S	L	L	
Hardened bare areas may cause increased runoff and erosion gullies.	Soil	Without mitigation					All hardened areas must be ripped, areas with topsoil scarified and areas without topsoil covered with a layer of topsoil before being seeded
		S	M	S	M	M	
		With mitigation					
		S	L	S	L	L	
	Land Capability	Without mitigation					

NATURE OF THE IMPACT	ENVIRONMENTAL ASPECT	IMPACT ASSESSMENT					MITIGATION MEASURES
		E	P	D	I	S	
DECOMMISSIONING AND CLOSURE PHASES							
Due to prolonged storage of topsoil, the fertility of the topsoil may have been lost, hence resulting poor re-establishment of vegetation on final rehabilitated area.		S	M	S	M	M	Undertake chemical tests to determine the ability of the topsoil to support vegetation, if it found that the fertility is reduced fertilisers must be used (under the recommendation of a specialist) to improve the fertility of the topsoil.
		With mitigation					
		S	L	S	L	L	
Machine operators in close proximity to machinery will be exposed to noise levels in excess of 85 dB.	Noise	Without mitigation					Issue employees with earplugs and instruct them how to use the earplugs.
		S	M	S	M	M	
		With mitigation					
		S	L	S	L	L	
The movement of mine machinery within the mine surface areas will also create noise, which may be a nuisance to the residents of the neighbouring property.	Noise	Without mitigation					The mine must keep their machinery in good repair.
		S	L	S	L	L	
		With mitigation					
		S	L	S	L	N	

NATURE OF THE IMPACT	ENVIRONMENTAL ASPECT	IMPACT ASSESSMENT					MITIGATION MEASURES
		E	P	D	I	S	
DECOMMISSIONING AND CLOSURE PHASES							
Ponding and erosion gullies will result in the failure to revert the mined area to recommended land use after mining.	Land Capability	Without mitigation					Monitor rehabilitated areas. Any signs of ponding must be addressed by levelling as soon as possible.
		S	M	S	M	M	
		With mitigation					
		S	L	S	L	L	
Invader species and noxious weeds may colonise the areas prior to the establishment of natural vegetation.	Vegetation	Without mitigation					Progress of establishment of re-vegetation must be monitored regularly. Identified declared invader species or exotic plant species must be removed.
		S	M	S	M	M	
		With mitigation					
		S	L	S	L	L	
Rehabilitated areas may show areas of soil erosion, which may remove replaced topsoil.	Soil	Without mitigation					Monitor rehabilitated areas. Any signs of soil erosion must be addressed by levelling as soon as possible.
		S	L	S	L	L	
		With mitigation					
		S	L	S	L	N	

6.4. SUMMARY OF SPECIALIST REPORTS

For this basic assessment, no specialist report was conducted, only the desktop assessment analysis of the environmental aspects was conducted. The baseline information is summarized in section 5.4 above.

6.5. ENVIRONMENTAL IMPACT STATEMENT

Ndzilo Coal (Pty) Limited has applied for a mining permit over the Roodepoort Colliery II. The mining operation will involve the systematic removal of coal and pseudocoal within the Roodepoort Colliery II. A conventional opencast mining will be used for the mining of the materials. After mining has ceased the mined-out area will be backfilled, shaped and seeded.

6.5.1. Description of affected environment

The proposed project is situated within the KwaMhlanga region. The proposed project is situated in area characterised by A relatively flat surfaces with rivers such as the Moses River. A variety of soil types were identified within the project area, which include well-drained, deep Hutton or Clovelly soils. The land uses over the project area correspond to the soils found in the area and include mainly agriculture. Due to the above land uses significant change has occurred on the natural vegetation within the proposed Roodepoort Colliery II, with most of the area being agricultural conforming to modified land.

6.5.2. Summary of key findings of the environmental impact assessment

During the proposed mining operation impacts may only occur on soils, natural vegetation, surface water, groundwater, sensitive landscapes, air quality, noise, and visual aspects should the mining method statement not be adhered to, Ndzilo Coal (Pty) Limited will undertake measures to ensure that the identified impacts are minimised. Assessment of the impacts with the proposed mitigation measures has shown the significance of the impacts on all affected environmental aspects to be reduced from to low and negligible significance.

6.6. ASPECTS FOR INCLUSION AS CONDITIONS OF THE ENVIRONMENTAL AUTHORISATION

In authorising the proposed Roodepoort Colliery II, the following conditions should form part of the environmental authorisation:

- Ndzilo Coal (Pty) Limited may not alter the location of any of the project activities included in this environmental impact assessment without obtaining the required environmental authorisation to do so under NEMA.
- Ndzilo Coal (Pty) Limited will not undertake any new activity that was not part of this environmental impact assessment and that will trigger a need for an environmental authorisation without proper authorisation.
- The EMPR must be implemented fully at all stages of the proposed project.
- Ndzilo Coal (Pty) Limited must limit night-time operations. This would be relevant for all work taking place at night within 150 m from the closest receptors in this community. If night work is conducted, such must be conducted in agreement with the land owners and affected parties (lawful land occupier and labours).

6.7. DESCRIPTION OF ASSUMPTIONS, UNCERTAINTIES AND GAPS IN KNOWLEDGE

The EIA Regulations, 2014 outline specific requirements that a description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures must be provided in the BAR.

The assessments undertaken are based on conservative methodologies and these methods attempts to determine potential negative impacts that could occur on the affected environmental aspects. These impacts may however be of smaller magnitude than predicted, while benefits could be of a larger extent than predicted.

This section outlines various limitations to the specialist studies that have been undertaken and indicates, where appropriate, the adequacy of predictive methods used for the assessment. This has been done to provide the authorities and interested and affected parties with an understanding of how much confidence can be placed in this impact assessment.

The impact assessment has investigated the potential impact on key environmental media relating to the specific environmental setting for the site. A number of desktop assessment were undertaken and result thereof and are presented in this report.

The information provided in this BAR and EMPR is therefore considered sufficient for decision-making purposes.

6.8. REASONED OPINION AS TO WHETHER THE PROPOSED PROJECT SHOULD OR SHOULD NOT CONTINUE

6.8.1. Reason why the activity should be authorised or not

According to the impact assessment undertaken for the proposed project, the key impacts of the project are on water, dust, noise and close-by community.

The project will also have positive impacts due to the employment to be created although for a short term.

The public will also be requested for their comments. These comments will be addressed as far as possible to the satisfaction of the interested and affected parties.

The management of the impacts identified in the impact assessment for all phases of the proposed project will be undertaken through a range of programmes and plans contained in the EMPR. In consideration of the programmes and plans contained within the EMPR, layouts and method statements compiled for the project, which is assumed will be effectively implemented, there will be significant reduction in the significance of potential impacts.

Based on the above, it is therefore the opinion of the EAP that the activity should be authorised.

6.8.2. Conditions that must be included in the authorisation

In authorising the proposed Roodepoort Colliery II, the following conditions should form part of the environmental authorisation:

- Ndzilo Coal (Pty) Limited may not alter the location of any of the project activities included in this environmental impact assessment without obtaining the required environmental authorisation to do so under NEMA.
- Ndzilo Coal (Pty) Limited will not undertake any new activity that was not part of this environmental impact assessment and that will trigger a need for an environmental authorisation without proper authorisation.

- The EMPR must be implemented fully at all stages of the proposed project.
- Ndzilo Coal (Pty) Limited must limit night-time operations. This would be relevant for all work taking place at night within 150 m from the closest receptors in this community. If night work is conducted, such must be conducted in agreement with the land owners and affected parties (lawful land occupier and labours).

6.9. PERIOD FOR WHICH THE ENVIRONMENTAL AUTHORISATION

Based on the mining method statement, the environmental authorisation should be given for two years.

6.10. UNDERTAKING

The signed undertaking will be presented to the DMRE on execution of the Roodepoort Colliery II.

6.11. FINANCIAL PROVISION

According to the EIA Regulations, 2014, where applicable, details of any financial provisions for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts must be provided in the BAR and EMPr. The financial provision will be provided in the final BAR.

6.12. OTHER INFORMATION REQUIRED BY THE COMPETENT AUTHORITY

Aside from the BAR and EMPR no other information has been requested by the competent authority.

6.13. OTHER MATTERS REQUIRED IN TERMS OF SECTION 24 (4) (A) AND (B) OF THE ACT

Any matter required in terms of the above section of the Act will be complied together with Ndzilo Coal (Pty) Limited.

