Black Wattle Colliery (Pty) Limited

Draft

Environmental Impact Report (EIR) and Environmental Management Programme (EMPr)

For

Black Wattle Colliery Opencast Expansion Project

Compiled in terms of Appendix 3 and Appendix 4 of the Amended Environmental Impact Assessment Regulations, 2014 (Government Notice No. R 982) (EIA Regulations, 2014) and submitted as contemplated in Regulation 23 of Chapter 4 of the EIA Regulations, 2014)

For

For the application for an Environmental Authorisation in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) and the Amended Environmental Impact Assessment Regulations 2014, Government Notice No. 983 (NEMA EIA Regulations, 2014) - Listing Notice 1 of 2014, Government Notice No. 984 - Listing Notice 2 of 2014, and Government Notice No. 985-Notice No- Listing Notice 3 of 2014

DMRE Reference No.: MP 30/5/1/2/2/22 MR (10140 MR)

Document No: 4296/2023

GEOVICON Environmental

Environmental & Geological Consultants

Report Type:	Environmental Impact Report and Environmental Management Programme
Project Title:	Black Wattle Colliery Opencast Expansion Project
Compiled for:	Black Wattle Colliery (Pty) Limited
Compiled by:	M. B. Mabogoane, B-Tech. Cand.Sci.Nat and Registered EAP
Reviewed by:	T. Shakwane, B.Sc. Hons. Pr. Sci.Nat and Registered EAP
Geovicon Reference:	4296/2023
Version:	Draft
Date:	April 2023
Distribution List:	Robert Grobler Environment Department at Black Wattle Colliery

Disclaimer:

The results and conclusions of this report are limited to the Scope of Work agreed between Geovicon Environmental (Pty) Limited and the Black Wattle Colliery (Pty) Limited for whom this report/ investigation has been conducted. 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)

M. B. Mabogoane, BTech. Candidate. Natural Scientist no: 128083)

_____

(Electronic signature)

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

EXECUTIVE SUMMARY

Black Wattle Colliery owned by Black Wattle Colliery (Pty) Limited is an opencast mining operation situated on the Remainder of portion 27 of the farm Middelburg Town and Townlands 287 JS and a portion of the remainder of portion 2 of the farm Uitkyk 290 JS, portions 4, 14, 27 and a portion of mineral area 1 (a portion of portion 3) of the farm Vaalbank 289 JS, Magisterial District of Middelburg, Mpumalanga Province.

Black Wattle Colliery is located approximately 3 km south of Middelburg at the intersection of the N4 freeway and the R35 Middelburg-Bethal Provincial Road. It lies within the Steve Tshwete Local Municipality and Nkangala District Municipality in the Mpumalanga Province. Black Wattle Colliery is an opencast strip mine near Middelburg, Mpumalanga. Black Wattle Colliery extracts the No. 1 and No. 2 coal seams within the Witbank Coalfields. The coal reserves in the project area were formerly mined using the underground method and was changed to opencast method due to poor roof wall encountered in the underground workings. The coal products from the mine are targeted for both local and international markets. Coal is processed on site using a Dense Medium Separation (DMS) coal washing plant. Arising mineral residue from the coal washing process during the life of mine have resulted in one mineral residue deposit facility, which is no longer active. Black Wattle Colliery is operated under a mining right granted by the DMRE (DMRE Ref. No.: MP 30/5/1/2/2/22 (10140) MR) and an approved EMPr.

In addition to the above, Black Wattle Colliery (Pty) Limited recently acquired additional coal reserves from Seriti Power (Pty) Ltd on land adjacent to their mining right area (a portion of portion 3 of the farm Vaalbank 289 JS and a portion of portions 24 and 29 of the farm Goedehoop 315 JS). The acquisition of this coal reserve will extend the life of mine of Black Wattle Colliery by approximately 6 years. A sale agreement between South 32 SA Coal Holdings (Pty) Limited and Black Wattle Colliery (Pty) Limited was established for the transfer of such reserve, pending ministerial approval. Black Wattle Colliery (Pty) Limited has accepted the transfer and intends on incorporating a portion of portion 3 of the farm Vaalbank 289 JS and a portion of portions 24 and 29 of the farm Goedehoop 315 JS into their Mining Right.

As a result, Black Wattle Colliery (Pty) Limited is lodging an application in terms of section 102 of the said Act to amend the Mining Right MP 30/5/1/2/2/22 MR (10140 MR) to include the property secured under the said transferal, and the mining right area will now measure 1203.846 Ha. In order to, comply with the requirements of the MPRDA and NEMA for the above-mentioned mining right variation, which will result in the undertaking of NEMA listed activities, Black Wattle Colliery (Pty) Limited must also apply for an environmental authorization for the listed activities triggered by the proposed mining operation.

This document concerns changes at Black Wattle Colliery's mining right area as a result, of the expansion of the mining right area i.e. extension of the opencast mining area together with infrastructure and facilities associated with the extension. Associated infrastructure and facilities will include:

- Haul road
- Topsoil stockpile
- Opencast pit
- Dirty water pipeline. The dirty water pipeline will tie-in to the existing dirty water pipeline that convey water from the existing opencast pits to the existing pollution control dam.
- Water management structures (storm water diversion structures).

The existing offices, waste storage facilities, workshops, and other structures will be used for the proposed opencast extension.

The proposed opencast expansion project will be conducted on a portion of portion 3 of the farm Vaalbank 289 JS and on portion of portions 24 and 29 of the farm Goedehoop 315 JS, within the Magisterial District of Middelburg, Mpumalanga Province.

In view of the above and since the NEMA requires that any person or entity that intends to undertake activities listed in the NEMA listing notices (Government Notices No. 983, 984 and 985) as amended, must obtain an Environmental Authorisation (EA) in terms of Section 24 of the NEMA before undertaking such activities. Black Wattle Colliery (Pty) Limited is therefore applying for an EA for the proposed expansion of its current opencast mining operation. According to the NEMA EIA Regulations, 2014, an application for an EA for the above listed activities, managed by an Environmental Assessment Practitioner (EAP), must be submitted to the competent authority in line with the requirements of the above-mentioned regulations. The Department of Mineral Resources and Energy (DMRE) (eMalahleni Office) is the competent authority for the above-mentioned applications.

In view of the above, Black Wattle Colliery (Pty) Limited appointed Geovicon Environmental (Pty) Limited, an independent environmental consulting company, to prepare and submit an EA application and manage the Environmental Impact Assessment (EIA) process for the proposed expansion of its current opencast mining operation. The above-mentioned EA for activities listed under Table 4 in this report, has been submitted to the DMRE, Mpumalanga Regional Office (Competent Authority) for their consideration (the application has been accepted).

Subsequent to the submission of the EA application, a Scoping Report (after being subjected to a public participation process) was submitted to the DMRE, which report has to date (14 February 2023) been accepted in terms of Regulation 22 of the NEMA EIA Regulations 2014, as amended. In line with the requirements of the NEMA EIA Regulations, 2014, an Environmental Impact Report and Environmental Management Programme (EIR/EMPr) (this document) for the proposed project was compiled and is thereby submitted for consideration.

This document (Draft EIR/EMPr, inclusive of the specialist reports), which concerns assessment of environmental impacts and a programme for management of the impacts for the proposed activity, was compiled and is submitted in terms of the amended NEMA EIA Regulations, 2014 for review and commenting by Interested and Affected Parties (I&APs) including the competent authority. The EIA, which result thereof is detailed in this report, was undertaken in compliance with the accepted plan of study described in the Scoping Report.

Environmental baseline data used in this report has been obtained through various agencies, pertaining to surface water quantities and qualities, geohydrological data and modelling, topographical analyses, soil impact assessment, vegetation surveys, wetland impact assessment and geological conditions, surface and groundwater impact assessments, visual impact assessment, biodiversity impact assessment, noise impact assessment, hydropedological impact assessment, climate change impact assessment, heritage impact assessment and the social impact assessment. Weather data was acquired from the South African Weather Service. Historic land use was determined through available data and by visual observations made during various field studies. The data accumulated and analysed is therefore deemed enough to gain a baseline indication of the present state of the environment of the proposed extension of its current opencast mining operation. The use of this baseline data for impact assessments is thus justified, and reliable conclusions could be made.

The environmental impacts that could arise during and after the proposed activities at the proposed project area were determined and ranked according to their significance. Based on the impact assessment, recommendations were made for the mitigation of significant negative environmental impacts that will result from the proposed project.

CONTENTS PAGE

TABLES

FIGURES

APPENDICES

Appendix #	Appendix Description
1.	Proof of Consultation for the Scoping Phase
2.	Agricultural Ecosystems Assessment Report
3.	Groundwater study
4.	Heritage Study
5.	Final Rehabilitation, Decommissioning and Mine Closure Plan
6.	Black Wattle Colliery Environmental Awareness Plan
7.	Screening Tool Report
8.	Noise Study

PART A

Draft

Environmental Impact Report (EIR)

Black Wattle Colliery (Pty) Limited

Black Wattle Colliery Opencast Expansion Project

April 2023

SECTION ONE

Introduction

1. INTRODUCTION

1.1 WHO IS DEVELOPING THE EIR AND EMPR?

1.1.1 Name and contact details of the EAP who prepared the EIR and EMPr

EAP: Miss M. B Mabogoane (B-Tech)

IAIA Membership No.: 6235

SACNASP Registration: 128083

EAPASA Registration: 2019/1356

Reviewer: Mr. O.T Shakwane (BSc. Hons.)

SACNASP Registration: 117080

EAPASA Registration: 2019/1763

IAIA Membership No.: 3847

Company: Geovicon Environmental (Pty) Limited

Postal Address:

P.O. Box 4050

Middelburg, 1050

Tel: (013) 243 0542

Fax: (086) 632 4936

Cell No.: 082 498 1847

Email: Tshepo@geovicon.co.za/Bathabile@geovicon.co.za

1.1.2 Expertise of the EAP who prepared the Draft EIR and EMPr

Geovicon Environmental (Pty) Limited has been appointed by Black Wattle Colliery (Pty) Limited as the independent environmental consultant to compile this EIR/EMPr and has no vested interest in the project.

Geovicon Environmental (Pty) Limited is a geological and environmental consulting company. The company was formed in 1996, and currently has twenty-seven years' experience in the geological and environmental consulting field. Geovicon Environmental (Pty) Limited has successfully completed consulting projects 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 and in 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 shareholders i.e. O.T. Shakwane, J.M. Bate and T.G. Tefu.

The Curriculum Vitae of the Environmental Assessment Practitioner (EAP) and the reviewer who were involved in the compilation of this report are as follows:

Ms. Bathabile Mabogoane obtained her Baccalaureus Technologiae (B-Tech) in Environmental Sciences at the Tshwane University of Technology in 2020. She started working as an intern at Shangoni Management Services, year 2017 specializing in conducting Waste Management Licence Audits, waste management related reports and Health, Safety and Environmental related aspects and Environmental related reports. She joined Geovicon Environmental (Pty) Limited as a Junior Environmental Consultant in August 2018, now appointed as the Environmental Consultant. Her responsibilities include: compilation of all documentation for mining rights, mining permits and prospecting right applications, compilation of EIR/EMPr, compilation of WUL applications with Integrated Water and Waste Management Plans, conducting of Environmental audits, Integrated Water Use Licence Audits, conducting of Environmental inspections, compilation of environmental reports (EMPr, SR, BARs, EIAs, Public Participation Reports), arrangement and attendance of Public Participation meetings with I&APs, conducting environmental audits and inspections at mining companies, compilation of Water Quality Reports and Environmental Audit Reports (EARs). Ms. Bathabile Mabogoane is the appointed EAP for the NEMA EA application and EIA Process for the proposed Black Wattle Colliery Opencast Expansion project. Ms. Bathabile Mabogoane has been involved in the field of EIA for the past six years.

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, EIA, environmental risk assessment and environmental management systems with several tertiary institutions. He has worked within the three state departments tasked with mining and environmental management i.e., Department of Water and Sanitation (Gauteng and Mpumalanga Region), DMRE (Mpumalanga Region) and Department of Agriculture, Conservation and Environment (Gauteng Region). Mr. Shakwane has been in the consulting field since 2004 and has undertaken EIAs for mining operations similar to the proposed Black Wattle Colliery Opencast Expansion project. Mr. Shakwane is the appointed EAP (reviewer) for the NEMA EA application and the EIA process for the proposed Black Wattle Colliery Opencast Expansion project. Mr. Shakwane has been involved in the field of EIA for the past twenty-one years.

He is registered with the Environmental Assessment Practitioners Association of South Africa and South African Council for Natural Scientific Professions as an EAP and a Professional Natural Scientist in terms of section 24H of the National Environmental Management Act, (Act 107 of 1998) and section 20(3) of the Natural Scientific Professions Act, 2003 (Act 27 of 2003), respectively. He is also a member of the International Association for Impact Assessment, South Africa.

Mr. Ornassis Tshepo Shakwane and Ms. Bathabile Mabogoane of Geovicon Environmental (Pty) Limited, hereby declares that they are independent EAP and that Geovicon Environmental (Pty) Limited and them have no business, financial, personal or other interest in this project in respect of which Geovicon Environmental (Pty) Limited is appointed. Furthermore, no circumstances exist that may compromise the

objectivity of Geovicon Environmental (Pty) Limited, excluding fair remuneration for work performed in connection with this report.

1.2 WHO WILL EVALUATE AND APPROVE THE EIR AND EMPR?

Before the proposed project can proceed, an EAP must compile an application for an EA for the proposed activities. An EIA must be undertaken in support of the application for an EA where a SR must be compiled and an EIA be carried out for the activities applied for, in terms of the NEMA EIA Regulations, 2014. The above-mentioned application must be made to the competent authority in terms of Section 24 of NEMA, Section 45 and Section 20(b) of the NEMWA and in terms of Regulations 16 of the NEMA EIA Regulations, 2014. The Minister responsible for the DMRE is the competent authority for this application. In view of the above, the EA application for the proposed Opencast Expansion Project was submitted to the DMRE, eMalahleni Regional Office for their consideration and decision making.

In the spirit of co-operative governance and in compliance with Regulation 7(2) the NEMA EIA Regulations, 2014, the competent authority (DMRE) will, during the processing of the EA application, consult with other organs of state that administers laws that relate to matters affecting the environment relevant to this application.

In addition to the above, all organs of state which have jurisdiction in respect of the activity applied for and all potential and registered I&APs will also be given an opportunity to evaluate and comment on the documents to be submitted to the authorities.

1.3 DETAILS OF THE APPLICANT

1.3.1 Name of the Applicant

Black Wattle Colliery (Pty) Limited

1.3.2 Name of the Mine

Black Wattle Colliery – Opencast Mining Operation

1.3.3 Name of the Project

Black Wattle Colliery Opencast Expansion Project

1.3.4 Address of Mine Owner

Postal Address:

Black Wattle Colliery (Pty) Limited

P. O. Box 1704

Middelburg

1050

Physical Address:

Portion 4

Farm Vaalbank 289 JS

1.3.5 Project Manager

Mr. R. Grobler

Cell: 083 250 7371

1.3.6 Contact Person

Mr. Robert Grobler (Email: r.grobler@bisichi.co.uk)

Black Wattle Colliery (Pty) Limited

Cell: 083 250 7371

1.4 Description Of The Property (Location Of The Project)

1.4.1 Name of the property

The name of the properties within which the proposed project falls has been described in Table 2.

1.4.2 Magisterial District & Regional Services Council

Magisterial: Middelburg Magisterial Districts, Mpumalanga

District Municipality: Nkangala District Municipality

Local Municipality: Steve Tshwete Local Municipality

1.4.3 Direction and Distance to Nearest Towns

Table 1 details the direction and distance to the nearest towns in relation to the proposed Opencast Expansion Project area.

Table 1: Direction and Distance to Nearest Towns

Town	Direction	Distance
Middelburg	North	8 km
Witbank	West	30 km
Belfast	East	78 km
Bethal	South	70 km

1.4.4 Surveyor General Code

Table 2 details the Surveyor General code for the proposed Opencast Expansion Project area.

Table 2: Surveyor General Code for the Project Area

Farm portion and name	Surveyor General Code

Farm portion and name	Surveyor General Code
Opencast Expansion	
Portion 3 of the farm Vaalbank 289 JS	T0JS 000000000289 00003
Portion 24 of the farm Goedehoop 315 JS	T0JS 000000000315 00024
Portion 29 of the farm Goedehoop 315 JS	T0JS 000000000315 00029
Topsoil Stockpile	
Portion 3 of the farm Vaalbank 289 JS	T0JS 000000000289 00003
Haul Road	
Portion 3 of the farm Vaalbank 289 JS	T0JS 000000000289 00003
Portion 24 of the farm Goedehoop 315 JS	T0JS 000000000315 00024
Dirty Water Pipeline	
Portion 3 of the farm Vaalbank 289 JS	T0JS 000000000289 00003
Portion 24 of the farm Goedehoop 315 JS	T0JS 000000000315 00024

1.5 LOCATION

The proposed opencast expansion project will be conducted on a portion of portion 3 of the farm Vaalbank 289 JS and a portion of portions 24 and 29 of the farm Goedehoop 315 JS, within the Magisterial District of Middelburg, Mpumalanga Province. The proposed project area is located approximately 8 km south of Middelburg at the intersection of the N4 freeway and the R35 Middelburg-Bethal provincial road. Refer to Figure 1 for the locality plan of the proposed project.

1.6 LAND TENURE OF IMMEDIATE AND ADJACENT LAND

The land where proposed project is situated, is a fallow land and it is utilised for grazing. Land immediately adjacent to the proposed opencast area is used for mining, crop cultivation, grazing and wilderness purposes. Table 3 and Figure 2 below indicates the direct and indirect surface owners for the proposed project. Land use within the proposed project area includes land used for agricultural purposes (grazing and crop cultivation). Wetland areas are mostly utilised as grazing and livestock watering areas.

Table 3: Direct and Indirect Surface Owners of the proposed Black Wattle Colliery Opencast Expansion Project

FARM	PORTION	SURFACE RIGHT OWNERS

Direct Surface Owners		
Vaalbank 289 JS		
Vaalbank 289 JS	3	J V Ranch CC
Goedehoop 315 JS	24	Seriti Power (Pty) Ltd
Goedehoop 315 JS	29	Seriti Power (Pty) Ltd
Adjacent Surface Owners		
Vaalbank 289 JS		
Vaalbank 289 JS	1	J V Ranch CC
Vaalbank 289 JS	14	Black Wattle Colliery (Pty) Limited (BWC)
Vaalbank 289 JS	27	Black Wattle Colliery (Pty) Limited (BWC)
Vaalbank 289 JS	28	Black Wattle Colliery (Pty) Limited (BWC)
Vaalbank 289 JS	29	C.A.M.M Trading Trust
Uitkyk 290 JS		
Uitkyk 290 JS	2	South32 SA Coal Holdings (Pty) Ltd
Goedehoop 315 JS		
Goedehoop 315 JS	11	Seriti Power (Pty) Ltd
Goedehoop 315 JS	34	Seriti Power (Pty) Ltd
Goedehoop 315 JS	25	Seriti Power (Pty) Ltd

* Indicates farm portions on which the Black Wattle Colliery Opencast Expansion Project will be undertaken.

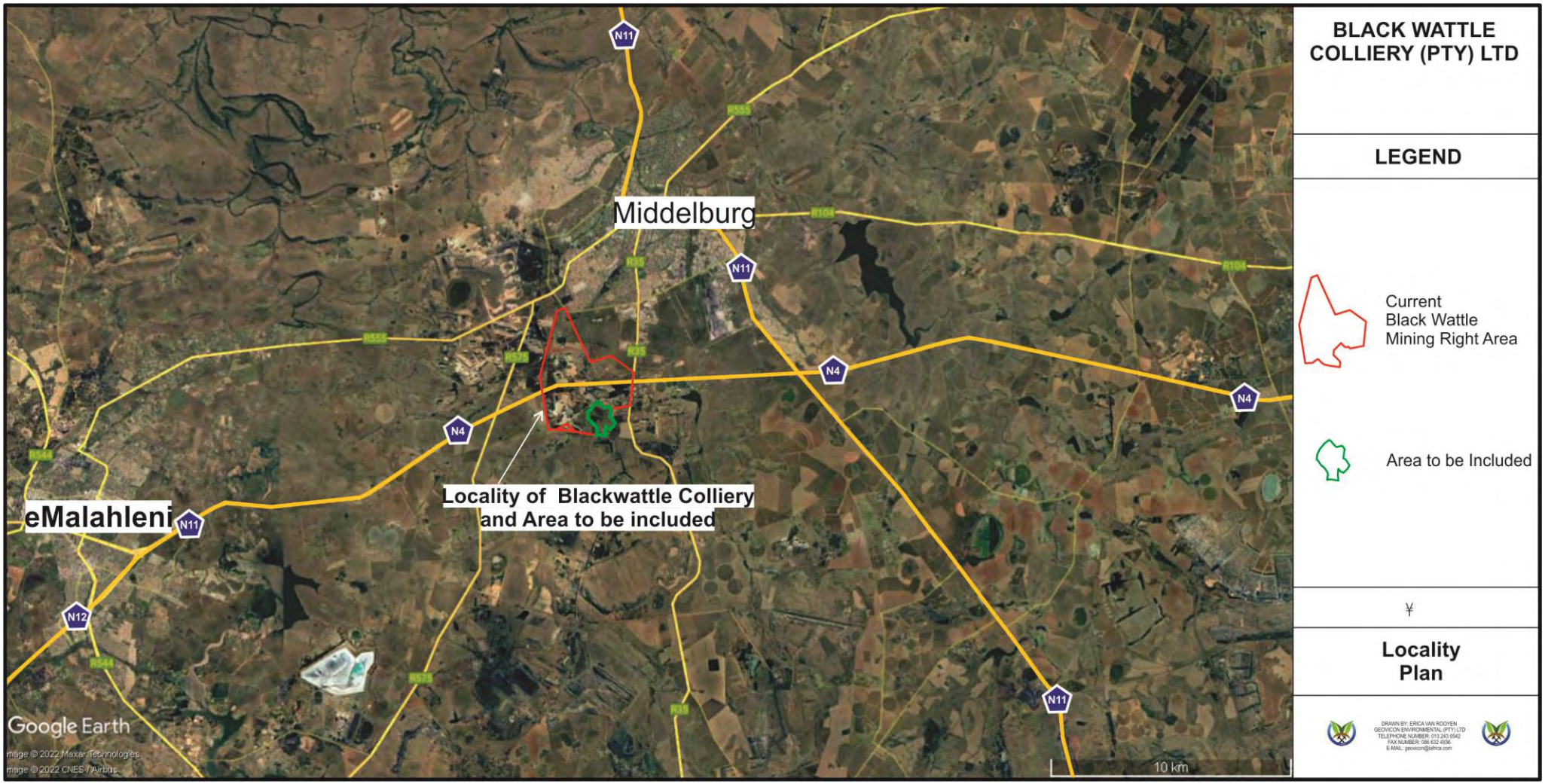


Figure 1: Locality Plan for the proposed Black Wattle Colliery Opencast Expansion Project

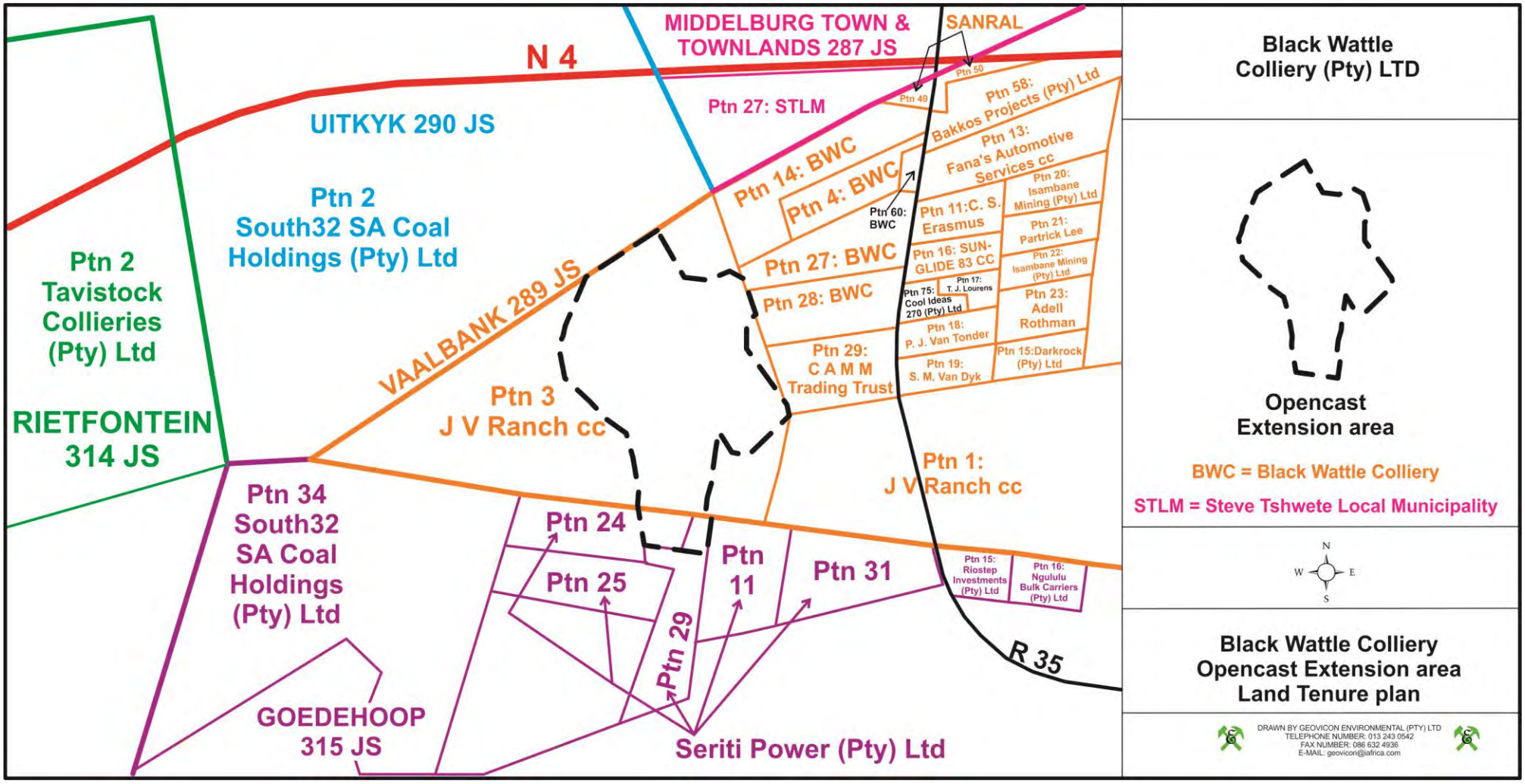


Figure 2: Land Tenure Plan for the proposed Black Wattle Colliery Opencast Expansion Project

SECTION TWO

Description of the Scope of the Proposed Project

2. DESCRIPTION OF THE SCOPE OF THE PROPOSED PROJECT

2.1 DESCRIPTION OF THE PROPOSED PROJECT

Black Wattle Colliery intends on undertaking an expansion of their existing mining section to include the Black Wattle Colliery Opencast Expansion Project, which will enable the extension of the mine coal reserves beyond the current Life of Mine (LoM). The project will comprise of the following activities, which are described in more detail below i.e.:

- Haul road
- Topsoil stockpile
- Opencast pits
- Dirty water pipeline
- Water management structures (storm water diversion structures)

The proposed opencast expansion project will be conducted on a portion of portion 3 of the farm Vaalbank 289 JS and a portion of portions 24 and 29 of the farm Goedehoop 315 JS, Magisterial District of Middelburg, Mpumalanga Province.

Opencast Expansion

Opencast mining, using the truck and shovel lateral rollover mining method will be undertaken. Mining will commence from the initial box-cut, which will mostly likely be connected to the existing operational opencast workings. Access to the opencast pit will be via a pit ramp. Haul roads will be extended from the existing road infrastructure in order to cater for the proposed opencast project.

The soft overburden will be removed by mechanical methods and stockpiled at the existing overburden stockpiling area. The hards overburden material removed will be used for backfilling the existing opencast pits, hence no new overburden (softs and hards) stockpile will be required at the proposed project area.

Topsoil Stockpile

Topsoil material will be stripped from the opencast and surface infrastructure areas and will be stockpiled at the proposed topsoil stockpiling area. The stripped soils will be stockpiled as per the recommendation from the soil specialist report. The topsoil material will therefore be used later to cover the backfilled opencast voids.

Haul Road

A haul road will be constructed to access the opencast areas. The constructed haul road will join the existing Black Wattle opencast haul road. The road will be used for the haulage of overburden and coal material from the proposed project to the existing designated areas.

Surface Dirty Water Pipeline

The dirty water pipeline will tie-in to the existing dirty water pipeline that convey water from the existing opencast pits to the existing pollution control dam.

Stormwater Structures

A stormwater diversion berm will be constructed as part of the proposed project, upslope of the pit. This berm will divert runoff water from the pit area.

2.2 LISTED ACTIVITIES AND SPECIFIED ACTIVITIES

The proposed project will result in conducting of activities that are considered as listed activities in terms of NEMA. In terms of the above-mentioned legislation, none of the above-mentioned listed activities can commence without an EA. In view of the above, Black Wattle Colliery (Pty) Limited has appointed Geovicon Environmental (Pty) Limited, an independent environmental consulting company to apply for an EA for all listed activities to be conducted at the proposed project area to the competent authority (DMRE). This section will give a description of the NEMA listed activities that were included in the application form for the EA. Table 4 reflects listed activities applied for, that will be undertaken at the proposed Project area. Refer to Figure 3 for the Surface Infrastructure Layout Plan for the Proposed Black Wattle Opencast Expansion Project Area.

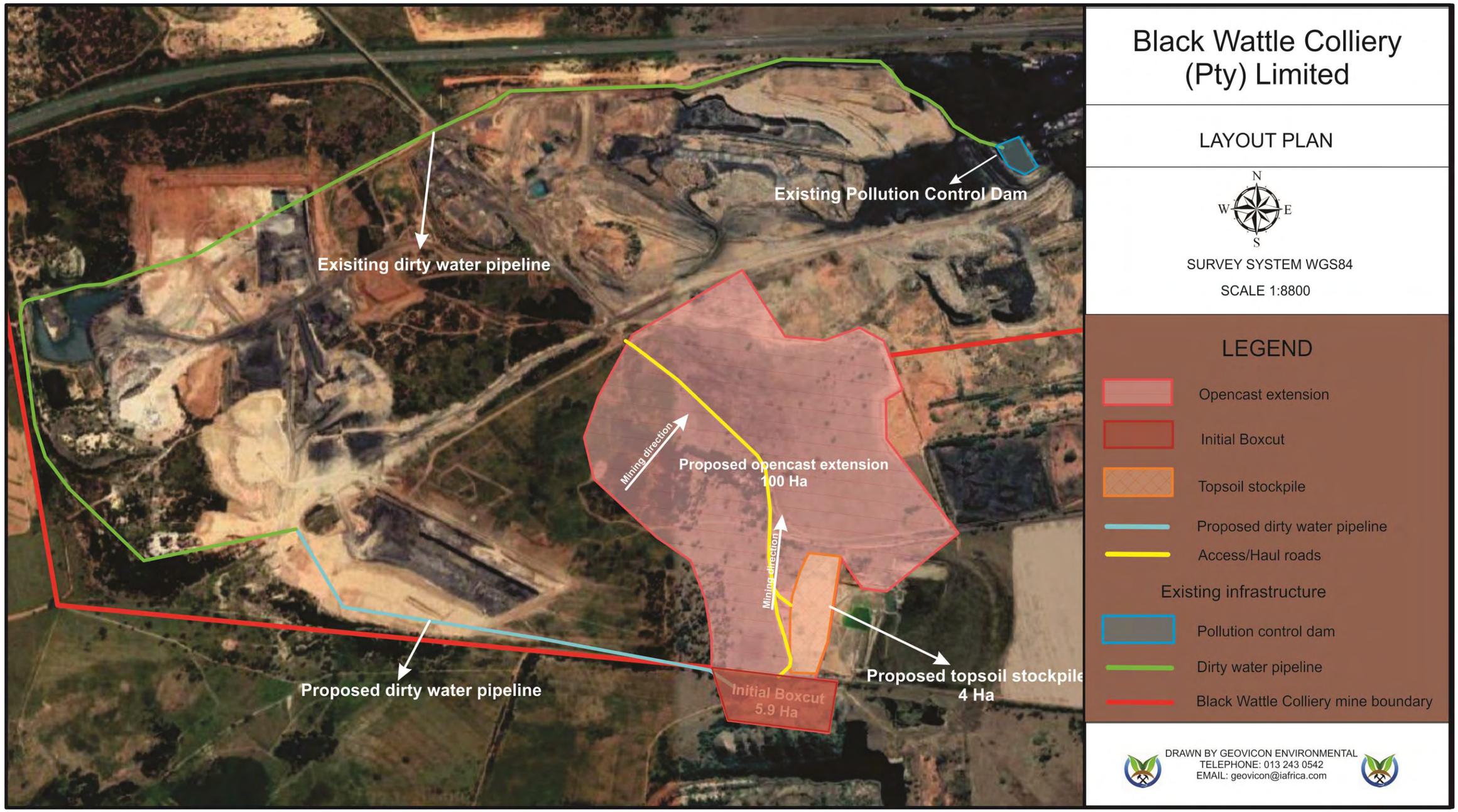


Figure 3: Surface Infrastructure Layout Plan for the Proposed Black Wattle Opencast Expansion Project Area

Table 4: Description of listed activities to be undertaken for the proposed Black Wattle Colliery Opencast Expansion Project

NAME OF ACTIVITY	AERIAL EXTENT OF THE ACTIVITY	LISTED ACTIVITY	APPLICABLE LISTING NOTICE
PROJECT LISTED AND SPECIFIC ACTIVITIES			
NATIONAL ENVIRONMENTAL MANAGEMENT ACT			
The construction of a dirty water pipeline for the collection of mine water from the mined out opencast pit, which will tie-in to the existing dirty water pipeline that convey water to the existing PCD.	The dirty water pipeline will cover an area of 0.1 hectares.	Activity 9 of Listing Notice 1: The development of infrastructure exceeding 1000 metres in length for the bulk transportation of water or storm water- (i) with an internal diameter of 0,36 metres or more; or (ii) with a peak throughput of 120 litres per second or more; excluding where- (a) such infrastructure is for bulk transportation of water or storm water or storm water drainage inside a road reserve; or (b) where such development will occur within an urban area.	GNR 983
The development and related operation of a dirty water pipeline for the transportation of waste water from the mined out opencast pit to the existing PCD. The pipeline will tie-in to the existing dirty water pipeline, which convey water to the existing PCD.	The dirty water pipeline will cover an area of 0.1 hectares.	Activity 10 of Listing Notice 1: The development and related operation of infrastructure exceeding 1000 metres in length for the bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge, or slimes? (i) with an internal diameter of 0,36 metres or more; or (ii) with a peak throughput of 120 litres per second or more; excluding where- (a) such infrastructure is for bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge, or slimes inside a road reserve; or (b) where such development will occur within an urban area.	GNR 983
Portion of the opencast pit will occur within a watercourse.	The area to be mined within a watercourse is 0.70 hectares.	Activity 12 of Listing Notice 1: The development of— (i) dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 square metres; or (ii) infrastructure or structures with a physical footprint of 100	GNR 983

NAME OF ACTIVITY	AERIAL EXTENT OF THE ACTIVITY	LISTED ACTIVITY	APPLICABLE LISTING NOTICE
		square metres or more; where such development occurs— (a) within a watercourse; (b) in front of a development setback; or (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse; — excluding— (aa) the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour; (bb) where such development activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies; (cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies; (dd) where such development occurs within an urban area; (ee) where such development occurs within existing roads, road reserves or railway line reserves; or (ff) the development of temporary infrastructure or structures where such infrastructure or structures will be removed within 6 weeks of the commencement of the development and where indigenous vegetation will not be cleared.	
Removing of soils and other materials for the construction of the opencast pit within a watercourse.	The area to be mined within a watercourse is 0.70 hectares.	Activity 19 of Listing Notice 1: The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse.	GNR 983

NAME OF ACTIVITY	AERIAL EXTENT OF THE ACTIVITY	LISTED ACTIVITY	APPLICABLE LISTING NOTICE
The construction, use and maintenance of a haul road for accessing the proposed mining operation.	The haul road will cover an area of 3.00 hectares.	Activity 24 of Listing Notice 1: The development of- (i) a road for which an environmental authorisation was obtained for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Government Notice 545 of 2010; or (ii) a road with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres; but excluding- (a) roads which are identified and included in activity 27 in Listing Notice 2 of 2014; or (b) roads where the entire road falls within an urban area.	GNR 983
The expansion of the opencast mine workings will result in the need for a water use licence in accordance with section 21 (c), 21(i) and 21 (j) of the National Water Act, 1998 (Act No. 36 of 1998) (NWA).	The expansion of the opencast pit will cover an area of 95.50 hectares.	Activity 34 of Listing Notice 1: The expansion or changes to existing facilities for any process or activity where such expansion or changes will result in the need for a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the release of emissions or pollution, excluding- (i) where the facility, process or activity is included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case the National Environmental Management: Waste Act, 2008 applies; or (ii) the expansion of or changes to existing facilities for the treatment of effluent, wastewater, or sewage where the capacity will be increased by less than 15 000 cubic metres per day.	GNR 983
The development and operation of the opencast expansion and associated infrastructure will result in the need for a water use licence in accordance with section 21(c), 21(i), 21(g) and 21(j) of the National Water Act, 1998 (Act No. 36 of 1998) (NWA).	The development and operation of the opencast expansion and associated infrastructure will cover an area of 102.81 hectares.	Activity 6 of Listing Notice 2: The development of facilities or infrastructure for any process or activity which requires a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent, excluding— (i) activities which are identified and included in Listing Notice 1 of 2014; (ii) activities which are included in the list of waste management activities	GNR 984

NAME OF ACTIVITY	AERIAL EXTENT OF THE ACTIVITY	LISTED ACTIVITY	APPLICABLE LISTING NOTICE
		published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case the National Environmental Management: Waste Act, 2008 applies; (iii) the development of facilities or infrastructure for the treatment of effluent, polluted water, wastewater or sewage where such facilities have a daily throughput capacity of 2 000 cubic metres or less; or (iv) where the development is directly related to aquaculture facilities or infrastructure where the wastewater discharge capacity will not exceed 50 cubic metres per day.	
The development of the mining operation and associated infrastructure will result in the clearance of indigenous vegetation from the project area.	The development and operation of the opencast expansion and associated infrastructure will cover an area of 102.81 hectares.	Activity 15 of Listing Notice 2: The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for- (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.	GNR 984
Black Wattle Colliery is already in possession of a mining right for the area covered by the proposed project. However, activities listed under GNR 983, GNR 984 and GNR 985 will be required in order to exercise the proposed activities within the mining right area. These includes the haul road, dirty water pipeline and topsoil stockpile.	The infrastructures will be approximately 7.3 hectares.	Activity 17 of Listing Notice 2: Underground and opencast mining which requires a mining right as contemplated in section 22 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including associated infrastructure, structures, and earthworks, directly related to the extraction of a mineral resource, including activities for which an exemption has been issued in terms of section 106 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002).	GNR 984
The development/use of haul road within the proposed mining area.	The haul road will cover an area of approximately 3 hectares.	Activity 4 of Listing Notice 3: The development of a road wider than 4 metres with a reserve less than 13,5 metres. In Free State, Limpopo, Mpumalanga, and Northern Cape provinces: • In an estuary;	GNR 985

NAME OF ACTIVITY	AERIAL EXTENT OF THE ACTIVITY	LISTED ACTIVITY	APPLICABLE LISTING NOTICE
		• Outside urban areas in: (aa) A protected area identified in terms of NEMPAA, excluding disturbed areas; (bb) National Protected Area Expansion Strategy Focus areas; (cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; (dd) Sites or areas identified in terms of an International Convention; (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (ff) Core areas in biosphere reserves; (gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve, excluding disturbed areas.; or (hh) Areas seawards of the development setback line or within 1 kilometre from the high-water mark of the sea if no such development setback line is determined; or (iii) In urban areas: (aa) Areas zoned for use as public open space; (bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority or zoned for a conservation purpose; or (cc) Seawards of the development setback line or within urban protected areas.	
Clearance of indigenous vegetation for the mining operation and for the construction of infrastructure associated with the mining project, which will cover an area of 100.19 hectares.	The land to be cleared of indigenous vegetation will cover an area of 102.81 hectares.	<u>Activity 12 of Listing Notice 3:</u> The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan. <u>(c) in Mpumalanga</u> (i) within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial	GNR 985

NAME OF ACTIVITY	AERIAL EXTENT OF THE ACTIVITY	LISTED ACTIVITY	APPLICABLE LISTING NOTICE
		Biodiversity Assessment 2004; (ii) within critically biodiversity area identified in bioregional plans; (iii) within the littoral active zone or 100 metres inland from high water mark of the sea or an estuarine functional zone; whichever distance is the greater, excluding where such removal will occur behind the development setback line on erven in urban areas (iv) on land, where, at the time of the coming into effect of this Notice or thereafter such land was zone open space, conservation or had an equivalent zoning or proclamation in terms of NEMPAA.	
Section of the proposed opencast pit will be conducted with a wetland area.	The area to be mined within a watercourse is 0.70 hectares.	Activity 14 of Listing Notice 3: The development of— (i) dams or weirs, where the dam or weir, including infrastructure and water surface area exceeds 10 square metres; or (ii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs— (a) within a watercourse; (b) in front of a development setback.	GNR 985

2.3 BLACK WATTLE OPENCAST EXPANSION PROJECT SURFACE INFRASTRUCTURE DESCRIPTION AND THE MINING METHOD

Below is the description of the surface infrastructure and the mining method for the proposed Black Wattle Opencast Expansion Project.

2.3.1 Target Mineral

The target mineral for the proposed project is coal.

2.3.2 Mining Method

Opencast mining, using the truck and shovel lateral rollover mining method will be undertaken. Mining will commence from the initial box-cut, which will mostly likely be connected to the existing operational opencast workings. Access to the opencast pit will be via a pit ramp. Haul roads will be extended from the existing road infrastructure in order to cater for the proposed opencast project.

The soft overburden will be removed by mechanical methods and stockpiled at the proposed overburden stockpiling area. The hards overburden material removed will be used for backfilling the existing opencast pits, hence no new overburden (softs and hards) stockpile will be required at the proposed project area.

2.3.3 Estimated Reserve

The Run of Mine reserve for the proposed opencast mining area is estimated 6 Mt, for the No. 2 coal seam.

2.3.4 Planned Life of Mine

The proposed opencast expansion will extent the LOM for Black Wattle mining area by 6 (six) years.

2.3.5 Existing Surface Infrastructure

The proposed Project area is mainly utilized for mining and wilderness. Existing surface infrastructure within the project study area is therefore connected to the above-mentioned current land uses and include roads networks.

2.3.5.1 Existing Road Networks and Powerlines

There are various main and minor roads, as well as power lines crossing the Black Wattle Colliery mining area. The N4 National road (freeway) divides the mining area into the south and north sections, the R35 and R575 provincial roads occur along the east and west of the mining area respectively. No access road will be constructed for the proposed project. All existing roads, except for a haul road to cater for the proposed opencast, will be utilised to cater the proposed project.

A siding (Uitkyk siding) on the Witbank-Middelburg railway line occurs to the west of the mining area. Final products are removed from the mine property directly to local markets and to the Uitkyk siding for export markets.

2.3.5.2 Existing Mining Infrastructure

The infrastructure for the current operations includes the following:

<u>Office/Workshop Complex:</u>

- The office/workshop complex will consist of the following i.e.:
- Main office (administrative) buildings,
- Workshops (Mine and mining contractors' workshops),

- Ablution facilities (chemical toilets or septic/conservancy tanks. Chemical toilets will be used at the opencast workings and the change house will be linked to the septic/conservancy tanks.
- Water and electrical distribution installations.

Mining sections:

The mining sections consist of the following facilities and infrastructure i.e.:

- Access roads and haul roads
- Coal crushing and screening plant facility,
- Coal processing facility (including a filter press plant)
- R.O.M. coal stockpiling area.
- Mining contractors' hard parks
- A weighbridge
- Pollution control dams, and
- Mine access control points (security points)

2.3.6 Water Impoundments

A number of streams runs adjacent to the proposed project study area.

2.3.7 Proposed Surface Infrastructure Description

2.3.7.1 Opencast Expansion

Opencast mining, using the truck and shovel lateral rollover mining method will be undertaken. Mining will commence from the initial box-cut, which will mostly likely be connected to the existing operational opencast workings. Access to the opencast pit will be via a pit ramp. Haul roads will be extended from the existing road infrastructure to cater for the proposed opencast project.

The soft overburden will be removed by mechanical methods and stockpiled at the existing overburden stockpiling area. The hards overburden material removed will be used for backfilling the existing opencast pits, hence no new overburden (softs and hards) stockpile will be required at the proposed project area.

2.3.7.2 Topsoil Stockpile

Topsoil material will be stripped from the opencast and surface infrastructure areas and will be stockpiled at the proposed topsoil stockpiling area. The stripped soils will be stockpiled as per the recommendation from the soil specialist report. The topsoil material will therefore be used later to cover the backfilled opencast voids.

2.3.7.3 Haul Road

A haul road will be constructed to access the Opencast areas. The constructed haul road will join the existing Black Wattle opencast haul road. The road will be used for the haulage of overburden and coal material from the proposed project to the existing designated areas.

2.3.7.4 Surface Dirty water pipeline

Dirty water from the proposed opencast pits will be collected via a proposed dirty water pipeline, that will tie into the existing water pipeline which collects water from the existing opencast pits to the existing PCD.

2.3.7.5 Water management structures (storm water diversion structures)

A stormwater diversion berm will be constructed as part of the proposed project, upslope of the pit. This berm will divert runoff water from the pit area.

2.3.8 Water Supply

No potable water plant is constructed on site. The municipality supplies the mine with portable water.

2.3.8.1 Power Supply

Diesel powered vehicles and machinery will be used for the mining at the proposed extension project. Storage of this fuel will be undertaken at the existing fuel storage facilities situated at the existing

2.3.8.2 Waste Management

According to NEMWA, waste is defined as any substance, material, or object, that is unwanted, rejected, abandoned, discarded, or disposed of, or that is intended or required to be discarded or disposed of, by the holder of that substance, material, or object, whether such substance, material or object can be re-used, recycled, or recovered and includes all waste as defined in Schedule 3 of NEMWA. Schedule 3 of NEMWA further divides waste into hazardous and general waste. Both hazardous and general waste will be generated from the proposed project area. Identification of waste to be generated from the proposed project was conducted in terms of Schedule 3 of NEMWA and all identified waste and their management is described below.

General Waste Management

General waste that may be generated at the proposed project include paper, plastic, cupboards, and food waste. Waste management include the separation of waste components into recyclable waste and waste that require disposal. Waste generated will temporarily be stored on-site at the existing waste storage facilities prior to off-site transportation to recycling facilities, collection points or licensed waste disposal sites by registered contractors. Black Wattle Colliery will use the current certified contractor for the collection and disposal of the waste generated from the project area.

Management of domestic waste include the temporary storage of all domestic waste generated from the mine in a demarcated area. All generated domestic and general waste will be collected on-site into the existing clearly demarcated waste skips/bins and transported off site by the appointed waste removal contractor. The waste skips/bins will be placed on protected areas. The waste generated will comply with the National Norms and Standards for Storage of Waste, 2013. The existing Waste Management and Monitoring Procedure for the management of general waste will be used for the Black Wattle Colliery Opencast Expansion 2022 Project.

Hazardous Waste Management

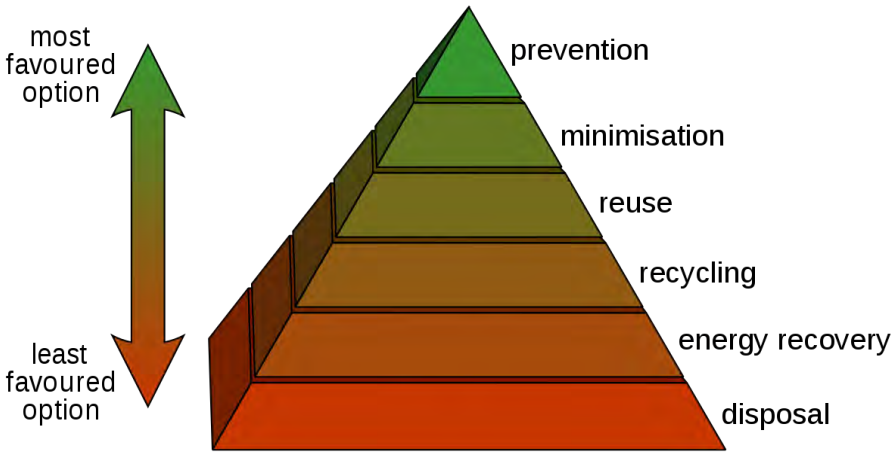
Hazardous waste that may be generated at the proposed project include used oils, fuel, degreasers, brake fluid and lubricants. The waste will be transported via existing routes to the existing temporary waste storage facilities within the existing mine workshops. Waste generated will be removed by the current permitted waste disposal contractor for treatment and disposal at a licensed hazardous waste disposal site. Management of hazardous waste include the temporary storage of all hazardous waste generated from the mine in a demarcated area. The waste generated will comply with the National Norms and Standards for Storage of Waste, 2013. Note that hazardous waste may be generated during the construction phase of the project.

The existing Black Wattle Colliery operational procedures for the management of hazardous waste will be used for the Black Wattle Colliery Opencast Expansion Project. The existing procedures include:

- Handling and Storage of Hazardous Material Procedure
- Chemical Spill Clean-up Procedure

- Waste Management and Monitoring Procedure.

Waste streams identified above will be managed according to the waste management hierarchy. The diagram below will be adhered to ensure the best practice for waste management.



2.3.8.3 Water Pollution Management Facilities

2.3.8.3.1 Sewage Treatment Plant

No sewage treatment plant will be required for the proposed project. Chemical toilets will be utilized.

2.3.8.3.2 Dirty Water Management and Storm Water Management Facilities

The proposed project is situated around wetland areas. In view of the above and in order to protect the surrounding water resources and wetland areas from potential pollution, facilities/structures associated with the proposed project will be equipped with a designed and properly constructed storm water management system, where required.

Storm water management entails the prevention of runoff from clean areas from entering dirty areas and the prevention of runoff from dirty areas from entering clean water areas. The above will hence prevent clean water from being contaminated by dirty mine water. This section will indicate how storm water at the proposed project will be managed.

The storm water management system for the proposed project includes the construction and operation of storm water diversion berms and a dirty water pipeline. The system will be designed to separate clean and dirty storm water from the catchment of the proposed project and its associated infrastructure.

Clean storm water generated proposed project area and the associated infrastructure will be diverted via berms towards the nearby clean water environment.

All dirty water from the proposed opencast pits will be collected via a proposed dirty water pipeline, that will tie into the existing water pipeline which collects water from the existing opencast pits to the existing PCD. The polluted storm water runoff from the haul roads will be diverted to the opencast pits, which will be pumped together with the dirty water to the existing PCD via dirty water pipeline.

2.3.8.4 Water Supply Infrastructures

Water will be required at the proposed mining area for the purpose of supplying potable water and dust suppression. Water for dust suppression will be sourced from the existing PCD and potable water will be sourced from the existing water supply within the mine.

2.4 Black Wattle Colliery Opencast Expansion Project Method Statement

In terms of the DMRE, EIR/EMPr template, Black Wattle Colliery (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.

The identified actions, activities and processes are supported by a surface layout plan together with a mining layout plan showing the location and aerial extent of all activities associated with the proposed project, including the proposed mining operation.

2.4.1 Construction Phase

2.4.1.1 Excavation of initial box cuts

An initial box cut will be constructed as depicted in the surface layout plan. Access pit ramps will be constructed within the initial box cut for access to the mining pits°. Topsoil from the initial box cuts will be stripped to a depth as specified by the soil specialist and will be removed to the proposed topsoil stockpile. Subsoil from the box cuts will be stripped and stockpiled separately at the proposed subsoil stockpile.

Hard overburden material from the initial box cuts will be drilled, blasted and removed to the existing hards overburden stockpile and softs overburden material will be removed and stockpiled at the proposed soft overburden stockpile. Finally, all coal material will be drilled, blasted, removed to the existing R.O.M. coal stockpile for crushing and screening before being sold to the destined clients.

2.4.1.2 Construction of Haul Roads

The construction activities associated with the proposed haul roads include: clearance of topsoil and unusable subsoil and the vegetation over the footprint of the areas covered by the proposed access roads, stockpiling of removed topsoil and subsoil to designated areas.

2.4.1.3 Construction of Storm Water Management

A stormwater diversion berm will be constructed as part of the proposed project, upslope of the pit. This berm will divert runoff water from the pit area.

During the construction of the above-mentioned storm water management structure, topsoil will be removed and stockpiled at the proposed topsoil stockpiles. Once excavated, the clean water berm will be constructed in according to the design specification.

2.4.1.4 Construction of Topsoil Stockpiling Area

Topsoil from all infrastructure areas will be stripped to the soil depth of the area as determined by the soil specialist. Note that some of the topsoil will be used for the construction of perimeter berms.

The position of the topsoil stockpile is indicated on the Mining Layout Plan in Figure 3. Note that topsoil will be removed from all stockpiling areas and infrastructure areas and some will be placed as berms around the areas prior to formation of the soft overburden stockpiles.

All topsoil, subsoil and soft overburden material removed during the construction phase (boxcut establishment phase will be stockpiled, separately.

The topsoil stockpiles will be placed such that they do not exceed a height recommended by a soil specialist. This height should be enough to reduce the leaching out effect on the stockpiled topsoil.

2.4.1.5 Construction of a Dirty Water Pipeline

During the construction of the dirty water pipeline, topsoil will be removed and stockpiled at the topsoil stockpiles. The pipeline will then be placed on the surface where vegetation has been removed, which will tie in to the existing dirty water pipeline that conveyor dirty water from the current opencast pits to the existing PCD.

2.4.2 Operational Phase

The following activities will be undertaken during the operational phase of the proposed project:

2.4.2.1 Systematic removal of the coal material by means of opencast mining methods)

Mining at the proposed opencast expansion will be undertaken by opencast mining method. The following will occur after the opening of the first cut at the opencast expansion mining area. The opencast pit will migrate forward as per the mining plan. Successive cuts will not exceed the width and length as specified in the mining layout plan. Following the removal of the extractable coal reserves, material from successive cuts will be used to backfill preceding cuts. Each cut will be systematically filled with overburden first, subsoil second and topsoil last viz. Overburden from the next cut will be drilled, blasted and placed in the first cut, subsoil from the third cut will be used to cover the overburden placed in the first cut, and topsoil from the fourth cut will be placed over the subsoil in the first cut.

2.4.2.2 Use of Mine Surface Infrastructure and associated Access and Haul Roads

The existing mine surface infrastructure, except for the proposed activities will be used for servicing the proposed opencast expansion area.

2.4.2.3 Stockpiling and Transportation of R.O.M. coal

R.O.M. coal from the opencast mining area will be transported by dump trucks via haul roads from the active opencast to the current and existing coal stockpiling area. The constructed haul roads will be used for this purpose.

2.4.2.4 Management of mine affected water

Dirty water from the proposed opencast pits will be collected via a proposed dirty water pipeline, that will tie into the existing water pipeline which collects water from the existing opencast pits to the existing PCD.

2.4.2.5 Waste Management

According to NEMWA, waste is defined as any substance, material, or object, that is unwanted, rejected, abandoned, discarded, or disposed of, or that is intended or required to be discarded or disposed of, by the holder of that substance, material, or object, whether such substance, material or object can be re-

used, recycled, or recovered and includes all waste as defined in Schedule 3 of NEMWA. Schedule 3 of NEMWA further divides waste into hazardous and general waste. Both hazardous and general waste will be generated from the proposed project area. Identification of waste to be generated from the proposed project was conducted in terms of Schedule 3 of NEMWA and all identified waste and their management is described below.

General Waste Management

General waste that may be generated at the proposed project include paper, plastic, cupboards, and food waste. Waste management include the separation of waste components into recyclable waste and waste that require disposal. Waste generated will temporarily be stored on-site at the existing waste storage facilities prior to off-site transportation to recycling facilities, collection points or licensed waste disposal sites by registered contractors. Black Wattle Colliery will use the current certified contractor for the collection and disposal of the waste generated from the project area.

Management of domestic waste include the temporary storage of all domestic waste generated from the mine in a demarcated area. All generated domestic and general waste will be collected on-site into the existing clearly demarcated waste skips/bins and transported off site by the appointed waste removal contractor. The waste skips/bins will be placed on protected areas. The waste generated will comply with the National Norms and Standards for Storage of Waste, 2013. The existing Waste Management and Monitoring Procedure for the management of general waste will be used for the Black Wattle Colliery Opencast Expansion 2022 Project.

Hazardous Waste Management

Hazardous waste that may be generated at the proposed project include used oils, fuel, degreasers, brake fluid and lubricants. The waste will be transported via existing routes to the existing temporary waste storage facilities within the existing mine workshops. Waste generated will be removed by the current permitted waste disposal contractor for treatment and disposal at a licensed hazardous waste disposal site. Management of hazardous waste include the temporary storage of all hazardous waste generated from the mine in a demarcated area. The waste generated will comply with the National Norms and Standards for Storage of Waste, 2013. Note that hazardous waste may be generated during the construction phase of the project.

The existing Black Wattle Colliery operational procedures for the management of hazardous waste will be used for the Black Wattle Colliery Opencast Expansion Project. The existing procedures include:

- Handling and Storage of Hazardous Material Procedure
- Chemical Spill Clean-up Procedure
- Waste Management and Monitoring Procedure.

2.4.2.6 Use of Existing Access Roads and Proposed Haul Roads

The roads will be used for the following:

- Transportation of coal, entrance purposes and accessing the mining area and associated surface infrastructures.

2.4.3 Decommissioning/Closure Phase

2.4.3.1 Filling of Final Voids

Since concurrent rehabilitation will be undertaken during the operational phase, only the final voids will require rehabilitation. Rehabilitation of the voids will include the following i.e. the hards, subsoil and topsoil overburden stockpiled during the construction phase of the opencast project will be used to backfill the final voids. Method of material placement will be placement of hards overburden first, followed by subsoil material and finally layer of topsoil. The final void will be filled to surface and shaped to ensure that the area is free draining.

The shaped area will be topsoiled and re-vegetated with a recommended seed mix or as per the land use requirements of the Black Wattle Colliery Closure Objectives.

2.4.3.2 Rehabilitation of Haul Roads

All hardened areas that will not be used after mining will be ripped to reduce compaction. The area will then be covered with a layer of topsoil before it will be seeded.

2.4.3.3 Rehabilitation of Topsoil Stockpile Area

After the removal of topsoil material for backfilling of the final voids, the stockpile areas will be ripped and covered with a layer of topsoil. Sections used to access the areas will be ripped before being covered with topsoil for seeding.

2.4.3.4 Seeding of rehabilitated areas

Following mechanical rehabilitation of the area, a recommended seed mix will be applied to all rehabilitated areas to accelerate vegetation establishment. A suitably qualified person will be employed to determine the most appropriate seed mix for the seeding of the rehabilitation areas.

2.4.3.5 Maintenance and monitoring of rehabilitated and surrounding environments

All rehabilitated areas will be monitored for cracks, erosion and settlements. All cracks, erosion gullies and settlement depressions will be repaired.

Data gathered from the above maintenance and from a monitoring programme will be used for the application of a closure certificate.

2.4.3.6 Maintenance and monitoring of rehabilitated and surrounding environments

The current 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 quarterly 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.

2.4.3.7 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 Black Wattle Colliery Opencast Expansion Project system 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, 1998 (Act No. 107 of 1998)

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 DMRE, as the case may be, except in respect of those activities that may commence without having to obtain an EA 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 EAs for the commencement of activities, subjected to EIA, 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 985, GNR 983 and GNR 984.

In view of the above, an EIA process 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 EA. This report has therefore been compiled in compliance with the above regulations.

3.3 National Environmental Management Air Quality Act, 2004 (Act No. 39 of 2004)

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 in Governmental Gazette No 37054, in terms of Section 21(1)(b) of the NEM: AQA.

The proposed Black Wattle Colliery Opencast Expansion Project will not trigger any of the activities listed under the above-mentioned Regulations. However, Black Wattle Colliery (Pty) Limited must ensure that emissions from the proposed activities complies with the standards as set in the above-mentioned regulations.

3.4 The National Heritage Resources Act, 1999 (Act No. 25 of 1999)

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 Heritage Impact Assessment (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. A Heritage Impact Assessment has been undertaken for the proposed project. Black Wattle Colliery (Pty) Limited will ensure that the recommendations proposed in the HIA report are adhered to, to ensure sustainable protection of the above-mentioned buildings and graves.

3.5 NATIONAL ENVIRONMENTAL MANAGEMENT BIODIVERSITY ACT (ACT NO. 10 OF 2004)

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 Draft EIR/EMPr has been complied to ensure that all applicable requirements prescribed in the NEMBA are complied with.

3.6 MPUMALANGA NATURE CONSERVATION ACT, 1998 (ACT NO. 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 Conservation Plan (MBCP). This plan has been jointly developed by the Mpumalanga Tourism and Parks Agency (MTPA) and the Department of Agriculture and Land Administration (DALA). The MBCP 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 MBCP as sensitive were identified and where applicable measures will be proposed for ensuring that the areas are not degrade by the proposed project activities. Furthermore, the Draft EIR/EMPr has been complied to ensure that all applicable requirements prescribed in the act are complied with.

3.7 MINERAL AND PETROLEUM RESOURCES DEVELOPMENT ACT, 2002 (ACT NO. 28 OF 2002)

The Department of the 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 EMPr be drafted for the mitigation of impacts identified during the EIA 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, EAs and water use. Under the One Environmental System, The Minister of Mineral Resources, will issue EAs and waste management licences in terms of the NEMA, and the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008), respectively, for mining and related activities. In view of the above, the application for an EA for the proposed Black Wattle Colliery Opencast Expansion Project was submitted to the DMRE as the competent authority.

3.8 NATIONAL WATER ACT, 1998 (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 resource s, 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.

Black Wattle Colliery (Pty) Limited has applied for an WULA for the water uses triggered by the proposed project to the DWS for consideration.

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.

No waste management activities are triggered by the proposed project, hence no application in terms of the NEMWA was submitted to the Department of Mineral Resources. However, where applicable,

principles and objectives relating to waste management will be used during the compilation of the EMPr for the proposed project.

3.10 National Environmental Management: Protected Areas Act (Act No. 57 of 2003)

NEMPAA provides for the declaration and management of protected areas in South Africa and provides for the declaration of special nature reserves, national parks, nature reserves; world heritage sites; specially protected forests, forest nature reserves; and mountain catchment areas.

According to Section 48 of NEMPAA, no person may conduct commercial prospecting, mining, exploration, production or related activities in a special nature reserve; national park; nature reserve; world heritage site; marine protected area; specially protected forest area; forest nature reserve or forest wilderness area. Furthermore, Section 48 of the NEMPAA provides that no person may conduct commercial prospecting, mining, exploration, production or related activities in a protected environment without the written permission of the Minister of Environmental Affairs and the Minister of Mineral Resources. None of the areas where identified.

3.11 EIA Guidelines

Several 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 several aspects relating to the EIA 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 EIA.

Several 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 Affairs 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

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. This section of the SR will indicate the need and desirability for the proposed Black Wattle Colliery Opencast Expansion Project, which was compiled in terms of the 2010 guideline on need and desirability, integrated environmental management guideline series 9, Department of Environmental Affairs (now known as the Department of Agriculture, Forestry and Fisheries).

The proposed project is situated within the Steve Tshwete Local Municipality in the Mpumalanga Province. As part of the requirements of the compilation of the EIR/EMPr, the applicant must determine the Need and Desirability of the proposed project. This section of the EIR/EMPr was; therefore, compiled to comply with the requirements of the guideline on need and desirability promulgated on the 20th of October 2014 under Government Notice 891 of 2014, which in turn will comply with the requirements of the EIA Regulations, 2014.

The need and desirability determination for this project will hence be structured such that it determines how the ecological attributes of the area, spatial development of the area, socio-economic profile of the communities within the study area and the project's financial viability fits together in ensuring that the proposed project becomes a success for the region.

4.1 ECOLOGICAL INTEGRITY

4.1.1 Considerations of the ecological integrity

Threatened ecosystems

The proposed Opencast Coal Mining Extension project is situated in the Rand Highveld grassland vegetation type (Gm 11) / ecosystem (Figure 4) in the Mesic Highveld Grassland Bioregion of the Grassland Biome (South African National Biodiversity Institute – SANBI).

The vegetation unit / ecosystem, associated with the proposed coal mining extension project is vulnerable (Figure 5). According to Government Notice 1002, Government Gazette No. 34809, 9 December 2011), vulnerable ecosystems are considered threatened ecosystems since it is ecosystems that have a high risk of undergoing significant degradation of ecological structure, function or composition because of human intervention, although they are not critically endangered ecosystems or endangered ecosystems.

The proposed coal mining extension project area is situated near a depression / pan wetland (National Wetland Map 5, SANBI) (Figure 6) (SANBI). It is however, not situated in a National Freshwater Ecological Priority Area (NFEPA) - rivers.

The proposed coal mining Extension Project is situated in the Mesic Highveld Grassland, Group 4, wetland ecosystem type (SANBI) (Figure 7). The ecosystem threat status assessment indicates the following categories for wetland types in this wetland ecosystem viz. Channelled valley bottom wetlands – Least threatened; Depression wetlands – Endangered; Flats – Endangered; Floodplain wetlands – Endangered; Seep wetlands – Least threatened; Unchannelled valley bottom wetlands – Least threatened; Valleyhead seep wetlands – Critically endangered (Mbona et. al. 2015).

Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs)

According to the Mpumalanga Biodiversity Sector Plan (MBSP) GIS-based electronic application (Mpumalanga Tourism and Parks Agency (MTPA), 2019), the proposed coal mining extension project is primarily situated in terrestrial assessment categories of “Heavily Modified”, meaning 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; “Moderately modified – old lands”, meaning areas which were modified within the last 80 years but were at some point abandoned, including old mines and old cultivated lands, collectively termed “old lands”; and “Other Natural Areas (ONAs)”, meaning areas that are not identified to meet biodiversity pattern or process targets. (Figure 8). Surrounding terrestrial assessment categories are also indicated in Figure 8.

According to the Mpumalanga Biodiversity Sector Plan (MBSP) GIS-based electronic application (Mpumalanga Tourism and Parks Agency (MTPA), 2019), the proposed coal mining extension project is primarily situated in freshwater assessment categories of “Heavily Modified” meaning areas that have experienced a form of land use that has resulted in the near complete loss of biodiversity and a degree of loss of ecological function; “Other Natural Areas” meaning 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; and “Ecological Support Areas (ESA) – Wetland Clusters” meaning clusters of wetlands embedded within largely natural landscapes to allow for the migration of fauna and flora between wetlands (Figure 9). A very small area is situated within “Ecological Support Areas (ESA) – Wetlands”, all non-FEPA wetlands, meaning, although not classed as FEPAs, these wetlands support the hydrological functioning of rivers, water tables and freshwater biodiversity, as well as providing a host of ecosystem services through the ecological infrastructure that they provide. This depression / pan, is currently partially mined by an unknown entity, and was historically partially mined by Middelburg Mining Services, now owned by Seriti Resources (Pty) Ltd. Surrounding freshwater assessment categories are also indicated in Figure 9.

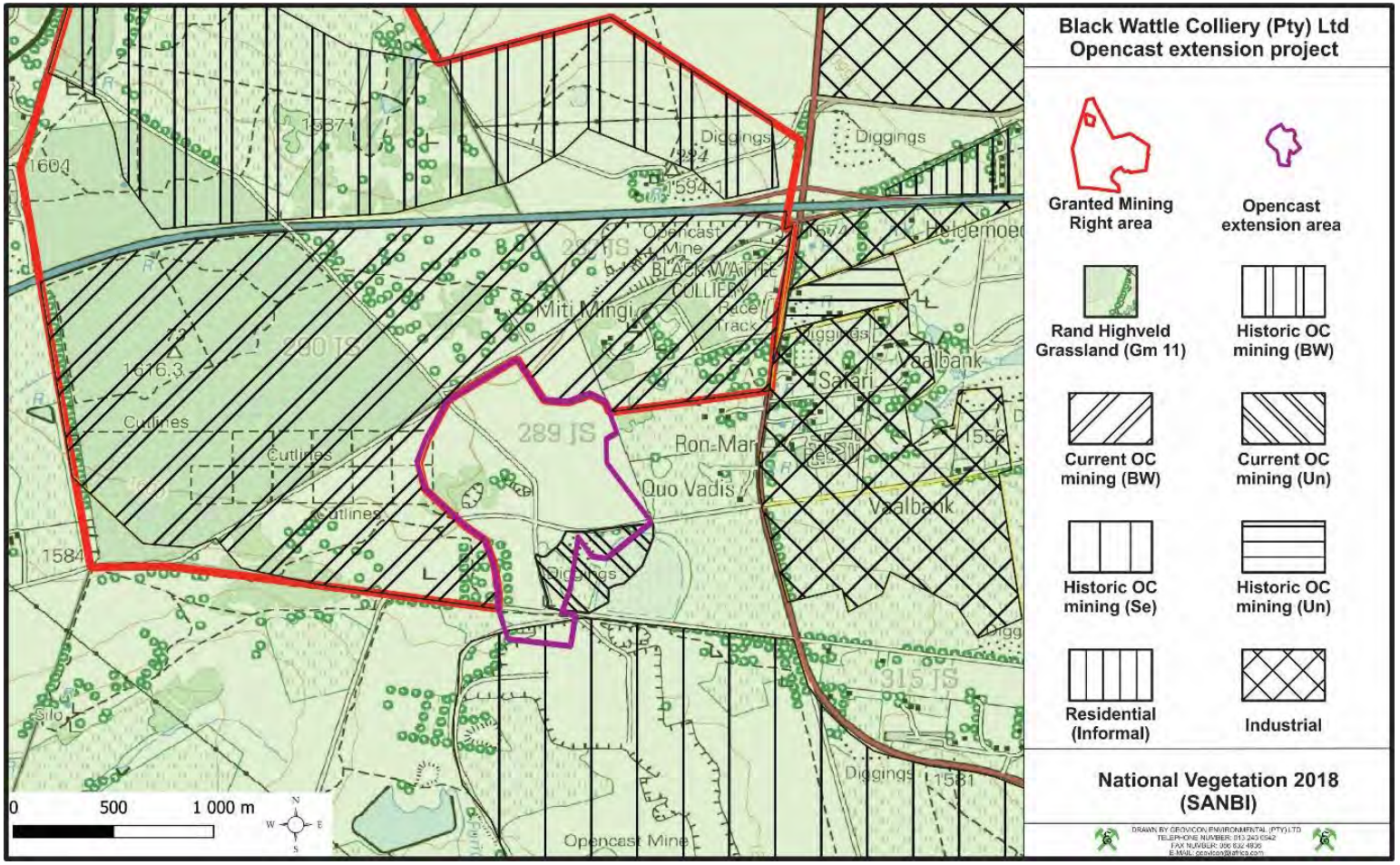


Figure 4: National vegetation map (SANBI) for the proposed Black Wattle Colliery Opencast Expansion Project

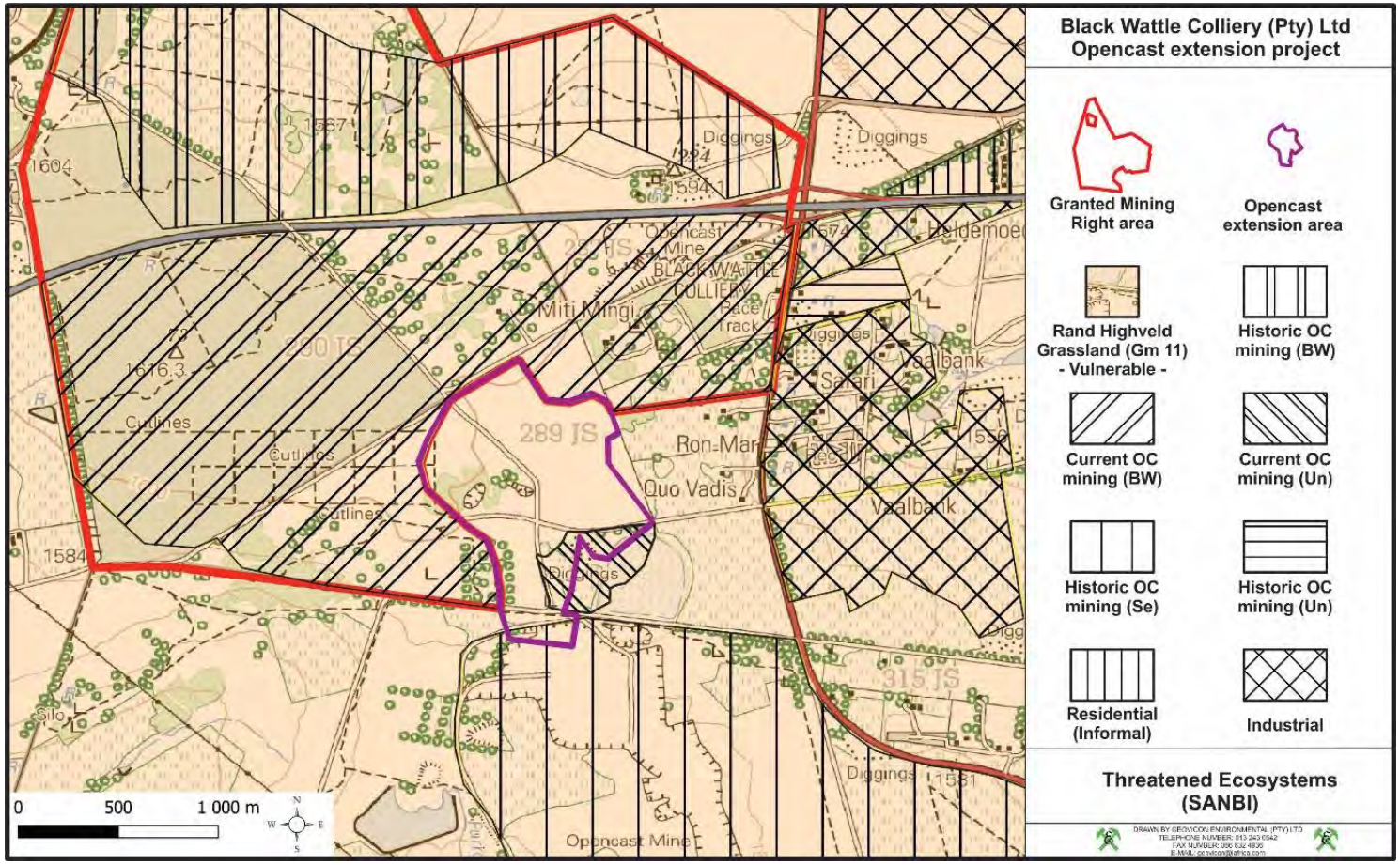


Figure 5: Threatened ecosystems for the proposed Black Wattle Colliery Opencast Expansion Project

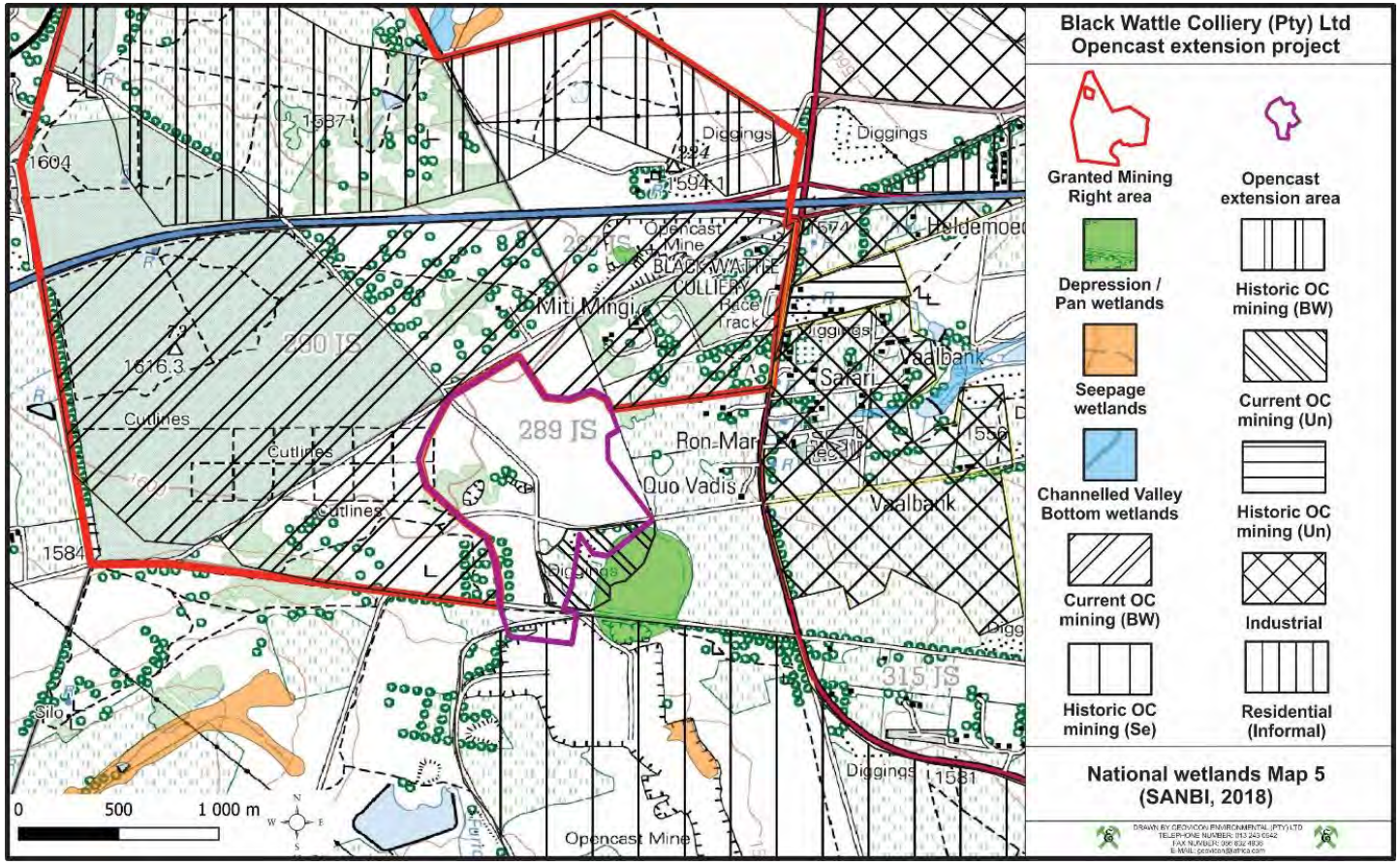


Figure 6: National wetland Types, Map 5 (2018) for the proposed Black Wattle Colliery Opencast Expansion Project

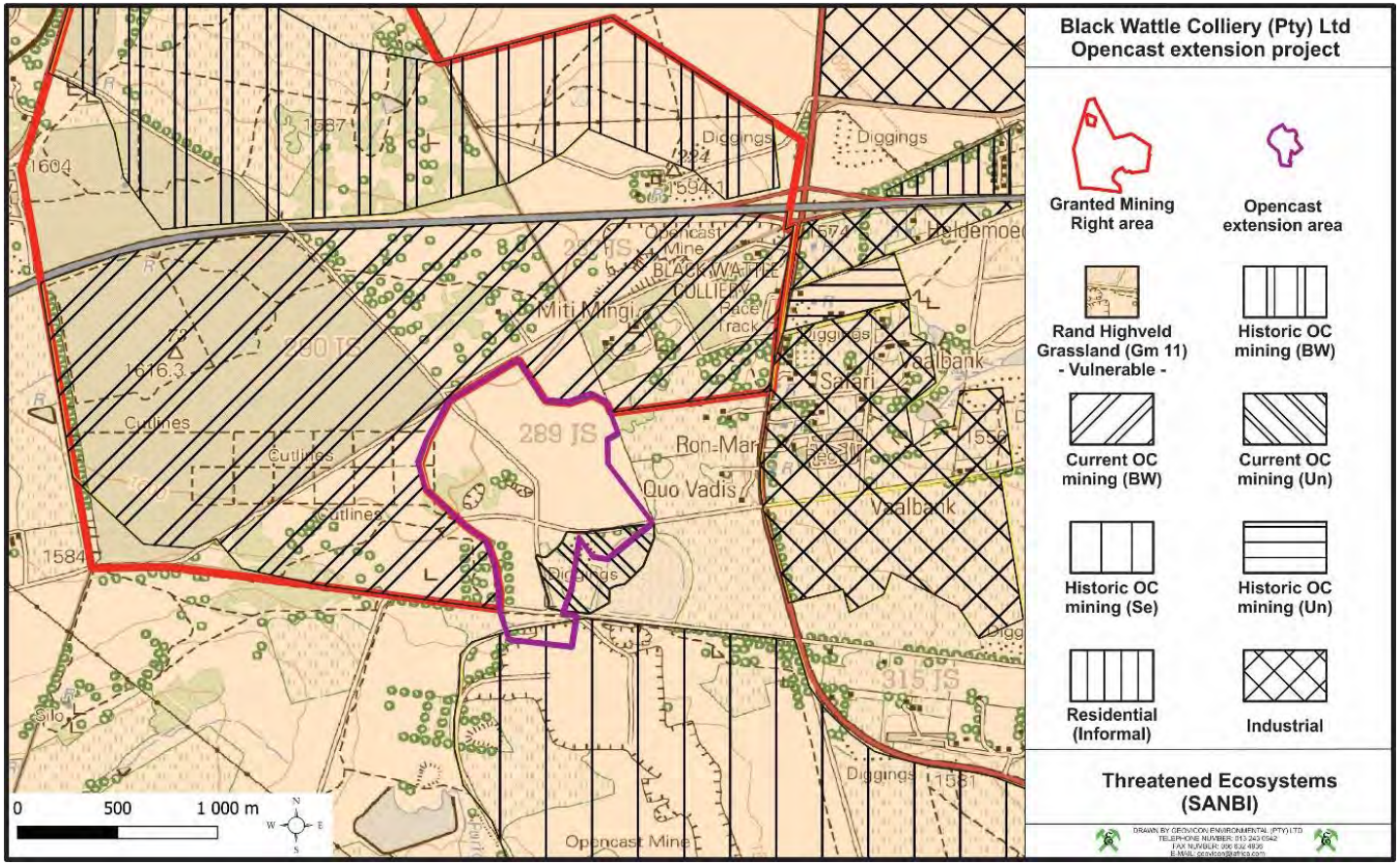


Figure 7: National Wetland Ecosystem types for the proposed Black Wattle Colliery Opencast Expansion Project

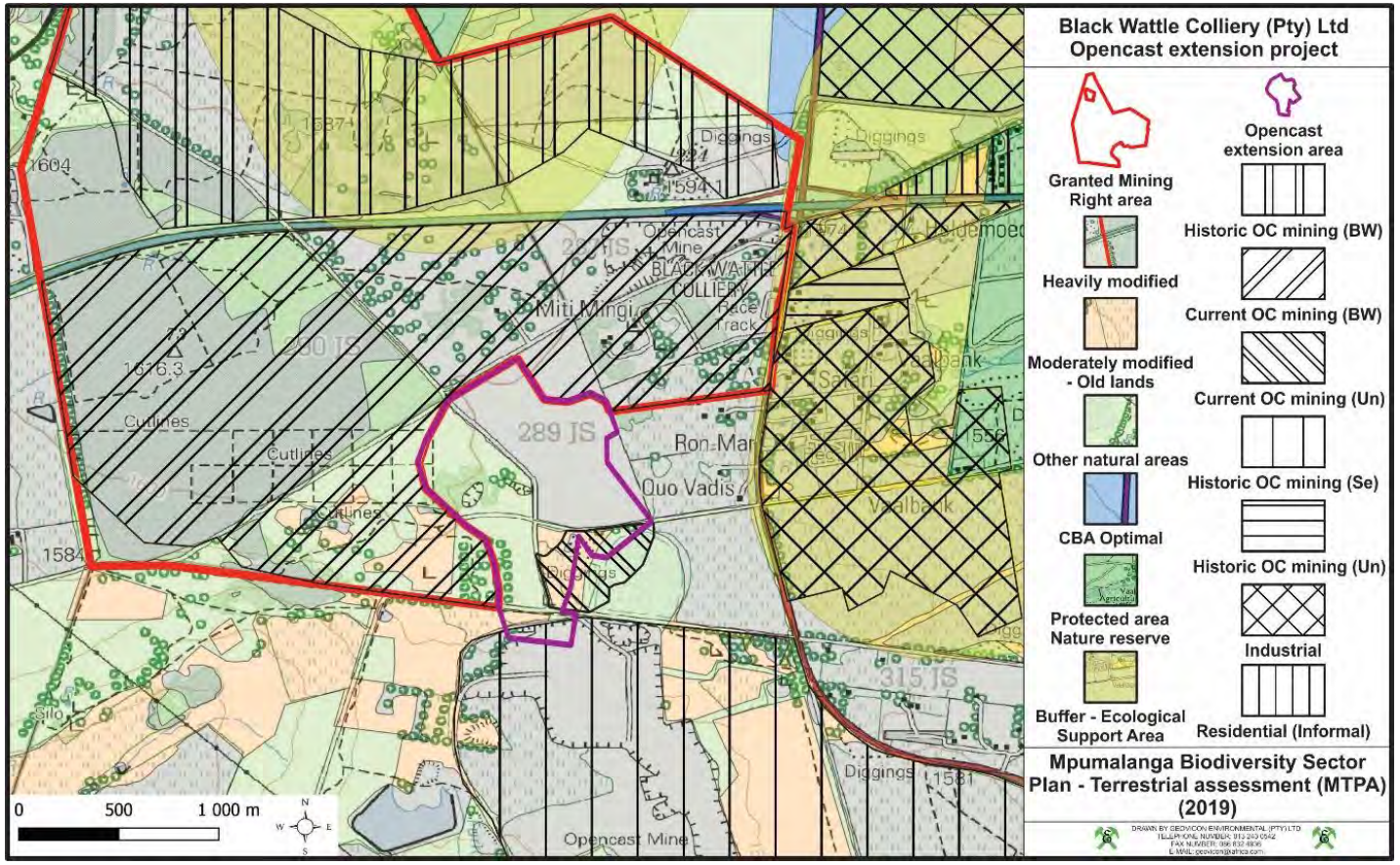


Figure 8: MBSP Terrestrial assessment for the proposed Black Wattle Colliery Opencast Expansion Project

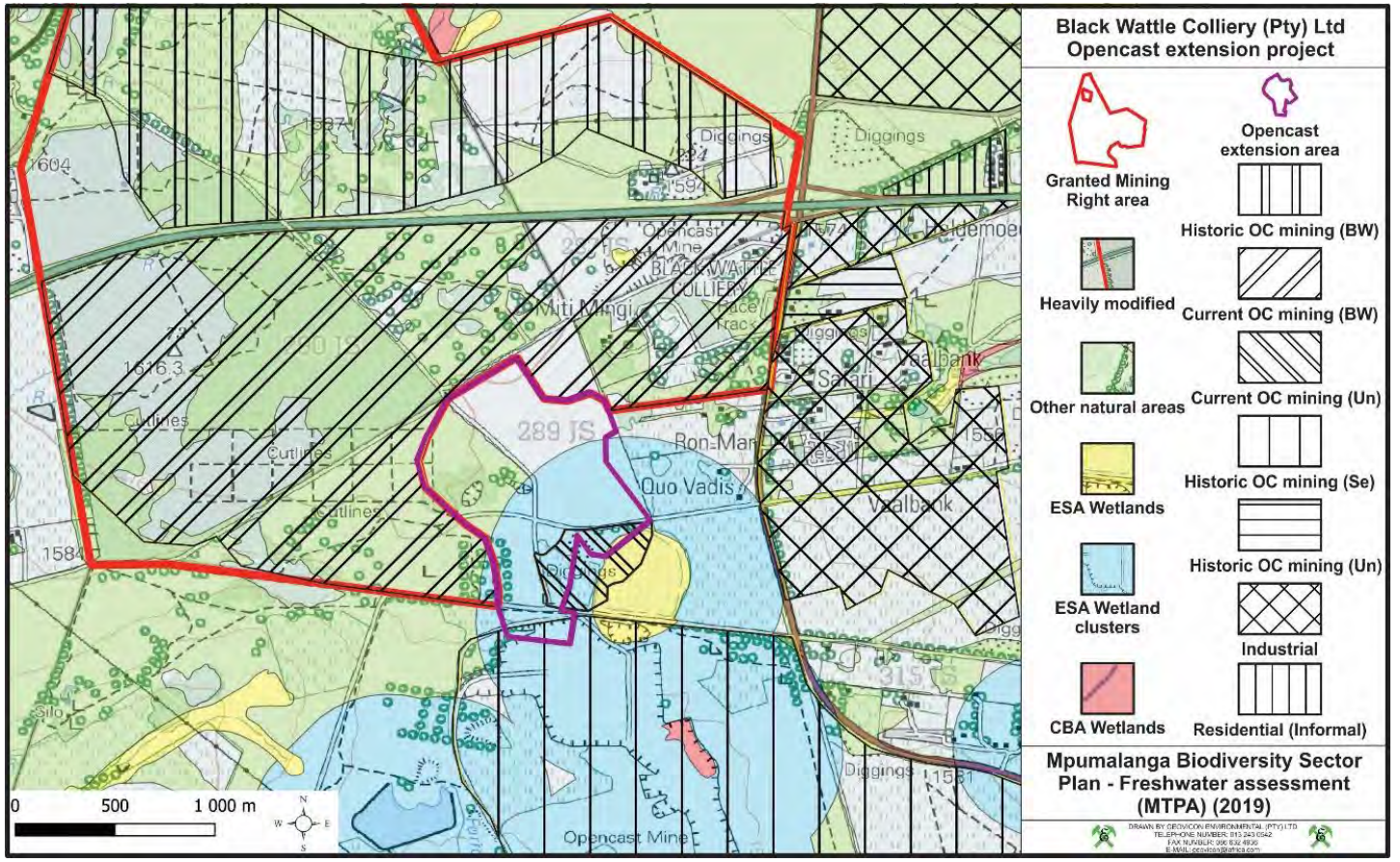


Figure 9: MBSP Freshwater assessment for the proposed Black Wattle Colliery Opencast Expansion Project

Conservation targets

According to the Mpumalanga Biodiversity Sector Handbook the Eastern Highveld grassland vegetation type (Gm 12) / ecosystem is poorly protected. The conservation target is 24 % of which the proportion of target protected is 12.99 %. It is near-endemic in Mpumalanga. This vegetation unit occurs still in a natural state (excluding old lands) on 47.98 % of surface area in Mpumalanga.

Ecological drivers of the ecosystem

According to the Mpumalanga Biodiversity Sector Handbook the most important ecological drivers in Mpumalanga are built infrastructure, cultivation, mining, prospecting, and residential areas. The Blackwattle Colliery Opencast Expansion 2022 Project area is situated in the Nkangala District Municipality with the percentages for the different ecological drivers as a percentage of the surface area of Mpumalanga as:

Built infrastructure – 14.3 %

Cultivation – 1.8 %

Mining – 39.9 %

Prospecting – 75.6 %

Residential – 8.0%

Environmental Management Framework

The Mpumalanga Biodiversity Sector Plan (MTPA 2014) is the Environmental Management Framework for Mpumalanga and provides for the sustainable use of natural resources in Mpumalanga by means of utilising the most recent and best quality spatial biodiversity information to inform land use and development planning, environmental assessments and authorisations and natural resource management.

Spatial Development Framework

The Steve Tshwete Municipality utilises its Spatial Development Framework for land use planning. Based on the above-mentioned special development framework, the proposed project is situated within an already developed area and will hence not conflict with the municipality's spatial development framework regarding preservation of the ecological integrity of the area.

4.1.2 Consideration of the disturbance or enhancement of the ecosystems and/or result in the loss or protection of biological diversity

The proposed Blackwattle Colliery Opencast Expansion 2022 Project area is situated to the south-eastern side, adjacent to the existing Black Wattle Colliery Mining Right Boundary. The area comprises land already impacted by historic and current land use activities. The proposed project area is approximately 93,5 ha in size. Currently, approximately 6,2 ha (6.6 %), is used for mining over a depression wetland, these mining activities are conducted by another entity other than the applicant, while approximately 3 ha (3.2 %) is used for dirt roads, the remaining 90 % of the area is used for grazing. The entire area consists out of modified or degraded grassland areas and is surrounded by mining activities; thus, it can be assumed that the activity of expanding the Blackwattle Colliery to include the proposed opencast expansion areas, will not have any detrimental effect on the biodiversity that utilises the proposed Blackwattle Opencast Expansion 2022 Project area.

Loss of biological diversity within the pan adjacent to the proposed Blackwattle Colliery Opencast Expansion 2022 Project area is unlikely, since mining commenced by another company in the month of

May in 2022. The mining operation currently is situated over the pan or depression wetland; thus, the ecological integrity of the wetland has been impacted negatively.

The negative impacts cannot be avoided since the proposed project area is situated within the mineable coal reserve adjacent to the existing mining right area. Measures to minimise the impact is to keep the activity footprint as small as possible.

Rehabilitation and re-vegetation will be conducted, during mining, according to best practice methods. Rehabilitation and re-vegetation of the rehabilitated area, as well as eradication of all declared invader plant species will result in ecosystem enhancement. To prohibit crop production, after rehabilitation of the project area, will also enhance the ecosystem, since the project area will be re-vegetated with grassland species, resulting in no ploughing or harvesting over the area.

The above-mentioned activities will result in ecosystem disturbances that can be mitigated by means of rehabilitation measures.

4.1.3 Consideration of pollution and degradation of the biophysical environment

The proposed project may pollute or degrade the biophysical environment with polluted mine water (in the surface and groundwater), coal dust, alteration of surface run-off water quantity, velocity and patterns, soil compaction and invasion of declared invader species. This negative impact cannot be avoided since this is the area where the coal reserve is situated.

The negative impact will be remedied by keeping the footprint of the development as small as possible, by the separation of dirty and clean water, containing all mine polluted water in a pollution control dam, dust suppression, routing clean water around the mining area to report to the streams, keeping the footprint of all dumps as small as possible and to implement an eradication programme for declared invader species.

4.1.4 Waste to be generated by the proposed development and their management

According to NEMWA, waste is defined as any substance, material, or object, that is unwanted, rejected, abandoned, discarded, or disposed of, or that is intended or required to be discarded or disposed of, by the holder of that substance, material, or object, whether such substance, material or object can be re-used, recycled, or recovered and includes all waste as defined in Schedule 3 of NEMWA. Schedule 3 of NEMWA further divides waste into hazardous and general waste. Both hazardous and general waste will be generated from the Black Wattle Colliery Opencast Expansion Project. Identification of waste to be generated from the Black Wattle Colliery Opencast Expansion 2022 Project was conducted in terms of Schedule 3 of NEMWA and all identified waste and their management is described below.

General Waste Management

General waste that may be generated at the proposed Black Wattle Colliery Opencast Expansion 2022 Project include paper, plastic, cupboards, and food waste. Waste management include the separation of waste components into recyclable waste and waste that require disposal. Waste generated will temporarily be stored on-site at the existing waste storage facilities prior to off-site transportation to recycling facilities, collection points or licensed waste disposal sites by registered contractors. Black Wattle Colliery will use the current certified contractor for the collection and disposal of the waste generated from the Black Wattle Colliery Opencast Expansion Project.

Management of domestic waste include the temporary storage of all domestic waste generated from the mine in a demarcated area. All generated domestic and general waste will be collected on-site into the

existing clearly demarcated waste skips/bins and transported off site by the appointed waste removal contractor. The waste skips/bins will be placed on protected areas. The waste generated will comply with the National Norms and Standards for Storage of Waste, 2013. The existing Waste Management and Monitoring Procedure for the management of general waste will be used for the Black Wattle Colliery Opencast Expansion Project.

Hazardous Waste Management

Hazardous waste that may be generated at the proposed project include used oils, fuel, degreasers, brake fluid and lubricants. The waste will be transported via existing routes to the existing temporary waste storage facilities within the mine's existing workshops. Waste generated will be removed by the current permitted waste disposal contractor for treatment and disposal at a licensed hazardous waste disposal site. Management of hazardous waste include the temporary storage of all hazardous waste generated from the mine in a demarcated area. The waste generated will comply with the National Norms and Standards for Storage of Waste, 2013. Note that hazardous waste may be generated during the construction phase of the project.

The existing Black Wattle Colliery operational procedures for the management of hazardous waste will be used for the Black Wattle Colliery Opencast Expansion Project. The existing procedures include:

- Handling and Storage of Hazardous Material Procedure
- Chemical Spill Clean-up Procedure
- Waste Management and Monitoring Procedure

Wastewater from the Opencast Pits

Waste will include disposal of polluted water in the pollution control dam and domestic waste from employees. Polluted water from all dirty water areas will report to a pollution control dam. Any water from the opencast workings will also be pumped into the pollution control dam. No water from the dirty areas at the mining area will thus report to any natural areas outside of the demarcated mining areas.