PART B

Environmental Management Programme

1. DETAILS OF THE EAP

EAP: Mr. Ornassis Tshepo Shakwane

Professional registration:

SACNASP: 117080

EAPASA: 2019/1763

IAIA Membership No.: 3847

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1.1. EXPERTISE OF THE EAP WHO PREPARED THE BAR AND EMPR

Geovicon Environmental (Pty) Limited is a geological and environmental consulting company. The company was formed during 1996, and currently has more than 20 years' experience in the geological and environmental consulting field. Geovicon Environmental (Pty) Limited has successfully completed consulting areas in the Mining sector (coal, gold, base metal and diamond), Quarrying sector (sand, aggregate and dimension stone), industrial sector and housing sector. Geovicon Environmental (Pty) Limited has undertaken contracts within all the provinces of South Africa, Swaziland, Botswana and Zambia. During 2001 Geovicon Environmental (Pty) Limited entered the field of mine environmental management and water monitoring.

Geovicon Environmental (Pty) Limited is a Black Economically Empowered Company with the BEE component owning 60% of the company. Geovicon Environmental (Pty) Limited has three directors i.e. O.T Shakwane, J.M. Bate and T.G Tefu.

Mr. O.T Shakwane obtained his BSc (Microbiology and Biochemistry) from the University of Durban Westville in 1994, and completed his honours degree in Microbiology in 1995. Mr O.T Shakwane has also completed short courses on environmental law and environmental impact assessment with the University of North West's Centre for Environmental Management. He has worked with the three state departments tasked with mining and environmental management i.e. Department of Water and Sanitation (Gauteng and Mpumalanga Region), Department of Mineral Resources (Mpumalanga Region) and Department of Agriculture, Conservation and Environment (Gauteng Region). Mr. Shakwane has been in the consulting field since 2004 and has completed various areas similar to the proposed Roodepoort Mining area as an environmental assessment practitioner. Mr Shakwane is the environmental assessment practitioner for the environmental impact assessment for the proposed Roodepoort Mining Permit area.

Over the past years Geovicon Environmental (Pty) Limited has formalised working relationships with companies that offer expertise in the following fields i.e., Geohydrology, Civil and Geotechnical

Engineering, Geotechnical Consultancy, Survey and Mine Planning and Soil & Land Use Consultancy. Geovicon Environmental (Pty) Limited is an independent consulting company, which has no interest in the outcome of the decision regarding the Roodepoort Mining Permit Area's basic assessment process. Curriculum Vitae of the EAP is attached as **Appendix E.**

2. DESCRIPTION OF THE ASPECTS OF THE ACTIVITY

The requirements to describe the aspects of the activity are covered in the environmental management programme and are included in PART A of the document under section 1. The reader is; therefore, referred to section 1 of PART A of this document.

3. COMPOSITE MAP

The map superimposing the proposed project, its associated structures and infrastructure on the environmental sensitivities of the preferred site will be provided on approval of the EMPR. Note that all areas that must be avoided due to their environmental sensitivity will be indicated in the Layout Plan.

4. DESCRIPTION OF THE MANAGEMENT OBJECTIVES INCLUDING MANAGEMENT STATEMENTS

4.1 General Closure Principles and Objectives

The following are the closure objectives, general principles and objectives guiding closure of the Roodepoort Colliery II area closure planning:

- Rehabilitation of areas disturbed as a consequence of mining to a land capability that will support and sustain a predetermined post-closure land use;
- Removal of all infrastructure/equipment that cannot be beneficially re-used, as per agreements established, and returning the associated disturbed land to the planned final land use;
- Removal of existing contaminated material from affected areas;
- Establishment of final landforms that are stable and safe in the long run;
- Establishment and implementation of measures that meet specific closure related performance objectives;
- Monitoring and maintenance of rehabilitated areas forming part of site closure to ensure the long-term effectiveness and sustainability of measures implemented.

4.2 Management of Environmental Damage, Environmental Pollution and Ecological degradation caused by THE Roodepoort Colliery II Activities

The following actions will be undertaken by Ndzilo Coal (Pty) Limited to ensure that the closure objectives are attained.

4.2.1 Infrastructure Areas

- All infrastructure and equipment used during the mining operation will be removed from the site.

- All haul roads that were used for access during mining will be allowed to re-establish to its pre-mining condition. Should unsatisfactory results be noted, the area will be physically rehabilitated.
- All rehabilitated areas will be maintained for a period of 2 years, where after the frequency will be reassessed. Where necessary, vegetation cover will be maintained by annual application of fertiliser.
- Maintenance with respect to erosion will be conducted on a minimum three-monthly basis if and where required.

4.2.2.1 Buildings (Offices, Workshops and Stores)

Mobile structures will be used and such structures will be removed from the sites during decommissioning phase.

4.3 POTENTIAL RISK OF ACID MINE DRAINAGE

Sulphate is probably the most reliable indicator of pollution emanating from coal mining. Sulphate concentrations can however increase due to mobilisation during the mining process. The chemistry analyses supplied within this report should henceforth serve as baseline water quality throughout of acid mine drainage (AMD) formation.

The reactions of acid and sulphate generation from sulphide minerals are discussed according to the three-stage stoichiometric example of pyrite oxidation after James, (1997) and (Ferguson & Erickson, 1988) in which one mole of pyrite oxidized forms two moles of sulphate:

Reaction (2.1) represents the oxidation of pyrite to form dissolved ferrous iron, sulphate and hydrogen. This reaction can occur abiotically or can be bacterially catalysed by *Thiobacillus ferrooxidans*.

$$FeS_2 + 7/2\ O_2 + H_2O = Fe^{2+} + 2SO_4^{2-} + 2H^+ \qquad (2.1)$$

The ferrous iron, (Fe^{2+}) may be oxidised to ferric iron, (Fe^{3+}) if the conditions are sufficiently oxidising, as illustrated by reaction (2.2). Hydrolysis and precipitation of Fe^{3+} may also occur, shown by reaction (2.3). Reactions (2.1), (2.2) and (2.3) predominate at pH > 4.5.

$$Fe^{2+} + 1/4O_2 + H^+ = Fe^{3+} + 1/2H_2O \qquad (2.2)$$

$$Fe^{3+} + 3H_2O = Fe(OH)_3\,(s) + 3H^+ \qquad (2.3)$$

Reactions (2.1) to (2.3) are relatively slow and represent the initial stage in the three-stage AMD formation process.

Stage the life of the proposed mining operations. The following few paragraphs contains a brief overview 1 will persist as long as the pH surrounding the waste particles is only moderately acidic (pH > 4.5). A transitional stage 2 occurs as the pH decreases and the rate of Fe hydrolyses (reaction 2.3) slows, providing ferric iron oxidant. Stage 3 consists of rapid acid production by the ferric iron oxidant pathway and becomes dominant at low pH, where the Fe^{2+} (ferric iron) are more soluble (reaction 4):

$$FeS_2 + 14\ Fe^{3+} + 8H_2O = 15Fe^{2+} + 2SO_4^{2-} + 16H^+ \qquad (2.4)$$

Without the catalytic influence of the bacteria, the rate of ferrous iron oxidation in an acid medium would be too slow to provide significant AMD generation. As such the final stage in the AMD generation process occurs when the catalytic bacteria *Thiobacillus ferrooxidans* have become established.

Reactions (2.2) and (2.4) then combine to form the cyclic, rapid oxidation pathway mainly responsible for the high contamination loads observed in mining environments.

4.4 STEPS TAKEN TO INVESTIGATE, ASSESS AND EVALUATE THE IMPACTS OF THE ACID MINE DRAINAGE

The identification of the monitoring parameters is crucial and depends on the chemistry of possible pollution sources. They comprise a set of physical and/or chemical parameters (e.g., groundwater levels and predetermined organic and inorganic chemical constituents). Once a pollution indicator has been identified it can be used as a substitute to full analysis and therefore save costs. The use of pollution indicators should be validated on a regular basis in the different sample position. The parameters should be revised after each sampling event; some metals may be added to the analyses during the operational phase, especially if the pH drops.

4.5 ENGINEERING AND DESIGNS SOLUTIONS TO BE IMPLEMENTED TO AVOID OR REMEDY ACID MINE DRAINAGE

Mining should aim to remove as much of the coal seam (acid generating material) as possible.
Separate acid generating material and non-acid generating material, as characterised by geochemical sampling and analyses, should be separated during mining.
Manage in-pit seepage and rainfall through a collection and storage system. Water stored in pit should be utilised locally for dust suppression, as far as possible. Excess pit water should be pumped to surface to be incorporated into the mine water balance.
The size of un-rehabilitated areas (pit, spoils, and un-vegetated areas) that produce contaminated runoff should be minimised.
Rehabilitation should be planned to promote free drainage and to minimise or eliminate ponding of storm water. On-going rehabilitation as mining operations progress is required.
The clean and dirty water flow areas on a mine site should be identified.
Engineer the final backfilled opencast topography such that runoff is directed away from the opencast areas.
The final layer (just below the topsoil cover) should be as clayey as possible and compacted if feasible, to reduce recharge to the opencasts.