4.1.5 Consideration of the disturbance or enhancement of landscape

Since the proposed project activities are mostly situated over mining areas, there will be minimal ecosystem disturbance and thus landscape disturbance due to this mining project. Rehabilitation will be conducted according to best practise methods to minimise the impact and re-vegetation as well as the eradication of all declared invader plant species will result in ecosystem / landscape enhancement. Prior to construction archaeological as well as palaeontological investigations will be conducted to determine if there will be a negative impact on sites that constitute the nation's cultural heritage.

4.1.6 Consideration of the impacts on non-renewable natural resources

The proposed project activities will partially exploit the coal reserve in this area. The coal reserve will only be exploited in an area where the coal is economically viable. This will keep the footprint of the project as small as possible. The consequence of the depletion of the non-renewable natural resource will be a positive impact on the community. The company extracting the coal will make a profit and a part of the profit will be used for community projects. This negative impact cannot be avoided since this is the area where the coal reserve is situated. The negative impact will be remedied by rehabilitation and re-vegetation, according to best practises.

4.1.7 Consideration of the impacts on renewable natural resources

4.1.7.1 Increment of the project's dependency on resources to maintain economic growth

The proposed project will reduce resource dependency since the non-renewable natural resource (coal) will be totally extracted.

4.1.7.2 Use of natural resources

Since South Africa is still dependant on coal for energy, and it is seen as a strategic mineral by the government, the proposed use of the natural resource constitutes the best use thereof. The use is justifiable since South Africa is currently still dependent on coal for energy because the use of alternative methods for energy is still too expensive in South Africa. It is also justifiable since intra-generational equity is still not balanced; thus, certain communities are dependent on the community projects that are generated with the profits from the coal mining companies. Coal will probably not be used by future societies as an energy resource since alternative energy resources will become cheaper in future. The coal resource will thus not be needed by future societies and thus do not need to be justifiable. Energy generation is the most important priority for which the resource can be used.

4.1.7.3 Promotion of reduced dependency on resources

The proposed project area is situated within an existing mining right area. If the coal in this location is thus extracted, it will promote a reduced dependency on the resource since the non-renewable natural resource (coal) will be totally extracted.

4.1.8 Application of risk-averse and cautious approach

4.1.8.1 Knowledge Gaps

The limits of current knowledge are the fact that most of the environmental investigations that were conducted, concentrated on the project area. The wetland integrity assessment, geohydrological investigation as well as surface water survey will incorporate areas outside of the mining right area. The fact that other mining companies near Black Wattle opencast expansion project area, will not share any of their environmental studies, is leaving a gap in terms of determination of cumulative impacts.

4.1.8.2 Application of the risk-averse and cautious approach to the proposed project

The level of risk is the fact that cumulative impacts can thus not be addressed on a larger scale. A risk-averse and cautious approach was applied by means of the different environmental investigations, including impact assessments, which will be conducted for the above-mentioned activities at project area.

4.1.9 Consideration of people's environmental rights

4.1.9.1 Negative impacts on people's environmental rights

There are commercial farmers situated within the proposed project area, that may be negatively impacted regarding the above-mentioned negative impacts. The negative impact cannot be avoided since this is the area where the coal reserves are situated. The negative impact will be remediated by keeping the footprint of the development as small as possible and post mining, by means of rehabilitation and re-vegetation according to best practises.

4.1.9.2 Positive impacts on people's environmental rights

Black Wattle Colliery will at a minimum spend the legislative required percentage of its revenue on community projects in accordance to its Social and Labour Plan.

The following include the positive impacts from the proposed project:

- Black Wattle Colliery is an already established opencast mining operation, this project is an expansion of the current mining operation. The expansion of the project will be utilising the current workforce, which will ensure sustained employment opportunity for existing workforce.
- However, additional jobs will be created for a short-term period during the construction period. Although the project may not create more permanent job opportunities, the livelihood opportunities that will be created with short term construction will make a difference for the community.
- The proposed project has effects on the local economy by capital expenditure, investment in local projects and other activities. This not only has direct positive impacts on the economy, but also creates a demand for a variety of goods and services that in turn stimulate local sectors. This economic environment will likely generate more opportunities for micro and small businesses, provided they are formalised and able to meet the procurement requirements of the proposed mine.

4.1.9.3 Description of the linkages and dependencies between human wellbeing and ecosystem services

The proposed project is also near several other collieries. There are farmstead and farm worker's houses situated within the proposed activities. Thus, there may be a linkage between human wellbeing, livelihoods and ecosystem services. The development's ecological impact will result in positive socio-economic impacts because it will increase the LoM of Black Wattle Colliery.

4.1.9.4 Impacts of the proposed project on ecological integrity objectives/targets/considerations of the project area

The proposed Black Wattle Colliery Opencast Expansion Project will negatively impact on ecological integrity objectives/targets/considerations. The negative impact will be remedied to an extent by keeping the footprint of the development as small as possible and post mining, by means of rehabilitation and re-vegetation, especially of the infrastructure area, according to best practises.

4.1.9.5 Consideration of the need to secure ecological integrity and a healthy biophysical environment

This negative impact cannot be avoided since this is the area where the coal reserve is situated. No alternatives can be considered since this is the area where the coal reserve is situated.

4.1.9.6 Description of cumulative ecological/biophysical impacts

The proposed project is situated within the Black Wattle Colliery Mining Right area. The negative cumulative ecological/biophysical impacts of the project may be high since it is situated near some wetland areas. The positive cumulative impact will be that the areas will be rehabilitated and re-vegetated to blend in with the surrounding environment. Vegetation cover and number of plant species will thus in future be higher than in the case of mono-crop cultivation. Over time, plant species occurring in natural veld may once again colonise the areas and this will enhance the habitat for small mammals, invertebrates and other small animal species.

4.2 SOCIO-ECONOMIC CONTEXT OF THE AREA

4.2.1 Risk-averse and cautious approaches applied in terms for socio-economic impacts

Desktop studies and literature review, primary data, consultation, and fieldwork were used to gather data for the determination of the socio-economic impacts from the proposed project. These included various secondary data sources for the extrapolation of information to determine and analyse the social and economic characteristics of the study area. A site visit will be undertaken and interviews conducted with relevant stakeholders and I&APs to assists in establishing the baseline environment, social fabric, as well as the key economic activities of the core communities. Information gathered in terms of the above approaches will be deemed enough to determine the current socio-economic situation and the impacts from the proposed project.

4.2.2 Impacts on people's environmental rights

The environmental rights contained in section 24 of the Constitution of the Republic of South Africa (Act No. 108 of 1996) provide that everyone is entitled to an environment that is not harmful to his or her well-being. In the context of the proposed project, this requires a determination of what level of pollution and degradation to the environment from the project is harmful to well-being. The general approach of the common law is to define an acceptable level of impacts which a reasonable person can be expected to tolerate in the circumstances. The subjectivity of this approach can be problematic which has led to the development of environmental guidelines and noise standards.

Several studies were conducted over the project area and some studies have been updated, which included studies on biophysical and social aspects of the environment. The outcomes of the studies were used to identify possible impacts from the proposed project. All significant impacts identified from the proposed project will be avoided and if they cannot be avoided, they will be mitigated to ensure that they are within acceptable levels as determined by the applicable environmental guidelines and standards. In view of the above and if the mitigation measures are strictly adhered to, the people's environmental rights as stipulated in section 24 of the Constitution will not be affected by the commencement and operation of the proposed project.

During the operation of the proposed project, monitoring of the environment will be ongoing and the results from the monitoring will be regularly reported to the responsible organs of state. Compliance to the measures that will be included in the EIR/EMPr will also be undertaken in accordance with the timeframes indicated in the EA that will be issued. Reports from the above monitoring and compliance assessment will be made available to the public for their perusal and commenting. The above illustrate the commitment Black Wattle Colliery (Pty) Limited will have ensuring that the environment is held in public trust for the people.

4.2.3 Public participation

A process that ensures that consultation with I&APs for the project will be undertaken. The process will be conducted to provide all I&APs with an opportunity to comment on the project. Platforms such as public meetings (focussed group) and public commenting opportunities will be offered to the I&APs. Black Wattle Colliery (Pty) Limited further commits to ensure their contribution to environmental education, to their employees and the nearby communities during the proposed project's LoM.

The employees will be made aware of work that may be harmful to their health and the environment and of any work posing danger. This will be undertaken in terms of the Mine Health and Safety Act, 1999 (Act 25 of 1999) and their regulations, which gives the employees the right to refuse work that is dangerous.

Black Wattle Colliery (Pty) Limited will respect decisions of employees regarding the above and is committed to the protection of employees against any dangerous working environment.

All issues raised by the I&APs are recorded and addressed in section 5 below of the final SR.

4.2.4 Intergovernmental co-ordination

Before the proposed project can proceed, EA must be applied for and issued. The above-mentioned application must be made to the competent authority, which in this case is the DMRE.

In the spirit of co-operative governance and in compliance with the NEMA, the competent authority will, during the processing for this application, consult with other organs of state that administer laws that relate to a matter affecting the environment relevant to this application.

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

- National Department of Mineral Resources and Energy – Competent Authority (Mpumalanga
- Regional Office)
- National Department of Water and Sanitation (Mpumalanga Regional Office)
- National Department of Agriculture, Rural Development, Land Reform and Environmental Affairs (Mpumalanga Regional Office)
- Immediate/adjacent landowners and legal occupiers
- Mpumalanga Tourism and Parks Agency
- South African National Road Agency
- South African Heritage Resources Agency
- Steve Tshwete Local Municipality
- Relevant Ward Councillors
- Eskom
- Transnet

Note however that this list is not exhaustive as more organs of state may be identified by the competent authority.

Aside from the NEMA IEA, an integrated water use licence will be required for the new water uses for the proposed project area. The application processes will, where possible, be run in parallel to save time and reduce confusing the I&APs.

In view of the above, Black Wattle Colliery (Pty) Limited believes that enough intergovernmental co-ordination and harmonisation of policies, legislation and actions relating to environment were undertaken. No conflicts of interests between organs of state are therefore anticipated in the application.

4.2.5 Environmental considerations

In the interest of the public and in bid to ensure that the environment is used to the interest of the public, we obtain baseline information to monitor if the proposed activities have an impact on the environment. During this process, the public is made aware of the current status quo of the environment in which the development is proposed. The data accumulated and analysed is deemed enough to gain a baseline indication of the present state of the environment. The impacts that could arise during and after the proposed activities were determined and ranked according to their significance. Based on the impact

assessment, recommendations were made for the mitigation of significant negative environmental impacts that will result from the proposed project.

The proponent will also make enough financial provision for remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects through a bank guarantee for closure costs and by making funds available from their operational costs during the construction, operational and closure phase of the mine.

SECTION FIVE

Motivation for the preferred development footprint

5. MOTIVATION FOR THE PREFERRED DEVELOPMENT FOOTPRINT

5.1 CONSIDERATION OF ALTERNATIVES

The amended NEMA, EIA Regulations, 2014 requires the EIR/EMPr to identify alternatives for projects applied for. An alternative in relation to a proposed activities, refers to different means of meeting the general purpose and requirements of the activities, which may include alternatives to (a) the property on which or location where it is proposed to undertake the activities; (b) the type of activities to be undertaken; (c) the design or layout of the activities;(d) the technology to be used in the activities; (e) the operational aspects of the activities; and (f) the option of not implementing the activities.

Black Wattle Colliery intends on undertaking an expansion of their existing mining section to include the Black Wattle Colliery Opencast Expansion Project, which will enable the extension of the mine coal reserves beyond the current Life of Mine (LoM). The project will comprise of the following activities, which are described in more detail below i.e.:

- Haul road
- Topsoil stockpile
- Opencast pit
- Dirty water pipeline
- Water management structures (storm water diversion structures)

Several alternatives were considered for the proposed project. This section of the report will highlight the alternatives considered for the proposed project.

5.1.1 Location Alternatives

The location alternative considered for the proposed project include the mining area, associated initial boxcut location and associated surface infrastructures. The location alternatives were selected based on certain criteria, which include the environmental considerations (how sensitive is the area in terms of soils, wetlands, groundwater etc.), sensitive receptors (proximity to communities and farmsteads) and the dependency to targeted coal reserves, mine design target areas and existing mine infrastructure. The final location of infrastructure has been determined by environmental, financial, and social considerations. The placement of infrastructure such as the haul/access road, stockpiles, water management structures has taken environmental impacts into consideration to ensure that placement will be in such a way that the expected impacts can be managed to reduce the overall impact on the surrounding environment, referred to as the least impacts zone. This has also considered the depth of coal and the most economical location to access the coal. Topography has been considered to minimise the visual impact, as well as impact on the wetland areas and sensitive areas such as pans.

5.1.2 Coal Reserves

Regarding the coal reserve, no alternatives in terms of the location were considered since the proposed project is dependent on the coal reserves which cannot be relocated. In addition to the above, the coal reserve to be mined occurs within Black Wattle Colliery mining right area. Black Wattle Colliery (Pty) Limited is therefore restricted by the boundaries of their mining right and cannot mine outside the boundaries.

5.1.3 Location of the Surface Infrastructures

Regarding the location of the haul/access road, topsoil stockpile, dirty water pipeline, and water management structures, two location alternatives were considered. These alternatives were selected based on the mining design target areas, which were selected to ensure the adequate management of dirty water from the mined-out pits and the topsoil materials. The selected alternatives included the utilisation of the existing infrastructures and the construction of additional infrastructures to accommodate the opencast expansion project. The additional infrastructures include haul/access road, topsoil stockpile, dirty water pipeline, water management structures. Other existing infrastructures will be utilised for the proposed project.

During the pre-feasibility stage, assessment of the alternatives was undertaken and the following was decided on, for consideration of the construction of the haul/access road, dirty water pipeline, topsoil stockpiles, water management structures as the preferred alternative:

Water management structures location- It will be determined through the reviewing of the existing mine's water balance, should the dam have enough capacity to handle the water from the proposed project, the existing dam will be utilised to contain dirty water from the proposed project.

Management of topsoil material- existing topsoil/overburden stockpiling areas are available at Black Wattle mining area. However, the extent of the areas will not be able to handle the volumes of topsoil material that will be stripped from the construction activities of the opencast pits. The intended purpose of the overburden material from these areas will be utilised later to backfill and cover the backfilled opencast voids of the existing opencast pits. Therefore, the stockpile location was based on the location of the proposed opencast expansion project and the extent of the existing stockpiling areas. In view of the above, it was decided that additional capacity to handle the additional topsoil material be created, the current opencast pits will be used for the placing the overburden from the initial box cut as backfilling material.

Haul road-a new haul road will be required to access the new initial boxcut for mining purposes. Therefore, a new haul road was proposed, which will connect to the existing road infrastructure.

Dirty water pipeline- no location alternatives were selected for the dirty water pipeline since this is the only location selected based on the environmental sensitive of the area.

In relation to the above, the alternative for the construction of the new additional infrastructures which includes the haul/access road, topsoil stockpile, and water management structures while utilising the other existing infrastructure is the preferred alternative.

5.1.4 Technology Alternatives

Based on the policies of the Department of Water and Sanitation, the local municipalities, and the mine itself, it was determined that the only feasible technological way of undertaking the proposed

activities would be to use energy currently available to the mine, existing waste and water management facilities, coal transportation methods and coal processing methods for the operation of the proposed project. In view of the above, no technology alternatives were considered for this project. It must be noted that the proposed additional infrastructures will not require any technology alternatives.

5.1.5 Operational Alternatives

5.1.5.1 Mining methods

Regarding the mining methods, two mining methods were investigated for the proposed project i.e. opencast and underground mining methods.

Mining using opencast mining method was decided against the underground mining method. The underground mining method was ruled out due to the following:

- Changing mining methods is undesirable as it requires capital investment on underground equipment making the underground mining option uneconomic.
- The resource is insufficient to warrant this change;
- The underground mining option will limit the utilisation of existing skills base.

In view of the above, the opencast mining method was decided as the preferred alternative for mining the coal.

5.1.6 Transportation/Conveyance alternatives

Regarding transportation of the mined coal, the use of an overland conveyor belt and haul trucks were investigated. The option of using haul trucks for transportation coal transportation works best since Black Wattle Colliery already has established this method to haul coal from the opencast area to the current ROM stockpile and tip area.

5.1.7 No-go Options

Black Wattle Colliery produces coal from their opencast mine using roll-over mining method. The current tonnage profile indicates that coal reserves at Black Wattle Colliery will facilitate economic coal mining. The Black Wattle Colliery Opencast Expansion Project was identified as a potential project to supplement the current LOM production profile for Black Wattle Colliery. The proposed Black Wattle Colliery Opencast Expansion Project will therefore improve Black Wattle Colliery (Pty) Ltd's Life of Mine. This will ensure that the current labour force has continued employment for the life of mine and that local businesses are continued to be supported by the mine. Should the mine not be able to continue with the Black Wattle Colliery Opencast Expansion Project, the mine will come to a premature closure, which will affect the labour force employed at Black Wattle Colliery and local businesses and communities supported by the mine.

Black Wattle Colliery (Pty) Ltd, due to the mining right they hold over the proposed mining area, is the only company that can exploit the coal reserve. Black Wattle Colliery (Pty) Limited has shown their commitment in the lessening of the environmental damage by undertaking the pre-mining environmental investigation that is being carried out using independent specialists and consultants.

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 domestic and export coal market. This may ultimately have an impact on the region, due to a loss of revenue and taxes.

5.2 CONCLUDING STATEMENT INDICATING THE PREFERRED ALTERNATIVES

Based on the above, the proposed mining operation is the preferred locations for the proposed project based on the following:

- Black Wattle Colliery (Pty) Limited holds a mining right over the proposed project area.
- If the mine if not able to proceed with this project, this may result in the sterilisation of the reserves, which will cause loss of revenue to the local municipality and the district at large.
- In view of the above, the consequences of not proceeding with this project will have a detrimental impact on the employment opportunities to be created, the surrounding previously disadvantaged community and the owners of the mine.

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, due to a loss of revenue and due to a loss in taxes.

5.3 DETAILS OF THE PUBLIC PARTICIPATION PROCESS FOLLOWED AND RESULTS THEREOF

Public participation is the cornerstone of the 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 I&APs 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 (as amended), when applying for an EA, the EAP managing the application must conduct a public participation process where all potential or registered I&APs, including the competent authority, are given a period of at least 30 days to submit comments on each of the SR, BARs, EIR/EMPr and where applicable the closure plan. In this case the SR and the EIR/EMPr is considered.

This section of the EIR/EMPr will explain the public participation process taken to comply with the above-mentioned requirements. Several public participation guidelines were published in a bid to assist persons responsible for the EA 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.

Black Wattle Colliery (Pty) Limited is applying for an EA for the proposed project. The application for the EA is undertaken in terms of the process as laid out in part 3 of Chapter 4 under the NEMA EIA

Regulations, 2014 (as amended). The above-mentioned regulations require that an applicant for an EA submit a SR and an EIR/EMPr report 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 project. The public participation process for the proposed project is designed to provide enough and accessible information to 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 EIR/EMPr.

The following are and will be taken in undertaking of the public participation process for the proposed project.

5.3.1 Registration phase

Immediate and adjacent landowners, local municipality, state departments and the greater public will be notified via emails (individual notices), site notices and a local newspaper of the proposed project. The Final SR was made available for comments to all relevant stakeholders during the registration phase.

5.3.2 Registered Interested and Affected Parties

The I&APs identified are as follows:

- National Department of Mineral Resources and Energy – Competent Authority (Mpumalanga
- Regional Office)
- National Department of Water and Sanitation (Mpumalanga Regional Office)
- National Department of Agriculture, Rural Development, Land Reform and Environmental Affairs (Mpumalanga Regional Office)
- Immediate/adjacent landowners and legal occupiers
- Mpumalanga Tourism and Parks Agency
- South African National Road Agency
- South African Heritage Resources Agency
- Steve Tshwete Local Municipality
- Relevant Ward Councillors
- ESKOM
- Transnet

5.3.3 Scoping Phase

- On the 18 of November 2022, notices were fixed at three sites i.e., 1) boundary fence of one of the properties affected by the project, 2) at a public place conspicuous to and accessible by the public (Library), 3) Near Black Wattle Colliery's Security Gate. 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 project will be undertaken, owners/lawful occupiers of land immediately adjacent to the proposed project area, the municipal councillors of the ward in which the proposed project is situated and the municipality which has jurisdiction over the proposed project area (Steve Tshwete local municipality). The written notices were compiled to comply with the requirements of Regulation 41(3) of the EIA Regulations, 2014.
- The draft SR was submitted to relevant State Departments and I&APs on the 18th of November 2022. The draft SR was also placed at the Gerard Sekoto Public Library and Black Wattle's security gate on the 18th of November 2022 for evaluation. An advertisement was placed in the local newspaper (Middelburg Observer) on the 18th of November 2022, in accordance with Regulation 41 of Government Notice No. 982 under Section 24 of the NEMA informing the public about the availability of the draft SR in the said library and gate for evaluation and comment.

5.3.4 Finalisation of Interested and Affected Party Database

On expiry of the registration and Scoping Phase commenting period, the database of interested and affected parties was finalised. All parties who indicated the interest of being registered as I&APs were added to the list of I&APs 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 I&APs.

The comments and issues raised by the I&APs, their responses and reaction to the responses for the Scoping Phase are presented in Table 5.

5.3.5 EIA Phase

The draft EIR/EMPr for the proposed project will be made available for comments to all I&APs.

5.3.6 Notification of potential and registered interested and affected parties

The following methods of notification were used to notify the interested and affected parties of the opportunity to comment on the draft EIR/EMPr during the EIA Phase public participation process for the proposed project:

- Written notices inviting comments on the draft EIR/EMPr were sent to I&APs on the 14 April 2023. The written notices were compiled to comply with the requirements of Regulation 41(3) of the EIA Regulations, 2014.
- Notice inviting, I&APs to comment on the draft EIR/EMPr was published in one local newspaper on the 14 April 2023 i.e. Middelburg Observer. The newspaper notice was published in English. The notice was compiled to comply with the requirements of Regulation 41(3) of the EIA Regulations, 2014.

- The draft EIR/EMPr was submitted to the relevant commenting authorities for their comments.
- A copy of the draft EIR/EMPr was placed at Gerald Sekoto Library for public perusal and commenting. The published newspaper notice will indicate the availability of the draft EIR/EMPr at the above-mentioned place and invited the public to comment of the draft EIR/EMPr.
- A public meeting will be held on the 28th April 2023. The public meeting was advertised in the local newspaper (Middelburg Observer) where interested and affected parties are invited to attend. The meeting is aimed to be used to present the specialist findings for the project and to collect any comments and issues that may be raised by the interested and affected parties.

5.3.7 Comments, Issues and Responses on the Draft EIR and EMPr

All comments and issues received after the consultation process of the Scoping Phase are recorded together with the responses to the comments made and reaction from the commenting party in Table 5 of this report. Comments and issues of the Draft EIR/EMPr will be included after the consultation period.

5.3.8 Proof of Consultation

Proof of consultation for the Scoping Phase is attached as Appendix 1.

Table 5: Comments, Issues and Responses on the Draft Scoping Report

Interested and Affected Parties	Date Comments Received	Issues raised/Comments	Response to issues raised	Consultation Status (Consensus dispute, not finalised, etc.)
LANDOWNERS OR LAWFUL OCCUPIERS ON DIRECT AND ADJACENT PROPERTIES				
J V Ranch cc	-	No comments received	-	Finalised
Black Wattle Colliery Pty Ltd	-	No objection	-	Finalised
Fana's Automotive Services Cc	-	No comments received	-	Finalised
Darkrock Pty Ltd	-	No comments received	-	Finalised
Petrus Johannes Van Tonder	-	No comments received	-	Finalised
Stephina Magaretha Van Dyk	-	No comments received	-	Finalised
Isambane Mining Pty Ltd	-	No comments received	-	Finalised
Transnet Ltd	-	No comments received	-	Finalised
Adell Rothman	-	No comments	-	Finalised

Interested and Affected Parties		Date Comments Received	Issues raised/Comments	Response to issues raised	Consultation Status (Consensus dispute, not finalised, etc.)
			received		
SANRAL		-	No comments received	-	Finalised
Bakkos Projects Pty Ltd		-	No comments received	-	Finalised
Cool Ideas 270 Pty Ltd		-	No comments received	-	Finalised
Ingwe Surface Holdings Ltd		-	No objection	-	Finalised
Riostep Inv Pty Ltd		-	No comments received	-	Finalised
Glencore Operations South Africa (Pty) Ltd		-	No objection	-	Finalised
Tavistock Collieries Pty Ltd		-	No objection	-	Finalised
South32 SA Coal Holdings (Pty) Ltd		-	No objection	-	Finalised
Ngululu Bulk Carriers Pty Ltd		-	No comments received	-	Finalised
Theuns Lourens		-	No comments received	-	Finalised

Interested and Affected Parties		Date Comments Received	Issues raised/Comments	Response to issues raised	Consultation Status (Consensus dispute, not finalised, etc.)
GOVERNMENT DEPARTMENTS/REGULATORY AUTHORITY					
Department Mineral Resources and Energy		-	No comments received	-	Finalised
Department of Water and Sanitation		-	No comments received	-	Finalised
Mpumalanga Tourism & Parks Agency		-	No comments received	-	Finalised
SANRAL		-	No comments received	-	Finalised
Steve Tshwete Local Municipality		-	No comments received	-	Finalised
Eskom		-	No comments received	-	Finalised
Department of Agriculture, Rural Development Land Reform and Environmental Affairs		-	No comments received	-	Finalised
TRANSNET		-	No comments received	-	Finalised

6. BASELINE INFORMATION

6.1 GEOLOGY

6.1.1 Regional Geology

General: Black Wattle Colliery falls within the Witbank coalfield. The mining area is situated on the northern portion of the Witbank Coalfield.

6.1.1.1 Witbank coalfield

The main Witbank coalfield is the centre of the coal mining industry in South Africa. It has been mined since 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 unconformably 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.

The layers of carbonaceous shale are usually confined to the beds between the No. 2 and No. 4A Seams. With a glauconitic sandstone marker present immediately above the No. 4A Seam. The coal zone has a stratigraphic thickness averaging approximately 70 metres. In parts of the field the uppermost seams have been removed by erosion. Except for the central portion of the Witbank coalfield, virtually dykes and sills of Karoo dolerite have intruded the whole field. The sills often transgress and lift the coal seams and have degraded large quantities of coal in the area.

Description of the individual coal seams within the Witbank Coal Field

No. 1 Coal Seam

This seam is not always developed, or may be unrecognisable when followed directly by No. 2 seam. It is best developed in the northern part of the field, where it may obtain a thickness of 3 meters. The seam lies close to or on the Dwyka Tillite and wedges out against highs on the uneven pre-Karoo floor. It has an ash content of 10 to 25% and a volatile content in the order of 26% when unaffected by dolerite intrusions.

No. 2 Coal Seam

This seam is the principal seam of the Witbank Coal field. It may follow directly above the No. 1 seam, or be separated from it by several metres of fine to coarse-grained sandstones.

The seam is up to 6 meters thick, and becomes thicker in valleys. Locally the seam may split into two, the lower known as No. 2A seam. The coal has an ash content of 10-15 and 25-30% volatiles.

No. 3 Coal Seam

This seam is seldom more than 0.5 metres thick and is not developed in some localities, thus, is of little economic importance. The No.3 seam is separated from the No.2 seam by carbonaceous shale, sandstone, siltstone, and shale totalling up to 13 metres in thickness.

No.4 Lower, No.4 Upper and No.4A Seams.

These seams constitute a zone consisting predominantly of coal and carbonaceous shale with subordinate sandstone over a thickness of approximately 14 metres. The coal in these seams is generally only suitable for power station consumption. No.4A seams is intermittent and generally less than 10 cm thick.No.4 Lower seams and No.4 upper seam vary in thickness from 1,2 to 4,6 metres and have an ash and volatile content of approximately 20%and 27% respectively.

No.5 Seams

The No.5 seam is the highest in the succession and is extensively denuded. Where present it generally lies less than 25 metres above the No.4A seams and has an average thickness of 2 metres. The ash content varies from 9-18% and volatiles from 30-35%.

Lateral Extent of the Coal Seams

The horizontal bedding together with the relative shallow depth of the coal seams and the topographical relief of the area has given rise to the formation of sub-outcrops of all the seams.

6.1.1.2 Local Geology

The local geology of the areas under investigation was determined from existing borehole cores and geological knowledge obtained during prospecting and mining activities on the Black Wattle Colliery. Information from surrounding mines was also used where necessary to verify and collaborate the interpretations.

Four coal seams are present in the area under consideration, numbered upwards as the No. 1 coal seam; No. 2 coal seam designated No.2 Upper seam and the No. 2 Lower seam where the seam is split by channel type sandstone; No. 3 coal seam and the No. 4 coal seam. The local stratigraphy of the Middle Ecca group is discussed below from the base upwards.

The No. 1 coal seam consists of a lustrous coal with an average thickness of 3.15 meters with a general westerly thinning. A thin mudstone/siltstone parting occurs near the base, giving rise to the formation of a No. 1 Lower coal seam.

Where present this No. 1 Lower seam is generally inferior in quality and is represented by a dull coal.

The No. 1 coal seam and No. 2 coal seams are separated by a distinctive parting of course grained to gritty sandstone (gritstone). Thin mudstone bands occur within the sandstone layer. The thickness of this sandstone parting layer varies considerably over the area under investigation, but generally attains a thickness of 0, 5 meters. In the west, the No. 1 and No. 2 coal seams merge (i.e. the sandstone parting is not present).

The No. 2 Lower coal seam has an average thickness of 2.82 meters. This seam can be divided into three distinct bands.

- The lower or bottom band consists of a lustrous coal with bright laminated coal concentrated at the base. This band has an average thickness of 0, 75 meters.
- The middle band consists of dull inferior coal grading to carbonaceous mudstone/siltstone with an average thickness of 0, 7 meters.

- The top band has a 1.5 to 2. 0-meter thickness consisting of a good quality lustrous coal containing several large mineral pyretic inclusions and calcareous layers (2 mm – 20 mm in thickness).

The roof of the No. 2 Lower coal seam consists of a competent sandstone layer with a minimum thickness of ~0, 7 meters and an average thickness of 2, 0 meters (note that this layer forms part of the parting between the No. 2 Lower and No. 2 Upper coal seams). The parting between the No. 2 lower coal seam and the No. 2 Upper coal seam consists of inter-layered sandstone and mudstone layers. This parting has a varying thickness of between 3. 0 to 3.7 meters.

The No. 2 Upper coal seam consists of dull to inferior coal grading to interlaminated mudstone/coal layer with an average thickness of 0.5 meters. A massive dark grey carbonaceous mudstone layer with an average thickness of 7.5 meters occurs directly above the No. 2 Upper coal seam. This carbonaceous mudstone layer is overlain by alternating sandstone and siltstone layers with an average package thickness of 4.8 meters. The No. 3 coal seam consists of a lustrous to mixed bright coal layer with a consistent thickness (where present) of ~0.4 meters.

The parting between the No. 3 coal seam and the No. 4 coal seam consists of a ~ 10 meter upward fining package of sandstone, siltstone, and mudstone layers. The No. 4 coal seam (where present) has an average thickness of 2.8 meters. A mudstone/siltstone in-seam parting of ~ 0.25 meters occurs 2.10 meters above the base. The coal seam is dull to lustrous. Occasional pyretic zones occur throughout the seam. The No. 4 coal seam is overlain by a ~2.0-meter-thick carbonaceous mudstone layer which is in turn overlain by a massive, very coarse grained (gritty) sandstone layer.

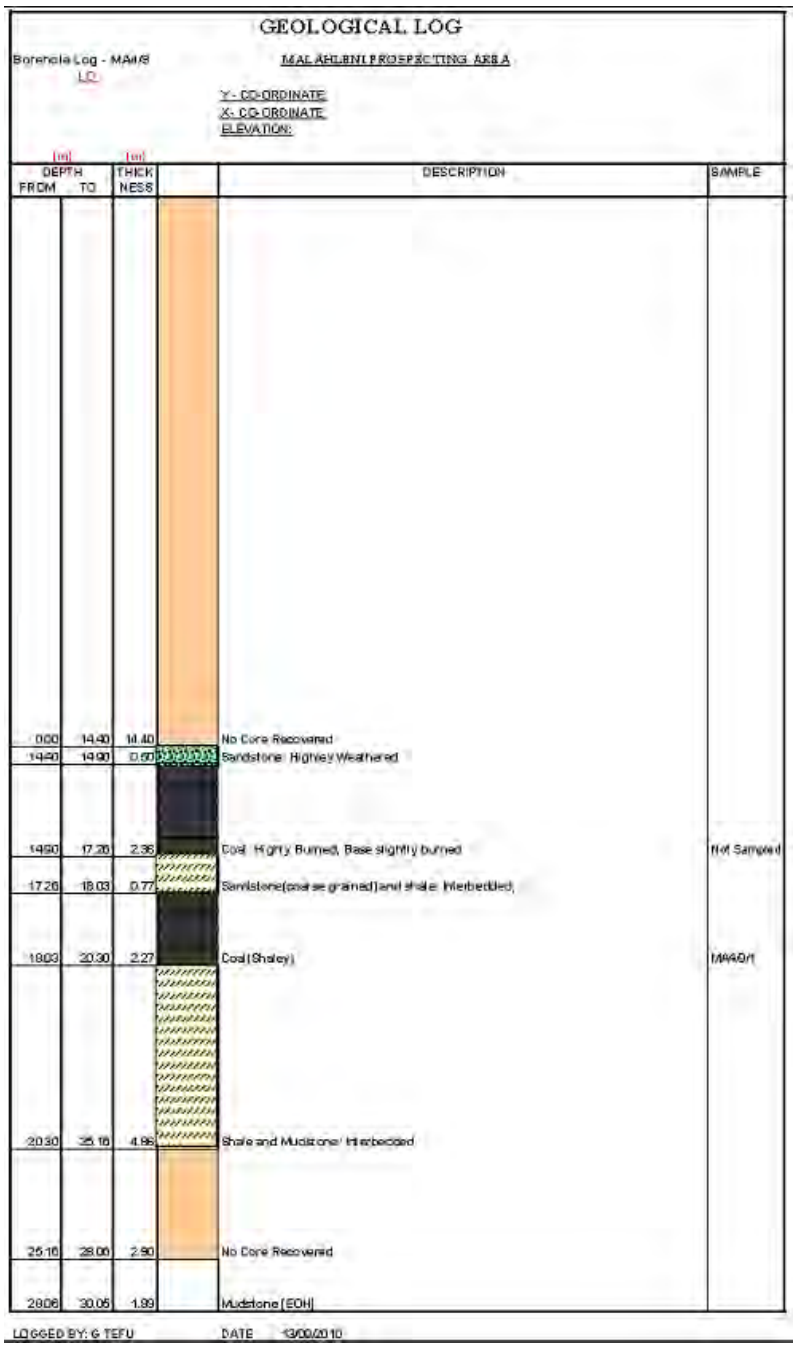


Figure 10:Generalised geological log for Black Wattle Colliery

6.2 CLIMATE

6.2.1 Regional Climate

The Black Wattle Colliery mining area falls in the summer rainfall region of Southern Africa, with a mean annual rainfall of 742.3 mm/year, 85.4% of which occurs during the months of October to March. Thunderstorms predominate during summer months, with occasional hailstorms. Mean annual A-pan evaporation is 2 127 mm/year.

Average temperatures in the winter months (May – August) vary between –1.8°C and 21.4°C, with frost occurring during winter months (peak occurrence during July; average 9 days). Average temperatures in the summer months (September – April) vary between –5.6°C and 27.2°C.

From the wind speed and wind direction recorded at the Ermelo weather station it is evident that predominant wind direction is from the north to northeast, whilst strong winds from the west and northwest also develop during the months of May to December.

Winds from the east occur with the greatest frequency (greater than 10%) from January through March. Winds from the southwest occur with the greatest frequency (greater than 10%) from June through July. Winds from the southeast and south are seldom but may occur on average 5% per month. Winds when blowing from the south-eastern quadrant are generally strong winds with velocities reaching 4.4 m/s.

All precipitation, evaporation and temperature data are presented in Table 6.

Table 6: Climatic conditions near Black Wattle Colliery – Middelburg.

Month	Rainfall (mm)	Temperature (°C)		A-pan Evaporation (mm)
		Mean max	Mean min	
January	131.2	27.2	13.7	251
February	109.7	26.8	13.4	199
March	89.6	26.0	11.4	183
April	39.3	23.9	7.4	147
May	20.7	21.3	2.2	121
June	6.7	18.5	-1.8	102
July	9.0	18.4	-1.7	127
August	9.8	21.4	0.8	146
September	22.9	24.0	5.3	195
October	66.3	26.0	10.1	223
November	117.4	26.2	11.8	210
December	119.7	27.1	13.2	223
Total	**742.3**			**2127**
Average		**23.9**	**7.1**	

6.2.2 Mean Annual Rainfall

The mean annual rainfall is 742 mm, which falls predominantly during the summer months as short showers and thunderstorms.

6.2.3 Mean Monthly Evaporation

The gross “A” pan evaporation recorded at Carolina is 2 127 mm. Furthermore, it is also observed that the maximum potential water loss occurs during the months of October, December, and January. Mean monthly evaporation figures are presented in Table 6.

6.2.4 Monthly Mean Wind Direction and Speed

No data on wind patterns is available for the proposed Black Wattle Colliery opencast mining area. The nearest wind recording station for which data is available is a station at Bethal. The mean monthly wind direction and speed measured at Bethal is presented in Table 7. The prevailing wind

direction is from North – East, at an average wind speed of 4.4 m/s. Maximum mean wind speed occurs during the late winter and spring, from a south-easterly direction.

Table 7: Average wind speed and direction

MONTH	N		NE		E		SE		S		SW		W		NW	
	N	V	N	V	N	V	N	V	N	V	N	V	N	V	N	V
Jan	67	4.3	124	4.0	119	4.5	92	5.1	40	4.6	47	4.3	45	3.8	149	3.8
Feb	48	4.1	108	3.8	139	4.1	135	4.9	61	4.5	48	3.9	41	3.5	91	3.7
Mar	53	3.9	99	3.7	126	3.7	99	4.5	50	4.1	56	4.1	43	3.5	111	3.9
Apr	50	4.0	88	3.5	94	4.0	55	4.2	45	4.3	71	4.4	71	4.5	129	4.0
May	54	4.4	66	3.7	61	3.9	62	4.5	47	4.2	79	4.5	67	4.7	116	4.1
Jun	48	4.1	47	3.7	59	4.1	42	4.8	46	4.7	99	4.5	76	4.3	115	4.3
Jul	43	4.1	66	3.7	64	4.1	62	4.9	54	4.6	84	4.5	57	4.2	121	4.1
Aug	80	4.9	96	4.4	87	4.3	33	5.6	35	4.9	75	4.9	65	4.9	192	4.7
Sept	115	4.8	134	4.8	101	5.0	48	5.7	32	4.1	58	5.1	59	5.0	203	4.8
Oct	115	4.5	139	4.7	116	5.4	58	5.6	41	4.9	54	4.7	47	4.8	223	4.8
Nov	105	4.4	135	4.4	110	5.0	56	5.3	37	4.9	45	4.6	55	4.3	229	4.7
Dec	91	4.2	138	4.1	102	4.8	55	4.9	35	4.5	47	4.9	55	4.2	194	4.2
Avg	**72**	**4.4**	**103**	**4.1**	**98**	**4.4**	**66**	**4.9**	**44**	**4.5**	**64**	**4.5**	**57**	**4.4**	**156**	**4.4**

6.2.5 Extreme Weather Conditions

The area is prone to hot 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.

6.3 TOPOGRAPHY

The highveld plateau of Mpumalanga, on which the proposed project area is located, is known for its gently rolling to slightly broken topography, with pans dotting inter-stream landform crests. The project area is situated in total on a near-level crestal area with some adjoining upper midslopes. There are no drainage channels apart from a slightly sloping crestal seep that appears to drain into an existing rehabilitated mined area to the north.

6.4 SOILS

In order to determine the baseline of the soils within the proposed project area, Black Wattle Colliery (Pty) Limited appointed Pedoplan International Consultants CC to undertake a Soil-landform Study (Appendix 2). The following indicate the soil assessment status of the proposed project.

6.4.1 Soil Forms Identified

According to the Soil-landform Study of the proposed project, a variety of soil types were identified. Apart from the small wetland seep mentioned above, and mining disturbances, the soil mantle consists in its entirety of moderately deep to deep, as well as shallow, well-drained, reddish loams of the Hutton and Mispah forms. In places, deeper subsoils contain abundant very fine quartz gravel derived from gritstone, reducing the water holding capacity. The underlying material in number of soil

profiles consists of an indurated iron pan “skin”, one or two centimetres thick, covering weathered, but also hard, sandstone, gritstone or shale.

Opencast Mining and Its Associated Infrastructure

- Well drained soils. The soils are mostly shallow (map unit Hu-Ms). The occurrences of deeper soils (unit Hu) also have restricted depth. There is thus a relative shortage of soil materials for rehabilitation.

Areas Surrounding the Opencast Area

- Hydric or wetland soils. These are hydric soils of the Katspruit form. Their morphology is clearly indicative of a wetter water regime (probably of long duration) in the past. At the time of survey, water was present at the surface only at the lowest point near the road that runs through the pan in the central south. Although the Katspruit soils show the morphology associated with permanent wetness, their status can probably not determine conclusively by a once-off routine type investigation such as the present one. A relatively shallow water table may be indicated, however, by abundant water that could be seen in voids in the mined-out area of the pan in the south.
- Permanent hydric soils of the Katspruit form. These soils are bordered by seasonal hydric soils of the Westleigh form. Downslope of a dolerite rock ridge, clay soils of the Sepane form occur. The wetland status of these soils is difficult to assess, in part due to their well buffered condition that tends to hold morphological change in check. Some pedons were considered marginal between temporary wetlands and terrestrial soils, but most are leaning towards the latter.
- Red soils on landform crests, yellow-brown downslope and grey and dark hydric soils.

The location and extent of soil form within the project area are shown in Figure 11.

6.4.2 Land Capability

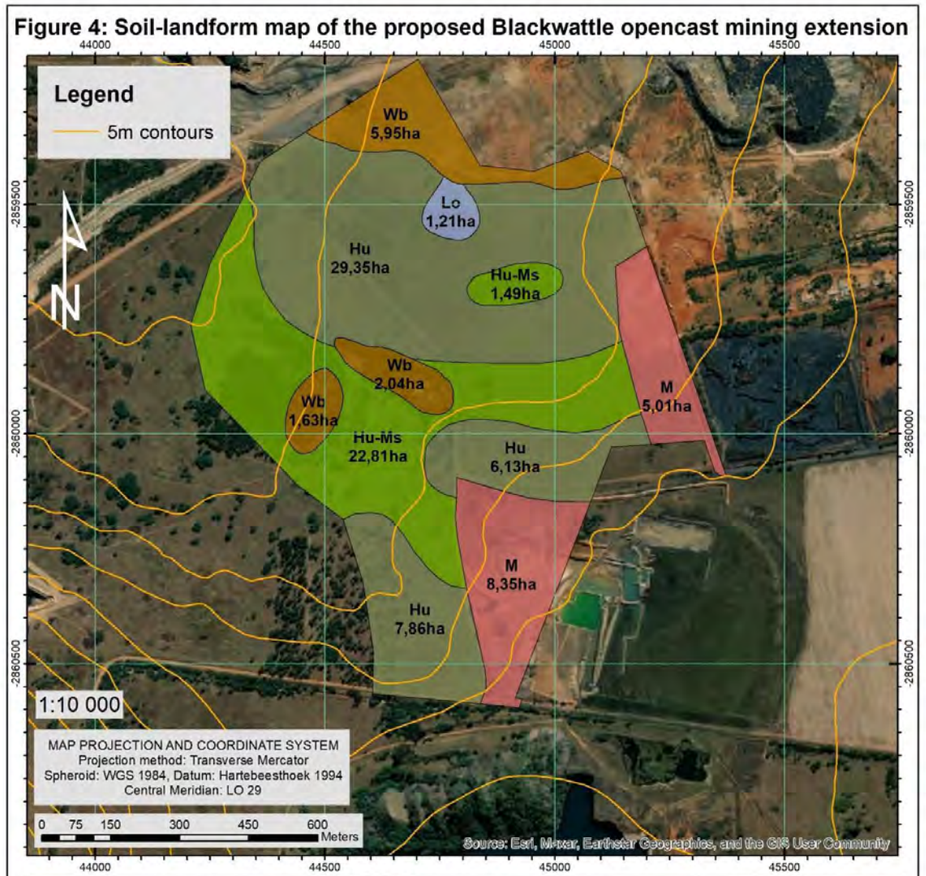
Land capability is determined by a combination of soil, terrain and climate features. Land capability classes reflect the most intensive long-term use of land under rain-fed conditions. The land capability of the proposed project site is classified as a combination of Class I (wetland), Class II (arable land) class III (grazing land) and class IV (wilderness land).

The location and extent of land capability classes within the proposed project soil study area are shown in Figure 12.

6.4.3 Land Use

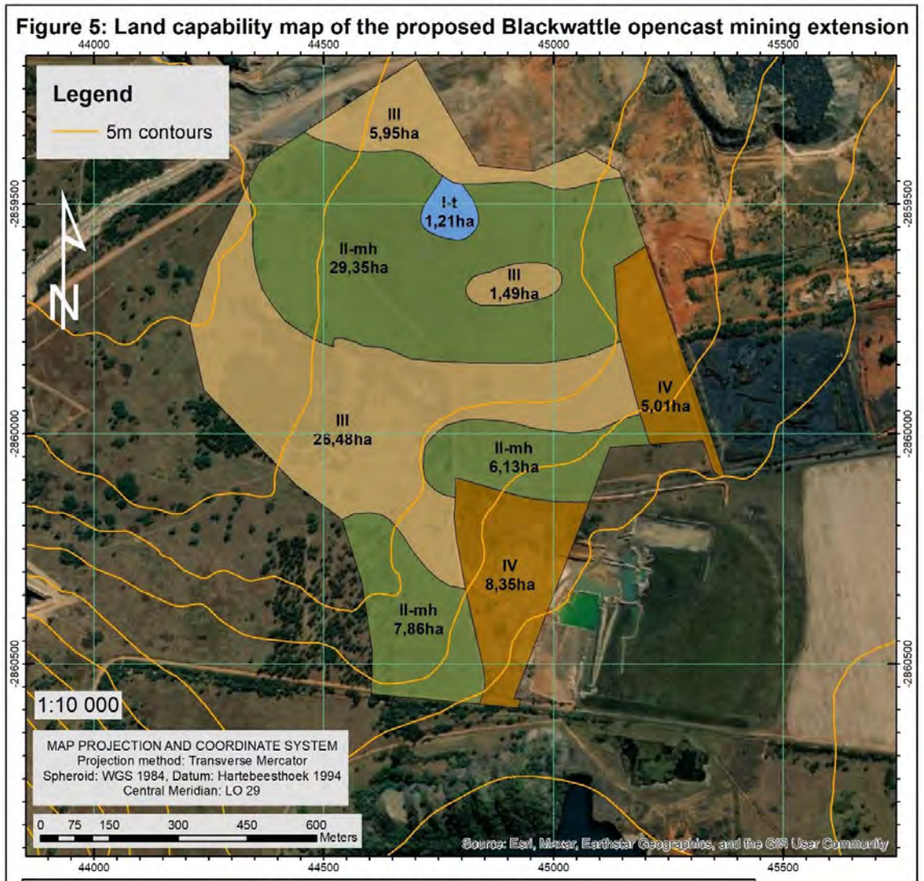
Most of the surface area over the study area is utilised for grazing purposes, with a small portion indicating mining activities (mined opencast pits). Figure 13 indicates the current land uses for the proposed project area. Current surrounding land uses comprise also coal mining, industrial sites, and crop production areas. Refer to Appendix 3 for the Agricultural Ecosystems Assessment Report, which indicate the agricultural and soil state of the proposed project area.

Figure 4: Soil-landform map of the proposed Blackwattle opencast mining extension



SOIL LEGEND			AREA		
MAP UNIT	LANDFORM COMPONENT	SOIL COMPONENT	ha	%	Correlation with 2018 edition
Hu	Level to gently sloping crest (1-3 % slope)	Moderately deep or deep (60-150 cm) well drained, red, apedal, sandy loam or sandy clay loam of the Hutton form	43.34	47.19	Hutton 2110
Hu-Ms	Level to gently sloping crest (2-3 % slope)	Shallow (30-60 cm) red-brown or red, well drained, massive, gravelly sandy loam or sandy clay loam on weathered or hard rock, of the Hutton or Mispah forms, with rock outcrops in places	24.30	26.46	Hutton 2110 Mispah 2110
Lo	Gently sloping seep on crest or possible upper midslope (2-3 % slope)	Moderately deep to deep, with shallow effective depth (30-50 cm), poorly drained, massive, grey-brown or grey, sandy loam or loamy sand on soft plinthite, of the Longlands form	1.21	1.32	Longlands 2100 2200
Wb	Gentle reconstituted slopes with some subsidence features (2-4% slope)	Shallow (20-30 cm thick) mixed material consisting of red loam and greyish, mostly soft rock spoil, over hard and some soft rock spoil.	9.62	10.48	Witbank 2300
Miscellaneous land classes					
M	Land undergoing active mining		13.36	14.56	-
		Total	91.83	100.0	

Figure 11: Soil Map for the Black Wattle Colliery Opencast Expansion Project



LEGEND: CURRENT LAND CAPABILITY					
Land capability class	Land capability description	*Soil-landform units	8-Class system equivalents	Area	
				ha	%
I-p	Class I - Wetland: permanent	-	-	0	0
I-s	Class I - Wetland: seasonal	-	-	0	0
I-t	Class I - Wetland temporary	Lo	Class V	1.21	1.32
II-mh	Class II - Arable land: moderately high potential	Hu	Class I, Class II, Class III	43.34	47.19
III	Class III - Grazing land	Hu-Ms, Wb	Class IV, Class VI, Class VII, Class VIII	33.92	36.94
IV	Class IV - Wilderness land	M		13.36	14.56
*See soil map Figure 4			TOTAL	91.83	100.0

Figure 12: Land Capability Classes for the Black Wattle Colliery Opencast Expansion Project

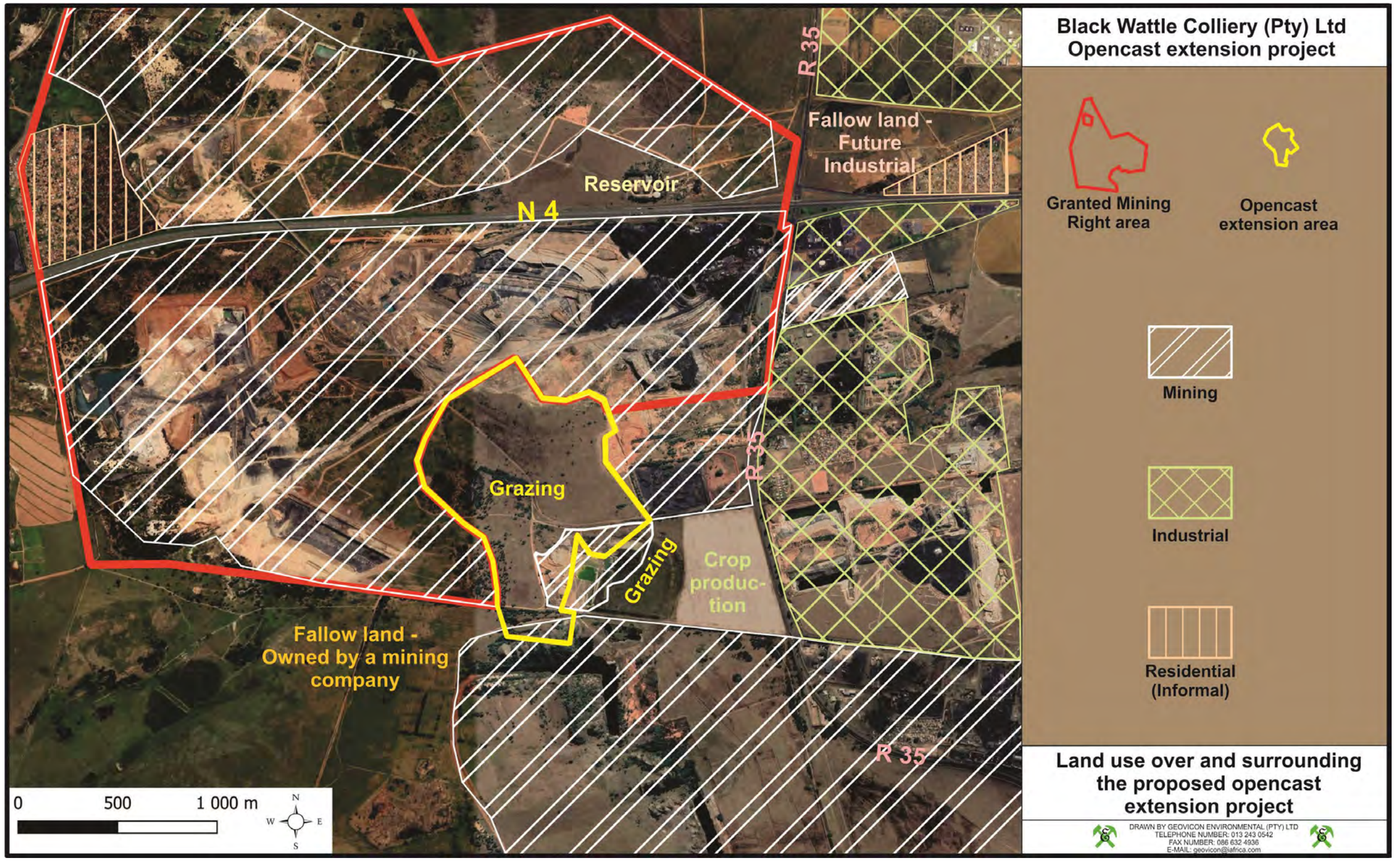


Figure 13: Land Use Map for the Black Wattle Colliery Opencast Expansion Project

6.5 BIODIVERSITY

The proposed Opencast Coal Mining Extension project is situated in the Rand Highveld grassland vegetation type (Gm 11) / ecosystem in the Mesic Highveld Grassland Bioregion of the Grassland Biome (South African National Biodiversity Institute – SANBI).

The vegetation unit / ecosystem, associated with the proposed coal mining extension project is vulnerable. According to Government Notice 1002, Government Gazette No. 34809, 9 December 2011), vulnerable ecosystems are considered threatened ecosystems since it is ecosystems that have a high risk of undergoing significant degradation of ecological structure, function or composition because of human intervention, although they are not critically endangered ecosystems or endangered ecosystems.

The proposed coal mining extension project area is situated near a depression / pan wetland (National Wetland Map 5, SANBI). It is however, not situated in a National Freshwater Ecological Priority Area (NFEPA) - rivers.

The proposed coal mining Extension Project is situated in the Mesic Highveld Grassland, Group 4, wetland ecosystem type (SANBI). The ecosystem threat status assessment indicates the following categories for wetland types in this wetland ecosystem viz. Channelled valley bottom wetlands – Least threatened; Depression wetlands – Endangered; Flats – Endangered; Floodplain wetlands – Endangered; Seep wetlands – Least threatened; Unchannelled valley bottom wetlands – Least threatened; Valleyhead seep wetlands – Critically endangered (Mbona et. al. 2015).

According to the Mpumalanga Biodiversity Sector Plan (MBSP) GIS-based electronic application (Mpumalanga Tourism and Parks Agency (MTPA), 2019), the proposed coal mining extension project is primarily situated in terrestrial assessment categories of “Heavily Modified”, meaning 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; “Moderately modified – old lands”, meaning areas which were modified within the last 80 years but were at some point abandoned, including old mines and old cultivated lands, collectively termed “old lands”; and “Other Natural Areas (ONAs)”, meaning areas that are not identified to meet biodiversity pattern or process targets.

According to the Mpumalanga Biodiversity Sector Plan (MBSP) GIS-based electronic application (Mpumalanga Tourism and Parks Agency (MTPA), 2019), the proposed coal mining extension project is primarily situated in freshwater assessment categories of “Heavily Modified” meaning areas that have experienced a form of land use that has resulted in the near complete loss of biodiversity and a degree of loss of ecological function; “Other Natural Areas” meaning 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; and “Ecological Support Areas (ESA) – Wetland Clusters” meaning clusters of wetlands embedded within largely natural landscapes to allow for the migration of fauna and flora between wetlands. A very small area is situated within “Ecological Support Areas (ESA) – Wetlands”, all non-FEPA wetlands, meaning, although not classed as FEPAs, these wetlands support the hydrological functioning of rivers, water tables and freshwater biodiversity, as well as providing a host of ecosystem services through the ecological infrastructure that they provide. This depression / pan, is currently partially mined by an unknown entity, and was historically partially mined by Middelburg Mining Services, now owned by Seriti Resources (Pty) Ltd.

6.6 SURFACE WATER

Black Wattle Colliery mining right area falls within the lower parts of the Klein Olifants River, which in turn falls within the Upper Olifants River catchment. The Black Wattle Colliery mining right area drains into three streams i.e. Du Toit Spruit to the northwest, Vaalbank Spruit to the east and the Spook Spruit to the west. These streams delineate the sub catchments affected by the proposed Black Wattle Colliery mining area refer to Figure 14.

Runoff water from the Du Toit Spruit will flow towards the Athlone Dam and ultimately to the Kruger dam. The Athlone dam is utilised for fishing and recreation purposes, whilst the Kruger dam is considered a back-up water supply for the town of Middelburg. The Vaalbank Spruit flows towards the Klein Olifants River whilst the Spook Spruit flows towards the Olifants River.

The proposed project is situated within the Spook Spruit sub-catchment. Based on the current water quality analysis from the water monitoring conducted by Black Wattle Colliery, the water quality of the Spook Spruit has been affected by the nearby coal mining operations.

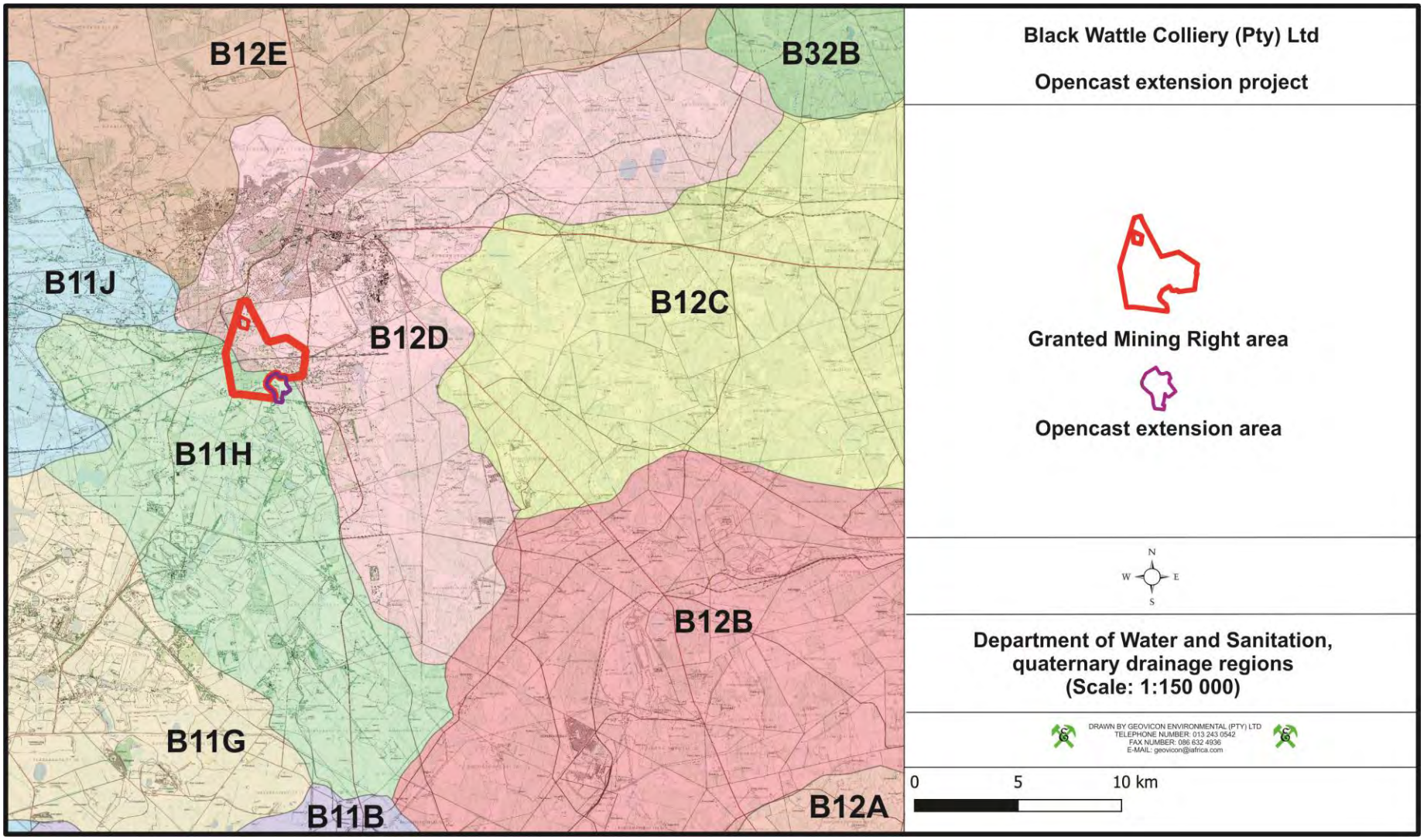


Figure 14:Catchments around the Black Wattle colliery

6.6.1 River Diversions

No river diversions are planned for the activities covered by this Report.

6.6.2 Water Authority

The Olifants River basin downstream of the Witbank Dam is a government water controlled catchment. The authority in charge is the Department of Water and Sanitation (Mpumalanga Regional Office).

6.6.3 Catchment Description

Black Wattle Colliery mining right area falls in the Olifants River catchments under the B11 and B12 tertiary drainage regions of the Upper Olifants River. Within these tertiary regions the proposed mine falls within the B11H and B12D quaternary drainage regions.

Black Wattle Colliery mining right area falls within the lower parts of the Klein Olifants River, which in turn falls within the Upper Olifants River catchment. The Black Wattle Colliery mining right area drains into three streams i.e. Du Toit Spruit to the northwest, Vaalbankspruit to the east and the Spookspruit to the west. These streams delineate the sub catchments affected by the proposed Black Wattle Colliery mining area.

Runoff water from the Du Toit Spruit will flow towards the Athlone Dam and ultimately to the Kruger dam. The Athlone dam is utilised for fishing and recreation purposes, whilst the Kruger dam is considered a back-up water supply for the town of Middelburg. The Vaalbankspruit flows towards the Klein Olifants River whilst the Spookspruit flows towards the Olifants River.

6.6.4 Baseline hydrology

Du Toit Spruit

The Du Toit Spruit has its source within the northern sections of the mining rights area. The catchment is impacted by current pipeline construction works and historical mining. Downstream of the mining rights area, the catchment flows through the southern parts of Middleburg. Natural vegetation within the catchment headwaters consists mostly of impacted grasslands. There were no signs of crop lands in the catchment upstream of Middleburg.

Vaalbank Spruit

The Vaalbank Spruit is a tributary of the Klein Olifants River. The Vaalbank Spruit flows in a northerly direction towards the confluence with the Klein Olifants River approximately 8 km downstream of Black Wattle Colliery. The Vaalbank Spruit is largely undeveloped, but numerous current and historical coal mining activities are present in the catchment. Land use consists mostly of impacted grasslands and dryland agriculture. The topography is relatively flat. Localised areas have steeper slopes, particularly near the stream. The Vaalbank Spruit is dammed with multiple farm dams. The water course is heavily vegetated with riparian vegetation. The flood plain is well developed in places.

Spook Spruit

The Spook Spruit is the tributary of the Olifants River with its confluence situated downstream the Witbank dam. The tributary water courses of the Spook Spruit are not developed within the mining rights area. The water courses only develop approximately 2 km from their confluence with the Spook Spruit. The stream is dammed

with multiple farm dams. Natural vegetation consists of mostly of impacted grasslands. The topography is relatively flat. Localised areas have steeper slopes, particularly near the streams.

Table 8: Catchments and sub-catchments in which Black Wattle Colliery fall.

Catchment name (stream)	Mean Annual Runoff (Mm^3/a)
Spookspruit	11.54
Du Toitspruit	1.18
Vaalbankspruit	7.78
Spookspruit tributary 1	0.24
Spookspruit tributary 2	0.17
Spookspruit tributary 3	0.36
Vaalbankspruit tributary	0.45

6.6.5 Flood Peaks and Volumes

The 50-year and 100-year flood peaks for the streams and rivers were calculated and the results are presented in Table 9.

Table 9: Flood peaks and volumes

River	50-yr	100-yr
Vaalbank Spruit	332 m^3/s	402 m^3/s
Du Toit Spruit	131 m^3/s	159 m^3/s
Spook Spruit (including tributary)	376 m^3/s	506 m^3/s

6.6.6 Surface Water Quality

The water quality data was compared against the South African water quality guidelines (Department of Water Affairs and Forestry, 1996). In selecting which guidelines to compare the data against, the likely downstream users need to be considered. The likely downstream users were determined by examining aerial photography, literature surveys and observations made during a site visit of the catchment. Figure 15 shows the sample location points.

The following parameters exceeded the recommended limits as prescribed by the IWUL:

- TDS in monitoring wells BWS01, BWS05, BWS09, BWR05 and BWR06.
- Fluoride in monitoring wells BWS01, BWS05 and BWS09.
- Sulphate in monitoring wells BWS01, BWS05, BWS09, BWR05 and BWR06.
- Calcium in monitoring wells BWS01, BWS05, BWS09 BWR05 and BWR06.
- Magnesium in monitoring wells BWS01, BWR05 and BWR06.
- Sodium in monitoring wells BWS01, BWS05 and BWS09.
- Potassium in monitoring well BWS01.
- Electrical conductivity in monitoring wells BWR05 and BWR06.
- Iron in monitoring wells BWR02, BWR03, BWR04, and BWR07.
- Manganese in monitoring wells BWS01, BWR02, BWR03, BWR04, BWR05 BWR06 and BWR08.

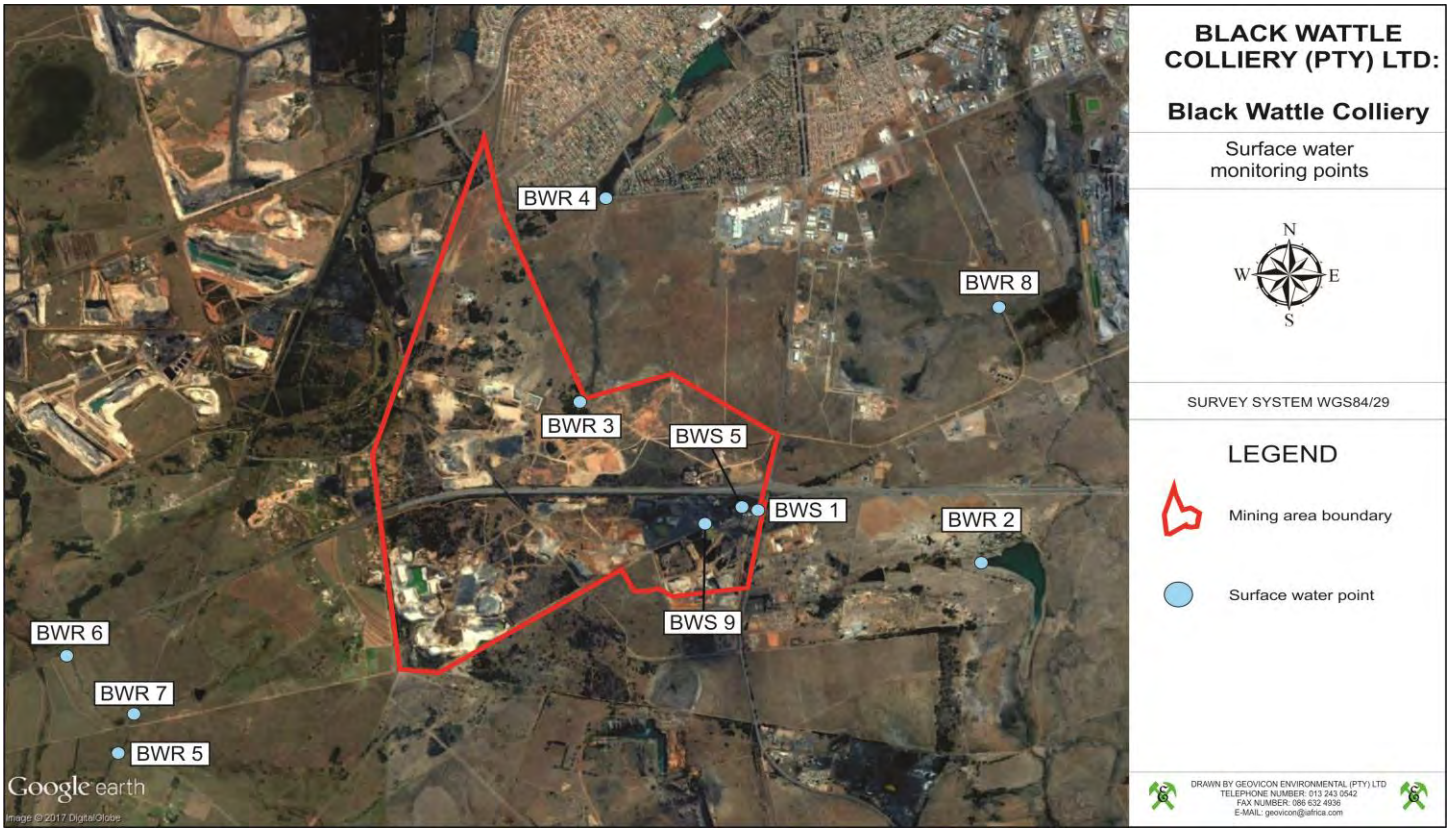


Figure 15: Surface water sample locations

6.6.7 Surface Water Users

Mining has in the past had an impact on the country's water resources. In view of this it is essential that before any mining development takes place, all potentially affected water users are identified and consulted, with regards to the potential impact the envisaged mining operation may have on them.

The water use identified on the mining area are:

- Domestic users – limited drinking water, but farm labourers and local inhabitants may consume this river water and use it for laundry and cleaning.
- Recreational users – it is likely that farm labourers and local inhabitants will swim in the rivers and they will be exposed to the water while washing in the rivers.
- Industrial users – there are no water quality sensitive industrial users on the rivers downstream of the study area.
- Aquatic users – the catchments are impacted by agriculture, urban, and mining and sensitive aquatic users are unlikely to be present. Some less sensitive aquatic species may still be present.
- Irrigation users – the river water may be used for irrigation.
- Livestock watering – the river water may be used for livestock watering

6.7 GROUNDWATER

Since mining activities can potentially impact groundwater, a description of the current groundwater conditions is required. The purpose of this section is, therefore to describe the currently prevailing groundwater conditions, predict the environmental impact of the proposed mining activity on the geohydrological regime of the area and recommend mitigation measures against the negative impacts on the groundwater regime. This prevailing groundwater conditions will serve as a reference baseline for quantifying potential mining impacts on the existing groundwater regime. Geo-Pollution Technologies was appointed to conduct a groundwater study that was used for determining the impacts of the proposed project on the groundwater regime. A copy of the geohydrological report for the proposed project is attached as Appendix 4 of this report.

6.7.1 Hydrogeology

According to the 1:500 000 General Hydrogeological Map4 the rocks of the Ecca group which forms part of the Karoo Supergroup. This Aquifer type typically act as secondary aquifers (intergranular and fractured rock aquifers). However, the multi-layered weathering system present in the geology along with locally identified intrusions and coal seems could prove to have up to four aquifer systems present in the form of a shallow aquifer in the weathered zone, deeper aquifer formed by fracturing in the Karoo sediments, aquifers associated with geological intrusions and aquifers formed within the more permeable coal seams and sandstone layers. These aquifer systems are discussed below.

The hydrogeology can be described in terms of the saturated and unsaturated zones.

6.7.1.1 Saturated Zone

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 Ecca Group. Groundwater movement is predominantly associated with secondary structures in this aquifer (fractures, faults, dykes, etc.). Both the porosity and the hydraulic conductivity of the Ecca Group fractured aquifers are known to be low. The commonly expected values of porosity and permeability for the rock types present in the site area, are 0 – 30% (porosity) and 10-7 – 1 m.d-1 (hydraulic conductivity) respectively (Kruseman & de Ridder, 1994). Movement of groundwater in this aquifer will be preferential in secondary structures such as joints, faults and fractures. From previous studies that were conducted at Blackwattle mine the hydraulic conductivity for this aquifer system was calculated to be 0.2 m/day.

6.7.1.2 Unsaturated zone

The main source of recharge into the shallow aquifer is rainfall that infiltrates the aquifer through the unsaturated (vadose) zone. Vertical movement of water is faster than lateral movement in this system as water moves predominantly under the influence of gravity. This aquifer is comprised of transported alluvium and in-situ weathered sediments and is underlain by consolidated sedimentary rocks (sandstone, shale and coal). Based on literature the hydraulic conductivity of this aquifer likely ranges between 10-3 and 1 m.day-15.

6.7.1.3 Water Levels

Groundwater level data was obtained from 23 groundwater monitoring points that were provided by Geovicon. Groundwater level measurements was not possible in all of the groundwater monitoring points due to the boreholes being discontinued, destroyed or no access being provided. In total 19 boreholes were available for

groundwater level measurement and the water level data is displayed since February 2022. For the latest monitoring run (November 2022), the groundwater levels varied between a minimum of 3.96 mbgl and a maximum of 23.73 mbgl.

6.7.1.4 Groundwater levels from monitoring data

Groundwater levels are measured on a quarterly basis by Geovicon (Pty) Ltd. The correlation between the monitoring boreholes and the topography are generally strong hence the assumption could be made that the groundwater flow direction mimics the onsite topography, the correlation is shown in Figure 16 below. The data was provided by the client and captured in a database. The following can be concluded from the groundwater level monitoring data collected from 2003: • Monitoring borehole GW1 was monitored since August 2003. The water level remains fairly stable over the monitoring period but shows an increase in variation since August 2019. The lowest water level was recorded in August 2021, whereafter the water level increased to 18.3 mbgl and has remained stable until the latest monitoring event in November 2022. The variation in the water level is a possible indication that the groundwater level in the region of the mine could be affected by the mine's dewatering. • Monitoring borehole YKOH reported water level fluctuations with the water level dropping from 12.6 mbgl to 26 mbgl between February 2020 and May 2020. The water level recovered back to 12.22 mbgl during the groundwater monitoring event in August 2020. Since August 2020 the water level in YKOH has steadily increased to the latest water level at 4.22 mbgl. This is a possible indication that the groundwater level in the region of the mine could be affected by the mine's dewatering • Groundwater monitoring points GW33, GW34 and windpump showed indications of a long-term decrease in the groundwater level that could possibly be attributed to the close by mining activities. • The remainder of the groundwater monitoring points indicated seasonal fluctuations. The greatest variance is shown in GW38 and GW44. The long-term groundwater level trends can be visualised in Figure 16 below.

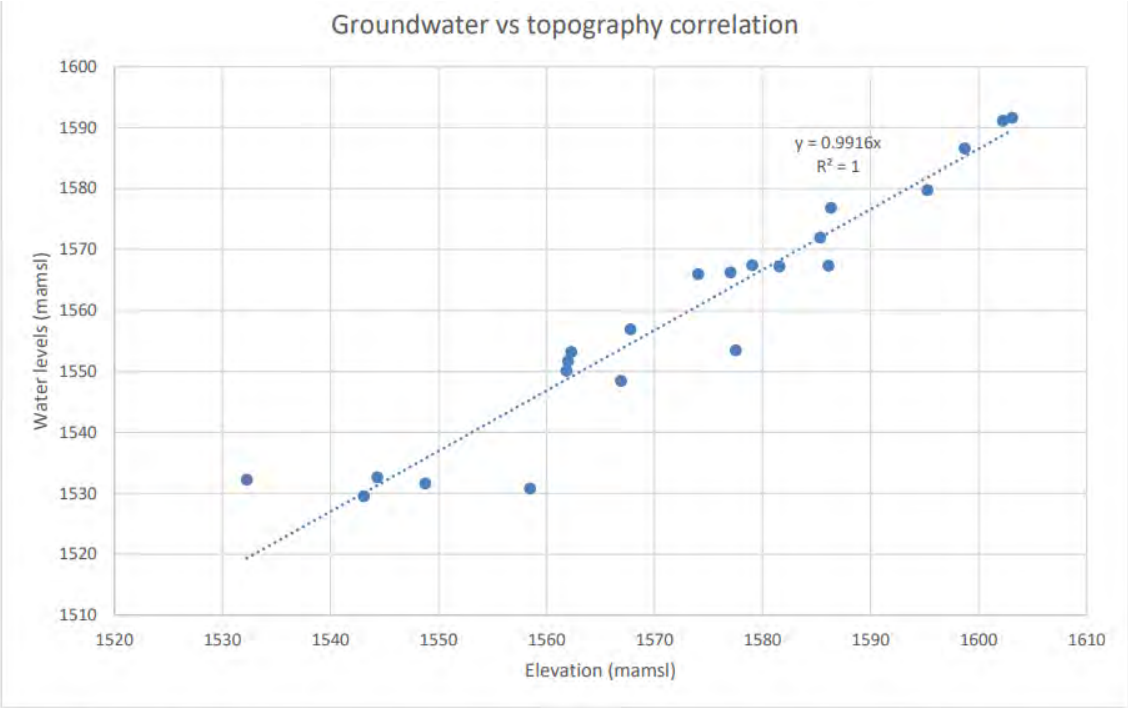


Figure 5: Correlation Graph of topography vs available groundwater levels (Monitoring Boreholes).

Figure 16: Correlation Graph of topography vs available groundwater levels

6.7.2 Hydrocensus

A Hydrocensus was conducted by GPT on 16 October 2020. Access was granted to a total of two additional groundwater monitoring points. All of the other properties that was visited during the day either did not use groundwater or no access was granted to the properties due to the occupants not being available. During the hydrocensus it did however become clear that due to the proximity of the mine to town Middelburg and presumptions about historic contamination of the groundwater in the area groundwater is not the main source of water in the area. The hydrocensus boreholes that was visited is described in the Table 10 below.

Table 10: Hydrocensus Boreholes.

Borehole	latitude	Longitude	Water level (mbgl)	Depth (mbgl)	Usage	Owner
HCBH1	25.870187	29.429931	23.21	40	Household usage	Chris Espach
HCBH2	25.854729	29.460832	11.19	45	Garden Irrigation	Como Trans

6.7.3 Ground Water Quality

Black Wattle Colliery undertakes an extensive surface water and groundwater-monitoring program and is in the process of updating its groundwater study. The latest groundwater monitoring data was used from the November 2022 groundwater monitoring event. The data included results from 26 groundwater samples and 9 surface water samples. The results were compared to the recommended concentrations as prescribed in the water use license (2011) and in the SANS241 drinking water standards. The SANS 241:2015 drinking water standards was used by GPT to compare the analysed results to and although the water quality objectives (for groundwater) that is contained in the WUL (2011) seems stringent a comparison was also made to these objectives. It is however recommended by GPT that an in-depth analysis needs to be done in terms of water quality at the mine to determine more achievable water use license objectives for groundwater and surface water. This observation can be made seeing that the water use license water quality objectives is more stringent than the SANS 241:2015 drinking water standards for various of the listed constituents.

Based on the monitoring report indicated above, the following groundwater determination was undertaken:

The following parameters exceeded the recommended limits as prescribed by the IWUL:

- Total N: in monitoring wells GW1, GW7, GW11, GW18, GW33, GW43, GW44, GW45, GW46, GW49, GW51, GGF, GWT and GWS.
- Chloride in monitoring wells GW11, GW18, GW33, GW36, GW46, GWT and GWS.
- Fluoride in monitoring wells GW7, GW11, GW35, GW42, GW43, GW45, GW46, GW47, GW49, GW50, YKOH, GGF, GWT and GWS.
- Sulphate in monitoring wells GW7, GW11, GW18, GW33, GW42, GW43, GW45, GW46, GW47, GW49, GW50, GW51, YKOH, GGF, GWT and GWS.
- Calcium in all monitoring wells except for GW1, GW2, GW34, GW36, GW40 and GW44.
- Sodium in all monitoring wells except for GW1, GW2, GW34, GW35, GW36, GW40 and GW44.
- Electrical conductivity in all monitoring wells except for GW1, GW2, GW34, GW36, GW40 and GW44. • pH in monitoring well GW1, GW2, GW44, GW49.

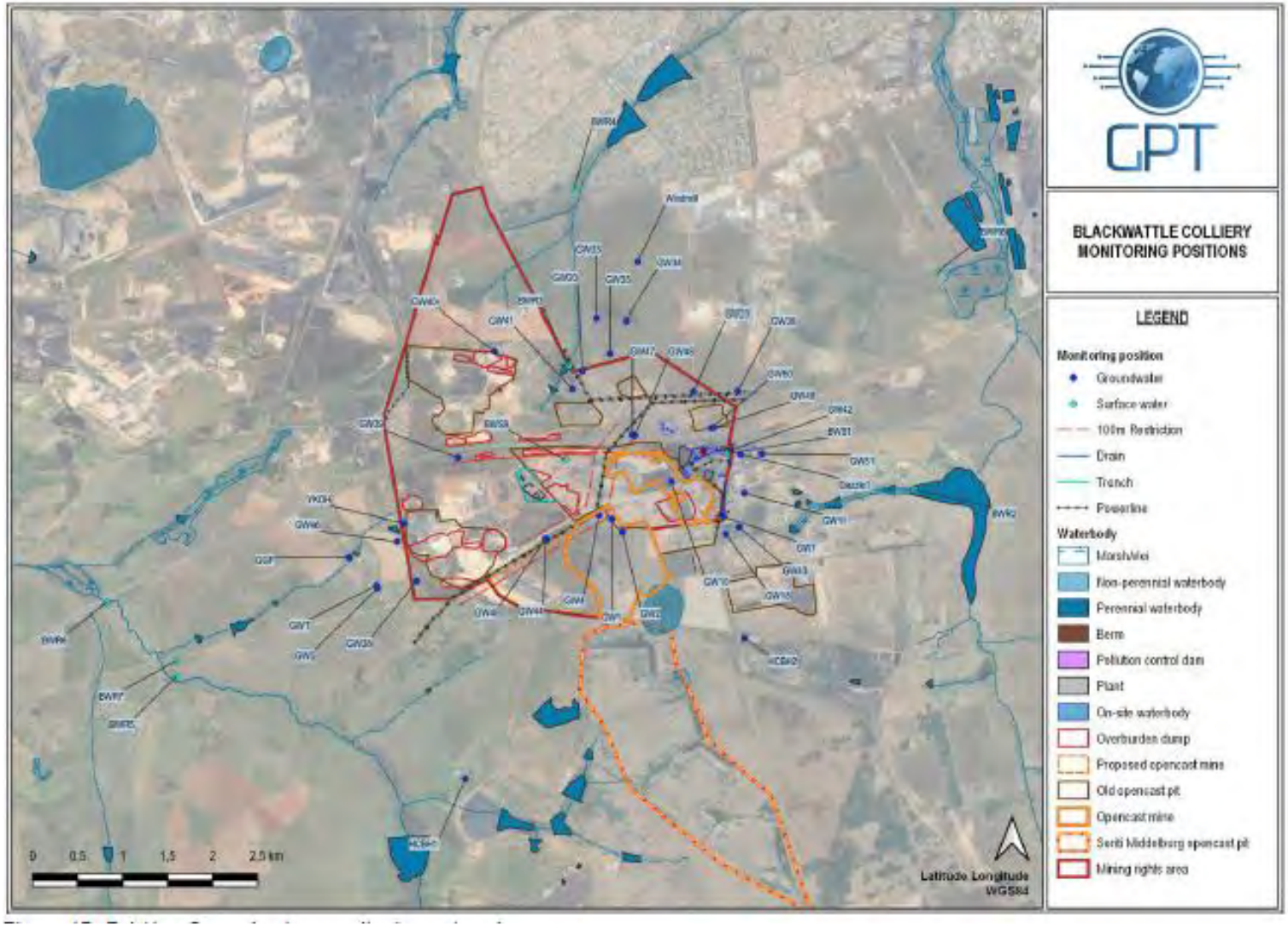


Figure 17: Groundwater monitoring points.

6.7.4 Drawdown

The calculated drawdown of the mining scenarios is depicted in Figure 18 below, as contours of drawdown for the mine. It follows from these figures that the cone of depression will most markedly moves in north and south eastern directions which follows the regional topography. It is noted from the drawdown map that due to the interconnectivity between the old mine workings, that the drawdown at these historically mined areas is noticeably higher than the surrounding areas. This could be attributed to the altered subsurface material that is expected to have a higher hydraulic conductivity value when compared with the surrounding undisturbed lithology. From the modelled cone of depression, it can be observed that the lowering of the water table is be spread over a relatively large area with a relatively small impact on the aquifer in undisturbed lithologies. Despite the modelled predictions, it must again be stressed that structures of preferred groundwater flow (like dolerite intrusions) have not been modelled. It is known by experience that dolerite will most likely transgress the area, but details are limited and not adequate to model this structure(s). If such a structure is dewatered, any boreholes drilled into the structure might be seriously affected. These effects cannot be predicted with the current knowledge and can only be established through continuous groundwater level monitoring and through available data.

6.7.5 Decant

Following the closure of the opencasts and the cessation of the dewatering it is assumed to lead to groundwater rebound. It is estimated that the water level in the planned opencast will recover in about 10 years after mining has ceased. After rebound has reached equilibrium or water in the pit equal to surrounding host rock, decant has the potential to occur due to excessive rainfall and surface water run-off water entering the pit. The percentage of the rainfall/run-off that is recharged into the rehabilitated opencast and potential decant depends on:

- The slope of the rehabilitated pit and its direct surroundings.
- The thickness and composition of the topsoil. i.e. clay content and compaction.
- The vegetation of the rehabilitation and its direct surroundings.
- The amount rainfall and intensity of the rainfall events.

The size of the ramps and the final voids predicted groundwater levels indicate that a rise in groundwater will occur and that decant after rebound in so far as daylighting to surface will occur at an eastern section of the mining rights area close to a historical open cast. The predicted decant area is depicted in Figure 19. Through the groundwater model results also indicates that a range of between 400 and 600 m3 of water will decant to the south east of the mining operations.

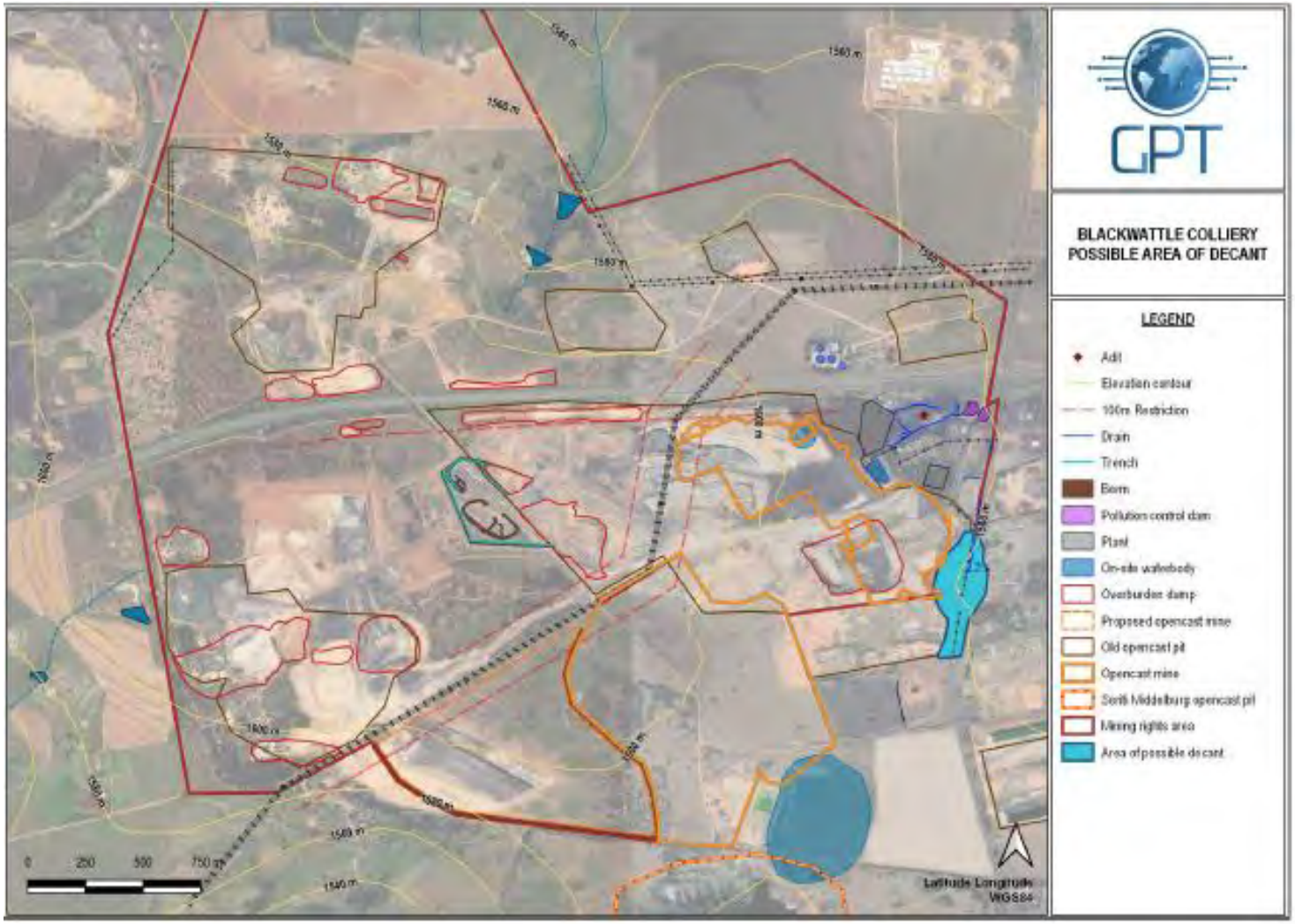


Figure 18: Black Wattle Colliery Areas of Possible Decant

6.7.6 Plume migration

It is essential for the sulphate plume migration to be modelled to quantify its magnitude-potential impact on groundwater so that mitigation measures can be implemented to prevent future damages. The migration of contaminated water from the mining area has been modelled as described, and the results are presented in Figure 20 and 21 in terms of the extent of the pollution plume 10, 25, 50 and 100 years after the operations have ceased. A scenario was modelled for the plume emanating from the planned opencast which will act as a constant source.

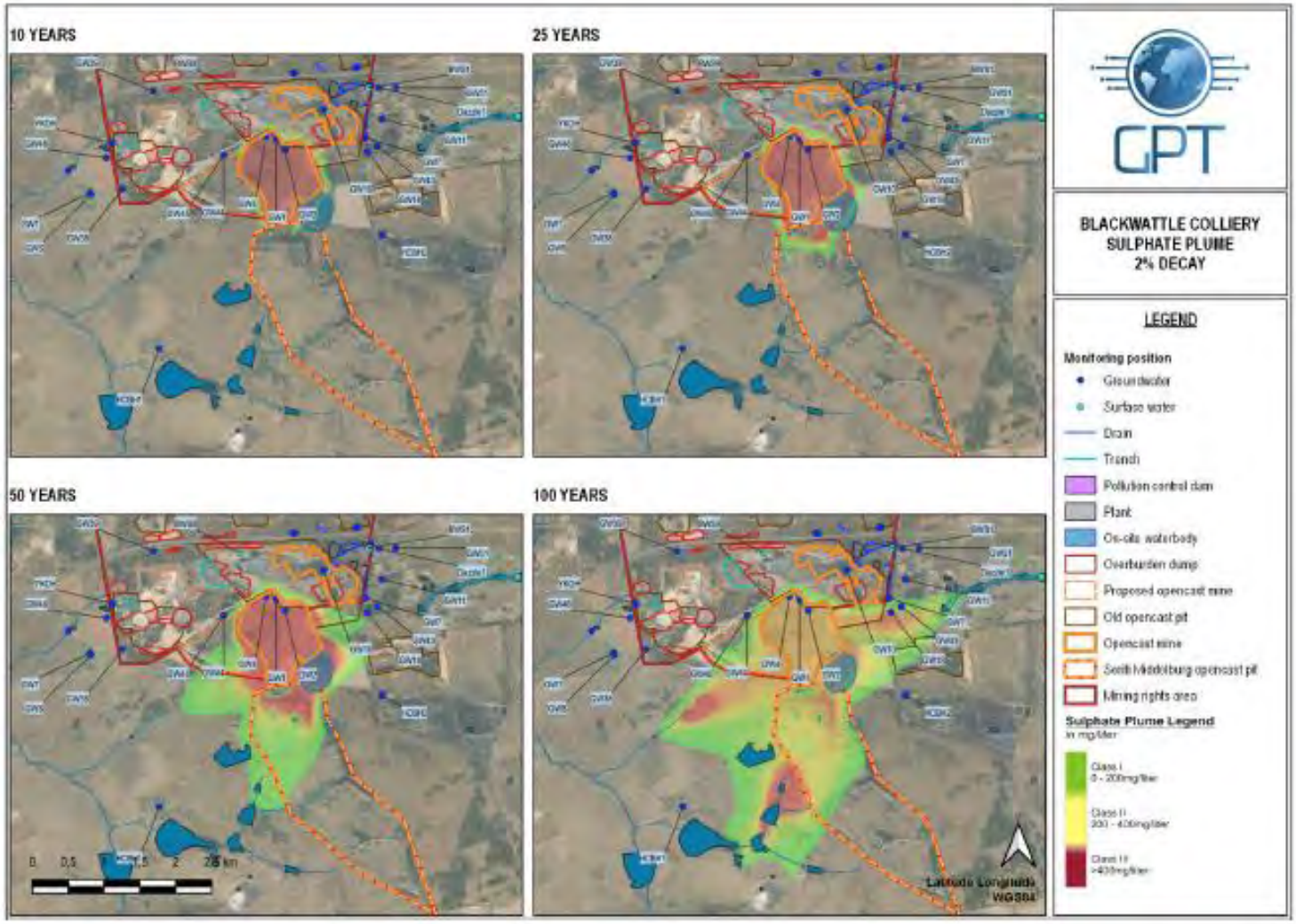


Figure 19: Sulphate plume after mining operations with 2% decay rate

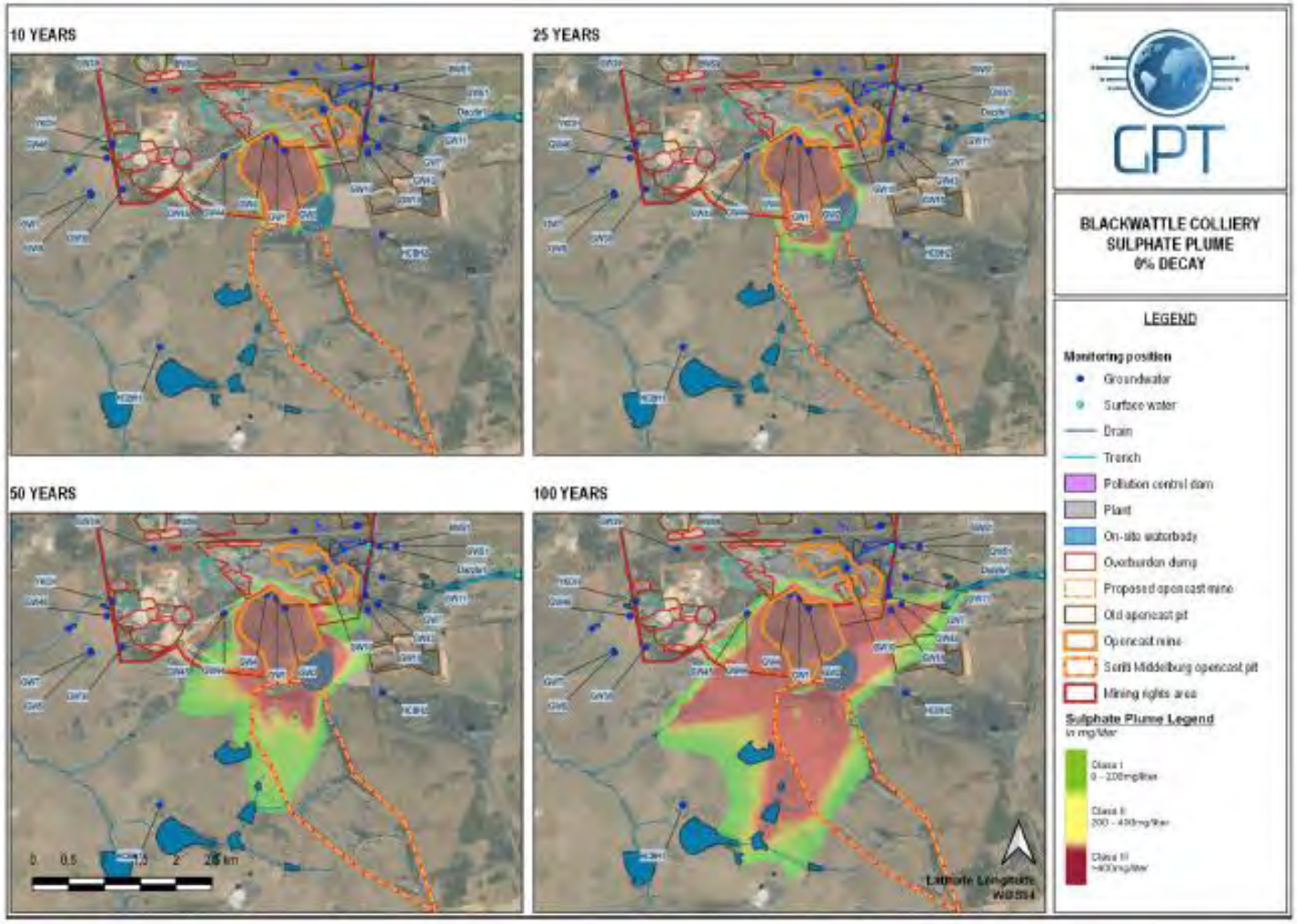


Figure 20: Sulphate plume after mining with 0% decay rate

6.8 SENSITIVE LANDSCAPE

Wetlands are sensitive landscapes under statuary protection, and such must not be cultivated, overgrazed or mined. The presence of wetlands within the proposed mining area needs to be assessed and their status determined which will give the applicant and the authorities the pre-mining conditions of the wetlands. To this extent, identification and delineation of wetland areas associated with the proposed Black Wattle Colliery opencast expansion project was conducted.