4.6 MEASURES TO REMEDY RESIDUAL OR CUMULATIVE IMPACTS FROM ACID MINE DRAINAGE

Remove as much coal from the opencasts as possible, as pyritic material that is the main cause of acid mine drainage, is associated with the coal.

Place remaining acid producing material as low as possible in the pit to ensure fast flooding of the material. All mined areas should be flooded as soon as possible to bar oxygen from reacting with remaining pyrite.

4.7 VOLUMES AND RATES OF WATER USE REQUIRED FOR THE PROPOSED PROJECT

The volumes and rates of water use required for the mining operation will be assessed during the mining activities.

4.8 WATER USE LICENCE APPLICATION

No Integrated water use licence application will be submitted to the Department of Water and Sanitation (DWS) for the proposed mining operation.

5. ENVIRONMENTAL MANAGEMENT PROGRAMME

Table 14: Environmental Management Programme for the proposed Roodepoort Colliery II.

Impact Activity Reference	Environmental Attribute	Impact Management Objectives	Targets (Impact Management Outcomes)	Management Actions and Interventions	Responsibility For Actions/Intervention	Monitoring Action	Responsibility and Frequency for Monitoring	Time period for Management Action
CONSTRUCTION PHASE								
Construction of mine infrastructure, haul and access roads, box-cut, PCD and diversion trenches.								
Activity 21 of listing notice 1: Any activity including the operation of that activity which requires a mining permit in terms of section 27 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including association infrastructures, earthworks, directly related to the extraction of the mineral resource. **Activity 27 of listing notice 1**: The clearance of an area of 1 hectare or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for the undertaking of a linear activity or maintenance purposes undertaken in accordance with a maintenance management plan.								
Loss of soils, erosion of the soils and impacts on land owner's livelihood.	Soils, Topography Land Use and Land Capability.	To ensure that the activities in the development of the mining area and associated infrastructure do not have detrimental impacts on the soils, land use and land capability.	Ensure that stockpile construction have minimum impact on topography.	Stockpile soils in designated areas. Ensure that there is no unnecessary disturbance of the area. Keep the stockpile height at 15 m maximum. Ensure that no erosion of the stockpiles occurs and that soils are stripped with its vegetation.	Appointed contractor and site manager.	Visual monitoring through inspections.	Environmental Control Officer (ECO) during construction.	During construction phase.
			Ensure that excavation of the initial box-cuts has minimum impact on topography. Ensure that movement and stockpiling of soils do not detrimentally reduce the fertility of the topsoil	Remove on average a layer of 300 mm of topsoil from the infrastructure areas and stockpile areas (subsoil overburden, hards material and run of mine coal stockpiling areas) and all soil forms (topsoil) from the initial box-cut area before removing the remaining soil profile (subsoil) and hard overburden material. Stockpile topsoil separately from subsoil and hards overburden.	Appointed contractor and the applicant site manager.	Visual monitoring and inspections.	ECO monthly.	During construction phase.
			Ensure that soil movement is conducted to have minimum impact on the viability of the soils.	All topsoil will be removed only in necessary areas. No unnecessary disturbance of natural habitat must be allowed.	Appointed contractor.	Visual monitoring and inspections	ECO monthly.	During construction phase.
Loss of natural vegetation in the affected areas.	Flora.	To ensure that the establishment of the mining area and associated infrastructure/equipment do not have detrimental impact on the area's flora.	Ensure that the removal of topsoil is conducted such that the impacts on the area's ability to maintain a natural vegetation cover is minimised	Minimum depth of topsoil removal will be 300 mm form the stockpiling and the initial box-cut area. This will ensure that the seed bank of the topsoil is as far as possible preserved. The soil must be stripped with its intact vegetation.	Appointed contractor and site manager.	Visual monitoring and inspections.	ECO monthly.	During construction phase.
			Ensure that stockpiling of topsoil is conducted in a manner that will not impact on the ability of	All topsoil removed will be stockpiled separately on the designated topsoil stockpile area.	Appointed contractor and site manager.	Visual monitoring and inspections.	ECO monthly.	During construction phase.

Impact Activity Reference	Environmental Attribute	Impact Management Objectives	Targets (Impact Management Outcomes)	Management Actions and Interventions	Responsibility For Actions/Intervention	Monitoring Action	Responsibility and Frequency for Monitoring	Time period for Management Action
			the area to maintain vegetation cover					
Migration of animal life due to disturbance caused proposed project	Animal Life	Ensure that the animal life within in the project is not affected by the proposed project	Maintenance of the current status on animal life within the project area	Establishment of the site will be undertaken according to the mining method statement.	Appointed contractor and site manager.	Visual monitoring and inspections.	ECO monthly.	During construction phase.
				Poaching and hunting will be prohibited at the mining site. The mine must create biodiversity awareness/education to ensure that the employees and any person rendering a service at the mine including visitors are aware of the importance of preserving biodiversity.	Appointed contractor and site manager.	Visual monitoring and inspections.	ECO monthly.	During construction phase.
Deterioration of water quality in in the nearby steams and within the groundwater regime.	Surface and Ground Water.	Ensure that the establishment of the project and its associated infrastructure does not have detrimental impact on nearby stream and the groundwater regime.	Ensure that construction of mine infrastructure has the least possible impact on the surface water runoff patterns, and thus loss of MAR within all catchments.	Construct infrastructure according to design specifications. Implement surface water management strategies.	Appointed contractor and site manager.	Regular inspections.	ECO monthly.	During construction phase.
			Ensure that impacts from diesel spills on surface water quality are minimised.	Remove diesel spills as soon as possible. Keep spill kits on site at all times and educate employees and any other person rendering service at the mine on how to use spill kits and/or report spills to the relevant department or responsible person. Any emergency repairs within the mining area must be conducted on protected ground either a concreted floor or on top of tarpaulin.	Appointed contractor and site manager	Regular inspections.	ECO monthly	During the construction phase
			Ensure that impacts from dirty water captured within the mine, on surface water quality is minimised**.**	Any dirty water captured within the mine must be diverted to the sump and the mine must construct dirty water and clean water separation structures. Implement a surface water monitoring programme.	Appointed contractor and site manager	Regular inspections	ECO monthly.	During construction phase.
			Ensure that diversion trenches/berms, and initial box-cut are designed and constructed to minimise impacts on ground water.	Any dirty water captured within the mine must be diverted to the sump and the mine must construct dirty water and clean water separation structures. Implement a ground water monitoring programme. Monitoring of all boreholes should commence prior to any construction or mining. Groundwater monitoring (i.e. sampling and water level measurements) should be conducted at quarterly intervals. Groundwater samples should be analysed at a SANAS accredited laboratory for chemical	Appointed contractor and site manager	Regular inspections	ECO monthly	During construction phase.

Impact Activity Reference	Environmental Attribute	Impact Management Objectives	Targets (Impact Management Outcomes)	Management Actions and Interventions	Responsibility For Actions/Intervention	Monitoring Action	Responsibility and Frequency for Monitoring	Time period for Management Action
				and physical constituents generally affected by coal mining and related activities.				
Air pollution through air pollutants' emissions, from the construction site.	Air quality.	Ensure that all operations during the construction phase do not result in detrimental air quality impacts.	Ensure that impacts from dust and diesel fumes generated by machinery on local air quality is minimised	All machinery will be fitted with the correct exhaust systems, which will be maintained and the mine must keep maintenance records.	Appointed contractor and site manager.	Visual inspections of areas with possible dust emissions.	ECO monthly.	During construction phase.
			Ensure that impacts from dust generated by blowing wind on local air quality is minimised.	Water for dust suppression purposes will be obtained from the sump. If dust suppression is not effective, the mine must resort to other dust suppression methods. Speed on access and haul roads will be limited to 40 km/hour.	Appointed contractor and site manager	Regular inspections	ECO monthly	During construction phase
			Ensure that impacts from dust generated by blasting on local air quality is minimised.	Blasting will as far as possible be conducted when wind direction is away from the houses.	Appointed contractor and site manager	Regular inspections.	ECO monthly	During construction phase
Increased noise levels.	Noise aspects.	Ensure that the noise levels emanating from the construction sites will not have detrimental effects on the mine employees and surrounding communities/land owners.	Ensure that noise impacts on machine operators and/or residences are minimised.	Machine operators will be issued with earplugs, and instructed how to use them. Ensure that machines, vehicles and equipment are well services and maintained so that they do not produce loud noise when being used.	Appointed contractor and site manager.	Use of earplugs will be checked and reported.	Site manager will check the use of the earplugs as regularly as possible.	During construction phase.
			Ensure impacts from noise and vibration generated during blasting are minimised	All residences and structures within a 500-meter radius of the proposed mining operation will be surveyed and a photographic record of these taken to determine a pre-mining condition. An open-door policy will be implemented and the mine will keep a complaint's register which will keep records of all complaints, timeframes and solutions implemented regarding issues raised.	Site manager	Regular Inspection.	Site manager checking as regularly as possible.	During construction phase.
Impacts on the Visual Aspects	Visual Aspects.	Ensure that the impacts on the overall visual aesthetic to the residences and landowners in the vicinity of the permit mining area.	Ensure that visual impacts from the generation of dust are minimized.	Blasting holes will be stemmed and a blasting specialist/technician must be appointed to conduct blasting using appropriate explosives.	Appointed contractor and site manager.	Visual monitoring and Inspection.	ECO monthly	During construction phase.
			Ensure that dust generated by wind and movement of machinery is minimised to have minimum visual impacts.	Water for dust suppression purposes will be obtained from the sump. If dust suppression is not effective, the mine must resort to other dust suppression methods. Speed on access and haul roads will be limited to 40 km/hour.	Appointed contractor and site manager.	Visual monitoring and Inspection	ECO monthly	During construction phase.
			Ensure that visual impacts from the	Berms will be constructed around visible parts of the mine to act as visual berms.	Appointed contractor and site manager	Visual monitoring and Inspection.	ECO monthly	During construction phase

Impact Activity Reference	Environmental Attribute	Impact Management Objectives	Targets (Impact Management Outcomes)	Management Actions and Interventions	Responsibility For Actions/Intervention	Monitoring Action	Responsibility and Frequency for Monitoring	Time period for Management Action
			mining activities are minimized					
Damage or destruction of sites with archaeological and cultural significance.	Sites of archaeological and cultural importance.	Ensure that the discovery of any archaeological and cultural is reported and that operational activities does not have detrimental impacts on the heritage sites if any.	The mining operations will be undertaken in compliance with the requirements of the National Heritage Resources Act, 1999 (Act 25 of 1999).	Report any archaeological or cultural discovery and ensure that operation doesn't have detrimental impact on the heritage sites if any.	Appointed contractor.	The site will be monitored for any mining related damages on a regular basis.	ECO monthly.	During construction phase.
Impact from the influx of job seekers and employment of farm labourers.	Socio-economic aspects.	Ensure that measures are taken to discourage influx of job seekers.	Measures taken will be in line with the company's recruitment policies.	Recruitment will not be undertaken on site and the mine will ensure to create awareness that preference will be given to local people first thus discouraging an influx of job seekers to the area.	Appointed contractor and site manager.	Visual monitoring.	Site manager	During the pre-construction and construction phase.
Impact on the livelihood of the land owners.	Socio-economic aspects.	Ensure that measures are taken to reduce the impact on the livelihood of the land owners.	Measures taken will be in line with the company's social policy.	All personnel entering the properties will be vetted. Employees will not wonder around the properties without supervision. Fire-fighting measures will be implemented and employees will be educated on how to manage fire-outbreaks on site.	Appointed contractor and site manager.	Site inspections and meetings with the land owners	Site manager	During the construction.
OPERATIONAL PHASE								
Operation of other mine infrastructure (pollution control facilities/ mine workshop complex and use of haul and access roads).								
Activity 21 listing notice 1: Any activity including the operation of that activity which requires a mining permit in terms of section 27 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including association infrastructures, earthworks, directly related to the extraction of the mineral resource. **Activity 27 of listing notice 1**: The clearance of an area of 1 hectare or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for the undertaking of a linear activity or maintenance purposes undertaken in accordance with a maintenance management plan.								
Soil profile disruption, contamination of soils, destruction of natural vegetation and loss of land use.	Soils, Natural Vegetation, Land Use and Land Capability.	Ensure that the operation of the systematic removal of coal, stockpiling and transportation do not have detrimental impacts on the soils, natural vegetation and current land use.	Ensure that the operation of the mine infrastructure has minimum impact on the soil.	Any emergency repairs within the mining area must be conducted on protected ground either a concreted floor or on top of tarpaulin. Any accidental spillage of hydrocarbon fluids must be cleaned as soon as possible. Keep spill kits on site.	Appointed contractor and site manager.	Regular inspections	ECO monthly.	During the operational phase of the project.
			Ensure that measures are taken to prevent the severe reduction of land capability due to mining. Ensure that movement and stockpiling of soils do not detrimentally reduce the fertility of the topsoil	Stockpile soils in designated areas. Ensure that there is no unnecessary disturbance of the area. Keep the stockpile height at 15 m maximum. Ensure that no erosion of the stockpiles occurs and that soils are stripped with its vegetation.	Appointed contractor	Regular inspections	ECO monthly	During the operational phase of the project

Impact Activity Reference	Environmental Attribute	Impact Management Objectives	Targets (Impact Management Outcomes)	Management Actions and Interventions	Responsibility For Actions/Intervention	Monitoring Action	Responsibility and Frequency for Monitoring	Time period for Management Action
			Manage the unmined and rehabilitated land within the mining area.	Rehabilitated areas must be maintained to ensure that as far as possible the rehabilitated areas are reverted to grazing land, ensure that there is no unnecessary disturbance of land and that movement and grazing is restricted within rehabilitated areas until the vegetation is fully established.	Appointed contractor	Regular inspections	ECO monthly.	During the operational phase of the project
			Ensure that vegetation on mined out areas and rehabilitated areas becomes self-sustaining	Maintain the vegetation cover by reseeding or applying fertilizers or conducting any other measures recommended by suitably qualified persons on areas showing sparse or unsatisfactory vegetation cover.	Appointed contractor	Regular inspections.	ECO monthly	During the operational phase of the project.
Loss of natural vegetation in the affected areas.	Flora.	To ensure that the establishment of the mining area and associated infrastructure/equipment do not have detrimental impact on the area's flora.	Ensure that the removal of topsoil is conducted such that the impacts on the area's ability to maintain a natural vegetation cover is minimised	Minimum depth of topsoil removal will be 300 mm form the stockpiling and the initial box-cut area. This will ensure that the seed bank of the topsoil is as far as possible preserved. The soil must be stripped with its intact vegetation.	Appointed contractor and site manager.	Visual monitoring and inspections.	ECO monthly.	During the operational phase of the project.
			Ensure that stockpiling of topsoil is conducted in a manner that will not impact on the ability of the area to maintain vegetation cover	All topsoil removed will be stockpiled separately on the designated topsoil stockpile area.	Appointed contractor and site manager	Visual monitoring and inspections.	ECO monthly	During the operational phase of the project.
Migration of animal life due to disturbance caused proposed project	Animal Life	Ensure that the animal life within in the project is not affected by the proposed project	Ensure that loss of indigenous fauna is minimised.	Ensure that environmental education of mine staff takes place at all levels to limit unnecessary damage to habitats and/or disturbance of fauna. Poaching and hunting will be prohibited at the mining site. The mine must create biodiversity awareness/education to ensure that the employees and any person rendering a service at the mine including visitors are aware of the importance of preserving biodiversity.	Appointed contractor and site manager.	Visual monitoring and inspections.	ECO monthly.	During the operational phase of the project.