The proposed coal mining project area is situated near a depression / pan wetland as indicated by the National Wetland Map 5, SANBI. It is however, not situated in a National Freshwater Ecological Priority Area (NFEPA) - rivers. Refer to Figure 21 for the National wetland types near the proposed coal mining project.

6.8.1 Wetland identification

In a pedal terrestrial soil area, the transition to wetland or hydric soils was recognised by bleaching and translocation or removal of oxidic coatings through the various processes associated with wetness, resulting in clearly visible colour changes. In wetland areas, red or yellow colours are replaced by grey colours, with or without mottles.

However, in structured clayey soils, bleaching caused by water from above (stagnic properties, IUSS Working Group WRB, 2014), a common process in seasonal hydric soils -- as opposed to gleyic properties, caused by groundwater from below -- is less readily achieved. Thus, factors such as the position in the landscape, bleaching of ped surfaces, presence of oxidised pore linings, and presence or absence of wetness were considered in assessing the non-wetland status of the Sepane soils.

Table 11 below lists the map units that are occupied by seasonal or permanent hydric soils and the indicators considered.

Table 11: Wetland zones and indicators

MAP UNIT	WETLAND ZONE	INDICATORS				
		TERRAIN UNIT	SOIL			PRESENCE OF WATER (at time of survey)
			Grey matrix colours within 50 cm	Mottles within 50 cm	Soil form	
Ka Wo-Ka	Permanent	Channeled valley bottoms; grass pan floor	Present in Ka; may occur deeper in Wo	Oxidized pore linings; no or few true mottles	Indicator of permanent wetland	Present in channeled valley bottoms; largely absent in grass pan floor
We, Lo, Lo-We, Lo-Wa. Lo-Cf	Seasonal	Seeps on lower midslopes or footslopes; Channeled or unchanneled valley bottoms	Present in E and B horizons	Present in B horizons of We and Lo	Indicator of seasonal or temporary wetland (within appropriate terrain setting)	Absent

6.8.2 Delineation

According to the DWS (2005), the object of the delineation procedure is to identify the outer edge of the temporary/seasonal zone. From this information it is then possible to comment on the location and possible impacts on wetlands.

6.8.3 Wetland Ecosystem Services

The ecosystem services provided by the wetlands identified on site was assessed and rated using the WET-EcoServices method (Kotze et al. 2008). Wetland Health (Present Ecological Status - PES)

The overall approach is to quantify the impacts of human activity or clearly visible impacts on wetland health, and then to convert the impact scores to a Present Ecological Status (PES) score. This takes the form of assessing the spatial extent of impact of individual activities/occurrences and then separately assessing the intensity of impact of each activity in the affected area. The extent and intensity are then combined to determine an overall magnitude of impact.

6.8.4 Wetland Health (Present Ecological Status - PES)

Although wetland habitat integrity goes beyond that which can be observed during soil surveys, certain pointers are given (Table 12).

Table 12: Present ecological status

Criteria	Attributes	Notes	Score	Confidence
Area 4 (Wetlands north of the N4)				
Hydrology	Flow modification	One small farm dam	4	4
		Possible additions of pumped mine water upstream of study area	4	2
	Permanent inundation	One small farm dam	4	4
Water quality	Water quality modification	Not investigated		
	Sediment load modification			
Hydraulic/ Geomorphic	Canalisation	None observed		
	Topographic alteration	None observed		
Biota	Terrestrial encroachment	Not investigated		
	Indigenous vegetation removal			
	Invasive plant encroachment			
	Alien fauna			
	Over-utilisation of biota	None observed		
Area 3				
Hydrology	Flow modification	One small impoundment	4	4
	Permanent inundation			
Water quality	Water quality modification	Not investigated		
	Sediment load modification			
Hydraulic/ Geomorphic	Canalisation	None observed		
	Topographic alteration	Contour banks in abandoned cultivated fields	4	1

Biota	Terrestrial encroachment	Not investigated		
	Indigenous vegetation removal			
	Invasive plant encroachment	Wattle	4	2
	Alien fauna	Not investigated		
	Over-utilisation of biota	None observed		
Area 2 (Grass pan)				
Hydrology	Flow modification	Opencast mined portion; ditches, berms and road	4	2
	Permanent inundation	In opencast mined portion	4	1
Water quality	Water quality modification	Not investigated		
	Sediment load modification	Not investigated		
Hydraulic/ Geomorphic	Canalisation	Ditches	4	2
	Topographic alteration	Sandy material removal; topsoil mounds	4	1
Biota	Terrestrial encroachment	Not investigated		
	Indigenous vegetation removal			
	Invasive plant encroachment			
	Alien fauna			
	Over-utilisation of biota			

Scoring guidelines per attribute:

Natural, unmodified = 5; largely natural = 4; moderately modified = 3; largely modified = 2; seriously modified = 1; critically modified = 0

Relative confidence of score:

Very high confidence = 4; High confidence = 3; moderate confidence = 2; marginal/low confidence = 1

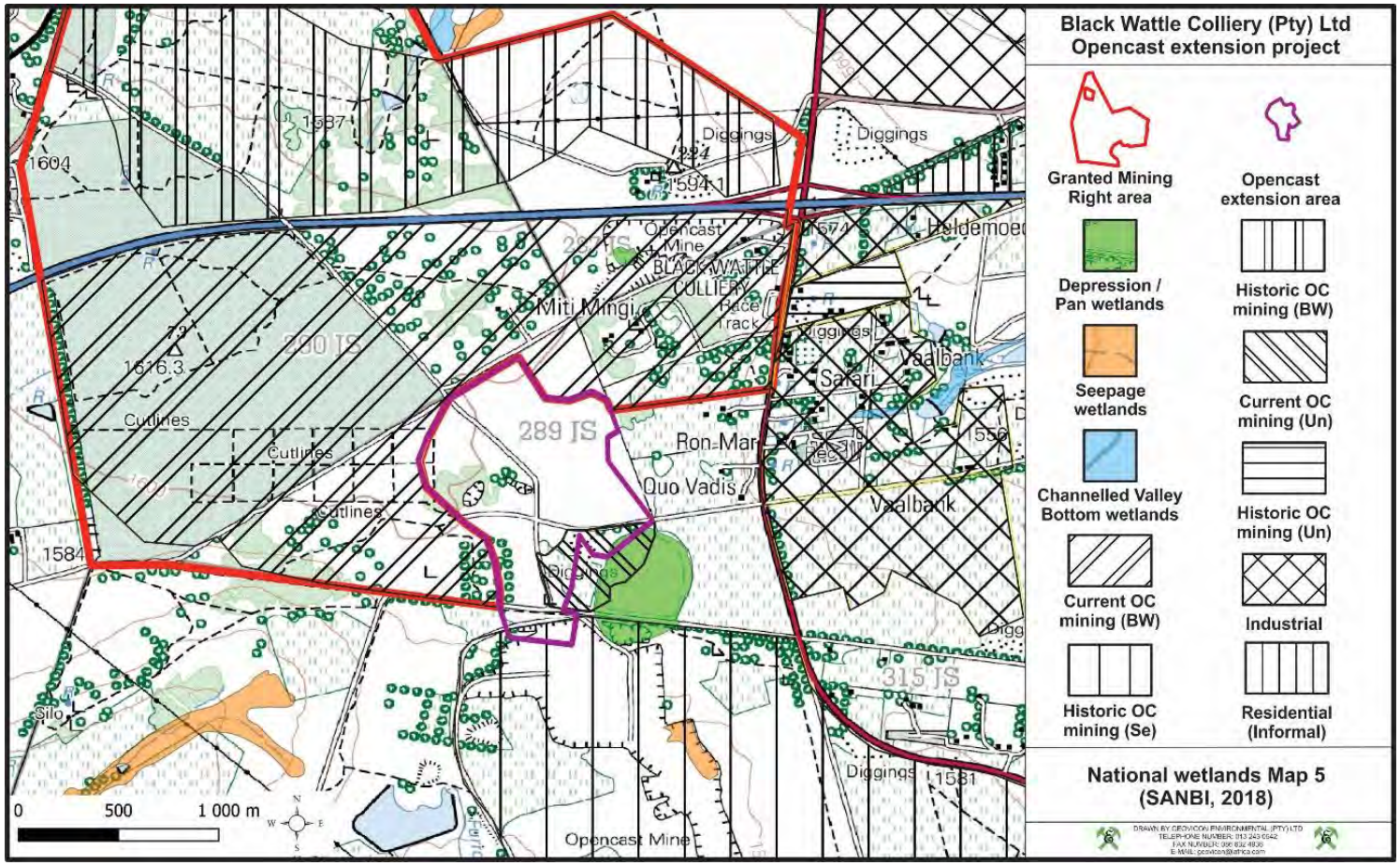


Figure 21: National wetland types in the vicinity of the proposed project

6.9 VISUAL

Regionally the area is characterised by a gentle undulating topography, covered by Black Wattle trees. Black Wattle Colliery is situated adjacent to the N4 freeway, which is the main easterly artery through the Mpumalanga Province. Black Wattle Colliery mining area is situated west of the R35 provincial road, approximately 2 km south of Tswelopele Street (Aerorand) and the N4 National Road divides the Colliery basically in the north and south sections. The proposed opencast extension area is situated approximately 3 km south and west of the N4 and R35, approximately 9 km north of Tswelopele Street (Aerorand) and 6 km from the hospital currently being constructed. As such the surface related mining activities may not be highly visible from the above-mentioned roads and public buildings, to the community residing within the suburb of Aerorand and small holdings around the said Colliery.

6.10 AIR QUALITY

Potentially air pollution from human activities may arise as a result of particulates entering the atmosphere. The sources of air pollution from human activities comprise of three broad categories i.e., stationary sources (agriculture, mining power generation, etc), community sources (homes or buildings, municipal waste and sewage sludge incinerators, etc) and mobile sources combustion-engine vehicles and fugitive emissions from vehicle traffic). Air pollutants are generally classified into suspended particulate matter (dusts, fumes, mists and smokes), gaseous pollutants (gases and vapours) and odours.

6.10.1 description of project activities

The proposed project includes various construction, operational and decommissioning activities that will have an impact on the air quality.

6.10.2 Legal Requirements

The air quality guidelines and standards are fundamental to effective air quality management, providing the link between the source of atmospheric emissions and the user of that air at the downstream receptor site. The ambient air quality guideline and standards values (National Ambient Air Quality Standards and National Dust Control Regulations) indicate safe daily exposure levels for most of the population, including the very young and the elderly, throughout an individual's lifetime. The air quality guidelines and standards are normally given for specific averaging periods.

Although there are several ambient air pollutants near the proposed operations, the pollutants of concern due to the proposed project activities will consist of particulate matter and gas emissions. Black Wattle Colliery is situated within the Steve Tshwete local municipal area. This area is dominated by mining, agricultural practices, industries, and residential areas. These activities have the potential to generate particulates that may cause air pollution.

Potential impacts that the proposed project may have on air quality include the generation of dust during the construction and operation phase. Dust generated will be because of vehicle movement over cleared surfaces.

6.11 SITES OF ARCHAEOLOGICAL AND CULTURAL INTEREST

The development of the proposed project may result in the disturbance of heritage sites. It is also possible that two sites close may be affected by the development of the opencast pit. In view of the above and in order to ensure that the identified sites are protected and demolished in a proper manner, Archaetnos cc was appointed to undertake an Archaeological Impact Assessment (Appendix 5) to determine the most appropriate manner of demolishing and management of the potentially affected heritage sites. The following Archaeological were identified within the proposed project:

Two sites of cultural heritage significance were identified during the survey. Refer to Figure 22.

Site no.1

Site no. 1 was identified during survey done in 2020 (Van Vollenhoven et.al. 2020: 24-29) and visited again during 2023. This is a graveyard of about 24 m long and about 14 m wide and is located next to the plantation area to the east. The site is not fenced in. The graves are orientated east to west. There is evidence of activity, digging of a trench, in the past that has covered some of the graves and more graves could be present underneath the earth mound.

The headstones are made of natural rock, cement and metal plaques. The grave dressings are made of natural stone and bricks. Graves goods are present at some of the graves. The total number of graves are approximately 32, with no graves 60 years or older, 5 graves younger than 60 years and 27 unmarked graves. The oldest grave belongs to Zanek Mavis Zimu – 11/11/1972 and the youngest is that of Futeka Masilela – 09/02/1995.

The following legible information was noted:
Gugu Merse Skhosana – 04/02/1986
Phinrile Masmane – 31/08/1986
Joannah Sibanyoni – -/-/1988

Site no. 2

This is a cement reservoir of about 13 m diameter and is set in the ground. The structure is most likely older than 60 years of age.

Figure 22: Sites of cultural heritage significance identified within the proposed Project area.

6.12 SOCIO-ECONOMIC STRUCTURE

Black Wattle Colliery is situated in the Middelburg Magisterial District. The current population density for Middelburg is estimated to be 142 775. The estimated average population growth rate for Middelburg is 6.1% per year over a ten-year period.

6.12.1 Administration

Mpumalanga is characterized by a dual system of governance which is a mix of political structures of governance and the traditional authorities. South Africa is a constitutional democracy with a system of government and an independent judiciary. The national, provincial, and local levels of government all have legislative and executive authority in their own spheres.

The provincial government is responsible for providing the strategic vision and framework for the province. They are responsible for ensuring cooperation and collaboration between municipalities and ensuring that each municipality performs their respective functions. District municipalities are responsible for the development of IDP and for the overall provision of services and infrastructure within the districts, including for the local municipalities. The purpose of district and local municipalities sharing the responsibility for local government is to ensure that all communities, particularly disadvantaged communities, are afforded equal access to resources and services. Traditional authorities refer to mainly rural areas whereby chiefs and their councils are responsible for administrative tasks at a community level and in mobilising local communities if there are any investment Project within their area of jurisdiction.

6.12.2 Population Demographics

6.12.2.1 Provincial and Regional Context

Mpumalanga is the second-smallest province after Gauteng with a surface area of 76 495 km2 but has the fourth largest economy in South Africa. The total population recorded for Mpumalanga province according to the Stats SA Mid-year population estimates 2022 was 4 720 497 an increase from app. 4.4 million in 2016. This figure is an estimate and not derived from the official national Population census which will only be released in 2023.

6.12.3 Nkangala District

Nkangala is the smallest district in terms of land occupation in the Mpumalanga province covering approximately 16 758.25 km2 which accounts for 22% of the province. Stats SA outlined that the population increased from 1 308 129 in 2011 to 1 445 624 in 2016. It is estimated that Nkangala had a population density of 86.3 per km2 in 2016 and an average population growth rate of 2.27% per annum. Although small in size, it is the second largest population in the province home to approximately 33% of the population of the province. The district comprises of six constituent local municipalities. The table below illustrates the population and household statistics for the different local municipalities as per the National Census 2011 and community survey 2016.

The Steve Tshwete Local Municipality population is increasingly under pressure due to population growth. According to Statistic South Africa, in 2016, the total population in STLM was approximately 278 749 with a 4.4% annual population growth rate. Over the nine-year period from 2007 to 2016, STLM's population increased by 9.7%. The municipality is now ranked the 7th largest population in the province and makes up 19.3% of the Nkangala District's total population (STLM Annual Report, 2021).

6.12.4 Population Density

Population density refers to the number of people per square kilometer (skm) on a particular area. Nkangala had a higher population per square kilometer (with an average of 84,9 people) compared to Mpumalanga with an average of 56,3 people per square kilometer. Nkangala and Mpumalanga had a higher population density higher than the national rate with an average of 45,6 people. Compared to other local municipalities Nkangala had the highest population density in 2016, as Enhlanzeni had 64,30 and Gert Sibande had 34,18 people per skm.

6.13 Environmental Impact Assessment for the Initial Site Layout

The current layout plan attached as Figure 3, is the initial site layout for the project. Results of the environmental assessment including results from the public participation will be used to determine whether the initial site layout must be changed.

6.14 Statement Motivating the Alternative Development Location (Final Site Layout)

The current layout plan attached as Figure 3 are the initial site layout for the project. Results of the environmental assessment were used to determine whether the initial site layout must be changed. The layout plan will be revised, should a need arise as the results from the public participation process. All changes will be provided in the Final EIR/EMPr for approval by the competent authority.

6.15 Environmental Impact Assessment Process Followed

6.15.1 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 EIA 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.

6.15.2 Environmental Impact Assessment Process Followed

Under Section 24 of the NEMA, the Minister promulgated the regulations pertaining to EIA Regulations, 2014, under Government Notice R982 in Government Gazette 38282 of 4 December 2014. These EIA regulations repealed the 2010 EIA regulations and therefore any process relating to EA must be undertaken under the EIA Regulations, 2014.

Chapter 4 of the EIA Regulations, 2014 deals with the provisions for an EA application. In view of the above, Black Wattle Colliery (Pty) Limited is obliged to comply with provisions of Chapter 4 for the intended EA application for the activities (listed and unlisted activities) within the proposed project.

Part 3 of chapter 4 of the EIA Regulations, 2014, contemplate the process to be undertaken for the application for EA for the proposed project, which is the S & EIR process. The process to be followed is described below.

6.15.2.1 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 and energy is the competent authority for environmental matters relating to mining and associated activities. In view of the above, the application for the proposed EA was submitted to the DMRE, eMalahleni Regional Office for their consideration and decision making.

6.15.2.2 Public Participation Process

Public participation is the cornerstone of the EIA process. The principles of the NEMA govern many aspects of EIA's, including public participation. These include provision of sufficient and transparent information on an ongoing basis to stakeholders to allow them to comment.

The following steps have been taken during the public participation process:

- The public participation process commenced by providing an opportunity for potential I&APs to register and comment on the SR.
- Reports included the EIA are made available to registered and potentially I&APs for their comments.
- I&APs and the public were also invited to a public meeting for the scoping phase and a meeting will be held for the EIA phase where the project and all major impacts from the proposed project will be discussed.
- Further to the above, I&APs and the public will be informed of the decision taken by the responsible authorities on the submitted application.

The above process will ensure that the EIR/EMPr is subjected to a I&APs, which ensures that the proposed project is brought to the attention of I&APs, the public and relevant organs of state including the competent authority.

6.15.2.3 Scoping Phase

According to Regulation 21 of the EIA Regulations, 2014, a SR must be submitted to the competent authority within 44 days after the submission of the EA application. As part of the public participation process, the draft SR was made available to the competent authority, potential and registered I&APs for their comments for a period of 30 days. After the completion of the consultation process, the SR was submitted to the competent authority and for review. The SR was accepted by the competent authority on the 14 February 2023.

6.15.2.4 EIA Phase

The public participation process for the EIA phase of the project commenced on the 14 April 2023 for a period of 30 days. The final EIR/EMPr will be submitted to the DMRE after the consultation period has lapsed.

6.15.2.5 Information Gathering

Environmental baseline data has been obtained through various agencies, pertaining to surface water quantities and qualities, geohydrological data and modelling, topographical analyses, soil surveys, vegetation surveys, wetland surveys and geological conditions. The combined data was used to determine the land capability. Historic land use was determined through available data and by visual observations made during various field studies. The data accumulated and analysed is

enough to gain a baseline indication of the present state of the environment. The use of these baseline studies for impact assessments is thus justified and reliable conclusions could be made.

The following specialist studies form part of this EIA i.e., Hydrological Study, Geohydrological Study, Heritage Study, Air Quality Study, Hydropedological Study, Wetland Study, Noise Study, Palaeontological Study, Soil Study, Climate Change Study, Biodiversity Study and Agricultural Economical Assessment were undertaken for the proposed project.

6.15.2.6 Decision on the S&EIR application

In compliance with Regulation 24 of the EIA Regulations, 2014, the competent authority will within 107 days of receipt of the final EIR/EMPr grant or refuse the EA application.

6.16 Environmental Impact Assessment Methodology

The following prediction and evaluation of impacts is based on the proposed project. This also includes identifying the impacts and risks for each alternative including the nature, significance, consequence, extent, duration and probability of the impacts.

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.

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).

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

Probability (P)	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 (E)	**Definition**
Small	0 – 40 ha/Local
Medium	40 – 200 ha/Regional
Large	200 + ha/National and International
Duration (D)	**Definition**
Short	0 – 5 years
Medium	6 – 25 years
Long	26 – 100 years or impact cease after operational life of project
Permanent	101 + years
Intensity (I)	**Definition**
Low	Does not contravene any laws. Is within environmental quality standards, thresholds, targets or objectives. Will not constitute a precedent for future actions. Effects observable and is reversible with time without human intervention. Will not result in the loss of irreplaceable resources or will result in the loss of least concerned resourced. 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 quality standards, thresholds, targets or objectives. Effects observable and is reversible through rehabilitation or human intervention. Will result in the loss of irreplaceable resources (Vulnerable and Near Threatened). 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 quality standards, thresholds, targets or objectives.

Extensive effects – irreversible alteration to the environment.

Will result in the loss of irreplaceable resources (Endangered or critically endangered).

Will have a significant impact on the health and welfare of humans or the environment.

Significance and Risk Category (S)	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

6.17 RESULTS OF THE ENVIRONMENTAL IMPACT ASSESSMENT

6.17.1 ASSESSMENT OF THE BLACK WATTLE COLLIERY OPENCAST EXPANSION PROJECT IMPACTS/RISKS IDENTIFIED

6.17.1.1 Pre-Construction and Construction Phases

Table 13: Results of the EIA (Pre-construction and construction phases)

NATURE OF THE IMPACT	ENVIRONMENTAL ASPECT	IMPACT ASSESSMENT					MITIGATION MEASURES
		E	P	D	I	S	
PRE-CONSTRUCTION AND CONSTRUCTION PHASES							
Activity 34 of Listing Notice 1 and Activity 15 of Listing Notice 2: The expansion of the opencast mine workings and the construction of the initial Box cut. Activity 12 and 19 of Listing Notice 1 and Activity 12 and 14 of Listing Notice 3: The construction of an initial box cut							
The construction of the initial box cut will lead to compaction of soil resources due to increased traffic, which may cause erosion of soils due to increased runoff water velocities. The establishment of the box cut will result in the stropping of soils with medium-high agricultural potential, which will result in the loss of agricultural/soil potential.	Soils, Land Use and Land Capability	Without Mitigation					The topsoil from the box-cut area will be stripped and stockpiled at a topsoil stockpiling area. The topsoil stockpile will not exceed a height of five meters, which will assist in minimizing compaction of the soils. The stockpiled topsoil will be seeded with a recommended seed mix to ensure that a good vegetation cover is achieved, if the natural seed-back doesn't create enough cover. No mixing of the topsoil material with subsoil, softs (soft overburden) and hard overburden material (contaminated overburden) will be allowed. In cases where compaction and/or erosion does occur, action plans should be implemented to apply mitigation.
		M	M	M	H	M	
		With Mitigation					
		S	L	S	L	L	
During the construction phase of the initial box cut, topsoil removed will be stripped and stockpiled for future use. This may result in the following impacts: Areas that have been stripped of vegetation and topsoil will be prone to erosion. This could lead to increased suspended solids being deposited into the local streams (Spookspruit Tributary).	Surface Water Quantity	Without Mitigation					The storm water diversion structures will be constructed in accordance with the project's stormwater management plan approved by the DWS, which shows the storm water management systems' silt control and erosion protection. Areas that are stripped will be optimised to limit unnecessary stripping. Storm water from upslope of the stripped areas will be diverted around these areas to limit the amount of storm water flowing over from these areas. The timing of the topsoil stripping will be optimised to limit the time between stripping and construction. Where practical constraints exist and areas need to be left stripped for long periods, contour ploughing, or ripping could reduce run-off and hence reduce erosion. Dry season construction is preferable where practical. The construction site will be optimised to limit over stripping. This will ensure that the generation of unnecessary volumes of silted water is controlled on site. The constructed storm water diversion structures will be maintained in good order, which will include the cleaning of the structures where necessary. Any damage within the constructed storm water diversion structures will be repaired as soon as possible. Divert clean runoff water away from the box cut to minimize surface flow
		M	H	S	M	M	
		With Mitigation					
		S	L	S	L	L	

NATURE OF THE IMPACT	ENVIRONMENTAL ASPECT	IMPACT ASSESSMENT					MITIGATION MEASURES
		E	P	D	I	S	
PRE-CONSTRUCTION AND CONSTRUCTION PHASES							
							into the working area.
Deterioration of water quality in the Spookspruit and the Vaalbankspruit Tributaries.	Surface Water Quality	Without Mitigation					Storm water diversion structures (berms) will be constructed to divert clean water runoff to the storm water systems. Areas that are to be stripped of topsoil will be optimised to limit unnecessary stripping. Excessive sedimentation of storm water run-off from the site will be prevented. Mine vehicles and machinery used during the construction phase must be well maintained.
		M	H	S	M	M	
		With Mitigation					
		S	L	S	L	L	
During the construction phase of the initial boxcut, a significant number of vehicles will be driving around the site. This may result in the following impacts: • If the construction vehicles are poorly maintained hydrocarbon spills could cause pollution if washed off roads by storm water.	Groundwater	Without Mitigation					The existing procedures for containment and remediation of any accidental hydrocarbon or other chemical spillages will be adhered to. Any incidents relating to hydrocarbon contamination should be investigated if the impact is perceived to be significant and a hydrocarbon contamination specialist should be consulted for further recommendations. Mine machinery will be repaired at existing designated areas fit for purpose. No maintenance outside the dedicated areas will be allowed unless it is an emergency repairs which must be on a protected ground or by use of drip trays. Training, which will be in accordance with the requirements of the norms and standards for the waste storage facilities will be conducted for employees working with waste. All spillages must be contained and the affected areas remedied. The existing waste collectors will be used for the removal of waste from the site to a registered waste disposal facility.
		M	L	S	L	L	
		With Mitigation					
		S	L	S	L	L	
The excavation of the initial boxcut will result in the removal of vegetation cover from the stripping of topsoil, which will lead to the loss of habitat.	Natural vegetation	Without mitigation					Ensure that construction activities are limited within the approved development footprint. Stockpile removed topsoil on a topsoil stockpile area separate from softs and hards overburden materials.
		S	M	S	M	M	
		With mitigation					
		S	L	S	L	L	
During the construction phase of the initial boxcut, as activities are taking place adjacent to wetlands/streams, there is a possibility that water quantity and quality can be impaired	Sensitive Landscape	Without Mitigation					All construction staff will be educated on the sensitivity of wetland areas and will be made aware of all wetland areas in close proximity to the construction sites.
		M	H	M	M	M	
		With Mitigation					

NATURE OF THE IMPACT	ENVIRONMENTAL ASPECT	IMPACT ASSESSMENT					MITIGATION MEASURES
		E	P	D	I	S	
PRE-CONSTRUCTION AND CONSTRUCTION PHASES							
through contaminated surface runoff entering the wetlands/streams. Typically, impairment will occur because of sediment disturbance resulting in an increase in turbidity. Water quality may also be impaired because of accidental spillages and the intentional washing and rinsing of equipment within the wetlands. Furthermore, a portion of the Depression (Pan) Wetland will be mined. This will therefore impact on the wetland system of the pan.		S	L	M	L	L	Develop and implement a construction stormwater management plan prior to the commencement of site clearing activities. Such a plan should aim to minimise the transport of sediment off site. Berms will be constructed to manage the silt from the construction site. Erosion within the construction site must be minimised through the following: • Limiting the area of disturbance and vegetation clearing to as small an area as possible. • Phasing vegetation clearing activities and limiting the time that any one area of bare soil is exposed to erosion. • Control of stormwater flowing onto and through the site. Where required, stormwater from upslope should be diverted around the construction site. • Prompt stabilisation and re-vegetation of soils after disturbance and construction activities in an area are complete. All disturbed areas outside the direct development footprints will be rehabilitated and re-vegetated as soon as possible. The construction servitudes of the box-cut will be regularly inspected for waste or littering and clean-up operations initiated if required. No loss of wetland habitat will be permitted outside the authorised areas. Landscape and re-vegetate all unnecessarily denuded areas as soon as possible.
Visual impacts on the surrounding properties, communities and road users from the construction site may result. These impacts may result from excessive clearing and stripping of topsoil for preparing the area for the development, relatively dust from construction activities and un-rehabilitated landscape scarring.	Visual Aspects	Without Mitigation					A perimeter berm will be constructed around the box-cut to shield the cuts away from the affected structures. Where possible areas disturbed by construction activity, will be suitably topsoiled and vegetated as soon as is possible. Limit areas of disturbance to areas where the box-cut will be constructed or placed. Dust suppression will be undertaken at all areas that will be affected by construction activities and where dust will be generated. Avoid upwards lighting of structures but rather direct the light downwards to focus on the object to be illuminated. As night lighting during construction is one of the more objectionable forms of visual impact, it is important that selective and sensitive location and design of the lighting requirements for the construction camp and the mine are developed.
		M	H	M	M	M	
		With Mitigation					
		S	L	M	L	L	
Animal burrows and habitats remaining within the proposed area will be destroyed during construction. This may result in the migration of remaining animal life away from the affected areas.	Animal Life	Without Mitigation					The rehabilitation of the disturbed areas will be conducted such that the rehabilitated areas will encourage the migration of animals back into the rehabilitated areas.
		M	H	S	H	H	
		With Mitigation					
		S	L	S	L	L	

NATURE OF THE IMPACT	ENVIRONMENTAL ASPECT	IMPACT ASSESSMENT					MITIGATION MEASURES
		E	P	D	I	S	
PRE-CONSTRUCTION AND CONSTRUCTION PHASES							
Activity 24 of Listing Notice 1: Construction of the haul roads. **Activity 6, 15 and 17 of Listing Notice 2: The development of the haul roads will result in the clearance of indigenous vegetation and will require a need for a WUL.**							
The construction phase for the roads will lead to erosion of soil resources due to altered surface dynamics, the presence of hardened surfaces and general degradation of soil resources, which could result in the loss of land capability.	Soils, land capability and land use	Without Mitigation					The entire area will be monitored regularly for erosion as part of the road maintenance procedure. In cases where erosion does occur, action plans should be implemented to apply mitigation. The construction of the roads will be undertaken within the approved footprint area. Excess soils will be stockpiled at the topsoil stockpiling area, which will not be more than five meters high.
		S	M	S	M	M	
		With Mitigation					
		S	L	S	L	L	
The construction of the roads will result in the change of the current land surface, which will result in the change in the local drainage patterns	Topography	Without Mitigation					The construction activities will be undertaken within the approved footprint areas.
		M	H	M	M	M	
		With Mitigation					
		S	L	M	L	L	
Areas that have been stripped of vegetation will be prone to erosion. This could lead to increased siltation being deposited into the local streams. During the construction of the roads, surface water runoff from such areas will be contaminated with suspended solids, which can add to the turbidity in the nearby streams. This may have detrimental impact on the livelihood of the affected streams. If the construction vehicles are poorly maintained oil spills could cause pollution if washed off roads by stormwater.	Surface Water	Without Mitigation					Minimise the extent of hardened surfaces. All construction vehicles will be well maintained and inspected for hydrocarbon leaks according to the maintenance schedule. Construction of the roads will be limited to designated boundaries. Areas that are stripped will be optimised to limit unnecessary stripping. Storm water from upslope of the stripped areas will be diverted around these areas to limit the amount of storm water flowing over from these areas.
		S	H	S	H	H	
		With Mitigation					
		S	M	S	M	L	
Disturbance brought about by construction activities of the roads, specifically the clearing of vegetation will provide opportunity for alien and pioneer species to establish and replace indigenous grassland/wetland species. During the construction phase, as activities are taking place adjacent to wetlands, there is a possibility that water quality can be impaired through contaminated surface runoff entering the wetlands.	Sensitive Landscape	Without Mitigation					All construction staff will be educated on the sensitivity of wetland areas and should be made aware of all wetland areas in close proximity to the construction sites. Erosion within the construction site will be minimised through the following: Limiting the area of disturbance and vegetation clearing to as small an area as possible. Phasing vegetation clearing activities and limiting the time that any one area of bare soil is exposed to erosion. Control of stormwater flowing onto and through the site. Where required, stormwater from upslope will be diverted around the construction site. Prompt stabilisation and re-vegetation of soils after disturbance and construction activities in an area are complete. All disturbed areas outside the direct development footprints will be rehabilitated and re-vegetated as soon as possible. The construction servitudes of the roads will be regularly inspected for waste or littering and clean-up operations initiated if required.
		S	H	S	H	H	
		With Mitigation					
		S	M	S	L	L	

NATURE OF THE IMPACT	ENVIRONMENTAL ASPECT	IMPACT ASSESSMENT					MITIGATION MEASURES
		E	P	D	I	S	
PRE-CONSTRUCTION AND CONSTRUCTION PHASES							
							No loss of wetland habitat will be permitted outside the authorised areas. Landscape and re-vegetate all unnecessarily denuded areas as soon as possible.
Noise generated from construction activities may add to the current noise levels. This may have impacts on surrounding property owners and occupiers.	Noise	Without Mitigation					Construction crew will conduct toolbox talks to educate their employees and ensure that they are aware of the legislation regarding noise. The mine vehicles used during the construction must be well maintained and measures should be implemented by the mine to ensure that the noise generated from the mine machinery is lowered.
		S	M	S	L	L	
		With Mitigation					
		S	L	S	L	L	
Visual impacts on the surrounding communities and road users from the construction site may result.	Aesthetics	Without mitigation					Where possible, areas disturbed by construction activities, will be suitably topsoiled and vegetated as soon as is possible. The progressive rehabilitation measures will allow for the maximum growth period before the completion of the project. Limit areas of disturbance to areas where the roads will be constructed. Dust suppression will be undertaken at all areas that will be affected by construction activities and where dust will be generated. Avoid upwards lighting of structures but rather direct the light downwards to focus on the object to be illuminated. As night lighting during construction is one of the more objectionable forms of visual impact, it is important that selective and sensitive location and design of the lighting requirements for the construction camp and the mine are developed. Not allowing external light fittings to shine upwards, all security and road lighting shall have “blinkers” or be specifically designed to ensure light is directed downwards to reduce light spill beyond the property boundary.
		S	M	S	L	L	
		With mitigation					
		S	L	M	L	L	
<u>Activity 6, 15 and 17 of Listing Notice 2:</u> Construction of the Topsoil Stockpile and the Dirty Water Pipeline. **<u>Activity 9 and 10 of Listing Notice 1:</u> Construction of the Dirty Water Pipeline.**							
The construction of the above-mentioned infrastructures (topsoil stockpile and dirty water pipeline) will result in the change of the current land surface, which will result in the change in the local drainage patterns.	Topography	Without Mitigation					The construction activities of the above-mentioned infrastructure will be undertaken within the approved footprint areas.
		S	H	M	M	M	
		With Mitigation					
		S	L	S	L	L	
The construction phase for the above-mentioned infrastructure (topsoil stockpile and dirty water pipeline) will lead to compaction and erosion of soil resources due to altered surface dynamics, the presence of hardened surfaces and general degradation of soil resources, which could result in the loss of land capability.	Soils, land capability and land use	Without Mitigation					The entire area will be monitored regularly for erosion as part of the road maintenance procedure. In cases where erosion does occur, action plans should be implemented to apply mitigation. The construction activities will be conducted within the approved footprint area. Excess soils will be stockpiled at the topsoil stockpiling area, which will not be more than five meters high. The stockpiled topsoil will be seeded with a recommended seed mix to ensure that a good vegetation cover is achieved, should the natural
		S		S	M	M	
		With Mitigation					
		S		S	L	L	

NATURE OF THE IMPACT	ENVIRONMENTAL ASPECT	IMPACT ASSESSMENT					MITIGATION MEASURES
		E	P	D	I	S	
PRE-CONSTRUCTION AND CONSTRUCTION PHASES							
							seedbank not provide sufficient cover. No mixing of the topsoil material with subsoil, softs and hard overburden material will be allowed.
During the construction of the surface infrastructure (topsoil stockpile and dirty water pipeline), topsoil will be stripped. These activities may result in bare areas, which will result in the erosion of soils during rainfall events, with elevated suspended solids reporting in the runoff water, which may ultimately enter the nearby watercourses.	Surface Water Quality	Without Mitigation					Minimise the extent of hardened surfaces, to retain surface runoff in stilling ponds or retention facilities and to release these in a controlled manner including energy dissipation to avoid erosion to the receiving wetland areas. Install/construct the construction stormwater management system prior to the onset of vegetation clearing activities on the surface infrastructure footprints. No activities will be allowed outside of the authorised areas. Ensure that no equipment is washed in the streams and washing will be undertaken at the mine's workshop area. All construction vehicles will be well maintained and inspected regularly for hydrocarbon leaks. Construction of the infrastructures will be limited to designated boundaries. In order to reduce the potential impacts associated with the introduction of contaminants dissolved or suspended in the runoff from construction sites, where practically possible, no runoff will be introduced into wetlands. All construction must be undertaken in line with the approved. Areas that are stripped will be optimised to limit unnecessary stripping. Storm water from upslope of the stripped areas will be diverted around these areas to limit the amount of storm water flowing over from these areas. Where practically possible, the major earthworks will be undertaken during the dry season (roughly from April to August) to limit erosion due to rainfall runoff. Cleared areas outside direct development footprint will be re-vegetated and seeded (where necessary) as soon as possible following disturbance. Regular monitoring and inspections at rehabilitated sites will be undertaken to ensure successful rehabilitation.
		S	H	S	M	M	
		With Mitigation					
		S	M	S	L	L	
Noise generated from construction activities may add to the current noise levels. This may have impacts on surrounding property owners and occupiers.	Noise	Without Mitigation					Construction crew will conduct toolbox talks to educate their employees and ensure that they are aware of the legislation regarding noise. The mine vehicles used during the construction must be well maintained and measures should be implemented by the mine to ensure that the noise generated from the mine machinery is lowered.
		S	M	S	M	M	
		With Mitigation					
		S	L	S	L	L	
During the construction of the above-mentioned surface infrastructure, hydrocarbon fluids (diesel, petrol and oils) and other chemicals may spill onto the ground resulting in the potential pollution of surface and groundwater environments.	Groundwater Quality	Without Mitigation					Used oil will be removed immediately after vehicle servicing. All material with potential to pollute will be stored in the existing secure facilities. Mine machinery will be repaired at designated areas fit for purpose. No maintenance outside the dedicated areas will be allowed unless it is an
		S	M	L	M	M	
		With Mitigation					
		S	L	S	L	L	

NATURE OF THE IMPACT	ENVIRONMENTAL ASPECT	IMPACT ASSESSMENT					MITIGATION MEASURES
		E	P	D	I	S	
PRE-CONSTRUCTION AND CONSTRUCTION PHASES							
							emergency repairs which must be on a protected ground or by use of drip trays. All hydrocarbon liquids will be stored in the existing leak and corrosion resistant containers. These containers will be placed in bunded areas. The containers used for the storage of hydrocarbon liquids will be maintained in good condition. All spillages will be contained and the affected areas remedied. Training for the waste storage facilities will be conducted for employees working with waste (hydrocarbon liquid), including contractors' employees. Credible waste collectors will be used for the removal of waste from the site to a registered waste disposal facility.
Construction activities will involve the clearing of large areas of soil, as well as the movement of soil. This will expose large areas and large volumes of soil to erosion by wind and water, which will likely be aggravated by an increase in surface runoff from bare soil areas and concentration of flows. Sediment could be transported downslope via surface runoff to the adjacent wetland areas, leading to increased turbidity with resultant impacts on aquatic habitats, including loss of sensitive species, as well as increased sediment deposition in wetlands, leading to habitat degradation as these areas become colonised by alien and pioneer species. Severe sedimentation could also impact of flow distribution within the wetlands.	Sensitive Landscape	Without Mitigation					Implement storm water management plan. Reduce the extent of bare surfaces wherever possible by rehabilitating and revegetating them. Design of surface infrastructure areas will be optimised to minimise the size of the development footprint and to avoid encroachment into wetland habitat. Emergency servicing of construction vehicles will take place only in dedicated areas. All construction staff will be educated on the sensitivity of wetland areas and will be made aware of all wetland areas in close proximity to the construction sites Develop and implement a construction stormwater management plan prior to the commencement of site clearing activities. Such a plan will aim to minimise the transport of sediment off site. Erosion within the construction site must be minimised through the following: • Limiting the area of disturbance and vegetation clearing to as small an area as possible; • Phasing vegetation clearing activities and limiting the time that any one area of bare soil is exposed to erosion; • Control of stormwater flowing onto and through the site. Where required, stormwater from upslope will be diverted around the construction site; • Prompt stabilisation and re-vegetation of soils after disturbance and construction activities in an area are complete. All disturbed areas outside the direct development footprints will be rehabilitated and re-vegetated as soon as possible. The construction servitudes will be regularly inspected for waste or littering and clean-up operations initiated if required.
		M	H	M	M	M	
		With Mitigation					
		S	L	M	L	L	

NATURE OF THE IMPACT	ENVIRONMENTAL ASPECT	IMPACT ASSESSMENT					MITIGATION MEASURES
		E	P	D	I	S	
PRE-CONSTRUCTION AND CONSTRUCTION PHASES							
							No loss of wetland habitat will be permitted outside of the authorised areas.
Combined Results of the Impact Assessment and Mitigation Measures: **Activity, 12, 19 of Listing Notice 1, Activity 6, 15 and 17 of Listing Notice 2 and Activity 12 and 14 of Listing Notice 3: The excavation, removal and moving of soil and rock within a watercourse or within 32m thereof. These includes: opencast pits (within watercourse and within 32 meters from a watercourse), topsoil stockpiles (within 32 meters), dirty water pipeline (within 32 meters).** **Activity 9 and 19 of Listing Notice 1: Construction of a Dirty Water Pipeline.** **Activity 24 of Listing Notice 1: Development/construction of a Haul Road.** **Activity 34 of Listing Notice 1 and Activity 15 of Listing Notice 2: The extension of the opencast mine workings will result in the need for a water use licence in accordance with section 21 (c) and 21(i) of the National Water Act, 1998 (Act No. 36 of 1998) (NWA) and will results in a need for clearance of vegetation.**							
The development of proposed Project will may result in the disturbance of heritage sites. Two sites of heritage importance have been identified within the proposed opencast pit area.	Sites of archaeological and cultural importance.	Without Mitigation					Fence all graveyards in and have a grave management plan drafted for the sustainable preservation thereof if the mine decides to not disturb the graves. The grave management plan will be written by a heritage expert. This usually is done when the graves are in no danger of being damaged, but where there will be a secondary impact due to the activities of the mine. Upon finding any archaeological or historical material, all work at the affected area must cease. The area will be demarcated in order to prevent any further work there until an investigation has been completed. An archaeologist will be contacted immediately to provide advice on the matter. Should it be a minor issue, the archaeologist will decide on future action, which could include adapting the HIA or not. Depending on the nature of the find, it may include a site visit. If needed, the necessary permit will be applied for with SAHRA. This will be done in conjunction with the appointed archaeologist. The removal of such archaeological material will be done by the archaeologist in lieu of the approval given by SAHRA, including any conditions stipulated by the latter. Work on site will only continue after removal of the archaeological/ historical material was done. Access will be provided to the families of the grave sites identified within the project area. Regulated visitor hours will be implemented that is compatible with mine safety rules. The families of the grave sites identified within the project area currently have access to these areas. Should alternatives to access the cultural heritage sites be identified during commencement of the project, the families will be notified. Should it be a need to relocate the graves, exhume the mortal remains and to have it relocated. This usually is relevant when the graves will be directly affected (damaged or destroyed) by the development. In this case
		M	H	M	M	M	
		With Mitigation					
		S	L	M	L	L	

NATURE OF THE IMPACT	ENVIRONMENTAL ASPECT	IMPACT ASSESSMENT					MITIGATION MEASURES
		E	P	D	I	S	
PRE-CONSTRUCTION AND CONSTRUCTION PHASES							
							specific procedures must be followed which includes social consultation. Graves younger than 60 years may be exhumed only by an undertaker. For those older than 60 years, and unknown graves, an undertaker and archaeologist should be appointed. Permits must be obtained from the Burial Grounds and Graves unit of SAHRA. This procedure is quite lengthy and involves social consultation.
Movement of mine vehicles over exposed areas will result in the generation of dust. Generated dust will migrate towards the predominant wind direction and may settle on surrounding farm houses.	Air Quality	Without Mitigation					Baseline monitoring at these sites will commence at least one year prior to the onset of the construction phase. Conduct dust suppression on a regular basis. Monitor the dust fall out concentration and ensure that significant source of pollution is managed, annually. Ambient monitoring will be used in combination with modelling and emission inventory to assess. the effectiveness of control measures at source and receivers, on an annual basis. Traffic will be restricted to demarcated areas and traffic volumes and speeds within the project area construction site will be controlled. The farmers and community meetings conducted by the mine will be used for environmental reporting and community liaison on matters relating to the impacts on air quality. Limit the area of operation to what is necessary. Rehabilitation of disturbed areas will be performed as soon as practicable.
		M	H	M	M	M	
		With Mitigation					
		S	L	M	L	L	
Influx of job seekers.	Socio-economic aspects.	Without Mitigation					Ensure good communication between the operation and surface owners and farmers whose properties might be directly affected by the population influx. Black Wattle Colliery will ensure that the creation of unrealistic expectations is prevented by communicating the period of the construction phase to the local communities and the communities will be informed that few new positions will be created. Local councillors will be involved in the above communication.
		S	H	S	M	M	
		With Mitigation					
		S	M	S	S	L	
Removal of natural vegetation due to the stripping of topsoil and disturbance of faunal habitat.	Biodiversity	Without Mitigation					Construction will be conducted during the winter months, where possible in order to curb surface water containing silt, reporting to the grassland/wetland areas and to avoid disturbance of animal species breeding in the grassland/wetland areas. Clearance of vegetation will be kept to the absolute minimum. No machinery will be serviced within the wetland areas. Chemical toilets must be provided on site and no employees may relieve themselves in the veld (wetland or terrestrial). Domestic waste will be collected on site and must not end up in the veldt (wetland or terrestrial). Dust suppression will be conducted regularly in order to have the least amount of dust settling on grassland/wetland vegetation.
		M	H	M	H	M	
		With mitigation					
		M	L	M	L	L	

NATURE OF THE IMPACT	ENVIRONMENTAL ASPECT	IMPACT ASSESSMENT					MITIGATION MEASURES
		E	P	D	I	S	
PRE-CONSTRUCTION AND CONSTRUCTION PHASES							
							Machinery will be kept in good working order to curb hydrocarbon leaks and spills that may contaminate the groundwater. Emergency maintenance will be conducted on protected ground. No snares may be set, no poaching of animals or plants may occur. The area will be fenced so that personnel working in this area cannot wander into the grassland/wetland areas and cause any disturbance.
Traffic impacts may result from the movement of vehicles around and within the project area	Traffic Aspects	Without Mitigation					A Speed limit of 60km/h will be enforced, and the proposed speed limit signs are to be erected. Traffic will be restricted to demarcated areas and traffic volumes and speeds within the construction site will be controlled.
		S	H	S	M	M	
		With mitigation					
		S	M	S	S	L	

6.17.1.2 Operational Phase

Table 14: Results of the EIA (Operational phase)

NATURE OF THE IMPACT	ENVIRONMENTAL ASPECT	IMPACT ASSESSMENT					MITIGATION MEASURES
		E	P	D	I	S	
OPERATIONAL PHASE							
Activity 34 of Listing Notice 1: Mining activities using opencast mining method. **Activity 6 of Listing Notice 2 and Activity 12 and 14 of Listing Notice 3: The opencast mining requires a need for a WUL.**							
Removal of coal by mining and will result in the disturbance of the geological layers overlying the target coal seams.	Geology	Without Mitigation					Use removed overburden to replace the overburden material in the mined out opencast pits during rehabilitation/concurrent rehabilitation of the opencast pit.
		M	H	P	M	M	
		With Mitigation					
		M	M	P	L	L	
Reduction in the catchment yield due to the mining activities.	Surface Water Quantity	Without Mitigation					Mining will be undertaken as per mining design specifications. Rainfall water entering the opencast pits during flood events will be removed with the use of pumps and pipelines with sufficient pumping capacity. The water will be pumped into the existing lined pollution control dam, which must be proven to have enough capacity to handle the additional water. The mine will develop an emergency procedure for evacuating employees in case the volumes of water captured in the pit are beyond the capacity of the pumping systems
		M	H	M	H	M	
		With Mitigation					
		M	M	M	L	L	
Deterioration of water quality.	Surface Water Quality	Without Mitigation					Contaminated shallow seepage and storm water run-off must be collected and routed to an existing lined pollution control dam via dirty water pipeline. The pollution control dam must be sized in accordance with Government Notice 704 of the South African National Water Act. The existing pollution control dam water levels and dirty water pipeline condition must be constantly monitored. Steps and procedures must be put in place to detect, manage and monitor situations where excess water builds up in the pollution control dam and pipe burst, leakage and spillages. Water reuse from the pollution control dam must be maximised.
		M	H	M	H	M	
		With Mitigation					
		M	M	M	L	L	
Damage of wetlands (portion of the opencast pits) in in the vicinity of the proposed project which will results in a change in hydrology, change in water quality and loss of wetlands and the biodiversity supported by these wetlands.	Sensitive Landscape	Without Mitigation					The expansion area should be designed such that contaminated dirty runoff water from the project area do not reports to the identified wetlands. Mining of wetlands will be limited to the approved footprint areas. A groundwater monitoring strategy as per the recommendations of the groundwater specialist report will be implemented to monitor groundwater levels in the surrounding area. Opportunities for the alternative treatment options for mine water post closure will also be investigated to reduce maintenance costs and responsibilities of water treatment post closure. A clear action plan will be developed to respond to water quality problems picked up by regular monitoring. Ensure that no equipment is maintained anywhere near the wetlands. The Department of Water and Sanitation (DWS) must be engaged with and the necessary IWUL must be obtained prior to commencement of any mining activity. Sufficient storm water control measures must be put in place on site to
		M	H	M	H	H	
		With Mitigation					
		M	L	M	L	L	

NATURE OF THE IMPACT	ENVIRONMENTAL ASPECT	IMPACT ASSESSMENT					MITIGATION MEASURES
		E	P	D	I	S	
OPERATIONAL PHASE							
							prevent sedimentation of wetlands and drainage lines.
Exposure of coal debris may lead to pollution of ground water and dewatering may reduce ground water yield to ground water users.	Groundwater	Without Mitigation					Boreholes surrounding the opencast area must be monitored. This will determine the extent of the dewatering cone from the opencast pit and any user affected must be compensated by the mine. Reduce the exposure of the carbonaceous material to free oxygen. This will be achieved by removing as much coal as possible during mining and placing the remaining carbonaceous material at the bottom of the opencast pit and backfill as fast as possible. If it can be proven that the mine is indeed affecting the quantity of groundwater available to certain users, the affected parties will be compensated. Compensation actions will be investigated. The groundwater numerical model will be updated during operational phase of the mine to identify any additional decant. Continuous monitoring of mine water levels (quarterly) within the predicted zone of dewatering. Groundwater inflows mining areas will be minimised by grouting, measured during abstraction (using a flow meter), re-used in the operations, or disposed of in an environmentally acceptable way. Depending on observed water qualities, treatment might be required before disposal. The numerical model and geochemical study will be updated biennially during the life of mine to calibrate and validate its results and to inform effective water management and closure planning. Monitoring of mine effluent and seepage will be performed to assure protection of the environment. Monitoring and field testing provide early detection of potential environmental issues, allowing evaluation and, if necessary, adaptive management interventions.
		M	M	M	M	M	
		With Mitigation					
		M	L	M	L	L	
Generated dust within the mine workings may affect the health of the mine employees.	Air Quality	Without Mitigation					Sufficient dust suppression will be undertaken to reduce the impacts of the generated dust on employees Employees will be provided with dust masks and will be instructed to use the dust masks.
		M	H	M	H	H	
		With Mitigation					
		S	L	M	L	L	
Noise generated from the operation of the mine machinery within the mine workings may have health effects on the mine employees.	Noise	Without Mitigation					Limit the maximum speed on the haul roads to 20 km/h or less, subject to risk assessment. 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 noise. Any deviation detected by the noise monitoring results must be addressed.
		M	H	M	H	H	
		With Mitigation					
		S	L	M	L	L	
<u>Activity 17 of Listing Notice 2:</u> Transportation of coal from the opencast mine workings to the existing ROM stockpile using coal trucks.							
During the operational phase, number of vehicles will be driving around the site, transportation of coal using trucks. This may result in the following impacts: If the vehicles are poorly maintained, hydrocarbon spills could cause pollution if washed off roads by storm water.	Natural Vegetation and Soils	Without Mitigation					All trucks used for the transportation of coal will be covered with tarpaulins during coal transportation. All spilled coal will be cleared immediately. Trucks will be required to obey certain road regulations when transporting coal at the mine. This will include speed limits etc.
		M	M	M	M	M	
		With Mitigation					
		S	L	M	L	L	

NATURE OF THE IMPACT	ENVIRONMENTAL ASPECT	IMPACT ASSESSMENT					MITIGATION MEASURES
		E	P	D	I	S	
OPERATIONAL PHASE							
This may have an impact on the clean water environment and the wetlands and may affect the properties surrounding landowners. These include natural vegetation, animal life, cultivated lands, roads and any other infrastructures. Coal spillages may result, if the loading of coal trucks is not supervised for prevent overloading.							
Impact on surface water and sensitive landscape due to the transportation of coal material.	Surface Water and Sensitive landscape	Without Mitigation					Loading of coal trucks will be supervised to prevent overloading. The road must be designed and operate to minimise the likelihood of spillages. All vehicles will only use designated roads with no indiscriminate driving through wetland or riparian areas. Should large spillages occur, clean-up of the spillages will be undertaken as soon as possible following the event. Dust suppression will be undertaken at the roads to prevent generation of excessive dust.
		M	H	M	H	H	
		With Mitigation					
		S	L	M	L	L	
Increased noise levels due to the transportation of coal.	Noise	Without Mitigation					As much as possible, transportation routes will be used during the day time. If roads/routes are to be used during the night-times will be routed as far as possible away from a receptor. If the receptors cannot be avoided, an agreement will be reached with the affected parties.
		M	M	M	M	M	
		With Mitigation					
		S	L	M	L	L	
Air pollution through air pollutants emissions from the mining site.	Air Quality	Without Mitigation					All trucks used for the transportation of coal will be covered with tarpaulins during coal transportation.
		M	H	M	H	M	
		With Mitigation					
		S	L	M	L	L	
<u>Activity 6 and 17 of Listing Notice 2:</u> Operation of the Dirty Water Pipeline and Topsoil Stockpile. **<u>Activity 9 and 10 of Listing Notice 1:</u> Operation of the Dirty Water Pipeline.**							
Erosion as a result of run-off and compaction. Contamination as a result of spillages from the operational activities.	Soils, Land Use and Land Capability.	Without Mitigation					The footprint of the infrastructure/facilities will be maintained to be within the approved perimeters. Areas with erosion gullies and sedimentation build up will be rehabilitated. Areas with compaction will be ripped and seeded. The stockpiled topsoil will be maintained to have good vegetation cover. Bare areas where no further activities will take place will be identified and re-vegetated with a recommended seed mix. The stockpiled topsoil will be maintained to be within the approved height of five meters.
		M	H	M	H	M	
		With Mitigation					
		S	L	M	L	L	
Dirty water from the pipeline (as a result of burst) will have a detrimental effect on the water quality in the local streams and the pan (depression wetland). Surface Water impacts due to pipeline burst/leakages.	Surface Water	Without Mitigation					The activities will be undertaken to comply with Government Notice 704 of NWA. Storm water from opencast pit will be routed to the mine's existing PCD via a pipeline. The pipeline will join to the existing pipeline that conveyor water to the existing PCD, in accordance with Government Notice 704 of the NWA. The dirty water pipeline will be operated and maintained in accordance with regulations under the Government Notice 704 of the NWA. The pipeline will be maintained regularly. The pipeline will be designed to convey run-off from a 50-year design
		M	H	M	H	M	
		With Mitigation					
		S	L	M	L	L	

NATURE OF THE IMPACT	ENVIRONMENTAL ASPECT	IMPACT ASSESSMENT					MITIGATION MEASURES
		E	P	D	I	S	
OPERATIONAL PHASE							
							storm. The pipeline will be well maintained and inspected for leaks/burst weekly. Surface water monitoring will be conducted to observe any water quality deterioration from the mining activities. Should the surface monitoring indicate water quality contamination, the surface water users will be informed of the outcomes and Black Wattle Colliery to investigate and identify action plans to remediate the impact.
Pollution of the groundwater regime by leakage from the dirty water pipeline.	Groundwater	Without Mitigation					Monitoring of the pipeline is imperative to manage the risk of spillage. Operate and manage the dirty water structures pipeline such that it does not leak, seep or discharge dirty water into the groundwater regime. The pipeline will be constructed to have leak detection system. The areas will be monitored for any spillages and spillages will be cleaned up immediately and the contaminated soil disposed of at the suitable area.
		M	H	M	H	M	
		With Mitigation					
		S	L	M	L	L	
Deterioration of water quality within the affected wetlands and destruction of the wetlands. Decreased flow within wetlands adjacent to the project area.	Sensitive Landscapes	Without Mitigation					Monitor the dirty water pipelines for spillages/leaks and where such spillages/leaks occur, the area will be remedied as soon as possible. All water management infrastructure on site will be inspected at least twice per year, ideally just before the start of the wet season and then again during the middle of the wet season, for any damage or obstructions. Obstructions will be cleared and damage repaired immediately to ensure optimal operation of the infrastructure. Implement the surface water management plan that will ensure effective clean and dirty water separation. Minimise extent of dirty water areas. Implement dust suppression within areas where dust may be generated and areas of heavy vehicle traffic. Implement water quality strategy. Compile an emergency response procedure for clean-up of any major spillages. The topsoil stockpile will be located within a clean water area and no contaminated water will come into contact with the topsoil stockpiles. Side slopes of the topsoil stockpiles will be kept as low as possible and should ideally be vegetated to minimise sediment loss and colonisation by alien/weed vegetation. Should leakage or discharges occur, clean-up and rehabilitation of the affected areas will be undertaken as soon as possible following the event.
		M	H	M	H	M	
		With Mitigation					
		S	L	M	L	L	
Activity 24 of Listing Notice 1 and Activity 6 and 17 of Listing Notice 2: Operation/use of Haul Roads.							
Degradation of topsoil due to the above-mentioned activity.	Soils	Without Mitigation					Implement dust suppression along the haul road.
		S	M	M	M	M	
		With Mitigation					
		L	M	L	L		
The roads have the potential to increase erosion and	Sensitive Landscape	Without mitigation					The road will be designed and operate to minimise the likelihood of

NATURE OF THE IMPACT	ENVIRONMENTAL ASPECT	IMPACT ASSESSMENT					MITIGATION MEASURES
		E	P	D	I	S	
OPERATIONAL PHASE							
sedimentation of wetlands throughout life of mine if storm water is not properly incorporated into the design philosophy of the roads.		M	H	M	H	M	spillages. All vehicles will only use designated roads with no indiscriminate driving through wetland or riparian areas. Should large spillages occur, clean-up of the spillages will be undertaken as soon as possible following the event. Dust suppression will be undertaken at the facility and roads to prevent generation of excessive dust.
		With Mitigation					
		S	M	L	L	L	
Air pollution through air pollutants from the operation of the roads.	Air quality	Without Mitigation					Priority will be given to continuous monitoring of ambient dust deposition rates for the full duration of the project. Enforce speed limits of 60km/h for the mine vehicles and coal trucks.
		M	H	M	H	M	
		With Mitigation					
		S	L	M	L	L	
Noise generated from the operation of the roads may have impacts on surrounding property owners and occupiers.	Noise	Without Mitigation					Ensure routeing has less impacts on sensitive receptors. Limit vehicle speed (60km\h) within the mining right area. Ensuring all equipment in use is maintained and equipped with the exhaust/silencer.
		M	M	M	M	M	
		With mitigation					
		L	L	L	L	L	
Traffic impacts may result from the movement of vehicles/trucks around and within the mining area.	Traffic Impacts	Without Mitigation					Traffic will be restricted to demarcated areas and traffic volumes and speeds within the active site will be controlled.
		H	H	M	M	M	
		With Mitigation					
		S	L	M	L	L	
Visual impacts on the surrounding communities and road users from the operation site may result.	Aesthetics	Without Mitigation					Limit areas of disturbance to areas where the roads will be used Dust suppression will be undertaken at all areas that will be affected by operational activities and where dust will be generated.
		M	M	M	M	M	
		With Mitigation					
		S	L	M	L	L	
		M	H	M	M	M	
		With mitigation					
		L	M	L	L	L	
Combined Results of the Impact Assessment and Mitigation Measures: **Activity, 12, 19 of Listing Notice 1, Activity 6 and 17 of Listing Notice 2 and Activity 12 and 14 of Listing Notice 3: Opencast Mining activities.** **Activity 9 and 10 of Listing Notice 1, Activity 6 and 17 of Listing Notice 2: The operation of the Dirty Water Pipeline.** **Activity 24 of Listing Notice 1 and Activity 6 and 17 of Listing Notice 2: Operation/use of Haul Roads.**							
The development of the proposed project may result in the disturbance of heritage sites.	Sites of archaeological and cultural importance	Without mitigation					Fence all graveyards in and have a grave management plan drafted for the sustainable preservation thereof if the mine decides to not disturb the graves. The grave management plan will be written by a heritage expert. This usually is done when the graves are in no danger of being damaged, but where there will be a secondary impact due to the activities of the mine. Upon finding any archaeological or historical material, all work at the affected area will cease. The area will be demarcated in order to prevent any further work there until an investigation has been completed. An archaeologist will be contacted immediately to provide advice on the matter.
		M	H	M	M	M	
		With mitigation					
		S	M	S	L	L	

NATURE OF THE IMPACT	ENVIRONMENTAL ASPECT	IMPACT ASSESSMENT					MITIGATION MEASURES
		E	P	D	I	S	
OPERATIONAL PHASE							
							Should it be a minor issue, the archaeologist will decide on future action, which could include adapting the HIA or not. Depending on the nature of the find, it may include a site visit. If needed, the necessary permit will be applied for with SAHRA. This will be done in conjunction with the appointed archaeologist. The removal of such archaeological material will be done by the archaeologist in lieu of the approval given by SAHRA, including any conditions stipulated by the latter. Work on site will only continue after removal of the archaeological/ historical material was done. Should it be a need to relocate the graves, exhume the mortal remains and to have it relocated. This usually is relevant when the graves will be directly affected (damaged or destroyed) by the development. In this case specific procedures must be followed which includes social consultation. Graves younger than 60 years may be exhumed only by an undertaker. For those older than 60 years, and unknown graves, an undertaker and archaeologist should be appointed. Permits must be obtained from the Burial Grounds and Graves unit of SAHRA. This procedure is quite lengthy and involves social consultation. Access will be provided to the families of the grave sites identified within the project area. Regulated visitor hours will be implemented that is compatible with mine safety rules. The families of the grave sites identified within the project area currently have access to these areas. Should alternatives to access the cultural heritage sites be identified during commencement of the project, the families will be notified.
Traffic impacts may result from the movement of vehicles/coal trucks around and within the project area.	Traffic Impact	Without Mitigation					A Speed limit of 60km/h will be enforced, and the proposed speed limit signs are to be erected. Traffic will be restricted to demarcated areas and traffic volumes and speeds within the areas will be controlled.
		H	H	M	M	M	
		With Mitigation					
		S	L	M	L	L	
Noise generated from the activities may add to the current noise levels. This may have impacts on surrounding property owners and occupiers.	Noise	Without Mitigation					Toolbox talks will be conducted to educate their employees and ensure that they are aware of the legislation regarding noise. Ensure that the mine employees are issued with earplugs and that they are instructed to use them. Any deviation detected by the noise monitoring results must be addressed.
		S	M	S	H	M	
		With Mitigation					
		S	L	S	L	L	
Visual impacts on the surrounding communities and road users from the operational site.	Aesthetics	Without Mitigation					Where possible areas disturbed by operational activity, will be suitably topsoiled and vegetated as soon as is possible. The progressive rehabilitation measures will allow for the maximum growth period before the completion of the project. Limit areas of disturbance to areas where the operational activities are conducted. Dust suppression will be undertaken at all areas that will be affected by operational activities and where dust will be generated. Avoid upwards lighting of structures but rather direct the light downwards to
		M	M	S	M	M	
		With Mitigation					
		M	M	M	L	L	

NATURE OF THE IMPACT	ENVIRONMENTAL ASPECT	IMPACT ASSESSMENT					MITIGATION MEASURES
		E	P	D	I	S	
OPERATIONAL PHASE							
							focus on the object to be illuminated. The constructed earthworks and landscapes will be maintained to reduce the visual impacts. These will include maintaining the vegetation cover over the topsoil stockpiles. The heights of these facilities will not be increased during the operational phase. Lighting will be conducted in manner that will reduce the impacts on visual aspects. These will include factors such as placing lights in areas and angles that will not shine towards the communities.
Removal of natural vegetation due to the stripping of topsoil and disturbance of faunal habitat.	Biodiversity	Without Mitigation					All activities will be undertaken within the approved footprint area. No machinery will be serviced within the grassland/wetland areas. Domestic waste will be collected on site and must not end up in the veldt (wetland or terrestrial). Dust suppression will be conducted regularly in order to have the least amount of dust settling on grassland/wetland vegetation. Machinery will be kept in good working order to curb hydrocarbon leaks and spills that may contaminate the groundwater. Emergency maintenance will be conducted on protected ground (drip trays/tarpaulins). No snares will be set, no poaching of animals or plants may occur. The area will be fenced so that personnel working in this area cannot wander into the grassland/wetland areas and cause any disturbance.
		S	H	M	M	M	
		With Mitigation					
		S	L	M	L	L	
Movement of mine vehicles over exposed areas will result in the generation of dust. Generated dust will migrate towards the predominant wind direction and may settle on surrounding farm houses.	Air Quality	Without mitigation					Ambient Air Quality monitoring will be undertaken. Conduct dust suppression on haul roads on a regular basis. Monitor the dust fall out concentration and ensure that significant source of pollution is managed. Traffic will be restricted to demarcated areas and traffic volumes and speeds within the site will be controlled. The farmers and community meetings conducted by the mine will be used for environmental reporting and community liaison on matters relating to the impacts on air quality. Reduce unnecessary traffic and minimise travelling distance through good layout and process design. Limit the area of operation to what is necessary. Rehabilitation of disturbed areas should be performed as soon as practicable.
		M	M	S	M	M	
		With mitigation					
		M	L	S	L	L	
Influx of job seekers.	Socio-economic aspects	Without Mitigation					Black Wattle Colliery will ensure that the creation of unrealistic expectations is prevented by communicating the period of the construction phase to the local communities and the communities will be informed that few new positions will be created. Local councillors will be involved in the above communication.
		S	H	S	M	M	
		With Mitigation					
		S	L	S	L	L	

6.17.1.3 Decommissioning and Closure Phases

Table 15: Results of the EIA (Decommissioning and Closure phases)

NATURE OF THE IMPACT	ENVIRONMENTAL ASPECT	IMPACT ASSESSMENT					MITIGATION MEASURES
		E	P	D	I	S	
DECOMMISSIONING AND CLOSURE PHASES							
Removal of infrastructure, backfilling final voids and rehabilitation of disturbed areas.							
Formation of topographical voids and highpoints.	Topography	Without Mitigation					All backfilled areas will be levelled and levelled areas monitored for any settlement depressions, which must be rectified as soon as possible.
		M	M	M	H	H	
		With Mitigation					
		M	L	M	L	L	
Compaction and contamination of soils within the rehabilitation site.	Soils	Without Mitigation					All vehicles and machinery used at the rehabilitation site will be kept in good working order. No repairs of mine vehicles or machinery will be conducted at the rehabilitation site unless it is emergency repairs, which will be conducted on protected ground. Movement of mine vehicles and machinery will be limited to demarcated routes, which will be rehabilitated when no longer in use. All infrastructure will be demolished in accordance to the rehabilitation plan. The backfilled and levelled surface will be covered with stockpiled topsoil. Soil amelioration will be conducted according to soil analyses as recommended by a soil specialist/suitable qualified person, in order to correct the pH and nutritional status before re-vegetation. Implementation of a closure / rehabilitation plan from the onset of the mining operation. The footprint will then be re-vegetated with a grass seed mixture as soon as possible in order to stabilize the soil and prevent soil loss during the rainy season
		M	H	M	M	M	
		With Mitigation					
		S	L	M	L	L	
Pollution of surface water environment.	Surface Water	Without Mitigation					Surface water monitoring will be conducted to observe any water quality deterioration from the mining activities. Should the surface monitoring indicate water quality contamination, the surface water users will be informed of the outcomes and Black Wattle Colliery to investigate and identify action plans to remediate the impact. The infrastructural areas will be rehabilitated to be free draining. Existing roads will be used where possible and new disturbed areas should be minimised. All equipment's, machinery will be well maintained to ensure that hydrocarbon spills are minimised.
		M	M	M	M	M	
		With Mitigation					
		S	L	M	L	L	
Groundwater contamination.	Groundwater	Without Mitigation					If it is found that the streams/river are negatively affected by pollution from the opencast workings, measures to intercept polluted seepage water will be investigated. Should it be determined that groundwater supply to users are
		S	H	M	M	M	
		With Mitigation					

NATURE OF THE IMPACT	ENVIRONMENTAL ASPECT	IMPACT ASSESSMENT					MITIGATION MEASURES
		E	P	D	I	S	
DECOMMISSIONING AND CLOSURE PHASES							
		S	L	M	L	L	affected by the pollution from the workings, the Compensation investigations will be conducted. Implement as many closure measures during the operational phase, while conducting appropriate monitoring programmes to demonstrate actual performance of the various management actions during the life of mine. The pipeline is removed post mine closure and its respective footprint areas rehabilitated (top soiling and seeding).
Deterioration of groundwater quality.		Without Mitigation					A groundwater monitoring strategy as per the recommendations of the groundwater specialist report will be implemented to monitor groundwater levels in the surrounding area. This will include monitoring of the shallow weathered aquifer water levels and water quality. The likelihood of decant, as well as its location and expected quality will be accurately determined at a high level of confidence and measures put in place to ensure that no decant or discharge of contaminated water occurs, unless it meets the applicable resource quality objectives (RQO's). Where the RQO's are exceeded, contaminated water will need to be treated. Where decant cannot be prevented, a water management strategy will therefore be developed and implemented on site that will ensure that water levels within the mined-out areas are actively managed post-mining so that decant is prevented and no contaminated water is discharged into the environment untreated. Opportunities for the alternative treatment options for mine water post closure will also be investigated to reduce maintenance costs and responsibilities of water treatment post closure. Mine design will consider the expected decant point and where possible be optimised to ensure to as far as possible prevent decant as predicted by the groundwater modelling. Where possible and if decant cannot be prevented, mine designs will target to have the decant point located outside any wetland or watercourse habitat, with sufficient space between the expected decant point and adjacent wetlands or watercourses to allow for suitable management interventions, including potentially the passive treatment of decant. A clear action plan will be developed to respond to water quality problems picked up by regular monitoring.
		M	H	M	H	H	
		With Mitigation					
		M	L	M	L	L	
Sediment runoff from the rehabilitation site may be deposited into the wetland area thereby result in the loss of wetland habitat.	Sensitive landscapes	Without Mitigation					The site will be rehabilitated to approximate the current landscape profile and will be re-vegetated with locally occurring indigenous grasses. During the decommissioning and closure phase, the final voids will be closed and all surface infrastructures are to be removed from site. Implement measures to manage stormwater runoff from the rehabilitated site. The alien vegetation management plan compiled by an ecologist during the construction/operational phase of the mine will be kept in place for several
		S	M	M	M	M	
		With Mitigation					
		S	L	M	L	L	

NATURE OF THE IMPACT	ENVIRONMENTAL ASPECT	IMPACT ASSESSMENT					MITIGATION MEASURES
		E	P	D	I	S	
DECOMMISSIONING AND CLOSURE PHASES							
							years following mine closure (minimum of five years). All species of alien invasive vegetation will be controlled and removed from site. No spread of alien vegetation into any wetlands or adjacent properties should be allowed. All disturbed and transformed areas will be landscaped to approximate the natural landscape profile, but should avoid steep slopes and concentrated run-off where possible. Compacted soils will be ripped and scarified. The rehabilitated areas will be re-vegetated as soon as possible following completion of the earthworks to minimise erosion. Regular long-term follow up of rehabilitated areas will be required to ensure the successful establishment of vegetation and to survey for any erosion damage on site. Erosion damage will be repaired immediately. Sediment traps will be placed in rehabilitated areas to avoid sedimentation.
Noise will be generated during the hauling and loading of material by trucks on site. This noise may exceed operational noise levels but will be short lived.	Noise	Without Mitigation					Provide employees with ear plugs and instructed them to use the ear plugs; Where possible berms as a barrier must be constructed between the source of noise and the receptors. The dimensions of the barrier must be as recommended by the noise specialist. See noise report for the recommendations.
		S	H	M	M	M	
		With Mitigation					
		S	L	M	L	L	
As this phase will involve additional traffic such as trucks removing materials, significant dust may be generated on the areas being worked.	Air Quality	Without Mitigation					Wet suppression using water carts will be conducted at areas with excessive dust emissions, which include unpaved roads. Chemical surfactants will be considered should water suppression not yield satisfactory results. The existing and new paved roads needed during decommissioning will be maintained, which will reduce the extent of areas that can generate dust. These roads will be rehabilitated after their use. The traffic volumes and speed within the site will be controlled. This will be in accordance to the safety rules of the mine. The farmers and community meetings conducted by the mine will be used for environmental reporting and community liaison on matters relating to the impacts on air quality.
		S	M	M	M	M	
		With Mitigation					
		S	L	M	L	L	
Visual impacts from the rehabilitation works.	Visual aspects	Without mitigation					All infrastructures will be removed during this phase in accordance to the rehabilitation plan. Limit areas of disturbance to areas where the rehabilitation activities will be undertaken. Dust suppression will be undertaken at all areas that will be affected by rehabilitation activities and where dust will be generated.
		M	M	M	M	M	
		With mitigation					
		L	L	L	L	L	
		L	M	P	M	M	
		With mitigation					
		L	M	M	L	L	
Damage or destruction of sites with archaeological and cultural significance.	Sites with archaeological and cultural significance.	Without mitigation					The rehabilitation activities will be undertaken such that it is away from the identified grave site.
		S	H	S	M	M	

NATURE OF THE IMPACT	ENVIRONMENTAL ASPECT	IMPACT ASSESSMENT					MITIGATION MEASURES
		E	P	D	I	S	
DECOMMISSIONING AND CLOSURE PHASES							
		With mitigation					The fence around the graves within the mining area will be maintained in good order and access to the grave yards will be made available to the family of the deceased.
		S	L	S	L	L	
Impacts on employment.	Socio-economic aspects	Without mitigation					Redeploy employees and contractors wherever possible. Implement non-mining related skills development programmes for employees and family members through the SLP throughout the life of mine to enable retrenched employees to seek alternative employment or start income-generating businesses.
		L	M	P	M	M	
		With mitigation					
		L	M	M	L	L	

6.17.1.4 After Closure Phase

NATURE OF THE IMPACT	ENVIRONMENTAL ASPECT	IMPACT ASSESSMENT					MITIGATION MEASURES
		E	P	D	I	S	
CLOSURE AND AFTER CLOSURE PHASES							
The groundwater study has indicated that decant might occur from the opencast workings in form of diffuse seepage. The decant water will contaminate the nearby streams and wetlands. The water quality is likely to remain poor in the long term (>20 years).	Surface Water and Groundwater	Without Mitigation					Black Wattle Colliery have specific decant management standards, outlined in their "long term commitment" plan. These standards and procedures will be employed to mitigate the effects of future decant. The intention of the mitigation will be to either stop the decant, improve the decant water quality to discharge standards agreed to by the appropriate catchment management agency or the Department of Water and Sanitation, or reduce decant to acceptable volumes agreed to by the appropriate catchment management agency or the Department of Water and Sanitation. Methods to improve the decant water quality could include flooding of the mining areas, where practical, to reduce oxygen ingress. Routing seepage through lime pits can also improve the water quality if the flows are low enough.
		L	H	P	H	H	
		With Mitigation					
		S	M	P	L	L	

Table 16: Cumulative Environmental Impact Assessment

GENERAL DESCRIPTION OF REGIONAL CONDITIONS AND EXISTING CUMULATIVE IMPACTS	CONTRIBUTION OF BLACK WATTLE COLLIERY TO CUMULATIVE IMPACTS	ENVIRONMENTAL ASPECT	IMPACT ASSESSMENT					MITIGATION MEASURES	TIMEFRAME OF CONTRIBUTION
			E	P	D	I	S		
CUMULATIVE ENVIRONMENTAL IMPACT									
The coalfield within the opencast workings is in Mpumalanga Province, which has good quality and high calorific value coal. The geological strata in the region will be	The contribution of the mine to this cumulative impact is the mining of coal which covers an area of approximately 95.50 ha.	Geological Aspects	Without Mitigation					The mine will ensure that the mined-out areas are rehabilitated in accordance with the approved rehabilitation plan.	All phases
			M	H	M	N	M		
			With Mitigation						

GENERAL DESCRIPTION OF REGIONAL CONDITIONS AND EXISTING CUMULATIVE IMPACTS	CONTRIBUTION OF BLACK WATTLE COLLIERY TO CUMULATIVE IMPACTS	ENVIRONMENTAL ASPECT	IMPACT ASSESSMENT					MITIGATION MEASURES	TIMEFRAME OF CONTRIBUTION
			E	P	D	I	S		
CUMULATIVE ENVIRONMENTAL IMPACT									
permanently altered.			S	L	M	L	L		
Several mining operations are being undertaken near the proposed mining projects. The presence of these mining operations will have an added impact on the regional topography of the area such that the sense of place will be affected. Drainage of the area may also be affected by the presence of other mining operations within and around the proposed mining area.	As large excavations are backfilled, there is a potential for the creation of dangerous excavations and steep embankments which will need to be backfilled and landscaped. Visual impacts from the proposed project would result from the removal of vegetation and the underlying geological layers to expose carbonaceous material and coal (boxcut), stockpiling of soil and spoils, which will result in topographical changes and changes in the general sense of place associated with the pre-mining landscape. In addition, much of the surface infrastructure at proposed project would have resulted in topographical elevations within the surface land use area, thereby altering the visual 'sense of place' associated with the pre-mining agricultural land use.	Topography and Visual Aspects	Without Mitigation					Management of impacts on topography will ensure that the contribution of the mine to cumulative visual impacts will be minimised as far as practicable.	All phases
			M	M	M	H	H		
			With Mitigation						
			M	L	M	L	L		
Agriculture is one of the largest economic sectors in Mpumalanga, placement of surface infrastructures in Mpumalanga, particularly large operations, have led to a significant loss of high agricultural potential soils that would otherwise continue to be capable of supporting crop cultivation. Loss of high potential agricultural land due to mining activities in the area will reduce the food production capability of the region.	The mining activities will lead to compaction and erosion of soil resources which could result in the loss of land capability. Moreover, the mining activities may lead to loss of soil structure and function, and ultimately to loss of biodiversity due to the transformation and fragmentation of natural habitats and ecosystems.	Soils	Without Mitigation					After the completion of the project, the area is to be cleared of all infrastructure and foundations, hence the altered environment will be returned to pre-mining state. The topsoil will be replaced during rehabilitation. Soils will be analysed and fertilisers will be added where applicable to improve the soil properties for use after closure.	Operational phase
			M	H	M	M	M		
			With Mitigation						
			S	L	M	L	L		

GENERAL DESCRIPTION OF REGIONAL CONDITIONS AND EXISTING CUMULATIVE IMPACTS	CONTRIBUTION OF BLACK WATTLE COLLIERY TO CUMULATIVE IMPACTS	ENVIRONMENTAL ASPECT	IMPACT ASSESSMENT					MITIGATION MEASURES	TIMEFRAME OF CONTRIBUTION
			E	P	D	I	S		
CUMULATIVE ENVIRONMENTAL IMPACT									
Invading alien plants are the single biggest threat to plant and animal biodiversity through the effects of predation, alteration of habitat or disruption of ecosystem process and services. Numerous species in Mpumalanga face the risk of extinction due to factors such as habitat loss, environmental degradation and fragmentation of landscapes (Mpumalanga SoE, 2003).	Alien and invasive species tend to establish in disturbed surface areas, which will be abundant during rehabilitation of the surface infrastructure. Unless appropriately managed, it is likely that alien and invasive species will encroach into natural vegetation areas, and especially into areas that are newly disturbed or rehabilitated. Several plant species that are protected by the Mpumalanga Nature Conservation Act 10 of 1998 were identified in the mining right area; however, no threatened species were identified.	Biodiversity - Alien Species and Threatened Species	Without Mitigation					All declared alien weeds will be effectively controlled during the life of mine.	Operational, decommissioning and closure phase.
			M	H	M	M	M		
			With Mitigation						
			S	L	M	L	L		
Groundwater contributes 6% of available water in Mpumalanga (Mpumalanga SoE, 2003). Groundwater is used for irrigation and domestic consumption in the surrounding agricultural region. Groundwater levels are drawn down at all operational mines in the region, leading to an overall impact on groundwater levels but has also led to a complicated flow of groundwater between mines.	The extent and quality of pollution plumes emanating from mining areas will affect the overall groundwater quality in the area. This could impact on the water users in the area. Development of draw down cones during the operational phase of the proposed operation together with other mines that are in their operational phase will occur due to the dewatering of these mining operations. This will affect the regional groundwater level. However, once dewatering ceased, groundwater levels are expected to recover.	Groundwater Aspects	Without Mitigation					Implementation of operational and decommissioning Phase mitigation measures to minimise and reduce impacts on groundwater quality will significantly reduce the overall contribution of Black Wattle Colliery to regional groundwater contamination.	Operational, decommissioning and closure phase.
			M	M	M	M	M		
			With Mitigation						
			S	L	M	L	L		
Water quality indicators have shown a general decrease in water quality over time.	If contaminated surface water (including decanting acid mine water) is discharged, or	Surface Water Aspects	Without Mitigation					Implementation of operational and decommissioning phase mitigation measures to minimise and reduce impacts on water	Operational, decommissioning and closure phase.
			S	H	M	M	M		
			With Mitigation						

GENERAL DESCRIPTION OF REGIONAL CONDITIONS AND EXISTING CUMULATIVE IMPACTS	CONTRIBUTION OF BLACK WATTLE COLLIERY TO CUMULATIVE IMPACTS	ENVIRONMENTAL ASPECT	IMPACT ASSESSMENT					MITIGATION MEASURES	TIMEFRAME OF CONTRIBUTION
			E	P	D	I	S		
CUMULATIVE ENVIRONMENTAL IMPACT									
	allowed to flow, to the receiving environment, the water quality in the receiving environment, which is already affected by other mining, industrial and agricultural activities would further deteriorate. Downstream users and aquatic habitats would be negatively affected by such discharge, and the wetlands in downstream receiving areas would also be negatively impacted.		S	L	M	L	L	quality, including decant management and treatment, will significantly reduce the overall contribution of Black Wattle Colliery to the negative water quality issues within the affected water catchments.	
Noise from the area emanates from the surrounding mining activities through movement of vehicles and use of equipment. Moreover, the area is surrounded by agricultural activities and provincial roads, which contributes towards the noise impact on the area.	Noise will be generated during the movement of trucks and loading of coal material by trucks on site. This noise may exceed operational noise levels but will be short lived. Machine operators utilising machinery will be exposed to noise levels in excess of 85dBA. The operation of the machinery and surface infrastructure such as ventilation facilities will generate noise levels that may have an impact on the surrounding communities.	Noise Aspects	Without Mitigation					Provide employees with ear plugs and instruct them on how to use them. Implement noise monitoring programme.	All phases
			S	H	M	M	M		
			With Mitigation						
			S	L	M	L	L		
Air quality is an issue of concern in Mpumalanga, as it is in many other parts of South Africa. A wide variety of air pollution exist in Mpumalanga, ranging from veld fires to industrial processes, agriculture, mining activities, power generation, paper and pulp processing, vehicle use and domestic use of fossil fuels (Mpumalanga Province, 2002).	Dust will be generated by wind blowing over exposed soils, movement of vehicles and machinery on bare ground and blasting during excavation of the box cut. The generated particulates will migrate mostly towards the predominant wind direction. This may eventually land one surrounding properties (vegetation, farming and residential areas). This may have impacts on vegetation including	Air Quality Aspects	Without Mitigation					Water captured in the PCD will be used to suppress generated dust. Use of dusticides to ensure dust generation is minimised. Ensure that mine machinery are maintained in good working order; and monitor dust within and around the affected areas.	All phases
			S	M	M	M	M		
			With Mitigation						
			S	L	M	L	L		

GENERAL DESCRIPTION OF REGIONAL CONDITIONS AND EXISTING CUMULATIVE IMPACTS	CONTRIBUTION OF BLACK WATTLE COLLIERY TO CUMULATIVE IMPACTS	ENVIRONMENTAL ASPECT	IMPACT ASSESSMENT					MITIGATION MEASURES	TIMEFRAME OF CONTRIBUTION
			E	P	D	I	S		
CUMULATIVE ENVIRONMENTAL IMPACT									
	the cultivated crops; residents of the informal settlements, mine villages and farmsteads and nearby road users. This impact would most likely be limited to the local area and will exists for the duration of the proposed project. Based on the possible health effects and nuisance the dust can have on the surrounding residences the impacts may have high significance Emission of carbon dioxide in exhaust fumes and smoke is generally of little consequence in isolation, but contributes to the regional air quality problems in Mpumalanga, and also to the larger, global issue of climate change.								
The use of provincial roads by heavy duty vehicles for the haulage of coal from the mines in the region leads to the deterioration of the public roads and increased safety hazards for all road users. I&APs are generally affected indirectly by direct impacts of mining and related activities on environmental aspects. The location of I&APs in relation to the mining and related activities strongly influences the severity of the impacts.	Black Wattle Colliery will have an additionally impact on the usage of provincial roads. Impacts on air quality, noise, surface water, groundwater and visual impacts will cumulatively impact on I&APs, especially those residing in communities located close to the mine.	Socio-economic Aspect	Without mitigation					Black Wattle Colliery will ensure that drivers employed by contractors responsible for the transport of the coal will be well trained to manage the safety hazards presented on the roads in the region. In addition to implementing measures to mitigate impacts on the mentioned environmental aspects, communication between the mine and I&APs is essential to managing the significance of such impacts.	All phases
			M	M	M	M	M		
			With mitigation						
			L	L	L	L	L		

6.18 SUMMARY OF SPECIALIST REPORTS

Table 17: Summary of the Specialist Reports

STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS		SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT	APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED
	ASPECT	RECOMMENDATION		
Soil				
Soil Impact Assessment	Impact Statement	The impact assessment indicates a "Moderate – Negative" post-mitigation significance rating for open cast mining during the construction and operational phase with the decommissioning phase being characterised by a "Minor - Negative" significance rating. It is the specialist's opinion that the degradation of soil resources are unavoidable, but manageable. Various mitigation measures pertaining to proper stripping and stockpiling strategies, reseeding of stockpiles, ongoing monitoring as well as ongoing rehabilitation have been described throughout this report to ensure such management. Furthermore, the findings from the impact assessment indicates "Minor -Negative" impacts from the proposed ancillary and stockpile aspects. Therefore, it is the specialist's opinion that the proposed mining activities proceed on the condition that all mitigation measures and recommendations throughout this report be strictly adhered to (including meeting rehabilitation targets).	Included in the EIA.	Section 5.3.3.4
	Rehabilitation	It is recommended that the land capability III and IV areas be rehabilitated back to "Arable" post-mining. This includes (Chamber of Mines of South Africa, 2007); Rehabilitated areas exceeding a depth of 0,6 m; The soil resources forming part of rehabilitated areas cannot be saline or sodic; The slope percentage must have a lower value than 2.0 after multiplying the slope percentage with the erodibility factor; and In using a monograph, a nominal value of 1% organic matter should be used. All land capability V and VI areas must be rehabilitated back to grazing, which include the following (Chamber of Mines of South Africa, 2007); Soil depth must be greater than 0, 25 m. Furthermore, it is recommended that the remediation take place aimed at reaching the current fertility of soils as much as possible.	Included in the EIA.	
Wetland Impact Assessment	Wetland Impacts	It was recommended that development in wetland zones should be avoided, if possible, as well as dumping of materials, spills and the run-on of polluted water into downslope wetland zones. It was also recommended that the construction of isolative embankments should be done where necessary. The mine should design, implement and maintain effective water runoff control measures and refrain from disturbing land in the proximities of wetland zones	Included in the EIA.	Section 5.3.8.3
Surface Water				

STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS		SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT	APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED
	ASPECT	RECOMMENDATION		
Surface Water Impact Assessment	Mitigation during construction phase	Topsoil stripping: Areas that are stripped should be optimised to limit unnecessary stripping. Storm water from upslope of the stripped areas should be diverted around these areas to limit the amount of storm water flowing over these areas. The timing of the topsoil stripping should be optimised to limit the time between stripping and construction. Where practical constraints exist and areas need to be left stripped for long periods, contour ploughing or ripping could reduce runoff and hence reduce erosion. Dry season construction is preferable. Hydro seeding of the topsoil stockpile is recommended to speed up vegetation cover. An appropriate seed mix should be recommended by a vegetation specialist. Construction related pollution: All construction vehicles should be well maintained and inspected for hydrocarbon leaks weekly. Wash bay discharge water should flow through an oil separator. Fuel depots and refuelling areas should be bunded. Chemicals should be stored in a central secure area. Regular toolbox talks on the responsible handling of chemicals should be undertaken.	Included in the EIA.	5.3.6.8
	Mitigation during operational phase	Contaminated water discharge: Shallow seepage and contaminated storm water run-off must be collected and routed to lined pollution control dams. The pollution control dam must be sized in accordance with Government Notice 704 of the South African National Water Act. Pollution control dam water levels must be constantly monitored. Steps and procedures must be put in place to manage situations where excess water builds up in the pollution control dams. Pollution control dam must be operated empty as far as practicable and cannot fulfil the same role as water storage dams, unless specifically designed to fulfil both purposes. Impacts due to leaking or burst dirty water pipes: It is preferable to run the dirty water pipelines through areas already serviced by dirty water systems where possible. Pipelines should be subjected to frequent patrols. An efficient system of reporting should be available to allow the immediate tripping of pumps should a leak be found. Vehicle fleet-related pollution: All vehicles should be well maintained and inspected for hydrocarbon leaks weekly. Wash bay discharge water should flow through an oil separator.	Included in the EIA.	

STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS		SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT	APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED
	ASPECT	RECOMMENDATION		
		Fuel depots and refuelling areas should be bunded. Chemicals should be stored in a central secure area. Regular training on the responsible handling of chemicals should be undertaken. If contract deposition is being used, responsible handling of chemicals and vehicle maintenance should be a key performance objective of the deposition contractor.		
	Decommissioning phase related mitigation	Removal of surface infrastructure and rehabilitation: Hydro seeding of the topsoil stockpile is recommended to speed up vegetation cover. An appropriate seed mix should be designed by a vegetation specialist. The cover must be designed to eliminate erosion and be stable in the long term (>100 years).	Included in the EIA.	
	Closure and After Closure related mitigation.	Mitigation of the impacts should include the following: The rehabilitation work should strive to minimise recharge and maximise run-off. A final void could be optimised to evaporate excess pit water. Where feasible, materials likely to produce the highest amounts of pollution should be replaced in sections of the pit where they will be permanently flooded, thus preventing oxidation of these materials. Should passive mitigation measures not be suitable, active alternatives can be considered such as some form of treatment, prior to release. The planned mining method and the commitment to adhering to appropriate safety factors must be made by the mine to prevent surface subsidence. Methods to stop or reduce decant volumes could include sealing some areas of the mine workings or leaving some areas unmined to act as a barrier to decant. Methods to improve the decant water quality could include flooding of the mining areas, where practical, to reduce oxygen ingress. Routing seepage through lime pits can also improve the water quality if the flows are low enough.	Included in the EIA.	
Groundwater				
Groundwater Assessment	Lowering of Groundwater Levels during Operations	Mitigation of the impacts should include the following: Clean and dirty water systems should be separated as planned. Ensure that the appropriate design facilities (berms, storm water channels etc.) are constructed to ensure clean and dirty water is separated at the coal handling facilities. Implement the EMP's of other environmental related aspects, including pollution prevention and impact minimisation. Groundwater monitoring boreholes should be sited at designated positions based on infrastructure layout, to comply with the design requirements of a groundwater monitoring system, as	Included in the EIA.	5.3.7.10

STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS		SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT	APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED
	ASPECT	RECOMMENDATION		
		recommended. Groundwater monitoring boreholes should be installed to comply with the minimum requirements as set by governmental guidelines. Monitor static groundwater levels on a quarterly basis in all boreholes within a zone of one kilometre surrounding the mines to ensure that any deviation of the groundwater flow from the idealised predictions is detected in time and can be acted on appropriately. If it can be proven that the mine is indeed affecting the quantity of groundwater available to certain users, the affected parties should be compensated. This may be done through the installation of additional boreholes for water supply purposes, Or an alternative water supply. If surface water monitoring shows that the catchments or/and tributaries are affected by mine dewatering, discharge of clean water into the tributaries should be considered. Timing and volumes should be determined by a surface water specialist. This may be achieved through dewatering boreholes around the mine to extract clean water and ensure dry mining conditions. Groundwater quality must be monitored on a quarterly basis. The monitoring results must be interpreted annually by a qualified hydrogeologist and the monitoring network should be audited annually to ensure compliance with regulations. The numerical model should be updated during operation of the opencast by using the measured inflows, water levels and drilling and pump test information to recalibrate and refine the impact prediction Water retention dams should be lined to prevent ingress of contamination Geochemical testing of the backfill material should be conducted to aid in the prediction of contaminant release and potential geochemical changes induced in the subsurface, by means of geochemical modelling. Clean and dirty water systems should be separated as planned.		

STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS		SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT	APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED
	ASPECT	RECOMMENDATION		
	Rise of Groundwater Levels Post-Operations	Mitigation of the impacts should include the following: Following mine closure and rehabilitation of the pit, the backfill may form an artificial aquifer which may decant. Should seepage or decant occur, the water should be redirected via trenching to an evaporation dam that is sanitarily lined with secondary containment. All sulphate containing waste material should be stored at the bottom of the opencast and flooded as soon as possible to exclude oxygen. Treatment of the decant may be viable, however all passive methods should be investigated first during the operational phase of the mine. Reduction of the opencast extent in potential decant areas is likely to lower the risk of discharge significantly. Backfill material should be compacted and surface water flow should be routed around the backfilled opencasts to reduce recharge to a maximal extent.		
	Spread of Groundwater Pollution Post-Operations	Mitigation of the impacts should include the following: Surface hydrology design should include surface drainage and storm water diversion drains, to meet the requirements of the Water Act. This includes the separation of unpolluted from polluted surface water and the containment of polluted water on site in impoundments. Also, where leachate is generated, it must be contained separately from water which is only slightly polluted through contact with the waste. The DWS requires a Water Quality Monitoring Plan as part of the permitting requirements. This involves background analyses, detection monitoring, investigative monitoring and post-closure monitoring. The Water Quality Monitoring Plan ensures that the water quality near a mine is regularly monitored and reported upon throughout its life, so that, where necessary, remedial action can be taken. Surface and groundwater quality and quality monitoring should be continued until a steady state is reached. A pollution control dam could be used to intercept polluted seepage water. An interception trench is an additional option to treat the contaminated discharge. Implement as many closure measures during the operational phase, while conducting appropriate monitoring programmes to demonstrate actual performance of the various management actions during the life of mine. All mined areas should be flooded as soon as possible to minimise oxygen from reacting with the remaining pyrite. Mining should remove all coal from the opencasts and separate acid forming and non-acid forming	Included in the EIA.	

STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS		SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT	APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED
	ASPECT	RECOMMENDATION		
		material. Deposit acid forming material at the base of the pit. The final backfilled opencast topography should be engineered such that runoff is directed away from the mining areas. The final layer (just below the topsoil cover) should be as clayey as possible and compacted if feasible, to reduce recharge to the decommissioned mines. Quarterly groundwater sampling must be conducted to establish a database of groundwater quality to assess plume movement trends. Audit the monitoring network annually. A detailed geochemical study is required to quantify the duration of contamination release from the mine.		
Noise				
Noise Impact Assessment	Noise impacts	Mitigation measures for noise control are limited due to the nature of the physics. However various mitigation measures can be applied singly or together where noise related complaints may be experienced. The mitigation measures include but are not limited to: Where possible, routing all access roads and haul roads at least 850m from any SR unless where additional impacts on other aspects of the receiving environment may be significantly impacted. This may only be applicable to SR 1 however SR 1 is invested in the project and portion 3 does not allow routing the access road in any other direction; Vehicle speed limitations within the mining right areas; Ensuring all equipment in use is maintained and equipped with the OEM's required muffler/exhaust/silencer; Consider the acoustic rating of equipment when selecting equipment; Maintaining a healthy consultative relationship with SR's to facilitate the sharing of knowledge and possible complaints as well as proposed corrective/preventative actions between parties.	Included in the EIA	5.3.12.3
Blasting				
Blasting Impact Assessment	Blasting Impacts	The specialist recommended that the ground vibration limit should not exceed 150 for national roads/tar roads, 75 for electrical lines, 150 for railway, 25 for transformers, 50 for water wells, 50 for telecoms tower, USBM criteria or 25 mm/s for general houses of proper construction, 12.5 for houses of lesser proper construction (preferred) and 6 for rural building – mud houses.	Included in the EIA.	5.3.12.3
Air quality				

STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS		SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT	APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED
	ASPECT	RECOMMENDATION		
Air Quality Impact Assessment	Air Quality impacts	It was recommended by the specialist that emission should be reduced by factors up to 75% - implementation of control measures in a focused approach. It was also recommended that ambient monitoring in combination with modelling and emission inventory should be undertaken as well as general strict monitoring and reporting.	Included in the EIA.	5.3.9.3
Heritage studies				
Sites of Archaeological & Cultural Importance	Sites of Archaeological & Cultural Importance	During the survey, no sites of cultural heritage significance were identified within the project area. The following is recommended: Since the graveyard is outside of the area of direct development, and already fence in, it should remain as such. However, a cultural heritage management plan (CMP) needs to be drafted to ensure the protection of the graves. After implementation of the above mitigation measures and upon receiving the necessary comments from the heritage authority, the proposed development may continue. It should be noted that the subterranean presence of archaeological and/or historical sites, features or artifacts is always a distinct possibility. Due to the density of vegetation it also is possible that some sites may only become known later on. Operating controls and monitoring should therefore be aimed at the possible unearthing of such features. Care should therefore be taken when development commences that if any of these are discovered, a qualified archaeologist be called in to investigate the occurrence.	Included in the EIA.	5.3.13.2

6.19 ENVIRONMENTAL IMPACT STATEMENT

This section of the report provides the description of the environmental impact assessment statement for the proposed project as contemplated in regulation 3(l) under Appendix 3 of the NEMA EIA Regulations, 2014.

Proposed surface infrastructure for the proposed project area is listed below:

- Opencast mining
- Haul roads
- Dirty water pipeline
- Topsoil stockpile

Current employment will be sustained due to the continuation of the opencast mining in the proposed extension project area.

Black Wattle Colliery is an already established opencast mining operation, this project is an extension of the current mining operation. The extension of the project will be utilising the current workforce, which will ensure sustained employment opportunity for existing workforce.

However, additional jobs will be created for a short-term period during the construction period. Although the project may not create more permanent job opportunities, the livelihood opportunities that will be created with short term construction will make a difference for the community.

The project will ensure that the current labour force has continued employment for an extended LoM and that local businesses are continued to be supported by the mine. All Social and Labour Plan initiatives currently underway will also benefit from an extended period of operation.

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 domestic and export coal market. This may ultimately have an impact on the region, due to a loss of revenue and taxes.

6.19.1 Description of affected environment

The proposed project is situated within the Rand Highveld grassland vegetation unit (Gm 11) / ecosystem, in the Mesic Highveld Grassland Bioregion of the Grassland biome (South African National Biodiversity Institute – SANBI) within its preferred region Black Wattle Colliery falls in the Olifants Water Management area. Black Wattle Colliery mining right area falls within the lower parts of the Klein Olifants River, which in turn falls within the Upper Olifants River catchment. The Black Wattle Colliery mining right area drains into three streams i.e. Du Toit Spruit to the northwest, Vaalbankspruit to the east and the Spookspruit to the west. These streams delineate the sub catchments affected by the proposed Black Wattle Colliery mining area. Surface and groundwater environments have shown some changes due to the current land uses, with the surface water environment being the most impacted. The study area is comprised of wetland systems. The wetland systems identified within and surrounding the proposed project area have been significantly impacted upon by previous mining activities not conducted by Black Wattle Colliery. As such the ecological services rendered by the wetland areas are minimal. The proposed project is situated within the Steve Tshwete Local Municipality. The major economic activities in the region are those associated with coal mining, metallurgical industries, commerce and light engineering, power generation, agriculture and administration. Mining is the major industrial activities near the proposed project area. An increase in

the environmental and economic impacts and various criminal activities and land invasions has been noted over the last number of years.

6.19.2 Summary of key findings of the environmental impact assessment

During the construction phase, a considerable amount of impacts on the soils, natural vegetation, surface water, groundwater, sensitive landscapes, air quality, heritage sites, noise, visual aspects, climate change and socio-economic status of the surrounding communities will be medium to very high without mitigation. These impacts are because of the opencast pit mining being undertaken within a portion of the depression (pan) wetland. Approximately 95.50 hectares of the opencast pit mining area will be targeted for opencast coal mining. This will result in roughly 0.70 hectares of wetland habitat being mined. Alternatives considered for the location and designing/layout of the project has shown that the designs would be the most favourable. Black Wattle Colliery (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 medium and high significance to medium/low significance.

Land use will change. Several uses, around the proposed project area may be affected, however measures will be put in place to minimise the impacts. Measures such as implementation of the rehabilitation plan, safety along the roads, noise control, dust suppression, undertaking of the activities within the approved footprint areas, avoiding disturbance of the sensitive area unless authorised and ensuring that the affected parties are always consulted and further will ensure that the impacts on the current uses are not detrimentally affected. With differential stockpiling and careful handling of the soils removed from the proposed project infrastructure area, the impacts on soils will be low after mitigation.

Proper rehabilitation and seeding with a seed mix recommended by a suitably qualified person, will ensure that the impact on the natural vegetation after implementation of the mitigation measures is low.

The activities undertaken during the construction, operational and decommissioning phases of the proposed project will result in the formation of voids, which will decrease surface runoff within the affected catchments. This impact, which is probable may affect the catchment of the Vaalbank Spruit, DuToit Spruit and Spook Spruit Tributaries and may also last beyond the life of the project. Mitigation for the predicted impacts will involve ensuring that the management of the clean and dirty water is undertaken in accordance the requirements of the regulations under GN 704 and ensuring that the mining plan is designed to prevent surface water pollution and deterioration thereof. If the mining plan has been designed to mitigate against surface water pollution and deterioration, no further mitigation measures are necessary.

An un-calibrated, comparative hydrological modelling assessment of affected wetland units under the current conditions and the mining scenario was conducted. The impacts to wetlands associated with the proposed mining expansion area were found to be relatively low given the small wetland area that is being mined. With regards to the mining areas avoidance could be achieved by conducting activities within the approved footprint areas.

Dirty storm water runoff from the dirty water areas (opencast pits) will have a detrimental impact on the surrounding water environment should this water be released to the environment. To prevent the occurrence of the above-mentioned impacts, a storm water management system, which will ensure

the diversion and collection of dirty storm water from the project area has been developed and will be implemented at the proposed project area. This system will further ensure that clean storm water from the project is diverted to the clean water environment, thereby preventing the contamination of clean storm water with the dirty water from the proposed project area. A system, which include water pipelines will be used for the collection and reuse of water from the PCD. The dirty water from the opencast pits will be contained at the existing PCD, where a pipeline will be constructed to conveyor water into the PCD. The pipeline will tie-in to the existing pipeline.

Sediments will be created from the site during the construction, operational and decommissioning phase, which may impact negatively on the surrounding water environment. berms which will be used to manage the silts from this runoff water.

Seepage from the dirty water areas within the proposed project area may enter the groundwater table, resulting in pollution of the surrounding groundwater aquifer. After closure of the proposed mining area, the water table will rise to reinstate equilibrium with the surrounding groundwater systems. This may result in the decanting of the mine affected water.

Further to the above, once the normal groundwater flow conditions have been re-instated, polluted water can migrate away from the mined areas. As some coal and carbonaceous layers may remain in the mined areas, the outflow from these areas will most likely be contaminated. Consequently, the groundwater quality is thus likely to decline.

In view of the above, both surrounding groundwater and surface water environment will be affected by the groundwater plume migration and decanting of the groundwater.

Drawdown may have an influence on some of the groundwater users. All affected groundwater users will be compensated for their loss of groundwater, once compensation investigations are conducted, should the drawdown from the mine affect the groundwater yield of their boreholes. The mine may pose a risk to the groundwater environment in the form of drawdown and contaminated seepage which will have an elevated sulphate concentration which is likely to impact negatively on the aquifer and could potentially also affect the nearby streams. Water management measures have been provided that will ensure that the predicted impacts are managed and reduced. Should the measures be undertaken, the significance rating predicted impacts would reduce to low rating.

For noise aspects, movement of mining machinery during the construction, operational and decommissioning phases of the proposed project will generate dust and diesel fumes. Dust will be generated by wind blowing over exposed soils, movement of vehicles and machinery on bare ground and blasting during excavation of the box cut. The generated particulates will migrate mostly towards the predominant wind direction. This may eventually land on surrounding properties (vegetation, farming and residential areas). This may have impacts on vegetation including the cultivated crops; residents of the informal settlements, mine villages and farmsteads and nearby road users. This impact would most likely be limited to the local area and will exist for the duration of the proposed project. Based on the possible health effects and nuisance the dust can have on the surrounding residences the impacts may have high significance. Measures will be put in place and implemented to maintain the impact significance rating as low. Machine operators utilising machinery will be exposed to noise levels more than 85dBA. The operation of the machinery and surface infrastructure such as ventilation facilities will generate noise levels that may have an impact on the surrounding communities. Noise levels may reach more than 130dBA during a blast. The noise of the blast may be audible within a 2km radius of the mine. These impacts, which are probable will cover the site and immediate local area and will last for the duration of the project. Mitigation measures will include the use of a suitably qualified blaster to ensure that the blasting is designed and conducted in a manner

that will not have an effect on the surrounding communities, ensuring that the mine employees exposed to high noise levels are provided with ear protection and instructed to use them, and ensuring that a noise specialist is appointed to recommend additional noise impact minimising measures and that these measures are implemented during the life of the proposed project. A Quarterly noise measurements programme is recommended during all phases.

For the visual aspects, the mine activities will be visible from the surrounding roads and properties. The mining project and its associated infrastructure will exert a high visual impact within the immediately surrounding area. Note that the undulating nature of the topography and the existing mining related surface infrastructure may reduce the significance of the visual impacts from the proposed project. These impacts will affect the immediate area and will last for the duration of the project. Measure will be put in place to limit the above-mentioned impacts. Measures include limiting areas of disturbance to the approved footprint areas, dust suppressing areas that will be affected by operational activities and where dust will be generated.

The development of the proposed project may result in the disturbance of heritage sites, should mitigation measures not be implemented. In view of the above and to ensure that the identified sites are protected and demolished in a proper manner, measures have been put in place for the protection of the identified heritage sites. These include fencing of the graves and development of the grave management plan. Should relocation of the graves be required, all relevant permits will be obtained before commencement.

Black Wattle Colliery is an already established opencast mining operation, this project is an extension of the current mining operation. The extension of the project will be utilising the current workforce, which will ensure sustained employment opportunity for existing workforce. However, additional jobs will be created for a short-term period during the construction period. Although the project may not create more permanent job opportunities, the livelihood opportunities that will be created with short term construction will make a difference for the community.

6.19.3 Final Master Layout Plan

The final map showing the layout of the proposed project in relation to the proposed project is attached as Figure 23. The maps have been developed to superimpose the proposed mining project together with its associated structures and infrastructure on the environmental sensitivities within the preferred project site. Note that the maps may change based on the outcomes of the consultation.

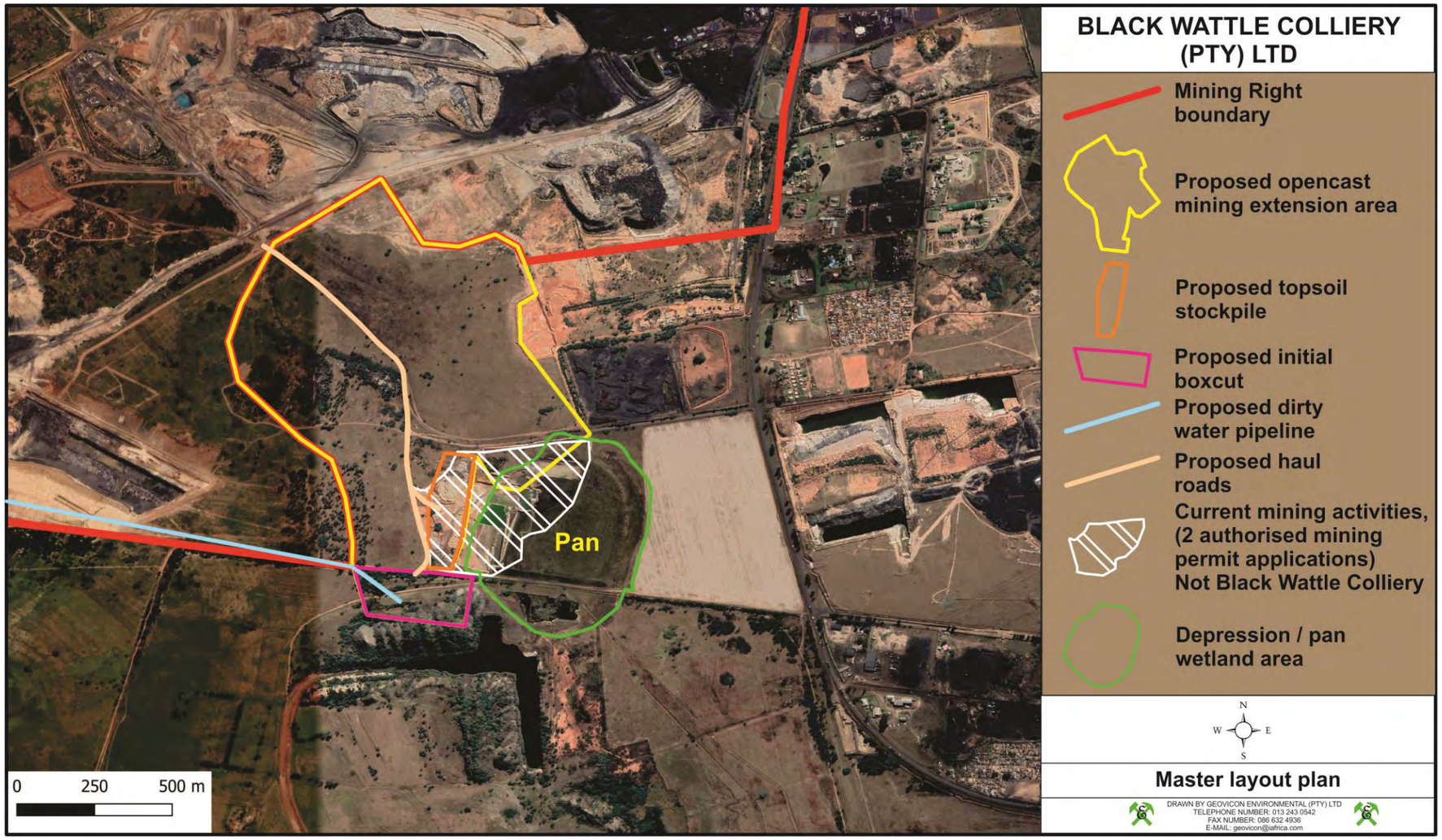


Figure 23: Master Layout Plan for the proposed Black Wattle Colliery Opencast Expansion Project

6.20 Final Proposed Alternatives

All proposed alternatives included in section 5 are finalised. Should there be a need to change alternatives after the consultation period, all will be detailed in the report.

6.21 Aspects for Inclusion as conditions of the Environmental Authorisation

In authorising the proposed project, the following conditions should form part of the EA:

- Black Wattle Colliery (Pty) Limited may not alter the location of any of the project activities included in this EIA without obtaining the required EA to do so under NEMA.
- Black Wattle Colliery (Pty) Limited will not undertake any new activity that was not part of this EIA and that will trigger a need for an EA without an authorisation. This includes decommissioning of any activities.
- Black Wattle Colliery (Pty) Limited must, where necessary and under the supervision by the competent authority, update the specialists reports and method statement included in the EIR/EMPr.
- The EMPr must be implemented fully at all stages of the proposed project.
- Black Wattle Colliery (Pty) Limited must consider the development of an environmental management system with applicable operational procedure to support the efforts of ensuring compliance with the EMPr commitments. These must be updated regularly. Frequency of updates must be informed by suitably qualified persons.

6.22 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 EIR. The specialist assessments undertaken are based on conservative methodologies and these methods attempts to determine potential negative impacts that could occur on the affected environmental aspects. 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 I&APs with an understanding of how much confidence can be placed in this impact assessment. The EIA has investigated the potential impact on key environmental media relating to the specific environmental setting for the site. Several studies were undertaken and result thereof, which forms part of this report, will be presented during the public meeting to be arranged. The information provided in this EIR is therefore considered enough for decision-making purposes. The environment that is likely to be affected by the proposed project was detailed in the section dealing with the environmental attributes. These studies include a soil survey, biodiversity, wetland survey, hydrological study, geohydrological study, heritage impact assessment, air quality impact assessment, noise impact assessment, climate impact assessment, hydropedological impact assessment, and surface water studies etc.

6.23 Reasoned Opinion as to Whether the Proposed Project should or should not Continue

6.23.1 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 mainly on the physical and biophysical component of the environment such as topography, soils, land use and capability, sensitive landscapes, ground and surface water. Wetlands and streams may be affected through siltation, salinization, acidification and changes in hydrology, which may result from release of mine affected water from the mining operation. Groundwater may be affected by pollution of surrounding groundwater regions by plume migration. Note however that the area has been mined before using both by underground and opencast mining methods hence the surrounding systems may have already been affected by these mining operations. These impacts are likely to be experienced throughout the life of the mine.

Other impacts from the proposed project include the socio-economic impact on the surrounding communities through unrealised expectations. The surrounding community may also be impacted via air pollution, higher than normal noise levels and change in the aesthetics of the area which will have impacts on the sense of place. It must however be noted that the area is currently used for mining purposes, hence the communities surrounding the proposed project area are used to mine related operations.

The project will also have positive impacts due to the employment to be created although for a short term during the construction phase. The employment due to the ability of the mine to operate will have a positive impact. Several community-based projects will be implemented by the mine, which will have positive impacts on the surrounding community.

All comments received during Public Participation Process and detailed specialist reports will be included in the final EIR and EMPr. Comments received during the scoping phase are included in this report. The management of the impacts identified in the EIR 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 as well as designs, 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. None of the environmental specialists who undertook the environmental specialist work were against the decision to continue with the mining operation although under the condition that measures proposed be implemented.

6.23.2 Conditions that must be included in the authorisation

See section 6.25 of the EIR.

6.24 Period for which the Environmental Authorisation

Based on the production rate, estimated reserve and the scheduled construction and decommissioning periods, the proposed operation will have a life of mine of six (6) years.

6.25 Undertaking

The signed undertaking is presented at the front of this document.

6.26 Financial Provision

According to Appendix 3 of the EIA Regulations, 2014, details of any financial provisions for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts must be provided in the EIR/EMPr. To avoid duplication, the financial provision for the proposed project has only been provided under the relevant section of the EMPr. See relevant section under the EMPr for the calculated quantum for the financial provision for the proposed project.

6.27 Deviation from approved Scoping Report

No deviation from the approved SR.

6.28 Other Information Required by the Competent Authority

Aside from the EIR/EMPr, no other information has been requested by the competent authority.

6.29 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 by Black Wattle Colliery (Pty) Limited.

PART B

Environmental Management Programme (EMPr)

Black Wattle Colliery (Pty) Limited –

Draft EIR/EMPr

Black Wattle Colliery Opencast Expansion Project

April 2023

1 DETAILS OF THE EAP

1.1 NAME AND CONTACT DETAILS OF THE EAP WHO PREPARED THE EMPR

EAP: Miss M. B Mabogoane

IAIA Membership No.: 6235

SACNASP Registration: 128083

EAPASA Registration: 2019/1356

Reviewer: Mr. O.T Shakwane (BSc. Honns.)

SACNASP Registration: 117080

EAPASA Registration: 2019/1763

IAIA Membership No.: 3847

Company: Geovicon Environmental (Pty) Limited

Postal Address:

P.O. Box 4050

Middelburg, 1050

Tel: (013) 243 0542

Fax: (086) 632 4936

Cell No.: 082 498 1847

Email: Tshepo@geovicon.co.za/Bathabile@geovicon.co.za

1.2 EXPERTISE OF THE EAP WHO PREPARED THE DRAFT EMPR

Geovicon Environmental (Pty) Limited has been appointed by Black Wattle Colliery (Pty) Limited as the independent environmental consultant to compile this EIR/EMPr and has no vested interest in the project.

Geovicon Environmental (Pty) Limited is a geological and environmental consulting company. The company was formed in 1996, and currently has twenty-four years' experience in the geological and environmental consulting field. Geovicon Environmental (Pty) Limited has successfully completed consulting projects 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 and in 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 shareholders i.e. O.T. Shakwane, J.M. Bate and T.G. Tefu.

The Curriculum Vitae of the Environmental Assessment Practitioner (EAP) and the Assistant EAP who were involved in the compilation of this report are as follows:

Ms. Bathabile Mabogoane obtained her Baccalaureus Technologiae (B-Tech) in Environmental Sciences at the Tshwane University of Technology in 2020. She started working as an intern at Shangoni Management Services, year 2017 specializing in conducting Waste Management Licence Audits, waste management related reports and Health, Safety and Environmental related aspects and Environmental related reports. She joined Geovicon Environmental (Pty) Limited as a Junior Environmental Consultant in August 2018, now appointed as the Environmental Consultant. Her responsibilities include: compilation of all documentation for mining rights, mining permits and prospecting right applications, compilation of EIR/EMPr, compilation of Water Use Licence applications with Integrated Water and Waste Management Plans, conducting of Environmental audits, Integrated Water Use Licence Audits, conducting of Environmental inspections, compilation of environmental reports (EMPr, SR, BARs, EIAs, Public Participation Reports), arrangement and attendance of Public Participation meetings with I&APs, conducting environmental audits and inspections at mining companies, compilation of Water Quality Reports and Environmental Audit Reports (EARs). Ms. Bathabile Mabogoane is the appointed EAP for the NEMA EA application and EIA Process for the proposed Black Wattle Colliery Opencast Expansion Project. Ms. Bathabile Mabogoane has been involved in the field of EIA for the past six years.

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, EIA, environmental risk assessment and environmental management systems with several tertiary institutions. He has worked within the three state departments tasked with mining and environmental management i.e., Department of Water and Sanitation (Gauteng and Mpumalanga Region), DMRE (Mpumalanga Region) and Department of Agriculture, Conservation and Environment (Gauteng Region). Mr. Shakwane has been in the consulting field since 2004 and has undertaken EIAs for mining operations similar to the proposed Black Wattle Colliery Opencast Expansion Project. Mr. Shakwane is the appointed EAP (reviewer) for the NEMA EA application and the EIA process for the proposed Black Wattle Colliery Opencast Expansion Project. Mr. Shakwane has been involved in the field of EIA for the past twenty one years.

He is registered with the Environmental Assessment Practitioners Association of South Africa and South African Council for Natural Scientific Professions as an EAP and a Professional Natural Scientist in terms of section 24H of the National Environmental Management Act, (Act 107 of 1998) and section 20(3) of the Natural Scientific Professions Act, 2003 (Act 27 of 2003), respectively. He is also a member of the International Association for Impact Assessment, South Africa.

Mr. Ornassis Tshepo Shakwane and Ms. Bathabile Mabogoane of Geovicon Environmental (Pty) Limited, hereby declares that they are independent EAP and that Geovicon Environmental (Pty) Limited and them have no business, financial, personal or other interest in this project in respect of which Geovicon Environmental (Pty) Limited is appointed. Furthermore, no circumstances exist that may compromise the objectivity of Geovicon Environmental (Pty) Limited, excluding fair remuneration for work performed in connection with this report.

2 DESCRIPTION OF THE ASPECTS OF THE ACTIVITY

The requirements to describe the aspects of the activity are covered by the EMPr 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 maps superimposing the proposed Black Wattle Colliery Opencast Expansion Project, its associated structures and infrastructure on the environmental sensitivities of the preferred site is attached as Figure 3.

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 mining areas for Black Wattle Colliery closure planning:

- Rehabilitation of areas disturbed because of mining to a land capability that will support and sustain a predetermined post-mine closure land use;
- Removal of all infrastructure 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 mine-affected areas;
- Reinstatement of self-sustaining ecosystems over the rehabilitated infrastructure and mining affected areas, requiring minimum on-going maintenance to facilitate a walk away situation;
- Establishment of final landforms that are stable and safe in the long run;
- Management of mine-affected water to prevent long-term risk of contamination of surface and underground water sources, which include where possible treatment of mine-affected water to;
- Prevention of acid mine drainage;
- Monitoring and maintenance of rehabilitation areas and water treatment processes forming part of mine closure to ensure the long-term effectiveness and sustainability of measures implemented.
- Regarding closure targets for Black Wattle Colliery, the mine will ensure that the rehabilitation of disturbed areas, removal of infrastructure, management of rehabilitated areas and management of mine affected water and water leaving the mining are is undertaken such that it ensures compliance with all relevant standards as published by the relevant state authorities.

4.2 MANAGEMENT OF ENVIRONMENTAL DAMAGE, ENVIRONMENTAL POLLUTION AND ECOLOGICAL DEGRADATION CAUSED BY PROJECT ACTIVITIES

The following actions will be undertaken by Black Wattle Colliery to ensure that the closure objectives are attained.

4.2.1 Infrastructure Areas

- All concrete, steel works and structures will be removed so that the land can be returned to as near as practically possible to its original state.
- All rehabilitated areas will be shaped to be free draining without concentrating flow such that erosion occurs, fertilised and a mixture of indigenous and pasture grasses will be planted. Following this rehabilitation, the infrastructure areas will have a capability similar to the pre-mining environment.
- All rehabilitated areas will be maintained for a period of 3 years, where after the frequency will be reassessed. Vegetation cover will be maintained by annual application of fertiliser combined with biennial cutting or burning for the first three years. After this period, fertilizer will be applied as and when required.
- Maintenance with respect to erosion will be conducted on a minimum three-monthly basis if and where required. This frequency will be reassessed after a 3-year period. The final rehabilitated surface will be stable, self-sustaining and erosion-free.
- All roads not required for residential or farming purposes and water pipelines will be removed and the ground restored as above.

4.2.2 Roads and Pipelines

The NEMA require all infrastructure associated with the mining operation to be removed and the surface on which it was situated to be returned, as close as is practically possible, to the original land use.

Roads

Haul roads to the proposed project will be rehabilitated. All gravel roads will be graded to remove carbonaceous material. The roads will be cross-ripped to 300 mm at right angles to the natural slope, fertiliser added as per soil requirements and vegetated with a seed mix of indigenous and pasture grasses. Maintenance will be conducted on the rehabilitated areas as indicated in the Policy statement.

4.2.3 Buildings (Offices, Workshops and Stores)

The bulk of the activity in removing the office structures (workshops and administration buildings). Note that should these structures be needed, mobile units will be used hence there will be no need for demolition to be undertaken during the decommissioning of the facilities.

4.2.4 General Overall Rehabilitation Procedures

The above areas will all be rehabilitated according to the following principals:

- All areas will be cleared of potentially contaminating material, which will be disposed of at an appropriate waste facility.

- Areas will be filled to attain adequate topographical levels similar to that of pre-mining. The areas will be contoured to ensure adequate drainage and prevent pooling or ponding of water.
- Where pooling or ponding of water occurs, the areas will be revisited and graded and filled as necessary.
- Soils that were removed and stockpiled need to be re-assessed prior to and during rehabilitation. This is necessary to ensure nutrients are adequate.
- The rehabilitated areas will be sampled and the necessary lime and fertiliser requirements applied prior to re-vegetation. Any area profiled and topsoiled will be vegetated within the same growing season. These areas will be vegetated with the prescribed seed mix, which will reflect the original biome type. The seed mixture should as a minimum, be made up according to the specifications of the specialist study. Rehabilitation should be done as soon as possible to reduce risk of soil erosion and to increase habitat availability for fauna as soon as possible.
- Once areas have been rehabilitated and seeded, access to these areas should be restricted.
- Rehabilitated areas will be monitored for vegetation cover and alien invasive encroachment on a 6 monthly basis. Areas of failed growth will be fertilised (if necessary) and re-seeded. All exotic and invasive vegetation should be removed.
- Erosion and pooling of water / impaired surface water flow will be monitored on a monthly basis during the rainy season and/or after each heavy rainfall event, any areas of concern will be addressed immediately. Where erosion gullies are noted, hale bales, gabion baskets or stick energy dissipaters are to be installed, and storm water control structures will be reviewed.
- The status of biodiversity and land management will be monitored on an annual basis and specialist recommendations applied.
- Groundwater and surface water monitoring will continue during the decommissioning, closure and post-closure phases.
- Maintenance and monitoring will continue for a period of at least 4 years following closure.

4.2.5 Rehabilitation of Ecologically Degraded Areas

The rehabilitation goal for degraded wetland areas as well as the rehabilitation of mining activities (constructed infrastructure) taking place within a wetland area or in the associated local catchment of the wetland area is to progressively re-instate areas that are safe, stable and non-polluting, that can be integrated into the greater farming area by enhancing the biodiversity and re-instating the wetland area to be used as grazing land, thus forming once more, part of the regional agricultural activities as well as align to the provincial economic initiatives. The rehabilitation goal for the wetland area is to maintain the Present Ecological State (PES) of the wetland area as indicated in a Wetland Assessment Report.

Wetland areas are evaluated based on their hydrogeomorphic classification, and as such three main drivers are recognised viz. geomorphology (topography), hydrology (surface flow) and vegetation (vegetation canopy cover of the soil). The level of rehabilitation must thus be evaluated against the re-instatement of these three components, not just for the wetland area per sae, but also for the part of the mining activities that are taking place in the local catchments of the wetland areas.

Mining activities taking place in a part of a wetland area will thus disturb part of the hydrological, geomorphological and vegetational functions of the wetland area itself. Mining activities taking place

in the associated local catchment area will also disturb part of the hydrological, geomorphological and vegetational functions of the local catchment area. During the life of mine, the wetland area will thus lose some of the water that would have reported to it during pre-mining conditions. The quality of the surface runoff water during mining will not be affected, since all polluted water will be contained within the mining area.

Rehabilitation of the mining and infrastructure area must thus be enough to emulate pre-mining geomorphology, hydrology and vegetation.

4.2.6 Geomorphology

The topography and soil profile are an important component of the geomorphology and determine amongst others how water and nutrients will flow through the system.

Topography

Following final rehabilitation, the area must be shaped so that the topography of the area emulates the pre-mining topography. The geomorphology of the catchment will thus be re-instated.

4.2.7 Hydrology

The topography is an important component of the hydrology and determine amongst others in which direction the surface runoff water is flowing over the area.

Topography

All infrastructure, buildings and voids in the mining and infrastructure area that hindered and altered the flow of water down to the wetland area must be dismantled, demolished, removed and backfilled. Following final rehabilitation, the area must be shaped so that the topography of the area emulates the pre-mining topography. The wetland area will receive once more most of the surface runoff water that it received prior to mining. The hydrology of the disturbed part of the catchment area as well as the wetland area will thus be re-instated.

Water quality

Surface water: Since the mining and infrastructure area will be covered with un-contaminated top-soil, surface water running over the area will not carry pollutants. Sub-surface water moving laterally through the sub-soil will also not carry pollutants since the compacted sub-soil layer will keep it above the potentially contaminated material.

Groundwater: Following mine closure and rehabilitation of the pit, the backfill may form an artificial aquifer which may decant. Should seepage or decant occur, the water should be redirected via trenching to an evaporation dam that is sanitarily lined with secondary containment. Treatment of the decant may be viable, however all passive methods should be investigated first during the operational phase of the mine.

4.2.8 Vegetation

Vegetation is an important component to curb the speed with which surface runoff water flows down a slope. Excessive flow can cause erosion and diminish infiltration. Vegetation is also imperative for the trapping of silt, pollutants and toxins.

Vegetation

During the placement of the top-soil layer, contour berms must be formed to aid in reducing the speed of runoff water. The rehabilitated terrestrial area will be seeded with the recommended terrestrial seed mixture and the rehabilitated wetland area will be re-vegetated with seed collected from the

hydromorphic grass species in the area. Once the vegetation is established, it will re-instate the natural services of flood attenuation, stream flow regulation and sediment/pollutant/ toxin trapping. The vegetation will also re-instate the habitat for smaller animals and invertebrates.

Actions to curb degradation of wetland areas during mining:

- Continuous ground- and surface water monitoring;
- Immediate clean-up of any contamination of the wetland area;
- Immediate restoration and re-vegetation of any erosion gullies or areas of ponding as a result of the mining activities;
- Monitor, control, eradicate and manage declared Category 1, 2 and 3 invader plant species;
- Limit the settling of dust, generated by mining activities, on wetland vegetation;
- Combat movement of people (by vehicles or on foot) through wetland areas;
- Combat the setting of snares by mine employees; and
- Combat the removal of plant species, especially medicinal plant species, by mine employees

4.2.9 Management of Extraneous Water as a Result of the Black Wattle Colliery Mining and Associated Activities

4.2.9.1 Management of Water from Opencast Workings

Ongoing Seepage

During the operational and decommissioning phases, detailed analysis will be conducted to confirm predicted decant points and to determine any new decant points from the opencast mine workings.

If it can indeed be proven that the mined-out areas will indeed decant, the following is committed to by Black Wattle Colliery.

Commitment:

- *If the decant water from the opencast workings is not of a quality suitable for downstream users, Black Wattle Colliery will initiate an investigation by a competent person or institution to determine the most appropriate actions to be undertaken, and the positions for such actions to be undertaken, to ensure that the water quality conforms to the downstream users' needs. Such actions and methods to be employed will be discussed with the Department of Water and Sanitation to gain their approval prior to implementation.*
- *If any water purification activities are to be conducted, these activities and or methods will be based on best available technology at the time of commencement (of the activity), and will continue until a self-sustaining acceptable water quality can be achieved.*

4.3 Potential Risk of Acid Mine Drainage

4.3.1 Acid Rock Drainage Potential

Acid rock drainage is a process whereby contaminants (especially metals and sulphate) are released from solid to liquid phase under acidic pH conditions due to the oxidation of sulphide minerals in the presence of oxygen (or other oxidants like ferric iron or manganese) and water, potentially accelerated by bacteria. Heat may be generated in the process. The term acid rock drainage is also used to refer to saline and neutral mine drainage, which are characterised by neutral to alkaline pH conditions and more moderate metal and sulphate contents. The laboratory tests to determine the

potential of rock samples to produce Acid Rock Drainage (ARD) are generally grouped into two categories: static and kinetic tests. The static tests are relatively simple, inexpensive, and rapid, whereas kinetic tests may take several months. The test work reported on comprises of static tests.

4.3.1.1 Steps taken to Investigate, Assess and Evaluate the Impacts of the Acid Mine Drainage

During the assessing of the impacts of the proposed project on groundwater, a numerical groundwater model, which took into consideration the results from the geochemical analysis, was used to investigate, assess and evaluate the impacts of acid mine drainage.

Numerical groundwater modelling is considered to be the most reliable method of anticipating and quantifying the likely impacts on the groundwater regime.

Modelling for the proposed project was done as representation of a groundwater flow system that attempts to mimic the natural processes. It is therefore a simplified version of the natural system, compiled with geological, hydrogeological, hydrological and meteorological data; which utilises governing equations to incorporate all this data and simulates the hydraulic properties or geochemical properties of the system.

4.3.1.2 Flow modelling

The finite difference numerical model was created using the US Department of Defence Groundwater Modelling System (GMS10.0) as Graphical User Interface (GUI) for the well-established Modflow and MT3DMS numerical codes.

MODFLOW is a 3D, cell-centred, finite difference, saturated flow model developed by the United States Geological Survey. MODFLOW can perform both steady state and transient analyses and has a wide variety of boundary conditions and input options. It was developed by McDonald and Harbaugh of the US Geological Survey in 1984 and underwent eight overall updates since. The latest update (Modflow NWT) incorporates several improvements extending its capabilities considerably, the most important being the introduction of the new Newton formulation and solver, vastly improving the handling of dry cells that has been a problem in Modflow previously.

Transport modelling

Transport modelling was done using MT3DMS. MT3DMS is a 3-D model for the simulation of advection, dispersion, and chemical reactions of dissolved constituents in groundwater systems. MT3DMS uses a modular structure similar to the structure utilized by MODFLOW, and is used in conjunction with MODFLOW in a two-step flow and transport simulation. Heads are computed by MODFLOW during the flow simulation and utilized by MT3DMS as the flow field for the transport portion of the simulation.

4.3.1.3 Risk Assessment

The groundwater risk assessment was assessed by defining the three components, which are the source, the pathway and the receptor. The risk assessment approach is therefore aimed at describing and defining the relationship between cause (source) through the groundwater pathway and the effect to the receptor. In the absence of any one of the three components, it is possible to conclude that groundwater risk does not exist.

Engineering and designs Solutions to be implemented to Avoid or Remedy Acid Mine Drainage

The reactions of acid mine drainage 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*.

FeS2 +7/2 O2 + H2O Fe2+ + 2SO42- + 2H+ (2.1)

The ferrous iron, (Fe2+) may be oxidised to ferric iron, (Fe3+) if the conditions are sufficiently oxidising, as illustrated by reaction (2.2). Hydrolysis and precipitation of Fe3+ may also occur, shown by reaction (2.3). Reactions (2.1), (2.2) and (2.3) predominate at pH > 4.5.

e2+ + 1/4O2 + H+ Fe3+ + 1/2H2O (2.2)

Fe3+ + 3H2O Fe(OH)3 (s) +3H+ (2.3)

Reactions (2.1) to (2.3) are relatively slow and represent the initial stage in the three-stage AMD formation process. Stage 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 Fe2+ (ferric iron) are more soluble (reaction 4):

FeS2 + 14 Fe3+ + 8H2O 15Fe2+ + 2SO42- + 16H+ (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. This contaminated water, which is mostly found in the mined out workings or mineral residue deposits will migrate from the source towards the receptors through the groundwater flow paths.

The following measures are recommended to try and avoid or remedy the generation of acid mine drainage within the proposed Black Wattle Colliery opencast extension project. Note that it will be impossible to totally eliminate the generation of acid mine drainage, however the measures given below will reduce the extent of the acid mine drainage. These have been divided in terms of the phases of the proposed project:

Pollution prevention starts in the planning phase of an operation through evaluation of plans and, aimed at understanding the potential impacts of alternative working methodologies and a conscious effort to select, design and implement the alternatives that maximise the ability to prevent pollution. Typical pollution prevention measures that were implemented include those shown below:

A layout plan that has considered closure and rehabilitation issues (effects of plume migration) was prepared by the mine and is submitted for approval by the competent authority. The numerical model will be updated regularly (every 3 to 5 years) during operation with available monitoring data. All operational planning and activities will be undertaken with eventual closure in mind, such that operations can end in a manner that minimizes the final risks and liabilities in the post-closure phase.

Monitoring boreholes for Black Wattle Colliery will be sampled to obtain information on the groundwater regime as well as for future monitoring purposes.

4.3.1.4 Measures to Remedy Residual or Cumulative Impacts from Acid Mine Drainage

If the seepage water from proposed project is not of a quality suitable for downstream users, Black Wattle Colliery will initiate an investigation by a competent person or institution to determine the most appropriate actions to be undertaken, the positions for such actions to be undertaken, and to ensure that the water quality conforms to the downstream user's needs. Such actions and methods to be employed will be discussed with the Department of Water and Sanitation to gain their approval prior to implementation.

If any water purification activities are to be conducted, these activities and or methods will be based on best available technology at the time of commencement, and will continue until a self-sustaining acceptable water quality can be achieved.

4.4 Volumes and Rates of Water Use Required for the Mining Operation

A water balance is one of the most important and fundamental water management tools available to the mines, which can assist the mines with their water management. Water balance can be used by the mines in identifying and quantifying points of water consumption, as well as pollution sources. This information is key in assisting the mine in their water management designs.

In view of the above and since Black Wattle Colliery is required to submit an IWULA to the DWS for any new water uses and since the water balance forms part of the supporting documentation for the IWULA, a water balance for the proposed project will be compiled. The water balance gives details of the volumes and rate of water that is currently used and that is required by the proposed Project. A copy of the water balance for the proposed project will be attached in the Final EIR/EMPr.

4.5 Water Use Licence Application

During the operation of the proposed mining project to be undertaken at Black Wattle Colliery, several activities that have been declared as water uses in terms of the NWA will be undertaken. In terms of section 22(1)(b), a person may use water if the water use is authorised by a licence under the National Water Act, 1998 (Act 36 of 1998). According to section 40 of the National Water Act, 1998 (Act 36 of 1998), the water use activities to be undertaken at the proposed Project must be authorised by DWS, whose authorisation must be in the form of an integrated water use licence. In view of the above, Black Wattle Colliery (Pty) Limited applied for an IWUL to the DWS (Mpumalanga Regional Office, Bronkhorstspruit) for consideration. The application is still underway.

5 ENVIRONMENTAL MANAGEMENT PROGRAMME

The EMPr was developed for all activities associated with the proposed Black Wattle Colliery Opencast Expansion Project (Table 18 below). This includes a description of the impact management objectives, management statements, identifying the impacts that must be avoided, managed and mitigated as identified through the EIA process for all phases of the development.

Table 18: Environmental management programme

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
PRE-CONSTRUCTION AND CONSTRUCTION PHASE								
Activity 34 of Listing Notice 1 and Activity 6 and 15 of Listing Notice 2: The expansion of the opencast mine workings and the construction of the initial Box cut. **Activity 12 and 19 of Listing Notice 1 and Activity 12 and 14 of Listing Notice 3: The construction of an initial boxcut.**								
The construction of the initial box cut will lead to compaction of soil resources due to increased traffic, which may cause erosion of soils due to increased runoff water velocities. The establishment of the box cut will result in the stropping of soils with medium-high agricultural potential, which will result in the loss of agricultural/soil potential.	Soils, Land Use and Land Capability	To ensure that the development of the box cut does not have detrimental impacts on the soil productivity, after mining land use and land capability.	Ensure that the stripping and stockpiling of the soils are undertaken in accordance with the rehabilitation guidelines.	The topsoil from the box-cut area will be stripped and stockpiled at a topsoil stockpiling area.	Appointed contractor and the mine site manager.	The area will be monitored for compaction and erosion.	Environmental Control Officer/Mine Environmental Co-ordinator (ECO).	During the stripping and stockpiling of topsoil.
				The topsoil stockpile will not exceed a height of five meters, which will assist in minimizing compaction of the soils.	Appointed contractor and the mine site manager.	The establishment of the topsoil stockpile will be inspected and the stockpile will be surveyed.	ECO weekly and Site manager daily. Stockpile surveyed on completion.	During stockpiling of topsoil.
				The stockpiled topsoil will be seeded with a recommended seed mix to ensure that a good vegetation cover is achieved, if the natural seed-back doesn't create enough cover.	Appointed contractor and ECO.	The seeding will be monitored by inspection.	ECO will inspect the seeding monthly.	During rainy season after stockpiling of topsoil.
				No mixing of the topsoil material with subsoil, softs (soft overburden) and hard overburden material (contaminated overburden) will be allowed.	Appointed contractor and ECO.	The seeding will be monitored by inspection.	ECO will inspect the seeding monthly.	During rainy season after stockpiling of topsoil.
				In cases where compaction and/or erosion does occur, action plans should be implemented to apply mitigation.	ECO.	The area will be monitored for compaction and erosion. Results of action plans if compaction and erosion is noted, will be kept on	The ECO will monitor the area for compaction and erosion every three months. The ECO will ensure that action plans,	Throughout the 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
						site and implemented.	if erosion and compaction is noted, are proposed and implemented.	
Disturbance of the geological profile.	Geology	To ensure that the construction of the initial box cut does not have detrimental impacts on the geology	Replacement of the opencast voids with removed overburden material	Use removed material to backfill the opencast voids. All remaining carbonaceous material will be placed at the bottom of the mining pits and should be covered with the rest of the remaining overburden material. This will reduce the exposure of the carbonaceous material to free oxygen, hence limiting the formation of acid mine generation.	ECO and Mining Contractor	Record volumes of overburden removed and replaced. Compare the volumes against volumetric assessment done by mine surveyor.	Surveyor and Monthly	Throughout Construction Phase
During the construction phase of the initial box cut, topsoil removed will be stripped and stockpiled for future use. This may result in the following impacts: Areas that have been stripped of vegetation and topsoil will be prone to erosion. This could lead to increased suspended solids being deposited into the local streams (Spookspruit Tributary).	Surface Water	Ensure that the establishment of the initial boxcut does not have detrimental impacts on the catchment yield.	Management of the storm water runoff will comply with the requirements of the regulations under the GN704 and as far as possible with the requirements of the relevant DWS Best Practice Guidelines.	The storm water diversion structures will be constructed in accordance with the project's stormwater management plan approved by the DWS, which shows the storm water management systems' silt control and erosion protection.	Mine manager and the ECO.	The constructed storm water diversion structures will be inspected.	ECO will undertake the inspections on a monthly basis and Site Manager daily during construction.	Throughout the construction phase.
				Areas that are stripped will be optimised to limit unnecessary stripping.	Appointed Contractor and ECO.	The construction activities will be inspected against the approved mine layout plan.	ECO will undertake the inspections on a monthly basis	Throughout the construction phase.
				Storm water from upslope of the stripped areas will be diverted around these areas to limit the amount of storm water flowing over from these areas.	Appointed Contractor and ECO.	The construction activities will be inspected against the approved mine layout plan.	ECO will undertake the inspections on a monthly basis	Throughout the construction phase.
				The timing of the topsoil stripping will be optimised to limit the time between stripping and construction. Where practical constraints exist and areas need to be left stripped for long periods,	Appointed Contractor and ECO.	The construction activities will be inspected against the approved mine	ECO will undertake the inspections on a monthly basis	Throughout the 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
				contour ploughing, or ripping could reduce run-off and hence reduce erosion.		layout plan.		
				Dry season construction is preferable where practical.	Appointed Contractor and ECO.	The construction activities will be inspected against the approved mine layout plan.	ECO will undertake the inspections on a monthly basis	Throughout the construction phase.
				The construction site will be optimised to limit over stripping. This will ensure that the generation of unnecessary volumes of silted water is controlled on site.	Appointed Contractor and ECO.	The construction site will be inspected.	ECO will undertake the inspections on a monthly basis and Site Manager daily during construction.	Throughout the construction phase.
				The constructed storm water diversion structures will be maintained in good order, which will include the cleaning of the structures where necessary.	ECO.	Inspection of the constructed storm water diversion structures will be conducted.	ECO and Site manager will undertake the inspections on a monthly basis.	Throughout the construction phase.
				Any damage within the constructed storm water diversion structures will be repaired as soon as possible.	ECO.	Inspection of the constructed storm water diversion structures will be conducted.	Mine engineer and ECO will undertake the inspections on a monthly basis.	Throughout the construction phase.
				Divert clean runoff water away from the box cut to minimize surface flow into the working area.	Appointed contractor and ECO.	Inspection of the constructed storm water diversion structures will be conducted.	Mine engineer and ECO will undertake the inspections on a monthly basis.	Throughout the construction phase.
Deterioration of water quality in the Spookspruit and the Vaalbankspruit. Tributaries.		Ensure that the establishment of the initial boxcut does not have detrimental impact on nearby stream water quality.	The quality of storm water from the initial boxcut will comply with the target water quality objectives as stipulated in the water use licence. Black Wattle Colliery	Storm water diversion structures (berms) will be constructed to divert clean water runoff to the storm water systems.	Mine manager and the project team.	Inspect and approve the construction of clean storm water diversion structures on completion of the construction	Mine engineer as and when required, ECO will undertake the inspections weekly and Site manager daily during the	Throughout the 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
			will undertake the construction activities in compliance with the regulations under the GN704.			activities.	construction of the storm water management structures.	
				Areas that are to be stripped of topsoil will be optimised to limit unnecessary stripping.	Appointed contractor.	Inspection of the site to ensure that the construction activities are undertaken within the approved footprint areas.	ECO will undertake the inspections monthly and Site manager daily.	Throughout the construction phase.
				Excessive sedimentation of storm water run-off from the site will be prevented.	Appointed contractors and the ECO.	Inspection of the site during soil stripping for excessive sedimentation run-off.	ECO will undertake the inspections monthly and Site manager daily.	Throughout the construction phase.
				Mine vehicles and machinery used during the construction phase must be well maintained.	Appointed contractors and the ECO.	The site vehicles and machinery will be inspected for signs of hydrocarbon leakages.	VOHE or ECO will undertake the inspections on a monthly basis.	Throughout the construction phase.
During the construction phase of the initial boxcut, a significant number of vehicles will be driving around the site. This may result in the following impacts: • If the construction vehicles are poorly maintained hydrocarbon spills could cause pollution if washed off roads by storm water.	Groundwater	Ensure that the groundwater regime is not detrimentally affected by spillages.	Hydrocarbons generated will be managed in terms of the norms and standards for waste storage and in accordance with the mine's waste management procedures.	The existing procedures for containment and remediation of any accidental hydrocarbon or other chemical spillages will be adhered to.	ECO.	Inspection of the construction area for signs of hydrocarbon spillages.	ECO will undertake the inspections monthly.	Throughout the construction phase.
				Any incidents relating to hydrocarbon contamination should be investigated if the impact is perceived to be significant and a hydrocarbon contamination specialist should be consulted for further recommendations.	ECO.	Inspection of the construction area for signs of hydrocarbon spillages and investigations conducted should spillage occur and the hydrocarbon contamination specialist	ECO will undertake the inspections monthly.	Whenever spillages occur.

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
						appointed should the impact be significant.		
				Mine machinery will be repaired at existing designated areas fit for purpose. No maintenance outside the dedicated areas will be allowed unless it is an emergency repairs which must be on a protected ground or by use of drip trays.	Appointed contractor, Mine engineer and ECO.	The project area will be inspected to ensure that mine machinery repairs are undertaken at the workshop area and any repairs must be on a protected ground or use of drip trays.	ECO will inspect the area on a monthly basis.	Throughout the construction phase.
				Training, which will be in accordance with the requirements of the norms and standards for the waste storage facilities will be conducted for employees working with waste.	Appointed contractor and ECO.	Records of training will be kept.	ECO will inspect the records quarterly.	Training will be conducted on intervals approved by the mine.
				All spillages must be contained and the affected areas remedied.	Appointed contractor and ECO.	Areas with spillages will be monitored after remediation to confirm that the areas are properly cleaned up.	ECO will monitor the affected areas on a monthly basis.	The management action will be undertaken when spillages occur throughout the construction phase.
				The existing waste collectors will be used for the removal of waste from the site to a registered waste disposal facility.	ECO.	Volumes of waste collected will be recorded in accordance with existing mine systems.	Appointed contractor and ECO will keep record of waste collected.	Waste will be collected on intervals approved by the mine.
The excavation of the initial boxcut will result in the removal of vegetation cover from the stripping of topsoil, which will lead to the loss of habitat.	Natural Vegetation	To ensure that the establishment of the initial boxcut does not result in the permanent loss of vegetation and its	The construction of the initial boxcut will be conducted according to the approved mining plan.	Ensure that construction activities are limited within the approved development footprint.	Appointed contractor, Mine engineer, geologist and ECO.	Areas of disturbance inspected against the approved design specifications of the initial boxcut.	The ECO will undertake monthly inspections.	Throughout the 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
		seed bank.		Stockpile removed topsoil on a topsoil stockpile area separate from softs and hards overburden materials.	Appointed contractor and ECO.	The stockpiling areas will be inspected to ensure that are stockpiled and managed accordingly.	The ECO will undertake monthly inspections.	Throughout the construction phase.
During the construction phase of the initial boxcut, as activities are taking place adjacent to wetlands/streams, there is a possibility that water quantity and quality can be impaired through contaminated surface runoff entering the wetlands/streams. Typically, impairment will occur as a consequence of sediment disturbance resulting in an increase in turbidity. Water quality may also be impaired as a consequence of accidental spillages and the intentional washing and rinsing of equipment within the wetlands. Furthermore, a portion of the Depression (Pan) Wetland will be mined. This will therefore impact on the wetland system of the pan.	Sensitive Landscape	Ensure that the establishment of the box-cut do not have detrimental impacts on the wetlands/streams identified surrounding the project study area.	Maintain or improve the current PES and EIS of the wetlands in accordance with the water use licence conditions.	All construction staff will be educated on the sensitivity of wetland areas and will be made aware of all wetland areas near the construction sites.	Appointed contractor and ECO.	Records of training will be kept.	ECO will inspect the records quarterly.	Training will be conducted on intervals approved by the mine.
				Develop and implement a construction stormwater management plan prior to the commencement of site clearing activities. Such a plan should aim to minimise the transport of sediment off site. Berms will be constructed to manage the silt from the construction site.	Civil engineer and ECO.	A construction stormwater management plan will be compiled and kept for implementation purposes.	A construction stormwater management plan will be compiled before commencement of site clearing activities.	Before commencement of site clearing activities.
				Erosion within the construction site must be minimised through the following: Limiting the area of disturbance and vegetation clearing to as small an area as possible. Phasing vegetation clearing activities and limiting the time that any one area of bare soil is exposed to erosion. Control of stormwater flowing onto and through the site. Where required, stormwater from upslope should be diverted around the construction site. Prompt stabilisation and re-vegetation of soils after disturbance and construction activities in an area are complete.	Appointed contractor, Mine engineer and ECO.	Inspections will be conducted during the construction of the box-cut to determine compliance with the management action.	ECO will undertake inspections monthly and site manager daily.	Throughout the construction phase.
				All disturbed areas outside the direct development footprints will be rehabilitated and re-vegetated as soon as possible.	Appointed contractor and ECO.	Areas of disturbance will be inspected to determine areas that need	ECO on a monthly basis.	Throughout the 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
						rehabilitation.		
				The construction servitudes of the box-cut will be regularly inspected for waste or littering and clean-up operations initiated if required.	Appointed contractor, Mine engineer, geologist and ECO.	The project area will be inspected for waste or littering. Areas with waste or littering will be monitored after remediation to confirm that the areas are properly cleaned up.	ECO on a monthly basis.	Throughout the construction phase.
				No loss of wetland habitat will be permitted outside the authorised areas.	ECO and mine manager.	ECO will conduct inspection of the construction area to ensure that all activities is undertaken outside of the approved footprint area and not within wetland areas.	The ECO will inspect the areas on a monthly basis.	Throughout the construction phase.
				Landscape and re-vegetate all unnecessarily denuded areas as soon as possible.	Appointed contractor and ECO.	ECO will conduct inspections to ensure that all unnecessary cleared areas are rehabilitated.	ECO will ensure that noise monitoring conducted. And monitoring reports are kept on site.	Throughout the construction phase.
Visual impacts on the surrounding properties, communities and road users from the construction site may result. These impacts may result from excessive clearing and stripping	Aesthetics	Ensure that all operations during the construction phase of the initial box-cut does not result in	Measures will be undertaken by the mine to ensure that the visual aspects from the site are complying with the	A perimeter berm will be constructed around the box-cut to shield the cuts away from the affected structures.	Mine engineer and the ECO.	The constructed perimeter berms will be inspected for compliance with the design specifications.	Mine Engineer and ECO on a monthly basis.	Throughout the 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
of topsoil for preparing the area for the development, relatively dust from construction activities and un-rehabilitated landscape scarring.		detrimental visual impacts on surrounding properties, communities and road users.	relevant visual standards and objectives.	Where possible areas disturbed by construction activity, will be suitably topsoiled and vegetated as soon as is possible.	Appointed contractor and ECO.	Areas of disturbance will be inspected to determine areas that need rehabilitation.	ECO on a monthly basis.	Throughout the construction phase.
				Limit areas of disturbance to areas where the box-cut will be constructed or placed.	Appointed contractor and ECO.	Areas of disturbance inspected against the approved areas.	Mine Engineer and ECO on a monthly basis.	Throughout the construction phase.
				Dust suppression will be undertaken at all areas that will be affected by construction activities and where dust will be generated.	Appointed contractor and ECO.	See monitoring under air quality.	See under air quality.	Daily during the construction phase of the project.
				Avoid upwards lighting of structures but rather direct the light downwards to focus on the object to be illuminated.	Appointed contractor.	Lighting installation and effects of the lighting to community will be monitored.	Safety officer/VOHE on a monthly basis.	During the operations phase of the project.
				As night lighting during construction is one of the more objectionable forms of visual impact, it is important that selective and sensitive location and design of the lighting requirements for the construction camp and the mine are developed.	Appointed contractor and ECO.	Selective and sensitive location and design of the lighting requirements for the construction camp and the mine will be developed and recorded.	Selective and sensitive location and design of the lighting requirements for the construction camp and the mine are developed and kept for implementation purposes.	Before construction phase.
Animal burrows and habitats remaining within the proposed area will be destroyed during construction. This may result in the migration of remaining animal life away from the affected areas.	Animal Life	To ensure that the establishment of the box-cut do not result in the permanent loss of natural habitat for the wild life.	The management of the impact will comply with the mine's biodiversity management plan and closure plan for the mine.	The rehabilitation of the disturbed areas will be conducted such that the rehabilitated areas will encourage the migration of animals back into the rehabilitated areas.	ECO and mining contractor.	The area being rehabilitated will be inspected. Where necessary an ecologist will be consulted for	ECO and ecologist annually.	Throughout the life of the mine.

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
						confirmation migration and return migration of the wild life and progress thereof.		
<u>Activity 24 of Listing Notice 1:</u> Construction of the haul roads. **<u>Activity 6, 15 and 17 of Listing Notice 2</u>: The development of the haul roads will result in the clearance of indigenous vegetation and will require a need for a WUL.**								
The construction phase for the roads will lead to erosion of soil resources due to altered surface dynamics, the presence of hardened surfaces and general degradation of soil resources, which could result in the loss of land capability.	Soils, land capability and land use	To ensure that the construction roads does not have detrimental impacts on the soils.	The construction of the roads will be conducted according to the approved detailed design plan.	The entire area will be monitored regularly for erosion as part of the road maintenance procedure.	Appointed contractor and ECO.	The area will be monitored for erosion and record of monitoring will be kept.	The ECO will monitor the areas for compaction and erosion every three months.	Throughout the construction phase.
				In cases where erosion does occur, action plans should be implemented to apply mitigation.	Appointed contractor and ECO.	The area will be monitored for erosion. Results of action plans if compaction and erosion was noted, will be kept on site and implemented.	The ECO will monitor the area for compaction and erosion every three months. The ECO will ensure that action plans, if erosion and compaction was noted, are proposed and implemented.	Throughout the construction phase.
				The construction of the roads will be undertaken within the approved footprint area.	Appointed contractor, Mine engineer and ECO.	Areas of disturbance inspected against the approved design specifications of the roads.	The ECO will undertake monthly inspections.	Throughout the construction phase.
				Excess soils will be stockpiled at the topsoil stockpiling area, which will not be more than five meters high.	ECO	Inspections will be conducted to ensure that the excess soils are stockpiled at the approved footprint area	ECO will conduct inspections on a monthly basis.	Throughout the 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 that they not exceed the height of five meters.		
The construction of the roads will result in the change of the current land surface, which will result in the change in the local drainage patterns.	Topography	Ensure that the constructions of the roads do not result in permanent alteration of the topographical patterns.	The disturbed areas will be rehabilitated according to the approved rehabilitation plan.	The construction activities will be undertaken within the approved footprint areas.	Appointed contractor, Mine engineer and ECO.	Areas of disturbance inspected against the approved design specifications of the roads.	The ECO will undertake monthly inspections.	Throughout the construction phase.
Areas that have been stripped of vegetation will be prone to erosion. This could lead to increased siltation being deposited into the local streams. During the construction of the roads, surface water runoff from such areas will be contaminated with suspended solids, which can add to the turbidity in the nearby streams. This may have detrimental impact on the livelihood of the affected streams. If the construction vehicles are poorly maintained oil spills could cause pollution if washed off roads by stormwater.	Surface Water	To ensure that the runoff water from the construction of the roads does not adversely affect clean water environment.	Management of the storm water will comply with the requirements of the regulations under the GN704 and as far as possible with the requirements of the relevant DWS Best Practice Guidelines.	Minimise the extent of hardened surfaces.	Appointed contractor, Mine engineer and ECO.	Areas of disturbance inspected against the approved route of the roads.	The ECO will undertake monthly inspections.	Throughout the construction phase.
				All construction vehicles will be well maintained and inspected for hydrocarbon leaks according to the maintenance schedule.		Measures to comply with the management actions will be recorded and filed.	ECO will update records annually	Throughout the construction phase.
				Construction of the roads will be limited to designated boundaries.	Appointed contractor, Mine engineer and ECO.	Areas of disturbance inspected against the approved route of the roads.	The ECO will undertake monthly inspections.	Throughout the construction phase.
				Areas that are stripped will be optimised to limit unnecessary stripping.	Appointed contractor, Mine engineer and ECO.	ECO will conduct inspections to ensure that all construction activities are contained within the approved footprint areas and no unnecessary	The ECO will inspect the areas on a monthly basis.	Throughout the 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
						clearance of vegetation is noted.		
				Storm water from upslope of the stripped areas will be diverted around these areas to limit the amount of storm water flowing over from these areas.	Appointed contractor, Mine engineer and ECO.	ECO will conduct inspections to ensure that the storm water from upslope of the stripped areas is diverted around these areas.	The ECO will inspect the areas on a monthly basis.	Throughout the construction phase.
Disturbance brought about by construction activities of the roads, specifically the clearing of vegetation will provide opportunity for alien and pioneer species to establish and replace indigenous grassland/wetland species. During the construction phase, as activities are taking place adjacent to wetlands, there is a possibility that water quality can be impaired through contaminated surface runoff entering the wetlands.	Sensitive Landscape	Ensure that the establishment of the roads do not have detrimental impacts on the wetlands identified within and outside the project study area.	Maintain or improve the current PES and EIS of the wetlands within the project study area in accordance with the water use licence conditions.	All construction staff will be educated on the sensitivity of wetland areas and should be made aware of all wetland areas near the construction sites.	Appointed contractor and ECO.	Records of training will be kept.	ECO will inspect the records quarterly.	Training will be conducted on intervals approved by the mine.
				Erosion within the construction site will be minimised through the following: Limiting the area of disturbance and vegetation clearing to as small an area as possible. Phasing vegetation clearing activities and limiting the time that any one area of bare soil is exposed to erosion. Control of stormwater flowing onto and through the site. Where required, stormwater from upslope will be diverted around the construction site. Prompt stabilisation and re-vegetation of soils after disturbance and construction activities in an area are complete.	Appointed contractor, Mine engineer and ECO.	Inspections will be conducted during the construction of the road to determine compliance with the management action.	ECO will undertake inspections monthly and site manager daily.	Throughout the construction phase.
				All disturbed areas outside the direct development footprints will be rehabilitated and re-vegetated as soon as possible.	Appointed contractor and ECO.	Areas of disturbance will be inspected to determine areas that need rehabilitation.	ECO on a monthly basis.	Throughout the 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 construction servitudes of the roads will be regularly inspected for waste or littering and clean-up operations initiated if required.	Appointed contractor, Mine engineer and ECO.	The project area will be inspected for waste or littering. Areas with waste or littering will be monitored after remediation to confirm that the areas are properly cleaned up.	ECO on a monthly basis.	Throughout the construction phase.
				No loss of wetland habitat will be permitted outside the authorised areas.	ECO and mine manager.	ECO will conduct inspection of the construction area to ensure that all activities is undertaken outside of the approved footprint area and not within wetland areas.	The ECO will inspect the areas on a monthly basis.	Throughout the construction phase.
				Landscape and re-vegetate all unnecessarily denuded areas as soon as possible.	Appointed contractor and ECO.	ECO will conduct inspections to ensure that all unnecessary cleared areas are rehabilitated.	ECO will ensure that noise monitoring conducted. And monitoring reports are kept on site.	Throughout the construction phase.
Noise generated from construction activities may add to the current noise levels. This may have impacts on surrounding property owners and occupiers.	Noise	Ensure that the noise levels emanating from the construction site will not have detrimental effects on the mine employees and surrounding communities.	The noise levels from the construction site will be managed and measures will be taken to ensure that noise levels are below the National Noise Control Regulations, SANS10103:2008 guidelines.	Construction crew will conduct toolbox talks to educate their employees and ensure that they are aware of the legislation regarding noise.	ECO.	Records of training will be kept.	ECO will inspect the records quarterly.	Training will be conducted on intervals approved by the mine.
				The mine vehicles used during the construction must be well maintained and measures should be implemented by the mine to ensure that the noise generated from the mine machinery is lowered.	Appointed contractor and ECO.	Records will be kept	ECO when maintenance is conducted.	Throughout the 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
Visual impacts on the surrounding communities and road users from the construction site may result.	Aesthetics	Ensure that all operations during the construction phase of the roads does not result in detrimental visual impacts on surrounding properties, communities and road users.	Measures will be undertaken by the mine to ensure that the visual aspects from the site are complying with the relevant visual standards and objectives.	Where possible, areas disturbed by construction activities, will be suitably topsoiled and vegetated as soon as is possible. The progressive rehabilitation measures will allow for the maximum growth period before the completion of the project.	Appointed contractor and ECO.	Areas of disturbance will be inspected to determine areas that need rehabilitation.	ECO on a monthly basis.	Throughout the construction phase.
				Limit areas of disturbance to areas where the roads will be constructed.	Appointed contractor and ECO.	Areas of disturbance inspected against the approved footprint area.	Mine Engineer and ECO on a monthly basis.	Throughout the construction phase.
				Dust suppression will be undertaken at all areas that will be affected by construction activities and where dust will be generated.	Appointed contractor and ECO.	See monitoring under air quality.	See under air quality.	Daily during the construction phase of the project.
				Avoid upwards lighting of structures but rather direct the light downwards to focus on the object to be illuminated.	Appointed contractor.	Lighting installation and effects of the lighting to community will be monitored.	Safety officer/VOHE on a monthly basis.	During the operations phase of the project.
				As night lighting during construction is one of the more objectionable forms of visual impact, it is important that selective and sensitive location and design of the lighting requirements for the construction camp and the mine are developed.	Appointed contractor and ECO.	Selective and sensitive location and design of the lighting requirements for the construction camp and the mine will be developed and recorded.	Selective and sensitive location and design of the lighting requirements for the construction camp and the mine are developed and kept for implementation purposes.	Before the construction phase.
<u>Activity 9 and 10 of Listing Notice 1:</u> Construction of the Dirty Water Pipeline. **<u>Activity 6, 15 and 17 of Listing Notice 2:</u> Construction of the Topsoil Stockpile and the Dirty Water Pipeline.**								
The construction phase for the above-mentioned infrastructure (topsoil stockpile and dirty water pipeline) will lead to compaction and erosion of soil	Soils, land capability and land use	To ensure that the construction of the above-mentioned	The construction of the above-mentioned activities will be conducted according	The entire area will be monitored regularly for erosion as part of the road maintenance procedure.	Appointed contractor and ECO.	The area will be monitored for compaction and erosion and	The ECO will monitor the areas for compaction and	Throughout the 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
resources due to altered surface dynamics, the presence of hardened surfaces and general degradation of soil resources, which could result in the loss of land capability.		activities does not have detrimental impacts on the soils.	to the approved plans.			record of monitoring will be kept.	erosion every three months.	
				In cases where erosion does occur, action plans should be implemented to apply mitigation.	Appointed contractor and ECO.	The area will be monitored for compaction and erosion. Results of action plans if compaction and erosion was noted, will be kept on site and implemented.	The ECO will monitor the area for compaction and erosion every three months. The ECO will ensure that action plans, if erosion and compaction was noted, are proposed and implemented.	Throughout the construction phase.
				The construction activities will be conducted within the approved footprint area.	Appointed contractor, Mine engineer and ECO.	Areas of disturbance inspected against the approved design plans	The ECO will undertake monthly inspections.	Throughout the construction phase.
				Excess soils will be stockpiled at the topsoil stockpiling area, which will not be more than five meters high.	ECO	Inspections will be conducted to ensure that the excess soils are stockpiled at the approved footprint area and that they not exceed the height of five meters.	ECO will conduct inspections on a monthly basis.	Throughout the construction phase.
				The stockpiled topsoil will be seeded with a recommended seed mix to ensure that a good vegetation cover is achieved, should the natural seedbank not provide enough cover.	Appointed contractor and ECO.	The seeding will be monitored by inspection.	ECO will inspect the seeding monthly.	During rainy season after stockpiling of topsoil.
				No mixing of the topsoil material with subsoil, softs and hard overburden material will be allowed.	Appointed contractor and ECO.	Undertake regular inspections to	ECO will undertake the inspection	During the stripping and stockpiling of topsoil.

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
						confirm correct placement of the removed soils.	monthly and Site manager daily.	
The construction of the above-mentioned infrastructures (topsoil stockpile and dirty water pipeline) will result in the change of the current land surface, which will result in the change in the local drainage patterns.	Topography	Ensure that the constructions of the above-mentioned infrastructures do not result in permanent alteration of the topographical patterns.	The disturbed areas will be rehabilitated according to the approved rehabilitation plan.	The construction activities of the above-mentioned infrastructure will be undertaken within the approved footprint areas.	Appointed contractor, Mine engineer and ECO.	Areas of disturbance inspected against the approved plans.	The ECO will undertake monthly inspections.	Throughout the construction phase.
During the construction of the surface infrastructure (topsoil stockpile and dirty water pipeline), topsoil will be stripped. These activities may result in bare areas, which will result in the erosion of soils during rainfall events, with elevated suspended solids reporting in the runoff water, which may ultimately enter the nearby watercourses.	Surface Water	To ensure that the runoff water from the construction activities does not adversely affect clean water environment.	Management of the storm water will comply with the requirements of the regulations under the GN704 and as far as possible with the requirements of the relevant DWS Best Practice Guidelines.	Minimise the extent of hardened surfaces, to retain surface runoff in stilling ponds or retention facilities and to release these in a controlled manner including energy dissipation to avoid erosion to the receiving wetland areas.	Appointed contractor and ECO.	Areas of disturbance inspected against the approved design specifications.	The ECO will undertake monthly inspections.	Throughout the construction phase.
				Install/construct the construction stormwater management system prior to the onset of vegetation clearing activities on the surface infrastructure footprints.	Appointed contractor and ECO.	Inspections to be conducted after construction activities to ensure that water protection measures are in place. These areas will be inspected after a heavy rainfall event to verify effectiveness to control sedimentation run-off.	The ECO will inspect the areas on monthly basis.	Before the commencement of the construction activities.
				No activities will be allowed outside of the authorised areas.	ECO and mine manager.	ECO will conduct inspections to ensure that no activities are constructed	The ECO will inspect the areas on a monthly basis.	Throughout the 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
						without necessary permits.		
				Ensure that no equipment is washed in the streams and washing will be undertaken at the mine's workshop area.	ECO and mine manager.	ECO will conduct inspections to ensure that all machinery equipment's are serviced at the workshop areas.	The ECO will inspect the areas on a monthly basis.	Throughout the construction phase.
				All construction vehicles will be well maintained and inspected regularly for hydrocarbon leaks.		Measures to comply with the management actions will be recorded and filed.	ECO will update records annually	Throughout the operational phase of the project.
				Construction of the infrastructures will be limited to designated boundaries.	Appointed contractor, Mine engineer and ECO.	Areas of disturbance inspected against the approved plans.	The ECO will undertake monthly inspections.	Throughout the construction phase.
				In order to reduce the potential impacts associated with the introduction of contaminants dissolved or suspended in the runoff from construction sites, where practically possible, no runoff will be introduced into wetlands.	Appointed contractor, Mine engineer and ECO.	ECO will conduct inspections to ensure that the all construction activities are contained within the approved footprint areas and runoff reported to the designated facility.	The ECO will inspect the areas on a monthly basis.	Throughout the construction phase.
				All construction must be undertaken in line with the approved.	Appointed contractor, Mine engineer and ECO.	ECO will conduct inspections and review of documents to ensure that the	The ECO will inspect the areas and conduct review on a monthly basis.	Throughout the 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
						facilities are constructed according to the approved plans,		
				Areas that are stripped will be optimised to limit unnecessary stripping.	Appointed contractor, Mine engineer and ECO.	ECO will conduct inspections to ensure that all construction activities are contained within the approved footprint areas and no unnecessary clearance of vegetation is noted.	The ECO will inspect the areas on a monthly basis.	Throughout the construction phase.
				Storm water from upslope of the stripped areas will be diverted around these areas to limit the amount of storm water flowing over from these areas.	Appointed contractor, Mine engineer and ECO.	ECO will conduct inspections to ensure that the storm water from upslope of the stripped areas is diverted around these areas.	The ECO will inspect the areas on a monthly basis.	Throughout the construction phase.
				Where practically possible, the major earthworks will be undertaken during the dry season (roughly from April to August) to limit erosion due to rainfall runoff.	Appointed contractor and ECO.	ECO will conduct inspections.	The ECO will inspect the areas on a monthly basis.	Throughout the construction phase.
				Cleared areas outside direct development footprint will be re-vegetated and seeded (where necessary) as soon as possible following disturbance.	Appointed contractor and ECO.	Areas of disturbance will be inspected to determine areas that need rehabilitation.	ECO on a monthly basis.	Throughout the construction phase.
				Regular monitoring and inspections at rehabilitated sites will be undertaken to ensure successful rehabilitation.	ECO.	Rehabilitated areas will be inspected and records of inspection will be	Rehabilitated areas will be inspected on a monthly basis and records of	During and after the 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
						kept.	inspection will be kept.	
Construction activities will involve the clearing of large areas of soil, as well as the movement of soil. This will expose large areas and large volumes of soil to erosion by wind and water, which will likely be aggravated by an increase in surface runoff from bare soil areas and concentration of flows. Sediment could be transported downslope via surface runoff to the adjacent wetland areas, leading to increased turbidity with resultant impacts on aquatic habitats, including loss of sensitive species, as well as increased sediment deposition in wetlands, leading to habitat degradation as these areas become colonised by alien and pioneer species. Severe sedimentation could also impact of flow distribution within the wetlands.	Sensitive Landscape	Ensure that the establishment of the mine infrastructure do not have detrimental impacts on the wetlands identified within the project study area.	Maintain or improve the current PES and EIS of the wetlands within and surrounding the project study area in accordance with the water use licence conditions. The areas to be rehabilitated will be in compliance with relevant rehabilitation guidelines.	Implement storm water management plan.	ECO, Mining Contractor	The areas will be inspected to ensure that the storm water plan is implemented.	Inspections will be undertaken by the ECO on a monthly basis.	Throughout the construction phase.
				Reduce the extent of bare surfaces wherever possible by rehabilitating and revegetating them.	ECO, Mining Contractor	Inspections will be conducted to ensure that all construction activities are conducted within the approved footprint areas.	Inspections will be undertaken by the ECO on a monthly basis.	Throughout the construction phase.
				Design of surface infrastructure areas will be optimised to minimise the size of the development footprint and to avoid encroachment into wetland habitat.	Appointed contractor, Mine engineer and ECO.	ECO will conduct inspections to ensure that all construction activities are contained within the approved footprint areas and no unnecessary clearance of vegetation is noted.	The ECO will inspect the areas on a monthly basis.	Throughout the construction phase.
During the construction phase, as activities are taking place adjacent to wetlands, there is a possibility that water quantity and quality can be impaired through contaminated surface runoff entering the wetlands. Typically, impairment will occur as a consequence of sediment disturbance resulting in an increase in turbidity. Water quality may also be impaired as a consequence of accidental spillages and the intentional washing				Emergency servicing of construction vehicles will take place only in dedicated areas.	ECO	Inspections will be conducted to ensure that emergency servicing of equipment's is undertaken in dedicated areas that are equipped with drip trays.	Inspections will be undertaken by the ECO on a monthly basis.	Throughout the 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 rinsing of equipment within the wetlands. It is possible that hydrocarbons will be temporarily stored and used on site, as well as cement and other potential pollutants								
Disturbance brought about by construction activities, specifically the clearing of vegetation will provide opportunity for alien and pioneer species to establish and replace indigenous grassland/wetland species.				All construction staff will be educated on the sensitivity of wetland areas and will be made aware of all wetland areas near the construction sites.	Appointed contractor and ECO.	Records of training will be kept.	ECO will inspect the records quarterly.	
				Develop and implement a construction stormwater management plan prior to the commencement of site clearing activities. Such a plan will aim to minimise the transport of sediment off site.	Civil engineer and ECO.	A construction stormwater management plan will be compiled and kept for implementation purposes.	A construction stormwater management plan will be compiled before commencement of site clearing activities.	
				Erosion within the construction site must be minimised through the following: Limiting the area of disturbance and vegetation clearing to as small an area as possible; Phasing vegetation clearing activities and limiting the time that any one area of bare soil is exposed to erosion; Control of stormwater flowing onto and through the site. Where required, stormwater from upslope will be diverted around the construction site; Prompt stabilisation and re-vegetation of soils after disturbance and construction activities in an area are complete.	Appointed contractor, Mine engineer and ECO.	Inspections will be conducted during the construction of the infrastructures to determine compliance with the management action.	ECO will undertake inspections monthly and site manager daily.	

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
				All disturbed areas outside the direct development footprints will be rehabilitated and re-vegetated as soon as possible.	Appointed contractor and ECO.	Areas of disturbance will be inspected to determine areas that need rehabilitation.	ECO on a monthly basis.	
				The construction servitudes will be regularly inspected for waste or littering and clean-up operations initiated if required.	Appointed contractor, Mine engineer, geologist and ECO.	The project area will be inspected for waste or littering. Areas with waste or littering will be monitored after remediation to confirm that the areas are properly cleaned up.	ECO on a monthly basis.	
				No loss of wetland habitat will be permitted outside of the authorised areas.	ECO and mine manager.	ECO will conduct inspection of the construction area to ensure that all activities is undertaken outside of the approved footprint area and not within wetland areas.	The ECO will inspect the areas on a monthly basis.	
During the construction of the above-mentioned surface infrastructure, hydrocarbon fluids (diesel, petrol and oils) and other chemicals may spill onto the ground resulting in the potential pollution of surface and groundwater environments.	Groundwater	Ensure that the groundwater regime is not detrimentally affected by the establishment of the mining infrastructures.	Groundwater quality near the site will not deteriorate beyond groundwater water quality targets set by the authorities.	Used oil will be removed immediately after vehicle servicing.	ECO	Inspections will be conducted to ensure that used oil is removed on site to the licenced waste disposal facility and records of removal will be kept on site.	Inspections will be undertaken by the ECO on a monthly basis.	
				All material with potential to pollute will be stored in the existing secure facilities.	ECO	Inspections will be conducted to	Inspections will be undertaken	

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
						ensure that all material with potential to pollute are stored in secure facilities (existing workshop and stores).	by the ECO on a monthly basis.	
				Mine machinery will be repaired at designated areas fit for purpose. No maintenance outside the dedicated areas will be allowed unless it is an emergency repairs which must be on a protected ground or by use of drip trays.	ECO and mine manager.	ECO will conduct inspections to ensure that all machinery equipment's are serviced at the workshop areas. Inspections will be conducted to ensure that emergency servicing of equipment's is undertaken in dedicated areas that are equipped with drip trays.	The ECO will inspect the areas on a monthly basis.	Throughout the construction phase.
				All hydrocarbon liquids will be stored in the existing leak and corrosion resistant containers. These containers will be placed in bunded areas. The containers used for the storage of hydrocarbon liquids will be maintained in good condition.	ECO and mine manager.	ECO will conduct inspections to ensure that all hydrocarbon liquids are stored in leak and corrosion resistant containers and in a concrete surface. Proof of the above will be kept and proof of maintenance	The ECO will inspect the areas on a monthly basis.	Throughout the 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
						thereof.		
				All spillages will be contained and the affected areas remedied.	Appointed contractor and ECO.	Areas with spillages will be monitored after remediation to confirm that the areas are properly cleaned up	ECO will monitor the affected areas on a monthly basis.	The management action will be undertaken when spillages occur throughout the construction phase.
				Training for the waste storage facilities will be conducted for employees working with waste (hydrocarbon liquid), including contractors' employees.	Appointed contractor and ECO.	Records of training will be kept.	ECO will inspect the records quarterly.	Training will be conducted on intervals approved by the mine.
				Credible waste collectors will be used for the removal of waste from the site to a registered waste disposal facility.	Appointed contractor and ECO.	Volumes of waste collected will be recorded in accordance with existing mine systems.	Appointed contractor and ECO will keep record of waste collected.	Waste will be collected on intervals approved by the mine.
Noise generated from construction activities may add to the current noise levels. This may have impacts on surrounding property owners and occupiers.	Noise	Ensure that the noise levels emanating from the project construction site will not have detrimental effects on the mine employees and surrounding communities.	The noise levels from the project site will be managed and measures will be taken to ensure that noise levels are below the National Noise Control Regulations, SANS10103:2008 guidelines and the International Finance Corporation (World Bank) guidelines.	Construction crew will conduct toolbox talks to educate their employees and ensure that they are aware of the legislation regarding noise.	ECO.	Records of training will be kept.	ECO will inspect the records quarterly.	Training will be conducted on intervals approved by the mine.
				The mine vehicles used during the construction must be well maintained and measures should be implemented by the mine to ensure that the noise generated from the mine machinery is lowered.	ECO.	Records will be kept.	ECO will inspect the records quarterly.	Maintenance will be conducted on intervals approved by the mine.
Combined Results of the Impact Assessment and Mitigation Measures: **Activity, 12, 19 of Listing Notice 1, Activity 6, 15 and 17 of Listing Notice 2 and Activity 12 and 14 of Listing Notice 3: The excavation, removal and moving of soil and rock within a watercourse or within 32m thereof. These includes: opencast pits (within watercourse and within 32 meters from a watercourse), topsoil stockpiles (within 32 meters), dirty water pipeline (within 32 meters).** **Activity 9 and 19 of Listing Notice 1: Construction of a Dirty Water Pipeline.** **Activity 24 of Listing Notice 1: Development/construction of a Haul Road.** **Activity 34 of Listing Notice 1 and Activity 15 of Listing Notice 2: The extension of the opencast mine workings will result in the need for a water use licence in accordance with section 21 (c) and 21(i) of the National Water Act, 1998 (Act No. 36 of 1998) (NWA) and will results in a need for clearance of vegetation.**									

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 development of proposed Project will may result in the disturbance of heritage sites. Two sites of heritage importance have been identified within the proposed opencast pit area.		Ensure that the construction activities do not have detrimental impacts on heritage sites.	The construction will be undertaken in compliance with the requirements of the National Heritage Resources Act, 1999 (Act 25 of 1999), IFC Standards and recommendations from the heritage specialist.	Fence all graveyards in and have a grave management plan drafted for the sustainable preservation thereof if the mine decides to not disturb the graves. The grave management plan will be written by a heritage expert. This usually is done when the graves are in no danger of being damaged, but where there will be a secondary impact due to the activities of the mine.	Appointed specialist and ECO.	Records of the cultural heritage management plan (CMP) will be kept on site for audit purposes. ECO will conduct monthly inspections to ensure that the graveyard area is always fenced and no disturbance is undertaken.	Monthly inspections will be conducted by the ECO and records of inspections and the plan will be kept on site.	Before commencement of the construction activities.
	Sites of archaeological and cultural importance.			Upon finding any archaeological or historical material, all work at the affected area must cease. The area will be demarcated in order to prevent any further work there until an investigation has been completed. An archaeologist will be contacted immediately to provide advice on the matter. Should it be a minor issue, the archaeologist will decide on future action, which could include adapting the HIA or not. Depending on the nature of the find, it may include a site visit. If needed, the necessary permit will be applied for with SAHRA. This will be done in conjunction with the appointed archaeologist. The removal of such archaeological material will be done by the archaeologist in lieu of the approval given by SAHRA, including any conditions stipulated by the	Appointed specialist and ECO.	Records of any archaeological or historical material will be kept on site for audit purposes. Inspection of the construction activities against the management action will be undertaken monthly.	Monthly inspections will be conducted by the ECO and records will be kept on site.	During the construction 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
				latter. Work on site will only continue after removal of the archaeological/ historical material was done.				
				Access will be provided to the families of the grave sites identified within the project area. Regulated visitor hours will be implemented that is compatible with mine safety rules.	Appointed specialist and ECO.	The grave management plan will indicate access to the families and the regulated hours.	Monthly inspections will be conducted by the ECO and records will be kept on site.	Throughout the construction phase.
				The families of the grave sites identified within the project area currently have access to these areas. Should alternatives to access the cultural heritage sites be identified during commencement of the project, the families will be notified.	Appointed specialist and ECO.	Inspection of the construction activities against the management action will be undertaken monthly.	Monthly inspections will be conducted by the ECO and records will be kept on site.	Throughout the construction phase.
				Should it be a need to relocate the graves, exhume the mortal remains and to have it relocated. This usually is relevant when the graves will be directly affected (damaged or destroyed) by the development. In this case specific procedures must be followed which includes social consultation. Graves younger than 60 years may be exhumed only by an undertaker. For those older than 60 years, and unknown graves, an undertaker and archaeologist should be appointed. Permits must be obtained from the Burial Grounds and Graves unit of SAHRA. This procedure is quite lengthy and involves social consultation.	Appointed heritage specialist and ECO.	Permits and consultations required before relocation will be conducted,	Records of relocation and consultation will be kept for records purposes.	Before the commencement of the construction phase.
Traffic impacts may result from the movement of vehicles around and within the project area.	Traffic Impact	Ensure that the operation of the mining activities have minimal impacts on traffic.	Operation of the mining activities will be undertaken according to the mines traffic management	A Speed limit of 60km/h will be enforced, and the proposed speed limit signs are to be erected.	Safety Officer/VOHE	Speed checking will be conducted.	Safety Officer/VOHE will conduct speed checking as regularly as possible.	Throughout the 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
			procedure.	Traffic will be restricted to demarcated areas and traffic volumes and speeds within the construction site will be controlled.	Safety Officer/VOHE	Observations on the speed at which vehicle are travelling will be conducted on an ad hoc basis.	VOHE, Safety Officer or Environmental Co-ordinator will do spot checks on an ad hoc basis.	Throughout the construction phase.
Visual impacts on the surrounding communities and road users from the construction site.	Aesthetics	Ensure that all operations during the construction phase of the activities does not result in detrimental visual impacts on surrounding properties, communities and road users.	Measures will be undertaken by the mine to ensure that the visual aspects from the site are complying with the relevant visual standards and objectives.	Where possible areas disturbed by construction activity, will be suitably topsoiled and vegetated as soon as is possible. The progressive rehabilitation measures will allow for the maximum growth period before the completion of the project.	Appointed contractor and ECO.	Areas of disturbance will be inspected to determine areas that need rehabilitation.	ECO on a monthly basis.	Throughout the construction phase.
				Limit areas of disturbance to areas where the construction activities will be constructed or placed.	Appointed contractor and ECO.	Areas of disturbance will be inspected to determine areas that need rehabilitation.	ECO on a monthly basis.	Throughout the construction phase.
				Dust suppression will be undertaken at all areas that will be affected by construction activities and where dust will be generated.	Appointed contractor and ECO.	See monitoring under air quality.	See under air quality.	Daily during the construction phase of the project.
				Avoid upwards lighting of structures but rather direct the light downwards to focus on the object to be illuminated.	Appointed contractor.	Lighting installation and effects of the lighting to community will be monitored.	Safety officer/VOHE on a monthly basis.	During the operations phase of the project.
				All areas affected by the construction works will need to be rehabilitated and re-vegetated.	Appointed contractor and ECO.	ECO will conduct inspections to ensure that all unnecessary cleared areas are rehabilitated.	Monthly inspections by ECO.	Throughout the 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
Influx of job seekers.	Socio-economic aspects.	Ensure that measures are taken to discourage influx of job seekers.	Measures taken to control influx of job seekers will be in line with the mine's safety and security standards.	Ensure good communication between the operation and surface owners and farmers whose properties might be directly affected by the population influx.	ECO.	Meeting with surface owners and farmers will be conducted and record kept for audit purposes.	ECO will check records on a monthly basis.	Throughout the pre-construction and construction phase.
				Black Wattle Colliery will ensure that the creation of unrealistic expectations is prevented by communicating the period of the construction phase to the local communities and the communities will be informed that few new positions will be created. Local councillors will be involved in the above communication.	ECO.	Number of job seekers will be monitored and meetings held by, and with the communities, will where possible, be attended by the mine.	Mine Manager and ECO will monitor the number of job seekers weekly and will attend meetings as and when these are held.	Throughout the pre-construction and construction phase.
Removal of natural vegetation due to the stripping of topsoil and disturbance of faunal habitat.	Biodiversity	Ensure that the construction activities do not impacts detrimentally on the ecological features of the streams in the study area.	Ensure that the aquatic ecology is manage in line with requirements set in the ecological assessment.	Construction will be conducted during the winter months, where possible to curb surface water containing silt, reporting to the grassland/wetland areas and to avoid disturbance of animal species breeding in the grassland/wetland areas.	Appointed contractor and ECO.	Inspections will be conducted to ensure hat activities are undertaken in winter season and records kept.	Monthly inspections by ECO.	Throughout the construction phase.
				Clearance of vegetation will be kept to the absolute minimum.	Appointed contractor, Mine engineer and ECO.	ECO will conduct inspections to ensure that all construction activities are contained within the approved footprint areas and no unnecessary clearance of vegetation is	The ECO will inspect the areas on a monthly basis.	Throughout the 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
						noted.		
				No machinery will be serviced within the wetland areas.	Appointed contractor and ECO.	Inspections will be conducted to ensure that no servicing of machinery is undertaken within the grassland/wetland areas.	The ECO will inspect the areas on a monthly basis.	Throughout the construction phase.
				Chemical toilets must be provided on site and no employees may relieve themselves in the veld (wetland or terrestrial).	Appointed contractor and ECO.	Inspections will be conducted to ensure that no employees may relieve themselves in the veld (wetland or terrestrial) and that toilets are provided.	The ECO will inspect the areas on a monthly basis.	Throughout the construction phase.
				Domestic waste will be collected on site and must not end up in the veldt (wetland or terrestrial).	Appointed contractor and ECO.	Volumes of waste collected will be recorded in accordance with existing mine systems. Inspections will also be conducted to observe for any	Appointed contractor and ECO will record volumes during collection	Waste will be collected whenever enough waste material has been collected.

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
						waste disposal on the veldt (wetland or terrestrial).		
				Dust suppression will be conducted regularly to have the least amount of dust settling on grassland/wetland vegetation.	Appointed contractor and ECO.	Visual inspections of areas with possible dust emissions will be conducted and dust suppression will be conducted	Inspections will be undertaken by the ECO on a monthly basis.	Throughout the construction phase.
				Machinery will be kept in good working order to curb hydrocarbon leaks and spills that may contaminate the groundwater.	Appointed contractor.	Vehicles and machinery will be inspected regularly and any hydrocarbon leaks and spills will be reported.	ECO will conduct the inspections monthly.	Throughout the construction phase.
				Emergency maintenance will be conducted on protected ground.	ECO and mine manager.	ECO will conduct inspections to ensure that all machinery equipment's are serviced at the workshop areas. Inspections will be conducted to ensure that emergency servicing of equipment's is undertaken in dedicated areas that are equipped with drip trays.	The ECO will inspect the areas on a monthly basis.	Throughout the construction phase.
				No snares may be set, no poaching of animals or plants may occur.	Appointed contractor and ECO.	The construction areas will be inspected to	The ECO will inspect the areas on a	Throughout the 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
						observe any poaching of animals or plants	monthly basis.	
				The area will be fenced so that personnel working in this area cannot wander into the grassland/wetland areas and cause any disturbance.	Appointed contractor and ECO.	The condition of the fence/barrier structure used to demarcate the grave yard will be monitored to ensure that damages do not occur as a result of construction related activities.	The ECO will inspect the areas on a monthly basis.	The fence will be created during construction and maintained throughout the construction phase.
Movement of mine vehicles over exposed areas will result in the generation of dust. Generated dust will migrate towards the predominant wind direction and may settle on surrounding farm houses.	Air Quality	Ensure that all operations during the construction phase of the mining project do not result in detrimental air quality impacts.	The proposed project will be constructed such that the ambient air quality does not exceed the National Air Quality Standards.	Baseline monitoring at these sites will commence at least one year prior to the onset of the construction phase.	Appointed contractor and ECO.	Baseline Report will be compiled and kept for audit purposes.	ECO will review the report before commencement of the construction activities.	Before commencement of the construction activities.
				Conduct dust suppression on a regular basis.	Appointed contractor and ECO.	Visual inspections of areas with possible dust emissions will be conducted and dust suppression will be conducted.	Inspections will be undertaken by the ECO on a weekly basis.	Throughout the construction phase.
				Monitor the dust fall out concentration and ensure that significant source of pollution is managed, annually. Ambient monitoring will be used in combination with modelling and emission inventory to assess. the effectiveness of control measures at source and receivers, on an annual basis.	Appointed contractor and ECO.	Ambient dust fall and PM monitoring will be conducted.	Dust monitoring will be conducted monthly by the appointed contractor and the ECO will ensure that records of monitoring are kept on site.	Throughout the construction phase.
				Traffic will be restricted to demarcated areas and traffic volumes and speeds	ECO	Observations on the speed at	Environmental Co-ordinator will	Throughout the 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
				within the project area construction site will be controlled.		which vehicle are travelling will be conducted on an ad hoc basis.	do spot checks on an ad hoc basis.	
				The farmers and community meetings conducted by the mine will be used for environmental reporting and community liaison on matters relating to the impacts on air quality.	ECO	Meetings with farmers will be arranged.	Environmental Co-ordinator will attend and keep minutes of meetings as and when they are arranged and held.	Whenever meetings with farmers are arranged and held during the construction phase.
				Limit the area of operation to what is necessary.	Appointed contractors and ECO.	Inspections will be conducted to ensure that activities are restricted within the approved foot print areas.	ECO on a monthly basis.	Throughout the construction phase.
				Rehabilitation of disturbed areas will be performed as soon as practicable.	Appointed contractor and ECO.	ECO will conduct inspections to ensure that all unnecessary cleared areas are rehabilitated.	Monthly inspections by ECO.	Throughout the construction phase.
OPERATIONAL PHASE								
Activity 34 of Listing Notice 1: Mining activities using opencast mining method. **Activity 6 of Listing Notice 2 and Activity 12 and 14 of Listing Notice 3: The opencast mining requires a need for a WUL.**								

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
Removal of coal by mining and will result in the disturbance of the geological layers overlying the target coal seams.	Geology	Ensure that the disruption of the geological profile do not results detrimental effects to the environment.	Undertake the mining and rehabilitation in line with the relevant mining and rehabilitation guidelines	Use removed overburden to replace the overburden material in the mined out opencast pits during rehabilitation/concurrent rehabilitation of the opencast pit.	ECO and Mining Contractor	Measuring volumes of overburden removed and replaced. Check the volumes against volumetric assessment done by mine surveyor.	Surveyor and Monthly	Throughout Operational Phase
Formation of topographical voids.	Topography	To ensure that the systematic removal of the target coal seams do not have detrimental impacts on the local topographic patterns	The opencast workings will be operated to comply with the safety standards set in the Mine Health and Safety Act, 1996 (Act 26 of 1996), the mine's health and safety policies, relevant operational procedures	Use material from the successive cuts to backfill the voids created by the construction of the initial box cut. Note that since concurrent rehabilitation will be used at the mine, only three to four cuts will always be open at the opencast mining area.	ECO and Mining Contractor	Measuring volumes of overburden removed and replaced. Check the volumes against volumetric assessment done by mine surveyor.	Surveyor and Monthly	Throughout Operational Phase
Reduction in the catchment yield due to the mining activities.	Surface Water Quantity	Ensure that the mining of the coal does not result in the detrimental impacts on the surface water environment.	Mining has been designed and will be conducted to comply with the safety standards set in the Mine Health and Safety Act, 1996 (Act 26 of 1996).	Mining will be undertaken as per mining design specifications.	ECO and the appointed contractor.	Mine water balance will be updated to determine the catchment yield during the operational phase.	Environmental specialist on an annual basis	Throughout Operational Phase
				Rainfall water entering the opencast pits during flood events will be removed with the use of pumps and pipelines with enough pumping capacity. The water will be pumped into the existing lined pollution control dam, which must be proven to have enough capacity to	ECO and the appointed contractor.	Mine water balance will be updated to determine the catchment yield during the operational	Environmental specialist on an annual basis	Throughout Operational 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
				handle the additional water.		phase.		
				The mine will develop an emergency procedure for evacuating employees in case the volumes of water captured in the pit are beyond the capacity of the pumping systems	ECO and the appointed contractor.	Mine water balance will be updated to determine the catchment yield during the operational phase.	Environmental specialist on an annual basis	Throughout Operational Phase
Deterioration of water quality.	Surface Water Quality	To ensure that the water from the opencast workings does not adversely affect clean water environment.	Management of the storm water will comply with the requirements of the regulations under the GN704 and as far as possible with the requirements of the relevant DWS Best Practice Guidelines.	Contaminated shallow seepage and storm water run-off must be collected and routed to an existing lined pollution control dam via dirty water pipeline. The pollution control dam must be sized in accordance with Government Notice 704 of the South African National Water Act. The existing pollution control dam water levels and dirty water pipeline condition must be constantly monitored. Steps and procedures must be put in place to detect, manage and monitor situations where excess water builds up in the pollution control dam and pipe burst, leakage and spillages. Water reuse from the pollution control dam must be maximised.	ECO and Mining Contractor	Surface Water Monitoring. Inspection of the dirty water pipeline for leaks, busts and spillages.	Monthly by an independent environmental specialist. Daily or when in use by the mine personnel.	Throughout Operational Phase
Exposure of coal debris may lead to pollution of ground water and dewatering may reduce ground water yield to ground water users.	Groundwater	Ensure that the systematic removal of coal does not have detrimental impacts on the surface and ground water	Ground water qualities within the surrounding environment will comply with the DWS resource water quality objectives and/or water quality limits set in the mine's water	Boreholes surrounding the opencast area must be monitored. This will determine the extent of the dewatering cone from the opencast pit and any user affected must be compensated by the mine. Reduce the exposure of the carbonaceous material to free oxygen.	ECO or appointed person.	Ground water Monitoring will be conducted.	Appointed contractor on quarterly basis.	During operational 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
		environment.	use licence. The mine will be undertaken to comply with the requirements of the GN704 regulations.	This will be achieved by removing as much coal as possible during mining and placing the remaining carbonaceous material at the bottom of the opencast pit and backfill as fast as possible.				
				If it can be proven that the mine is indeed affecting the quantity of groundwater available to certain users, the affected parties will be compensated. Compensation actions will be investigated.	ECO	Monitoring results will be used to determine the effect of the drawdown to groundwater users.	ECO on a monthly basis.	As and when the groundwater user is affected by the mine.
				The groundwater numerical model will be updated during operational phase of the mine to identify any additional decant.	ECO and appointed specialist.	Ensure that a suitably qualified specialist will be appointed.	ECO will appoint the specialist as and when necessary.	Every two to three years during the operational phase of the project.
				Continuous monitoring of mine water levels (quarterly) within the predicted zone of dewatering.	ECO and appointed contractor.	Monitoring results will be kept for recommendation purposes.	ECO will keep records of the monitoring when monitoring is required.	Throughout the operational phase.
				Groundwater inflows mining areas will be minimised by grouting, measured during abstraction (using a flow meter), re-used in the operations, or disposed of in an environmentally acceptable way. Depending on observed water qualities, treatment might be required before disposal.				
				The numerical model and geochemical study will be updated biennially during the life of mine to calibrate and validate its results and to inform effective water management and closure planning.				