Impact Activity Reference	Environmental Attribute	Impact Management Objectives	Targets (Impact Management Outcomes)	Management Actions and Interventions	Responsibility For Actions/Intervention	Monitoring Action	Responsibility and Frequency for Monitoring	Time period for Management Action
Exposure of soils may lead to increased silt loads in surface water runoff.	Surface and Ground Water.	Ensure that the systematic removal of coal, stockpiling and transportation does not have detrimental impacts on the surface and ground water environment.	Ensure that diesel spillages do not occur.	Remove diesel spills as soon as possible. Keep spill kits on site at all times and educate employees and any other person rendering service at the mine on how to use spill kits and/or report spills to the relevant department or responsible person. Any emergency repairs within the mining area must be conducted on protected ground either a concreted floor or on top of tarpaulin.	Appointed contractor and site manager.	Visual monitoring and inspections.	ECO monthly.	During the operational phase of the project.
			Ensure that runoff reporting into the opencast pit is minimized Ensure that impacts of seepage from the rehabilitated workings on groundwater is minimised	Any dirty water captured within the mine must be diverted to the sump and the mine must construct dirty water and clean water separation structures. Implement a ground and surface water monitoring programme. Construct a pollution control dam designed by a qualified person according to the relevant standards and legislation if the in-pit sumps are not adequate	Appointed contractor and site manager.	Visual monitoring and inspections.	ECO monthly	During the operational phase of the project.
	Groundwater and surface water	Ensure that the systematic removal of coal, stockpiling and transportation does not have detrimental impacts on the surface and ground water environment.	Ensure that mining activities don't have detrimental impact on water sources.	Implement a ground water monitoring programme. Groundwater monitoring (i.e. sampling and water level measurements) should be conducted at quarterly intervals. Groundwater samples should be analysed at a SANAS accredited laboratory for chemical and physical constituents generally affected by coal mining and related activities.	Appointed contractor and site manager.	Monitoring and inspections.	ECO/Service provider quarterly	During the operational phase of the project.
	Groundwater	Ensure that the systematic removal of coal, stockpiling and transportation does not have detrimental impacts on the surface and ground water environment.	Ensure that mining activities don't have detrimental impact on water sources for the downstream users.	Mining must be undertaken concurrently with rehabilitation. Only three cuts must be operational at any time during mining, hence reducing the extent of the cone of depression.	Appointed contractor and site manager.	Monitoring and inspections.	ECO/Service provider quarterly	During the operational phase of the project.
Generation of dust and fuel fumes by vehicular movement.	Air quality.	Ensure that the air quality in the vicinity of the mining sites and sites' access routes are not detrimentally altered.	Ensure that impacts from dust and diesel fumes generated by machinery on local air quality is minimised.	All machinery will be fitted with the correct exhaust systems, which will be maintained and in good repair. Enforce a 40km/hour speed limits on site and ensure that dust suppression is undertaken on access and/or haul roads.	Appointed contractor and site manager.	Visual inspections of areas with possible dust emissions.	ECO monthly.	During the operational phase of the project.
			Ensure that impacts from dust generated by blowing wind on local air quality is minimised	Water for dust suppression purposes must be obtained from the sump and used to suppress dust. If dust suppression is not effective, the mine must resort to other dust suppression methods.	Appointed contractor and site manager	Regular inspections	ECO monthly.	During the operational phase of the project.

Impact Activity Reference	Environmental Attribute	Impact Management Objectives	Targets (Impact Management Outcomes)	Management Actions and Interventions	Responsibility For Actions/Intervention	Monitoring Action	Responsibility and Frequency for Monitoring	Time period for Management Action
				Speed on access and haul roads will be limited to 40 km/hour.				
Increased noise levels.	Noise aspects.	Ensure that the noise levels emanating from the operational site will not have detrimental effects on the mine employees and surrounding communities/land owners.	Ensure that noise impacts on machine operators and/or residences are minimised.	Machine operators will be issued with earplugs, and instructed how to use them. Ensure that machines, vehicles and equipment are well services and maintained so that they do not produce loud noise when being used.	Appointed contractor and site manager.	Site checks regularly.	Site manager.	During the operational phase of the project.
			Ensure impacts from noise generated during blasting are minimised	All residences and structures within a 500-meter radius of the proposed mining operation will be surveyed. An open-door policy will be implemented and the mine will keep a complaint's register which will keep records of all complaints, timeframes and solutions implemented regarding issues raised.	Site manager	Use of earplugs will be checked and reported.	Site manager	During the operational phase of the project.
Damage or destruction of sites with archaeological and cultural significance.	Sites of archaeological and cultural importance.	Ensure that the discovery of any archaeological and cultural is reported and that operational activities does not have detrimental impacts on the heritage sites if any.	The mining operations will be undertaken in compliance with the requirements of the National Heritage Resources Act, 1999 (Act 25 of 1999).	Report any archaeological or cultural discovery and ensure that operation doesn't have detrimental impact on the heritage sites if any.	Appointed contractor.	The site will be monitored for any mining related damages on a regular basis.	ECO monthly.	During the operational phase of the project.
Safety, intrusion and livelihood impacts on the landowners and occupiers.	Socio-economic aspects.	Ensure that the mining operation does not significantly disrupt the daily living and movements of the land owners and occupiers.	The mine will ensure that all safety standards are met and that access to landowners and occupiers are not detrimentally affected.	Announce any road closures and other disruptions and maintain roads used for the operation in good order.	Appointed contractor and site manager.	Liaison with affected parties.	Site manager as and when necessary.	During the operational phase of the project.
				Keep communication with land owners and land occupiers open during the operational phase of the project. Ensure that negotiations on compensation are undertaken before the mining can commence. This will include any other conditions that the landowner may deem necessary for the mining operation.	Applicant and site manager.	Meetings with the landowners. Minutes of any meeting held with landowners and agreements will be recorded and filed.	Site manager as and when meetings are held.	During the operational phase of the project.
				Ensure that safety measures are implemented to prevent impacts on land owners and occupiers.	Site manager.	Regular checks and inspections.	Site manager	During the operational phase of the project.

Impact Activity Reference	Environmental Attribute	Impact Management Objectives	Targets (Impact Management Outcomes)	Management Actions and Interventions	Responsibility For Actions/Intervention	Monitoring Action	Responsibility and Frequency for Monitoring	Time period for Management Action
Impact on the livelihood of the land owners.	Socio-economic aspects.	Ensure that measures are taken to reduce the impact on the livelihood of the land owners.	Measures taken will be in line with the company's social policy.	All personnel entering the properties will be vetted. Employees will not wander around the properties without supervision. Fire-fighting measures will be implemented and employees will be educated on how to manage fire-outbreaks on site.	Appointed contractor and site manager.	Site inspections and meetings with the land owners	Site manager	During the operational phase of the project.
DECOMMISSIONING AND CLOSURE PHASE								
Removal of infrastructure and final rehabilitation of disturbed areas								
Activity 21 listing notice 1: Any activity including the operation of that activity which requires a mining permit in terms of section 27 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including association infrastructures, earthworks, directly related to the extraction of the mineral resource.								
Compaction and contamination of soils within the rehabilitation site.	Soils.	Ensure that the soils in the vicinity of the rehabilitation site is not detrimentally impacted.	Ensure that all areas are kept free of erosion	Ripping will be conducted at right angles to the natural slope.	Appointed contractor.	Regular site check.	Site manager will conduct the inspections monthly.	Throughout the decommissioning and closure phases.
				All stockpiled soil will be chemically analysed prior to use. Dependent on the analysis obtained, fertiliser will be added as per analysis recommendation report prior to use for rehabilitation	Appointed contractor	Regular site check.	ECO will conduct the inspections monthly	Throughout the decommissioning and closure phases
Re-instatement of, land capability, land use and topographical patterns.	Land Capability, Land Use and Topography.	Ensure that the rehabilitation of the site re-instate the soil productivity, land capability, land use and topographical patterns	Ensure that all areas are kept free of erosion.	Erosion maintenance will be undertaken by surface ripping of compacted and eroded areas at right angles to the inherent slope. Ensure that area is free draining and there's no ponding on site.	Appointed contractor.	Regular site check.	Site manager will conduct the inspections.	During decommissioning phase and closure phases.
			Ensure that the vegetation has sufficient time to colonise the area.	After this initial period, the rehabilitated areas will be assessed to determine the colonisation of the area and recommendations obtained as to when cultivation/grazing can commence.	Appointed contractor	Regular site check.	Site manager will conduct the inspections.	During decommissioning phase and closure phases.
			Ensure that the vegetation has sufficient time to colonise the area	Rehabilitated areas will be seeded after the first rain. This will ensure that the desired vegetation cover will be achieved.	Appointed contractor.	Regular site check.	Site manager will conduct the inspections.	During decommissioning phase and closure phases.
Pollution of surface water environment.	Surface Water.	Ensure that the rehabilitation of the site does not have detrimental	Ensure that the vegetation has	Dirty water diversion trenches will be kept in place until all dirty areas are rehabilitated.	Appointed contractor.	Regular site check.	Site manager will conduct the inspections.	Throughout the decommissioning and closure phases.

Impact Activity Reference	Environmental Attribute	Impact Management Objectives	Targets (Impact Management Outcomes)	Management Actions and Interventions	Responsibility For Actions/Intervention	Monitoring Action	Responsibility and Frequency for Monitoring	Time period for Management Action
		impacts on the surface water environment.	sufficient time to colonise the area.	All haul roads and stockpiling areas will be graded and ripped. Ripping to be at right angles to the natural slope.	Appointed contractor	Regular site check.	Site manager will conduct the inspections	Throughout the decommissioning phase.
				The storm water diversion trenches will be kept intact and maintained until such time that it can be proven that the rehabilitated area is maintenance free and self-sustaining.	Appointed contractor	Site inspections will be conducted.	Site manager will conduct the inspections	Throughout the decommissioning phase and closure phases.
	Groundwater and surface water.	Ensure that the systematic removal of coal, stockpiling and transportation does not have detrimental impacts on the surface and ground water environment.	Ensure that mining activities don't have detrimental impact on water sources	Implement a ground water monitoring programme. Groundwater monitoring (i.e. sampling and water level measurements) should be conducted at quarterly intervals. Groundwater samples should be analysed at a SANAS accredited laboratory for chemical and physical constituents generally affected by coal mining and related activities.	Appointed contractor and site manager.	Monitoring and inspections.	ECO/Service provider quarterly	During operational phase.
Air pollution from rehabilitation site.	Air quality.	Ensure that rehabilitation do not have detrimental impacts on air quality.	Ensure that the vegetation has sufficient time to colonise the area	Dust suppression will be on going during working day. Water will be obtained from the sump in the pit.	Appointed contractor.	Visual inspections of areas with possible dust emissions will be conducted	ECO will conduct inspections monthly.	Throughout the decommissioning phase.
				All machines will be fitted with the correct exhaust systems	Site manager and appointed contractor	Site inspections will be conducted	Site manager will conduct inspections monthly	Throughout the decommissioning phase
Generated noise from the rehabilitation site.	Noise.	Ensure that the rehabilitation activities does not have detrimental impacts on people.	To ensure that the rehabilitation personnel's health is not adversely affected by noise generation.	All rehabilitation activities will cease at 18h00 to ensure that no third party is impacted on during the night-time hours.	Appointed contractor and site manager.	Regular site check.	Site manager.	Throughout the decommissioning phase.
				Vehicles, machinery and equipments will be serviced regularly. Broken exhaust systems will be replaced.	Site manager and appointed contractor	Regular site check	Site manager	Throughout the decommissioning phase
Damage or destruction of sites with archaeological and cultural significance.	Sites of archaeological and cultural importance.	Ensure that the rehabilitation does not have detrimental impacts on heritage sites if any.	Should heritage sites be identified, they should not be damaged or destroyed by the rehabilitation activities.	Report any archaeological and/or cultural significance discoveries. A hundred-meter buffer will be maintained between any archaeological and cultural important site and the rehabilitation site.	Appointed contractor and the site manager.	The sites will be monitored for any rehabilitation related damages.	ECO will monitor the site monthly.	Throughout the decommissioning phase.
Impact on the livelihood of the land owners.	Socio-economic aspects.	Ensure that measures are taken to reduce the impact on the livelihood of the land owners.	Measures taken will be in line with the company's social policy.	All personnel entering the properties will be vetted. Fire-fighting measures must be implemented and the workforce must be educated on fire management.	Appointed contractor and site manager.	Site inspections and meetings with the land owners	Site manager	Throughout decommissioning phase.

6. FINANCIAL PROVISION

Section 24 P of NEMA requires an applicant applying for an environmental authorisation related to mining to comply with the prescribed financial provision for the rehabilitation, closure and ongoing post decommissioning management of negative environmental impacts before the Minister responsible for mineral resources issues the environmental authorisation. The above-mentioned financial provision may be in the form of a bank guarantee, trust fund or cash.

6.1 DESCRIPTION OF CLOSURE OBJECTIVES AND EXTENT TO WHICH THEY HAVE BEEN ALIGNED TO THE DESCRIBED BASELINE ENVIRONMENT

The closure objectives for the proposed project as detailed under section 4.1 of the EMPR, were determined in consideration of physical (infrastructure), biophysical (environmental) and socio-economic measures as well as alignment to the closure components provided by the Department of Mineral Resources and Energy (DMRE). See section 4.1 for the closure objectives.

6.2 CONFIRMATION THAT THE ENVIRONMENTAL OBJECTIVES IN RELATION TO CLOSURE HAVE BEEN CONSULTED WITH LANDOWNERS AND INTERESTED AND AFFECTED PARTIES

The draft BAR and EMPR is made available to the interested and affected parties during the public participation process for the proposed project. Note that the consultation of interested and affected parties included the owners of the properties directly affected by the proposed project and owners of land immediately adjacent the proposed project area.

The above confirms that the land owners and interested and affected parties will be consulted regarding the environmental objectives in relation to the closure of the proposed project.

6.3 REHABILITATION PLAN FOR THE PROPOSED PROJECT

In terms of Regulation 23 of NEMA EIA Regulations, 2014, an EMPR must address the requirements as determined in the regulations, pertaining to the financial provision for the rehabilitation, closure and post closure of the proposed operations. In view of the above, a rehabilitation plan must be provided to the DMRE in support of the financial provision determined for the proposed operations. Since no disturbance has results on site due to the proposed project no annual rehabilitation plan was compiled.

6.4 COMPATIBILITY OF THE REHABILITATION PLAN WITH THE CLOSURE OBJECTIVES

The rehabilitation plan will be drafted to be compatible with the closure objectives.

6.5 DETERMINATION OF THE QUANTUM OF THE FINANCIAL PROVISION REQUIRED TO MANAGE AND REHABILITATE THE ENVIRONMENT

The financial pecuniary provision for Roodepoort Colliery II will be determined based on the requirements of Chapter 2.4.1. of the Guideline document for the evaluation of the quantum of closure-related financial provision provided by a Mine, revision 1.6, September 2004, DMRE. The financial provision for the first year will be determined and will, with its associated reports be included in the final BAR.

6.6 METHOD OF PROVIDING FOR THE FINANCIAL PROVISION

According to Regulation 8 of the Regulations pertaining to the pertaining to the financial provision for mining, exploration, mining or production operations (GNR 1147), an applicant or holder of a right or permit must make financial provision by one or a combination of the following:

- financial guarantee from a bank registered in terms of the Banks Act, 1990 (Act No. 94 of 1990) or from a financial institution registered by the Financial Services Board as an insurer or underwriter;
- deposit into an account administered by the Minister responsible for mineral resources; *or*;
- contribution to a trust fund established in terms of applicable legislation.

Ndzilo Coal (Pty) Limited has opted to use a financial guarantee to provide for the determined quantum for financial provision. See Table 15 below.

Table 15: Financial provision for Roodepoort Colliery II.

"Rules-based" assessment of the quantum for financial provision							
CALCULATION OF THE QUANTUM							
Mine:	Roodepoort Colliery II- NDZILO COAL (Pty) Limited	**Location:**	Mpumalanga				
Evaluators:	O.T Shakwane of Geovicon Environmental (Pty) Limited	**Date:**	01/03/2022				
No.:	**Description:**	**Unit:**	**A Quantity**	**B Master rate**	**C Multiplication factor**	**D Weighting factor 1**	**E=A*B*C*D Amount (Rands)**
			Step 4.5	**Step 4.3**	**Step 4.3**	**Step 4.4**	
1	Dismantling of processing plant & related structures	m^3	0.00	R 18.36	1.00	1.10	R 0.00
2 (A)	Demolition of steel buildings & Structures	m^2	0.00	R 255.82	1.00	1.10	R 0.00
2 (B)	Demolition of reinforced concrete buildings & structures	m^2	0.00	R 376.99	1.00	1.10	R 0.00
3	Rehabilitation of access roads	m^2	500.00	R 45.78	1.00	1.10	R 25 179.38
4 (A)	Demolition & rehabilitation of electrified railway lines	m	0.00	R 444.30	1.00	1.10	R 0.00
4 (B)	Demolition & rehabilitation of non electrified railway lines	m	0.00	R 242.34	1.00	1.10	R 0.00
5	Demolition of housing &/or administration facilities	m^2	0.00	R 511.63	1.00	1.10	R 0.00
6	Opencast rehabilitation including final voids & ramps	ha	1.00	R 268 200.17	1.00	1.10	R 295 020.19
7	Sealing of shafts, adits & inclines	m^3	0.00	R 137.33	1.00	1.10	R 0.00
8 (A)	Rehabilitation of overburden & spoils	ha	0.60	R 178 800.11	1.00	1.10	R 118 008.07
8 (B)	Rehabilitation of processing waste deposits & evaporation ponds (basic)	ha	0.00	R 222 692.31	0.80	1.10	R 0.00
8 (C)	Rehabilitation of processing waste deposits & evaporation ponds (acidic)	ha	0.10	R 646 804.03	0.80	1.10	R 56 918.75
9	Rehabilitation of subsidised areas	ha	0.00	R 149 733.48	1.00	1.10	R 0.00
10	General surface rehabilitation	ha	1.00	R 141 639.86	1.00	1.10	R 155 803.84
11	River diversions	ha	0.00	R 141 639.86	1.00	1.10	R 0.00
12	Fencing	ha	0.00	R 161.56	1.00	1.10	R 0.00
13	Water management	ha	0.10	R 53 855.46	1.00	1.10	R 5 924.10
14	2 to 3 years of maintenance & aftercare	ha	5.00	R 18 849.42	1.00	1.10	R 103 671.79
15 (A)	Specialist study	SUM	0.00	R 200 000.00	1.00	1.00	R 0.00
15 (B)	Specialist study	SUM	0.00	R 0.00	1.00	1.00	R 0.00
						Sub Total 1	
						(Sum of items 1 to 15 Above)	**R 760 526.12**
	Multiply by Weighting factor 2	1.1		R 76 052.61			R 76 052.61
1	Preliminary and general	Add 12% if subtotal 1 is less than R100,000,000.00					R 91 263.13
2	Contingencies	Add 10% of subtotal 1					R 76 052.61
						Sub Total 2	
						(Subtotal 1 plus sum of management & contingencies)	**R 1 003 894.48**
						VAT (15%)	R 150 584.17
		(Subtotal 2 plus VAT)			**GRAND TOTAL**		**R 1 154 478.66**