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
				Monitoring of mine effluent and seepage will be performed to assure protection of the environment. Monitoring and field testing provide early detection of potential environmental issues, allowing evaluation and, if necessary, adaptive management interventions.				
				Mine design should consider the expected decant point.	Mine Manager and ECO.	Records of the initial and the revised mine plan will be kept on site for audit purposes. The mined-out plan will be reviewed against the revised mine plan that shows the decant points.	ECO will review the plans as mining progresses.	Before the construction phase and the operational phase.
Damage of wetlands (portion of the opencast pits) in in the vicinity of the proposed project which will results in a change in hydrology, change in water quality and loss of wetlands and the biodiversity supported by these wetlands.	Sensitive Landscape	Ensure that the systematic removal of the target coal seams do not result in the destruction of the remaining wetlands and deterioration of its water quality.	The systematic removal of the target coal seams will be conducted in compliance with the requirements of the GN704 regulations and the conditions stipulated in the water use licence.	The expansion area should be designed such that contaminated dirty runoff water from the project area do not reports to the identified wetlands.	ECO.	The areas will be inspected to ensure activities are undertaken within the approved footprint area.	ECO on a monthly basis.	Throughout the operational phase.
				Mining of wetlands will be limited to the approved footprint areas.	ECO and Mining Contractor.	Areas of disturbance inspected against the approved plans.	The ECO will undertake monthly inspections.	Throughout the operational phase.
				A groundwater monitoring strategy as per the recommendations of the groundwater specialist report will be implemented to monitor groundwater levels in the surrounding area.	ECO and appointed contractor.	Monitoring results will be kept for recommendation purposes.	ECO will keep records of the monitoring quarterly.	Throughout the operational 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
				Opportunities for the alternative treatment options for mine water post closure will also be investigated to reduce maintenance costs and responsibilities of water treatment post closure.	Appointed contractor.	Records of the alternative treatment options for mine water post closure will be kept.	ECO and mine surveyor when agreed upon.	Throughout the operational phase.
				A clear action plan will be developed to respond to water quality problems picked up by regular monitoring.	Appointed contractor and ECO.	Records of the action plan will be kept.	ECO and mine surveyor when agreed upon.	Throughout the operational phase.
				Ensure that no equipment is maintained anywhere near the wetlands.	Appointed mining contractor and environmental manager.	The areas will be inspected to ensure activities are undertaken within the approved footprint area.	ECO on a monthly basis.	Throughout the operational phase.
				The Department of Water and Sanitation (DWS) must be engaged with and the necessary IWUL must be obtained prior to commencement of any mining activity.	Appointed EAP and ECO	Before the commencement of the project.	Before the commencement of the project.	Before the commencement of the project.
				Enough storm water control measures must be put in place on site to prevent sedimentation of wetlands and drainage lines.	Appointed contractor and ECO.	Area will be inspected to check if stormwater structures are constructed and well maintained.	ECO on a monthly basis.	Throughout the operational phase.
Generated dust within the mine workings may affect the health of the mine employees.	Air quality.	Ensure that the air quality within the mine workings does not affect the health of the mine employees.	Air quality within the workings will comply with the national dust control regulations.	Enough dust suppression will be undertaken to reduce the impacts of the generated dust on employees.	Appointed contractor and ECO.	Dust suppression will be monitored.	Appointed contractor and ECO will ensure that records of dust suppression are kept.	Throughout the operational phase.
				Employees will be provided with dust masks and will be instructed to use the dust masks.	Appointed contractor and ECO.	Use of dust masks by employees will be monitored.	Appointed contractor and ECO will monitor the use of dusts masks monthly.	Throughout the operational 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
Noise generated from the operation of the mine machinery within the mine workings may have health effects on the mine employees.	Noise.	Ensure that the noise levels within the mine workings does affect the health of the mine employees.	Noise levels within the workings will comply with the required noise limits.	Limit the maximum speed on the haul roads to 20 km/h or less, subject to risk assessment.	ECO	Observations on the speed at which vehicle are travelling will be conducted.	Records of vehicles that exceeded the specified speed limit will be recorded.	Throughout the operational phase.
				Ensure that the mine employees are issued with earplugs and that they are instructed to use them.	ECO/safety officer	PPE Registers will be kept on site.	ECO/safety officer weekly and site manager daily.	
				Educate employees on the dangers of hearing loss due to mine machinery noise.	Safety officer/Environmental Officer	Records of awareness and inductions will be kept at the site.	When new employees are employed and when from leave or as per the required procedure.	
				Any deviation detected by the noise monitoring results must be addressed.	ECO	Records of noise monitoring will be compared to the National Noise Control Regulations.	ECO on a monthly basis.	
<u>Activity 17 of listing notice 2:</u> Transportation of coal from the opencast mine workings to the existing ROM stockpile using coal trucks.								
During the operational phase, number of vehicles will be driving around the site, transportation of coal using trucks. This may result in the following impacts: • If the vehicles are poorly maintained, hydrocarbon spills could cause pollution if washed off roads by storm water. This may have an impact on the clean water environment and the wetlands and may affect the properties surrounding landowners. These include natural vegetation, animal life, cultivated lands, roads and any other infrastructures. Coal spillages may result, if the	Natural Vegetation and Soils	Ensure that the use of transportation routes do not result in the contamination of the soils and surrounding environment.	The routes will be operated such that all environmental parameters are within relevant targets.	All trucks used for the transportation of coal will be covered with tarpaulins during coal transportation.	ECO and mining contractor.	Inspections will be undertaken during transportation.	ECO will undertake monthly inspections.	Throughout the operational phase.
				All spilled coal will be cleared immediately.				
				Trucks will be required to obey certain road regulations when transporting coal at the mine. This will include speed limits etc.				

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
loading of coal trucks is not supervised for prevent overloading.								
Impact on surface water and sensitive landscape due to the transportation of coal material.	Surface Water and Sensitive landscape	Ensure that the use and maintenance of the roads do not result in detrimental impacts of the identified wetlands areas and surface water.	Maintain or improve the current PES and EIS of the wetlands and water qualities within the affected streams.	Loading of coal trucks will be supervised to prevent overloading. The road must be designed and operate to minimise the likelihood of spillages. All vehicles will only use designated roads with no indiscriminate driving through wetland or riparian areas.				
				Should large spillages occur, clean-up of the spillages will be undertaken as soon as possible following the event.				
				Dust suppression will be undertaken at the roads to prevent generation of excessive dust.				
Increased noise levels due to the transportation of coal.	Noise	Ensure that the use of the transportation routes do not have detrimental impacts on the nearby Receptors.	The noise levels from the transportation routes will be managed.	As much as possible, transportation routes will be used during the day time.				
				If roads/routes are to be used during the night-times will be routed as far as possible away from a receptor. If the receptors cannot be avoided, an agreement will be reached with the affected parties.				
Disruption in daily living and movement patterns	Socio-Economic effects	To ensure that the transportation of coal does not have effect on the livelihood of the surrounding properties and businesses.	The mine will ensure that all mine safety standards are met.	Routes to be used for the transportation of coal will be agreed with the affected parties, where possible. Keep communication with neighbouring land owners, land occupiers and the public (interested and affected parties) open during the operational phase of the project.				
Air pollution through air pollutants' emissions and spontaneous combustion from the mining site.	Air quality.	Ensure that all operations do not result in detrimental air quality impacts.	The use of the transportation routes will be conducted such that the ambient air quality does not exceed the National Air Quality Standards.	All trucks used for the transportation of coal will be covered with tarpaulins during coal transportation.				
<u>Activity 6 and 17 of Listing Notice 2:</u> Operation of the Dirty Water Pipeline and Topsoil Stockpile.								
Erosion as a result of run-off and	Soils, Land	Ensure that the above-mentioned	The soils near the clean and dirty water	The footprint of the infrastructure/facilities will be maintained to be within the	ECO and Mining	Inspection of the affected areas	ECO and Mining Contractor will	Throughout the operational 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
compaction. Contamination as a result of spillages from the operational activities.	Use and Land Capability.	infrastructures are operated such that they do not have detrimental impacts on the surround areas' soils.	managements will be suitable for natural vegetation growth and to support the current land use and the biodiversity of the affected areas.	approved perimeters. Areas with erosion gullies and sedimentation build up will be rehabilitated. Areas with compaction will be ripped and seeded.	Contractor.	during rehabilitation.	conduct the inspections quarterly.	
				The stockpiled topsoil will be maintained to have good vegetation cover. Bare areas where no further activities will take place will be identified and re-vegetated with a recommended seed mix.	ECO and Mining Contractor.	Inspection of the site for any stockpile misuse.	Mine ECO will monitor the area annually.	
				The stockpiled topsoil will be maintained to be within the approved height of five meters.	ECO and Mining Contractor.	Monitor the vegetation distribution on the stockpiled topsoil.	ECO will undertake monthly inspections.	
Dirty water from the pipeline (because of burst) will have a detrimental effect on the water quality in the local streams and the pan (depression wetland).		To ensure that the runoff water from the above-mentioned activities does not adversely affect clean water environment.	Management of the storm water will comply with the requirements of the regulations under the GN704 and as far as possible with the requirements of the relevant DWS Best Practice Guidelines.	The activities will be undertaken to comply with Government Notice 704 of NWA.	ECO and Mining Contractor.	Inspections will be undertaken against the GNR 704 and records kept on site.	ECO will undertake monthly inspections.	Throughout the operational phase.
				Storm water from opencast pit will be routed to the mine's existing PCD via a pipeline. The pipeline will join to the existing pipeline that conveyor water to the existing PCD, in accordance with Government Notice 704 of the NWA.				
				The dirty water pipeline will be operated and maintained in accordance with regulations under the Government Notice 704 of the NWA.				
Surface Water impacts due to pipeline burst/leakages.	Surface Water			The pipeline will be maintained regularly.				
				The pipeline will be designed to convey run-off from a 50-year design storm.				
				The pipeline will be well maintained and inspected for leaks/burst weekly.				
				Surface water monitoring will be conducted to observe any water quality deterioration from the mining activities.	ECO	Surface water results will be reviewed to identify any surface water contamination.	ECO to review the results on a monthly basis.	Throughout the operational phase.
				Should the surface monitoring indicate water quality contamination, the surface water users will be informed of the outcomes and Black Wattle Colliery to	ECO	Surface water results will be reviewed to identify any	ECO to review the results on a monthly basis.	Throughout the operational 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
				investigate and identify action plans to remediate the impact.		surface water contamination and action plans, should contamination occur, will be implemented to reduce the impacts.		
Pollution of the groundwater regime by leakage from the dirty water pipeline.	Groundwater	Ensure that the pipeline do not result in the worsening of the groundwater pollution.	Ground water near the dirty water management structures will comply with the water quality parameter targets stipulated in the water use licence and the recommended standards.	Monitoring of the pipeline is imperative to manage the risk of spillage.	ECO and appointed contractor.	Inspections will be undertaken and records kept on site.	ECO will undertake monthly inspections.	Throughout the operational phase.
				Operate and manage the dirty water structures pipeline such that it does not leak, seep or discharge dirty water into the groundwater regime.				
				The pipeline will be constructed to have leak detection system.				
				The areas will be monitored for any spillages and spillages will be cleaned up immediately and the contaminated soil disposed of at the suitable area.				
Deterioration of water quality within the affected wetlands and destruction of the wetlands. Decreased flow within wetlands adjacent to the project area.	Sensitive Landscapes	Ensure that the operation of the pipeline and the topsoil stockpile do not result in the destruction of the remaining wetlands and deterioration of its water quality.	The transportation of dirty water and the management of the topsoil stockpile will be conducted such that the PES and EIS of the wetlands are maintained or improved.	Monitor the dirty water pipelines for spillages/leaks and where such spillages/leaks occur, the area will be remedied as soon as possible.	ECO and Mining Contractor.	Inspections will be undertaken and records kept on site.	ECO will undertake monthly inspections.	Throughout the operational phase.
				All water management infrastructure on site will be inspected at least twice per year, ideally just before the start of the wet season and then again during the middle of the wet season, for any damage or obstructions. Obstructions will be cleared and damage repaired immediately to ensure optimal operation of the infrastructure.	ECO and appointed contractor.	Inspection results will be kept for recommendation purposes.	ECO will keep records of the Inspection when monitoring twice a year.	Throughout the operational 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
				Implement the surface water management plan that will ensure effective clean and dirty water separation.	ECO and appointed contractor.	Implement of the surface water management plan will be monitored and records kept for audit purposes.	ECO will undertake monthly monitoring.	Throughout the operational phase.
				Minimise extent of dirty water areas.	ECO.	Activities will be inspected to ensure that all are undertaken within the approved footprint area.	ECO will undertake monthly inspections.	Throughout the operational phase.
				Implement dust suppression within areas where dust may be generated and areas of heavy vehicle traffic.	ECO.	Inspection of the areas to ensure that dust suppression is conducted.	ECO will undertake monthly inspections.	Throughout the operational phase.
				Implement water quality strategy.	Appointed contractor and ECO.	The water management strategy will be monitored to ensure that implementation is adhered to.	ECO will undertake monthly inspections.	Throughout the operational phase.
				Compile an emergency response procedure for clean-up of any major spillages.	ECO.	Emergency procedure must be filed by the mine.	ECO will undertake monthly inspections.	Throughout the operational 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 topsoil stockpile will be located within a clean water area and no contaminated water will come into contact with the topsoil stockpiles. Side slopes of the topsoil stockpiles will be kept as low as possible and should ideally be vegetated to minimise sediment loss and colonisation by alien/weed vegetation.	ECO.	Inspection of the topsoil stockpile areas.	ECO will undertake monthly inspections.	Throughout the operational phase.
				Should leakage or discharges occur, clean-up and rehabilitation of the affected areas will be undertaken as soon as possible following the event.	ECO.	Inspection of the entire areas will be undertaken.	ECO will undertake monthly inspections.	Throughout the operational phase.
Activity 24 of Listing Notice 1 and Activity 6 and 17 of Listing Notice 2: Operation/use of Haul Roads.								
Degradation of topsoil.	Soils	Ensure that the above-mentioned infrastructure is operated such that they do not have detrimental impacts on the surround areas' soils.	The soils near the clean and dirty water managements will be suitable for natural vegetation growth and to support the current land use and the biodiversity of the affected areas.	Implement dust suppression along the haul road.	ECO.	Inspection of the area to ensure that dust suppression is conducted.	ECO will undertake monthly inspections.	Throughout the operational phase.
The roads have the potential to increase erosion and sedimentation of wetlands throughout life of mine if storm water is not properly incorporated into the design philosophy of the roads.	Sensitive Landscape	Ensure that the establishment of the roads do not have detrimental impacts on the wetlands identified within the project study area.	Maintain or improve the current PES and EIS of the wetlands within the project study area in accordance with the water use licence conditions.	The road will be designed and operate to minimise the likelihood of spillages. All vehicles will only use designated roads with no indiscriminate driving through wetland or riparian areas.	ECO.	Inspections will be undertaken and records kept on site.	ECO will undertake monthly inspections.	Throughout the operational phase.
				Should large spillages occur, clean-up of the spillages will be undertaken as soon as possible following the event.				
				Dust suppression will be undertaken at the facility and roads to prevent generation of excessive dust.				
Air pollution through air pollutants from the operation of the roads.	Air quality.	Ensure that the operation of the roads do not result in detrimental air quality impacts.	The operation of roads will be conducted such that the ambient air quality does not exceed the National Air Quality	Priority will be given to continuous monitoring of ambient dust deposition rates for the full duration of the project.	Appointed contractor and ECO.	Ambient dust fallout monitoring will be undertaken within the project area.	ECO will keep records of the dust fall-out monitoring which will be undertaken on a	Throughout the operational 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
			Standards.				monthly basis.	
				Enforce speed limits of 60km/h for the mine vehicles and coal trucks.	ECO	Observations on the speed at which vehicle are travelling will be conducted.	Records of vehicles that exceeded the specified speed limit will be recorded by the ECO.	
Noise generated from the operation of the roads may have impacts on surrounding property owners and occupiers.	Noise	Ensure that the noise levels emanating from the operation of the roads will not have detrimental effects on the mine employees and surrounding communities.	The noise levels from the project site will be managed and measures will be taken to ensure that noise levels are below the National Noise Control Regulations, SANS10103:2008 guidelines and the International Finance Corporation (World Bank) guidelines.	Ensure routeing has less impacts on sensitive receptors.	ECO.	Undertake ambient noise monitoring programme.	ECO on a monthly basis.	Throughout the operational phase.
				Limit vehicle speed (60km\h) within the mining right area.	ECO.	Observations on the speed at which vehicle are travelling will be conducted.	Records of vehicles that exceeded the specified speed limit will be recorded.	
				Ensuring all equipment in use is maintained and equipped with the exhaust/silencer.	ECO and appointed personnel.	Maintenance of all equipment's will be undertaken by the appointed personnel and ensure that the required muffler/exhaust/ silencer are equipped.	ECO and will keep records of maintenance plan on a monthly basis.	
				The mine will consider the sound rating of equipment when selecting equipment.	ECO and appointed personnel.	Maintenance of all equipment's will be undertaken by the appointed personnel and ensure that the required muffler/exhaust/ silencer are equipped.	ECO will keep records of maintenance plan on a monthly basis.	

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 mine will maintain a healthy consultative relationship with surrounding communities and landowners to facilitate the sharing of knowledge and possible complaints as well as proposed corrective/preventative actions between parties.	ECO	Meetings will be conducted with the surrounding communities. Minutes of the meetings conducted with communities in close proximity to the mining areas will be kept on site. Records of non-compliances and actions to the non-compliances will be filed for audit purposes.	ECO will keep records of the minutes, non-compliances and the actions identified.	
Traffic impacts may result from the movement of vehicles/trucks around and within the mining area.	Traffic	Ensure that the operation of the roads have minimal impacts on traffic.	Operation of the roads will be undertaken according to the mines traffic management procedure.	Traffic will be restricted to demarcated areas and traffic volumes and speeds within the active site will be controlled.	ECO and appointed contractor.	Inspections will be conducted during the operation of the roads to determine compliance with the management action.	ECO will undertake monthly inspections.	
Visual impacts on the surrounding communities and road users from the operation site may result.	Aesthetics	Ensure that all operations of the roads do not result in detrimental visual impacts on	Measures will be undertaken by the mine to ensure that the visual aspects from the site are complying with the	Limit areas of disturbance to areas where the roads will be used.	Appointed contractor and ECO.	Areas of disturbance inspected against the approved design specifications.	Mine Engineer and ECO on a monthly basis.	

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
		surrounding properties, communities and road users.	relevant visual standards and objectives.	Dust suppression will be undertaken at all areas that will be affected by operational activities and where dust will be generated.	Appointed contractor and ECO.	See monitoring under air quality.	See under air quality.	
Combined Results of the Impact Assessment and Mitigation Measures: **Activity, 12, 19 of Listing Notice 1, Activity 6 and 17 of Listing Notice 2 and Activity 12 and 14 of Listing Notice 3: Opencast Mining activities.** **Activity 9 and 10 of Listing Notice 1, Activity 6 and 17 of Listing Notice 2: The operation of the Dirty Water Pipeline.** **Activity 24 of Listing Notice 1 and Activity 6 and 17 of Listing Notice 2: Operation/use of Haul Roads.**								
The development of the proposed project may result in the disturbance of heritage sites.	Sites of archaeological and cultural importance.	Ensure that the operational activities do not have detrimental impacts on heritage sites.	The operational activities will be undertaken in compliance with the requirements of the National Heritage Resources Act, 1999 (Act 25 of 1999), IFC Standards and recommendations from the heritage specialist.	Fence all graveyards in and have a grave management plan drafted for the sustainable preservation thereof if the mine decides to not disturb the graves. The grave management plan will be written by a heritage expert. This usually is done when the graves are in no danger of being damaged, but where there will be a secondary impact due to the activities of the mine.	Appointed specialist and ECO.	Records of the cultural heritage management plan (CMP) will be kept on site for audit purposes. ECO will conduct monthly inspections to ensure that the graveyard area is always fenced and no disturbance is undertaken.	Monthly inspections will be conducted by the ECO and records of inspections and the plan will be kept on site.	Before commencement of the construction activities.

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
				Upon finding any archaeological or historical material, all work at the affected area will cease. The area will be demarcated in order to prevent any further work there until an investigation has been completed. An archaeologist will be contacted immediately to provide advice on the matter. Should it be a minor issue, the archaeologist will decide on future action, which could include adapting the HIA or not. Depending on the nature of the find, it may include a site visit. If needed, the necessary permit will be applied for with SAHRA. This will be done in conjunction with the appointed archaeologist. The removal of such archaeological material will be done by the archaeologist in lieu of the approval given by SAHRA, including any conditions stipulated by the latter. Work on site will only continue after removal of the archaeological/ historical material was done.	Appointed specialist and ECO.	Records of any archaeological or historical material will be kept on site for audit purposes. Inspection of the operational activities against the management action will be undertaken monthly.	Monthly inspections will be conducted by the ECO and records will be kept on site.	Throughout the operational 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
				Should it be a need to relocate the graves, exhume the mortal remains and to have it relocated. This usually is relevant when the graves will be directly affected (damaged or destroyed) by the development. In this case specific procedures must be followed which includes social consultation. Graves younger than 60 years may be exhumed only by an undertaker. For those older than 60 years, and unknown graves, an undertaker and archaeologist should be appointed. Permits must be obtained from the Burial Grounds and Graves unit of SAHRA. This procedure is quite lengthy and involves social consultation.	Appointed heritage specialist and ECO.	Permits and consultations required before relocation will be conducted,	Records of relocation and consultation will be kept for records purposes.	Before the commencement of the construction phase.
				Access will be provided to the families of the grave sites identified within the project area. Regulated visitor hours will be implemented that is compatible with mine safety rules.	Appointed specialist and ECO.	The grave management plan will indicate access to the families and the regulated hours.	Monthly inspections will be conducted by the ECO and records will be kept on site.	Throughout the operational phase.
				The families of the grave sites identified within the project area currently have access to these areas. Should alternatives to access the cultural heritage sites be identified during commencement of the project, the families will be notified.	Appointed specialist and ECO.	Inspection of the construction activities against the management action will be undertaken monthly.	Monthly inspections will be conducted by the ECO and records will be kept on site.	Throughout the operational phase.
Traffic impacts may result from the movement of vehicles/coal trucks around and within the project area.	Traffic Impact	Ensure that the operation of the mining activities have minimal impacts on traffic.	Operation of the mining activities will be undertaken according to the mines traffic management procedure.	A Speed limit of 60km/h will be enforced, and the proposed speed limit signs are to be erected.	Appointed specialist and ECO	Speed checking will be conducted.	Appointed specialist and ECO will conduct speed checking as regularly as possible.	Throughout the operational phase.
				Traffic will be restricted to demarcated areas and traffic volumes and speeds within the areas will be controlled.	Appointed specialist and ECO	Observations on the speed at which vehicle are travelling will be conducted on	Environmental Co-ordinator will do spot checks on an ad hoc	Throughout the operational 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
						an ad hoc basis.	basis.	
Noise generated from the activities may add to the current noise levels. This may have impacts on surrounding property owners and occupiers.	Noise	Ensure that the noise levels emanating from the project site will not have detrimental effects on the mine employees and surrounding communities.	The noise levels from the project site will be managed and measures will be taken to ensure that noise levels are below the National Noise Control Regulations, SANS10103:2008 guidelines and the International Finance Corporation (World Bank) guidelines	Toolbox talks will be conducted to educate their employees and ensure that they are aware of the legislation regarding noise.	ECO.	Records of training will be kept.	ECO will inspect the records quarterly.	Training will be conducted on intervals approved by the mine.
				Ensure that the mine employees are issued with earplugs and that they are instructed to use them.				
				Any deviation detected by the noise monitoring results must be addressed.	Appointed contractor and ECO.	Noise monitoring will be conducted.	ECO will inspect the records quarterly.	Throughout the operational phase.
Visual impacts on the surrounding communities and road users from the operational site.	Aesthetics	Ensure that all operations of the infrastructures do not result in detrimental visual impacts on surrounding properties, communities and road users.	Measures will be undertaken by the mine to ensure that the visual aspects from the site are complying with the relevant visual standards and objectives.	Where possible areas disturbed by operational activity, will be suitably topsoiled and vegetated as soon as is possible. The progressive rehabilitation measures will allow for the maximum growth period before the completion of the project.	Appointed contractor and ECO.	Areas of disturbance will be inspected to determine areas that need rehabilitation.	ECO on a monthly basis.	Throughout the operational phase.
				Limit areas of disturbance to areas where the operational activities are conducted.	ECO.	Areas of disturbance will be inspected to determine areas that need rehabilitation.	ECO on a monthly basis.	Throughout the operational phase.
				Dust suppression will be undertaken at all areas that will be affected by operational activities and where dust will be generated.	Appointed contractor and ECO.	See monitoring under air quality.	See under air quality.	Throughout the operational phase.
				Avoid upwards lighting of structures but rather direct the light downwards to focus on the object to be illuminated.	Appointed contractor.	Lighting installation and effects of the lighting to community will be monitored.	ECO on a monthly basis.	Throughout the operational phase.
			The visibility of the activities will not increase beyond the planned extent during	The constructed earthworks and landscapes will be maintained to reduce the visual impacts. These will include maintaining the vegetation cover over the	ECO.	Monitoring for the visual impacts will include regular	Mine Environmental Co-ordinator will conduct	Throughout the operational 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 operational phase.	topsoil stockpiles. The heights of these facilities will not be increased during the operational phase.		inspections on the berms, stockpiles and other infrastructure at the site.	inspections monthly.	
				Lighting will be conducted in manner that will reduce the impacts on visual aspects. These will include factors such as placing lights in areas and angles that will not shine towards the communities.	ECO.	Inspections will be undertaken on the lighting at the site	The site manager will conduct inspections monthly.	Throughout the operational phase.
Removal of natural vegetation due to the stripping of topsoil and disturbance of faunal habitat.	Biodiversity	Ensure that the operational activities do not impacts detrimentally on the ecological features of the streams in the study area.	Ensure that the aquatic ecology is manage in line with requirements set in the ecological assessment.	All activities will be undertaken within the approved footprint area.	Appointed contractor, Mine engineer and ECO.	ECO will conduct inspections to ensure that all operational activities are contained within the approved footprint areas and no unnecessary clearance of vegetation is noted.	The ECO will inspect the areas on a monthly basis.	Throughout the operational phase.
				No machinery will be serviced within the grassland/wetland areas.	Appointed contractor and ECO.	Inspections will be conducted to ensure that no servicing of machinery is undertaken within the grassland/wetland areas.	The ECO will inspect the areas on a monthly basis.	Throughout the operational phase.
				Domestic waste will be collected on site and must not end up in the veldt (wetland or terrestrial).	Appointed contractor and ECO.	Volumes of waste collected will be recorded in accordance with existing mine systems. Inspections will also be	Appointed contractor and ECO will record volumes during collection	Waste will be collected whenever enough waste material has been collected.

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
						conducted to observe for any waste disposal on the veldt (wetland or terrestrial).		
				Dust suppression will be conducted regularly to have the least amount of dust settling on grassland/wetland vegetation.	Appointed contractor and ECO.	Visual inspections of areas with possible dust emissions will be conducted and dust suppression will be conducted	Inspections will be undertaken by the ECO on a monthly basis.	Throughout the operational phase.
				Machinery will be kept in good working order to curb hydrocarbon leaks and spills that may contaminate the groundwater.	Appointed contractor.	Vehicles and machinery will be inspected regularly and any hydrocarbon leaks and spills will be reported.	Safety Officer will conduct the inspections monthly.	Throughout the operational phase.
				Emergency maintenance will be conducted on protected ground (drip trays/tarpaulins).	ECO and mine manager.	ECO will conduct inspections to ensure that all machinery equipment's are serviced at the workshop areas. Inspections will be conducted to ensure that emergency servicing of equipment's is undertaken in dedicated areas that are equipped with drip trays.	The ECO will inspect the areas on a monthly basis.	Throughout the operational phase.
				No snares will be set, no poaching of	Appointed contractor	The construction	The ECO will	Throughout the

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
				animals or plants may occur.	and ECO.	areas will be inspected to observe any poaching of animals or plants	inspect the areas on a monthly basis.	operational phase.
				The area will be fenced so that personnel working in this area cannot wander into the grassland/wetland areas and cause any disturbance.	Appointed contractor and ECO.	The condition of the fence/barrier structure used to demarcate the grave yard will be monitored to ensure that damages do not occur as a result of construction related activities.	The ECO will inspect the areas on a monthly basis.	Throughout the operational phase.
Movement of mine vehicles over exposed areas will result in the generation of dust. Generated dust will migrate towards the predominant wind direction and may settle on surrounding farm houses.	Air Quality	Ensure that all operations of the mining project do not result in detrimental air quality impacts.	The proposed project will be operated such that the ambient air quality does not exceed the National Air Quality Standards.	Ambient Air Quality monitoring will be undertaken.	Appointed contractor and ECO.	Ambient Air Quality monitoring will be conducted.	Dust monitoring will be conducted monthly by the appointed contractor and the ECO will ensure that records of monitoring are kept on site.	Throughout the operational phase.
				Conduct dust suppression on haul roads on a regular basis.	Appointed contractor and ECO.	Visual inspections of areas with possible dust emissions will be conducted and dust suppression will be conducted.	Inspections will be undertaken by the ECO on a weekly basis.	Throughout the operational phase.
				Monitor the dust fall out concentration and ensure that significant source of pollution is managed.	Appointed contractor and ECO.	Ambient dust fall and PM monitoring will be conducted.	Dust monitoring will be conducted monthly by the appointed contractor and	Throughout the operational 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 ECO will ensure that records of monitoring are kept on site.	
				Traffic will be restricted to demarcated areas and traffic volumes and speeds within the site will be controlled.	Mine Manager and ECO.	Observations on the speed at which vehicle are travelling will be conducted on an ad hoc basis.	Environmental Co-ordinator will do spot checks on an ad hoc basis.	Throughout the operational phase.
				The farmers and community meetings conducted by the mine will be used for environmental reporting and community liaison on matters relating to the impacts on air quality.	ECO.	Meetings with farmers will be arranged.	Environmental Co-ordinator will attend and keep minutes of meetings as and when they are arranged and held.	Whenever meetings with farmers are arranged and held during the Operational Phase.
				Reduce unnecessary traffic and minimise travelling distance through good layout and process design.	Appointed contractors and ECO.	Inspections will be conducted to ensure that traffic is restricted within the approved foot print areas.	ECO on a monthly basis.	Throughout the operational phase.
				Limit the area of operation to what is necessary.	Appointed contractors and ECO.	Inspections will be conducted to ensure that activities are restricted within the approved foot print areas.	ECO on a monthly basis.	Throughout the operational phase.
				Rehabilitation of disturbed areas should be performed as soon as practicable.	Appointed contractor and ECO.	ECO will conduct inspections to ensure that all unnecessary cleared areas are rehabilitated.	Monthly inspections by ECO.	Throughout the operational 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
Influx of job seekers.	Socio-economic aspects.	Ensure that measures are taken to discourage influx of job seekers.	Measures taken to control influx of job seekers will be in line with the mine's safety and security standards.	Black Wattle Colliery will ensure that the creation of unrealistic expectations is prevented by communicating the period of the construction phase to the local communities and the communities will be informed that few new positions will be created. Local councillors will be involved in the above communication.	Community Liaison Officer.	Number of job seekers will be monitored and meetings held by, and with the communities, will where possible, be attended by the mine.	Community Liaison Officer and Safety officer will monitor the number of job seekers weekly and will attend meetings as and when these are held.	Throughout the operational phase.
DECOMMISSIONING AND CLOSURE PHASE								
Removal of infrastructure, backfilling final voids and rehabilitation of disturbed areas.								
Formation of topographical voids and highpoints.	Topography	To ensure that the rehabilitation of historical mining areas does not have detrimental impacts on the local topographic patterns.	Ensure that the rehabilitation of historical mining areas is undertaken in accordance with the applicable rehabilitation guidelines.	All backfilled areas will be levelled and levelled areas monitored for any settlement depressions, which must be rectified as soon as possible.	ECO and Mining Contractor	The backfilled areas will be surveyed by a qualified surveyor	Surveyor and Monthly and records will be kept on site.	Throughout the decommissioning and closure phases.
Compaction and contamination of soils within the rehabilitation site.	Soils.	Ensure that the soils near the rehabilitation site is not detrimentally impacted.	Rehabilitated areas will be maintained to comply with the mine's closure objectives.	All vehicles and machinery used at the rehabilitation site will be kept in good working order.	Appointed contractor.	Vehicles and machinery will be inspected regularly and any oil incidences will be reported.	Safety Officer will conduct the inspections monthly.	Throughout the decommissioning and closure phases.
				No repairs of mine vehicles or machinery will be conducted at the rehabilitation site unless it is emergency repairs, which will be conducted on protected ground.	Appointed contractor.	All incidents of emergency repairs will be inspected and occurrence recorded.	Rehabilitation Officer or ECO will undertake the inspections as and when incidents are reported.	Throughout the decommissioning and closure phases.
				Movement of mine vehicles and machinery will be limited to demarcated routes, which will be rehabilitated when no longer in use.	Appointed contractor.	Rehabilitation site will be inspected to monitor areas with compaction	ECO will conduct the inspections monthly.	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
						or hydrocarbon contamination.		
				All infrastructure will be demolished in accordance to the rehabilitation plan.	Appointed contractor.	Demolishing of the infrastructure will be inspected	Mine engineer will conduct the inspections bi-weekly.	Throughout the decommissioning and closure phases.
				The backfilled and levelled surface will be covered with stockpiled topsoil.	Appointed contractor.	Soil thickness will be progressively monitored during replacement.	Rehabilitation officer or suitably qualified person will conduct the monitoring bi-weekly.	During the backfilling of the pit and its box cut.
				Soil amelioration will be conducted according to soil analyses as recommended by a soil specialist/suitable qualified person, to correct the pH and nutritional status before re-vegetation.	Appointed contractor.	The soil fertility status will be determined by soil chemical analysis.	Suitably qualified person will conduct the tests after levelling (before seeding/ re-vegetation).	After levelling and before seeding/ re-vegetation of the backfilled and rehabilitated areas.
				Implementation of a closure / rehabilitation plan from the onset of the mining operation.	Appointed contractor.	Inspections will be undertaken and records kept on site.	ECO will undertake monthly inspections.	Operational phase and decommissioning phase.
				The footprint will then be re-vegetated with a grass seed mixture as soon as possible to stabilize the soil and prevent soil loss during the rainy season.	Appointed contractor.	Type and method of seeding and the resultant vegetation cover will be monitored.	Suitably Qualified Person will monitor the area monthly.	After levelling and top soiling of the backfilled and rehabilitated areas.
Pollution of surface water environment.	Surface Water.	Ensure that the rehabilitation of the site does not have detrimental impacts on the surface water environment.	The surface water leaving the rehabilitation site will comply with the water quality parameters stipulated in the water use licence.	Surface water monitoring will be conducted to observe any water quality deterioration from the mining activities.	ECO	Surface water results will be reviewed to identify any surface water contamination.	ECO to review the results on a monthly basis.	During the decommissioning phase of the project.
				Should the surface monitoring indicate water quality contamination, the surface water users will be informed of the outcomes and Black Wattle Colliery to investigate and identify action plans to remediate the impact.	ECO	Surface water results will be reviewed to identify any surface water contamination	ECO to review the results on a monthly basis.	During the decommissioning 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
						and action plans, should contamination occur, will be implemented to reduce the impacts.		
				The infrastructural areas will be rehabilitated to be free draining.	Appointed contractor.	Progress of rehabilitation will be monitored.	ECO will conduct monitoring of the rehabilitation annually.	Throughout the decommissioning and closure phases.
				Existing roads will be used where possible and new disturbed areas should be minimised.	Rehabilitation officer.	Rehabilitation site will be inspected for misuse.	ECO will conduct monitoring of the rehabilitation annually.	Throughout the decommissioning and closure phases.
				All equipment's, machinery will be well maintained to ensure that hydrocarbon spills are minimised.	Rehabilitation officer.	Rehabilitation site will be inspected for spillages.	ECO will conduct monitoring of the rehabilitation annually.	Throughout the decommissioning and closure phases.
Groundwater contamination.	Groundwater.	Ensure that the deterioration of groundwater quality down gradient of the mining operations due to plume movement is minimised.	The groundwater leaving the site will comply with the water quality parameters stipulated in the Black Wattle Colliery water use licence.	If it is found that the streams/river are negatively affected by pollution from the opencast workings, measures to intercept polluted seepage water will be investigated. Should it be determined that groundwater supply to users are affected by the pollution from the workings, the Compensation investigations will be conducted.	Mine Manager and ECO.	Regular sampling of the streams/river/boreholes must be conducted.	ECO will monitor the streams monthly.	During the decommissioning and closure of the proposed 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
				Implement as many closure measures during the operational phase, while conducting appropriate monitoring programmes to demonstrate actual performance of the various management actions during the life of mine.	Mine Manager and ECO.	Groundwater sampling must be conducted during the operational phase to establish a database of groundwater quality to assess plume movement trends. Audit the monitoring network annually.	ECO will monitor groundwater quarterly.	During the decommissioning and closure of the proposed project.
				The pipeline is removed post mine closure and its respective footprint areas rehabilitated (top soiling and seeding).	Rehabilitation officer.	Rehabilitation site will be inspected for misuse.	ECO will conduct monitoring of the rehabilitation annually.	Throughout the decommissioning and closure phases.
Deterioration of groundwater quality.				A groundwater monitoring strategy as per the recommendations of the groundwater specialist report will be implemented to monitor groundwater levels in the surrounding area. This will include monitoring of the shallow weathered aquifer water levels and water quality.	ECO and appointed contractor.	Monitoring results will be kept for recommendation purposes.	ECO will keep records of the monitoring quarterly.	Throughout the decommissioning and closure phases
				The likelihood of decant, as well as its location and expected quality will be accurately determined at a high level of confidence and measures put in place to ensure that no decant or discharge of contaminated water occurs, unless it meets the applicable resource quality objectives (RQO's). Where the RQO's are exceeded, contaminated water will need to be treated. Where decant cannot be prevented, a water management strategy will therefore be developed and implemented on site that will ensure that water levels within	ECO and appointed contractor.	Inspections will be conducted to determine any decant occurrence.	Surveyor on a monthly basis.	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
				the mined-out areas are actively managed post-mining so that decant is prevented and no contaminated water is discharged into the environment untreated.				
				Opportunities for the alternative treatment options for mine water post closure will also be investigated to reduce maintenance costs and responsibilities of water treatment post closure.	Appointed contractor.	Records of the alternative treatment options for mine water post closure will be kept.	ECO and mine surveyor when agreed upon.	Throughout the decommissioning and closure phases
				Mine design will consider the expected decant point and where possible be optimised to ensure to as far as possible prevent decant as predicted by the groundwater modelling. Where possible and if decant cannot be prevented, mine designs will target to have the decant point located outside any wetland or watercourse habitat, with enough space between the expected decant point and adjacent wetlands or watercourses to allow for suitable management interventions, including potentially the passive treatment of decant.	Mine Manager, Rehabilitation Officer and ECO.	Records of the initial and the revised mine plan will be kept on site for audit purposes. The mined-out plan will be reviewed against the revised mine plan that shows the decant points.	ECO will review the plans as mining progresses.	Before the construction phase.
				A clear action plan will be developed to respond to water quality problems picked up by regular monitoring.	Appointed contractor and ECO.	Records of the action plan will be kept.	ECO and mine surveyor when agreed upon.	Throughout the decommissioning and closure phases.
Sediment runoff from the rehabilitation site may be deposited into the wetland area thereby result in the loss of wetland habitat.	Sensitive landscapes.	Ensure that the wetlands situated near of the rehabilitation site are not detrimentally affected by the runoff from the rehabilitation site.	The wetlands will maintain or improve its current present ecological status and ecological importance status.	The site will be rehabilitated to approximate the current landscape profile and will be re-vegetated with locally occurring indigenous grasses.	Rehabilitation officer.	Rehabilitation site will be inspected for misuse.	ECO will conduct monitoring of the rehabilitation annually.	Throughout the decommissioning and closure phases.
				During the decommissioning and closure phase, the final voids will be closed and all surface infrastructures are to be removed from site.	Rehabilitation officer.	Rehabilitation site will be inspected for misuse.	ECO will conduct monitoring of the rehabilitation annually.	Throughout the decommissioning and closure phases.
				Implement measures to manage stormwater runoff from the rehabilitated	Rehabilitation officer and ECO.	Rehabilitation site will be	ECO will conduct	Throughout the decommissioning and

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
				site.		inspected for misuse.	monitoring of the rehabilitation annually.	closure phases.
				The alien vegetation management plan compiled by an ecologist during the construction/operational phase of the mine will be kept in place for several years following mine closure (minimum of five years). All species of alien invasive vegetation will be controlled and removed from site. No spread of alien vegetation into any wetlands or adjacent properties should be allowed.	ECO and appointed contractor.	Rehabilitation site will be inspected for occurrence of alien vegetation and removal undertaken thereof.	ECO will inspect the area annually.	During the decommissioning and closure of the proposed project.
				All disturbed and transformed areas will be landscaped to approximate the natural landscape profile, but should avoid steep slopes and concentrated run-off where possible.	Rehabilitation officer.	Rehabilitation site will be inspected.	ECO will conduct monitoring of the rehabilitation annually.	Throughout the decommissioning and closure phases.
				Compacted soils will be ripped and scarified.	Rehabilitation officer.	Rehabilitation site will be inspected.	ECO will conduct monitoring of the rehabilitation annually.	Throughout the decommissioning and closure phases.
				The rehabilitated areas will be re-vegetated as soon as possible following completion of the earthworks to minimise erosion.	Rehabilitation officer.	Rehabilitation site will be inspected.	ECO will conduct monitoring of the rehabilitation annually.	Throughout the decommissioning and closure phases.
				Regular long-term follow up of rehabilitated areas will be required to ensure the successful establishment of vegetation and to survey for any erosion damage on site. Erosion damage will be repaired immediately.	Rehabilitation officer.	Rehabilitation site will be inspected.	ECO will conduct monitoring of the rehabilitation annually.	Throughout the decommissioning and closure phases.
				Sediment traps will be placed in rehabilitated areas to avoid sedimentation.	Rehabilitation officer.	Rehabilitation site will be inspected.	ECO will conduct monitoring of the rehabilitation annually.	Throughout the decommissioning and closure phases.
Air pollution from rehabilitation site.	Air quality.	To ensure that the rehabilitation	Decommissioning and rehabilitation of the	Wet suppression using water carts will be conducted at areas with excessive dust	ECO and appointed contractor.	Visual inspections of	ECO will undertake	Throughout the decommissioning 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
		areas does not have detrimental impacts on air quality.	areas will be operated in such a manner that the ambient air quality does not exceed the air quality standards including the internal air quality targets.	emissions, which include unpaved roads. Chemical surfactants will be considered should water suppression not yield satisfactory results.		areas with possible dust emissions such as unpaved roads and transfer points will be conducted	monthly inspections.	
				The existing and new paved roads needed during decommissioning will be maintained, which will reduce the extent of areas that can generate dust. These roads will be rehabilitated after their use.	Mine manager and appointed contractor	Ambient air quality and dust fall monitoring (including recommended additional monitoring points) will be conducted.	ECO will conduct ambient dust fallout monitoring monthly.	Throughout the decommissioning phase.
				The traffic volumes and speed within the area will be controlled. This will be in accordance to the safety rules of the mine.	Safety Officer.	Observations on the speed at which vehicle are travelling will be conducted.	Safety Officer will conduct inspections on an ad hoc basis.	Throughout the decommissioning phase.
				The farmers and community meetings conducted by the mine will be used for environmental reporting and community liaison on matters relating to the impacts on air quality.	ECO.	Minutes of the meeting will be recorded.	ECO will keep records of community meetings.	Throughout the decommissioning phase.
Visual impacts from the rehabilitation works.	Visual aspects.	Ensure that the rehabilitation of the all infrastructures does not have detrimental visual impacts on the surrounding property owners and users.	Rehabilitation area will not increase beyond the planned extent.	All infrastructures will be removed during this phase in accordance to the rehabilitation plan.	ECO.	Monitoring for the visual impacts will include regular inspections on the rehabilitation works against the rehabilitation plan.	ECO will conduct inspections monthly.	Throughout the decommissioning 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
Increased noise levels.	Noise aspects.	Ensure that the noise levels emanating from the Black Wattle Colliery project decommissioning site will not have detrimental effects on the mine employees and surrounding communities.	The noise levels from the Black Wattle Colliery project site will be managed and measures will be taken to ensure that noise levels are below the National Noise Control Regulations, SANS10103:2008 guidelines.	Provide employees with ear plugs and instructed them to use the ear plugs; Where possible berms as a barrier must be constructed between the source of noise and the receptors. The dimensions of the barrier must be as recommended by the noise specialist. See noise report for the recommendations.	Appointed contractor and ECO.	Undertake ambient noise monitoring programme. Speed checking will be conducted.	Environmental specialist twice a year. Safety Officer will conduct speed checking as regularly as possible.	During Decommissioning and Closure Phases.
Damage or destruction of sites with archaeological and cultural significance.	Sites of archaeological and cultural importance.	Ensure that the rehabilitation activities do not have detrimental impacts on the identified grave yards and the cultural activities (should they be undertaken).	The grave sites will not be damaged or destroyed by the rehabilitation activities and the cultural activities will not be disturbed by the rehabilitation activities.	The rehabilitation activities will be undertaken such that it is away from the identified grave site. The fence around the graves within the mining area will be maintained in good order and access to the grave yards will be made available to the family of the deceased.	Appointed contractor and the Mine Environmental Co-ordinator.	The grave site will be monitored for any rehabilitation related damages on a quarterly basis.	Mine Environmental Co-ordinator will monitor the grave yard quarterly.	Throughout the decommissioning phase.
Impacts on employment.	Socio-economic aspects.	Ensure that cessation of the operation does not have detrimental impacts on the employees and surrounding communities.	Manage the loss of employment in accordance to the approved Social and labour plan of the mine.	Transfer and redeploy employees and contractors wherever possible. Implement non-mining related skills development programmes for employees and family members through the SLP throughout the life of mine to enable retrenched employees to seek alternative employment or start income-generating businesses.	Appointed contractor and the Mine Environmental Co-ordinator. Appointed contractor and the Mine Environmental Co-ordinator.	Monitor the employee transfer process. Monitor the progress of the mine's employee skills development programme.	Human Resources Manager will monitor the transfer. Community Liaison Officer.	During the decommissioning of the project. During the decommissioning of the project.
AFTER CLOSURE 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 groundwater study has indicated that decant might occur from the opencast workings in form of diffuse seepage. The decant water will contaminate the nearby streams and wetlands. The water quality is likely to remain poor in the long term (>20 years).	Surface Water and Groundwater	Ensure that the mined-out areas do not result in detrimental surface impacts on the surrounding surface users and the environment.	The groundwater around the mined-out areas will comply with the water quality standards to be provided by the DWS on closure.	Black Wattle Colliery have specific decant management standards, outlined in their “long term commitment” plan. These standards and procedures will be employed to mitigate the effects of future decant. The intention of the mitigation will be to either stop the decant, improve the decant water quality to discharge standards agreed to by the appropriate catchment management agency or the Department of Water and Sanitation, or reduce decant to acceptable volumes agreed to by the appropriate catchment management agency or the Department of Water and Sanitation.	ECO and Rehabilitation Officer	Decant management standards will be implemented to mitigate decant, should it occur.	ECO will monitor the decant areas against the procedures and the standards.	Throughout the closure phase until closure certificate is obtained.
				Methods to improve the decant water quality could include flooding of the mining areas, where practical, to reduce oxygen ingress. Routing seepage through lime pits can also improve the water quality if the flows are low enough.	ECO and Rehabilitation Officer	Monitoring will be conducted and the results analysed based on the approved water quality limits.	ECO will monitor the results on a monthly basis.	Throughout the closure phase until closure certificate is obtained.

6 PROCEDURE FOR ENVIRONMENTAL RELATED EMERGENCIES AND REMEDIATION

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 Black Wattle Colliery (Pty) Limited in terms of environmental legislation requirements. The following define most likely potential environmental emergencies:

- Hydrocarbon spills or leaks
- Veld fires due to spontaneous combustion
- Explosions (electrical transformers)
- Spills or leaks of process water or slurry
- Flooding due to Burst/Overflowing Dams
- Burst pipelines
- Chemical spills from equipment
- Transportation accidents

Black Wattle Colliery (Pty) Limited has developed procedures for environmental related emergencies for the Black Wattle Colliery, which is explained in more detail below.

Introduction

This procedure describes the process to be followed to report and deal with emergencies, which may occur on the mine property. 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 properties and to manage environmental risk.

This standard procedure aims 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. Below are the objectives of the above-mentioned procedure:

- To ensure quick and controlled responses to environmental emergencies through the use of correct personnel and equipment.
- To prevent incidents from becoming more extensive through the timeouts contact and arrival of trained personnel on site.
- To establish a management mechanism from which a range of safety, environmental and health issues can be dealt with, should they arise.

Purpose of the procedure

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

This procedure is developed to provide guidance to ensure that:

- Danger to the environment, personnel, contractors and non-employees are minimised.
- Legal liability is managed and minimised.
- Public relations are effectively managed during and following emergencies.

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.

Legal requirements

The following below listed legislation was identified for the emergency response activities in the mining industry. The legislation requires that governmental departments be kept informed of incidents and accidents:

- Regulation 51 of Regulations under the Minerals and Petroleum Resources Development Act, 2002 (Act 28 of 2002) – PROCEDURE FOR ENVIRONMENTAL RELATED EMERGENCY AND REMEDIATION
- Mine Health & Safety Act 29 of 1996 – MANNER OF REPORTING AND KEEPING OF INFORMATION REGARDING INCIDENTS & EMERGENCIES
- Occupational Health & Safety Act 85 of 1993 – EMPLOYEE REQUIREMENTS TO REPORT INCIDENTS WHERE ACTIVITY HAS OCCURRED

Black Wattle Colliery (Pty) Limited is responsible for the safety and wellbeing of employees working at Black Wattle Colliery as well as the protection of the environment from unnecessary negative impacts. The management of the mine has a responsibility to initiate a warning process should an emergency occur or should something at the mine site deteriorate in an uncontrolled manner presenting a risk to employees, the public or the environment.

General Mine Manager

It is the responsibility of the Mine Manager to appoint a person or persons to review and audit the activities as covered by the scope of this Procedure. The Mine Manager or his appointed representative shall ensure that the audits are being conducted systematically and at regular defined intervals. The Mine Manager shall further ensure that the person nominated to perform audits of the emergency system, are given all the necessary assistance and facilities to conduct the task effectively.

Local Government

Local government departments have the responsibility to warn residents of a hazardous situation, these warnings must be based on information provided by the mine.

All employees, contractors and other relevant parties

All employees, contractors and other relevant parties should ensure that they are familiar with this procedure.

Description of Possible Emergencies, Mine's Preparedness and Remedial actions

The following define most likely potential environmental emergencies. The safety officer will be contacted in all emergencies. In all cases the surrounding area must be cordoned off in a safe and efficient way. Emergency equipment for direct incidents must always be available on the mine.

Hydrocarbon spills or leaks caused by diesel spills, oil spills.

These are typically spillages or leaks of hydrocarbon liquids from containers and pipelines. The hydrocarbon liquids involved in these emergencies are diesel, new and used oils and paint. The spillages of hydrocarbon liquids may potentially contaminate the groundwater regime, surface water and soil over the affected areas. These, if not remediated properly, may have permanent detrimental effects on environmental components.

All hydrocarbons will be stored in well enclosed containers. The containers will be placed within bunded areas. The bunded areas will be constructed to have capacity to contain the total volumes of stored liquids plus ten percent of the stored liquids. Emergency telephone numbers with contact persons will be placed near the containers. Credible companies will be called, if a carbon spill occurs, to assess the situation and take the necessary steps.

Surface fires, including veld fires.

These include any fires within the Black Wattle Colliery mining right area. These fires may emanate either from the mine area or outside the mining area. The fires are considered emergency situations since they put lives of employees at risk and result in the destruction of environmental components such as natural vegetation (grasses, trees), animal life (wild and domestic livestock) and air quality. It is for this reason that fires have been identified as a potential emergency.

Firefighting equipment will always be kept ready at the mine, in a good working condition and at an accessible location. Correct fire extinguishers will be used to extinguish the fire. Note that no water on electrical and liquid-based fires will be used. The employees will be trained on dealing with fire situations. Fire breaks will be made at suitable locations. Where possible the fire breaks will be made by machinery by removing the vegetation. Employees will be trained on making and maintaining fire breaks. First aid equipment will always be made available. Emergency telephone numbers with contact persons will be placed near the areas prone to the emergency. The following procedure will be implemented.

- Safety Officer will assemble the fire team and combat the fire.
- If the fire seems to go out of control, the Fire Brigade from the nearby town will be contacted. Black Wattle Colliery (Pty) Limited will establish a working agreement with the Fire Brigade from the nearby town to make themselves available at any time in case fires are out of control.
- All affected farmers will be contacted.

Explosions (Electrical Transformers etc.)

Explosions of transformers at the mine have a potential detrimental impact on the environment. During explosion of the transformers, a significant amount of oils will be leaked, which may be ignited or may enter the environment having permanent impacts on the environment.

Transformers at the mine will be inspected and checked for any signs of potential explosions or leakage of spills. The following procedure will be implemented.

- The electrical foreman will be contacted.

- The electricity supply will be switched off.
- Eskom will be contacted for assistance.
- In cases of transformer oil spillage, credible companies will be called in to clean up contamination.

Dam failure/and flooding/burst of pipeline

If a situation exists where a dam wall fails, *i.e.* burst or collapse, water within the dam may contaminate the surface water environment and may put the lives of employees and animals at risks. Flooding is just one of the scenarios that may result due to dam failure. Flooding can occur during abnormal storm events. These might cause certain structures within the mine to fail, hence placing lives under serious risk.

This category of emergency includes accidental burst of pipelines, which will be conveying dirty water to the PCD. This also has the potential to cause harm to the environment, hence the emergency procedure.

Inspection of dam walls, trenches, berms and pipelines must be carried out by an appointed competent person. Special inspections will be undertaken after a significant storm event. Any structural change in the dam wall, trenches, berms and pipelines will be reported to the appointed person, who will seek advice or address the situation immediately. The following procedure will be implemented.

- The Safety Officer will see to it that proper equipment and operators are available.
- The affected dam wall will be closed by means of a Front-End Loader.
- The spillage will be cleaned by utilising proper equipment as soon as possible.
- People affected by the spillage will be informed.
- If the spill reaches a road, the department of roads will be notified and warning signs will be placed at the affected location.
- Pipelines will be repaired/replaced and the spillage cleaned as a priority by whatever method is needed for that situation.

Transportation accident

The mine will use various machinery and vehicles such as dump and haulage trucks for the transportation of material around the mine. During an accident, while transporting the material, both the material and the liquid within the vehicles may cause detrimental damage to the environment. Liquids will include diesel, petrol and oils from the vehicles. Transported material will include coal, slurry and discard.

Speed limit signs will be place around the mine. The employees will be made aware of the speed limits and the reasons for having them. Measures will be implemented in areas prone to accidents. The following procedure will be implemented.

- Spillages will be remediated as soon as possible.
- Type of spillage must be identified.
- Clean-up will be done by a credible company.

- Transport Company will be notified.
- If outside the mine grounds, the traffic department will be notified.

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 (to relevant stakeholder)
- Containment and clean-up
- Corrective action
- Monitoring

Emergency equipment and supplies

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

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 will be available on site will include:

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

Training

The mine management will ensure that employees are trained regarding emergencies that might occur at Black Wattle Colliery.

Monitoring and activity procedure

The above listed typical environmental emergencies were identified through the compilation of the EIA and EMPr (This document) and from previous mine environmental management experiences.

During the mining operations, the mine management will ensure that measures are implemented to ensure that all possible environmental emergency activities are identified.

Review and revision

During the mining operation, several emergency response drills will be carried out and recorded (minimum of one per section every year). Emergency response drills are normally carried out during operational hours to best evaluate the response and to involve the highest number of employees. These are at the discretion of the General Manager and Site/Section Manager and may involve one or more of the emergency activities listed in this standard procedure. Emergency response drills should not be of the same type unless significant problems were experienced with the previous drill.

Regular auditing and questioning of the key personnel involved in emergency response will also be conducted. These involve the form of planned task observations (PTO). It is the responsibility of the Site/Section Manager to undertake these PTO's on a regular basis and record the response.

Information from PTO's and drills are collated and assessed. Alterations and modifications to the Emergency Response Procedure are conducted after the response drill evaluation. This task is performed in co-ordination with the Section/Site Manager to which the drill applies

A report is generated, which will be distributed to the parties concerned for review and modification. Any significant problems are addressed by altering the response plan in this procedure.

7 FINANCIAL PROVISION

Section 24 P (1) of NEMA requires an applicant for an EA related to relating to prospecting, exploration, mining or production to comply with the prescribed financial provision for the rehabilitation, closure and ongoing post decommissioning management of negative environmental impacts of their proposed operation before the Minister responsible for mineral resources issues the waste management licence. The above-mentioned financial provision may be in the form of an insurance, bank guarantee, trust fund or cash.

To this effect regulations pertaining to the above-mentioned financial provision for prospecting, exploration, mining or production operations (GNR 1147) were promulgated on the 20th of November 2015. Further to the above, in terms of Regulation 23(3) and 23(4), an environmental impact report: EIR/EMPr must, where an application is for an EA application for activities directly related to prospecting, exploration, extraction and primary processing of a mineral or petroleum resource, must address the requirements as determined in the regulations pertaining to the financial provision for the rehabilitation, closure and post closure of prospecting, mining or production operations, made in terms of the NEMA as amended.

In view of the above, Black Wattle Colliery (Pty) Limited will undertake the financial provision determination for the proposed project in terms of the above-mentioned Regulations. In support of the above legal requirement and since no new guideline for determination of financial provision has yet been promulgated under NEMA, the guideline document for the evaluation of the quantum of closure-related financial provision provided by a mine developed by the DMRE was used for the determination of the financial provision for the proposed project.

The report detailing the financial provision for the proposed project will be submitted to the DMRE with the final EIR/EMPr after the completion of the public participation process. A copy of the report can be made available on request.

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

The closure objectives for Black Wattle Colliery as detailed under section 4.1 of the EMPr, were determined based on a review of the existing closure measures and considering that many aspects of the mine are operated in a similar manner, the measures were considered in terms of physical (infrastructure), biophysical (environmental) and socio-economic measures as well as aligned to the closure components provided by the DMRE.

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

The draft EIR/EMPr is made available to the interested and affected parties during the public participation process for the proposed project. Note that the consultation of I&APs includes the direct owners of the properties affected by the proposed project and owners of land immediately adjacent to the proposed project area, communities, land dwellers and state departments.

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

7.3 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 mining operations. In view of the above, a rehabilitation plan must be provided to the DMRE in support of the financial provision determined for mining operations. This section details the rehabilitation plan for the proposed project. The Final Rehabilitation, Decommissioning and Mine Closure Plan is attached as Appendix 6.

The aim of rehabilitation is to return the land disturbed by all mining activities to at least the pre-mining use and ensure that residual and latent impacts at the closure of the mine are minimal. Objectives associated with rehabilitation include:

The closure objectives and targets for Black Wattle Colliery are as follows:

- Rehabilitation of areas disturbed because of mining to a land capability that will support and sustain a predetermined post-mine closure land use;
- Removal of all infrastructure 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 mine-affected areas;
- Reinstatement of self-sustaining ecosystems over the rehabilitated infrastructure and mining affected areas, requiring minimum on-going maintenance to facilitate a walk away situation;
- Establishment of final landforms that are stable and safe in the long run;
- Management of mine-affected water to prevent long-term risk of contamination of surface and underground water sources, which include where possible treatment of mine-affected water to;
- Prevention of acid mine drainage;
- Monitoring and maintenance of rehabilitation areas and water treatment processes forming part of mine closure to ensure the long-term effectiveness and sustainability of measures implemented.
- Regarding closure targets for Black Wattle Colliery, the mine will ensure that the rehabilitation of disturbed areas, removal of infrastructure, management of rehabilitated areas and management of mine affected water and water leaving the mining are is undertaken such that

it ensures compliance with all relevant standards as published by the relevant state authorities.

7.3.1 Infrastructure Areas

- All concrete, steel works and structures will be removed so that the land can be returned to as near as practically possible to its original state.
- All rehabilitated areas will be shaped to be free draining without concentrating flow such that erosion occurs, fertilised and a mixture of indigenous and pasture grasses will be planted. Following this rehabilitation, the infrastructure areas will have a capability like the pre-mining environment.
- All rehabilitated areas will be maintained for a period of 3 years, where after the frequency will be reassessed. Vegetation cover will be maintained by annual application of fertiliser combined with biennial cutting or burning for the first three years. After this period, fertilizer will be applied as and when required.
- Maintenance with respect to erosion will be conducted on a minimum three-monthly basis if and where required. This frequency will be reassessed after a 3-year period. The final rehabilitated surface will be stable, self-sustaining and erosion-free.
- All roads not required for residential or farming purposes and water pipelines will be removed and the ground restored as above.

7.3.2 Roads and Pipelines

The NEMA require all infrastructure associated with the mining operation to be removed and the surface on which it was situated to be returned, as close as is practically possible, to the original land use.

Roads

Haul roads to the proposed project will be rehabilitated. All gravel roads will be graded to remove carbonaceous material. The roads will be cross-ripped to 300 mm at right angles to the natural slope, fertiliser added as per soil requirements and vegetated with a seed mix of indigenous and pasture grasses. Maintenance will be conducted on the rehabilitated areas as indicated in the Policy statement.

7.3.3 Buildings (Offices, Workshops and Stores)

The bulk of the activity in removing the office structures (workshops and administration buildings). Note that should these structures be needed, mobile units will be used hence there will be no need for demolition to be undertaken during the decommissioning of the facilities.

7.3.4 General Overall Rehabilitation Procedures

The above areas will all be rehabilitated according to the following principals:

- All areas will be cleared of potentially contaminating material, which will be disposed of at an appropriate waste facility.
- Areas will be filled to attain adequate topographical levels like that of pre-mining. The areas will be contoured to ensure adequate drainage and prevent pooling or ponding of water.

- Where pooling or ponding of water occurs, the areas will be revisited and graded and filled as necessary.
- Soils that were removed and stockpiled need to be re-assessed prior to and during rehabilitation. This is necessary to ensure nutrients are adequate.
- The rehabilitated areas will be sampled and the necessary lime and fertiliser requirements applied prior to re-vegetation. Any area profiled and topsoiled will be vegetated within the same growing season. These areas will be vegetated with the prescribed seed mix, which will reflect the original biome type. The seed mixture should as a minimum, be made up according to the specifications of the specialist study. Rehabilitation should be done as soon as possible to reduce risk of soil erosion and to increase habitat availability for fauna as soon as possible.
- Once areas have been rehabilitated and seeded, access to these areas should be restricted.
- Rehabilitated areas will be monitored for vegetation cover and alien invasive encroachment on a 6 monthly basis. Areas of failed growth will be fertilised (if necessary) and re-seeded. All exotic and invasive vegetation should be removed.
- Erosion and pooling of water / impaired surface water flow will be monitored on a monthly basis during the rainy season and/or after each heavy rainfall event, any areas of concern will be addressed immediately. Where erosion gullies are noted, hale bales, gabion baskets or stick energy dissipaters are to be installed, and storm water control structures will be reviewed.
- The status of biodiversity and land management will be monitored on an annual basis and specialist recommendations applied.
- Groundwater and surface water monitoring will continue during the decommissioning, closure and post-closure phases.
- Maintenance and monitoring will continue for a period of at least 4 years following closure.

7.4 Compatibility of the Rehabilitation Plan with the Closure Objectives

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

7.5 Determination of the Quantum of the Financial Provision Required to Manage and Rehabilitate the Environment

The determination of the quantum of the financial provision required to manage and rehabilitate the environment at the proposed project has been conducted in accordance with the requirements of the regulations pertaining to the above-mentioned financial provision for prospecting, exploration, and mining or production operations. Based on the calculations indicated in Table 19, the quantum of pecuniary provision required for the proposed project will be **R5 079 570.49** and this will be provided to the DMRE.

7.6 Method of Providing for the Financial Provision

Regular annual contributions will be made to this fund to ensure that enough funds are available for rehabilitation of project activities during the decommissioning phase. Black Wattle Colliery (Pty) Limited will either provide a bank guarantee or an insurance fund for the calculated financial provision.

Table 19: Assessment of the quantum for financial provision

"Rules-based" assessment of the quantum for financial provision							
CALCULATION OF THE QUANTUM							
Mine:	BLACK WATTLE COLLIERY (PTY) LIMITED	**Location:**	Magisterial District of Middelburg, Mpumalanga Province.				
Evaluators:	O.T Shakwane of Geovicon Environmental (Pty) Limited	**Date:**	13/04/2023				
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 19.47	1.00	1.10	R 0.00
2 (A)	Demolition of steel buildings & Structures	m^2	0.00	R 271.16	1.00	1.10	R 0.00
2 (B)	Demolition of reinforced concrete buildings & structures	m^2	0.00	R 399.61	1.00	1.10	R 0.00
3	Rehabilitation of access roads	m^2	30000.00	R 48.53	1.00	1.10	R 1 601 408.78
4 (A)	Demolition & rehabilitation of electrified railway lines	m	0.00	R 470.96	1.00	1.10	R 0.00
4 (B)	Demolition & rehabilitation of non electrified railway lines	m	0.00	R 256.88	1.00	1.10	R 0.00
5	Demolition of housing &/or administration facilities	m^2	0.00	R 542.33	1.00	1.10	R 0.00
6	Opencast rehabilitation including final voids & ramps	ha	1.90	R 284 292.18	1.00	1.10	R 594 170.66
7	Sealing of shafts, adits & inclines	m^3	0.00	R 145.57	1.00	1.10	R 0.00
8 (A)	Rehabilitation of overburden & spoils	ha	0.00	R 189 528.11	1.00	1.10	R 0.00
8 (B)	Rehabilitation of processing waste deposits & evaporation ponds (basic)	ha	0.00	R 236 053.85	0.80	1.10	R 0.00
8 (C)	Rehabilitation of processing waste deposits & evaporation ponds (acidic	ha	0.00	R 685 612.28	0.80	1.10	R 0.00
9	Rehabilitation of subsided areas	ha	0.00	R 158 717.49	1.00	1.10	R 0.00
10	General surface rehabilitation	ha	4.00	R 150 138.25	1.00	1.10	R 660 608.29
11	River diversions	ha	0.00	R 150 138.25	1.00	1.10	R 0.00
12	Fencing	ha	0.00	R 171.26	1.00	1.10	R 0.00
13	Water management	ha	0.00	R 57 086.78	1.00	1.10	R 0.00
14	2 to 3 years of maintenance & aftercare	ha	4.10	R 19 980.38	1.00	1.10	R 90 037.89
15 (A)	Specialist study	SUM	2.00	R 200 000.00	1.00	1.00	R 400 000.00
15 (B)	Specialist study	SUM	0.00	R 1 000 000.00	1.00	1.00	R 0.00
						Sub Total 1	
						(Sum of items 1 to 15 Above)	**R 3 346 225.62**
	Multiply by Weighting factor 2	1.1		R 334 622.56			R 334 622.56
1	Preliminary and general	Add 12% if subtotal 1 is less than R100,000,000.00					R 401 547.07
2	Contingencies	Add 10% of subtotal 1					R 334 622.56
						Sub Total 2	
						(Subtotal 1 plus sum of management & contingencies)	**R 4 417 017.82**
						VAT (15%)	R 662 552.67
		(Subtotal 2 plus VAT)			**GRAND TOTAL**		**R 5 079 570.49**

8 MECHANISM FOR MONITORING COMPLIANCE WITH AND PERFORMANCE ASSESSMENT AGAINST THE ENVIRONMENTAL MANAGEMENT PROGRAMME AND REPORTING THEREOF

8.1 FUNCTIONAL REQUIREMENTS FOR ENVIRONMENTAL 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. Below is the explanation of how each environmental aspects to be affected by the mine will be monitored, which include all aspects of the environment affected by the proposed Black Wattle Colliery Opencast Expansion Project.

8.1.1 Soil

The soil profile will be disturbed during the construction and operational phases of the proposed project. As a mitigation measure, the stripping, stockpiling and replacement of the soil layers must be conducted such that all topsoil removed are replaced during the rehabilitation of the disturbed areas. During the construction phase, the stockpiled soils will be monitored to determine the quality of the soils. The results of the analysis will be useful in determining the amount and type of fertilizers required for the soils during the decommissioning phase. The soils will also be monitored once used during the rehabilitation of the disturbed areas. Competent and accredited laboratories will be used for the analysis of the soils. Records of soil placement and package thickness will be kept during mining the decommissioning phase.

8.1.2 Topography

The establishment of the proposed opencast project will result in creation of a topographical highpoint, which will alter the topographical patterns of the local surroundings.

In view of the above, it will be necessary that all voids and topographic highs created be surveyed regularly by a mine surveyor. The surveyed data must be compared and aligned to the approved design parameters of the structures resulting in topographical impacts. The mine surveyor will also survey all rehabilitated areas including the backfilled voids. The regular surveying of the topography will be the monitoring of the topography.

8.1.3 Natural Vegetation, Land Use and Capability

The ability of land (soils) to enable establishment and maintenance of good vegetation cover over an area can be used to describe the land capability of an area. During the mining the land use and capability over the areas where the pit and associated surface infrastructure will be placed would have been impacted upon. As a mitigation measure, the disturbed areas will be rehabilitated and made comparable to an after-mining land use. For monitoring of the effectiveness of the mitigation measure

on land use and capability, the establishment and ability to maintain a good vegetation cover together with monitoring described under soils will be conducted. Distribution of plant species suitable for the after land use will be monitored during the closure phase of the project, which will be suitable for determining the effectiveness of the mitigation measures.

8.1.4 Surface and Groundwater

8.1.4.1 Water Monitoring

The existing 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 quarterly for groundwater monitoring points for until the first five years after closure. Thereafter, the frequency for surface water monitoring points will decrease to quarterly and the groundwater monitoring points to be twice a year. This will again be reviewed after a further 2 years. Additional groundwater monitoring points will be sampled to include monitoring of the impacts from the proposed project area.

8.1.5 Bio-monitoring

Vegetation and SASS 5 monitoring surveys will continue through the decommissioning phase. The vegetation surveys will be expanded to include all rehabilitated areas to ensure that the vegetation composition and cover is adequate.

Note that the frequency of the bio-monitoring surveys will be decreased during the decommissioning phase to annually. The bio-monitoring and vegetation surveys will continue for a minimum of 3 years after closure.

8.1.6 Noise

Environmental Noise Monitoring can be divided into two distinct categories, namely:

- Passive monitoring – the registering of any complaints (reasonable and valid) regarding noise; and
- Active monitoring – the measurement of noise levels at identified locations.

Active environmental noise monitoring is recommended due to the medium (after the implementation of appropriate mitigation measures) significance for a noise impact to develop. In addition, should a valid complaint be registered, the mine must investigate this complaint as per the following sections. It is recommended that the noise investigation be done by an independent acoustic consultant.

8.1.7 Air Quality

During mining the movement of machines and blowing winds will generate dust. Impacts resulting from the generated dust will be low. Despite this, the fact that cumulative impacts may result from other sources, Black Wattle Colliery has developed a dust-monitoring programme. Services of an independent service provider will be used to monitor the overall dust generated at the project area The monitoring network should be updated to consider the receivers identified as part of the air quality study updates. The air quality monitoring must be in line with the ambient air monitoring, performance assessment and reporting programme provided in the air quality assessment report.

8.1.8 Sensitive Landscapes

The monitoring of wetlands will involve the assessment of the wetland Present Ecological State and the Ecological Services on an annual basis. The soil types in the unaffected areas will not change thus a soil investigation will not be necessary. Soil investigation will only be limited to the areas where wetlands are affected. Below is the description on how the Present Ecological State and the Ecological Services will be determined.

8.1.8.1 Present Ecological State – PES (Wetland Health or integrity)

The Present Ecological State (PES) will be determined using the method described by Macfarlane *et. al.* 2008. Level 2 Hydrological, Geomorphological and Vegetation assessments are conducted separately after which an overall wetland PES is determined.

8.1.8.2 Ecosystem services

The assessment of the ecosystem services supplied by the identified wetland units was conducted according to the guidelines as described by Kotze *et. al.* 2008 (WET Eco Services - A technique for rapidly assessing ecosystem services supplied by wetlands). This technique is designed for inland palustrine wetlands that refers to non-tidal wetlands dominated by emergent plants, shrubs or trees and includes a variety of systems commonly described as marsh, floodplain, vlei or seep. A level 2 assessment will be undertaken which examines and rates natural as well as human services. **The system is not designed to provide a single overall measure of value or importance of a wetland.**

8.1.9 Field work

The field work that will be conducted annually and will include surveying the area to determine if there is a change in the vegetation composition. Animal species will be verified and if any water is available, bio-monitoring will be conducted. Soil investigation will be conducted only on areas being rehabilitated.

The survey will also include the observation of any erosion features as well as the detection of any declared invader plant species or plant species that must be protected.

8.1.10 Interested and Affected Parties

A list of all identified I&APs is given in the EIR. Any additional or new parties that would like to be included in this list will be included in the list.

The mine also uses an open-door approach with the surrounding inhabitants and landowners. This allows the mine to pro-actively react to any perceived complaint from its neighbours thus ensuring that the situation is resolved timeously.

8.2 Monitoring compliance with and performance assessment against the environmental management programme and reporting thereof

As part of the general terms and conditions for an EA and in order to ensure compliance with the EMPr and Regulation 34 under the EIA Regulations, 2014 and in order to assess the continued appropriateness and adequacy of the EMPr, Black Wattle Colliery (Pty) Limited will, for the period during which the EA and EMPr remain valid, ensure that the compliance with the conditions of the EA

and the EMPr, is audited and that an environmental audit report is submit to the DMRE as determined in the EA for the proposed project.

8.3 Environmental Awareness Plan

To describe the core elements of the mine's Environmental Management System (EMS), Black Wattle Colliery (Pty) Limited has developed an environmental awareness plan and an emergency procedure that it uses to inform its employees of any environmental risks that may results from their work and the way the risk will be dealt with to prevent pollution nor degradation of the environment. Copies of the environmental awareness plan for Black Wattle Colliery, which will be applicable to the proposed project are available on request. A copy of the approved emergency procedure for Black Wattle Colliery is attached as Appendix 7 of this report.

8.4 Undertaking to Comply

The signed undertaking will be presented to DMRE on approval of the EIR/EMPr.

8.5 Statutory Requirements

An IWUL application for all the water uses within the proposed project is being prepared for submission to the DWS.

9 UNDERTAKING

Herewith I, the person whose full names is stated below, confirm that I am the EAP authorised to act as representative of Geovicon Environmental (Pty) Limited, the company commissioned by the applicant in terms of Regulation 12 of the EIA Regulations, 2014 of the National Environmental Management Act, 1998 (Act No. 107 of 1998), and confirm that:

- The above report is compiled with all relevant available information pertaining to the proposed project.
- All relevant stakeholders and I&APs were consulted and any comments received were included in the compilation of this report.
- Any responses provided to I&APs by the EAP is included in this report.
- The plan of study for the proposed project is included in this report and was provided to all I&APs to ensure that they are aware and agree to the plan of study for undertaking the Environmental Impact Assessment.

Full Names and Surname	Tshepo Ornassis Shakwane
Date	14/04/2023
Signature	

Appendix 1

Proof of Consultation for the Scoping Phase

Black Wattle Colliery (Pty) Ltd

Public Participation Report

For the Scoping Phase

As contemplated in Chapter 6 of the National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA)'s Amended Environmental Impact Assessment Regulations, 2014 (Government Notice No. 982) (NEMA EIA Regulations, 2014)

For

BLACK WATTLE COLLIERY

JANUARY 2023

GEOVICON Environmental

Report Type:	Public Participation Report
Project Title:	Black Wattle Opencast expansion 2022 Project
Compiled for:	Black Wattle Colliery (Pty) Ltd
Compiled by:	T. Shakwane, B.Sc. Hons. Pr. Sci.Nat and Registered EAP
Geovicon Reference:	39102021
Version:	Final
Date:	January 2023

Disclaimer:

The results and conclusions of this report are limited to the Scope of Work agreed between Geovicon Environmental (Pty) Limited and the Black Wattle Colliery (Pty) Ltd for whom this report/ investigation has been conducted. 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)

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

EXECUTIVE SUMMARY

Black Wattle Colliery owned by Black Wattle Colliery (Pty) Limited is an opencast mining operation situated on the Remainder of portion 27 of the farm Middelburg Town and Townlands 287 JS and a portion of the remainder of portion 2 of the farm Uitkyk 290 JS, Portion 4, 14, 27 and a portion of mineral area 1 (a portion of portion 3) of the farm Vaalbank 289 JS, Magisterial District of Middelburg, Mpumalanga Province.

Black Wattle Colliery is located approximately 3 km south of Middelburg at the intersection of the N4 freeway and the R35 Middelburg-Bethal Provincial Road. It lies within the Steve Tshwete Local Municipality and Nkangala District Municipality in the Mpumalanga Province. Black Wattle Colliery is an opencast strip mine near Middelburg, Mpumalanga. Black Wattle Colliery extracts the No. 1 and No. 2 coal seams within the Witbank Coalfields. The coal reserves in the project area were formerly mined using the underground method and was changed to opencast method due to poor roof wall encountered in the underground workings. The coal products from the mine are targeted for both local and international markets. Coal is processed on site using a Dense Medium Separation (DMS) coal washing plant. Arising mineral residue from the coal washing process during the life of mine have resulted in one mineral residue deposit facility, which is no longer active. Black Wattle Colliery is operated under a mining right granted by the DMRE (DMRE Ref. No.: MP 30/5/1/2/2/22 (10140) MR) and an approved EMPR.

In addition to the above, Black Wattle Colliery (Pty) Limited recently acquired additional coal reserves from South 32 SA Coal Holdings (Pty) Limited on land adjacent to their mining right area (a portion of portion 3 of the farm Vaalbank 289 JS). The acquisition of this coal reserve will extend the life of mine of Black Wattle Colliery by approximately ten years. A sale agreement between South 32 SA Coal Holdings (Pty) Limited and Black Wattle Colliery (Pty) Limited was established for the transfer of such reserve, pending ministerial approval. Black Wattle Colliery (Pty) Limited has accepted the transfer and intends on incorporating a part of portion of portion 3 of the farm Vaalbank 289 JS into their Mining Right.

As a result, Black Wattle Colliery (Pty) Limited is lodging an application in terms of section 102 of the said Act to amend the Mining Right MP 30/5/1/2/2/22 MR (10140 MR) to include the property secured under the said transferal, and the mining right area will now measure 1203.846 Ha. In order to comply with the requirements of the MPRDA and NEMA for the above-mentioned mining right variation, which will result in the undertaking of NEMA listed activities, Black Wattle Colliery (Pty) Limited also has to apply for an integrated environmental authorization for the listed activities triggered by the proposed mining operation.

This document concerns changes at Black Wattle Colliery's mining right area as a result, of the expansion of the mining right area i.e. extension of the opencast mining area together with infrastructure and facilities associated with the extension. Associated infrastructure and facilities will include:

• Access/haul roads,

• Overburden material stockpiles

• Opencast pits

• Water management structures (storm water diversion structures and possibly a pollution control dam with a silt trap).

Where possible, the existing offices, workshops, and other structures will be used for servicing the machinery used at the proposed opencast extension. In view of the above, Black Wattle Colliery (Pty) Ltd appointed Geovicon Environmental (Pty) Limited, an independent environmental consulting company, to prepare and submit the IEA application and manage the Environmental Impact Assessment (EIA) process for the proposed Black Wattle opencast expansion 2022. The above-mentioned Integrated Environmental Authorisation (IEA) for activities listed

under Table 4 in this report, has been submitted to the DMRE, Mpumalanga Regional Office (Competent Authority) for their consideration.

Regulation 21 of the NEMA EIA Regulations, 2014, requires that if a Scoping and Environmental Impact Reporting process (S&EIR) must be applied to an application, the applicant must submit a Scoping Report (SR), an Environmental Impact report (EIR) and an Environmental Management Programme (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. The Draft SR (this document), which has been compiled to meet the requirements of Appendix 2 and Regulation 21 of the NEMA EIA Regulations, 2014, and is made available to the competent authority and registered and potential Interested and Affected Parties (I&APs) as part of the public participation process for their review and comments.

CONTENTS PAGE

PUBLIC PARTICIPATION REPORT

TABLES

ANNEXURES

Annexure A	List of registered I&APs
Annexure B	Newspaper Notices
Annexure C	Site Notices
Annexure D	Written notices sent via emails
Annexure E	Proof of hand delivered documents and documents sent by courier

ABBREVIATIONS

TERMS	DEFINITION
EAPASA	Environmental Assessment Practitioners Association of South Africa
BEE	Black Economic Empowerment
CV	Curriculum Vitae
DMRE	Department of Mineral Resources and Energy
DWS	Department of Water and Sanitation
EAP	Environmental Assessment Practitioner
EA	Environmental Authorisation
SR	Scoping Report
EIA	Environmental Impact Assessment
EIR/EMPr.	Environmental Management Programme Report
S&EIA	Scoping and Environmental Impact Assessment
IEA	Integrated Environmental Authorisation
IWUL	Integrated Water Use Licence
I&APs	Interested and Affected Parties

TERMS	DEFINITION
MTPA	Mpumalanga Tourism and Parks Agency
SLP	Social and Labour Plan

1. INTRODUCTION

1.1 WHO IS DEVELOPING THE PUBLIC PARTICIPATION REPORT?

1.1.1 Name and contact details of the EAP's who prepared the Public Participation Report

EAP: Mr. O.T Shakwane (BSc. Honns.)

SACNASP Registration: 117080

EAPASA Registration: 2019/1763

IAIA Membership No.: 3847

Company: Geovicon Environmental (Pty) Limited

Postal Address:

P.O. Box 4050

Middelburg, 1050

Tel: (013) 243 0542

Fax: (086) 632 4936

Cell No.: 082 498 1847

Email: Tshepo@geovicon.co.za/intern3@geovicon.co.za

1.1.2 Expertise of the EAP's who prepared and reviewed the Public Participation Report

Geovicon Environmental (Pty) Limited has been appointed by Black Wattle Colliery (Pty) Ltd as the independent environmental consultant to conduct public consulation for the Mining Right Project, IEA application and compile this Public Participation Report and has no vested interest in the project.

Geovicon Environmental (Pty) Limited is a geological and environmental consulting company. The company was formed in 1996, and currently has twenty-six years' experience in the geological and environmental consulting field. Geovicon Environmental (Pty) Limited has successfully completed consulting projects 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 and in 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 shareholders i.e. O.T. Shakwane, J.M. Bate and T.G. Tefu.

The Curriculum Vitae of the Environmental Assessment Practitioner (EAP) who compiled the report and the reviewer who is involved in the compilation of this report is as follows:

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, EIA, environmental risk assessment and environmental management systems with several tertiary institutions. He has worked within the three state departments tasked with mining and environmental management i.e., Department of Water and Sanitation (Gauteng and Mpumalanga Region), DMRE (Mpumalanga Region) and Department of Agriculture, Conservation and Environment (Gauteng Region). Mr. Shakwane has been in the consulting field since 2004 and has undertaken environmental impact assessments for mining operations similar to the proposed Black Wattle Opencast expansion 2022 project. Mr. Shakwane is the appointed EAP for the NEMA, IEA application and the EIA process for the proposed Black WattleOpencast expansion 2022 Project. Mr. Shakwane has been involved in the field of EIA for the past nineteen years.

He is registered with the Environmental Assessment Practitioners Association of South Africa and South African Council for Natural Scientific Professions as an EAP and a Professional Natural Scientist in terms of section 24H of the National Environmental Management Act, (Act 107 of 1998) and section 20(3) of the Natural Scientific Professions Act, 2003 (Act 27 of 2003), respectively. He is also a member of the International Association for Impact Assessment, South Africa.

Mr. Ornassis Tshepo Shakwane of Geovicon Environmental (Pty) Limited, hereby declares that he is an independent EAP and that Geovicon Environmental (Pty) Limited has no business, financial, personal or other interest in this project in respect of which Geovicon Environmental (Pty) Limited is appointed. Furthermore, no circumstances exist that may compromise the objectivity of Geovicon Environmental (Pty) Limited, excluding fair remuneration for work performed in connection with this environmental project.

1.2 LEGAL REQUIREMENTS

Public participation is the cornerstone of any Environmental Impact Assessment (EIA) process. The principles of the NEMA govern many aspects of EIA's, including public participation. The general objective of integrated environmental management defined in section 23 (2) (d) of 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 I&APs 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, the Environmental Assessment Practitioner (EAP), must ensure that provision of sufficient and transparent information on an ongoing basis to stakeholders are made available to allow them to comment. The EAP must also ensure that the participation of previously disadvantaged people, including women and the youth, are undertaken.

In terms of the NEMA and NEMWA, when applying for an EA and WML, the EAP managing the application must conduct a PPP where all stakeholders, including potential and/or registered Interested and Affected Parties (I&APs), are given a period of at least 30 days to comment on each document during the Scoping and Environmental Impact Assessment (S&EIA) Process.

In view of the above, a PPP was initiated for the proposed project's scoping phase.

1.3 OBJECTIVE OF PUBLIC PARTICIPATION PROCESS

The following are the objectives guiding the PPP of the Black Wattle Opencast expansion 2022 Project:

- Inform, raise awareness, educate and increase understanding of a broad range of stakeholders and I&APs about the proposed project, affected environment and the environmental process to be followed;
- Establish lines of communication between stakeholders, I&APs and the project team;
- Provide ample opportunity to all parties for the exchange of information and expression of views and concerns and enhanced benefits and alternatives;
- Obtain contributions of stakeholders and I&APs and ensure that all views, issues, concerns and queries raised are fully documented (including how they were raised and have been addressed); and
- Identify all the significant issues associated with the proposed project.

2. DETAIL OF PUBLIC PARTICIPATION REPORT

2.1 IDENTIFICATION OF I&AP'S

In order to comply with the procedure for public participation as part of the PPP, contemplated in Chapter 6 of the amended EIA Regulations (Government Notice Regulation 982), any person who is interested in, or affected by the above-mentioned project was invited to register as an I&AP and to comment on the draft SR for the proposed project.

Direct and adjacent surface owners and land occupiers of the proposed project area were automatically identified as registered I&APs. Specific State Departments were identified and listed on Section 2.1.1 of this document and have also been registered as I&APs. Refer to Annexure A for the list of registered I&APs for the proposed project.

Further to this, anyone who made their interest in the project known to either Geovicon Environmental (Pty) Ltd and/or Black Wattle Colliery, were also added to the list of registered I&APs.

The PPP commenced by providing potential I&APs 30 days to register and comment on the Draft SR.

2.1.1 Registered I&APS

- The I&AP's identified for the proposed Black Wattle Opencast expansion 2022 Project are as follows:
- National Department of Mineral Resources and Energy – Competent Authority (Mpumalanga Regional Office)
- National Department of Water and Sanitation (Mpumalanga Regional Office)
- Direct and Immediately adjacent landowners and legal occupiers
- Steve Tshwete Local Municipality
- Mpumalanga Tourism and Parks Agency
- South African National Road Agency
- Eskom Holdings SOC Limited
- Department of Agriculture, Land Reform and Rural Development
- Surrounding farm communities

2.2 THE PUBLIC PARTICIPATION PROCESS FOLLOWED

Below is the description of the process that was followed for the consultation with I&APs during the scoping phase of the proposed project.

2.2.1 Notification of I&APS

The methods of notification listed below were used to notify the potential and registered I&APs of the scoping phase consultation process and the opportunity to comment on the Draft SR for the proposed project.

2.2.2 Written Notices

Written notices were sent to the direct and immediately adjacent landowners and lawful occupiers, municipal representatives and commenting authorities to comment on the Draft SR. The written notices were sent via emails. The DMRE and the Mpumalanga Tourism and Parks Agency (MTPA) were sent printed copies through hand delivery and courier, respectively. See Annexure D for all the written notices sent via emails, proof of hand delivered documents and documents that were sent by courier. See Annexure G for Comments and responses from I&APs and the EAP respectively.

2.2.3 Newspaper Notices

Newspaper notice was placed in a local newspaper (Middelburg Observer) in accordance with Regulation 41 of NEMA RIA Regulations, 2014. The purpose was to inform the public about the availability of the Draft SR at the Gerard Sekoto Public Library, Steve Tshwete local municipality and Black Wattle Colliery security gate. See Annexure B for the newspaper notice.

2.2.4 Site Notices

Three site notices were compiled to reach the community surrounding the Black Wattle Opencast expansion 2022 proposed project area. The site notices were placed at the following sites (Black Wattle Colliery security gate), proposed Community area, Gerard Sekoto Public Library. See Annexure C for the site notices.

2.2.5 Placement of document for public comments

The Draft SR was made available on the 18th of November 2022 at the Gerard Sekoto Public Library for public comment.

2.3 COMMENTS AND RESPONSES ON THE DRAFT SCOPING REPORT

All comments and issues received from the I&APs were recorded. The comments and issues raised by the I&APs and responses are summarised in the Table 1 below.

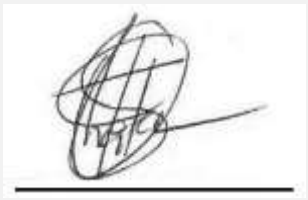
Table 1: Comments and Response

Interested and Affected Parties		Date Comments Received	Issues raised/Comments	Response to issues raised	Consultation Status (Consensus dispute, not finalised, etc.)
LANDOWNERS OR LAWFUL OCCUPIERS ON DIRECT AND ADJACENT PROPERTIES					
J V Ranch cc		-	No comments received	-	Finalised
Black Wattle Colliery Pty Ltd		-	No comments received	-	Finalised
Fana's Automotive Services Cc		-	No comments received	-	Finalised
Darkrock Pty Ltd		-	No comments received	-	Finalised
Petrus Johannes Van Tonder		-	No comments received	-	Finalised
Stephina Magaretha Van Dyk		-	No comments received	-	Finalised
Isambane Mining Pty Ltd		-	No comments received	-	Finalised
Transnet Ltd		-	No comments received	-	Finalised
Adell Rothman		-	No comments received	-	Finalised
SANRAL		-	No comments received	-	Finalised
Bakkos Projects Pty Ltd		-	No comments received	-	Finalised
Cool Ideas 270 Pty Ltd		-	No comments received	-	Finalised
Ingwe Surface Holdings Ltd		-	No comments received	-	Finalised
Riostep Inv Pty Ltd		-	No comments received	-	Finalised
Glencore Operations South Africa (Pty) Ltd		-	No comments received	-	Finalised
Tavistock Collieries Pty Ltd		-	No comments received	-	Finalised
South32 SA Coal Holdings (Pty) Ltd		-	No comments received	-	Finalised
Ngululu Bulk Carriers Pty Ltd		-	No comments received	-	Finalised
Theuns Lourens		-	No comments received	-	Finalised
GOVERNMENT DEPARTMENTS/REGULATORY AUTHORITY					
Department Mineral Resources and Energy		-	No comments received	-	Finalised
Department of Water and Sanitation		-	No comments received	-	Finalised
Mpumalanga Tourism & Parks Agency		-	No comments received	-	Finalised
SANRAL		-	No comments received	-	Finalised
Steve Tshwete Local Municipality		-	No comments received	-	Finalised
Eskom		-	No comments received	-	Finalised
Department of Agriculture, Fisheries and Forestry		-	No comments received	-	Finalised
TRANSNET		-	No comments received	-	Finalised

3. UNDERTAKING

Herewith I, the person whose full names is stated below, confirm that I am the EAP authorised to act as representative of Geovicon Environmental (Pty) Limited, the company commissioned by the applicant in terms of Regulation 12 of the EIA Regulations, 2014 of the National Environmental Management Act, 1998 (Act No. 107 of 1998), and confirm that:

- The above report is compiled with all relevant available information pertaining to the proposed project.
- All relevant stakeholders and I&APs were consulted and any comments received were included in the compilation of this report.
- Any responses provided to I&APs by the EAP is included in this report.
- The plan of study for the proposed project is included in this report and was provided to all I&APs to ensure that they are aware and agree to the plan of study for undertaking the Environmental Impact Assessment.

Full Names and Surname	Tshepo Ornassis Shakwane
Date	11/1/2023
Signature	

Annexure A: List of I&APs

Black Wattle Colliery surface owners

Direct Surface owners for the triangle

Farm	Portion	Surface owner	Contact person	Contact number	E-mail
Vaalbank 289 JS	3	J V Ranch cc	Johannes Albertus Visser		
			Annarie Bronkhorst (Daughter)	082 868 4861	Annariebronkhorst@gmail.com

Adjacent surface owners to the triangle OC expansion area

Vaalbank 289 JS	1	J V Ranch cc	Johannes Albertus Visser		
			Annarie Bronkhorst (Daughter)	082 868 4861	Annariebronkhorst@gmail.com
	3	J V Ranch cc	Johannes Albertus Visser		
			Annarie Bronkhorst (Daughter)	082 868 4861	Annariebronkhorst@gmail.com
	4	BLACK WATTLE COLLIERY PTY LTD	Robert Grobler		
			Takalani		
	11	Carel Stephanus Erasmus	Rassie Erasmus	082 462 3398	rassie375@gmail.com
	13	FANA'S AUTOMOTIVE SERVICES CC	David Nkosi	072 129 9739	davidn@ub-holdings.co.za
	14	BLACK WATTLE COLLIERY PTY LTD			
	15	DARKROCK PTY LTD	DAVID MATTHEW CILLIERS	087 654 1569/ 083 299 5164	david@darkrock.co.za
	17	Theuns Lourens	Theuns (Snr)	083 299 5164	lourenstheuns@gmail.com
	18	PETRUS JOHANNES VAN TONDER	PETRUS JOHANNES VAN TONDER	082 566 2657/ 012 430 4905	reservations@birdwood.co.za
	19	STEPHINA MAGARETHA VAN DYK	STEPHINA MAGARETHA VAN DYK	082 874 9183	c.j.s.m@mweb.co.za
		People living in her farm, she will send them the SR			
	20	ISAMBANE MINING PTY LTD	THANDEKA NOKUKHANYA MBETHE	072 190 1191/ 013 590 0292	thandeka@isambane.co.za
	21	TRANSNET LTD			
	22	ISAMBANE MINING PTY LTD	THANDEKA NOKUKHANYA MBETHE	072 190 1191/ 013 590 0292	thandeka@isambane.co.za
	23	ADELL ROTHMAN	ADELL ROTHMAN	084 402 8585/ 014 592 9788	Phone voicemail
	49	SANRAL	oakly Van Eyk	013 766 8449	Vaneyko@nra.co.za
			Victoria Bota		botav@nra.co.za
	50	SANRAL	oakly Van Eyk	013 766 8449	Vaneyko@nra.co.za
			Victoria Bota		botav@nra.co.za
	58	BAKKOS PROJECTS PTY LTD	Khaalid Hassim	071 678 6666	khaalidhassim786@gmail.com
			Faizal Hassim	082 786 3141	
			Gerhard	079 059 6659	

	75	COOL IDEAS 270 PTY LTD	Yusuf Mohamed Patel	076 114 8936	
			Dorus Bothma	082 388 3248	dorus@coolits.co.za
Goedehoop 315 JS	11	INGWE SURFACE HOLDINGS LTD	Peter Maseko		Peter.Maseko@south32.net
	15	RIOSTEP INV PTY LTD	JAN ALBERTUS KRITZINGER	082 653 2154/ 0514110080	bertus@truckandtrailerbloem.co.za
	16	NGULULU BULK CARRIERS PTY LTD	TSHILILO CHRISTOPHER LUVHANI	083 62 82999/ 086 140 4030	luvhanic@ndululu.co.za
	24	Glencore Operations South Africa (Pty) Ltd	Arnot Lottering		Arno.Lottering@glencore.co.za
					janine.ingram@glencore.co.za
	25	TAVISTOCK COLLIERIES PTY LTD	Peter Maseko		Arno.Lottering@glencore.co.za
					janine.ingram@glencore.co.za
	31	TAVISTOCK COLLIERIES PTY LTD	Peter Maseko		Arno.Lottering@glencore.co.za
					janine.ingram@glencore.co.za
	34	South32 SA Coal Holdings (Pty) Ltd	Peter Maseko		Peter.Maseko@south32.net
Uitkyk 290 JS	2	South32 SA Coal Holdings (Pty) Ltd	Peter Maseko		Peter.Maseko@south32.net
Rietfontein 314 JS	2	Tavistock Collieries (Pty) Ltd (Glencore)	Peter Maseko		Arno.Lottering@glencore.co.za
					janine.ingram@glencore.co.za

State and Semi Departments

		SANRAL	oakly Van Eyk	013 766 8449	Vaneyko@nra.co.za
			Victoria Bota		botav@nra.co.za
		DMRE			Hand Delivery
		Eskom	EMMY MOLEPO		MolepoME@eskom.co.za
		DWS	ISAAC Tlagadii	060 998 9196	tlagadii@dwa.gov.za'
		Trac N4	Reggy Nkosi	013 243 1771/082 457 2395	'rnkosi@tracn4.co.za'
		Steve Tshwete Local Municipality			Hand Delivery
		Gerard Sekoto Public Library			Hand Delivery
		Steve Tshwete Local Municipality	MR M MAHAMBA	013 249 7000/ 013 243 2550	mmahamba@stlm.gov.za
		Environmental Manager	Angel Masia	013 249 7000	angelm@stlm.gov.za
		Department of Rural Development and Land Reform	Loves Shabane		'loves@dalrrd.gov.za''
		Mpumalanga Tourism & Parks Agency	Thabile Mnisi	013 759 5301	thabile.mnisi@mtpa.co.za'
			Nokwazi Ngobeni		Nokwazi.Ngobeni@mtpa.co.za

Annexure B: Newspaper Advertisement

PUBLIC NOTICE

NOTICE: PUBLIC PARTICIPATION PROCESS (PPP): SCOPING REPORT (SR) FOR AN ENVIRONMENTAL AUTHORISATION (EA), A SECTION 102 APPLICATION AND AN INTEGRATED WATER USE LICENCE APPLICATION (IWULA) – BLACK WATTLE COLLIERY (PTY) LTD: BLACK WATTLE COLLIERY

NOTICE NOT FOR JOB APPLICATIONS

Black Wattle Colliery (Pty) Limited (Reg. No: 1994/002802/07) is applying to vary its granted mining right in terms of Section 102 of the Mineral and Petroleum Resources Development Act 2002 (Act 28 of 2002) (MPRDA), for Mining Right MP 30/5/1/2/2/10140 MR to include an additional adjacent mining area, subject to the consent of the Minister of the Department of Mineral Resources and Energy (DMRE). Black Wattle Colliery (Pty) Limited is simultaneously applying for an EA in terms of sections 24 and 44 of the National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA) read together with Regulations 21, 22, 23 & 24 of the amended Environmental Impact Assessment Regulations, 2014 (Government Notice R 326) (EIA Regulations). Black Wattle Colliery (Pty) Limited is also applying for an Integrated Water Use Licence (IWUL) for certain water use activities in terms of Section 40 of the National Water Act,1998 (Act 36 of 1998) (NWA). The proposed project will thus result in the construction of the following infrastructure: access and haul roads, water management facilities, a box cut, existing overburden material stockpile and the runoff mine coal stockpiling area will be used.

The proposed project will occur on **a portion of portion 3 of the farm Vaalbank 289 JS, Magisterial District of Middelburg, Mpumalanga Province.**

Geovicon Environmental (Pty) Ltd has been appointed as the independent environmental consultant to compile the SR, Environmental Impact Report (EIR), Environmental Management Programme (EMPr) and IWULA technical reports and to conduct consultation with Interested and Affected Parties regarding the proposed mining project in terms of the MPRDA, NEMA and NWA

The printed draft SR will be available at the Middelburg Public Library (Gerard Sekoto) and at Black Wattle Colliery Security Gate. The electronic copy will be available upon request from the contact person mentioned below. The draft SR will be available from 18 November 2022 until 9 January 2023 for public perusal and comments.

As part of the Public Participation Process (PPP), contemplated in Chapter 6 of the EIA Regulations, 2017 (Government Notice R 326), any person who is interested in, or affected by the above-mentioned project is hereby invited to register as an I&APs and to comment on the draft SR on, or before, 9 January 2023. Please send comments to the contact person mentioned below, using the following Reference No.: MP 30/5/1/2/2/10140 MR.

Consultant:
Geovicon Environmental (Pty) Ltd
P. O. Box 4050
Middelburg

1050

Tel.: 013 243 0542
Fax: 086 632 4936
Cell: 082 359 5604
E-mail: geovicon@iafrica.com
Contact person: Riana Bate

MOTOR MECHANIC ARRESTED FOR DRIVING CLIENT'S CAR WITHOUT PERMISSION

By MP Staff Reporter

KWAMHLANGA – On the 15 November 2022, a 34-year-old man, who is a motor mechanic, has been arrested after driving his client's vehicle without consent thus refusing to give it back to the owner when he finished fixing it.

According to the information, on Sunday, 13 February 2022 police received a complaint at KwaMhlanga that a certain motor mechanic refused to hand over the victim's car. Reports further stated that the victim's car had an engine fault and she then took her Chevrolet Aveo to the mechanic to be fixed where she paid an amount of R800. When the victim wanted her car back the man refused to give it back, citing that he was not yet done but then demanded an amount of R6000. Despite the victim insisting that the mechanic brings back her car, the man kept on refusing. He was later seen by others gallivanting around Moloto with the victim's car without her consent. She then reported the matter to the police at KwaMhlanga. A case of driving a motor vehicle without owner's consent was opened and the man was arrested.

The suspect it due to appear before KwaMhlanga Magistrate's Court today 15 November 2022.The Provincial Com-missioner of Mpumalanga Lieutenant General Semakaleng Manamela has warned that business owners should avoid exploiting our communities especially women and the vulnerable groups. "It is possible that the me-chanic might have taken an advantage that the complainant is a woman and has little knowledge about vehicles. This tendency must stop now. I further request others to report incidents of this nature and not to allow anyone to abuse them directly or indirectly" said the Provincial Commissioner

INFORMATION SHARING SESSION WITH FARMERS IN EMALAHLENI IN THE NKANGALA DISTRICT FOCUSING ON ISSUES OF WATER RIGHTS APPLICATIONS

By MP Staff Reporter

Recently, the Department of Water and Sanitation (DWS) held an information sharing session with farmers in Emalahleni in the Nkangala District focusing on issues of water rights applications. This is in response to President Cyril Ramaphosa's commitment that water rights/licence applications should be processed within 90 days, instead of the initial 300 days.

Some farmers have been struggling because their water rights applications were declined, and the information sharing session was aimed at alleviating their frustrations regarding water access and usage for farm owners and their farming activities.

According to the Department, farmers need authorization to use water. They must have a pre-consultation with the DWS for advices on how to apply, and to know which documents are needed, to qualify for a water licence.

For convenience purposes, applicants are encouraged to apply online on: www.dws.gov.za

Annexure C: Site Notice

Placement of Site Notices

Notice placed at proposed surrounding community area

Noticed placed at Blackwattle Colliery Security Gate

Noticed placed at Gerard Sekoto Public Library

Annexure D: Written Notice sent via email

State Department

intern3@geovicon.co.za

From: intern3@geovicon.co.za
Sent: 21/November/2022 3:01 PM
To: 'angelm@stlm.gov.za'
Subject: CONSULTATIOIN; BLACK WATTLE COLLIERY (PTY) LTD; Vaalbank 289 JS
Attachments: Combined Draft scoping report for Black Wattle Colliery Opencast Expansi....pdf

Importance: High

STATE DEPARTMENT

NOTICE: PUBLIC PARTICIPATION PROCESS (PPP):
SCOPING REPORT (SR) FOR AN ENVIRONMENTAL AUTHORISATION (EA), A SECTION 102 APPLICATION AND AN INTEGRATED WATER USE LICENCE APPLICATION (IWULA)
– BLACK WATTLE COLLIERY (PTY) LTD: BLACK WATTLE COLLIERY

Black Wattle Colliery (Pty) Limited (Reg. No: 1994/002802/07) is applying to vary its granted mining right in terms of Section 102 of the Mineral and Petroleum Resources Development Act 2002 (Act 28 of 2002) (MPRDA), for Mining Right MP 30/5/1/2/2/10140 MR to include an additional adjacent mining area, subject to the consent of the Minister of the Department of Mineral Resources and Energy (DMRE). Black Wattle Colliery (Pty) Limited is simultaneously applying for an EA in terms of sections 24 and 44 of the National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA) read together with Regulations 21, 22, 23 & 24 of the amended Environmental Impact Assessment Regulations, 2014 (Government Notice R 326) (EIA Regulations). Black Wattle Colliery (Pty) Limited is also applying for an Integrated Water Use Licence (IWUL) for certain water use activities in terms of Section 40 of the National Water Act,1998 (Act 36 of 1998) (NWA). The proposed project will thus result in the construction of the following infrastructure: access and haul roads, water management facilities, a box cut, existing overburden material stockpile and the runoff mine coal stockpiling area will be used.

The proposed project will occur on a portion of portion 3 of the farm Vaalbank 289 JS, Magisterial District of Middelburg, Mpumalanga Province.

The application for an EA was submitted to the Department of Mineral Resources, Mpumalanga Regional Office (eMalahleni) and the application for the IWUL will be uploaded into the electronic EWULAAS application system of the Department of Water and Sanitation.

Geovicon Environmental (Pty) Ltd has been appointed as the independent environmental consultant to compile the SR, Environmental Impact Report (EIR), Environmental Management Programme (EMPr) and IWULA technical reports and to conduct consultation with Interested and Affected Parties regarding the proposed mining project in terms of the MPRDA, NEMA and NWA.

The printed draft SR will be available at the Middelburg Public Library (Gerard Sekoto) and at Black Wattle Colliery Security Gate. The electronic copy will be available upon request from the contact person mentioned below. The draft SR will be available from 18 November 2022 until 9 January 2023 for public perusal and comments.

As part of the Public Participation Process (PPP), contemplated in Chapter 6 of the EIA Regulations, 2017 (Government Notice R 326), you as the person/entity who is interested in, or affected by the above-mentioned project is hereby registered as

an Interested or Affected Party, and afforded an opportunity to comment on the draft SR on, or before, 9 January 2023. Please send comments to the contact person mentioned below, using the following Reference No.: **MP 30/5/1/2/2/10140 MR.**

Kind regards

Luyanda Khala
(BSc. In Life and Environmental science)
Geovicon Environmental (Pty) Ltd
Email:intern3@geovicon.co.za
Cell: 083 487 2514 Tel: 013 243 0542
Fax: 086 632 4936

intern3@geovicon.co.za

From: intern3@geovicon.co.za
Sent: 18/November/2022 4:08 PM
Subject: CONSULTATIOIN; BLACK WATTLE COLLIERY (PTY) LTD; Vaalbank 289 JS

Importance: High

Bcc: 'Vaneyko@nra.co.za'; 'botav@nra.co.za'; 'MolepoME@eskom.co.za'; 'tlagadii@dwa.gov.za''; 'rnkosi@tracn4.co.za'; 'mmahamba@stlm.gov.za'; 'loves@dalrrd.gov.za''

STATE DEPARTMENT

NOTICE: PUBLIC PARTICIPATION PROCESS (PPP):
SCOPING REPORT (SR) FOR AN ENVIRONMENTAL AUTHORISATION (EA), A SECTION 102 APPLICATION AND AN INTEGRATED WATER USE LICENCE APPLICATION (IWULA)
– BLACK WATTLE COLLIERY (PTY) LTD: BLACK WATTLE COLLIERY

Black Wattle Colliery (Pty) Limited (Reg. No: 1994/002802/07) is applying to vary its granted mining right in terms of Section 102 of the Mineral and Petroleum Resources Development Act 2002 (Act 28 of 2002) (MPRDA), for Mining Right MP 30/5/1/2/2/10140 MR to include an additional adjacent mining area, subject to the consent of the Minister of the Department of Mineral Resources and Energy (DMRE). Black Wattle Colliery (Pty) Limited is simultaneously applying for an EA in terms of sections 24 and 44 of the National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA) read together with Regulations 21, 22, 23 & 24 of the amended Environmental Impact Assessment Regulations, 2014 (Government Notice R 326) (EIA Regulations). Black Wattle Colliery (Pty) Limited is also applying for an Integrated Water Use Licence (IWUL) for certain water use activities in terms of Section 40 of the National Water Act,1998 (Act 36 of 1998) (NWA). The proposed project will thus result in the construction of the following infrastructure: access and haul roads, water management facilities, a box cut, existing overburden material stockpile and the runoff mine coal stockpiling area will be used.

The proposed project will occur on a portion of portion 3 of the farm Vaalbank 289 JS, Magisterial District of Middelburg, Mpumalanga Province.

The application for an EA was submitted to the Department of Mineral Resources, Mpumalanga Regional Office (eMalahleni) and the application for the IWUL will be uploaded into the electronic EWULAAS application system of the Department of Water and Sanitation.

Geovicon Environmental (Pty) Ltd has been appointed as the independent environmental consultant to compile the SR, Environmental Impact Report (EIR), Environmental Management Programme (EMPr) and IWULA technical reports and to conduct consultation with Interested and Affected Parties regarding the proposed mining project in terms of the MPRDA, NEMA and NWA.

The electronic copy of the Draft SR (One report) can be accessed via the link below for your perusal and/ or comments from 18 November 2022 until 9 January 2023.
Click on the link; https://we.tl/t-hfT9UyIwEF

As part of the Public Participation Process (PPP), contemplated in Chapter 6 of the EIA Regulations, 2017 (Government Notice R 326), you as the person/entity who is interested in, or affected by the above-mentioned project is hereby registered as

an Interested or Affected Party, and afforded an opportunity to comment on the draft SR on, or before, 9 January 2023. Please send comments to the contact person mentioned below, using the following Reference No.: **MP 30/5/1/2/2/10140 MR.**

kind regards

Luyanda Khala
(BSc. In Life and Environmental science)
Geovicon Environmental (Pty) Ltd
Email:intern3@geovicon.co.za
Cell: 083 487 2514 Tel: 013 243 0542
Fax: 086 632 4936

Direct Surface Owners

intern3@geovicon.co.za

From: intern3@geovicon.co.za
Sent: 18/November/2022 3:58 PM
To: 'Annariebronkhorst@gmail.com'
Subject: CONSULTATIOIN; BLACK WATTLE COLLIERY (PTY) LTD; Vaalbank 289 JS
Attachments: Combined Draft scoping report for Black Wattle Colliery Opencast Expansion 2022 Project.pdf

Importance: High

DIRECT SURFACE OWNER

NOTICE: PUBLIC PARTICIPATION PROCESS (PPP):
SCOPING REPORT (SR) FOR AN ENVIRONMENTAL AUTHORISATION (EA), A SECTION 102 APPLICATION AND AN INTEGRATED WATER USE LICENCE APPLICATION (IWULA)
– BLACK WATTLE COLLIERY (PTY) LTD: BLACK WATTLE COLLIERY

Black Wattle Colliery (Pty) Limited (Reg. No: 1994/002802/07) is applying to vary its granted mining right in terms of Section 102 of the Mineral and Petroleum Resources Development Act 2002 (Act 28 of 2002) (MPRDA), for Mining Right MP 30/5/1/2/2/10140 MR to include an additional adjacent mining area, subject to the consent of the Minister of the Department of Mineral Resources and Energy (DMRE). Black Wattle Colliery (Pty) Limited is simultaneously applying for an EA in terms of sections 24 and 44 of the National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA) read together with Regulations 21, 22, 23 & 24 of the amended Environmental Impact Assessment Regulations, 2014 (Government Notice R 326) (EIA Regulations). Black Wattle Colliery (Pty) Limited is also applying for an Integrated Water Use Licence (IWUL) for certain water use activities in terms of Section 40 of the National Water Act,1998 (Act 36 of 1998) (NWA). The proposed project will thus result in the construction of the following infrastructure: access and haul roads, water management facilities, a box cut, existing overburden material stockpile and the runoff mine coal stockpiling area will be used.

The proposed project will occur on a portion of portion 3 of the farm Vaalbank 289 JS, Magisterial District of Middelburg, Mpumalanga Province.

The application for an EA was submitted to the Department of Mineral Resources, Mpumalanga Regional Office (eMalahleni) and the application for the IWUL will be uploaded into the electronic EWULAAS application system of the Department of Water and Sanitation.

Geovicon Environmental (Pty) Ltd has been appointed as the independent environmental consultant to compile the SR, Environmental Impact Report (EIR), Environmental Management Programme (EMPr) and IWULA technical reports and to conduct consultation with Interested and Affected Parties regarding the proposed mining project in terms of the MPRDA, NEMA and NWA.

The printed draft SR will be available at the Middelburg Public Library (Gerard Sekoto) and at Black Wattle Colliery Security Gate. The electronic copy will be available upon request from the contact person mentioned below. The draft SR will be available from 18 November 2022 until 9 January 2023 for public perusal and comments.

As part of the Public Participation Process (PPP), contemplated in Chapter 6 of the EIA Regulations, 2017 (Government Notice R 326), you as the person/entity who is interested in, or affected by the above-mentioned project is hereby registered as

an Interested or Affected Party, and afforded an opportunity to comment on the draft SR on, or before, 9 January 2023. Please send comments to the contact person mentioned below, using the following Reference No.: **MP 30/5/1/2/2/10140 MR**

kind regards

Luyanda Khala
(BSc. In Life and Environmental science)
Geovicon Environmental (Pty) Ltd
Email:intern3@geovicon.co.za
Cell: 083 487 2514 Tel: 013 243 0542
Fax: 086 632 4936

Immediately Adjacent Surface Owners

intern3@geovicon.co.za

From:	intern3@geovicon.co.za
Sent:	21/November/2022 2:58 PM
Subject:	CONSULTATIOIN; BLACK WATTLE COLLIERY (PTY) LTD; Vaalbank 289 JS
Attachments:	Combined Draft scoping report for Black Wattle Colliery Opencast Expansi....pdf
Importance:	High

Tracking:

Recipient	Read
'reservations@birdwood.co.za'	Read: 21/Nov/2022 3:20 PM
'c.j.s.m@mweb.co.za'	Read: 22/Nov/2022 7:02 AM
'david@darkrock.co.za'	

Bcc: 'reservations@birdwood.co.za'; 'c.j.s.m@mweb.co.za'; 'david@darkrock.co.za'

IMMEDIATELY ADJACENT SURFACE OWNER

NOTICE: PUBLIC PARTICIPATION PROCESS (PPP):
SCOPING REPORT (SR) FOR AN ENVIRONMENTAL AUTHORISATION (EA), A SECTION 102 APPLICATION AND AN INTEGRATED WATER USE LICENCE APPLICATION (IWULA)
– BLACK WATTLE COLLIERY (PTY) LTD: BLACK WATTLE COLLIERY

Black Wattle Colliery (Pty) Limited (Reg. No: 1994/002802/07) is applying to vary its granted mining right in terms of Section 102 of the Mineral and Petroleum Resources Development Act 2002 (Act 28 of 2002) (MPRDA), for Mining Right MP 30/5/1/2/2/10140 MR to include an additional adjacent mining area, subject to the consent of the Minister of the Department of Mineral Resources and Energy (DMRE). Black Wattle Colliery (Pty) Limited is simultaneously applying for an EA in terms of sections 24 and 44 of the National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA) read together with Regulations 21, 22, 23 & 24 of the amended Environmental Impact Assessment Regulations, 2014 (Government Notice R 326) (EIA Regulations). Black Wattle Colliery (Pty) Limited is also applying for an Integrated Water Use Licence (IWUL) for certain water use activities in terms of Section 40 of the National Water Act,1998 (Act 36 of 1998) (NWA). The proposed project will thus result in the construction of the following infrastructure: access and haul roads, water management facilities, a box cut, existing overburden material stockpile and the runoff mine coal stockpiling area will be used.

The proposed project will occur on a portion of portion 3 of the farm Vaalbank 289 JS, Magisterial District of Middelburg, Mpumalanga Province.

The application for an EA was submitted to the Department of Mineral Resources, Mpumalanga Regional Office (eMalahleni) and the application for the IWUL will be uploaded into the electronic EWULAAS application system of the Department of Water and Sanitation.

Geovicon Environmental (Pty) Ltd has been appointed as the independent environmental consultant to compile the SR, Environmental Impact Report (EIR), Environmental Management Programme (EMPr) and IWULA technical reports and to conduct consultation with Interested and Affected Parties regarding the proposed mining project in terms of the MPRDA, NEMA and NWA.

The printed draft SR will be available at the Middelburg Public Library (Gerard Sekoto) and at Black Wattle Colliery Security Gate. The electronic copy will be available upon request from the contact person mentioned below. The draft SR will be available

from 18 November 2022 until 9 January 2023 for public perusal and comments.

As part of the Public Participation Process (PPP), contemplated in Chapter 6 of the EIA Regulations, 2017 (Government Notice R 326), you as the person/entity who is interested in, or affected by the above-mentioned project is hereby registered as
an Interested or Affected Party, and afforded an opportunity to comment on the draft SR on, or before, 9 January 2023. Please send comments to the contact person mentioned below, using the following Reference No.: **MP 30/5/1/2/2/10140 MR.**

Kind regards

Luyanda Khala
(BSc. In Life and Environmental science)
Geovicon Environmental (Pty) Ltd
Email:intern3@geovicon.co.za
Cell: 083 487 2514 Tel: 013 243 0542
Fax: 086 632 4936

intern3@geovicon.co.za

From: intern3@geovicon.co.za
Sent: 18/November/2022 3:58 PM
Subject: CONSULTATIOIN; BLACK WATTLE COLLIERY (PTY) LTD; Vaalbank 289 JS
Attachments: Combined Draft scoping report for Black Wattle Colliery Opencast Expansion 2022 Project.pdf

Importance: High

Bcc: 'Annariebronkhorst@gmail.com'; 'rassie375@gmail.com'; 'davidn@ub-holdings.co.za'; 'lourenstheuns@gmail.com'; 'thandeka@isambane.co.za'; 'Vaneyko@nra.co.za'; 'botav@nra.co.za'; 'khaalidhassim786@gmail.com'; 'dorus@coolits.co.za'; 'Peter.Maseko@south32.net'; 'bertus@truckandtrailerbloem.co.za'; 'luvhanic@ndululu.co.za'; 'Arno.Lottering@glencore.co.za'; 'janine.ingram@glencore.co.za'

IMMEDIATELY ADJACENT SURFACE OWNER

NOTICE: PUBLIC PARTICIPATION PROCESS (PPP):
SCOPING REPORT (SR) FOR AN ENVIRONMENTAL AUTHORISATION (EA), A SECTION 102 APPLICATION AND AN INTEGRATED WATER USE LICENCE APPLICATION (IWULA)
– BLACK WATTLE COLLIERY (PTY) LTD: BLACK WATTLE COLLIERY

Black Wattle Colliery (Pty) Limited (Reg. No: 1994/002802/07) is applying to vary its granted mining right in terms of Section 102 of the Mineral and Petroleum Resources Development Act 2002 (Act 28 of 2002) (MPRDA), for Mining Right MP 30/5/1/2/2/10140 MR to include an additional adjacent mining area, subject to the consent of the Minister of the Department of Mineral Resources and Energy (DMRE). Black Wattle Colliery (Pty) Limited is simultaneously applying for an EA in terms of sections 24 and 44 of the National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA) read together with Regulations 21, 22, 23 & 24 of the amended Environmental Impact Assessment Regulations, 2014 (Government Notice R 326) (EIA Regulations). Black Wattle Colliery (Pty) Limited is also applying for an Integrated Water Use Licence (IWUL) for certain water use activities in terms of Section 40 of the National Water Act,1998 (Act 36 of 1998) (NWA). The proposed project will thus result in the construction of the following infrastructure: access and haul roads, water management facilities, a box cut, existing overburden material stockpile and the runoff mine coal stockpiling area will be used.

The proposed project will occur on a portion of portion 3 of the farm Vaalbank 289 JS, Magisterial District of Middelburg, Mpumalanga Province.

The application for an EA was submitted to the Department of Mineral Resources, Mpumalanga Regional Office (eMalahleni) and the application for the IWUL will be uploaded into the electronic EWULAAS application system of the Department of Water and Sanitation.

Geovicon Environmental (Pty) Ltd has been appointed as the independent environmental consultant to compile the SR, Environmental Impact Report (EIR), Environmental Management Programme (EMPr) and IWULA technical reports and to conduct consultation with Interested and Affected Parties regarding the proposed mining project in terms of the MPRDA, NEMA and NWA.

The printed draft SR will be available at the Middelburg Public Library (Gerard Sekoto) and at Black Wattle Colliery Security Gate. The electronic copy will be available upon request from the contact person mentioned below. The draft SR will be available
from 18 November 2022 until 9 January 2023 for public perusal and comments.

As part of the Public Participation Process (PPP), contemplated in Chapter 6 of the EIA Regulations, 2017 (Government Notice R 326), you as the person/entity who is interested in, or affected by the above-mentioned project is hereby registered as
an Interested or Affected Party, and afforded an opportunity to comment on the draft SR on, or before, 9 January 2023. Please send comments to the contact person mentioned below, using the following Reference No.: **MP 30/5/1/2/2/10140 MR.**

Kind regards

Luyanda Khala
(BSc. In Life and Environmental science)
Geovicon Environmental (Pty) Ltd
Email:intern3@geovicon.co.za
Cell: 083 487 2514 Tel: 013 243 0542
Fax: 086 632 4936

Annexure E: Proof of hand delivered documents sent by courier

South Africa

PO BOX 4050
MIDDELBURG
1052

TEL: +27 (0)13 243 0542
FAX: +27 (0) 086 632 4936
CEL: 082 554 5261
EMAIL: geovicon@iafrica.com

GEOVICON ENVIRONMENTAL (Pty) Ltd

2006/030830/07 VAT nr. 4930233137

To:	Department of Mineral Resources and Energy (DMRE)	**From:**	Mr O. T Shakwane
Fax:		**Page:**	1
Phone:		**Date:**	2022/11/18
Re:	**Draft Scoping Report: Black Wattle Colliery (Pty) Limited: Black Wattle Opencast Expansion 2022 project**		

The Regional Manager

Department of Mineral Resources and Energy

Private Bag X7279

Emalahleni

Attention: Regional Manager

Draft Scoping Report: Black Wattle Colliery (Pty) Limited: Black Wattle Opencast Expansion 2022 project

Situated on a portion of mineral area 1 (a portion of portion 3) of the farm Vaalbank 289 JS, situated within the Magisterial District of Middelburg, Mpumalanga Province.

DMRE Reference No.: MP 30/5/1/2/2/22 MR (10140 MR)

The **Draft Scoping Report** is hereby submitted to you.

Please find **volume 1 of 1** of the **Draft Scoping Report** for your perusal.

Yours,

Mr O. T Shakwane

Receipt of above-mentioned documents are hereby acknowledged.

Received by ..... Date .....

Signed .....

Dept. of Mineral Resources
Private Bag X7279
2022 -11- 18
Witbank 1035
Dept. of Mineral Resources

South Africa

PO BOX 4050
MIDDELBURG
1052

TEL: +27 (0)13 243 0542
FAX: +27 (0) 086 632 4936
CEL: 082 544 5261
EMAIL: geovicon@iafrica.com

GEOVICON ENVIRONMENTAL (Pty) Ltd

2006/030830/07 VAT nr. 4930233137

To:	Steve Tshwete Local Municipality	**From:**	Mr T.O Shakwane
Fax:		**Pages:**	1
Phone:		**Date:**	2022/11/18
Re:	**Draft Scoping Report: Black Wattle Colliery (Pty) Limited: Black Wattle Opencast Expansion 2022 project**		

Steve Tshwete Local Municipality

Attention: Municipal Manager

Draft Scoping Report: Black Wattle Colliery (Pty) Limited: Black Wattle Opencast Expansion 2022 project

Situated on a portion of mineral area 1 (a portion of portion 3) of the farm Vaalbank 289 JS, situated within the Magisterial District of Middelburg, Mpumalanga Province.

DMRE Reference No.: MP 30/5/1/2/2/22 MR (10140 MR)

The **Draft Scoping Report** is hereby submitted to you.

Please find **volume 1 of 1** of the **Draft Scoping Report** for your perusal.

Yours,

Received by SIPHIWE ..... Date 18 NOV 2022

Signed .....

STEVE TSHWETE LOCAL MUNICIPALITY
2022 -11- 18
Municipal Manager's

South Africa

PO BOX 4050
MIDDELBURG
1052

TEL: +27 (0)13 243 0542
FAX: +27 (0) 086 632 4936
CEL: 082 544 5261
EMAIL: geovicon@iafrica.com

GEOVICON ENVIRONMENTAL (Pty) Ltd

2006/030830/07 VAT nr. 4930233137

To:	Gerard Sekoto Public Library	**From:**	Mr T.O Shakwane
Fax:		**Pages:**	1
Phone:		**Date:**	2022/11/18
Re:	**Draft Scoping Report: Black Wattle Colliery (Pty) Limited: Black Wattle Opencast Expansion 2022 project**		

Gerard Public Library

Attention: Chief Librarian/Assistant

Draft Scoping Report: Black Wattle Colliery (Pty) Limited: Black Wattle Opencast Expansion 2022 project

Situated on a portion of mineral area 1 (a portion of portion 3) of the farm Vaalbank 289 JS, situated within the Magisterial District of Middelburg, Mpumalanga Province.

DMRE Reference No.: MP 30/5/1/2/2/22 MR (10140 MR)

The **Draft Scoping Report** is hereby submitted to you.

Please find **volume 1 of 1** of the **Draft Scoping Report** for public perusal.

Yours,

Received by ..... Date 18/4/22

Signed .....

DIRECTORS: O.T. Shakwane BSc Honns Microbiology; J.M. Bate (Pr.Sci.Nat) MSc Entomology; T.G. Tefu BSc Geology

GERARD SEKOTO
Public Library / Openbare biblioteek
Box 14 / Bus 14
Middelburg, 1050
Date 18/11/22

South Africa

PO BOX 4050
MIDDELBURG
1052

TEL: +27 (0)13 243 0542
FAX: +27 (0) 086 632 4936
CEL: 082 554 5261
EMAIL: geovicon@iafrica.com

GEOVICON ENVIRONMENTAL (Pty) Ltd

2006/030830/07 VAT nr. 4930233137

To:	Black Wattle Colliery Security Gate	**From:**	Mr O. T Shakwane
Fax:		**Page:**	1
Phone:		**Date:**	2022/11/18
Re:	**Draft Scoping Report: Black Wattle Colliery (Pty) Limited: Black Wattle Opencast Expansion 2022 project**		

Black Wattle Colliery (Pty) Limited

P. O. Box 1704

Middelburg

1050

Attention: Black Wattle Colliery

Draft Scoping Report: Black Wattle Colliery (Pty) Limited: Black Wattle Opencast Expansion 2022 project

Situated on a portion of mineral area 1 (a portion of portion 3) of the farm Vaalbank 289 JS, situated within the Magisterial District of Middelburg, Mpumalanga Province.

DMRE Reference No.: MP 30/5/1/2/2/22 MR (10140 MR)

The **Draft Scoping Report** is hereby submitted to you.

Please find **volume 1 of 1** of the **Draft Scoping Report** for public perusal.

Yours,

Mr O. T Shakwane

Receipt of above-mentioned documents are hereby acknowledged.

Received by ..... Date 18/11/22

Signed .....

THE Courier GUY

Worldwide Express
We would love to handle your package

HEAD OFFICE:
P O Box 532
Lanseria
1748

Sharecall No.:
0861 203 203
After Hours WhatsApp:
082 823 3254
Email:
support@the courierguy.co.za

VX3DCB

ACCOUNT NO. (Very Important)	CLIENT REFERENCE	DATE DD MM YY	PARCELS	MASS	VOLUME	ORIGIN	DEST.	OFFICE REFERENCE

FROM:

Contact Name: RIANA BATE
Contact Phone Number (Very Important): (013) 243 0542
Company Name: GEOVICON ENVIRONMENTAL (PTY) LTD
Street Address: 42 A.G. VISSER STREET
GHOLFSIG, MIDDELBURG
City: MIDDELBURG
Country: SOUTH-AFRICA
Postal Code: 1050

TO:

To (Contact Name): THABILE MNTSHAKWAZI
Contact Phone Number (Very Important): (013) 759 5301
Company Name: MPUMALANGA TOURISM AND PARKS AGENCY
Exact Street Address (We cannot deliver to Box Numbers): N4 HALS GATEWAY, BLOCK G ROOM 27
MATAFFIN, MBOMBELA
City: MBOMBELA
Country: SOUTH-AFRICA
Postal Code: 1200

Special Instructions: DRAFT SCOPING REPORT - BLACKWATTLE Colliery OPENCAST EXPANSION 2020 PROJECT

NUMBER	DESCRIPTION OF CONTENTS	ACTUAL WEIGHT	DIMENSIONS (cm)	
			x x	
			x x	
			x x	

By virtue of the clients signature hereto, the client acknowledges having read, understood, and agreed to be bound by the standard conditions of carriage of The Courier Guy (Pty) Ltd., which standard conditions are annexed hereto.

INSURANCE Y ☐ N ☐
(ONLY DECLARE VALUE IF YES)
DECLARED VALUE R

SERVICES REQUIRED: Please tick appropriate box(es)

						CHARGES	R	c
1		SAME DAY EXPRESS	8		INTERNATIONAL DOCUMENTS			
2		LOCAL OVERNIGHT COURIER BAG	9		INTERNATIONAL PARCELS			
3		LOCAL SAME DAY COURIER BAG	10		INTERNATIONAL AIR FREIGHT			
4		SAME DAY ECONOMY	11		AFTER HOURS SERVICE			
5		OVERNIGHT COURIER	12		SATURDAY SERVICE			
6		DOMESTIC AIR FREIGHT	13		EARLY BIRD	VAT		
7		DOMESTIC ROAD FREIGHT	14		NATIONAL FLYER ECONOMY SERVICE	TOTAL		

CLIENT SIGNATURE (VERY IMPORTANT)

RECEIVED BY THE COURIER GUY (Pty) Ltd.:

DATE: 19 / 11 / 20

TIME: 14:08

Confirmation that goods were received in good condition

RECEIVER'S SIGNATURE

PRINT SURNAME AND INITIALS (VERY IMPORTANT)

DATE: / /

TIME:

PLEASE PRINT - USE A BALL POINT PEN AND PRESS HARD (4 COPIES)

1st Copy: THE COURIER GUY (Pty) Ltd. COPY
2nd Copy: PROOF OF DELIVERY
3rd Copy: RECEIVERS COPY
4th Copy: SENDERS COPY

Appendix 2

Agricultural Ecosystems Assessment Report

SPECIALIST REPORT

Combined Screening Tool verification and Agricultural Ecosystem Specialist Assessment

of the

Proposed Blackwattle opencast mining extension

on portions of the farms
Goedehoop, Vaalbank and Uitkyk near Middelburg,
Mpumalanga Province

Submitted by

Geovicon Environmental (Pty) Ltd

Report by

JL Schoeman

Date: April 2023
Status: Edition 2

Table of Contents

List of figures

List of tables

1. Introduction

Blackwattle Coal Mine (Pty) Ltd is applying for authorisation to extend their opencast mining operations situated to the south of the N4 road opposite Middelburg, Mpumalanga. The preferred site is bordered by opencast operations on three sides, with another such operation a few hundred metres away on the forth side. A change of land use is required.

1.1 Purpose of report

The purpose of this specialist study report is:

a) to verify the agricultural theme sensitivity of the proposed development site, confirming or disputing the current use of the land and the environmental sensitivity as identified by the screening tool, and

b) if a very high or high sensitivity rating is confirmed, to make an Agricultural Agro-Ecosystem Specialist Assessment.

In conducting the field study and compiling this report the consulting environmental firm, Geovicon Environmental (Pty) Ltd. was assisted by Mr JL Schoeman, a Professional Natural Scientist (Soil Science) Reg. No. 400465/04.

1.2 Relevant experience of compiler

Mr Schoeman is a pedologist with 53 years of experience in detailed and reconnaissance soil surveys (including the National Land Type Survey), soil classification, soil characterization (land and crop suitability for irrigated and rainfed land uses), pedological research (including mine soil properties and reclamation), specialist soil studies for impact assessment and pedological inputs for provincial and municipal profiling and agricultural master planning.

1.3 Statement of independence

It is hereby certified that the compiler has no vested interests in Blackwattle Colliery, Geovicon Environmental, or any Government Department.

1.4 Site visit

The site was visited on 1-3 March and on 3 April, 2023.

1.5 Approach

The climatic and topographical settings and soil properties were considered as the three most important semi-permanent physical resources and determinants of land capability, land suitability and agricultural sensitivity.

To ascertain the second and third of these determinants, the area was traversed by vehicle and on foot and 69 georeferenced hand soil auger pits or positions of soil boundaries were made on a flexible 125 by 125 m grid. The soils were described in a standard manner. The present land use, condition of the land surface, slope class and other relevant hillslope features were noted, as these have a bearing on the agricultural potential and sensitivity.

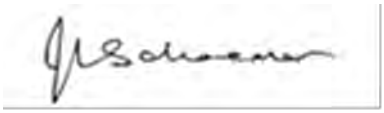
The soil types were classified and mapped in accordance with the South African Taxonomic System (Soil Classification Working Group, 1991) and correlated with the taxa of the Third Edition

of the system (2018). Soil boundaries were mapped by interpolation, aided by Google Earth imagery with a 5 m contour overlay. For the subdivision of landforms into terrain units, the system of the Soil Classification Working Group (1991) was used. The climatic setting was assessed by extracting rainfall and temperature data for the relevant grid cells from a climate study by the ARC-Institute for Soil, Climate and Water.

As no arable agriculture is practised in the development site, agricultural potential ratings were based on crop yield data for the Middelburg District, gleaned from various grain and oilseed industry websites such as Grain-SA, AFGRI, OPDT (Oil and Protein Seeds Development Trust) as well as SA-Stats. As the soil survey data collected indicate average to good soils in the development site, average to good yield ranges from these sources were considered to be applicable, the broad climatic context being similar over the highveld areas of the district.

Final map productions were outsourced to PedoGIS cc.

Signed:



2. Agricultural sensitivity as rated by the Screening Tool

The dotted blue outline on Figure 1, the area where agricultural activities or potential will be impacted, will be referred to as “the development site” in this report.

The agricultural sensitivity of the development site was rated in a report generated by means of the National web-based Screening Tool[1], dated 21/01/2023 07:01:32. This Screening Tool report was requested by P.I. Steenekamp of Rehab Green cc on behalf of JL Schoeman. The screening categories were Transformation of land / from Agriculture or Afforestation / Mining / Mining right. A signed copy of the screening tool report is attached as Appendix A.

2.1 Cadastral details of the development site

The cadastral details are shown in Table 1.

Table 1: Cadastral details of the development site

PROPERTY DETAILS: No.	FARM NAME	FARM/ ERF No	PORTION	LATITUDE	LONGITUDE	PROPERTY TYPE
1	VAALBANK	289	0	25°50'27.25S	29°28'49.62E	Farm
2	GOEDEHOOP	315	0	25°53'3.84S	29°26'40.93E	Farm
3	UITKYK	290	0	25°49'47.95S	29°25'56.12E	Farm
4	VAALBANK	289	3	25°50'49.2S	29°26'36.77E	Farm Portion
5	GOEDEHOOP	315	24	25°51'11.75S	29°26'34.44E	Farm Portion
6	GOEDEHOOP	315	29	25°51'27.41S	29°26'48.38E	Farm Portion
7	UITKYK	290	2	25°49'50.29S	29°25'56.7E	Farm Portion
8	GOEDEHOOP	315	11	25°51'19.67S	29°27'0.81E	Farm Portion

[1] Republic of South Africa, 2020. Protocol for the specialist assessment and minimum report. Content requirements for environmental impacts on agricultural resources. Government Notice No. 320, Government Gazette 43110.

2.2 Location of the proposed development site

The location of the development site is shown in Figure 1.

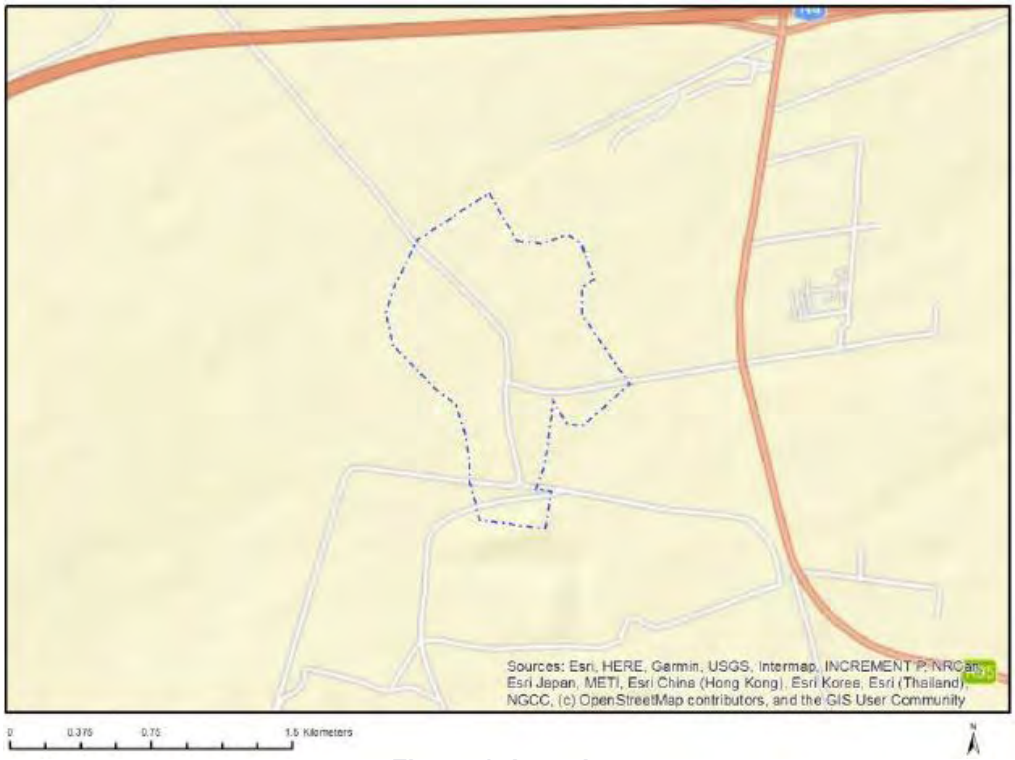


Figure 1: Location

2.3 Relative agriculture theme sensitivity

Figure 2 depicts the agricultural theme sensitivity output from the screening tool.

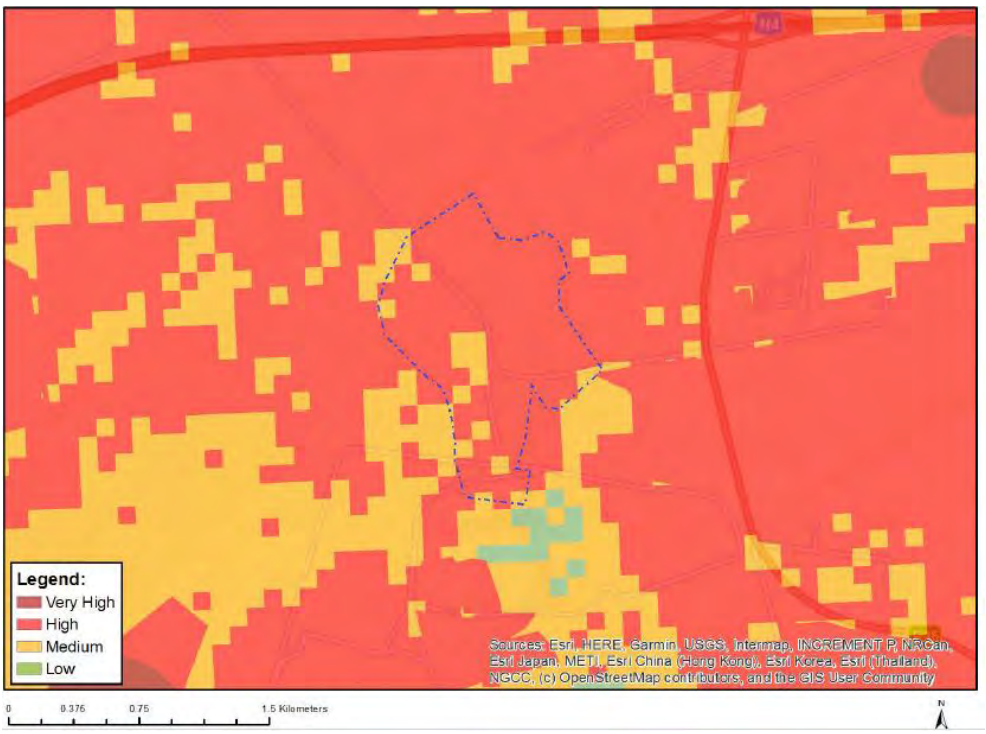


Figure 2: Relative agriculture theme sensitivity

3. Agricultural sensitivity based on baseline land and soil assessment

3.1 Land attributes considered

The following land attributes were considered to be key determinants of land capability, agricultural sensitivity and arable or horticultural potential and -productivity:

- Climate (growing season temperatures, frost, rainfall during the growing season and evaporative demand).
- Landform (landscape position, e.g. well-drained uplands, poorly drained bottomlands), slope gradient and slope curvature.
- Soil physical properties (effective depth, texture, structure, infiltration, permeability and nature of underlying material).
- Soil chemical properties (acidity, alkalinity, sodicity), natural fertility and fertilizer response.
- Water availability for irrigation.

Not all of the above can be fully addressed in a study of this nature but a substantial body of knowledge is available as a guide. Information is also conveyed by soil classification.

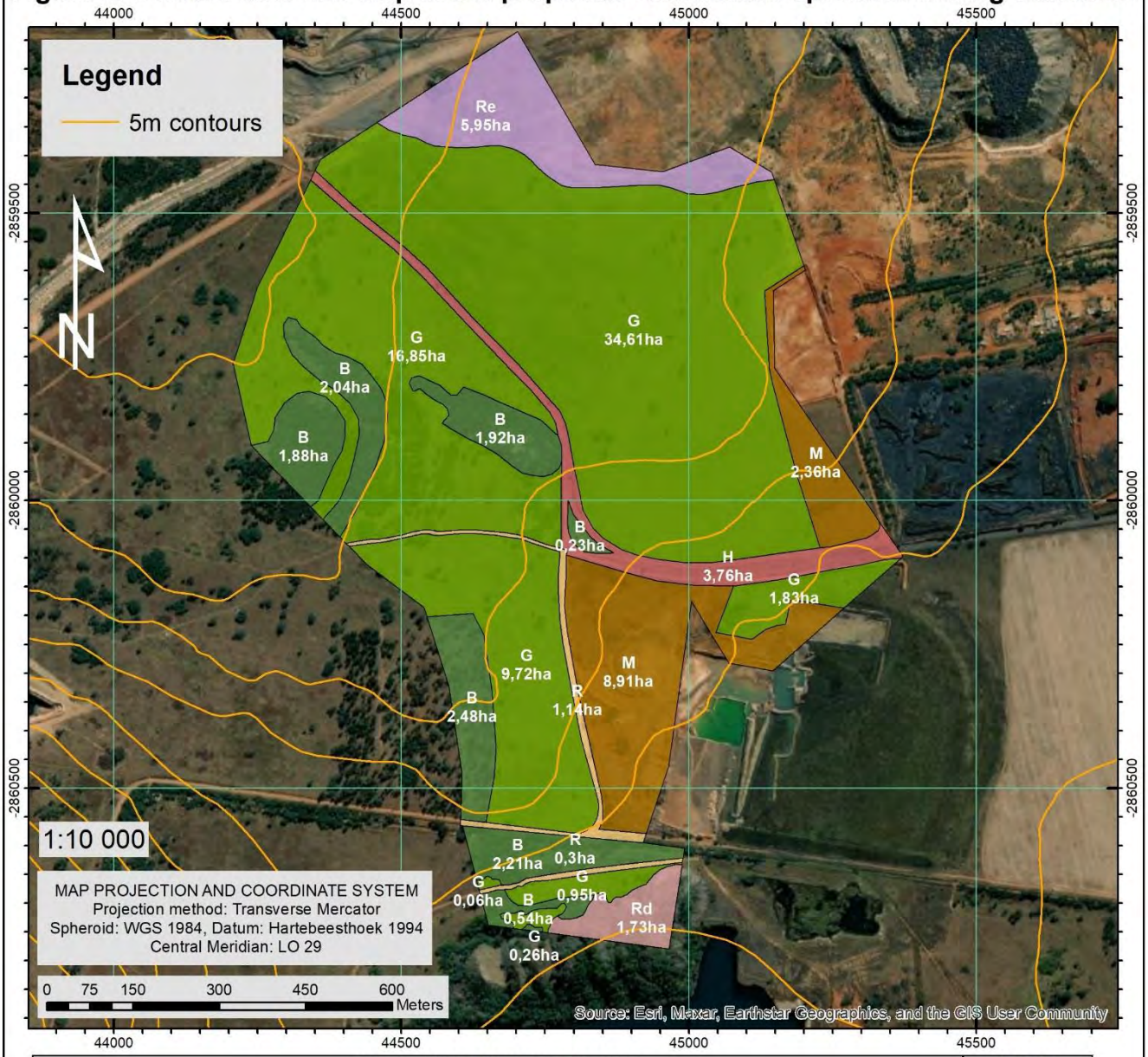
These land attributes affect agricultural sensitivity not only singly, but also by contributing to complex sensitivities, *e.g.* growing season (overlap between the temperature and moisture seasons), soil erodibility, soil stability, runoff, water holding capacity and between-season water transfer.

In addition to the above, factors such as the current land use, level of productivity, strategic importance, compatibility to mechanisation and surrounding land uses are pros and cons in considering land use change.

3.2 Current land use

The land use at the time of survey is shown by Figure 3 and in Table 2.

Figure 3: Current land use map of the proposed Blackwattle opencast mining extension



CURRENT LAND USE LEGEND		AREA	
LAND USE CODE	LAND USE	ha	%
B	Previously cultivated or woodlot land; currently unused grassland with scattered to somewhat dense stands of trees or bush (eucalyptus and wattle); sporadically used for informal wood collecting by vagrants	11.33	11.33
G	Previously cultivated-, woodlot- or homestead areas; currently largely unused grassland with few to scattered trees (mostly wattle, with eucalyptus and pine at old homesteads)	64.28	64.46
H	Haulage roads	3.76	3.77
M	Active mining	11.27	11.31
Re	Mined land in process of being rehabilitated; mostly poor plant coverage; incipient gully erosion in places	5.95	5.96
Rd	Hard and soft rock dumps, approximately 10-20 m high; bare or sparsely covered with grasses and trees	1.73	1.73
R	Other roads	1.44	1.44
	Total	**99.76**	**100.0**

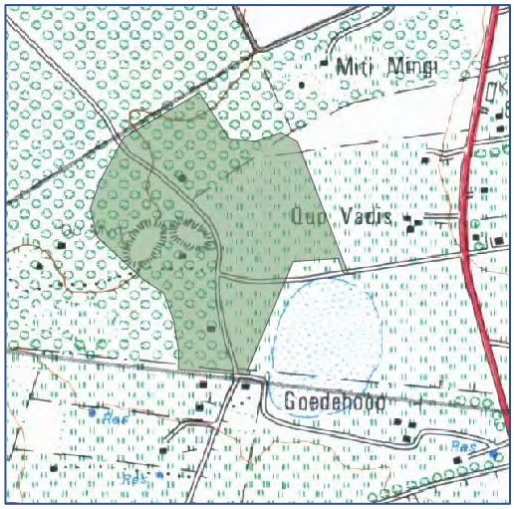
Figure 3: Current land use

Table 2: Current land use

LAND USE CODE	CURRENT LAND USE	AREA	
		ha	%
B	Previously cultivated or woodlot land; currently unused grassland with scattered to somewhat dense stands of trees or bush (eucalyptus and wattle); sporadically used for informal wood collecting by vagrants	11.33	11.33
G	Previously cultivated-, woodlot- or homestead areas; currently largely unused grassland with few to scattered trees (mostly wattle, with eucalyptus and pine at old homesteads)	64.28	64.46
H	Haulage roads	3.76	3.77
M	Active mining	11.27	11.31
Re	Mined land in process of being rehabilitated; mostly poor or no plant covering; incipient gully erosion in places	5.95	5.96
Rd	Hard and soft rock dumps, approximately 10-20 m in height; bare or sparsely covered with grasses and trees	1.73	1.73
R	Other roads	1.44	1.44
	Total	99.76	100.0

It is evident that the current land use of the development site, in contrast to the potential, is of little economic value or strategic importance.

3.2.1 Note on historic land use



A 1:50 000 topographic map, of which a portion is shown here, is thought to be relatively old (compilation date unavailable). It shows the presence—at a point of time in the past—of woodlots to the west and north and cultivated fields in the south-east within the development site.

This land use pattern may point to non-arable land capability being associated with the shallower soils in the west and arable land capability with the deeper soils, largely in the east and south. It also shows old mining works in the central west. These features have been rehabilitated, as evidenced by levelled surfaces, rock fragments present in the soil profile and a few discard- and soil dumps that remain.

During the field visit no signs were observed of domestic animals grazing in the main development area. Evidence of cattle grazing was noticed, however, in the Goedhoop area to the southwest of the pan.

3.3 Climate

The long-term mean annual rainfall of the development site is 700 mm (of which 85% occurs during the summer months of October to March). Summer temperatures are moderate, with the average long-term daily maximum temperature (Tmax) being around 26°C for January, the hottest month. The winters are frosty, with an average long-term daily minimum temperature (Tmin) of 1°C for July. Regular frost occurs from early May to the end of August (information from unpublished modelled gridded data from the ARC-Institute for Soil, Climate and Water).

The “climate capability”—a key element of land capability—can be categorized as C2 (slight limitation rating) mainly due to the somewhat restricting summer rainfall and frost occurrences during the winter months (Schoeman et al., 2002).

3.4 Soil and landform resources

3.4.1 Topography and drainage

The highveld plateau of Mpumalanga, on which the development site is located, is known for its gently rolling to slightly broken topography, with pans dotting inter-stream landform crests. The site is situated in total on a near-level crestal area with some adjoining upper midslopes. There are no drainage channels apart from a slightly sloping crestal seep that appears to drain into a rehabilitated mined area to the north (Figure 3).

3.4.2 Soils

Methods of investigation and evaluation

In preparation for field work, the boundaries of the proposed development site was uploaded onto Goggle Earth and the image scrutinised. Visible terrain, surface disturbances, drainage and vegetation features were interpreted as an aid in deriving at an appropriate survey intensity. A flexible grid of 125 by 125 m was selected for point data collection. The production of a suitable base map with 5 m contours and grid points was outsourced to PedoGIS cc.

As summarised in the introduction, the site was traversed by vehicle and on foot and 56 georeferenced hand soil auger pits were made. At or near grid points the soils were identified by hand auguring to a depth of 1.5 m or to refusal. Descriptive soil data were logged in a standard manner and the data point georeferenced. The present land use, condition of the land surface, slope class and other relevant hillslope features were noted.

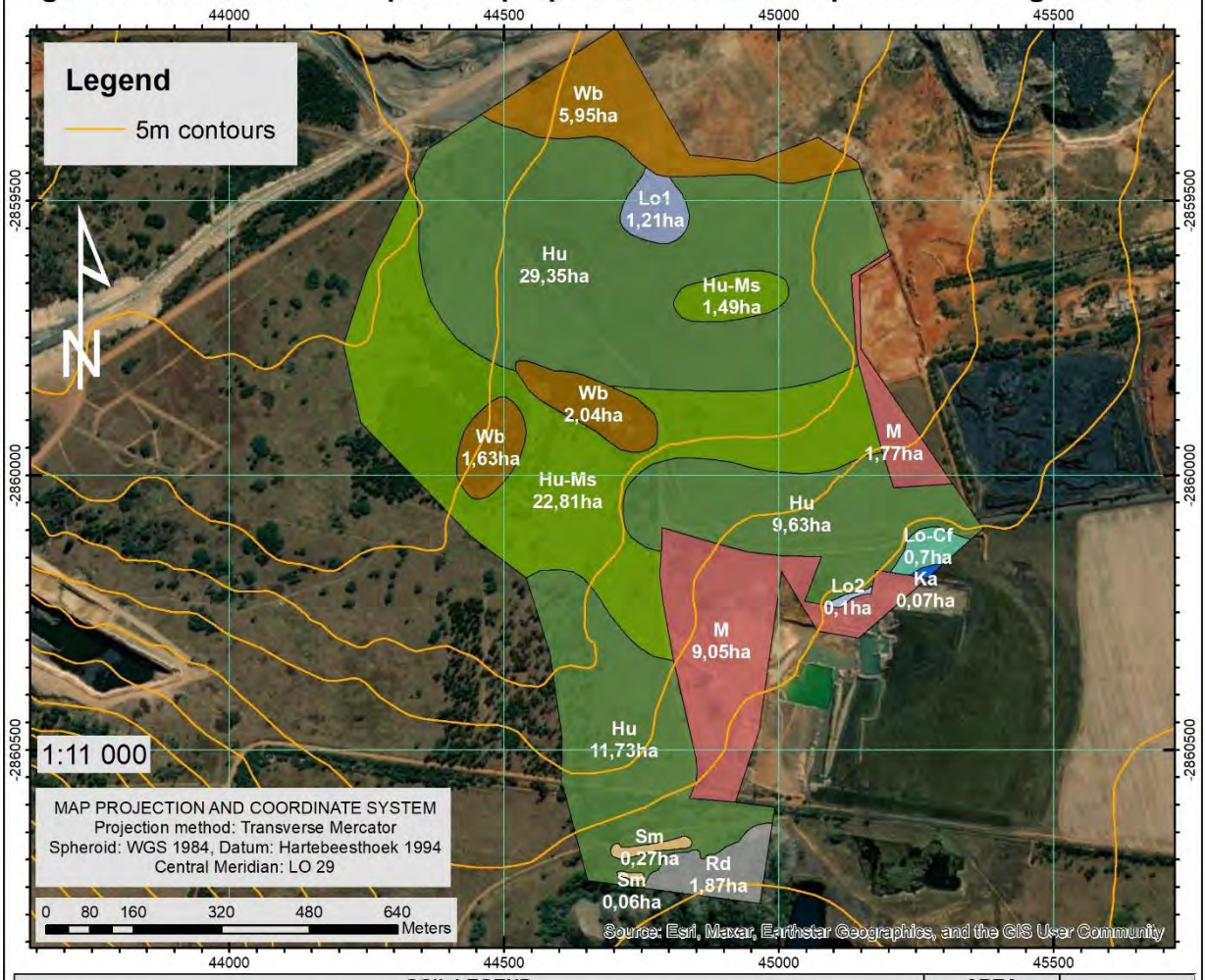
The soils were classified in accordance with the South African Taxonomic System (Soil Classification Working Group, 1991). Visible soil boundaries were stippled out in the field on the hard copy base map. No sampling was done, as fertility status and other chemical properties were to be gleaned from similar soil profiles in the wider area from the national soil profile database under auspices of the ARC-Institute for Soil, Climate and Water.

Subsequent to field work, data points were electronically transferred to the base map on Google Earth and soil boundaries were finalised by hand on a new hard copy base map showing the data points. Final map production was outsourced to PedoGIS cc.

The development site of 100 ha included 17 ha that was inaccessible at the time of survey due to ongoing mining or rehabilitation activities (map symbols M and Re in Figure 3). A map of the soils and miscellaneous land classes is shown as Figure 4. The soil characteristics are summarised in Tables 3 and 4. Derived soil properties are summarised in Table 5.

The soil mantle consists largely of moderately deep to deep, as well as shallow, well-drained, reddish loams of the Hutton and Mispah forms. In places, deeper subsoils contain very fine quartz gravel derived from gritstone. The underlying material in a number of soil profiles consists of an indurated iron pan “skin”, one or two centimetres thick, over weathered or hard sandstone, gritstone or shale.

Figure 4: Soil-landform map of the proposed Blackwattle opencast mining extension



SOIL LEGEND			AREA		
MAP UNIT	LANDFORM COMPONENT	SOIL COMPONENT	ha	%	Correlation with 2018 edition
Hu	Level to gently sloping crest (1-3 % slope)	Moderately deep or deep (60-150 cm) well drained, red, apedal, sandy loam or sandy clay loam of the Hutton form	50.71	50.85	Hutton 2110
Hu-Ms	Level to gently sloping crest (2-3 % slope)	Shallow (30-60 cm) red-brown or red, well drained, massive, gravelly sandy loam or sandy clay loam on weathered or hard rock, of the Hutton or Mispah forms, with rock outcrops in places	24.30	24.36	Hutton 2110 Mispah 2110
Lo1	Gently sloping seep on crest or possible upper midslope (2-3 % slope)	Moderately deep to deep, with shallow effective depth (30-50 cm), poorly drained, massive, grey-brown or grey, sandy loam or loamy sand on soft plinthite, of the Longlands form	1.21	1.22	Longlands 2100/2200
Lo2	Gently sloping footslopes or level bottomlands (1-5% slope)	Moderately deep to deep, with shallow effective depth (30-50 cm), poorly drained, massive, grey-brown or grey, sandy loam or loamy sand on soft plinthite, of the Longlands form	0.10	0.10	Longlands 2100/2200
Lo-Cf	Gently or moderately sloping footslopes (3-6% slope)	Shallow (30-50 cm) poorly drained, grey, massive, sandy loam or loamy sand on soft plinthite or lithocutanic B horizons of the Longlands or Cartref forms	0.70	0.70	Longlands 2100/2200
Ka	Level bottomlands (1-2 % slope)	Moderately deep or deep, with shallow effective depth (10-40 cm), very poorly drained, dark or grey, weak or moderate blocky, sandy clay loam, sandy clay, clay loam or clay, of the Katspruit form	0.07	0.07	
Wb	Gentle reconstituted slopes with some subsidence features (2-4% slope)	Shallow (20-30 cm thick) mixed material consisting of red loam and greyish, mostly soft rock spoil, over hard and some soft rock spoil.	9.62	9.65	Witbank 2300
Miscellaneous land classes					
M	Land undergoing active mining		10.82	10.84	-
Rd	Rock dumps		1.87	1.88	-
Sm	Topsoil mounds		0.33	0.33	-
		Total	99.73	100.0	

Figure 4: Soil-landform map

Only ha hydric (wetland) soils, mainly of the Longlands form, were encountered. These soils of map units Lo1, Lo2 and Lo-Cf display grey colours within 50 cm from the surface, qualifying them as hydric soils. Grey colours and mottles in the deeper subsoil confirms the hydric status. The absence of free water in these profiles at the end of the rainy season was considered to be an indication of temporary wetland conditions rather than seasonal.

Table 3: Soil-landform and miscellaneous land class map units

MAP UNIT	LANDFORM COMPONENT	SOIL COMPONENT	AREA		CORRELATION WITH 2018 EDITION
			ha	%	
Hu	Level to gently sloping crest (1-3 % slope)	Moderately deep or deep (60-150 cm) well drained, red, apedal, sandy loam or sandy clay loam of the Hutton form	50.71	50.85	Hutton 2110
Hu-Ms	Level to gently sloping crest and (2-3 % slope)	Shallow (30-60 cm) red-brown or red, well drained, massive, gravelly sandy loam or sandy clay loam on weathered or hard rock, of the Hutton or Mispah forms, with rock outcrops in places	24.30	24.36	Hutton 2110 Mispah 2110
Lo1	Gently sloping seep on crest or possible upper midslope (2-3 % slope)	Moderately deep to deep, with shallow effective depth (30-50 cm), poorly drained, massive, grey-brown or grey, sandy loam or loamy sand on soft plinthite, of the Longlands form	1.21	1.22	Longlands 2100 2200
Lo2	Gently sloping footslopes (1-5% slope	Moderately deep to deep, with shallow effective depth (30-50 cm), poorly drained, massive, grey-brown or grey, sandy loam or loamy sand on soft plinthite, of the Longlands form	0.10	0.10	Longlands 2100 2200
Lo-Cf	Gently or moderately sloping footslopes (3-6% slope)	Shallow (30-50 cm) poorly drained, grey, massive, sandy loam or loamy sand on soft plinthite or lithocutanic B horizons of the Longlands or Cartref forms	0.70	0.70	Longlands 2100, 2200 Cartref 1130
Ka	Level bottomlands (1-2 % slope)	Moderately deep or deep, with shallow effective depth (10-40 cm), very poorly drained, dark or grey, weak or moderate blocky, sandy clay loam, sandy clay, clay loam or clay, of the Katspruit form	0.07	0.07	Katspruit 2210, 1220
Wb	Gentle reconstituted slopes with some subsidence features (2-4% slope)	Shallow (20-30 cm thick) mixed material consisting of red loam and greyish, mostly soft rock spoil, over hard and some soft rock spoil.	9.62	9.65	Witbank 2300
Miscellaneous land classes					
M	Land undergoing active mining		10.82	10.84	
Rd	Rock dumps		1.87	1.88	
Sm	Topsoil mounds (consisting of reddish sandy loam or sandy clay loam)		0.33	0.33	
Total			99.73	100.0	

Table 4: Soil horizons and classification

MAP SYMBOL	SOIL FORM AND FAMILY	GENERALISED PROFILE DESCRIPTION
Hu	Hutton 1100 sandy loam sandy clay loam	*Orthic A horizon:* 20-30 cm thick; red-brown, massive, friable or firm, sandy loam or sandy clay loam (clay content 18-22%); gradual transition to *Red apedal B horizon*: 60-150 cm deep; red, apedal, firm, sandy clay loam, (clay content 18-24%); underlying material weather or hard rock with a thin iron hydroxide capping
Hu-Ms	Hutton 2100 Mispah1100 sandy loam, sandy clay loam	*Orthic A horizon:* 10-20 cm thick, red-brown, massive, friable or firm, sandy loam or sandy clay loam (clay content 15-20%); gradual transition to *Red apedal B horizon:* 20-60 cm deep; red, apedal, friable or firm, sandy loam or sandy clay loam (clay content 18-22%); or clear transition to *R horizon:* mostly hard rock
Lo	Longlands 2100 2200	*Orthic A horizon:* 30-40 cm thick; grey-brown massive, friable, sandy loam (clay content 15-18%); gradual or clear transition to *Soft plinthic B horizon:* 40->80 cm deep; underlying material: not investigated
Ka	Katspruit	*Orthic A horizon*: 10-40 cm thick: dark grey or grey, weak or moderate blocky sandy clay, clay loam or clay (clay content 30-45%) gradual transition to: *G horizon:* grey clay of unknown depth

Complex soil properties that are not commonly measured were derived in a qualitative manner from soil survey data. Selected properties of this nature, together with selected fertility parameters from the national soil profile database in custodianship of the ARC-Institute for Soil, Climate and Water, are presented in Table 5.

Table 5: Derived soil properties

SOIL PROPERTY		MAP UNIT			
		Hu	Ms	Lo	Ka
Infiltration rate class[1]		Moderate-rapid	Moderate-rapid	Rapid	Slow
Profile water holding capacity class [2]		Moderate-high	Low	Moderate	Moderate
Drainage class [3]	Upper subsoil	Well drained	Well drained	Well drained	Low-moderate
	Lower subsoil (not substrate)	Well drained	-	Poorly	Poorly
Natural fertility status		Moderate	Moderate	Moderate	Moderate
pH class (topsoil)		5.0-6.0	5.0-6.0	5.0-6.0	6.0-7.0
Susceptibility to water erosion (slope taken into account)		Low	Low	Low-moderate	Low
Swell-shrink potential		Low	Low	Low	Moderate
Soil stability		High	High	Moderate	Moderate
Susceptibility to surface crusting		Moderate	Moderate	Low	Moderate-high
Susceptibility to com-paction		High	High	High-moderate	Moderate-high
Adsorption capacity for pollutants		Moderate-high	Low	Low	High
Dust potential		Moderate	Moderate	Moderate	Moderate

[1] Class limits (mm/h): Rapid 20-40; Mod 8-20; Mod slow: 3-8; Slow <3

[2] USDA (2018)

[3] Class limits (mm/h): Rapid 150-500; Mod rapid 50-150; Mod 15-50; Mod slow 5-15; Slow 1.5-5

3.5 Land capability and agricultural potential

Although the term land capability has been used in South Africa in at least five or six different contexts, mostly making use of different parameters—causing some confusion—the concept

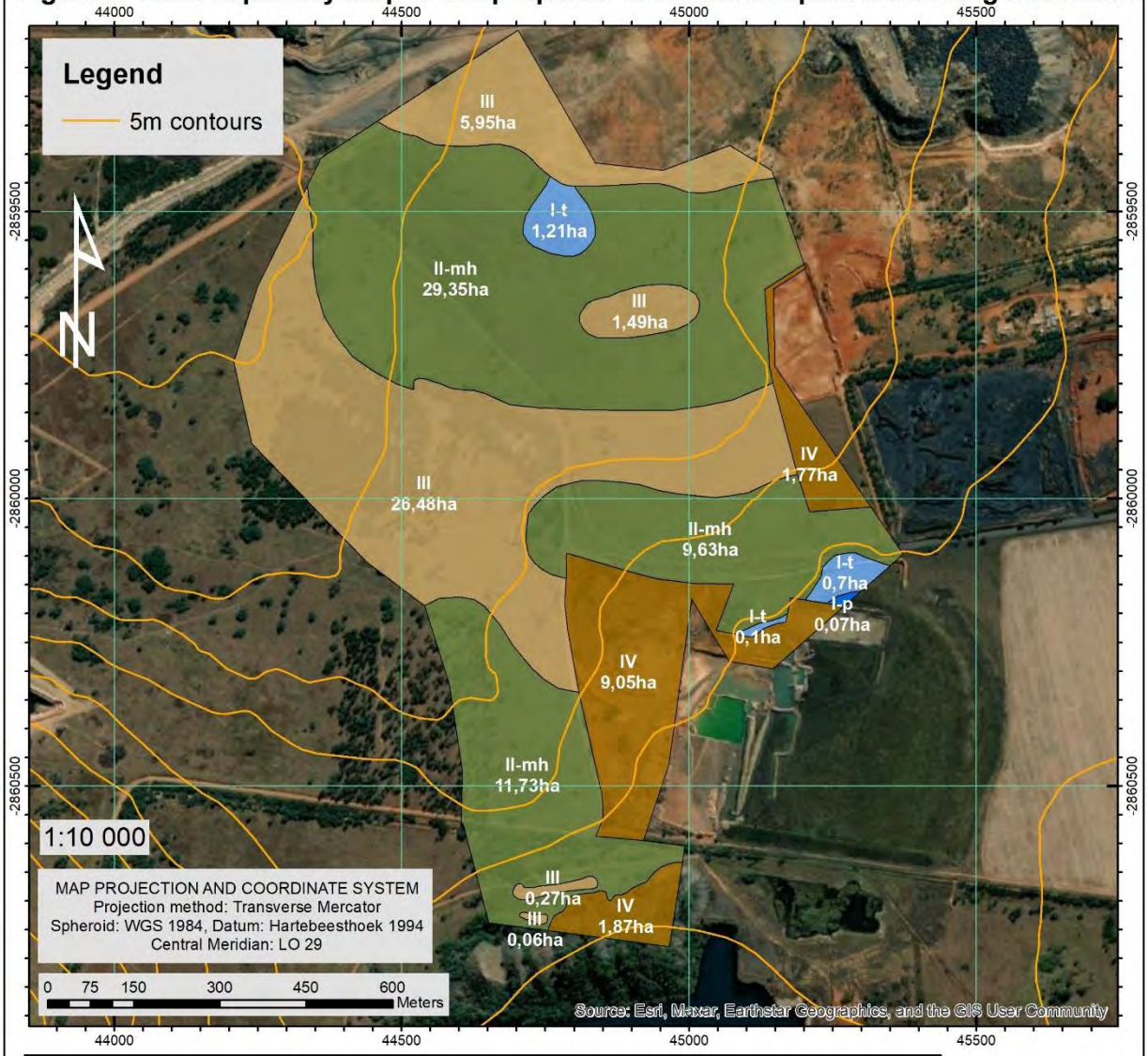
remains useful. The aim is always to define and delineate land of good, bad or indifferent qualities (as well as susceptibilities to degradation) in order to identify land worthy of protection against land use change in order to safeguard the continued production of food, fibre or forage.

Table 6 and Figure 5 show land capability classes in accordance with the Chamber of Mines guidelines, together with equivalents of the Classic 8-Class system (Klingebiel & Montgomery, 1961). This broad framework was augmented for purposes of this report with qualifiers. The qualifier t denotes temporary wetlands (Class I-t) and mh denotes moderately high agricultural potential (Class II-mh).

Table 6: Land capability in terms of the Chamber of Mines' guidelines

Land capability class	Description	Soil-landform map units	8-Class system equivalents	Area	
				ha	%
I-p	Class I – Wetland: permanent	Ka	Class V	0.07	0.07
I-s	Class I – Wetland: seasonal	-			
I-t	Class I – Wetland: temporary	Lo1, Lo2,Lo-Cf	Class V	2.01	2.02
II-m/mh	Class II – Arable land: moderately high agricultural potential	Hu	Class I Class II Class III	50.71	50.85
III	Class III – Grazing land	Hu-Ms Wb Sm	Class IV Class VI Class VII	34.25	34.34
IV	Class VI	M Rd	Class VIII	12.69	12.72
Total				99.73	100

Figure 5: Land capability map of the proposed Blackwattle opencast mining extension



LEGEND: CURRENT LAND CAPABILITY					
Land capability class	Land capability description	*Soil-landform map units	8-Class system equivalents	Area	
				ha	%
I-p	Class I - Wetland: permanent	Ka		0.07	0.07
I-s	Class I - Wetland: seasonal	-	-	0.00	0.00
I-t	Class I - Wetland temporary	Lo1, Lo2, Lo-Cf	Class V	2.01	2.02
II-mh	Class II - Arable land: moderately high potential	Hu	Class I, Class II, Class III	50.71	50.85
III	Class III - Grazing land	Hu-Ms, Wb, Sm	Class IV, Class VI, Class VII	34.25	34.34
IV	Class IV - Wilderness land	M, Rd	Class VIII	12.69	12.72
*See soil map Figure 4			TOTAL	99.73	100.0

Figure 5: Land capability

3.6 Other site information required by the Protocol

3.6.1 Current and potential agricultural productivity

Currently

Currently there is no crop production and few signs of grazing activities in the development site. There will thus be no losses of current agricultural production resulting from the intended change in land use.

Potential

According to various grain and oilseed industry websites such as Grain-SA, AFGRI, OPDT (Oil & Protein Seeds Development Trust) as well as SA-Stats, the annual yields of maize in the Middelburg district tend to vary between 4.7 to 7 t ha^{-1}. Those of soya are 2.5 t ha^{-1}. In comparison, the average maize yield in the Free State Province for the latest agro census (2017) was 3.2 t ha^{-1} and in North West Province, 2.6 t ha^{-1}.

As the broad climatic and "soilscape" settings of the arable (highveld) areas of the district is known to vary little, it is deemed acceptable to regard the above crop yields as applicable to the moderately deep to deep soils (map unit Hu) of the development site.

3.6.2 Current employment

No traces (e.g. accommodation, dogs, cattle, goats or footpaths) indicative of workers or watchmen were detected. Evidently there is no current employment on site.

3.6.3 Potential losses of production and employment

The 51 ha land with arable potential could have produced, on average, between 240 and 360 tons of maize, or alternatively 128 tons of soya, per season. This potential production capacity will be lost for the duration of mining and rehabilitation. It can, however, be expected to be slowly regained under good farming practises—and if rehabilitation is done to standards—to between 50 and 70% of the pre-mining yields within an eight to fifteen year timespan following on rehabilitation and an initial period of three or four seasons of the land being planted to pasture.

A most important proviso would be that (if not already in place) conditions and incentives will timely be negotiated with Organised Agriculture and other bodies in order to enable interested, knowledgeable, successful and appropriately experienced commercial farmers to apply for entering into such an enterprise.

Growing from a zero base, the intended land use change can be expected to have a very large positive effect on employment.

3.6.4 Development structures and infrastructure

Drawings of planned development structures and infrastructure were not received at the time of survey. It was communicated, however, that at the development site, activities will include opencast expansion, one topsoil stockpile, haulage roads and a dirty water pipeline. Overburden material and the ROM will be stockpiled at the existing stockpile areas. The dirty water pipeline will be connected to the existing dirty water pipeline that collects water from the existing opencast pits to an existing pollution control dam.

In the absence of detailed layout plans, the total development site is thus to be considered as potentially subjected to the following actions and impacts:

- Open pits
- Ramps
- One topsoil stockpile
- Access roads
- Haulage roads
- Rehabilitation, encompassing water runoff management, slope and soil reconstitution and re-vegetation.

3.6.5 Existing impacts at the development site

The following existing impacts were noted:

- Two small footprints of old mining or quarrying activities (map units Re situated west of the approximately north-south haulage road, Figure 4). Except for a few unlevelled dumps, these areas are levelled to a smooth surface. Their presence was revealed by rock fragments in the soil profiles and some gravel on the surface.
- Ongoing rehabilitation inside the northern border (map unit Re in the north in Figure 4).
- Active mining activities (map units M in the south and east, Figure 4).
- Large rock dumps in the south.
- Topsoil mounds in the south.

3.6.6 Vegetation composition

The bulk of the site consists of formally unused grasslands (rangeland) developed on previously cultivated land or woodlots. These rangelands are dotted in places with scattered stands of trees (wattle) (land use map unit G, Figure 3). The balance consists of highly degraded woodlot areas that can be described as unused grassland with scattered to dense stands of trees or bush (eucalyptus and wattle), apparently sporadically used for informal wood collecting by vagrants. No noticeable weed infestations and very little garbage dumping was observed.

3.6.7 Available water sources

No surface water sources or boreholes were noted.

3.6.8 Relation to adjacent land use

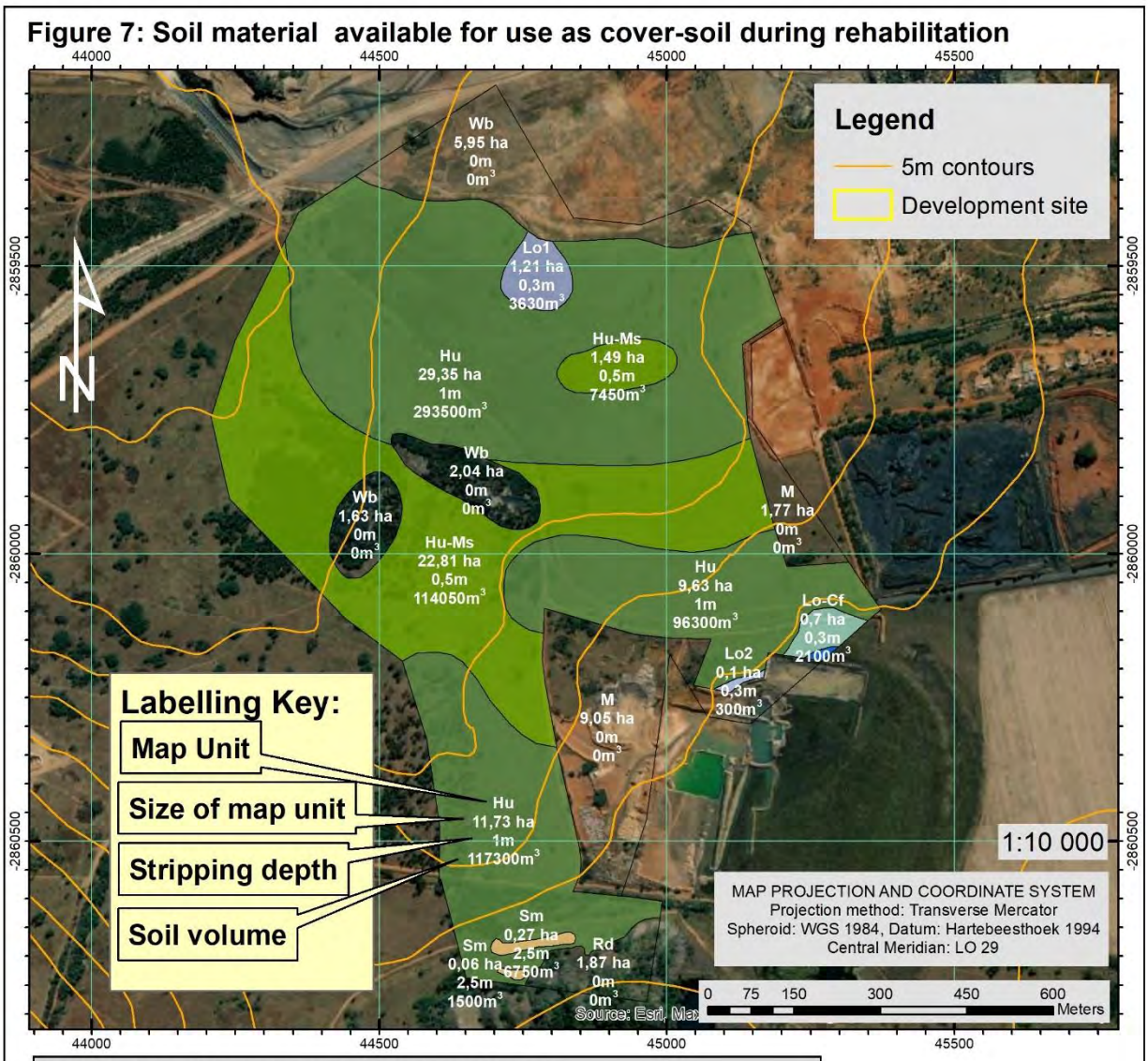
Figure 6: Relation to adjacent land use

The development site is surrounded by mining activities to the north and northeast (Figure 6). Immediately to the west is an area of currently unused mine property. Mining activities occur further to the west. The cropland between the pan and the R35 road would not be affected. The grasslands in and around the site are not grazed as part of any formal animal production enterprises. It can therefore be stated that there will be no fragmentation or disturbance of agricultural activities. There is, however, rangeland activities about two kilometres to the southwest

3.7 Soil materials suitable for use as cover soil

The types and volumes of soil materials suitable for use as cover soil in rehabilitation are shown in Figure 7 and Table 7. These materials consist of all the A and B horizons, where present, of all soils present except the subsoils of the Longlands form.

A major issue would be the wise handling of the limited quantities of soil materials available (plus minus 643 000 cubic metres, Table 7). If soil materials are not carefully stripped and conserved, quantities might be insufficient to rehabilitate to high standards.



LEGEND: AVAILABILITY OF MATERIALS FOR USE AS COVER-SOIL				
MAP UNIT	AVERAGE STRIPPING DEPTH (m)	AREA (ha)	VOLUME (m^3)	Post-mining average replacement depth over total site excluding currently mined areas
Hu	1.0	50.71	507100	0.7m
Hu-Ms	0.5	24.30	121500	
Lo1	0.3	1.21	3630	
Lo2	0.3	0.10	300	
Lo-Cf	0.3	0.70	2100	
Ka	0.3	0.07	210	
Sm	2.5	0.33	8250	
Wb	0.0	9.62	0	
Rd	0.0	1.87	0	
M	0.0	10.82	0	
	Total	99.73	643090	

Figure 7: Availability of soil materials suitable for use as cover soil

Table 7: Availability of soil materials suitable for use as cover soil during rehabilitation

MAP UNIT	AVERAGE STRIPPING DEPTH (m)	AREA (ha)	VOLUME (m^3)
Hu	1.0	50.71	507 100
Hu-Ms	0.5	24.30	121 500
Lo1	0.3	1.21	3 630
Lo2	0.3	0.10	300
Ka	0.3	0.07	210
Sm	2.5	0.33	8 250
Wb	0.0	9.62	0
Rd	0.0	1.87	0
M	0.0	10.82	0
Total		99.73	643 080

4. SITE SENSITIVITY VERIFICATION

4.1 Norms applied

The following norms were applied (after P.I. Steenekamp, personal communication):

High agricultural sensitivity

- All deep, well-drained, loamy sand to sandy clay loam soils on slopes less than 7.1%, irrespective of current agricultural use.
- All currently cultivated fields for crops or pastures on non-hydric soils, irrespective of potential and type.
- All deep, high potential soils occupied by semi-permanent agricultural structures (structures without roofs and concrete foundations e.g. cattle kraals, bale storage facilities).
- All abandoned or vacant areas with deep, high potential soils that are occupied by partly demolished structures and are surrounded by crop farming or cultivated pastures.

Medium agricultural sensitivity

- All shallow soils without frequent rocky outcrops, not utilized for crop farming or cultivated pasture.
- All soils with a pure sand texture but not subject to wetness.
- All soils subject to wetness, but to a degree that still enables crop farming or cultivated pastures.
- All soils on slopes between 7.1 and 14.3%.
- All deep, but highly dispersive soils.
- All soils occupied by permanent farming structures such as farmsteads and farming-related buildings.

Low agricultural sensitivity

- All shallow soils with frequent rocky outcrops.
- All soils on slopes above 14.3%.
- All soils subject to wetness to such a degree that crop farming or cultivated pastures are not possible

4.2 Confirmation of agricultural sensitivity

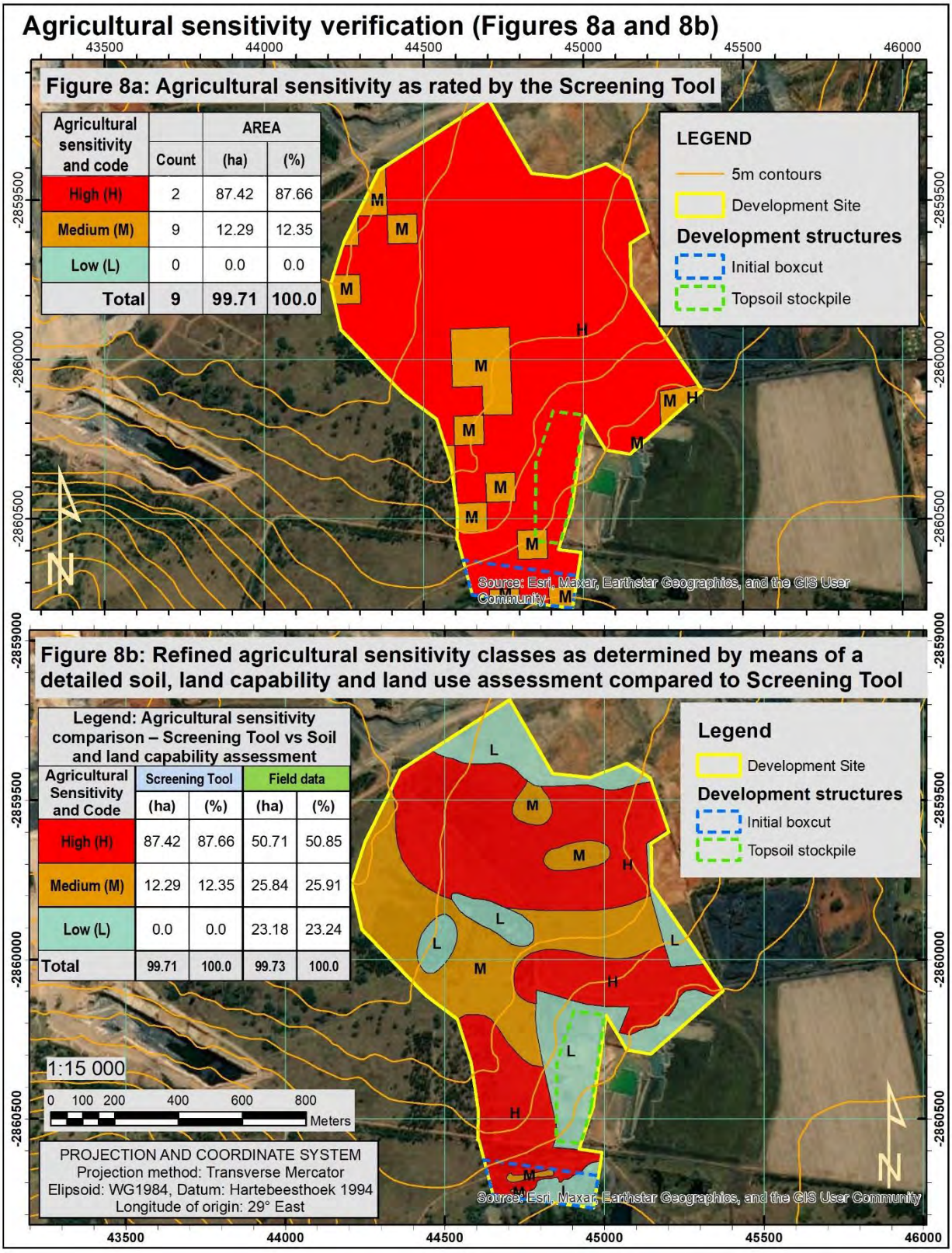


Figure 8: Agricultural sensitivity

Figure 8 and Table 8 show the agricultural sensitivity classes of the development site, both as derived from the screening tool and soil survey data.

Table 8: Agricultural sensitivity comparison: Screening Tool versus soil and land capability assessment

MAP UNIT	DESCRIPTION	AGRICULTURAL SENSITIVITY			
		Screening tool data	Ha	Field data	Ha
Hu	Red loams 60-150 cm deep	High	87.42	High	50.71
Hu-Ms	Loams <60 deep, some rock outcrops	Medium	12.29	Medium	24.30
Lo1,	Grey sandy loam over hydric subsoil	Not shown		Medium	1.21
Sm	Topsoil mounds			Medium	0.33
Lo 2, Lo-Cf				Low	0.80
Ka	Grey hydric sandy clay or clay			Low	0.07
Wb	Rehabilitated mined land without cover soil, many rock fragments			Low	9.62
M	Active mining			Low	10.82
Rd	Rock dumps			Low	1.87
Total			99.71		99.73

4.3 Screening tool information confirmed

As shown in Figure 8 and Table 8 the occurrence of high and medium sensitivity classes are confirmed.

4.4 Screening tool information disputed

4.4.1 Relative areas occupied by the classes

The areas covered by the various classes are disputed, however.

(1) The land of high sensitivity was found to be smaller than predicted by the screening tool (50.71 ha versus 87.42 ha).

(2) The land of medium sensitivity was found to be larger than shown by the screening tool (25.84 ha, versus 12.29 ha).

(3) Land of low agricultural sensitivity (23.18 ha) comprises legacy rock dumps near the southern boundary and small legacy rehab areas (total 2.64 ha), an area overlapping with the previous application (0.1 ha) and current mining and rehab activities (20.44 ha).

4.4.2 Areas missed by screening tool or changed by recent developments

Areas not shown by the screening tool are mainly recent or legacy developments as listed under (3) above.

5. Agricultural impact assessment

The following potential impacts can be expected to derive from operations in the development site:

5.1 Temporary loss of arable potential during construction and operational phases

Despite the current grassland/old land status, the area represented by soil-landform map unit Hu possesses a moderately high arable potential. This potential will be lost for the duration of the mining and rehabilitation activities.

5.2 Diminished agricultural potential when reverting back to agriculture

The bulk of the area represented by map unit Hu should be able to be rehabilitated (in terms of landform, slopes and soil) to arable standards. Although 60 cm cover soil depth is a minimum requirement for arable standards, it is a well-known fact that periodic droughts necessitate a relatively high water-holding capacity—e,g. such as provided by soils of one metre or more effective depth. It would be commendable if at least some rehabilitated areas could reach a cover soil depth or 1 metre.

Whether 50, 60, 70 (or even 80%) of the original potential productivity will be reached over a time span of, say 8 to 15 years after the land is returned to agricultural use (and had been under pasture for a few years) will depend on the skills applied and care taken by the mine in creating near-natural landforms, as well as in the operational activities of stripping, conserving, putting back, ameliorating, fertilizing and revegetating the soil materials involved. Bringing the rehabilitated land back into an agricultural production system will also depend on commercial farmer inputs (section 3.6.3).

The following operational and related factors may contribute to diminished agricultural potential:

5.2.1 Failure to restore landforms to near-natural conditions

Failure to restore landforms—crest, midslope, footslope and bottomland sequences—to near-natural conditions can result in long-lasting negative outcomes. These may include (a) the concentration and pooling of runoff water, resulting in the formation of melonholes, (b) unwanted ingress of water into pits, (c) localised salinization and acidification of spoil, cover soil, groundwater and streams, (d) soil erosion from steep slopes and (e) land surfaces or slopes unconducive to the use of large agricultural machines.

5.2.2 Failure to repair damage to land surface configurations due to post-levelling subsidence

Uneven land surfaces, melonholes and soil erosion resulting from unrepaired post-levelling subsidence will contribute to the lowering of post-rehabilitation arable potential and hamper the use of large agro-equipment.

5.2.3 Incomplete stripping of deep subsoils, resulting in loss of cover soil materials

It is of prime importance to recognise that soil materials for use as cover soil is limited (plus minus 643 000 cubic metres, Table7) and their depth is variable. As shown in Table 7, the average depth of suitable materials in the Hu polygon is 1.05 m. It is to be realised, however, that this figure is the average of a range of 0.6 to 1.5 m. (Due to the nature of the land this variability could not be reduced in terms of map units while employing industry standards of soil survey intensities).

Stripping will thus have to deal with substantial variability within this soil map unit in particular. Uniform stripping to 1 m depth would leave behind valuable soil material in some places and include weathered rock in others. One way of identifying patches of deeper soils might be to apply a first round of stripping down to 60 cm, followed by a second round in patches or areas where signs of rock appear to be absent.