7. MECHANISM FOR MONITORING COMPLIANCE WITH AND PERFOMAMCE ASSESSMENT AGAINST THE ENVIRONMENTAL MANAGEMENT PROGRAMME AND REPORTING THEREOF

7.1 INSPECTIONS AND MONITORING

During the impact assessment, potential impacts on the environment were identified. Mitigation measures were also specified for prevention and management of the impact so as to minimise their effect on the environment. This section will describe how the mine intends to ensure that the mitigation measures are being undertaken and that their effectiveness is proven.

A monitoring programme has been developed for the identified impacts and their mitigation measures. This monitoring programme will be undertaken and results thereof used to determine the effectiveness of the mitigation measures. The ECO will have an overall responsibility for ensuring that all monitoring is conducted according to the approved EMPR.

7.2 MONITORING COMPLIANCE WITH AND PERFORMANCE ASSESSMENT AGAINST THE ENVIRONMENTAL MANAGEMENT PROGRAMME AND REPORTING THEREOF

As part of the general terms and conditions for a mining permit, and in order to ensure compliance with the environmental management programme and to assess the continued appropriateness and adequacy of the environmental management programme Ndzilo Coal (Pty) Limited will:

- Conduct monitoring on a continuous basis
- Conduct performance assessments of the environmental management programme annually
- Compile and submit a performance assessment report to the minister in which compliance with the approved environmental management programme is demonstrated

The performance assessment report will as a minimum contain the following:

- Information regarding the period applicable to the performance assessment
- The scope of the assessment
- The procedure used for the assessment
- The interpreted information gained from monitoring the approved environmental management programme
- The evaluation criteria used during the assessment
- The results of the assessment

Recommendations on how and when non-compliance and deficiencies will be rectified

7.3 PROCEDURE FOR ENVIRONMENTAL RELATED EMERGENCIES AND REMEDIATION

Ndzilo Coal (Pty) Limited has developed procedures for environmental related emergencies for Roodepoort Colliery II which is explained in more detail below. Note that these procedures will be revised by the responsible person. The date of commencement of the revised procedures will always be indicated to prevent confusion.

7.3.1 Introduction

An effective, comprehensive, well considered and tested environmental emergency preparedness and response plan has the potential to save lives, prevent unnecessary damage to the company and other property and to manage environmental risk. The aim is to identify potential for and respond to accidents and emergency situations, and for preventing and mitigating the environmental impacts that may be associated with them. However, the emergency preparedness and response should be reviewed and revised where necessary.

7.3.2 What is an Environmental Emergency?

An environmental emergency is an unplanned event, which has the potential to result in a significant adverse environmental impact and/or could result in legal liability to Ndzilo Coal (Pty) Limited in terms of environmental legislation requirements. The following define most likely potential environmental emergencies:

- Hydrocarbon spills or leaks
- Surface fires, including veld fires
- A chemical spill
- Transportation accidents
- Other environmental emergencies requiring special services

7.3.3 Purpose of the procedure

To provide guidance to all mine employees and contractors in the event of an environmental emergency at Roodepoort Colliery II and related to its activities.

This procedure is developed so as to provide guidance to ensure that:

Danger to the environment, personnel, contractors and the non-employee is minimised.

- Legal liability is managed and minimised.
- Public relations are effectively managed during and following emergencies.
- Reporting is effective and corrective/follow-up actions are implemented.

7.3.4 Who should use these procedures?

This procedure contains information relevant to all employees and contractors of the mine. It is the responsibility of all employees to familiarise themselves with the contents of this procedure. Furthermore, mine management should ensure that all contractors have access to this procedure and the requirements contained herein (See Table 16).

7.3.5 Responsibilities

Table 16: Responsibilities

Mine Management	Ndzilo Coal (Pty) Limited is responsible for the safety and well-being of employees working at Roodepoort Colliery II as well as the protection of the environment from unnecessary negative impacts. The management of the Colliery has a responsibility to initiate a warning process should an emergency occur or should something at the Colliery deteriorate in an uncontrolled manner presenting a risk to employees, the public or the environment.

Local Government(s)	Local governments have the responsibility to warn residents of a hazardous situation, these warnings must be based on information provided by the Colliery.
All employees, contractors and other relevant parties	All employees, contractors and other relevant parties should ensure that they are familiar with this procedure.

7.3.6 Notification process

There are six main steps in managing an emergency, from the identification of the situation to final close off. They are as follows:

- Find and identify
- Ensure human safety
- Reporting
- Containment and clean-up
- Corrective action
- Monitoring

7.3.7 Emergency equipment and supplies

There is a directory of emergency equipment and other supplies on site as well as person/s responsible for the equipment.

7.3.8 Communication systems

Communication is critical during an emergency on site so that efforts to manage the situation are coordinated to produce the desired results. The communication channels that are available on site include:

- Internal phone line system
- Hand held radios
- Cellular phones

7.3.9 Training

The mine management ensures that employees are trained regarding potential emergencies that may occur at Roodepoort Colliery II.

7.3.10 Review of procedure

To ensure that the procedure is adequate, management will review the procedure at any time deemed necessary and change the emergency procedures at Roodepoort Colliery II.

7.3.11 Emergency Response flowchart for Ndzilo Coal (Pty) Limited

The emergency response at Roodepoort Colliery II is undertaken, as shown in Figure 16 below.