5.2.4 Stripping into non-soil substrate, resulting in loss of quality of cover soil

Non-soil materials, mainly weathered rock, commonly displays relatively weak or no aggregation of individual particles into relatively stable crumb-like structural units—the way good soil does—mainly due to low or no organic matter. Aggregation of fine particles into crumbs is necessary to facilitate water infiltration as well as resistance to dispersion, surface sealing/crusting and erosion. Inert coarse particles (such as coarse sand and gravel) have no cohesion, fertility or water holding capacity. Thus the presence of such materials tends to lower the quality of the cover soil.

5.2.5 Mixing A and B horizons, resulting in surface crusting and lowered infiltration

Although separate stripping of A and B horizons has cost, time and stockpiling space implications, the fact remains that organic matter is necessary for soil aggregation. It is well known that aggregation renders the soil surface resistant to raindrop dispersion and sealing/crusting, thereby enhances water infiltration, conserves soil fertility and offers resistance to erosion. It is therefore highly desirable to put the more organic-rich A horizon material of stripped soil at the new surface whenever possible.

5.2.6 Loss of natural soil structure caused by stripping, transporting and stockpiling

Loss of natural soil structure is bound to take place as a result of pulverising, compaction, and smearing (the latter under wet conditions) if soil is repeatedly manipulated by heavy machines. Loss of structure is aided by loss of fresh organic matter and the dying off of microbes and mesofauna during stockpiling. Much of the damage may be unavoidable, however, and difficult to minimise.

5.2.7 Compaction of soil material and soil microbial degradation due to stockpiling

Investigating soil stockpile degradation, Coaltech (2016) and Paterson *et al*., (2019) confirmed considerable and widespread physical and microbiological degradation in stockpiled soils. It appears, however, that prospects of minimisation is limited, and revolves about limiting vehicle traffic on both stockpiles and rehabilitated areas, ensuring low stockpile height (<3 m) and using stockpiled soils within a short time span (3-5 years). Circumventing stockpiling by stripping and direct dumping and spreading thus appears to have merit.

5.2.8 Handling and spreading of cover soil, resulting in soil compaction

Spreading and levelling of cover soil under wet conditions result in compaction of the soil layers to bulk densities exceeding around 1.7 Mg m^3. When the soil dries out, the induced soil strength and low porosity largely limits plant root distribution to cracks and planes of weakness, thereby constraining plant growth (Nell and Steenekamp, 1998). The clay mineralogical makeup of the red apedal sandy clay loam soils is unconducive to volume changes concomitant with moisture changes. There is thus little or no ability to self-rectify induced compaction (Schoeman *et al,*2002).

5.3 Loss of grazing potential

The area represented by map unit Hu-Ms possesses a certain grazing potential, the quantification of which was not attempted this report.

It is a requirement that all of the land represented by the map unit Hu-Ms, less final voids, will be rehabilitated at least to grazing standards, i.e. having a cover soil thickness of at least 30 cm. This having been stated, it might be advisable to use any excess of stripped soil material to enhance the arable potential areas, rather than create rehabilitated land of a potential that is halfway between arable and grazing. Of great importance would be to resist stripping into soft rock to increase volume. Regarding cover soil, quality is as important, or more so, than volume.

On the other hand, if insufficient care is taken in stripping as much good soil as possible for use as cover soil, the target depth of 30 cm or more over the areas intended for grazing standards might be difficult to reach. And it is common knowledge that uncovered spoil is notoriously difficult to revegetate and to be made productive.

5.4 Loss of wetland functionality

The wetland functions of the small soil-landform map unit Lo will be lost for the duration of mining and rehabilitation activities. It is debatable whether a land facet with similar wetland functions should be planned for in the landforms to be reconstituted.

5.5 Sequestering and compaction of land under topsoil stockpile

One topsoil stockpile (other than haulroads) is the only infrastructure planned to be located in the development area. Sequestering will be short-term (0-5 years or transient, Appendix A). The inevitable soil compaction will take a few years to alleviate.

5.6 Dust generation

Negligible impact on agricultural potential during the implementation phase. Impacts will cease after closure.

5.7 Impacts related to enlarged usage of existing facilities

Existing facilities to be used include overburden and ROM stockpiles as well as a pollution control dam. No information was provided on the way discard is to be dispensed of.

5.7.1 Potential impacts relating to overburden and ROM stockpiles

The sequestering of land is already a fact unless the facilities are to be expanded. Potentially polluted runoff, seepage and dust are factors already present. Increased levels, however, can be expected to require enhancement of the following: monitoring, vigilance against leakages and improvements, maintenance or rebuilding of structures. Unmitigated impacts are likely to be salinization and acidification of the local soils, runoff water and groundwater through seepage.

5.7.2 Potential impacts relating to discard management

The relatively large areas under discard dumps are permanently sequestered unless fractionation technologies (Amaral et al., 2022) enable reduction of the footprint by putting some or most of the materials to use over time. It is a well-known fact that discard is a major source of salination and acidification of land and water. Sequestering will be long-term, i.e. impact ceases after

closure of activity (Appendix A). The inevitable soil compaction will be even longer term, but can be alleviated over time by ripping and adding organic matter.

5.7.3 Potential impacts relating to the dirty water pipeline and receiving pollution control dam

As with other pollution-related facilities, there will be a need for an enhanced focus on monitoring, vigilance against leakages—coupled to improvements where required—and maintenance in order to prevent soil and water salination.

5.8 Impact assessment analysis

The significance of impacts are rated in Table 9 in terms of severity, duration, extent and probability of occurrence. The methodology employed is explained in Appendix B.

The analysis shows that loss of arable potential is the most significant, being rated as high without and with mitigation. The magnitude (or severity) of the impact on cover soil materials is thought to be able to be lowered by attentive mitigation throughout the complex mining and rehabilitation processes.

Table 9: Impact assessment

IMPACT	ENVIRONMENTAL SIGNIFICANCE (1)											
	WITHOUT MITIGATION						WITH MITIGATION					
	S	D	E	P	SP	Significance	S	D	E	P	SP	Significance
Temporary loss of arable potential during operational phase	8	4	1	5	65	Moderate	8	4	1	5	65	Moderate
Diminished agricultural potential at the time of reverting back to agriculture	10	5	1	5	80	High	6	5	1	5	60	Moderate
Loss of grazing potential	4	5	1	5	50	Moderate	4	4	1	5	45	Low
Loss of wetland Functionality	6	5	2	4	52	Moderate	6	5	2	4	52	Low
Sequestering and compaction of land under topsoil stockpile	2	5	1	5	40	Low	2	4	1	4	28	Low
Dust generation	6	4	2	5	60	Moderate	4	4	2	4	40	Low
Potential impacts relating to overburden and ROM stockpiles	6	5	1	4	48	Moderate	4	5	1	3	30	Low
Potential impacts relating to discard management	6	5	2	5	65	Moderate	4	5	2	3	33	Low
Potential impacts relating to the dirty water pipeline and the receiving pollution control dam	4	4	2	3	30	Low	4	4	2	2	20	Insignificant

(1) For explanation of methodology see Annexure A

6. Mitigation measures

Table 10: Suggested mitigation measures

POTENTIAL IMPACT	MITIGATION MEASURES

1. Temporary loss of arable potential during construction and operational phases	No mitigation
2. Diminished agricultural potential subsequent to returning land back to agriculture (some physical causes listed below)	Planning, managing and monitoring to ensure rehabilitating 50 ha to arable potential, with slopes less than 5%, cover soil depth of 60 to 80 cm and bulk density of less than 1.65 Mg m^{-3}.
2.1 Failure to restore landscapes to near-natural conditions	Modelling, planning, mapping and field operations based on accurate contour maps of the areas to be stripped, adherence to plans and sustained monitoring and communication between all line functions involved.
2.2 Failure to repair damage to post-levelling surface configurations due to subsidence	Assuming that subsidence can be unpredictable, the recourse is post-subsidence filling and compacting where appropriate, followed by land preparation for (temporarily) establishing an effective grass sward.
2.3 Incomplete stripping of deep subsoils, resulting in loss of cover soil materials	Considering the relative shortage of soil materials, special care is to be taken during the active mining phase to leave as little as possible of the reddish subsoil material behind during stripping.
2.4 Stripping into non-soil substrate, resulting in loss of quality of cover soil	Likewise, care has to be taken not to strip into underlying material. These are hard or soft, mostly whitish or very pale red, mostly gritty, sandstone, gritstone or shale, in places capped by a hard, thin iron pan.
2.5 Mixing A and B horizons, resulting in surface crusting and lowered infiltration	If separate stripping of A horizon and subsoil material is not feasible, application of organic matter such as broiler or feedlot waste on the newly created soil surface could curb soil dispersion due to raindrop impact, thereby enhancing water infiltration for crop water use.
2.6 Loss of natural soil structure caused by stripping, transporting and stockpiling	It is a given that loss of natural structure will occur when soil is manipulated by earth moving machines. Mitigation could focus on devising ways to minimise pulverising when dry and smearing when wet. Moist soil conditions are preferred above very dry or very wet.
2.7 Compaction of soil material and soil microbial degradation due to stockpiling	Avoiding unnecessary adverse physical and biological conditions in cover soil materials by limiting vehicle passes on both stockpiles and rehabilitated areas as far as possible and ensuring low stockpile height (<3 m) and the use of stockpiles within as short a time span as possible (3-5 years).
2.8 Handling and spreading of cover soil, resulting in soil compaction	Working under wet conditions should be avoided whenever possible. Cross ripping of layers that suffered compaction is to be done, as deep as feasible, at moist but not wet or very dried out conditions.
3. Loss of grazing potential	Planning, managing and monitoring to ensure rehabilitating xx ha to grazing potential, with slopes less than 12 %, cover soil depth of 30 cm or more and bulk density of less than 1.65 Mg m^{-3}.
4. Loss of temporary wetland functionality	The seep present (map unit Lo) carries a message of periodic water excesses in lowlands. Consider the possibility of the latter in planning the runoff configuration of the rehabilitated land.
5. Sequestering and compaction of land under topsoil stockpiles	No mitigation for the short to medium term sequestering. Post-removal restoring of the quality of the land would include repeated cross-ripping, ploughing, harrowing, neutralising, fertilizing, soil conditioning and re-vegetating.
6. Dust generation	Systems in place for suppressing dust by spraying with water.
7. Impacts related to enlarged usage of existing facilities	Due diligent consideration of the current versus the intended capacities and design requirements.
8. Potential impacts relating to overburden and ROM stockpiles	No mitigation for sequestering and compaction during construction and operational phases. Soil degradation to be addressed after decommissioning and demolishing by restorative surface clearing, soil analysis, ripping, ploughing, harrowing, neutralising, fertilizing, soil conditioning and revegetating

9. Potential impacts relating to discard management	Effectively designed, installed and maintained collection and treatment systems for leachate.
10. Potential impacts relating to the dirty water pipeline and the receiving pollution control dam	Due diligent consideration of the current versus the intended capacities and design requirements; regular inspection and monitoring.

7. Benefits, other impacts and conclusions

7.1 Long-term benefits of the intended land use versus agricultural use

The intended land use will undoubtedly have many economic and social benefits, some or many of which, may be of a long-term nature.

If the land were to remain in agriculture, but be engulfed by smallholdings, the benefits from agricultural use would likely not amount to much. However, if the rehabilitated land were to be skilfully and appropriately managed—in a commercial agricultural enterprise setting—and in accordance with its potentials, it will be able to profitably produce food and forage indefinitely. In such a scenario the commendable climatic setting would be put to profitable use.

7.2 Other impacts of the proposed development

Although perhaps not strictly environmental, the following may be added: visual impacts, noise, vibration and heavy vehicle traffic. The fact may be taken into account, however, that these impacts are already present in the local environment.

7.3 Acceptability of the prosed development

From an agricultural natural resources and land use viewpoint the development is acceptable, mainly for the following reasons:

1. The immediate surroundings of the proposed development is a peri-urban area, already fragmented into smallholdings and mining activities, which does not form part of a contiguous, active and productive farming area.
2. The proposed development constitute an expansion onto land that evidently have not been used for agriculture for years.
3. It is common knowledge that mines supplying thermal coal to power stations have to expand if necessitated by product demand and the need to recover cost of investment. The intended location is so eminently situated for such a purpose that alternative sites for expansion were not offered for investigation.

7.4 Recommendation

It is recommended that the application be unconditionally approved.

7.5 Gaps and assumptions

The absence of drawings and information on the siting of infrastructure (and pits) caused some assumptions to be made.

7.6 Proposed impact management outcomes and monitoring requirements for inclusion in the Environmental Management Programme

7.6.1 Impact management outcomes

The impact analysis, as summarised in Table 10, points to the following:

The core potential losses to agriculture are considered to be, firstly, diminished agricultural potential when the land is reverting back to agriculture—in particular if mitigation might prove to be below par. The level of diminishing will be lowered or heightened by the way several of the topsoil conservation and rehabilitation processes were managed and executed (details in section 5 and Table 11).

In second place is the temporary loss of arable potential during the operational phase. This impact cannot be mitigated. However, as was pointed out above, the manner of conducting each of the operational actions that may impact on rehabilitation will largely determine the long term agricultural productivity.

With respect to the 78 ha that is still unaffected by current operations, the following two outcomes are considered the most important to agriculture:

1. Planning, managing, executing and monitoring the rehabilitation of 50 ha land to arable standards, with slopes of less than 5%, cover soil depth of 60 to 80 cm and bulk densities of less than 1.65 Mg m^{-3}, and as far as possible in blocks that would be amenable to mechanised crop production.
2. Similarly, planning, managing, executing and monitoring the rehabilitation of 25 ha to grazing standards, with slopes less than 8%, cover soil depth of 30 cm or more and bulk densities of less than 1.65 Mg m^{-3}.

7.6.2 Monitoring

Every six months an in-field inspection is to be done in areas where soil works are taking place. It is to be done by a suitably qualified, experienced, independent and registered soil scientist or technician. He or she should be accompanied, when working on the tasks described below, by a designated official from the mine.

During soil stripping

Occurrences of insufficient stripping depth, or stripping into and mixing soil with non-soil material, are to be assessed by hand augering at ±100 m intervals. Also to be assed is the height and condition of soil stockpiles.

During levelling and landscaping

Visual inspection of landforms, slopes and expected drainage.

After completion of cover soil levelling and ripping

The rehabilitated soils and associated land capability are to be assessed by means of auger observations at a density of 100 m x 100 m to at least 10 cm into the underlying spoil material. Every third pit in every direction is to be flagged for machine digging of profile pits to facilitate undisturbed core sampling at 10-20 cm depth for bulk density determination. Another sample should be taken at the same depth for soil fertility determination.

Reports are to be lodged with both the Environmental Officer of the mine and the Environmental practitioner involved.

References

Amaral F, Gcayiya M, Kotsiopoulos A, Broadhurst JL, Power D, Harrison STL., 2022. Valorization of South African Coal Wastes through Dense Medium Separation. Minerals. 2022; 12(12):1519. https://doi.org/10.3390/min12121519.

Chamber of Mines of South Africa-Coaltech Research Association, 2007. Guidelines for the rehabilitation of mined land. Chamber of Mines, Johannesburg.

Coaltech, 2016. Stockpiling of coal mine soils. Project 8.2.6. Author DG Paterson. Coaltech Research Association NPC, Johannesburg. https://coaltech.co.za/wp-content/uploads/2019/10/Project-8.2.6-Stockpiling-of-Coal-Mine-Soils-Jun-2016.pdf

Klingebiel, AA & Montgomery, PH, 1966. Land Capability Classification. USDA Handbook, US Government Pr. Office, Washington DC, 21 p.

Nell, JP & Steenekamp, PI, 1998. Final Report: Establishing a soil profile database for rehabilitated opencast mined land. ARC-Institute for Soil, Climate and water, Pretoria.

Paterson. DG, Mushia, MN, Mkula SD, 2019. Effects of stockpiling on selected properties of opencast coal mine soils. S A Journal of Plant and Soil 36 (2). Published Online: 1 Apr 2019.https://hdl.handle.net/10520/EJC-168e24436b. https://journals.co.za/doi/abs/10.1080/02571862.2018.1493161#:~:text=Soil%20stockpiling%20is%20a%20necessary,of%20various%20ages%20and%20origins.

Prinsloo, MA & Erasmus, MJH, 2000. The potential of rehabilitated minesoils for the production of maize and sunflower. Final Report. ARC-Grain Crops Institute, Potchefstroom.

Republic of South Africa, 2020. Protocol for the specialist assessment and minimum report. Content requirements for environmental impacts on agricultural resources. Government Notice No. 320, Government Gazette 43110.

Schoeman, JL, Matlawa, SM & Howard, MD, 2001. Quantification of the water balance of rehabilitated minesoils under rainfed pastures at selected sites in Mpumalanga. Water Research Commission Report No.798/1/02.

Schoeman, JL, van der Walt, M, Monnik, KA, Thackrah, J, Malherbe, J & le Roux, RE, 2002. Development and application of a land capability classification system for South Africa. Report GW/A/2000/57. ARC-Institute for Soil, Climate, and Water, Pretoria.

Soil Classification Working Group, 1991. Soil classification. A taxonomic system for South Africa. Mem. agric. nat. Resour. S. Afr. No. 15. ARC-Institute for Soil, Climate, and Water, Pretoria.

Soil Classification Working Group, 2018. Soil Classification. A natural and Anthropogenic System for South Africa. ARC-Institute for Soil, Climate, and Water, Pretoria.

USDA, 2018. Soil Survey Manual. United States Department of Agriculture. Handbook No.18. https://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/ref/?cid=nrcs142p2_054261

Appendix A: Screening Tool report

Appendix B: Impact assessment methodology

Potential impacts were assessed according to the intensity (or severity), duration, extent and probability of occurrence of the impact:

Intensity/Severity is a measure of the degree of change in a measurement, analysis or condition (e.g. crop yields before mining compared to those of rehabilitated land) and is classified as *none, negligible, low, moderate, high* and *very high*.

Duration refers to the length of time over which an environmental impact may occur: i.e. *transient* (less than 1 year), *short-term* (0 to 5 years), *medium term* (5 to 15 years), *long-term* (greater than 15 years with impact ceasing after closure of the project) or *permanent*.

Scale/Geographic extent refers to the area that could be affected by the impact and is classified as *site, local, regional, national,* or *international*.

Probability of occurrence is a description of the probability of the impact actually occurring as *improbable* (less than 5% chance), *low probability* (5% to 40% chance), *medium probability* (40 % to 60 % chance), *highly probable* (most likely, 60% to 90% chance) or *definite* (impact will definitely occur).

Impact significance is regarded as a function of the *magnitude* of the impact and the *probability* of the impact occurring. Impact magnitude, in turn, is regarded as a function of the extent, duration and severity of the impact. Impact significance was rated using the following scoring system:

Severity	**Duration**	**Extent**	**Probability**
10 (Very high)	5 (Permanent)	5 (International)	5 (Definite/don't know)
8 (High)	4 (Long-term - impact ceases after closure of activity)	4 (National)	4 (Highly probable)
6 (Moderate)	3 (Medium-term, 5 to 15 years)	3 (Regional)	3 (Medium probability)
4 (Low)	2 (Short-term. 0 to 5 years)	2 (Local)	2 (Low probability)
2 (Very low)	1 (Transient)	1 (Site)	1 (Improbable)
1 (Negligible)			0 (None)

After ranking these criteria for each impact, a significance rating was calculated using the following formula:

SP (significance points) = (severity, S + duration, D + extent, E) x Probability, P

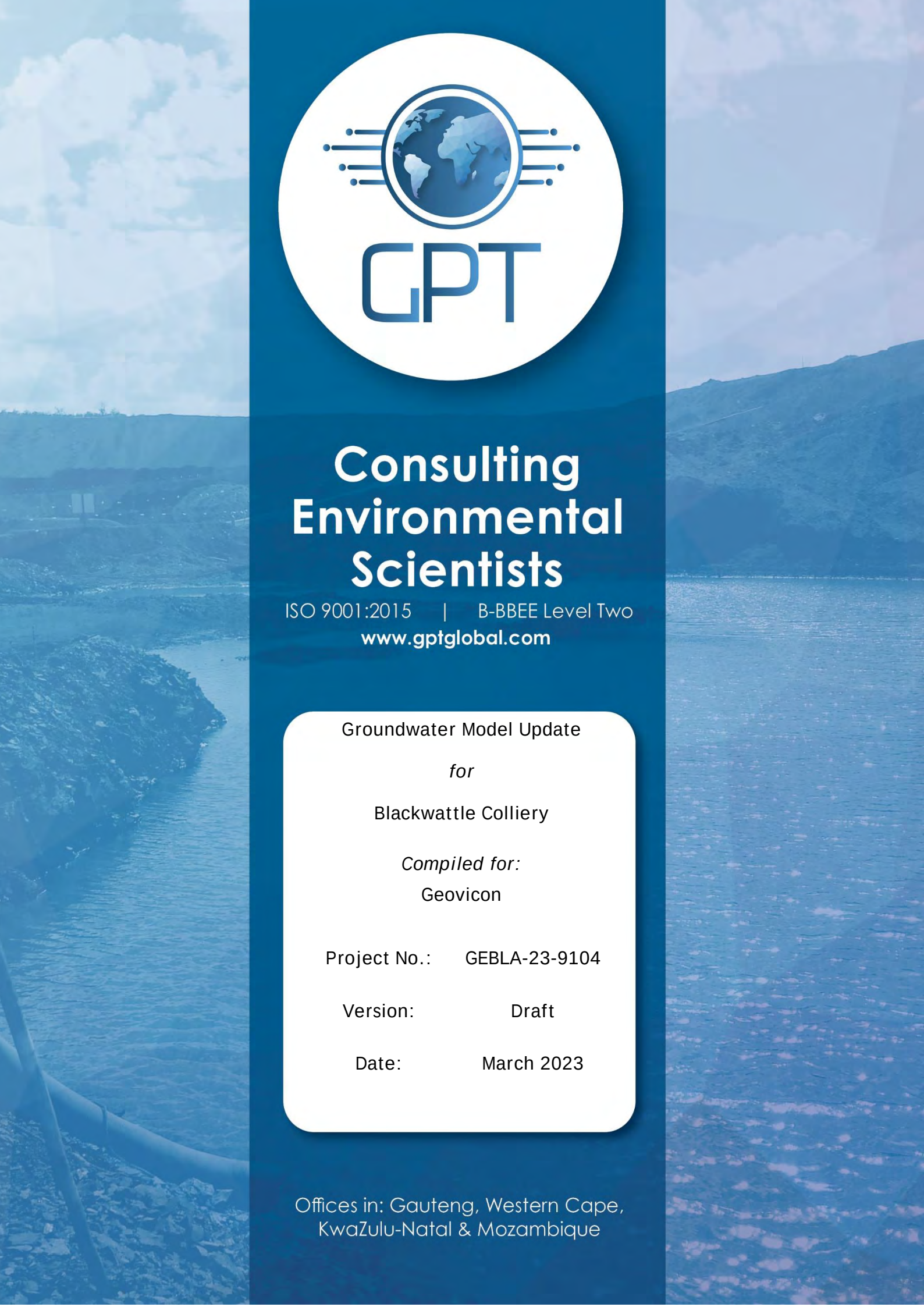
The maximum value is 100 significance points (SP). The potential environmental impacts were then rated as of *High* (SP >75), *Moderate* (SP 46 – 75), *Low* (SP ≤15 - 45) or *Negligible* (SP < 15) significance as outlined below:

Value	Environmental significance	Description
SP >70	High	An accepted limit or standard is expected to be exceeded or large magnitude impacts to occur to a highly valued or sensitive resource or receptor. Impacts of high significance would typically influence the decision to proceed with the project.
SP 46 - 70	Moderate	An effect will be experienced, but the impact magnitude is sufficiently small and well within accepted standards, and/or the receptor is of low

		sensitivity/value. Such an impact is unlikely to have an influence on the decision. Impacts may justify significant modification of the project design or alternative mitigation.
SP 26 - 45	Low	An effect will be experienced, but the impact magnitude is small and is within accepted standards, and/or the receptor is of low sensitivity/value or the probability of impact is extremely low. Such an impact is unlikely to have an influence on the decision although impact should still be reduced as low as possible, particularly when approaching moderate significance.
SP < 25	Insignificant	A resource or receptor will not be affected in any material way by a particular activity, or the predicted effect is deemed to be imperceptible or is indistinguishable from natural background levels. No mitigation is required.
	Positive impact	Positive consequences / effects are likely

Appendix 3

Groundwater study



Consulting Environmental Scientists

ISO 9001:2015 | B-BBEE Level Two

www.gptglobal.com

Groundwater Model Update

for

Blackwattle Colliery

Compiled for:

Geovicon

Project No.: GEBLA-23-9104

Version: Draft

Date: March 2023

Offices in: Gauteng, Western Cape, KwaZulu-Natal & Mozambique

Report Type:	Groundwater Model Update
Site Name:	Blackwattle Colliery
Site Location:	Middelburg, Mpumalanga
Compiled For:	Geovicon
Compiled By:	Z Rothmann; BSc. Hons
GPT Reference:	GEBLA-23-9104
Client Reference:	
Version:	Draft
Date:	March 2023
Distribution List (Current Version):	Geovicon
Reviewed by:	M. Terblanche; B. Sc. Hons.; Pr. Sci. Nat (400081/17)

Disclaimer:

The results and conclusions of this report are limited to the Scope of Work agreed between GEM-GPT and the Client for whom this 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 word-of-mouth, from the Client and Contractors.

Declaration:

I hereby declare:

- 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.
- I have no bias with regard to this project or towards the various stakeholders involved in this project.
- I have not received, nor have I been offered, any significant form of inappropriate reward for compiling this report.

(*electronic signature)*
Z Rothmann; B. Sc. Hons

(*electronic signature)*
M. Terblanche; B. Sc. Hons.; Pr. Sci. Nat (400081/17)

Customer Satisfaction:

Feedback regarding the technical quality of this report (i.e. methodology used, results discussed and recommendations made), as well as other aspects, such as timeous completion of project and value of services rendered, can be posted onto GPT's website at www.gptglobal.com.

EXECUTIVE SUMMARY

Geo Pollution Technologies - Gauteng (Pty) Ltd (GPT) was appointed by Geovicon (Pty) Ltd to update the existing groundwater model for the new opencast mining sections to the south west of the current operations. The Blackwattle Colliery is an existing coal mine, mining in an area previously exploited through underground methods. The existing numerical groundwater flow and transport model was updated to simulate the current groundwater flow, water qualities and predict groundwater interflows at different stages of opencast mining. Results of a geochemical analysis relating to the mine expansion to the south west of the current operations is included in this report.

The following conclusions and recommendations could be made regarding the mining of a new open cast section, south west of the current operations, at the Blackwattle colliery:

Location: The site is located on the farm Uitkyk 290 JS and portions of the Vaalbank 289 and the Middelburg town and Townlands farms.

Topography: The area is characterised by a gently undulating topography with a slope in the order of 1:40 (0.025) that is regionally in a north -western direction.The local surface drainage is undulating but seems to be mostly in the direction of Du toit stream in the north east of the site. The Du Toit stream flows into the Klein-Olifants River a few kilometres downstream (to the north) of the site. Surface drainage in the south western part of the mining rights area is in a south-western direction towards the Spookspruit stream, while drainage in the east of the mining rights section is in a south easterly direction towards the Pienaars Dam. Some perennial and non-perennial surface water bodies (mainly recreational dams) are found outside of a 1000m radius of the site. The Athlone and Kruger dams are situated in the Du toit stream about 3 kilometres north of the site, while the Pienaars Dam is about 3 kilometres east in the Klein-Olifants River

Climate: Climatic data was obtained from the DWA weather station at the Middelburg Dam (rainfall data and evaporation data) for the Middelburg area1. The mine is located in the summer rainfall region of Southern Africa with precipitation usually occurring in the form of convectional thunderstorms. The average annual rainfall (measured over a period of 38 years) is approximately 668.4 mm, with the high rainfall months between November and January. The mean annual evaporation is 1792.9 mm.

Geology: According to the 1: 250 000 geology series map 2528 Pretoria, the area is underlain by sediments of the Ecca Group, which forms part of the Karoo Supergroup. The Ecca Group consists mainly of dark grey shale that is carbonaceous in some instances, with interbedded whitish sandstone and greyish gritstone as well as occasional coal bands (Visser, 1989). In the investigated area, the Selonsrivier Formation of the Rooiberg Group (Transvaal Supergroup) underlies the Ecca Group. The Selonsrivier Formation consists of red rhyolite with occasional thin interlayered sandstone, tuff, black rhyolite, and breccia units. According to the drilling records from previous investigations, a felsite has been drilled into to the south of the current mining project. This is most likely the northern extremity of the Selonsrivier formation, but not enough information is available to delineate the extent of the outcrop.

Hydrogeology: According to the 1:500 000 General Hydrogeological Map[2] the rocks of the Ecca group which forms part of the Karoo Supergroup. This Aquifer type typically act as secondary aquifers (intergranular and fractured rock aquifers). However, the multi-layered weathering system present

1 Department of Water Affairs (DWA): www.dwa.gov.za

2 Haupt, C.J., (1995). An explanation of the 1:500 000 General Hydrogeological Map. Johannesburg 2526. DWAF.

in the geology along with locally identified intrusions and coal seems could prove to have up to four aquifer systems present in the form of a shallow aquifer in the weathered zone, deeper aquifer formed by fracturing in the Karoo sediments, aquifers associated with geological intrusions and aquifers formed within the more permeable coal seams and sandstone layers.

Groundwater levels: Groundwater levels are measured on a quarterly basis by Geovicon (Pty) Ltd. The correlation between the monitoring boreholes and the topography are generally strong hence the assumption could be made that the groundwater flow direction mimics the onsite topography, the correlation is shown in Figure 7 below. The data was provided by the client and captured in a database. The following can be concluded from the groundwater level monitoring data collected from 2003:

- Monitoring borehole GW1 was monitored since August 2003. The water level remains fairly stable over the monitoring period but shows an increase in variation since August 2019. The lowest water level was recorded in August 2021, whereafter the water level increased to 18.3 mbgl and has remained stable until the latest monitoring event in November 2022. The variation in the water level is a possible indication that the groundwater level in the region of the mine could be affected by the mine's dewatering.

- Monitoring borehole YKOH reported water level fluctuations with the water level dropping from 12.6 mbgl to 26 mbgl between February 2020 and May 2020. The water level recovered back to 12.22 mbgl during the groundwater monitoring event in August 2020. Since August 2020 the water level in YKOH has steadily increased to the latest water level at 4.22 mbgl. This is a possible indication that the groundwater level in the region of the mine could be affected by the mine's dewatering

- Groundwater monitoring points GW33, GW34 and windpump showed indications of a long-term decrease in the groundwater level that could possibly be attributed to the close by mining activities.

- The remainder of the groundwater monitoring points indicated seasonal fluctuations. The greatest variance is shown in GW38 and GW44.

Water Quality: Water quality data was provided by the client. The latest groundwater monitoring data was used from the November 2022 groundwater monitoring event. The data included results from 26 groundwater samples and 9 surface water samples. The results were compared to the recommended concentrations as prescribed in the water use license (2011) and in the SANS241 drinking water standards.

Groundwater

The following parameters exceeded the recommended limits as prescribed by the IWUL:

- Total N: in monitoring wells GW1, GW7, GW11, GW18, GW33, GW43, GW44, GW45, GW46, GW49, GW51, GGF, GWT and GWS.
- Chloride in monitoring wells GW11, GW18, GW33, GW36, GW46, GWT and GWS.
- Fluoride in monitoring wells GW7, GW11, GW35, GW42, GW43, GW45, GW46, GW47, GW49, GW50, YKOH, GGF, GWT and GWS.
- Sulphate in monitoring wells GW7, GW11, GW18, GW33, GW42, GW43, GW45, GW46, GW47, GW49, GW50, GW51, YKOH, GGF, GWT and GWS.

- Calcium in all monitoring wells with the exception of GW1, GW2, GW34, GW36, GW40 and GW44.
- Sodium in all monitoring wells with the exception of GW1, GW2, GW34, GW35, GW36, GW40 and GW44.
- Electrical conductivity in all monitoring wells with the exception of GW1, GW2, GW34, GW36, GW40 and GW44.
- pH in monitoring well GW1, GW2, GW44, GW49.

Surface Water

The following parameters exceeded the recommended limits as prescribed by the IWUL:

- TDS in monitoring wells BWS01, BWS05, BWS09, BWR05 and BWR06.
- Fluoride in monitoring wells BWS01, BWS05 and BWS09.
- Sulphate in monitoring wells BWS01, BWS05, BWS09, BWR05 and BWR06.
- Calcium in monitoring wells BWS01, BWS05, BWS09 BWR05 and BWR06.
- Magnesium in monitoring wells BWS01, BWR05 and BWR06.
- Sodium in monitoring wells BWS01, BWS05 and BWS09.
- Potassium in monitoring well BWS01.
- Electrical conductivity in monitoring wells BWR05 and BWR06.
- Iron in monitoring wells BWR02, BWR03, BWR04, and BWR07.
- Manganese in monitoring wells BWS01, BWR02, BWR03, BWR04, BWR05 BWR06 and BWR08.

Aquifer Vulnerability: The GDT calculated a vulnerability value of 53%, which indicates that aquifer is moderately vulnerable to contamination.

Aquifer Classification: Based on information collected during the hydrocensus it can be concluded that the aquifer system in the study area can be classified as a "Minor Aquifer System", based on the fact that the local population is not only dependant on groundwater.

Aquifer Protection Classification: A Groundwater Quality Management Index of 4 was estimated for the study area from the ratings for the Aquifer System Management Classification. According to this estimate a medium level groundwater protection is required for the aquifer. Reasonable and sound groundwater protection measures based on the modelling will therefore be recommended to ensure that no cumulative pollution affects the aquifer, even in the long term. DWA's water quality management objectives are to protect human health and the environment. Therefore, the significance of this aquifer classification is that measures must be taken to limit the risk to the following environments: The protection of the underlying aquifer, The protection of the underlying aquifer and the protection of surface water courses and features like the du Toit's stream, the Klein Olifant's river and dams like the Athlone Dam, Kruger's Dam and Pienaars Dam.

Geochemical results

Two geochemical samples were collected in 2020 as per the GPT operating procedure from the onsite waste rock and overburden stockpiles. GPT was accompanied and directed by the relevant mine staff in collecting two representative samples of the waste rock and overburden. The results from the geochemical samples is as follows:

- From the mineral composition results (XRD analysis) of the two analysed samples a dominance in potentially acid generating minerals like pyrite are absent, this could potentially be a limiting factor for acid mine drainage.

- Acid base accounting and Net Acid Generating potential analysis indicated some capacity to generate acid do exists in the collected samples, however the majority of the content in the material have sufficient neutralisation potential to counter the acid production.

- Based on the analysed results regarding the total leached concentrations and total concentrations the analysed samples can be classified as waste type 3. Waste type 3 is a low risk waste. The potential leached of concern include Barium, Copper and Lead.

Form the geochemical samples it can be concluded that the material sampled will most likely not be acid generating. It should however be noted that the properties of the material will vary spatially hence acid generating material at the mine could not be ruled out.

Predicted Impacts of Mining: The predicted impacts of mining can be summarised as follows:

- During Mining: The mining scenario of the planned southeastern opencast were modelled to completion to provide operational advice concerning the regional cone of depression and inflow rates into the opencast mining pit. The phases assumed the completion of planned opencast mining operations to a depth of 40 mbgl. The results indicates that the water entering the mining drain will flow into the open pit area at approximately 1000 m^3/day to 1200m^3/day (about 11l/s). However, the actual inflow could differ significantly from these predictions because of unknown underground conditions and climatic impact, but the trend could be useful.

- The modelled drawdown does reach a pan to the south east of the planned opencast area. The drawdown at the pan be regarded as significant, since the drawdown at this point is modelled to be around 12 mbgl. Local streams and pans are also most likely isolated from the aquifer by a clay layer, hence the impact on the streams is not expected to be significant in reducing the stream flow. Moreover, as the local streams serve mainly as rainwater drainage channels, it is not anticipated that this dewatering will influence the transfer of rainwater to the pans. It is thus concluded that the drawdown from the mining operations will not have significant environmental impacts on the surrounding area.

Post-Mining:

- Predicted groundwater levels indicate that a rise in groundwater will occur and that decant after rebound in so far as daylighting to surface will occur at a eastern section of the mining rights area close to a historical open cast. The regional water level is calculated to rebound in about 10 years. Through the groundwater model results indicates that between 400 and 600 m3 of water will decant to the east of the mining operations. GPT recommends that monitoring needs to be done to assess if decant is occurring east of the mining rights area, and if indeed it does occur it is recommended that a cut of trench should be installed to control the decant at this position since the decant is modelled to be less than 5 l/s.

- After the decommissioning of the mine some discards and exposed reactive mineral surfaces will remain in the mine, this outflow could be contaminated as a result of mine drainage. As sulphate is normally a significant solute in drainage from mines, sulphate concentration from the mine has

been modelled as a conservative (non-reacting) indicator of mine drainage pollution. A worst-case scenario was modelled with a starting sulphate concentration of 2 000 mg/litre. The migration of contaminated water from the mining area has been modelled as described, and the results are presented in terms of the extent of the pollution plume in time periods of 10, 25, 50 and 100 years after the operations have ceased. A scenario was modelled for the plume emanating from the planned opencast which will act as a constant source.

Within the limitations of the abovementioned assumptions, the water quality impact of the planned open cast after the decommissioning of the mine is as follows:

- The leachate plume emanating from the mined areas will be largely contained during the first few years while the groundwater in the colliery is still in rebound.
- A sulphate concentration of around 200mg/l will reach a non-perennial tributary after 50 years after decommissioning of the mine after the sulphate concentration will increase as long as the contamination source remains. The non-perennial stream is tributary of the spook spruit which is located south west of the planned open cast.
- Reasonable rehabilitation could result in a declining source concentration. This will result in less contamination on the long term, but the contamination during the first few decades is relatively unchanged.
- The farm dam in the tributary of the spook spruit south west of the planned open cast will also eventually be impacted by contaminant transport as is modelled.

Recommendations: The following actions are recommended:

- Water quantity and quality data should be collected on a regular, ongoing basis during mine operations. These data will be used to recalibrate and update the mine water management model, to prepare monitoring and audit reports, to report to the regulatory authorities against the requirements of the IWMP and other authorisations and as feedback to stakeholders in the catchment, perhaps via the CMA.
- The practice of rehabilitating old mine workings is very promising from a groundwater environmental view and should be maintained meticulously during future mining.
- Groundwater monitoring boreholes should be drilled in areas which is expected to be impacted in terms of groundwater quantity and quality. At least one monitoring well is proposed to the east of the current coal processing facility. Another two-groundwater monitoring point is also proposed to the south west of the planned mining area between the non-perennial tributary of the Spook spruit and the planned open cast mine, to assess possible future impacts. It is also recommended that all the new monitoring wells should be aquifer tested in order to accurately update the groundwater model with representative aquifer parameters.
- Regularly update the groundwater impact status report and numerical model against monitored data during operations, at least once more before closure.
- The hydrocensus and risk assessment should at least be repeated once before closure to evaluate any impacts

TABLE OF CONTENTS

Page

LIST OF FIGURES

Page

LIST OF TABLES

Page

LIST OF APPENDICES

Page

LIST OF ABBREVIATIONS

Abbreviation	Explanation
ARD	Acid Rock Drainage
BPG	Best Practice Guidelines
CMS	Catchment Management Strategy
CSM	Conceptual Site Model
EC	Electrical Conductivity
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
IWRMP	Integrated Water Resources Management Plan
IWRM	Integrated Water Resources Management
km^2	Square kilometre
L/s	Litres per second
mamsl	Metres above mean sea level
Ml/d	Megalitres per day
m	metre
mm	Millimetre
mm/a	Millimetres per annum
mS/m	Millisiemens per metre
m^3	Cubic metre
MAP	Mean Annual Precipitation
MPRDA	Mining and Petroleum Resources Development Act (Act No. 73 of 2002) 1989)
NEMA	National Environmental Management Act (Act No. 107 of 1998)
NWA	National Water Act (Act No. 36 of 1998)
ppm	Parts per million
RDM	Resource Directed Measures
RQO	Resource Quality Objective
RWQO	Resource Water Quality Objective
TDS	Total Dissolved Solids
WMA	Water Management Area
WMP	Water Management Plan

DEFINITIONS

Definition	Explanation
Aquiclude	A geologic formation, group of formations, or part of formation through which virtually no water moves
Aquifer	A geological formation which has structures or textures that hold water or permit appreciable water movement through them. Source: National Water Act (Act No. 36 of 1998).
Borehole	Includes a well, excavation, or any other artificially constructed or improved underground cavity which can be used for the purpose of intercepting, collecting or storing water in or removing water from an aquifer; observing and collecting data and information on water in an aquifer; or recharging an aquifer. Source: National Water Act (Act No. 36 of 1998).
Boundary	An aquifer-system boundary represented by a rock mass (e.g. an intruding dolerite dyke) that is not a source of water, and resulting in the formation of compartments in aquifers.
Cone of Depression	The depression of hydraulic head around a pumping borehole caused by the withdrawal of water.
Confining Layer	A body of material of low hydraulic conductivity that is stratigraphically adjacent to one or more aquifers; it may lie above or below the aquifer.
Dolomite Aquifer	See "Karst" Aquifer
Drawdown	The distance between the static water level and the surface of the cone of depression.
Fractured Aquifer	An aquifer that owes its water-bearing properties to fracturing.
Groundwater	Water found in the subsurface in the saturated zone below the water table.
Groundwater Divide or Groundwater Watershed	The boundary between two groundwater basins which is represented by a high point in the water table or piezometric surface.
Groundwater Flow	The movement of water through openings in sediment and rock; occurs in the zone of saturation in the direction of the hydraulic gradient.
Hydraulic Conductivity	Measure of the ease with which water will pass through the earth's material; defined as the rate of flow through a cross-section of one square metre under a unit hydraulic gradient at right angles to the direction of flow (m/d).
Hydraulic Gradient	The rate of change in the total hydraulic head per unit distance of flow in a given direction.
Infiltration	The downward movement of water from the atmosphere into the ground.
Intergranular Aquifer	A term used in the South African map series referring to aquifers in which groundwater flows in openings and void spaces between grains and weathered rock.
Karst (Karstic)	The type of geomorphological terrain underlain by carbonate rocks where significant solution of the rock has occurred due to flowing groundwater.

Definition	Explanation
Karst (Karstic) Aquifer	A body of soluble rock that conducts water principally via enhanced (conduit or tertiary) porosity formed by the dissolution of the rock. The aquifers are commonly structured as a branching network of tributary conduits, which connect together to drain a groundwater basin and discharge to a perennial spring.
Monitoring	The regular or routine collection of groundwater data (e.g. water levels, water quality and water use) to provide a record of the aquifer response over time.
Observation Borehole	A borehole used to measure the response of the groundwater system to an aquifer test.
Phreatic Surface	The surface at which the water level is in contact with the atmosphere: the water table.
Piezometric Surface	An imaginary or hypothetical surface of the piezometric pressure or hydraulic head throughout all or part of a confined or semi-confined aquifer; analogous to the water table of an unconfined aquifer.
Porosity	Porosity is the ratio of the volume of void space to the total volume of the rock or earth material.
Production Borehole	A borehole specifically designed to be pumped as a source of water supply.
Recharge	The addition of water to the saturated zone, either by the downward percolation of precipitation or surface water and/or the lateral migration of groundwater from adjacent aquifers.
Recharge Borehole	A borehole specifically designed so that water can be pumped into an aquifer in order to recharge the ground-water reservoir.
Saturated Zone	The subsurface zone below the water table where interstices are filled with water under pressure greater than that of the atmosphere.
Specific Capacity	The rate of discharge from a borehole per unit of drawdown, usually expressed as m3/d•m.
Specific Yield	The ratio of the volume of water that drains by gravity to that of the total volume of the saturated porous medium.
Storativity	The volume of water an aquifer releases from or takes into storage per unit surface area of the aquifer per unit change in head.
Transmissivity	Transmissivity is the rate at which water is transmitted through a unit width of an aquifer under a unit hydraulic gradient. It is expressed as the product of the average hydraulic conductivity and thickness of the saturated portion of an aquifer.
Unsaturated Zone (Also Termed Vadose Zone)	That part of the geological stratum above the water table where interstices and voids contain a combination of air and water.
Watershed (Also Termed Catchment)	Catchment in relation to watercourse or watercourses or part of a watercourse means the area from which any rainfall will drain into the watercourses or part of a watercourse through surface flow to a common point or points. Source: National Water Act (Act No. 36 of 1998).
Water Table	The upper surface of the saturated zone of an unconfined aquifer at which pore pressure is equal to that of the atmosphere.

GROUNDWATER MODEL UPDATE

BLACKWATTLE COLLIERY

1 INTRODUCTION

Geo Pollution Technologies - Gauteng (Pty) Ltd (GPT) was appointed by Geovicon (Pty) Ltd to update the existing groundwater model for the new opencast mining sections to the south west of the current operations. The Blackwattle Colliery is an existing coal mine, mining in an area previously exploited through underground methods. The existing numerical groundwater flow and transport model was updated to simulate the current groundwater flow, water qualities and predict groundwater interflows at different stages of opencast mining. Results of a geochemical analysis relating to the mine expansion to the south west of the current operations is included in this report.

The report is structured according to the requirements of the National Water Act, 1998 Regulations regarding the procedural requirements for water use licence applications and appeals 24 March 2017, Act N0. R. 267.

2 SCOPE OF WORK

2.1 Project Objectives

Within the scope of work the groundwater study aimed to address the following:

- Quantify and update the current groundwater status quo and identify data gaps
- Impact Predictions
- Updated groundwater Risk Assessment
- Updated Groundwater Management Options and Mitigation Measures
- A baseline groundwater assessment

3 METHODOLOGY

3.1 Desk Study

This entailed the gathering of information through the collation, scrutiny, and evaluation of available and relevant meteorological, geographical, geological, hydrogeological and water quality data.

3.2 Conceptual Modelling

Using existing monitoring data, hydrocensus data and geochemical sampling a conceptual model will be constructed with the aim of describing flow mechanisms and contaminant transport.

3.3 Reporting

A report detailing the findings of the study will provided in the format that is expected from the client.

4 GEOGRAPHICAL SETTING

4.1 Site Location, Topography and Drainage

The site is located on the farm Uitkyk 290 JS and portions of the Vaalbank 289 and the Middelburg town and Townlands farms. The Colliery is located approximately 6 km south of Middelburg in the Mpumalanga Province (Figure 1). The current mining operations consist out of two rehabilitated opencasts to the north east and the current open cast mining sections in the south west.

The topography (shown in Figure 2) can normally be used as a good first approximation of the hydraulic gradient in the unconfined aquifer. This discussion will focus on the slope and direction of fall of the area under investigation, features that are important from a groundwater point of view.

The local surface drainage is undulating but seems to be mostly in the direction of Du toit stream in the north east of the site. The Du Toit stream flows into the Klein-Olifants River a few kilometres downstream (to the north) of the site. Surface drainage in the south western part of the mining rights area is in a south-western direction towards the Spookspruit stream, while drainage in the east of the mining rights section is in a south easterly direction towards the Pienaars Dam. Some perennial and non-perennial surface water bodies (mainly recreational dams) are found outside of a 1000m radius of the site. The Athlone and Kruger dams are situated in the Du toit stream about 3 kilometres north of the site, while the Pienaars Dam is about 3 kilometres east in the Klein-Olifants River.

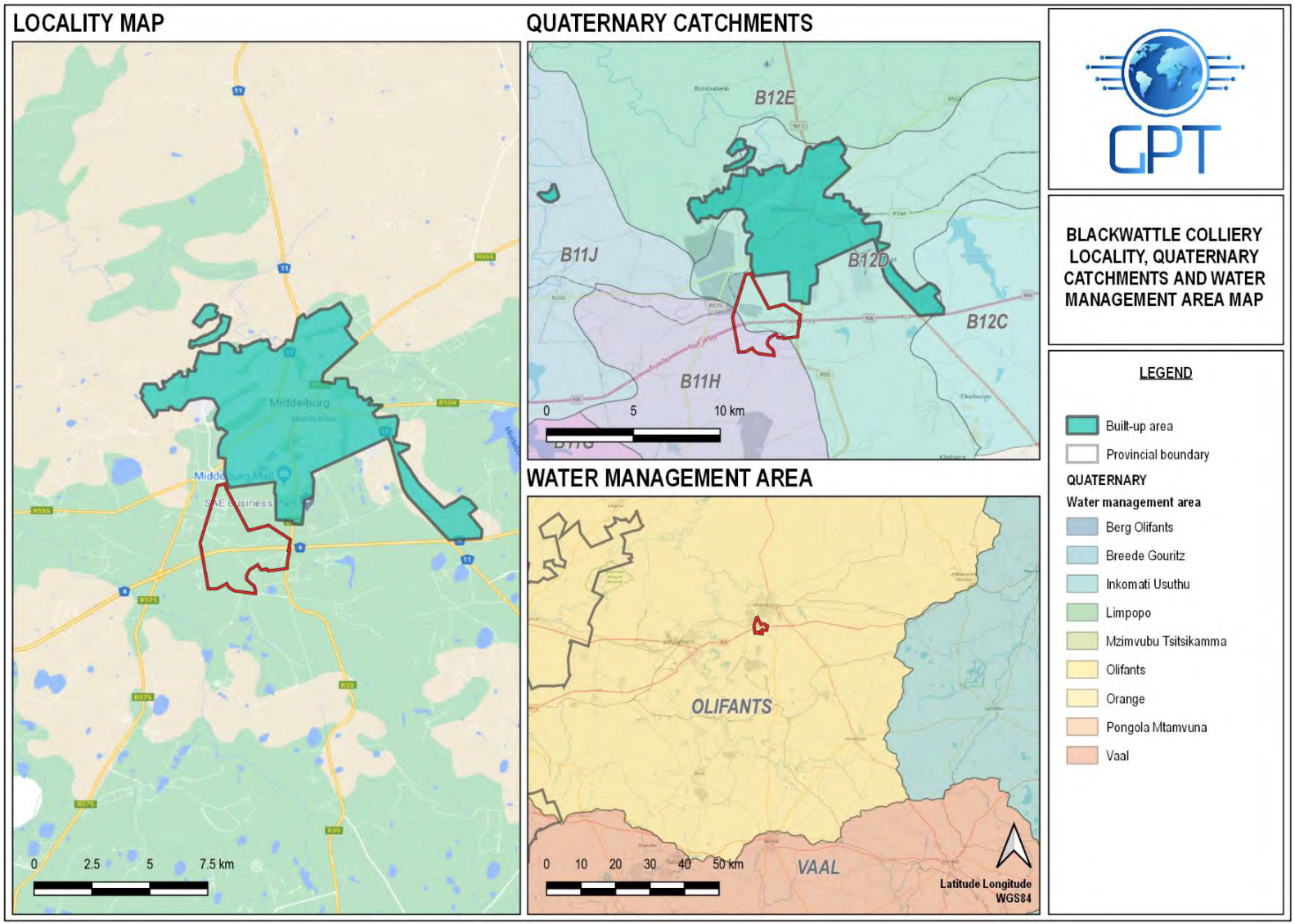


Figure 1: Site Location and Quaternary Catchment Boundaries.

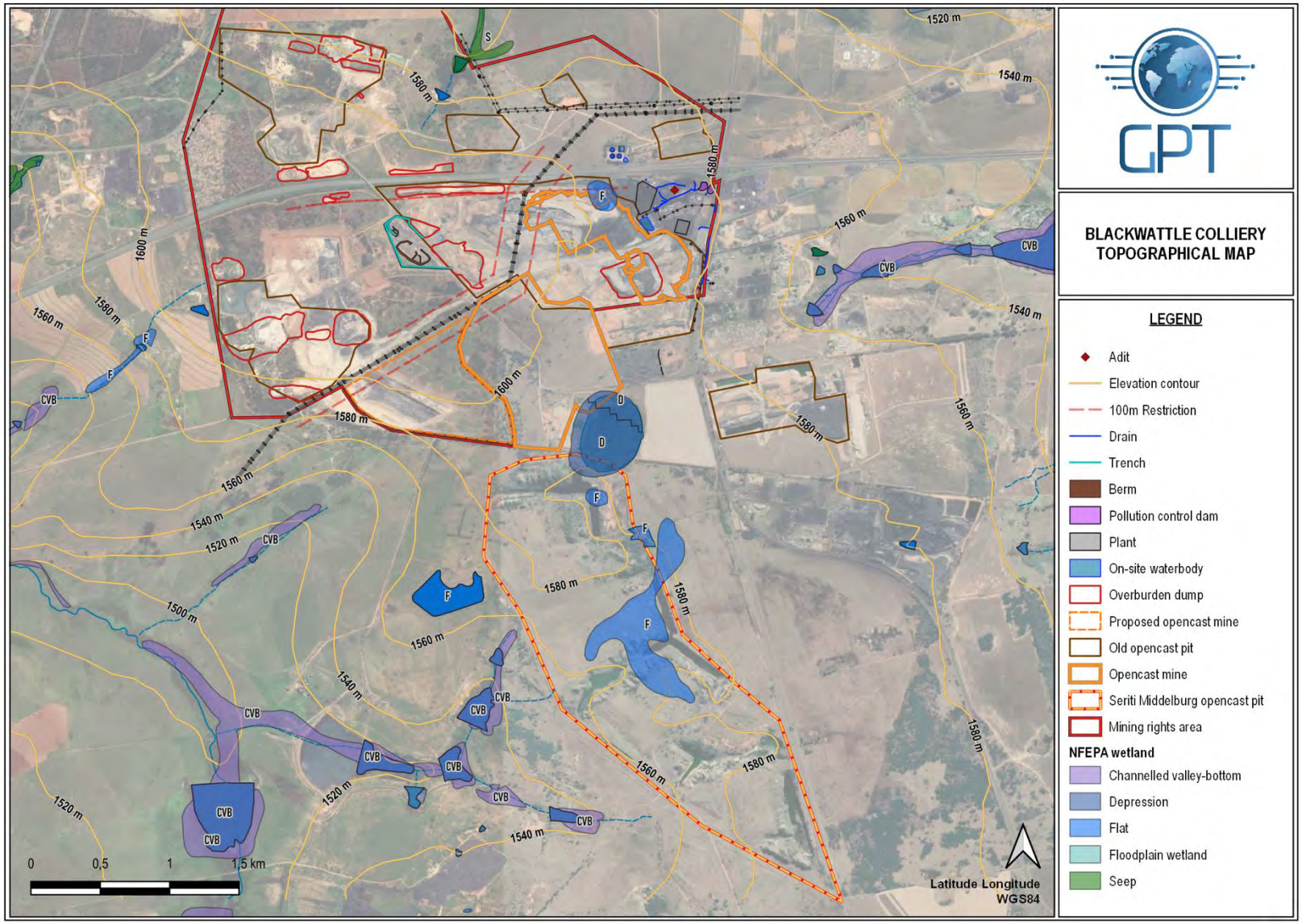


Figure 2: Site Topography.

4.2 Climate

Climatic data was obtained from the DWA weather station at the Middelburg Dam (rainfall data and evaporation data) for the Middelburg area (Table 1)[3]. The mine is located in the summer rainfall region of Southern Africa with precipitation usually occurring in the form of convectional thunderstorms. The average annual rainfall (measured over a period of 38 years) is approximately 668.4 mm, with the high rainfall months between November and January. The mean annual evaporation is 1792.9 mm.

Table 1: Climatic Data.

Month	Average monthly rainfall (mm)	Mean monthly evaporation
January	117.2	191.1
February	85.1	169.8
March	76.4	158.8
April	31.8	126.1
May	10.9	104.9
June	7.3	82.6
July	2.8	91.9
August	7.9	127.2
September	19.6	169.8
October	75	191.1
November	112.1	186.7
December	122.4	193
Annual	668.4	1792.9

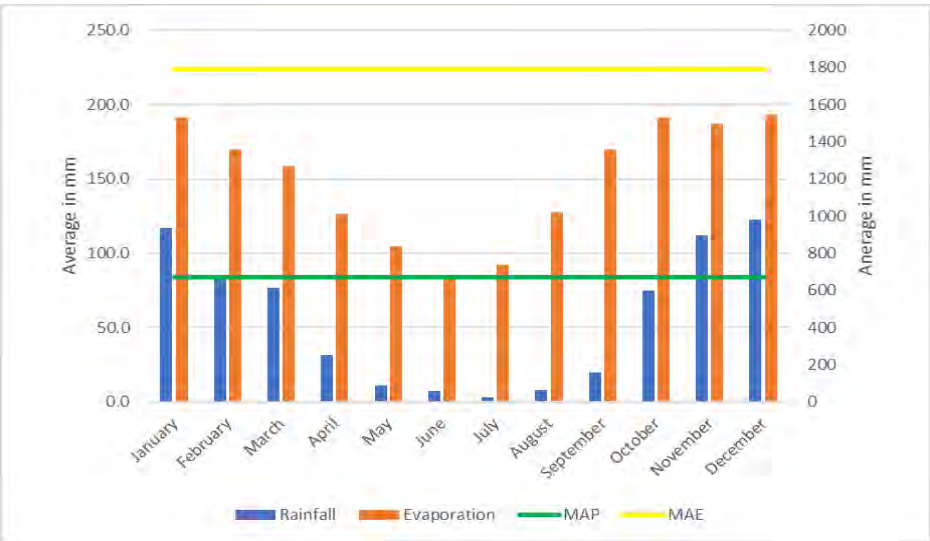


Figure 3: Climatic data representation.

[3] Department of Water Affairs (DWA): www.dwa.gov.za

4.3 Groundwater Recharge Calculations

Recharge to the shallow, unconfined aquifer was calculated using the RECHARGE program developed by the Institute for Groundwater Studies at the University of the Free State, South Africa. The calculated recharge percentage equates to approximately 3.7%.

Table 2: Recharge calculation for the shallow unconfined aquifer.

Recharge Estimation			
Method	mm/a	% of rainfall	Certainty (Very High = 5; Low = 1)
Various schematic maps			
Soil	44.3	6.0	2
Geology	21.26	3	4
Vegter	20	3	3
Acru	10.0	4.3	3
Harvest Potential	25.0	3.4	3

5 PREVAILING GROUNDWATER CONDITIONS

5.1 Geology

5.1.1 Regional Geology

According to the 1: 250 000 geology series map 2528 Pretoria, the area is underlain by sediments of the Ecca Group, which forms part of the Karoo Supergroup. The Ecca Group consists mainly of dark grey shale that is carbonaceous in some instances, with interbedded whitish sandstone and greyish gritstone as well as occasional coal bands (Visser, 1989).

In the investigated area, the Selonsrivier Formation of the Rooiberg Group (Transvaal Supergroup) underlies the Ecca Group. The Selonsrivier Formation consists of red rhyolite with occasional thin interlayered sandstone, tuff, black rhyolite and breccia units. According to the drilling records from previous investigations, a felsite has been drilled into to the south of the current mining project. This is most likely the northern extremity of the Selonsrivier formation, but not enough information is available to delineate the extent of the outcrop.

From the geophysical survey conducted in 2005 at the site, geological structures in the mining area could be identified. The identification of geological structures in the area could be an indication of geological weathering and fracturing in the area that could potentially serve as preferential flow paths for groundwater. Due to lack of geological data over the entire mining rights area, the presence of these geological structures were however not modelled in the numerical groundwater model, which could be a limitation.

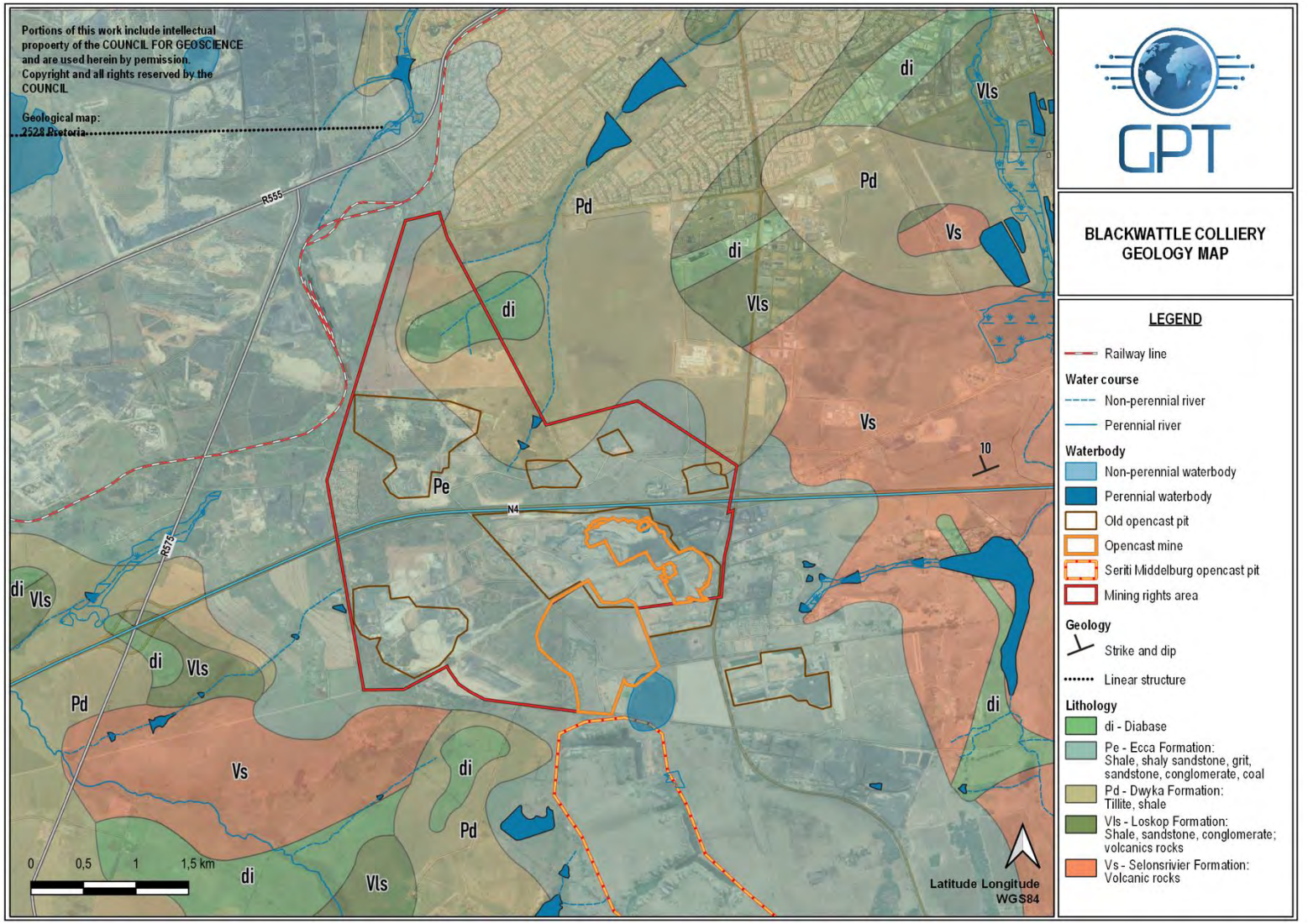


Figure 4: Regional Geology Map (1:250 000 geology series map).

5.2 Hydrogeology

According to the 1:500 000 General Hydrogeological Map[4] the rocks of the Ecca group which forms part of the Karoo Supergroup. This Aquifer type typically act as secondary aquifers (intergranular and fractured rock aquifers). However, the multi-layered weathering system present in the geology along with locally identified intrusions and coal seems could prove to have up to four aquifer systems present in the form of a shallow aquifer in the weathered zone, deeper aquifer formed by fracturing in the Karoo sediments, aquifers associated with geological intrusions and aquifers formed within the more permeable coal seams and sandstone layers.. These aquifer systems are discussed below.

5.2.1 Unsaturated Zone - Shallow, regolith aquifer

The main source of recharge into the shallow aquifer is rainfall that infiltrates the aquifer through the unsaturated (vadose) zone. Vertical movement of water is faster than lateral movement in this system as water moves predominantly under the influence of gravity. This aquifer is comprised of transported alluvium and in-situ weathered sediments and is underlain by consolidated sedimentary rocks (sandstone, shale and coal). Based on literature the hydraulic conductivity of this aquifer likely ranges between 10^{-3} and 1 m.day^{-1}[5].

5.2.2 Saturated Zone - Fractured, bedrock aquifer

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 Ecca Group. Groundwater movement is predominantly associated with secondary structures in this aquifer (fractures, faults, dykes, etc.).

Both the porosity and the hydraulic conductivity of the Ecca Group fractured aquifers are known to be low. The commonly expected values of porosity and permeability for the rock types present in the site area, are 0 - 30% (porosity) and 10^{-7} - 1 m.d^{-1} (hydraulic conductivity) respectively (Kruseman & de Ridder, 1994). Movement of groundwater in this aquifer will be preferential in secondary structures such as joints, faults and fractures. From previous studies that were conducted at Blackwattle mine the hydraulic conductivity for this aquifer system was calculated to be 0.2 m/day.

5.2.3 Dykes and Sills

Dolerite intrusions in the form of dykes and sills are often encountered in these aquifers. These intrusions can serve both as aquifers and aquifuges. Thick, unbroken dykes inhibit the flow of water perpendicular to the dykes, forming (leaky) compartments in most instances. In contrast, the baked and cracked contact zones is normally highly conductive parallel to the dykes and these effectively interconnect the strata of the sediments both vertically and horizontally into a single aquifer, though highly heterogeneous and anisotropic unit on the scale of mining. These structures thus tend to dominate the flow of groundwater in fractured aquifers. Unfortunately, their location and properties are rather unpredictable and expensive to define in sufficient detail. Their influence on the flow of groundwater is thus incorporated by using higher than usual flow parameters for the sedimentary rocks of the aquifer. As indicated in Section 5.1.1 the dykes and sills were not included in the model due to a lack of geological data over the mining rights area.

5.2.4 Aquifers Associated with coal Seams

The coal seams form layered sequences 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

[4] Haupt, C.J., (1995). An explanation of the 1:500 000 General Hydrogeological Map. Johannesburg 2526. DWAF.

[5] Kruseman, G.P. and de Ridder N. A. (1994). Analysis and Evaluation of Pumping Test Data. Second Edition (Completely Revised).

tends to act as an aquitard allowing the flow of groundwater at the margins. The major coal seam in the area are more than 40 metres below surface.

5.3 Groundwater Levels

Groundwater level data was obtained from 23 groundwater monitoring points that were provided by Geovicon. Groundwater level measurements was not possible in all of the groundwater monitoring points due to the boreholes being discontinued, destroyed or no access being provided. In total 19 boreholes were available for groundwater level measurement and the water level data is displayed since February 2022. For the latest monitoring run (November 2022), the groundwater levels varied between a minimum of 3.96 mbgl and a maximum of 23.73 mbgl.

5.3.1 Groundwater levels from monitoring data

Groundwater levels are measured on a quarterly basis by Geovicon (Pty) Ltd. The correlation between the monitoring boreholes and the topography are generally strong hence the assumption could be made that the groundwater flow direction mimics the onsite topography, the correlation is shown in Figure 7 below. The data was provided by the client and captured in a database. The following can be concluded from the groundwater level monitoring data collected from 2003:

- Monitoring borehole GW1 was monitored since August 2003. The water level remains fairly stable over the monitoring period but shows an increase in variation since August 2019. The lowest water level was recorded in August 2021, whereafter the water level increased to 18.3 mbgl and has remained stable until the latest monitoring event in November 2022. The variation in the water level is a possible indication that the groundwater level in the region of the mine could be affected by the mine's dewatering.

- Monitoring borehole YKOH reported water level fluctuations with the water level dropping from 12.6 mbgl to 26 mbgl between February 2020 and May 2020. The water level recovered back to 12.22 mbgl during the groundwater monitoring event in August 2020. Since August 2020 the water level in YKOH has steadily increased to the latest water level at 4.22 mbgl. This is a possible indication that the groundwater level in the region of the mine could be affected by the mine's dewatering

- Groundwater monitoring points GW33, GW34 and windpump showed indications of a long-term decrease in the groundwater level that could possibly be attributed to the close by mining activities.

- The remainder of the groundwater monitoring points indicated seasonal fluctuations. The greatest variance is shown in GW38 and GW44.

The long-term groundwater level trends can be visualised in Figure 7 below.

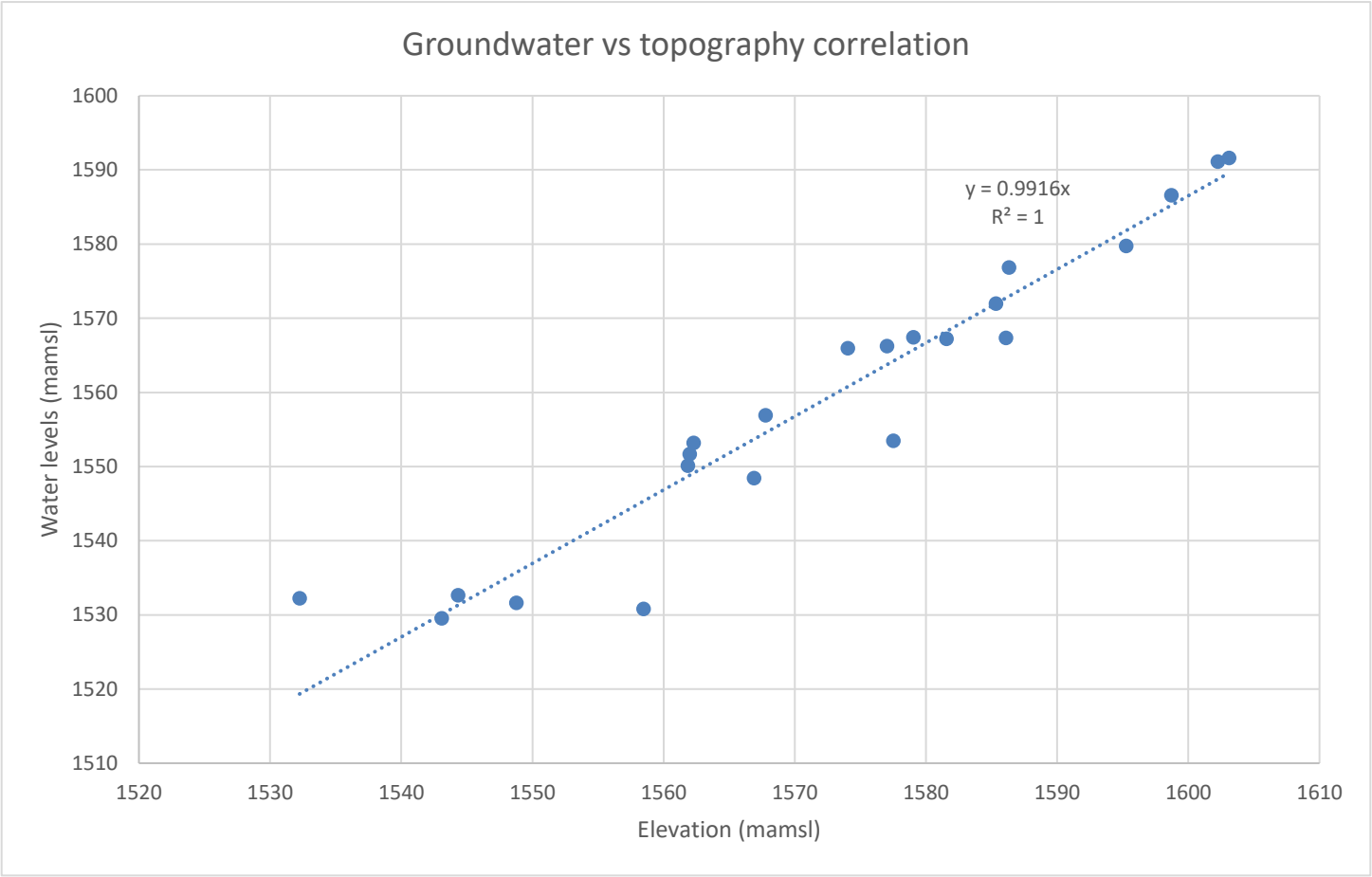


Figure 5: Correlation Graph of topography vs available groundwater levels (Monitoring Boreholes).

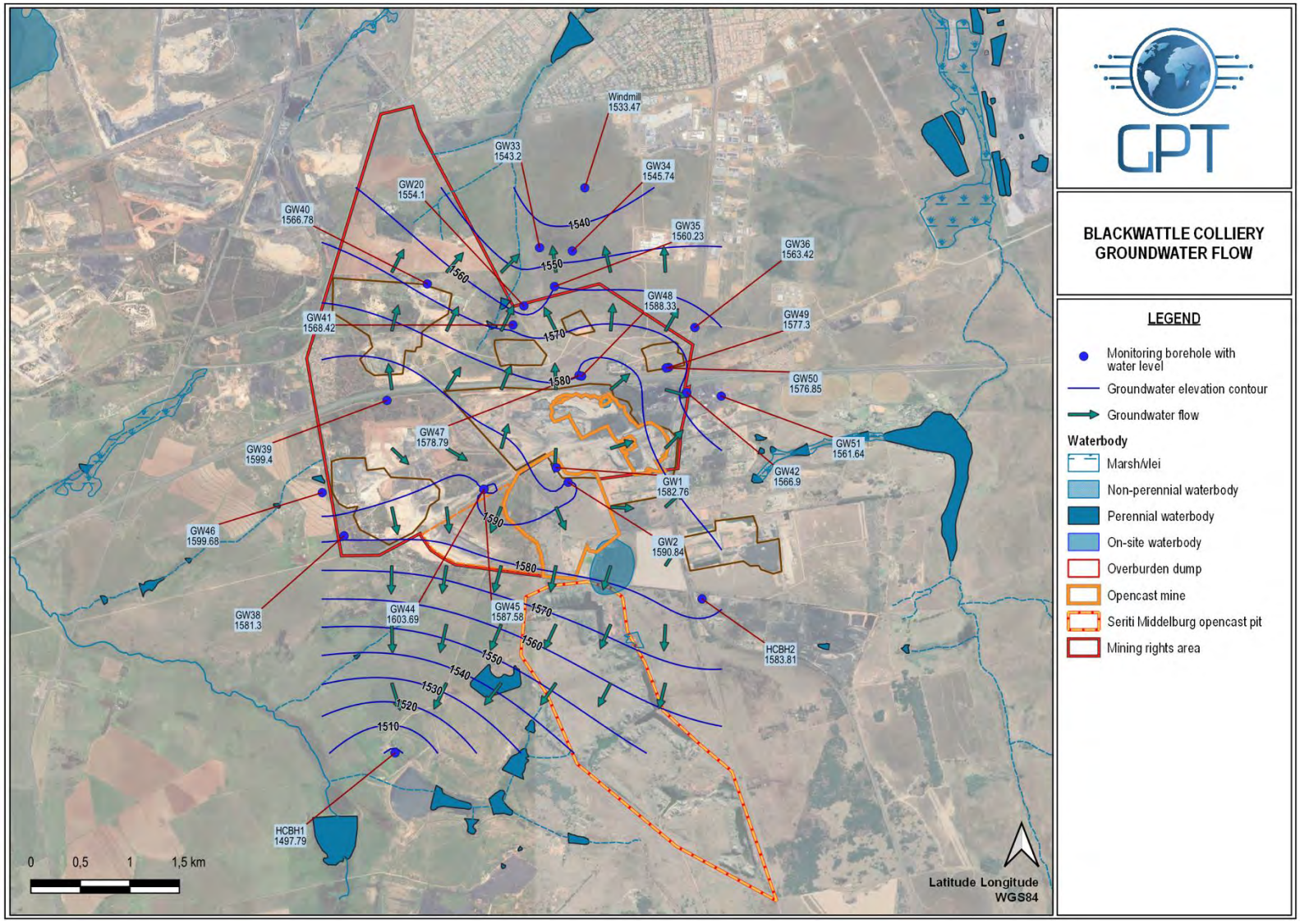


Figure 6: Contoured water levels of the water table aquifer (unconfined aquifer).

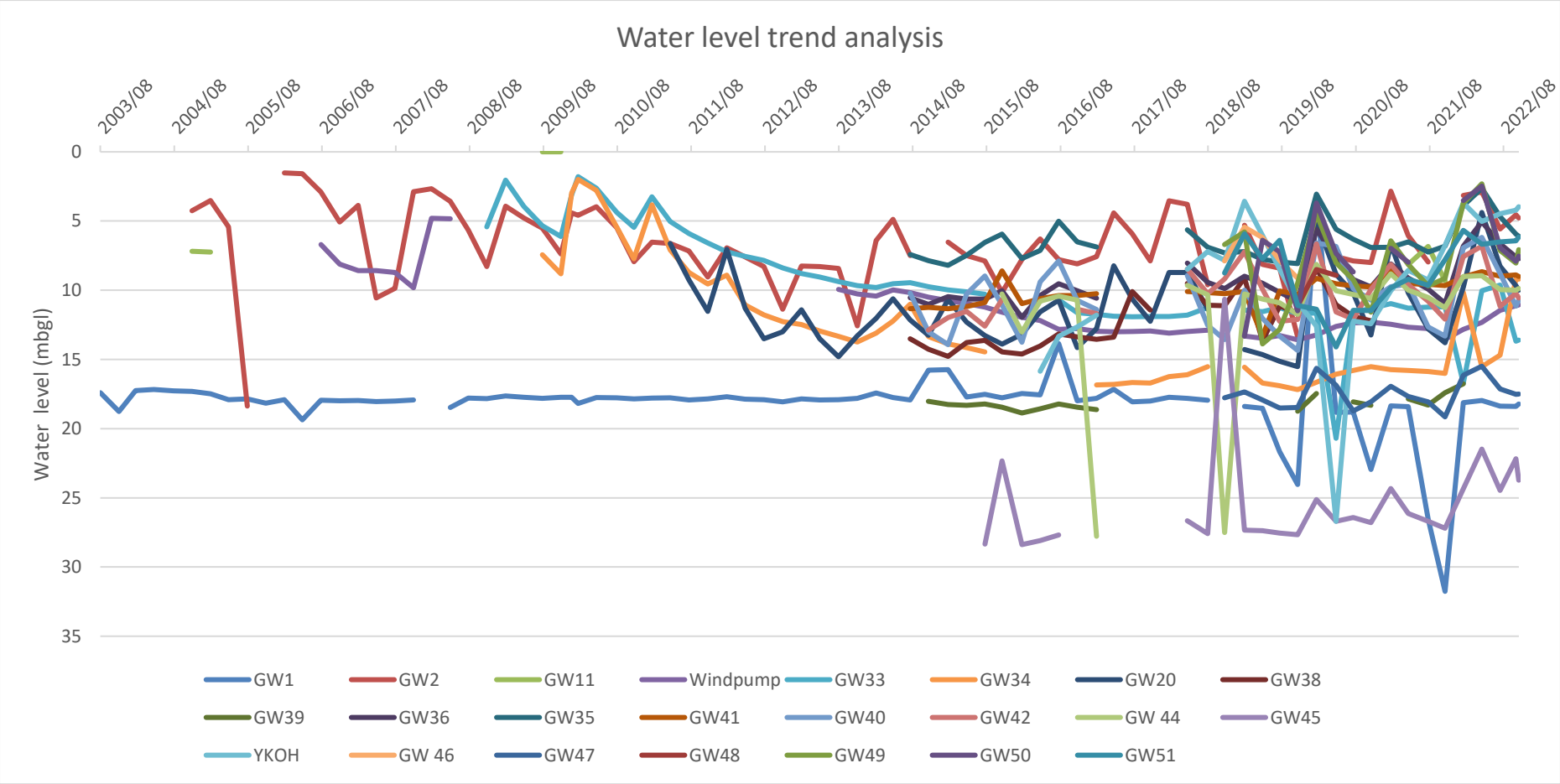


Figure 7 Historical water level data.

5.4 Groundwater Potential Contaminants

The potential contaminants associated with the mining activities may emanate from the opencast and overburden dumps and product stockpiles.

Workshops, fuel and oil handling facilities are likely sources of hydrocarbon related contaminants. Oils, grease and other hydrocarbon products (such as petrol and diesel) handled in these areas may contaminate the environment by spillages and leakages. Oils and greases are removed and collected in oil traps. Run-off (contained with hydrocarbons) which is not collected may enter the storm water system from where it may contaminate surface water bodies and groundwater. Septic tanks and sewage treatment plants potentially contaminate groundwater. Contaminants associated with these plants include coliforms (e.g. E. coli), bacteria viruses, ammonia, phosphate, sulphate and nitrate. Effluent from these systems usually contains elevated concentrations of organic matter which may lead to elevated COD and BOD. Waste disposal areas may source a wide range of contaminants, ranging from metals, organic matter, hydrocarbons, phosphates, etc.

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. Sulphate is also a constituent from which Acid mine drainage can occur. The following few paragraphs contains a brief overview 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*.

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

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.

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

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

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

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

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.

According to the SANS Guidelines for Drinking Water, high concentrations of sulphate exert predominantly acute health effects. Sulphate also imparts a salty or bitter taste to water. The taste threshold for sulphate falls in the range of 200 - 400mg/L. Above 400mg/L diarrhoea occurs in most individuals and user-adaptation does not occur. It is also important to note that adverse chronic effects may occur in livestock if sulphate levels exceed 1000mg/L, such as diarrhoea and poor productivity.

5.5 Water Quality

Water quality data was provided by the client. The latest groundwater monitoring data was used from the November 2022 groundwater monitoring event. The data included results from 26 groundwater samples and 9 surface water samples. The results were compared to the recommended concentrations as prescribed in the water use license (2011) and in the SANS241 drinking water standards.

The SANS 241:2015 drinking water standards was used by GPT to compare the analysed results to ,and although the water quality objectives (for groundwater) that is contained in the WUL(2011) seems stringent a comparison was also made to these objectives. It is however recommended by GPT that an in-depth analysis needs to be done in terms of water quality at the mine to determine more achievable water use license objectives for groundwater and surface water. This observation can be made seeing that the water use license water quality objectives is more stringent than the SANS 241:2015 drinking water standards for various of the listed constituents. The results for both the surface and groundwater quality analysis can be visualized in Table 3 below.

5.5.1 Groundwater

The following parameters exceeded the recommended limits as prescribed by the IWUL:

- Total N: in monitoring wells GW1, GW7, GW11, GW18, GW33, GW43, GW44, GW45, GW46, GW49, GW51, GGF, GWT and GWS.
- Chloride in monitoring wells GW11, GW18, GW33, GW36, GW46, GWT and GWS.
- Fluoride in monitoring wells GW7, GW11, GW35, GW42, GW43, GW45, GW46, GW47, GW49, GW50, YKOH, GGF, GWT and GWS.
- Sulphate in monitoring wells GW7, GW11, GW18, GW33, GW42, GW43, GW45, GW46, GW47, GW49, GW50, GW51, YKOH, GGF, GWT and GWS.
- Calcium in all monitoring wells with the exception of GW1, GW2, GW34, GW36, GW40 and GW44.
- Sodium in all monitoring wells with the exception of GW1, GW2, GW34, GW35, GW36, GW40 and GW44.
- Electrical conductivity in all monitoring wells with the exception of GW1, GW2, GW34, GW36, GW40 and GW44.
- pH in monitoring well GW1, GW2, GW44, GW49.

5.5.2 Surface Water

The following parameters exceeded the recommended limits as prescribed by the IWUL:

- TDS in monitoring wells BWS01, BWS05, BWS09, BWR05 and BWR06.
- Fluoride in monitoring wells BWS01, BWS05 and BWS09.
- Sulphate in monitoring wells BWS01, BWS05, BWS09, BWR05 and BWR06.
- Calcium in monitoring wells BWS01, BWS05, BWS09 BWR05 and BWR06.
- Magnesium in monitoring wells BWS01, BWR05 and BWR06.
- Sodium in monitoring wells BWS01, BWS05 and BWS09.
- Potassium in monitoring well BWS01.
- Electrical conductivity in monitoring wells BWR05 and BWR06.
- Iron in monitoring wells BWR02, BWR03, BWR04, and BWR07.
- Manganese in monitoring wells BWS01, BWR02, BWR03, BWR04, BWR05 BWR06 and BWR08.

The following constituents exceeded the SANS241:2015 drinking water standards in the groundwater monitoring network:

- Electrical conductivity exceeded in all monitoring wells with the exception of GW1, GW2, GW34, GW36, GW40 and GW44.
- Total dissolved solids exceeded in monitoring wells GW11, GW42, GW46, GW49, GW51, GGF and GWS.
- Fluoride exceeded in monitoring well GW42.
- Sulphate exceeded the acute health limit in monitoring wells GW42, GGF and GWS.
- Iron exceeded in monitoring wells GW2, GW49 and Wind Pump.
- Manganese exceeded in monitoring wells GW2, GW20, GW33, GW36, GW41, GW42, GW46, GW47, GW49, GW50, GW51, GGF, GWS and Wind Pump.
- pH did not exceed in any of the monitoring wells.

The SANS 241-1 2015 tables are available in the The following surface water monitoring points exceeded the SANS241:2015 drinking water standards:

- Electrical conductivity did not exceed the limit in any of the surface monitoring points.
- Total Dissolved Solids exceeded the limits in surface water monitoring points BWS01, BWS05, BWS09, BWR05 and BWR06.

- Sulfate exceeded the acute health limits in surface water monitoring points BWS01, BWS05, BWS09, BWR05 and BWR06.
- Iron exceeded the limits in surface water monitoring points BWS01, BWS05, BWR03 and BWR07.
- Manganese exceeded the limits in surface water monitoring points BWS01, BWS05, BWS09, BWR02, BWR03 and BWR04.
- Aluminium exceeded the limits in surface water monitoring points BWS01 and BWS05.

Table 3 Water Quality Results for Blackwattle Colliery.

	Unit	IWUL	WQT domestic	GW1	GW2	GW7	GW11	GW18	GW20	GW33	GW34	GW35
TDS	(mg/l)		450	22.00	18.00	186.00	708.00	128.00	66.00	310.00	16.00	59.00
N	(mg/l)	0.11	6	0.19	0.10	0.37	0.37	0.71	0.10	0.22	0.10	0.11
Cl	(mg/l)	5.5	100	3.29	3.33	5.01	26.40	5.81	3.61	9.07	1.52	1.78
Alkalinity	(mg/l)			5.00	6.00	123.00	59.00	44.00	63.00	516.00	13.00	55.00
F	(mg/l)	0.22	1	0.20	0.20	0.33	0.42	0.20	0.20	0.20	0.20	0.26
SO4	(mg/l)	8.8	200	5.22	3.22	23.50	329.00	24.40	1.73	10.60	1.00	1.00
CaCO3	(mg/l)			9.00	8.00	51.00	386.00	51.00	54.00	78.00	5.00	49.00
Ca	(mg/l)	3.51	32	1.91	1.79	14.50	67.20	12.40	10.40	13.00	1.12	8.87
Mg	(mg/l)	121	30	0.95	0.87	6.31	53.10	4.93	6.71	11.10	0.58	6.61
Na	(mg/l)	4.73	100	3.63	3.49	37.70	29.20	11.40	5.09	17.60	4.15	4.07
K	(mg/l)		50	0.99	0.45	1.81	11.00	2.49	3.25	31.50	0.61	2.94
EC	(mS/m)	5.72	70	3.80	3.20	28.00	83.60	17.00	13.60	110.00	2.90	11.10
pH		6.89	6-9	5.45	5.28	6.99	6.92	6.83	6.70	7.41	6.17	7.61
Fe	(mg/l)		0.10	0.22	0.64	0.04	0.04	0.10	0.14	0.25	0.03	0.04
Mn	(mg/l)		0.05	0.03	0.14	0.01	0.09	0.01	0.24	0.18	0.04	0.01
Al	(mg/l)		0.15	0.06	0.01	0.08	0.03	0.08	0.04	0.05	0.01	0.09

Table 4: Water Quality Results for Blackwattle Colliery. (continued)

	Unit	IWUL	WQT domestic	GW36	GW40	GW41	GW42	GW43	GW44	GW45	GW46	GW47
TDS	(mg/l)		450	28.00	22.00	248.00	1918.00	262.00	23.00	93.00	726.00	460.00
N	(mg/l)	0.11	6	0.10	0.10	0.10	0.10	0.23	0.56	0.96	0.32	0.10
Cl	(mg/l)	5.5	100	5.88	1.58	1.59	3.52	2.87	2.28	1.88	26.40	5.16
Alkalinity	(mg/l)			13.00	19.00	249.00	17.00	169.00	15.00	70.00	63.00	349.00
F	(mg/l)	0.22	1	0.20	0.20	0.20	3.51	0.53	0.20	0.33	0.36	1.26
SO4	(mg/l)	8.8	200	1.81	1.00	1.00	1177.00	17.70	1.00	10.00	351.00	53.40
CaCO3	(mg/l)			11.00	9.00	201.00	1260.00	67.00	12.00	59.00	382.00	337.00
Ca	(mg/l)	3.51	32	2.44	1.76	38.90	350.00	14.90	3.21	13.10	66.50	29.00
Mg	(mg/l)	121	30	1.18	1.04	25.20	93.80	7.32	0.91	6.49	52.50	64.20
Na	(mg/l)	4.73	100	3.59	3.88	5.70	62.90	55.80	3.37	7.82	28.90	26.60
K	(mg/l)		50	4.97	2.38	8.43	11.10	2.45	1.38	6.41	10.90	14.80
EC	(mS/m)	5.72	70	5.10	3.90	43.20	202.00	36.90	4.00	16.30	83.40	70.50
pH		6.89	6-9	6.04	6.62	6.69	6.98	7.75	5.84	6.53	6.85	7.16
Fe	(mg/l)		0.10	0.25	0.04	0.15	0.04	0.10	0.06	0.02	0.11	0.05
Mn	(mg/l)		0.05	0.33	0.07	0.26	0.81	0.01	0.01	0.01	0.13	0.12
Al	(mg/l)		0.15	0.02	0.05	0.06	0.14	0.03	0.19	0.05	0.10	0.04

Table 5: Water Quality Results for Blackwattle Colliery (continued)

	Unit	IWUL	WQT domestic	GW47	GW49	GW50	GW51	YKOH	GGF	GWT	GWS	Wind Pump
TDS	(mg/l)		450	460.00	756.00	282.00	846.00	388.00	872.00	182.67	2782.00	214.00
N	(mg/l)	0.11	6	0.10	0.31	0.1	0.13	0.1	0.88	2.52	0.22	0.1
Cl	(mg/l)	5.5	100	5.16	3.11	3.99	1.82	3.52	2.74	12.53	9.55	3.06
Alkalinity	(mg/l)			349.00	8.00	140.00	55.00	27.00	7.00	105.00	95.33	226.00
F	(mg/l)	0.22	1	1.26	0.55	0.49	0.2	0.27	0.26	1.45	0.33	0.2
SO4	(mg/l)	8.8	200	53.40	397.00	64.00	413.00	250.00	536.67	25.6	1669.00	2.87
CaCO3	(mg/l)			337.00	338.00	125.00	406.00	223.00	527.00	61.00	1825.00	117.00
Ca	(mg/l)	3.51	32	29.00	66.3	22.7	31.1	39.00	116.00	14.00	403.33	30.8
Mg	(mg/l)	121	30	64.20	41.8	16.6	79.9	30.6	57.67	6.35	198.67	9.76
Na	(mg/l)	4.73	100	26.60	30.2	35.6	20.3	18.8	17.2	39.2	51.87	7.67
K	(mg/l)		50	14.80	3.49	1.96	21.1	16.1	10.05	3.31	28.13	4.72
EC	(mS/m)	5.72	70	70.50	76.3	39.4	84.7	56.1	99.37	30.00	266.00	42.3
pH		6.89	6-9	7.16	5.52	7.28	7.76	7.44	6.25	7.35	7.06	6.88
Fe	(mg/l)		0.10	0.05	1.77	0.06	0.03	0.04	0.07	0.03	0.22	10.3
Mn	(mg/l)		0.05	0.12	6.67	0.13	0.24	0.01	1.14	0.02	12.21	0.32
Al	(mg/l)		0.15	0.04	0.11	0.06	0.02	0.04	0.06	0.04	0.08	0.03

Table 6: Surface Water Quality Results for Black Wattle Colliery.

		Units	BWS01	BWS05	BWS09	IWUL: Settling Dam	IWUL: PCD	IWUL: Return Water Dam
Total dissolved solids	TDS	(mg/l)	2242.67	2681.33	2774.67	527.8	550	527.8
Nitrates	N	(mg/l)	1.1	0.93	2.38	-	-	-
Chloride	Cl	(mg/l)	2.2	3.66	2.37	5	9	5
Alkalinity		(mg/l)	8.33	3.67	31	-	6	40.93
Fluoride	F	(mg/l)	0.4	0.43	0.43	0.2	0.12	0.2
Sulphate	SO4	(mg/l)	1483.33	1764.67	1592.33	370.7	318	370.7
Hardness	CaCO3	(mg/l)	1466.33	1725.33	1703.67	-	-	-
Calcium	Ca	(mg/l)	369.33	414	380.67	72.53	0.1	72.53
Magnesium	Mg	(mg/l)	132.27	168	13	33.98	-	33.89
Sodium	Na	(mg/l)	19.88	28.47	32.6	9.19	13	9.19
Potassium	K	(mg/l)	10.57	18.29	18.37	5.4	-	-
Electrical conductivity	EC	(mS/m)	225.67	269	295.67	-	-	
pH	pH		4.64	4.31	6.71	3.26	5.75	6.2
Iron	Fe	(mg/l)	0.41	1.2	0.06	2.98	-	2.98
Manganese	Mn	(mg/l)	5.7	7.03	6.51	2.68	-	2.68
Aluminium	Al	(mg/l)	4.43	4.9	0.13	7.54	5.41	7.54

Table 7: Surface Water Quality Results for Black Wattle Colliery (continued)

		Units	WQT Domestic	BWR02	BWR03	BWR04	BWR05	BWR06	BWR07	BWR08
Total dissolved solids	TDS	(mg/l)	450	174.67	265.33	86.67	1206	1212.67	84.33	322.67
Nitrates	N	(mg/l)	6	0.1	0.1	0.1	0.1	0.1	0.1	0.18
Chloride	Cl	(mg/l)	100	13.75	3.64	2.15	10.1	10.06	5.22	23.83
Alkalinity		(mg/l)	-	39	34	26.67	31.67	27.5	54.33	57
Fluoride	F	(mg/l)	1	0.28	0.24	0.2	0.45	0.46	0.24	0.27
Sulphate	SO4	(mg/l)	200	82.07	149.67	38.3	802.67	783.33	15.43	159.87
Hardness	CaCO3	(mg/l)	-	89.33	149.33	45.67	575.96	754.67	41.67	189.67
Calcium	Ca	(mg/l)	32	20.7	28.5	8.7	121	114.33	7.82	32.77
Magnesium	Mg	(mg/l)	30	9.14	18.97	5.83	121.67	114	5.32	26.2
Sodium	Na	(mg/l)	100	15.6	9.31	8.05	41.93	40.23	11.05	23.53
Potassium	K	(mg/l)	50	4.85	8.85	0.97	13.27	12.67	1.25	3.77
Electrical conductivity	EC	(mS/m)	70	28.67	37.7	13.83	143.67	141	13.47	47.83
pH	pH		6-9	6.71	6.28	6.58	7.02	7.08	7.28	7.18
Iron	Fe	(mg/l)	0.1	0.16	0.61	0.15	0.07	0.02	0.42	0.07
Manganese	Mn	(mg/l)	0.05	0.74	1.89	0.22	0.06	0.09	0.05	0.09
Aluminium	Al	(mg/l)	0.15	0.04	0.03	0.02	0.05	0.04	0.1	0.12

5.6 Geochemical Sampling

Two geochemical samples were collected in 2020 as per the GPT operating procedure from the onsite waste rock and overburden stockpiles. GPT was accompanied and directed by the relevant mine staff in collecting the two representative samples of the waste rock and overburden. Although the material might slightly differ in properties the main goal of the geochemical samples to assess if acid generating minerals and leached would be present in the planned open cast to the north west of the site.

The samples were submitted to a SANS accredited laboratory for whole rock analysis and total trace elements (TCT), water leached (LCT) and Acid Base Accounting and speciation. The results of the geochemical samples are discussed in the section below.

5.6.1 XRD mineral composition results

The XRD results indicates that the mineral composition of the waste rock dump material indicate a dominance in the mineral Kaolinite (67.1%) and to a lesser extent Quartzite (18.8%),Microcline (6.1%) Muscovite (4.9%), Dolomite (2.6%), and Rutile (0.6%). The overburden material indicates a dominance in the mineral Quartzite (48.9%) and Kaolinite (34.6%) and to a lesser extent Microcline (12.1%) Muscovite (2.2%), Dolomite (1.4%), and Rutile (0.9%).

From the mineral composition results (XRD analysis) of the two analysed samples a dominance in potentially acid generating minerals like pyrite are absent, this could potentially be a limiting factor for acid mine drainage. The results of the XRD analysis can be seen in APPENDIX II.

5.6.2 Net Acid Generating potential and Acid Base accounting

Acid base accounting and Net Acid Generating potential analysis indicated some capacity to generate acid do exists in the collected samples, however the majority of the content in the material have sufficient neutralisation potential to counter the acid production.