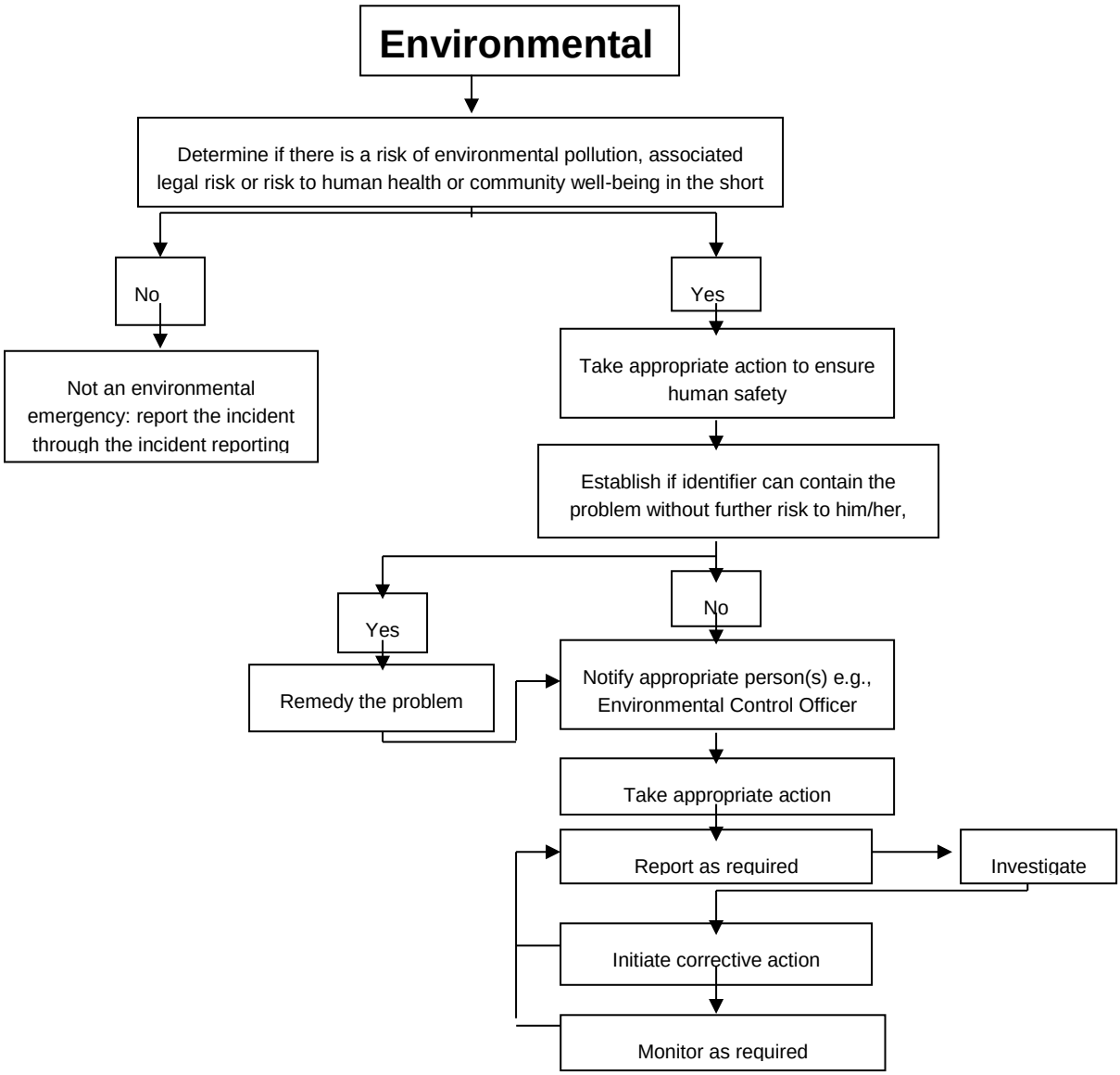

Figure 16: Emergency Response.

7.4 ENVIRONMENTAL AWARENESS PLAN

In terms of section 39(3)(c) of the Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002), Roodepoort Colliery II must compile and implement an environmental awareness plan. The above-mentioned environmental awareness plan must describe the manner in which the site manager (in this case Roodepoort Colliery II) will inform their employees of any environmental risk which may result from their work and the manner in which the environmental risks will be addressed to avoid pollution or/and degradation of the environment. This document, therefore concerns the details of the environmental awareness plan for Roodepoort Colliery II as required by the Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002).

7.4.1 Objectives and Legal Requirements

The following are the objectives of the environmental awareness plan

- To identify the necessary training needs for different categories of employees in the mine
- To train all employees on environmental issues on the mine

The following legislation apply to this environmental awareness plan

- Employment Equity Act, 1998 (Act 55 of 1998)
- National Environmental Management Act, 198 (Act 77 of 1998)
- Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002).

7.4.2 Manner of informing employees of risks to avoid pollution and degradation of the environment

The identification of environmental training and environmental awareness needs are derived from an analysis of the type of role different categories of employees play at Roodepoort Colliery. The following categories are considered, *viz*:

- Senior Management
- Middle management (Environmental Officers)
- Supervisors
- Operators
- Visitors and contractors

Each of these categories have different responsibilities and therefore have different knowledge requirements and environmental awareness training needs, to obtain that knowledge.
The different categories and environmental awareness and training needs are summarised below in Table 17:

Table 17: Environmental Awareness Matrix.

Occupation Category	EMP Responsibility	Required knowledge and output	Training required	Interval
Senior management	Managing	Understand the EMP objectives	Induction and post-leave awareness/training	Annually
		Knowledge of the Colliery's significant impacts and risks.	EMP Workshops	Once off
		Review the EMP actions	EMP objectives and actions /Management reviews	Annually
		Knowledge of EMP Procedures (awareness and emergency)	Specific training program on EMP	Once off, refresh annually
Middle and Junior management	Implementing and daily management	Knowledge of Colliery's significant environmental impacts	EMP Review workshops	Annually
		Setting of EMP objectives for environmental improvement	EMP Review workshops	Annually
		Knowledge of EMP procedures (awareness and emergencies)	Specific training programmes on EMP	Once off, refresh annually
	Adhering to procedures to control impacts	Understand EMP objectives	Induction and post-leave training	Annually
		Knowledge of significant impacts	Induction and post-leave training	Annually
		Knowledge of procedures (awareness and emergency)	EMP Review workshop	Annually
Plant and machine operators, assemblers and elementary occupations	Executing assigned EMP actions Controlling work activities to prevent impacts.	General awareness of EMP impacts and objectives.	Induction and post-leave training	Continuously
		Understand environmental requirements relating to work	Induction and post-leave training	Annually

Occupation Category	EMP Responsibility	Required knowledge and output	Training required	Interval
		activities and consequences of not following requirements		
		Knowledge of procedures	Training and information sharing	Continuously
Visitors and contractor	Managing and controlling daily actions to prevent or control impacts	Basic awareness of EMP	Induction or specific modules/ awareness programme	Once off, annual review if applicable
		Environmental requirements of work activities	Induction or specific awareness programme	Once off, annual review if applicable
		Knowledge of procedures	Training and information sharing	Continuously
		Understanding environmental consequences of personal actions and performance.	Induction or specific modules/ awareness programme	Once off, annual review if applicable
		Compliance to procedures	Induction or specific awareness programmes.	
Personnel requiring specific training and awareness identified on site by management, Environmental Officer, training department, etc.	Managing and controlling daily actions to prevent impacts	Examples include but are not limited to: Waste management Hazardous chemical handling	Specific training programme on EMP procedures.	As required

7.4.3 Induction for all employees, including contractors

All employees (including contractor employees) undergo induction. Roodepoort Colliery's induction includes training and awareness on environmental issues on the Colliery and is compulsory for all new employees. The induction programme as mentioned above, have an environmental management component. On an annual basis the environmental section of the induction gets updated. Consideration is given to the following:

- Significant environmental impacts as identified in the EMP
- Procedures: environmental awareness and emergency procedures
- Trends in incidents
- Trends in audit findings

7.4.4 General environmental awareness training

General awareness training is offered to operators, processors and the other various sections of the mine during the safety toolbox talks. This is conducted on rotational basis. New environmental awareness topics are determined and new topics are introduced after all the shifts have received training/awareness on the current topic. The following is undertaken to ensure that the above awareness training is conducted.

- A monthly environmental awareness topic for discussion is distributed to all mine sections. These topics are discussed at the safety toolbox talks, by SHE (Safety, Health and Environmental) representative and environmental officers if available.
- The topics are displayed on the notice boards of all mine sections.
- Ad hoc environmental awareness sessions to various departments/sections are conducted on request. The presentations focus on the environmental issues relevant to individual tasks.

7.4.5 Provision for job specific environmental awareness training

Job specific training is developed to address urgent training needs as identified /required. The training material focus on the following:

- Waste prevention and control (implementation of the waste management procedure).
- Water management (Leaking pipes and taps)
- Hydrocarbon and chemical spill reporting and clean-up
- Storing and handling of chemicals
- Rehabilitation
- Dust management on the mine

Supervisory staff within specific mine sections are equipped with the necessary knowledge and information to guide their employees on environmental aspects applicable in performing a specific task.

7.4.6 Competency training

Management (training official/environmental officer) is responsible for the environmental awareness training of middle management and supervisors. This training is conducted through workshops. If required, external organisations may be requested to provide training to selected employees (e.g., EMP auditing).

Competence and the effectiveness of training and development initiatives as described in the matrix, are determined through the following:

- Trend analysis and reporting
- Analysis of work areas during visits and audits
- Trend analysis of monthly incidents (or zero tolerance if available) as recorded per mine section.

7.4.7 Review of awareness and training material

The content of all awareness and training material will be updated at least once a year.

7.4.8 Roles and responsibilities

In the case where there is no training department on site, a responsible person should be identified (Mine manager, Environmental Officer or Consultant) to ensure that the objective of this procedure is met.

7.5 UNDERTAKING TO COMPLY

I, ..., the undersigned and duly authorised thereto by **Ndzilo Coal (Pty) Limited** have studied and understand the contents of this document in its entirety and hereby duly undertake to adhere to the conditions as set out therein including the amendment(s) agreed to by the Regional Manager.

Signed at .....……..... this.....day of…….....20.....

..... **.....**

Signature of applicant **Designation**

APPROVAL

Approved in terms of Section 39(4) of the Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002)

Signed at……this.....day of…….....20.....

.....……..

REGIONAL MANAGER

REGION:……