The Acid Base Accounting (ABA) analysis indicated a net neutralizing potential for both the waste rock and overburden samples. The ratio of neutralizing potential mineral to acid generating minerals 2.14 I for the waste rock sample and 2.52 for the overburden sample.

The Net Acid Generation (NAG) analysis indicated pH values of 6.10 for the overburden sample and 7.94 in the waste rock sample. The neutral pH values and surplus neutralizing potential in the samples is a indicates that the waste rock and overburden sample is not acid generating by nature. The results of the Acid Base Accounting (ABA) and Net Acid Generating (NAG) analysis can be seen in APPENDIX II.

5.6.3 Waste Classification

The waste classification study was conducted according to National Environmental Management waste act (Act 59 of 2008). The following regulations are applicable to waste classification:

- GNR-365 -National Norms and Standards for Assessing Wastes for Landfill Disposal developed by the Department of Environmental Affairs (DEA) in 2013.
- GNR636 -National Norms and Standards for Disposal of Waste to landfill developed by the DEA in 2013.

Based on the analysed results shown in Table 8 below (An empty cell denotes a value below detection limit) all samples can be classified as waste type 3. Waste type 3 is a low risk waste. Potential leached of concern are indicated to be:

- Barium
- Copper
- Lead

To allow disposal of this waste the mine would be required to apply for an exemption in term of Notice 1006 of 2014 (14 November 2014): Proposed regulations to exclude a waste stream of a portion of a waste stream from the definition of waste.

5.6.4 Geochemical results summary

Form the geochemical samples it can be concluded that the material sampled will most likely not be acid generating. It should however be noted that the properties of the material will vary spatially, hence acid generating material at the mine could not be ruled out.

Table 8 Waste classification results

Parameter	Total Concentration Threshold (TCT)						Leachable Concentration Threshold (LCT)						
	Unit	Waste Rock	Overburden	TCT0	TCT1	TCT2	Unit	Waste Rock	Overburden	LCT0	LCT1	LCT2	LCT3
As as Arsenic	mg/kg	5.28	2.60	5.8	500	2000	mg/l	0.00		0.01	0.5	1	4
B as Boron	mg/kg	30.95	18.76	150	15000	60000	mg/l	0.04	0.02	0.5	25	50	200
Ba as Barium	mg/kg	615.60	843.35	62.5	6250	25000	mg/l	0.24	0.28	0.7	35	70	280
Cd as Cadmium	mg/kg	0.34	0.11	7.5	260	1040	mg/l			0.003	0.15	0.3	1.2
Chloride as Cl	mg/kg			NA	NA	NA	mg/l			300	15000	30000	120000
CN total as Cyanide total	mg/kg			14	10500	42000	mg/l			0.07	3.5	7	28
Co as Cobalt	mg/kg	20.33	10.23	50	5000	20000	mg/l			0.5	25	50	200
Cr as Total Chromium	mg/kg	133.42	125.62	46000	80000	NA	mg/l			0.1	5	10	40
Cr (VI) as Chromium (VI)	mg/kg			6.5	500	2000	mg/l			0.05	2.5	5	20
Cu as Copper	mg/kg	52.17	18.75	16	19500	78000	mg/l			2	100	200	800
F as Fluoride	mg/kg			100	10000	40000	mg/l	0.61	0.26	1.5	75	150	600
Hg as Mercury	mg/kg	0.08	0.04	0.93	160	640	mg/l			0.006	0.3	0.6	2.4
Mn as Managanese	mg/kg	359.01	249.01	1000	25000	100000	mg/l	0.003	0.02	0.5	25	50	200
Mo as Molybdenum	mg/kg	1.09	0.84	40	1000	4000	mg/l	0.01	0.003	0.07	3.5	7	28
Ni as Nickel	mg/kg	67.36	44.09	91	10600	42400	mg/l			0.07	3.5	7	28
Nitrate as N	mg/kg			NA	NA	NA	mg/l	0.27	0.15	11	550	1100	4400
Pb as Lead	mg/kg	30.72	23.83	20	1900	7600	mg/l			0.01	0.5	1	4
Sb as Antimony	mg/kg	0.52	0.19	10	75	300	mg/l		0.01	0.02	1	2	8
Se as Selenium	mg/kg	0.50	0.53	10	50	200	mg/l	0.002	0.001	0.01	0.5	1	4
Sulphate as SO4	mg/kg			NA	NA	NA	mg/l	14.36	14.65	250	12500	25000	100000
V as Vanadium	mg/kg	141.89	72.31	150	2680	10720	mg/l	0.003		0.2	10	20	80
Zn as Zinc	mg/kg	129.76	91.96	240	160000	640000	mg/l	0.002	0.002	5	250	500	2000
TDS	mg/kg			NA	NA	NA	mg/l	38.00	54.00	1000	12500	25000	100000

NA: Not applicable/Below Threshold: An empty cell is also below detection limit

TCT0 limits based on screening values for the protection of water resources contained in the Framework for the Management of Contaminated Land (DEA, March 2010);	LCT1 limits derived by multiplying LCT0 values by a Dilution Attenuation Factor (DAF) of 50, as proposed by the Australian State of Victoria;
TCT1 limits derived from land remediation values for commercial/industrial land	LCT2 limits derived by multiplying LCT1 values by a factor of 2;
TCT2 limits derived by multiplying the TCT1 values by a factor of 4, as used by the Environmental Protection Agency, Australian State of Victoria. Environmental Protection Agency,	LCT3 limits derived by multiplying the LCT2 values by a factor of 4.

Waste Type 0	LC > LCT3 OR TC > TCT2	Not allowed
Waste Type 1	LCT2 < LC ≤ LCT3 OR TCT1 < TC	Class A or Hh:HH landfill
Waste Type 2	LCT1 < LC ≤ LCT2 AND TC ≤	Class B or GLB+ landfill
Waste Type 3	LCT0 < LC ≤ LCT1 AND TC ≤ TCT1	Class C or GLB- landfill
Waste Type 4	LC ≤ LCT0 AND TC ≤ TCT0 for metal ions and inorganic anions AND all chemical substances are	Class D or GLB- landfill

6 AQUIFER CHARACTERISATION

The term aquifer refers to a strata or group of interconnected strata comprising of saturated earth material capable of conducting groundwater and of yielding usable quantities of groundwater to boreholes and /or springs (Vegter, 1994). In the light of South Africa's limited water resources, it is important to discuss the aquifer sensitivity in terms of the boundaries of the aquifer, its vulnerability, classification and finally protection classification, as this will help to provide a framework in the groundwater management process.

6.1 Aquifer Vulnerability

Aquifer vulnerability assessment indicates the tendency or likelihood for contamination to reach a specified position in the groundwater system after introduction at some location above the uppermost aquifer. Stated in another way, it is a measure of the degree of insulation that the natural and manmade factors provide to keep contamination away from groundwater.

- Vulnerability is high if natural factors provide little protection to shield groundwater from contaminating activities at the land surface.
- Vulnerability is low if natural factors provide relatively good protection and if there is little likelihood that contaminating activities will result in groundwater degradation.

The following factors have an effect on groundwater vulnerability:

- Depth to groundwater: Indicates the distance and time required for pollutants to move through the unsaturated zone to the aquifer.
- Recharge: The primary source of groundwater is precipitation, which aids the movement of a pollutant to the aquifer.
- Aquifer media: The rock matrices and fractures which serve as water bearing units.
- Soil media: The soil media (consisting of the upper portion of the vadose zone) affects the rate at which the pollutants migrate to groundwater.
- Topography: Indicates whether pollutants will run off or remain on the surface allowing for infiltration to groundwater to occur.
- Impact of the vadose zone: The part of the geological profile beneath the earth's surface and above the first principal water-bearing aquifer. The vadose zone can retard the progress of the contaminants.

The Groundwater Decision Tool (GDT) was used to quantify the vulnerability of the aquifer underlying the site using the below assumptions.

- Depth to groundwater below the site was estimated from water levels measured during a hydrocensus conducted on 15 October 2020 and the groundwater monitoring data provided by Geovicon, of which the latest water levels was used. The water level in measured wells was between 4.71 mbgl and 26.42 mbgl
- Groundwater recharge of ~40 mm/a (4% recharge),
- Clayish vadose zone
- Gradient of 1% were assumed and used in the estimation.

The aquifer vulnerability for a contaminant released from surface to a specified position in the groundwater system after introduction at some location above the uppermost aquifer was determined using the criteria described below and assuming a worst-case scenario:

- Highly vulnerable (> 60), the natural factors provide little protection to shield groundwater from contaminating activities at the land surface.
- Medium Vulnerable = 30 to 60%, the natural factors provide some protection to shield groundwater from contaminating activities at the land surface, however based on the contaminant toxicity mitigation measures will be required to prevent any surface contamination from reaching the groundwater table.
- Low Vulnerability (< 30 %), natural factors provide relatively good protection and if there is little likelihood that contaminating activities will result in groundwater degradation
- The GDT calculated a vulnerability value of 53%, which is medium.

6.2 Aquifer Classification

The aquifer(s) underlying the subject area were classified in accordance with "A South African Aquifer System Management Classification, December 1995."

The main aquifers underlying the area were classified in accordance with the Aquifer System Management Classification document[6]. The aquifers were classified by using the following definitions:

- Sole Aquifer System: An aquifer which is used to supply 50% or more of domestic water for a given area, and for which there is no reasonably available alternative sources should the aquifer be impacted upon or depleted. Aquifer yields and natural water quality are immaterial.
- Major Aquifer System: Highly permeable formations, usually with a known or probable presence of significant fracturing. They may be highly productive and able to support large abstractions for public supply and other purposes. Water quality is generally very good (Electrical Conductivity of less than 150 mS/m).
- Minor Aquifer System: These can be fractured or potentially fractured rocks which do not have a high primary permeability, or other formations of variable permeability. Aquifer extent may be limited and water quality variable. Although these aquifers seldom produce large quantities of water, they are important for local supplies and in supplying base flow for rivers.
- Non-Aquifer System: These are formations with negligible permeability that are regarded as not containing groundwater in exploitable quantities. Water quality may also be such that it renders the aquifer unusable. However, groundwater flow through such rocks, although imperceptible, does take place, and needs to be considered when assessing the risk associated with persistent pollutants.

Based on information collected during the hydrocensus it can be concluded that the aquifer system in the study area can be classified as a "Minor Aquifer System", based on the fact that the local population is not dependant on groundwater to meet their water needs.

In order to achieve the Aquifer System Management and Second Variable Classifications, as well as the Groundwater Quality Management Index, a points scoring system as presented in Table 9 and Table 10 was used.

[6] Department of Water Affairs and Forestry & Water Research Commission (1995). A South African Aquifer System Management Classification. WRC Report No. KV77/95.

Table 9 Ratings - Aquifer System Management and Second Variable Classifications.

Aquifer System Management Classification		
Class	Points	Study area
Sole Source Aquifer System:	6	
Major Aquifer System:	4	
Minor Aquifer System:	2	2
Non-Aquifer System:	0	
Special Aquifer System:	0 - 6	
Second Variable Classification (Weathering/Fracturing)		
Class	Points	Study area
High:	3	
Medium:	2	2
Low:	1	

Table 10: Ratings - Groundwater Quality Management (GQM) Classification System

Aquifer System Management Classification		
Class	Points	Study area
Sole Source Aquifer System:	6	
Major Aquifer System:	4	
Minor Aquifer System:	2	2
Non-Aquifer System:	0	
Special Aquifer System:	0 - 6	
Aquifer Vulnerability Classification		
Class	Points	Study area
High:	3	
Medium:	2	2
Low:	1	

As part of the aquifer classification, a Groundwater Quality Management (GQM) Index is used to define the level of groundwater protection required. The GQM Index is obtained by multiplying the rating of the aquifer system management and the aquifer vulnerability. The GQM index for the study area is presented in Table 11.

The vulnerability, or the tendency or likelihood for contamination to reach a specified position in the groundwater system after introduction at some location above the uppermost aquifer, in terms of the above, is classified as medium.

The level of groundwater protection based on the Groundwater Quality Management Classification:

GQM Index = Aquifer System Management x Aquifer Vulnerability

= 2x 2 = 4

Table 11: GQM Index for the Study Area

GQM Index	Level of Protection	Study Area
<1	Limited	
1 - 3	Low Level	
3 - 6	Medium Level	4
6 - 10	High Level	
>10	Strictly Non-Degradation	

6.3 Aquifer Protection Classification

A Groundwater Quality Management Index of 4 was estimated for the study area from the ratings for the Aquifer System Management Classification. According to this estimate a medium level groundwater protection is required for the aquifer. Reasonable and sound groundwater protection measures based on the modelling will therefore be recommended to ensure that no cumulative pollution affects the aquifer, even in the long term.

DWA's water quality management objectives are to protect human health and the environment. Therefore, the significance of this aquifer classification is that measures must be taken to limit the risk to the following environments.

- The protection of the underlying aquifer.
- The protection of surface water courses and features like the du Toit's stream, the Klein Olifant's river and Dams like the Athlone Dam, Kruger's Dam and Pienaars dam.

7 CONCEPTUAL SITE MODEL (CSM)

From the results of the field investigations, hydrocensus and monitoring data, a conceptual hydrogeological model was compiled for the site (Figure 8Error! Reference source not found.).This conceptual model is a simplified representation of the conditions at and in the vicinity of the site, and will provide the framework during the development of the risk assessment and numerical flow and transport model. The conceptual model created two scenarios one of the current cross section before the planned open cast mine to the south west of the current working and one of the existing open cast.

7.1 Water Levels

Groundwater levels are measured on a quarterly basis by Geovicon (Pty) Ltd and the monitoring data was provided of which the latest water levels was used. The water level in measured wells was between 8.07 mbgl and 27.66 mbgl. The groundwater flow direction mimics the topography and is mostly in a north western direction.

7.2 Contaminant Levels

The following constituents exceeded the SANS241:2015 drinking water standards in the groundwater monitoring network:

- Electrical conductivity exceeded in all monitoring wells with the exception of GW1, GW2, GW34, GW36, GW40 and GW44.
- Total dissolved solids exceeded in monitoring wells GW11, GW42, GW46, GW49, GW51, GGF and GWS.
- Fluoride exceeded in monitoring well GW42.
- Sulphate exceeded the acute health limit in monitoring wells GW42, GGF and GWS.
- Iron exceeded in monitoring wells GW2, GW49 and Wind Pump.
- Manganese exceeded in monitoring wells GW2, GW20, GW33, GW36, GW41, GW42, GW46, GW47, GW49, GW50, GW51, GGF, GWS and Wind Pump.
- pH did not exceed in any of the monitoring wells.

The SANS 241-1 2015 tables are available in the following surface water monitoring points exceeded the SANS241:2015 drinking water standards:

- Electrical conductivity did not exceed the limit in any of the surface monitoring points.
- Total Dissolved Solids exceeded the limits in surface water monitoring points BWS01, BWS05, BWS09, BWR05 and BWR06.
- Sulfate exceeded the acute health limits in surface water monitoring points BWS01, BWS05, BWS09, BWR05 and BWR06.
- Iron exceeded the limits in surface water monitoring points BWS01, BWS05, BWR03 and BWR07.
- Manganese exceeded the limits in surface water monitoring points BWS01, BWS05, BWS09, BWR02, BWR03 and BWR04.
- Aluminium exceeded the limits in surface water monitoring points BWS01 and BWS05.

7.3 Flow Drivers

Potential contamination will follow the undulating surface topography in the respective downgradient direction.

The main source of recharge into the shallow aquifer is rainfall that infiltrates the aquifer through the unsaturated (vadose) zone. Vertical movement of water is faster than lateral movement in this system as water moves predominantly under the influence of gravity.

This aquifer may contain sedimentary sediments consisting of sandstones, shales and coal beds of the Ecca Formation.

Groundwater movement is predominantly associated with secondary structures in this aquifer (fractures, faults, dykes, etc.). The commonly expected values of porosity and permeability for sedimentary rock types, are 0.05 (porosity) and 10^{-5} $m.d^{-1}$ (hydraulic conductivity) respectively (Kruseman & de Ridder, 1994). It should however be noted that differing values was used due to lack of site-specific aquifer and hydraulic parameters. Movement of groundwater in this aquifer will be preferential in secondary structures such as joints, faults and fractures.

7.4 Recharge and evapotranspiration potential

The average annual rainfall is 668.4 mm/a, while the evapotranspiration rate measured at 1792.9mm/a.

7.5 Receptors

Any user of a groundwater or surface water resource that is affected by impact from any of the above-mentioned sources is defined as a receptor. Furthermore, a borehole or surface water resource may be effected in terms of quantity and quality. The following receptors may be found:

- Groundwater users are found within a 2 km radius around the site. The surrounding environment consist mainly of mining activity.
- The protection of surface water courses and features like the du Toit's stream, the Klein Oliphant's river and dams like the Athlone dam, Kruger's dam and Pienaars dam.

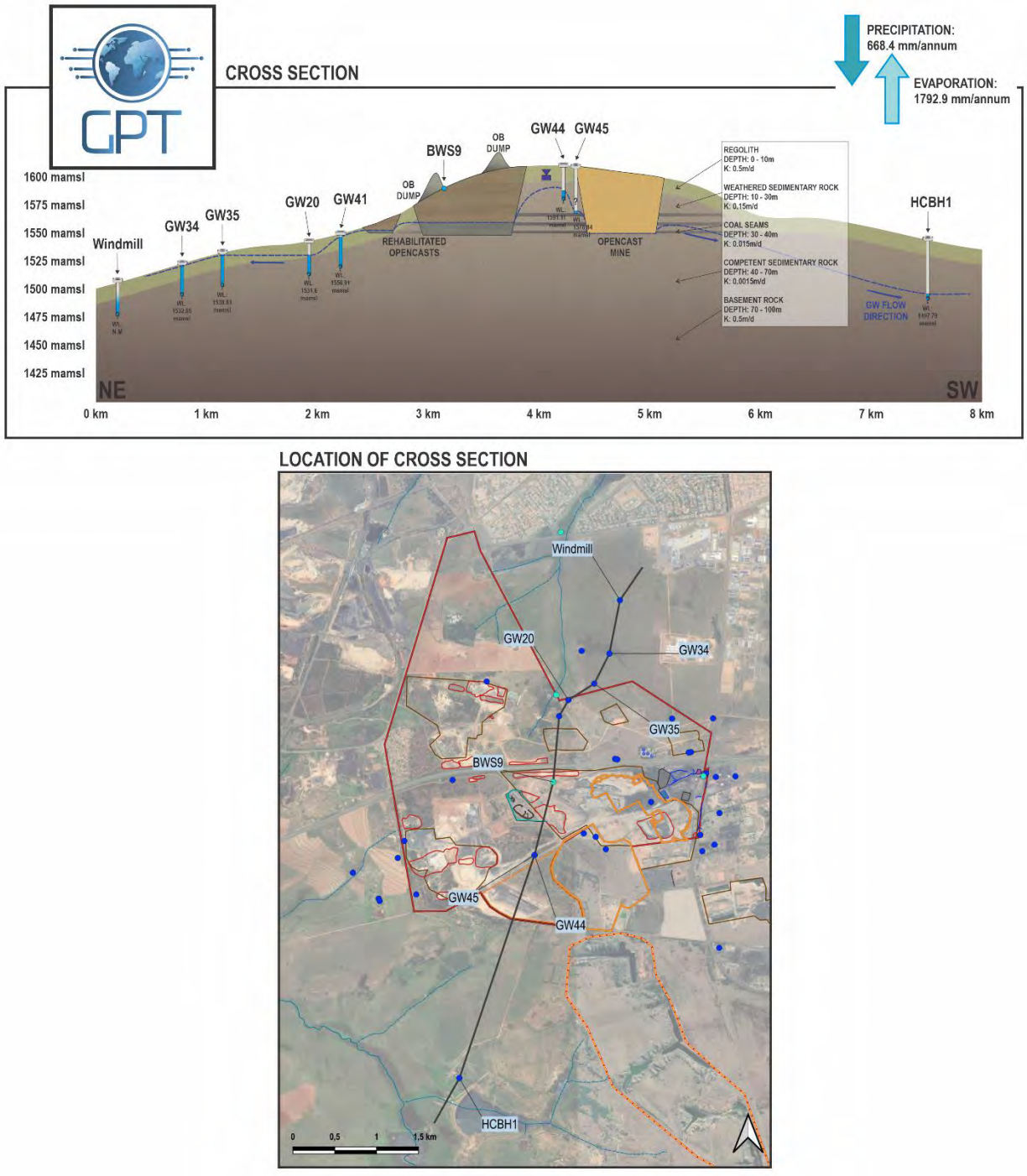


Figure 8: CSM cross sections positions.

8 GROUNDWATER FLOW AND TRANSPORT MODELLING

The numerical groundwater flow model is constructed and simulated to aid in decision making processes and environmental management.

The groundwater regime of the study area is highly heterogeneous due to complex faulting and intrusions, which ultimately influence the groundwater flow patterns. Constructing a groundwater flow model with all the detail is close to impossible; however, assumptions are made based on data gathered in the field and used to simulate different scenarios to conclude with management protocol.

Therefore, the purpose of the numerical model is to develop a tool than can be used to assess the impact of the current and planned mining operations during the operational phase and the decommissioned phase. Together with this, simulate the impacts associated with potential pollution sources.

8.1 Software Model Choice

The finite difference numerical model was created using AquaVeo's Groundwater Modelling System (GMS10.4) as Graphical User Interface (GUI) for the well-established Modflow and MT3DMS numerical codes.

MODFLOW is a 3D, cell-centred, finite difference, saturated flow model developed by the United States Geological Survey. MODFLOW can perform both steady state and transient analyses and has a wide variety of boundary conditions and input options. It was developed by McDonald and Harbaugh of the US Geological Survey in 1984 and underwent eight overall updates since. The latest update (Modflow-NWT) incorporates several improvements extending its capabilities considerably, the most important being the introduction of the Newton formulation of Modflow. This dramatically improved the handling of dry cells that has been a problematic issue in Modflow in the past.

MT3DMS is a 3-D model for the simulation of advection, dispersion, and chemical reactions of dissolved constituents in groundwater systems. MT3DMS uses a modular structure similar to the structure utilized by MODFLOW and is used in conjunction with MODFLOW in a two-step flow and transport simulation. Heads are computed by MODFLOW during the flow simulation and utilized by MT3DMS as the flow field for the transport portion of the simulation.

8.2 Model Set-Up and Boundaries

Boundaries were chosen to include the area where the groundwater pollution plume could reasonably be expected to spread and simultaneously be far enough removed from site boundaries not to be affected by groundwater abstraction. These boundaries are described in Table 12.

These boundaries resulted in an area of about 4 to 12 km around the proposed mining areas, which is considered far enough for the expected groundwater effects not to be influenced by boundaries.

8.3 Groundwater Elevation and Gradient

The calibrated static water levels as modelled have been contoured (Figure 6). Groundwater flow direction should be perpendicular to these contours and inversely proportional to the distance between contours. As can be expected, the groundwater flow is mainly from topographical high to low areas, eventually draining to the local streams.

8.4 Geometric Structure of the Model

The geometric structure of the model is discussed in Appendix C, with only the conceptual model input and fixed aquifer parameters discussed below.

8.5 Groundwater Source and Sinks

Although the most relevant aquifer parameters are optimised by the calibration of the model, many parameters are calculated and/or judged by conventional means. The fixed assumptions and input parameters were used for the numerical model of this area.

Table 12: Input parameters to the numerical flow model

Model Parameter	Value	Unit	Reason
Recharge to the aquifer	0.0001	m/d	Calculated
Recharge to the backfilled opencast mine	0.0004	m/d	Hodgson and Krantz (1998)
Evapotranspiration	0.0046	m/d	Calculated
Boundaries	Topographic water divides	-	Existing boundary conditions present at the site that would potentially include modelled impacts
Refinement	20	m	Based on the scale of the mining area
Grid dimensions	400 x 450	Cell count	Product of the grid refinement
Hydraulic conductivity	0.15	m/d	Calibrated
Hydraulic anisotropy (vertical)	10	-	Anderson et al. (2015)
Effective porosity	30 declining to 3 with depth in each layer	%	Wang et al. (2009)
Layers	5	Count	Mining depth is 30m
Longitudinal dispersion	50	m	Schulze-Makuch (2005)
Head error range	0.19	m	Calculated as 10% of the difference between the maximum and minimum calculated head elevations

8.6 Conceptual Model Input

For the purpose of this study, the subsurface was envisaged to consist of the following hydrogeological units.

- The upper few meters below surface consist of completely weathered material. This layer is anticipated to have a reasonable high hydraulic conductivity, but in general unsaturated. However, a seasonal aquifer perched on the bedrock probably does form in this layer, especially after high rainfall events. Flow in this perched aquifer is expected to follow the surface contours closely and emerge as fountains or seepage at lower elevations. The thickness of this layer below ground level is approximately 10mbgl.

- The next twenty meters are weathered shale/sandstone bedrock with a low hydraulic conductivity. This layer was modelled as the weathered aquifer in the groundwater model. The permanent groundwater level resides in this unit. The groundwater flow direction in this unit is influenced by regional topography and for the site flow would be in general from high lying areas to the low-lying areas and streams.

- Below the weathered aquifer, the fracturing of the aquifer is less frequent and fractures less significant due to increased pressure. This results in an aquifer of lower hydraulic conductivity and slower groundwater flow velocities. Zones of weathering do however exists in these layers due to historical mining activities and contact zones between the sedimentary stone and the coal seams. These layers were modelled as the weathered fractured aquifer in the numerical groundwater model. The weathered fractured aquifer can be found in the groundwater at layer 3 (which represents the local coal seam) which is 10m thick and layer 4 that is 30m thick.

- Below the weathered fractured aquifer, the fracturing of the aquifer is less frequent and fractures less significant due to increased pressure. This results in an aquifer of lower hydraulic conductivity and very slow groundwater flow velocities. This layer was modelled in the groundwater model as layer 5 and was modelled to be 30m thick in total.

8.7 Calibration of the Numerical Model

Water level and quality data obtained from onsite groundwater monitoring was used to calibrate the steady state numerical groundwater flow model. It is important to note that that only static water levels which had a representative water level in relation to the observed regional groundwater level was used for the calibration of the groundwater model. The results obtained during the steady state scenarios were used as initial conditions to simulate dewatering and contaminant transport impacts. A good fit was obtained for the measured groundwater levels and concentrations (Table 13 and Figure 9).

Table 13 below indicates the aquifer characteristics that was assigned to each layer in the groundwater model. The calibration error statistics can be seen in Table 14. The mean head error was 0.19 meter can be regarded as sufficient for the models' purpose.

Table 13: Optimal Calibrated Aquifer Parameters.

Aquifer	Model layer	Layer thickness (m)	Porosity (%)	Hydraulic conductivity (m/d)
Regolith (topsoil +softs)	Layer 1	10	0.3	0.5
Weathered aquifer	Layer 2	20	0.05	0.15
Weathered Fractured Aquifer (Coal seams)	Layer 3	10	0.04	0.015
Weathered Fractured Aquifer	Layer 4	30	0.04	0.015
Fractured	Layer 5	30	0.003	0.0015

Table 14: Calibration Statistics.

Description	Value
Mean Residual (Head)	0.19
Mean Absolute Residual (Head)	5.47
Root Mean Squared Residual (Head)	7.05

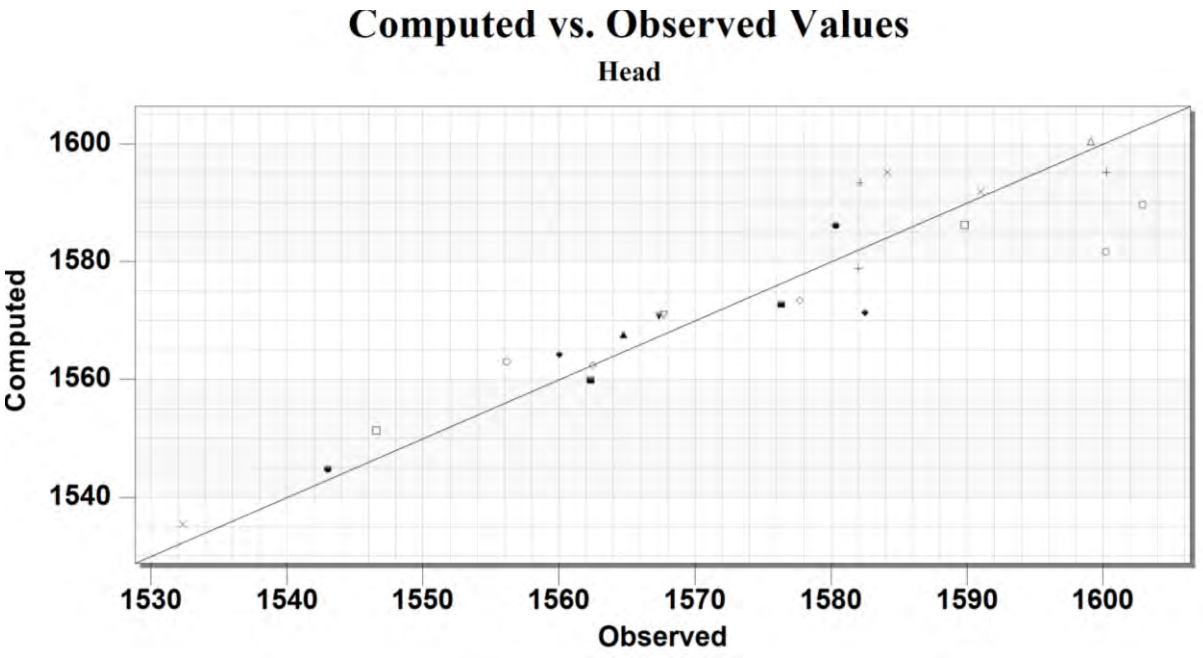


Figure 9: Water level Calibration Graph

8.8 Model Runs

8.8.1 During-Mining

This model represents the groundwater situation during operation of the mine. For the purposes of this model a worst-case scenario was assumed, namely that the entire planned new open cast will be dewatered during the mining period. Due to the interconnectedness of the historic and current mining activities it is expected that the cone of depression that is created by the dewatering of the planned mining section will impact all of the old underground workings due to the fact that these section has higher hydraulic properties, due to the alteration of the subsurface material. Hence, only the planned new open cast mining section to the south west of the existing operations was modelled with a drain for dewatering.

GPT was however also requested to model the impact of planned water storage at two final void pits in the south west and north western areas of the mining right area. Additionally, the impact of the coal processing plant on the shallow aquifer was also modelled. The modelling included the following transport and dewatering scenarios:

Dewatering

- Planned new south western opencast

Transport

It is expected that the flow directions of the groundwater close to the mine will be in the in the direction of the mine due to dewatering activities, hence any contamination originating from mining activity close to the mine will have limited environmental impact in terms of contamination. Geovicon did however request GPT to model the following two scenarios during mining, which could potentially impact the environment from a water quality perspective:

- The impact of the storage of water, originating from mining activity, in two historical opencast pits in the western and northern sections of the site.
- The impact of the coal processing plant on the shallow aquifer.

8.8.2 Post-Mining

This models the post-mining scenario, assuming that the most likely recharge over the rehabilitated opencasts will be 0.0004 m/d. This amounts to a recharge of about 21% of rainfall, which is probably a realistic if not worst-case scenario[7]. It is expected that during the postmining phase that the regional water levels will recover to levels that is higher than the starting hydraulic head due to the effect of the altered subsurface material that that is expected to have a higher hydraulic conductivity due to mining activities. Hence the post mining model will focus on areas in and around the mine where decant can possibly occur.

The post mining impact relating to the spread of contamination from the planned opencast mine was modelled to assess the impact that the mine could possibly have on the surrounding environment. The storage of water in the open pits in the mining rights area and the possible contaminant impact

[7] Grobbelaar, R et al: Long-Term Impact of Intermine Flow from Collieries in the Mpumalanga Coalfields, Sept 2004. Institute for Groundwater Studies, University of the Free State, Bloemfontein RSA.

of the coal processing plant was not modelled in the post mining scenario , since it is assumed that these activities would cease at the end of the mine's live span which is around 5 years. The post mining model included the following transport and dewatering scenarios:

Discharge

- Planned new south western opencast and current and historical mine workings

Transport

- Planned new south western opencast and current and historical mine workings

9 HYDROGEOLOGICAL IMPACTS

It is the aim of this chapter to assess the likely hydrogeological impact that the current mine might have on the receiving environment. The typical operational stages that will be considered in this section are:

- Operational Phase: The conditions expected to prevail during the operation of the site.
- Decommissioning Phase: The closing of operations as well as site clean-up and rehabilitation.
- Post-mining Phase: This relates to the steady-state conditions following site-closure. A period will be considered after which it is assumed that impacts will steadily decrease, and the system will commence its return to the natural state.

9.1 Operational Phase Impacts

The operational phase is interpreted as the active mining in the current mining operations. It is inevitable that these effects will impact on the groundwater regime. The potential impacts that will be considered are the groundwater quantity and quality. A summary of the potential impacts during operation can be seen in Table 15.

9.1.1 Impacts on groundwater quantity

During the operational phase, it is expected that the main impact on the groundwater environment will be de-watering of the surrounding aquifer. Water entering the mining area (planned opencast) will have to be pumped out to enable mining activities. This will cause a lowering in the groundwater table in- and around the mine.

The dewatering of the aquifer has been calculated for the planned new opencast using the calibrated numerical model as described above. The following scenario was modelled:

9.1.1.1 Planned south western opencast

The mining scenario of the planned southeastern opencast were modelled to completion to provide operational advice concerning the regional cone of depression and inflow rates into the opencast mining pit. The phases assumed the completion of planned opencast mining operations to a depth of 40 mbgl.

The results are presented in Table 15 below. It indicates that the water entering the mining drain will flow into the open pit area at approximately 1000 m^3/day to 1200m^3/day (about 11l/s). However, the actual inflow could differ significantly from these predictions because of unknown underground conditions and climatic impact, but the trend could be useful.

The calculated drawdown of the mining scenarios is depicted in Figure 10 below, as contours of drawdown for the mine. It follows from these figures that the cone of depression will most markedly moves in north and south eastern directions which follows the regional topography. It is noted from the drawdown map that due to the interconnectivity between the old mine workings, that the drawdown at these historically mined areas is noticeably higher than the surrounding areas. This could be attributed to the altered subsurface material that is expected to have a higher hydraulic conductivity value when compared with the surrounding undisturbed lithology. From the modelled

cone of depression, it can be observed that the lowering of the water table is be spread over a relatively large area with a relatively small impact on the aquifer in undisturbed lithologies.

Despite the modelled predictions, it must again be stressed that structures of preferred groundwater flow (like dolerite intrusions) have not been modelled. It is known by experience that dolerite will most likely transgress the area, but details are limited and not adequate to model this structure(s). If such a structure is dewatered, any boreholes drilled into the structure might be seriously affected. These effects cannot be predicted with the current knowledge and can only be established through continuous groundwater level monitoring and through available data.

9.1.2 Impacts on surface water

Although surface water as such is not part of this study, the impact of the planned opencast on streams in the area can be estimated qualitatively from the model in so far as the groundwater component (base flow) of the stream is concerned. Such an impact assessment will not include possible surface runoff influences caused by mining, but merely addresses the base flow component due to gaining (or losing) of groundwater by the stream.

It can be deduced from the calculated figures that the cumulative groundwater drawdown at some of the local streams and wetlands close to the mine could be impacted (Table 15). The modelled drawdown does reach a pan to the south east of the planned opencast area. The drawdown at the pan be regarded as significant, since the drawdown at this point is modelled to be around 12 mbgl. Local streams and pans are also most likely isolated from the aquifer by a clay layer, hence the impact on the streams is not expected to be significant in reducing the stream flow. Moreover, as the local streams serve mainly as rainwater drainage channels, it is not anticipated that this dewatering will influence the transfer of rainwater to the pans. It is thus concluded that the drawdown from the mining operations will not have significant environmental impacts on the surrounding area. The cone of depression intersecting the surface water features can be seen in Figure 10.

9.1.3 Impacts on groundwater quality

During the planned mining operations it is expected that any groundwater contamination will be directed towards the opencast operations due to the lowering of the groundwater levels and altering of the groundwater flow directions. The expected impact on the aquifer is likely to be insignificant.

Table 15: Summary of potential impacts during mining - dewatering.

Mining Area - Western Opencast	Opencast Area (ha)	Cone of depression from edge of pit (m)	Estimated Inflow for the Total Area (m^3/day)	Estimated Inflow for the Total Area (L/s)	Potential Impacted Receptor	Expected Water Level Decline in the pit (m)
Planned Blackwattle Extension	95	150 -4500m	1000 to 1200	10 to 12	Pan to the south east of the Pit, GW1, GW2, GW47, GW48	35

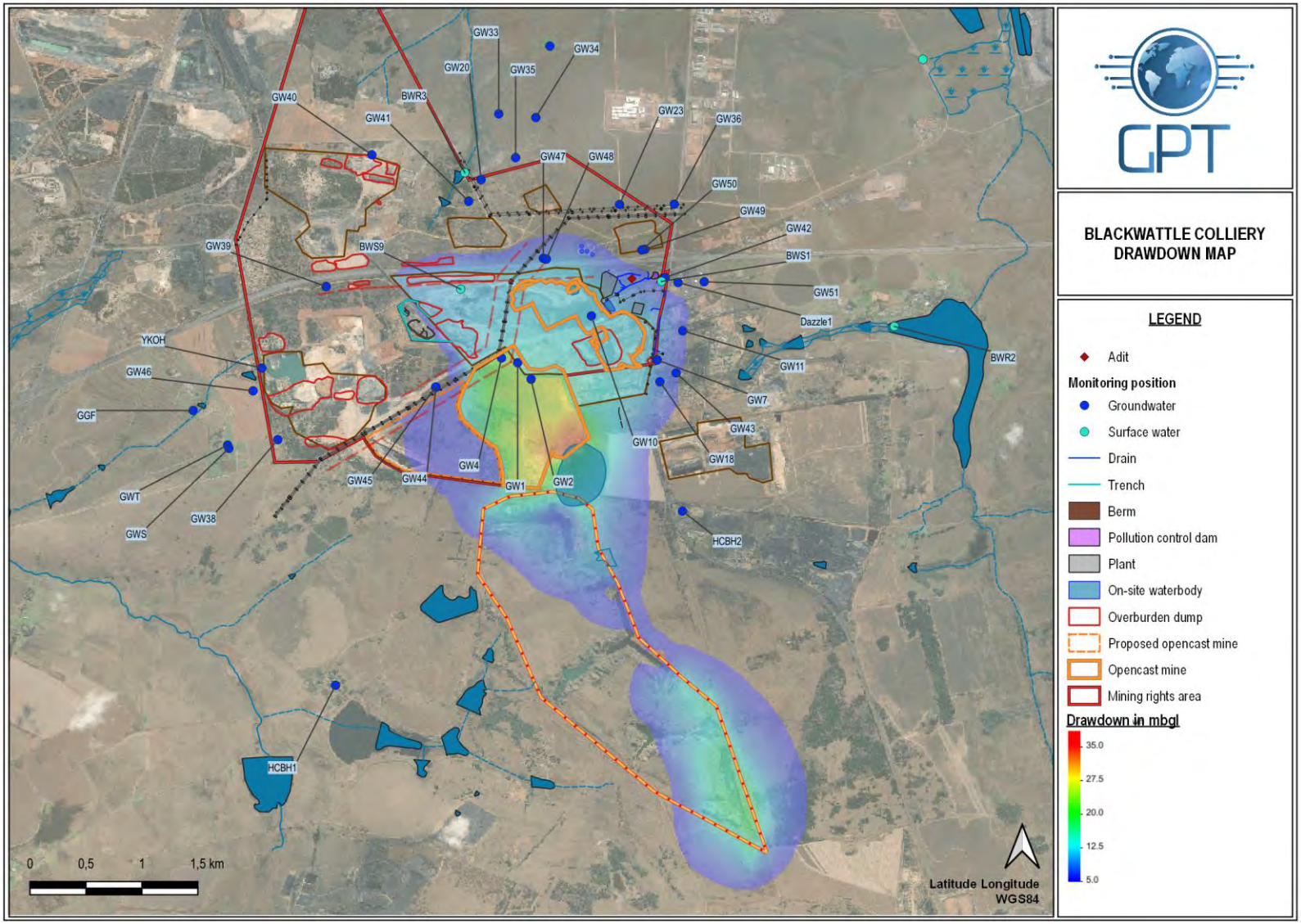


Figure 10: Cone of depression during the mining of the planned open pit

9.1.4 Groundwater management

9.1.4.1 General

- Ensure that the water level in the two open pits that is planned for water storage do not go above the consolidated geological layers, as this will potentially increase the seepage into the unconsolidated layer.

- Identify and maximise areas of the mine that will result in clean storm water runoff (for example open veld areas) as well as infrastructure associated with the mine (for example office areas) and ensure that runoff from these areas is routed directly to natural watercourses and not contained or contaminated.

- Ensure that clean storm water is only contained if the volume of the runoff poses a risk, if the water cannot be discharged to watercourses by gravitation, for attenuation purposes, or when the clean area is small and located within a large dirty area. This contained clean water should then be released into natural watercourses under controlled conditions.

- Ensure the minimisation of contaminated areas, reuse of dirty water wherever possible and planning to ensure that clean areas are not lost to the catchment unnecessarily.

- Ensure that seepage losses from storage facilities (such as polluted dams) are minimised and overflows are prevented.

- Ensure that all possible sources of dirty water have been identified and that appropriate collection and containment systems have been implemented and that these do not result in further unnecessary water quality deterioration.

- Ensure that less polluted water or that: moderately polluted water is not further polluted. Where possible less and more polluted water should be separated. This will assist in the reuse water strategy and improve possibilities for reuse based on different water quality requirements by different mine water uses.

- Where contaminants are transported along construction roads, emergency containment and mitigation measures must be developed to minimize impacts should accidental spillages occur along the transport routes.

- Store all potential sources of contamination in secure facilities with appropriate Storm Water management systems in place to ensure that contaminants are not released to the water resource through Storm Water runoff.

- Separate and collect all storm water that has a quality potentially poorer than the water quality specified and negotiated for the specific catchment into dirty water storage facilities for reuse within the mining operations.

- Ensure that all storm water structures that are designed to keep dirty and clean water separate can accommodate a defined precipitation event. (The magnitude of the precipitation event used in such an objective statement must, as a minimum, adhere to the relevant legal requirements.)

- Route all clean storm water directly to natural watercourses without increasing the risk of a negative impact on safety and infrastructure, e.g. loss of life or damage to property due to an increase in the peak runoff flow.

- Ensure that the maximum volume of clean water runoff is diverted directly to watercourses and the minimum amount of storm water reports to the pit floor of an open cast mine.

- Develop and implement proper environmental management and auditing systems to ensure that pollution prevention and impact minimisation plans and measures developed in the design and feasibility stages are fully implemented.

- The size of unrehabilitated areas (pit, spoils, unvegetated 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.

- Every effort should be made to maximise the clean area and minimise the dirty area when locating the diversion berms, channels and dams. In the case of a new mine, the maximisation of the clean areas should have an influence in overall mine planning and the location of the mine infrastructure

- The mine planning should consider concurrent rehabilitation of mine workings and waste management facilities, to maximise the areas of clean runoff that can be discharged to the natural watercourses.

- Additional monitoring wells should be drilled at the areas where modelling shows pollution might migrate to like the coal processing facilities and water storage dams. These wells could act as an early warning system.

9.1.4.2 Waste rock deposits and pollution control dams

- Monitoring of water storage facilities, particularly pollution control dams, is imperative to manage the risk of spillage from the dams. Stage-storage (elevation-capacity) curves are useful tools to monitor the remaining capacity within a water storage facility.

- As discussed in the previous section and previous point the monitoring of the storage of the storage of water in the two open pits in the mining area has to be closely monitored from a ground water perspective, hence ground water monitoring wells needs to be drilled in these areas to assess both the groundwater levels and quality in these areas

- Prevent the erosion or leaching of materials from any residue deposit or stockpile from any area and contain material or substances so eroded or leached in such area by providing suitable barrier dams, evaporation dams or any other effective measures to prevent this material or substance from entering and polluting any water resources.

- Water quantity and quality data should be collected on a regular, ongoing basis during mine operations. These data will be used to recalibrate and update the mine water management model, to prepare monitoring and audit reports, to report to the regulatory authorities against the requirements of the IWMP and other authorisations and as feedback to stakeholders in the catchment, perhaps via the CMA. The water quality data should also be

used in terms of setting water quality objectives for the mine or to update the current water use license limits

- Water that has been in contact with residue, and must therefore be considered polluted, must be kept within the confines of the MRD until evaporated, treated to rendered acceptable for release, or re-used in some other way.

- All water that falls within the catchment area of the MRD must be retained within that area. For most MRDs the catchment can be divided into component catchments, as follows:

    - The top area of the MRD together with any return water storage dams which have been connected to the top area of the MRD by means of an outfall penstock, and

    - The faces of the MRD together with the catchment paddocks provided to receive run-off from the faces and any additional catchment dams associated with the faces and catchment paddocks.

- The design, operation and closure of MRDs should incorporate consideration of the risk of changes in the mining and plant operations, and hence the mine water balance, through the life cycle of the mine.

- A system of storm water drains must be designed and constructed to ensure that all water that falls outside the area of the MRD is diverted clear of the deposit. Provision must be made for the maximum precipitation to be expected over a period of 24 hours with a probability of once in one hundred years. A freeboard of at least 0.5 m must be provided throughout the system above the predicted maximum water level. This requirement applies to all MRDs, both fine and coarse-grained MRDs.

- Ensure that the water use practices on and around the MRD do not result in unnecessary water quality deterioration, e.g. use of the return water dam for storage of poorer quality water.

Since the drawdown or the groundwater levels during mining could influence the upper baseflow of the Dutoit stream and spook spruit, as well as smallholdings close to the Middelburg - Bethal road, the following measures are recommended:

- The static level of groundwater in all boreholes within a distance of less than two kilometres must be measured regularly to establish a database against which future groundwater levels can be compared.

- Such measurements must be made preferably quarterly, but at least twice annually, following the dry and rainy seasons.

- In the event of unacceptable decrease of the yield of any affected boreholes, alternative water supply should be supplied to the affected parties until such time that the groundwater recovers following closure of the pit.

9.1.4.3 Opencast pits

- Mining should aim to remove as much of the coal seam (acid generating material) as possible.

- Should any boreholes decrease in yield as a result of the mines dewatering activities the mine should supply the owners with a volume of water as agreed upon between the parties involved.

- The capacity to rapidly pump water out of the pit into storage dams should be maintained. This will assist in minimising water quality deterioration due to long-term retention of storm water in contact with materials that may cause water quality deterioration.

- Berms should be constructed around the opencast pits to minimise the flow of any surface water or floodwater into mine workings. These berms should be constructed to allow free drainage away from the pits.

- Separate acid generating material and non-acid generating material, as characterised by geochemical sampling and analyses, should be separated during mining

- Concurrent rehabilitation should take place during the operational phase, where applicable, to:

    - Meet the post-mining topography requirements.

    - Minimise the post-closure water management requirements, by maximising free-draining areas and minimising contamination of clean water.

    - The above water management principles should play a key and decisive role when evaluating and deciding on rehabilitation and closure strategies.

    - Additionally, adding lime to backfill material could be considered to minimise the generation of acidity.

- Water quantity and quality data should be collected on a regular, ongoing basis during mine operations. These data will be used to recalibrate and update the mine water management model, to prepare monitoring and audit reports, to report to the regulatory authorities against the requirements of the IWMP and other authorisations and as feedback to stakeholders in the catchment, perhaps via the CMA. See the Monitoring Network section.

- If excessive groundwater recharge and rainfall is encountered other than the predicted volumes the water could be managed as follows:

    - 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,

    - Maximise the abstraction and discharge of clean groundwater ahead of the pit development, through installation of dewatering boreholes surrounding the pit.

Please note that further investigation will be required for the above especially the siting and pumping rate of the dewatering boreholes.

9.2 Decommissioning and Post-Closure Phase Impacts

During this phase it is assumed that dewatering of the planned opencasts will be ceased, and it will be allowed to flood. The groundwater regime will return to a state of equilibrium once mining has stopped and the removal of water from the mining void has been discontinued.

The rise in groundwater level is predicted to be relatively slow and the water levels are expected to recover only in about 10 years. The slow recovery is ascribed to the low hydraulic conductivity of the surrounding bedrock which mostly consists out of sedimentary rock. The following possible impacts were identified at this stage:

- Following closure of the mine, the groundwater level will rise to an equilibrium that will differ from the pre-mining level due to the disturbance of the bedrock that will have result in the disturbed material to have a higher hydraulic conductivity. However, this change is likely to be minimal although it might result in possible future decant.

- Groundwater within the mined areas is expected to deteriorate due to chemical interactions between the geological material and the groundwater. The resulting groundwater pollution plume is expected to commence with downstream movement.

- Continued groundwater contamination is likely to be released from the plant facility if it is not cleaned up.

A summary of the potential impacts during the closure of the mine is shown in Table 17.

9.2.1 Impacts on groundwater quantity

After closure, the water table will rise in the mine to reinstate equilibrium with the surrounding groundwater systems. However, the mined areas will have a large hydraulic conductivity compared to the pre-mining situation.

9.2.2 Rebound and potential decant

Following the closure of the opencasts and the cessation of the dewatering it is assumed to lead to groundwater rebound. It is estimated that the water level in the area of the planned opencast will recover in about 10 years after mining has ceased.

After rebound has reached equilibrium or water in the pit equal to surrounding host rock, decant has the potential to occur due to excessive rainfall and surface water run-off water entering the pit. The percentage of the rainfall/run-off that is recharged into the rehabilitated opencast and potential decant depends on:

- The slope of the rehabilitated pit and its direct surroundings.

- The thickness and composition of the topsoil. i.e. clay content and compaction.

- The vegetation of the rehabilitation and its direct surroundings.

- The amount rainfall and intensity of the rainfall events.

- The size of the ramps and the final voids

Predicted groundwater levels indicate that a rise in groundwater will occur and that decant after rebound in so far as daylighting to surface will occur at an eastern section of the mining rights area close to a historical open cast. The predicted decant area is depicted in Figure 11. Through the groundwater model results also indicates that a range of between 400 and 600 m^3 of water will decant to the south east of the mining operations.

Please note that predicted decant areas may vary from exact real word decant areas due to sub-surface heterogeneity, however the general areas of predicted decant should hold true.

Table 16 Water recharge characteristics for opencast mining in the Mpumalanga area (Hodson and Kranz, 1998[8])

Water Source	Water into opencast (% rainfall)	Suggested Mean value (% rainfall)
Rain onto ramps and voids	20-100	70
Rain onto not rehabilitated spoils	30-80	60
Rain onto levelled spoils (run-off)	3-7	5
Rain onto levelled spoils (Seepage)	15-30	20
Rain onto rehabilitated spoils (run-off)	5-15	10
Rain onto rehabilitated spoils (seepage)	5-10	8
	(% of total pit water)	(% of total pit water)
Surface run-off from pit surroundings	5-15	6
Groundwater seepage	2-15	10

9.2.3 Impacts on groundwater quality

Once the normal groundwater flow conditions have been re-instated, polluted water could potentially migrate away from the mining areas.

9.2.3.1 Spread of pollution

As some discards and exposed reactive mineral surfaces will remain in the mine, this outflow could be contaminated as a result of mine drainage. As sulphate is normally a significant solute in drainage from mines, sulphate concentration from the mine has been modelled as a conservative (non-reacting) indicator of mine drainage pollution. A starting concentration of 2 000 mg/litre has been assumed as a worst-case scenario. However, geological material is a transient contaminant source and decreases in the concentration of released contaminants are expected over time.

The migration of contaminated water from the mining area has been modelled as described, and the results are presented in Figure 13 in terms of the extent of the pollution plume 10, 25, 50 and 100 years after the operations have ceased. A scenario was modelled for the plume emanating from the planned opencast which will act as a constant source.

Within the limitations of the abovementioned assumptions, it can be estimated from these figures that:

[8] Hodgson, F.D.I.; Krantz, R.M., (1998), "Groundwater Quality Deterioration in the Olifants River Catchment above the Loskop Dam with Specialised Investigations in the Witbank Dam Sub-Catchment", WRC Report no. 291/1/98.

- The leachate plume emanating from the mined areas will be largely contained during the first few years while the groundwater in the colliery is still in rebound.

- A sulphate concentration of around 20mg/l will reach the a non-perennial tributary after 50 years after decommission of the mine wear after the sulphate concentration will increase as long as the contamination source remains. The local non perennial stream impacted is a tributary of the spook spruit which is located south west of the planned open cast.

- Reasonable rehabilitation could result in a declining source concentration. This will result in less contamination on the long term, but the contamination during the first few decades is relatively unchanged.

- The farm dam in the tributary of the spook spruit south west of the planned open cast will also eventually be impacted.

It is thus vital to follow sound environmental practices during mining and rehabilitation to reduce the impact on the receiving environment.

The modelling results must be viewed with caution as a homogeneous aquifer has been assumed. Heterogeneities in the aquifer are unknown and the effect of this cannot be predicted. Furthermore, no chemical interaction of the leachate with the minerals in the surrounding bedrock has been assumed. As there must be some interaction and retardation of the plume, this calculation will represent a worst-case scenario.

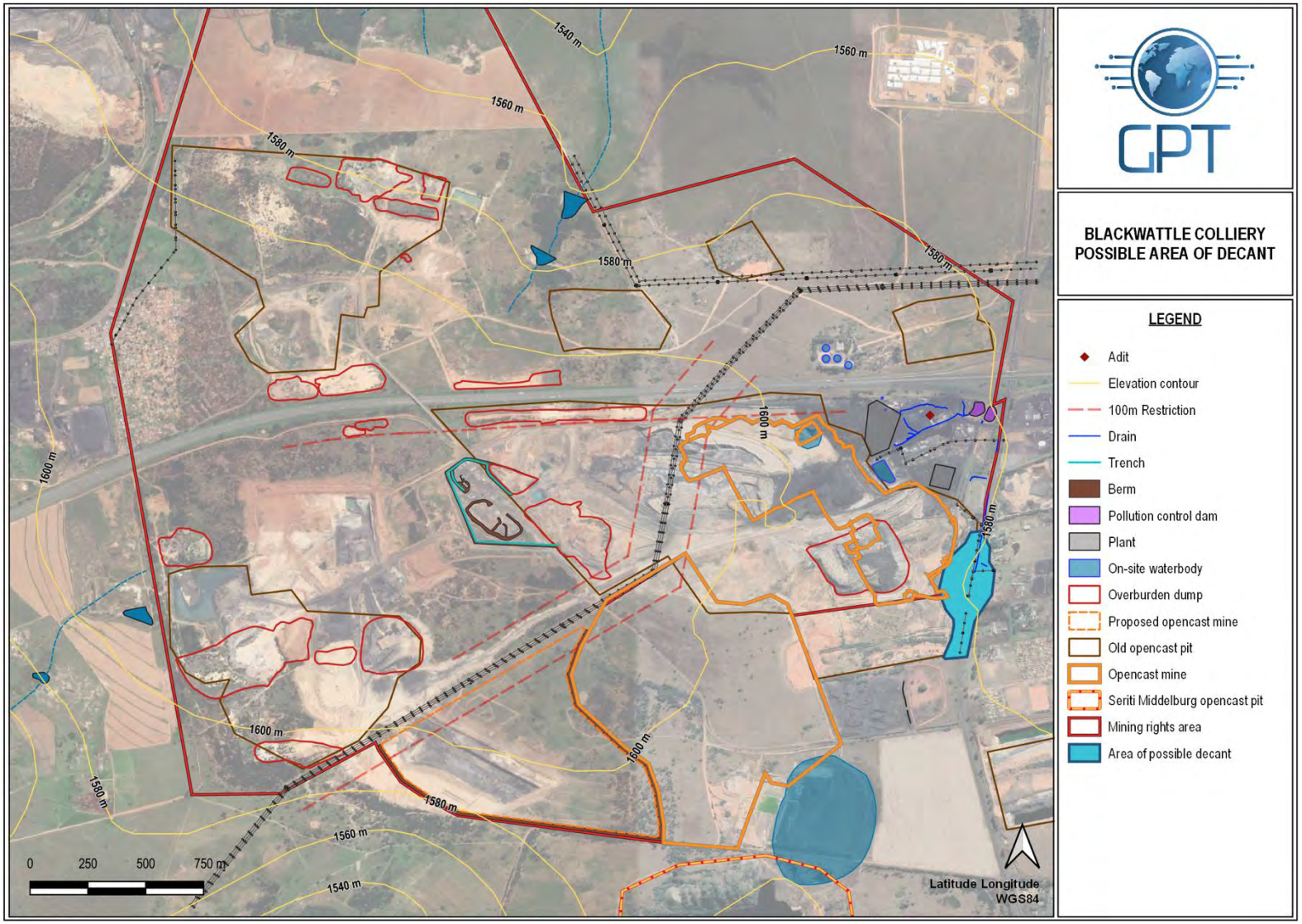


Figure 11 Blackwattle areas of possible decant.

Table 17: Summary of potential impacts post operations

Mining Area	Area (m^2)	Potential impacted receptor	Estimated increase in concentrations during closure (mg/ℓ)	Rebound time (Years)	Potential decant (Yes/No)	Expected Decant Volume (m^3/day)	Potential decant area
Planned Opencast	77	Local streams (tributary of Spook spruit)	200 - 2 000	10	Yes	400 to 500	To the north east of the opencast

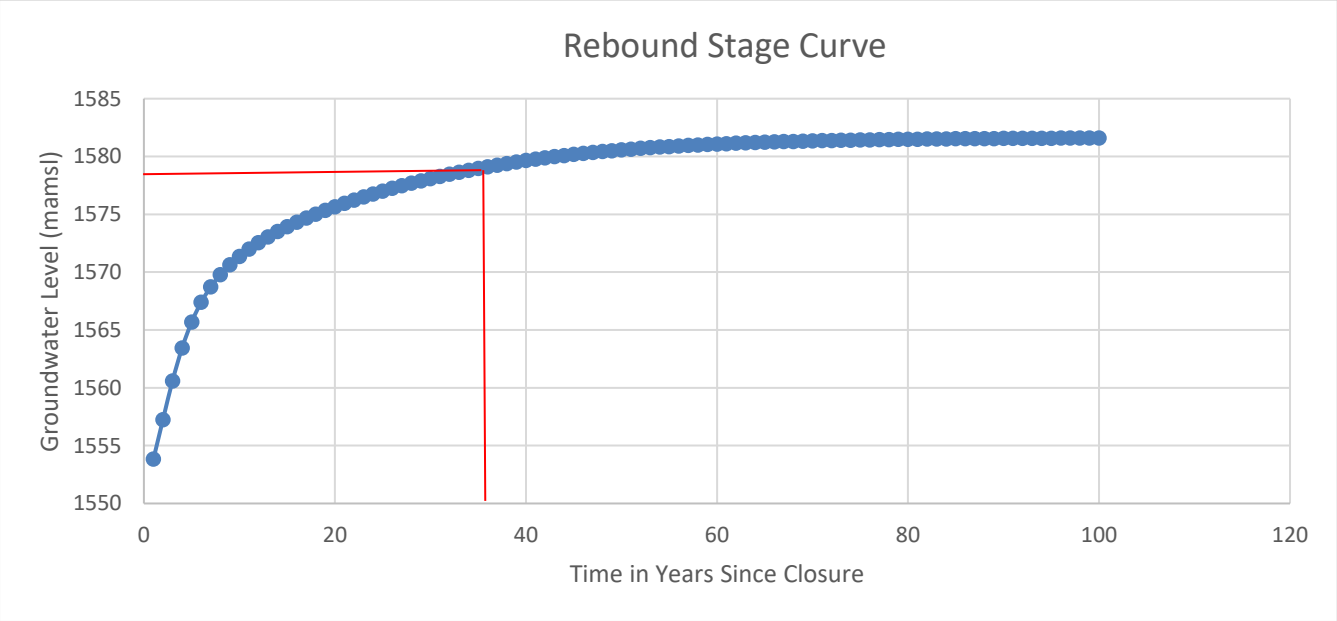


Figure 12 Rebound stage curve

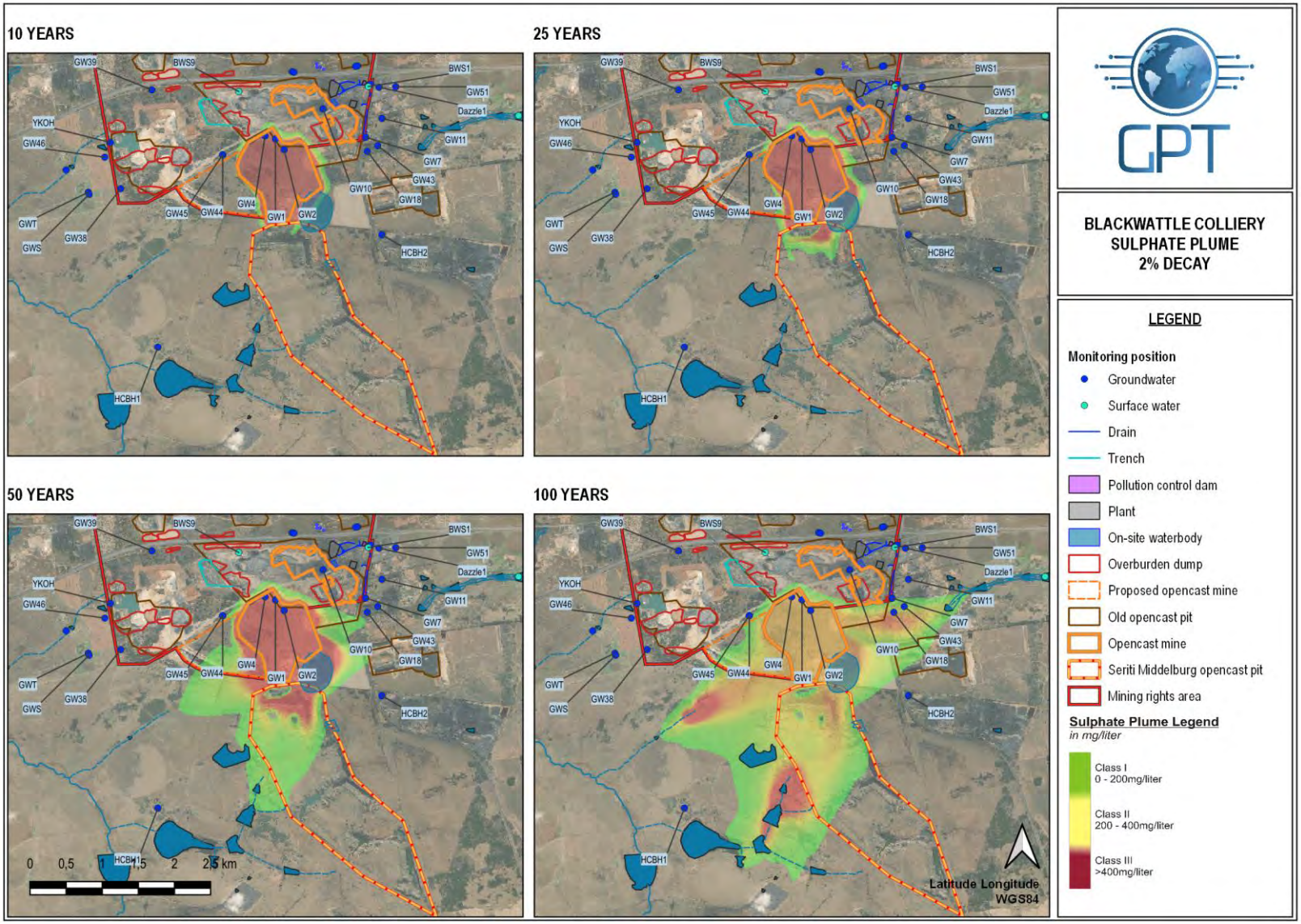


Figure 13: Sulphate plume after mining operations with 2% decay rate

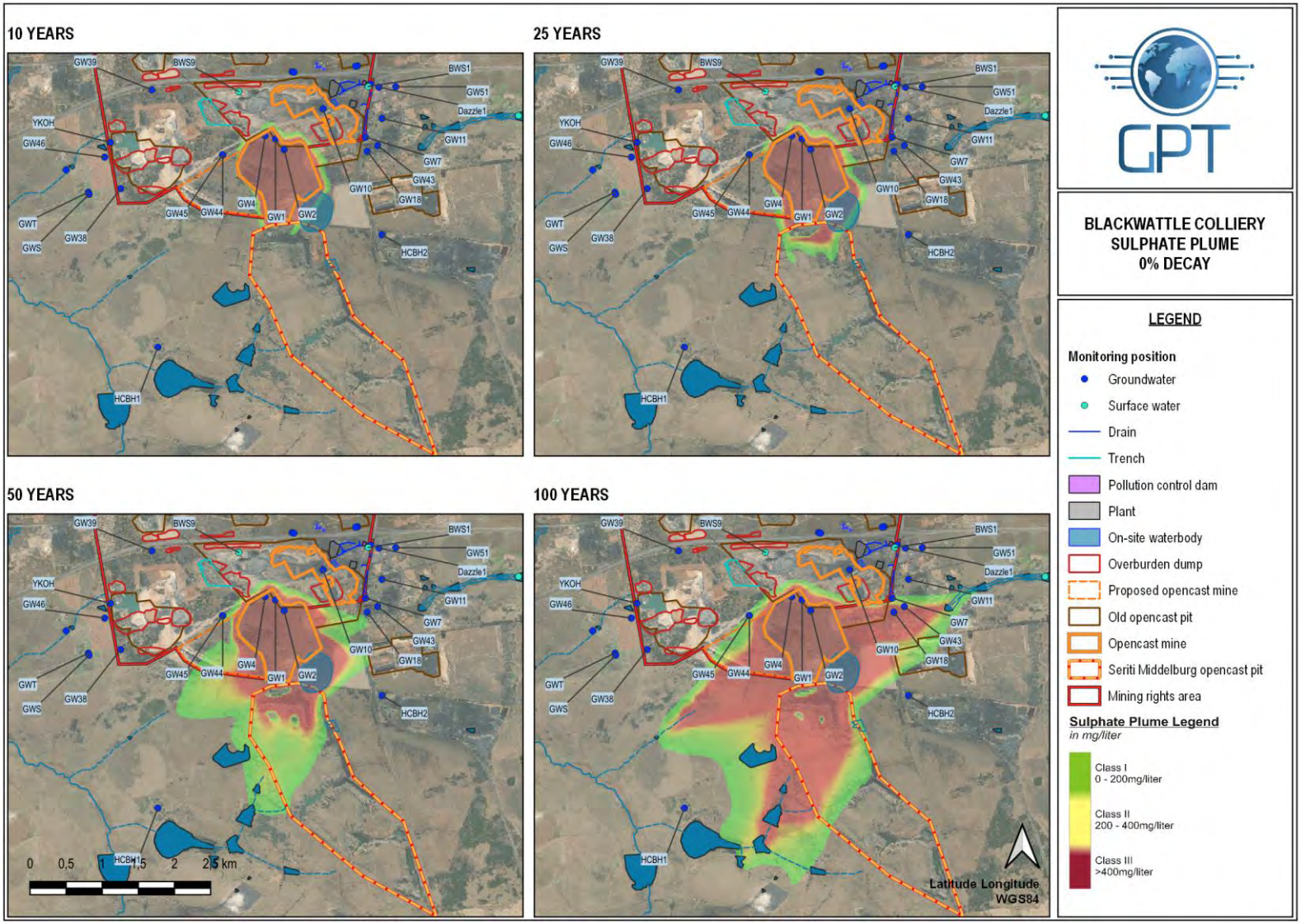


Figure 14: Sulphate plume after mining with 0% decay rate

9.2.4 Cumulative effects

The cumulative pollution impacts of all current and historic mining in addition to the current mine could not be calculated as any data on surrounding mines is not available. However, it is highly recommended that a regional study be undertaken to quantify impacts on at least a quaternary scale or a data sharing agreement should be reached with neighbouring mines.

9.2.5 Groundwater management

9.2.5.1 Waste rock deposits

- Update the numerical and geochemical model against monitored data
- After proper geochemical investigation the ARD can be dealt with as follows.
- Cover and capping research studies and design to reduce water and oxygen reactions
- Use as waste backfill in open pits or underground
- Neutralisation (e.g. lime) and treatment (stimulation of sulphate reducing bacteria)
- Segregation/isolation/encapsulation
- Passive leachate management and treatment
- Polluted groundwater can be treated as follows:
- Reduce hydraulic head by water shedding
- Integrate capture store-release systems
- Utilise evapotranspiration
- Cap and cover with capillary break
- Drainage diversions
- Neutralisation and detoxification of tails seepage
- Wetland filtration

9.2.5.2 Opencast pits

The post-closure groundwater management of the opencast should be done in two phases:

Phase 1: Immediately after closure

Phase 2: After Rapid Flooding

Please note that the numerical and geochemical model needs to be updated against monitored data during the post-closure phase.

<u>Phase 1: Immediately after closure</u>

During mining the acid generating material and non-acid generating material should have been separated.

- The acid producing material should be placed as low in the pits as possible, followed by the non-acid generating material.
- Rapid flooding should be done by diverting storm water channels and pumping of available groundwater into the pit until the acid producing material is inundated by the water.

Phase 2: After Rapid Flooding

After the acid producing material is inundated by the water:

- The final backfilled opencast topography should be engineered 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.
- Natural berms should then be constructed to allow free drainage of surface water around the rehabilitated pit.

9.2.5.3 Opencast decant

Should monitoring indicate the passive methods employed during the rehabilitation of the opencast are ineffective and the decant water quality is unacceptable for release the following can be implemented.

Passive Method

Should low volumes of water be encountered (< 5 ℓ/s) an interception trench can be designed as follows:

- The depth of the trench should be at least 4 mbgl (or 2 m below the groundwater level) to intercept polluted seepage that resulting from the opencast pit
- The design of the trench gradient must be such that the water is free-flowing without eroding the channel;
- The water from the trench must be captured, retained and managed within the mine water systems i.e. lined evaporation dams until the decant water quality reached equilibrium.
- A passive wetland treatment option could also be investigated.

Active Method

Should high volumes of water be encountered (> 5 ℓ/s), Treatment strategies may include a greater or lesser degree of water treatment in order to render the water suitable for reuse. If there is still a residual water management problem, then the operation could evaluate and negotiate options with DWA for the discharge of such water to the water resource.

9.2.5.4 Assumptions and limitations

The modelling was done within the limitations of the scope of work of this study and the amount of data available. Although all efforts have been made to base the model on sound assumptions and has been calibrated to observed data, the results obtained from this exercise should be considered in accordance with the assumptions made. Especially the assumption that a fractured aquifer will behave as a homogeneous porous medium can lead to error. However, on a large enough scale (bigger than the REV, Representative Elemental Volume) this assumption should hold reasonably well.

10 GROUNDWATER MONITORING SYSTEM

10.1 Groundwater Monitoring Network

A groundwater monitoring system has to adhere to the criteria mentioned below. As a result, the system should be developed accordingly.

10.1.1.1 Source, plume, impact and background monitoring

A groundwater monitoring network should contain monitoring positions which can assess the groundwater status at certain areas. The boreholes can be grouped classification according to the following purposes:

- Source monitoring: Monitoring boreholes are placed close to or in the source of contamination to evaluate the impact thereof on the groundwater chemistry.
- Plume monitoring: Monitoring boreholes are placed in the primary groundwater plume's migration path to evaluate the migration rates and chemical changes along the pathway.
- Impact monitoring: Monitoring of possible impacts of contaminated groundwater on sensitive ecosystems or other receptors. These monitoring points are also installed as early warning systems for contamination break-through at areas of concern.
- Background monitoring: Background groundwater quality is essential to evaluate the impact of a specific action/pollution source on the groundwater chemistry.

10.1.2 System response monitoring network

Groundwater levels: The response of water levels to abstraction is monitored. Static water levels are also used to determine the flow direction and hydraulic gradient within an aquifer. Where possible all of the above-mentioned borehole's water levels need to be recorded during each monitoring event.

10.1.3 Monitoring frequency

In the operational phase and closure phase, quarterly monitoring of groundwater quality and groundwater levels is recommended. Quality monitoring should take place before after and during the wet season, i.e. during September and March. It is important to note that a groundwater-monitoring network should also be dynamic. This means that the network should be extended over time to accommodate the migration of potential contaminants through the aquifer as well as the expansion of infrastructure and/or addition of possible pollution sources.

10.2 Monitoring Parameters

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 sampling positions. 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.

10.2.1 Abbreviated analysis (pollution indicators)

Physical Parameters:

- Groundwater levels

Chemical Parameters:

- Field measurements:
  - pH, EC
- Laboratory analyses:
  - Major anions and cations (Ca, Na, Cl, SO_4)
  - Other parameters (EC)

10.2.2 Full analysis

Physical Parameters:

- Groundwater levels

Chemical Parameters:

- Field measurements:
  - pH, EC
- Laboratory analyses:
  - Anions and cations (Ca, Mg, Na, K, NO_3, Cl, SO_4, F, Fe, Mn, Al, & Alkalinity)
  - Other parameters (pH, EC, TDS)
  - Petroleum hydrocarbon contaminants (where applicable, near workshops and petroleum handling facilities)
  - Sewage related contaminants (E.Coli, faecal coliforms) in borehole in proximity to septic tanks or sewage plants.

10.3 Monitoring Boreholes

DWAF (1998) states that "A monitoring hole must be such that the section of the groundwater most likely to be polluted first, is suitably penetrated to ensure the most realistic monitoring result."[9]

Currently a monitoring network does exist for the current mine. The current monitoring program are listed in Table 18 and the areas of these monitoring boreholes are shown in Figure 15.These boreholes are utilised for water level monitoring and water quality measurements during operations, as well as groundwater quality monitoring after decommissioning of the site.

It is recommended by GPT that at least 3 new ground water monitoring wells needs to be drilled to assess the impact of the proposed mining activities on the surrounding environment. GPT considered areas where impacts are modelled and groundwater monitoring wells is absent or where the spatial extent of the predicted groundwater impacts, as set out in the groundwater model is not sufficient. These boreholes should be sited using geophysical methods on the southern edge of the proposed opencast pit.

[9] Department of Water Affairs and Forestry (DWAF). (1998). Minimum Requirements for the Water Monitoring at Waste Management Facilities. CTP Book Printers. Cape Town.

Table 18 Groundwater monitoring positions.

ID	Longitude (East)	Latitude (South)	Frequency	Comments
GW 1	29.44625	-25.841531	Quarterly	Existing
GW 2	29.44745	-25.84300	Quarterly	Existing
GW 4	29.44481	-25.84111	Quarterly	Existing
GW 7	29.45870	-25.84129	Quarterly	Existing
GW 10	29.45283	-25.83736	Quarterly	Existing
GW 11	29.46098	-25.83869	Quarterly	Existing
GW 18	29.45894	-25.84323	Quarterly	Existing
GW 20	29.44299	-25.82521	Quarterly	Existing
GW 23	29.45534	-25.82742	Quarterly	Existing
GW 33	29.44457	-25.81934	Quarterly	Existing
GW 34	29.44787	-25.81967	Quarterly	Existing
Dazzle 1	29.46056	-25.83438	Quarterly	Existing
Windpump	29.44913	-25.81330	Quarterly	Existing
GW 35	29.44607	-25.82325	Quarterly	Existing
GW 36	29.46022	-25.82739	Quarterly	Existing
GW 38	29.42486	-25.84839	Quarterly	Existing
GW 39	29.42918	-25.83474	Quarterly	Existing
GW 40	29.43325	-25.82299	Quarterly	Existing

ID	Longitude (East)	Latitude (South)	Frequency	Comments
GW 41	29.44188	-25.82714	Quarterly	Existing
GW 42	29.45941	-25.83394	Quarterly	Existing
GW 43	29.46039	-25.84244	Quarterly	Existing
GW 44	29.43896	-25.84370	Quarterly	Existing
GW 45	29.43894	-25.84370	Quarterly	Existing
GW 46	29.42266	-25.84404	Quarterly	Existing
GW 47	29.44854	-25.83222	Quarterly	Existing
GW 48	29.44881	-25.83229	Quarterly	Existing
GW 49	29.45760	-25.83142	Quarterly	Existing
GW 50	29.45733	-25.83147	Quarterly	Existing
GW 51	29.46289	-25.83431	Quarterly	Existing
YKOH	29.42344	-25.84200	Quarterly	Existing
GGF	29.41731	-25.84579	Quarterly	Existing
GWT	29.42038	-25.84888	Quarterly	Existing
GWS	29.42049	-25.84917	Quarterly	Existing

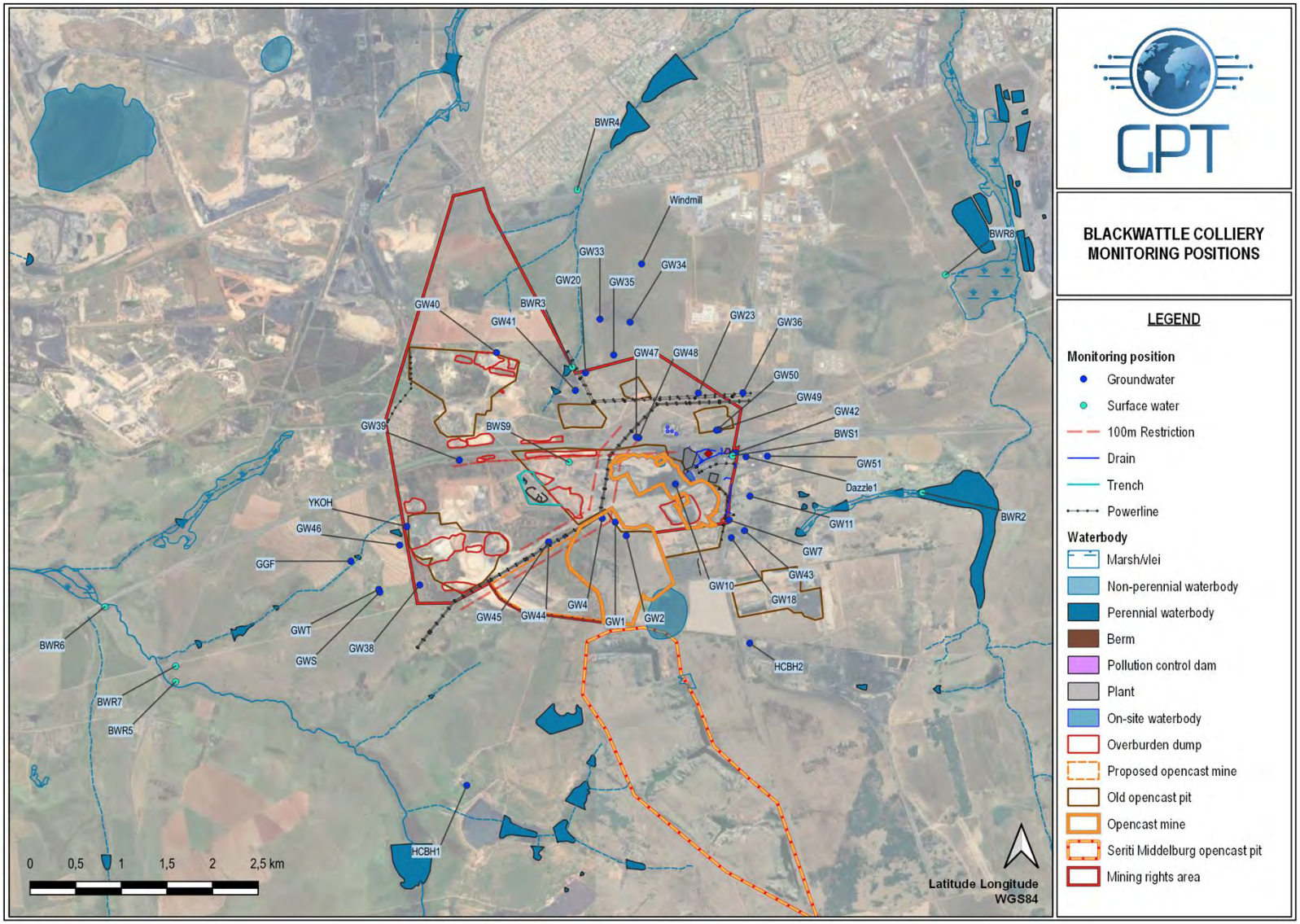


Figure 15: Existing Groundwater monitoring network.

11 IMPACTS QUANTIFICATION

The impact quantification was done using the procedures for the assessment and minimum criteria for reporting aquatic biodiversity in terms of sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998. In terms of groundwater the proposed development impact on the functioning of the aquatic feature in terms of:

- base flows;
- quantity of water including change in the hydrological regime or hydroperiod of the aquatic ecosystem;
- quality of water;
- the location of areas not suitable for development, which are to be avoided during construction and operation, where relevant;
- additional environmental impacts expected from the proposed development
- the degree to which impacts and risks can be mitigated;
- the degree to which the impacts and risks can be reversed;
- the degree to which the impacts and risks can cause loss of irreplaceable resources;
- a suitable construction and operational buffer for the aquatic ecosystem, using the accepted methodologies;

11.1 Environmental Impact Assessment (EIA) Regulations, 2017

The Environmental Impact Assessment (EIA) 2014 Regulations [as amended] promulgated in terms of Sections 24 (5), 24M and 44 of the National Environmental Management Act, 1998 (Act No. 107 of 1998) [as amended] (NEMA), requires that all identified potential impacts associated with the proposed project be assessed in terms of their overall potential significance on the natural, social and economic environments. The criteria identified in the EIA Regulations (2014) include the following:

- Nature of the impact;
- Extent of the impact;
- Duration of the impact
- Probability of the impact occurring;
- Degree to which impact can be reversed;
- Degree to which impact may cause irreplaceable loss of resources;
- Degree to which the impact can be mitigated; and
- Cumulative impacts.

The impact assessment methodology (as defined below) whereby the Significance of a potential impact is determined through the assessment of the relevant temporal and spatial scales determined of the Extent, Magnitude and Duration criteria associated with a particular impact. This method does not explicitly define each of the criteria but rather combines them and results in an indication of the overall significance.

Table 19: Significance Rating of Impact(s)

Impacts	Extent	Duration	Intensity	Reversibility	Probability	Significance = Irreplaceability (Reversibility + Intensity + Duration + Extent) X Probability		Mitigation Efficiency (ME)	Significance Rating (WM) = Significance Rating (WOM) x Mitigation Efficiency	
Dewatering (Cone of Depression)	3	3	3	3	5	60	High	0.6	36	Low
Decant	3	5	4	3	4	60	High	0.4	24	Low
Spread of Pollution at Coal processing plant (during mining	2	2	4	4	5	60	High	0.7	42	Medium
Spread of Pollution at water storage pits (during mining)	3	2	3	4	5	55	High	0.6	33	Low
Spread of Pollution (Post Closure)	4	4	3	4	5	75	High	0.6	45	Medium

12 POST-CLOSURE MANAGEMENT PLAN

The groundwater risk assessment methodology is based on defining and understanding the three basic components of the risk, i.e. the source of the risk (source term), the pathway along which the risk propagates, and finally the target that experiences the risk (receptor). The risk assessment approach is therefore aimed at describing and defining the relationship between cause and effect. In the absence of any one of the three components, it is possible to conclude that groundwater risk does not exist.

12.1 Remediation of Physical Activity

The following measures are relevant for remediation of physical activities at the mine:

- Roads that will no longer be used shall be ripped or ploughed and if necessary, appropriately prepared to ensure the re-growth of vegetation. This will include placing back the stored topsoil and planting/seeding.

- Materials, which may hamper re-growth of vegetation, must be removed prior to rehabilitation and disposed of in an approved manner.

- The goal of rehabilitation, with respect to the area from which the product has been extracted, is to leave the area level and even, containing no foreign debris or other materials.

- All scrap, and other foreign materials shall be removed from the bed of neighbouring streams and rivers and disposed of as per other refuse whether these accrue from the mining operation or are washed on to the site from upstream.

- Removal of these materials shall be on a continuous basis while the mine is operating and not only at the start of rehabilitation.

- Tailings in the form of boulders, rocks or oversized gravel screened out during mining will be spread over as wide a portion of the mined river bed as possible or, if buried, shall be covered by a minimum of 500 mm of sand, if at all practically possible.

- Where reeds or other riverine vegetation has been removed from areas for mining, these shall be systematically re-established in the approximate areas they occurred before mining.

- An effective control programme for the eradication of invader species and other alien plants may be required.

- On completion of mining, all buildings, structures or objects on the camp/office sites, shall be completely removed (unless DME requests that the buildings be left) and the site should be fully rehabilitated.

- On completion of mining, the campsite/office site will be rehabilitated through the removal of all facilities, waste and any other feature constructed or established during use of the campsite.

- All areas, devoid of vegetation/grass or where soils have been compacted due to traffic, shall be ploughed or ripped and, if necessary, appropriately ensure the re-growth of vegetation (plant or seed).

- French drains shall be compacted and covered with a final layer of topsoil to a height of 10 cm above the surrounding ground surface.

- On completion of mining, the surface of the stockpile and processing areas outside riverbeds shall be ploughed/ripped to a depth of at least 500 mm, graded even and the topsoil previously stored adjacent to the site in a bund wall returned to its original depth over the area.

- The area shall be appropriately prepared, if necessary, (e.g. fertilized and seeded), to ensure the re-growth of vegetation.

- Settling ponds will be rehabilitated after first spreading tailings from the tailings dump evenly over the floor of the ponds, should this be the method chosen to rehabilitate tailings.

- The tailings will then be covered through spreading the previously excavated material from the pond's wall evenly over the area.

- The topsoil previously stored adjacent to the site shall then be returned to its original depth over the area.

- The area shall be appropriately prepared, if necessary, to ensure the re-growth of indigenous vegetation.

12.2 Remediation of Storage Facilities

For ROM sites and PCDs the following measures are applicable:

- AMD can be dealt with as follows;
    - Completely remove all remaining coal from the site
    - Use remaining material as backfill in open pits
    - Recover the RWD and remove polluted soil, if any.
    - Cover and capping these facilities to reduce water and oxygen reactions
    - If unsuccessful, consider neutralisation of acidic material
    - Alternatively, use passive leachate water management and treatment
- Polluted groundwater can be treated as follows:
    - Reduce hydraulic head by water shedding
    - Integrate capture-store-release systems
    - Utilise evapotranspiration
    - Cap and cover with capillary break
    - Use drainage diversions
    - Consider wetland filtration

12.3 Remediation of Environmental Impacts

In the case of permanent cessation of mining, i.e. closure, the mine management team must:

- Ensure that the required rehabilitation of pollution control measures is undertaken in accordance with the closure objectives and the mine closure plan (developed in terms of the Minerals and Petroleum Resources Development Act and the Mining Environmental Series (MEM) and guidelines on closure prepared by the Department of Water Affairs and Forestry. Additional information on closure of pollution control measures is provided in BPG A4: Pollution Control Dams,

- Identify temporary conveyances that will not be required for closure,

    - Update the temporary conveyances that are required for closure to permanent structures and,

    - Add any additional conveyances that are required for the closure conditions.

In terms of regulation 9, section 2, the mine management must ensure that:

- All existing impacts from the water management infrastructure are remediated,

- Stream diversions systems are managed according to closure plan and closure objectives,

- The potential future impacts, for example, decant from the mine, have been identified and are covered in the closure plan and the closure financial provisions, and

- A procedure is in place in the closure plan for the closure of the final voids, if applicable.

Other practical implications in terms of water management measures for mine closure are as follows:

- All water management infrastructure should be designed and managed to facilitate mine closure. This includes the following considerations:

    - The durability and longevity of water management designs, e.g. provision of erosion protection for long-term control of erosion,

    - The critical role that water modelling must play in the design process for long-term water quality impact prediction and the design of adequate impact mitigation measures

    - The consideration of active versus passive care of the water management infrastructure post-closure,

    - And the consideration of the final land use and final land forms should be incorporated into the design of the water management measures for closure

12.4 Remediation of Water Resource Impacts

- The post-closure water use should be considered in the design process

- The final mine topography should be planned, as far as possible, to be free-draining

- The post-closure water management plan should take cognisance of the likelihood that the water table will rebound in the rehabilitated pits. Modelling of the post-closure groundwater situation will be required to determine:
    - The long-term water level in the pit.
    - The long-term management of the pit lake.
    - The likelihood and position of future decant and/or seepage points, and the impact of these on the receiving water.
    - The mine management will need to consider the use of the water post-closure. This water can be used for irrigation purposes if of suitable quality. If the water is not of suitable quality, it will need to be treated prior to re-use or discharge. For further information on treatment of contaminated water the following document can be consulted: Department of Water Affairs and Forestry, 2007. Best Practice Guideline H4: Water Treatment.
    - The institutional arrangement for water re-use in the closure phase will need to be considered and planned.

12.5 Backfill of Pits

The post-closure groundwater management of the opencast should be done in two phases:

- Phase 1: Immediately after closure
- Phase 2: After Rapid Flooding

Please note that the numerical and geochemical model needs to be updated against monitored data during the post-closure phase.

Phase 1: Immediately after closure

During mining the acid generating material and non-acid generating material should have been separated.

- The acid producing material should be placed as low in the pits as possible, followed by the non-acid generating material.
- Rapid flooding should be done by diverting storm water channels and pumping of available groundwater into the pit until the acid producing material is inundated by the water.

Phase 2: After Rapid Flooding

After the acid producing material is inundated by the water:

- The final backfilled opencast topography should be engineered 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.

- Natural berms should then be constructed to allow free drainage of surface water around the rehabilitated pit.

13 CONCLUSIONS AND RECOMMENDATIONS

Geo Pollution Technologies - Gauteng (Pty) Ltd (GPT) was appointed by Geovicon (Pty) Ltd to update the existing groundwater model for the new opencast mining sections to the south west of the current operations. The Blackwattle Colliery is an existing coal mine, mining in an area previously exploited through underground methods. The existing numerical groundwater flow and transport model was updated to simulate the current groundwater flow, water qualities and predict groundwater interflows at different stages of opencast mining. Results of a geochemical analysis relating to the mine expansion to the south west of the current operations is included in this report.

The following conclusions and recommendations could be made regarding the mining of a new open cast section, south west of the current operations, at the Blackwattle colliery:

Location: The site is located on the farm Uitkyk 290 JS and portions of the Vaalbank 289 and the Middelburg town and Townlands farms.

Topography: The area is characterised by a gently undulating topography with a slope in the order of 1:40 (0.025) that is regionally in a north -western direction. The local surface drainage is undulating but seems to be mostly in the direction of Du toit stream in the north east of the site. The Du Toit stream flows into the Klein-Olifants River a few kilometres downstream (to the north) of the site. Surface drainage in the south western part of the mining rights area is in a south-western direction towards the Spookspruit stream, while drainage in the east of the mining rights section is in a south easterly direction towards the Pienaars Dam. Some perennial and non-perennial surface water bodies (mainly recreational dams) are found outside of a 1000m radius of the site. The Athlone and Kruger dams are situated in the Du toit stream about 3 kilometres north of the site, while the Pienaars Dam is about 3 kilometres east in the Klein-Olifants River

Climate: Climatic data was obtained from the DWA weather station at the Middelburg Dam (rainfall data and evaporation data) for the Middelburg area10. The mine is located in the summer rainfall region of Southern Africa with precipitation usually occurring in the form of convectional thunderstorms. The average annual rainfall (measured over a period of 38 years) is approximately 668.4 mm, with the high rainfall months between November and January. The mean annual evaporation is 1792.9 mm.

Geology: According to the 1: 250 000 geology series map 2528 Pretoria, the area is underlain by sediments of the Ecca Group, which forms part of the Karoo Supergroup. The Ecca Group consists mainly of dark grey shale that is carbonaceous in some instances, with interbedded whitish sandstone and greyish gritstone as well as occasional coal bands (Visser, 1989). In the investigated area, the Selonsrivier Formation of the Rooiberg Group (Transvaal Supergroup) underlies the Ecca Group. The Selonsrivier Formation consists of red rhyolite with occasional thin interlayered sandstone, tuff, black rhyolite, and breccia units. According to the drilling records from previous investigations, a felsite has been drilled into to the south of the current mining project. This is most likely the northern extremity of the Selonsrivier formation, but not enough information is available to delineate the extent of the outcrop.

Hydrogeology: According to the 1:500 000 General Hydrogeological Map[11] the rocks of the Ecca group which forms part of the Karoo Supergroup. This Aquifer type typically act as secondary aquifers (intergranular and fractured rock aquifers). However, the multi-layered weathering system present in the geology along with locally identified intrusions and coal seems could prove to have up to four

10 Department of Water Affairs (DWA): www.dwa.gov.za
11 Haupt, C.J., (1995). An explanation of the 1:500 000 General Hydrogeological Map. Johannesburg 2526. DWAF.

aquifer systems present in the form of a shallow aquifer in the weathered zone, deeper aquifer formed by fracturing in the Karoo sediments, aquifers associated with geological intrusions and aquifers formed within the more permeable coal seams and sandstone layers.

Groundwater levels: Groundwater levels are measured on a quarterly basis by Geovicon (Pty) Ltd. The correlation between the monitoring boreholes and the topography are generally strong hence the assumption could be made that the groundwater flow direction mimics the onsite topography, the correlation is shown in Figure 7 below. The data was provided by the client and captured in a database. The following can be concluded from the groundwater level monitoring data collected from 2003:

- Monitoring borehole GW1 was monitored since August 2003. The water level remains fairly stable over the monitoring period but shows an increase in variation since August 2019. The lowest water level was recorded in August 2021, whereafter the water level increased to 18.3 mbgl and has remained stable until the latest monitoring event in November 2022. The variation in the water level is a possible indication that the groundwater level in the region of the mine could be affected by the mine's dewatering.

- Monitoring borehole YKOH reported water level fluctuations with the water level dropping from 12.6 mbgl to 26 mbgl between February 2020 and May 2020. The water level recovered back to 12.22 mbgl during the groundwater monitoring event in August 2020. Since August 2020 the water level in YKOH has steadily increased to the latest water level at 4.22 mbgl. This is a possible indication that the groundwater level in the region of the mine could be affected by the mine's dewatering

- Groundwater monitoring points GW33, GW34 and windpump showed indications of a long-term decrease in the groundwater level that could possibly be attributed to the close by mining activities.

- The remainder of the groundwater monitoring points indicated seasonal fluctuations. The greatest variance is shown in GW38 and GW44.

Water Quality: Water quality data was provided by the client. The latest groundwater monitoring data was used from the November 2022 groundwater monitoring event. The data included results from 26 groundwater samples and 9 surface water samples. The results were compared to the recommended concentrations as prescribed in the water use license (2011) and in the SANS241 drinking water standards.

Groundwater

The following parameters exceeded the recommended limits as prescribed by the IWUL:

- Total N: in monitoring wells GW1, GW7, GW11, GW18, GW33, GW43, GW44, GW45, GW46, GW49, GW51, GGF, GWT and GWS.
- Chloride in monitoring wells GW11, GW18, GW33, GW36, GW46, GWT and GWS.
- Fluoride in monitoring wells GW7, GW11, GW35, GW42, GW43, GW45, GW46, GW47, GW49, GW50, YKOH, GGF, GWT and GWS.
- Sulphate in monitoring wells GW7, GW11, GW18, GW33, GW42, GW43, GW45, GW46, GW47, GW49, GW50, GW51, YKOH, GGF, GWT and GWS.
- Calcium in all monitoring wells with the exception of GW1, GW2, GW34, GW36, GW40 and GW44.

- Sodium in all monitoring wells with the exception of GW1, GW2, GW34, GW35, GW36, GW40 and GW44.
- Electrical conductivity in all monitoring wells with the exception of GW1, GW2, GW34, GW36, GW40 and GW44.
- pH in monitoring well GW1, GW2, GW44, GW49.

Surface Water

The following parameters exceeded the recommended limits as prescribed by the IWUL:

- TDS in monitoring wells BWS01, BWS05, BWS09, BWR05 and BWR06.
- Fluoride in monitoring wells BWS01, BWS05 and BWS09.
- Sulphate in monitoring wells BWS01, BWS05, BWS09, BWR05 and BWR06.
- Calcium in monitoring wells BWS01, BWS05, BWS09 BWR05 and BWR06.
- Magnesium in monitoring wells BWS01, BWR05 and BWR06.
- Sodium in monitoring wells BWS01, BWS05 and BWS09.
- Potassium in monitoring well BWS01.
- Electrical conductivity in monitoring wells BWR05 and BWR06.
- Iron in monitoring wells BWR02, BWR03, BWR04, and BWR07.
- Manganese in monitoring wells BWS01, BWR02, BWR03, BWR04, BWR05 BWR06 and BWR08.

Aquifer Vulnerability: The GDT calculated a vulnerability value of 53%, which indicates that aquifer is moderately vulnerable to contamination.

Aquifer Classification: Based on information collected during the hydrocensus it can be concluded that the aquifer system in the study area can be classified as a "Minor Aquifer System", based on the fact that the local population is not only dependant on groundwater.

Aquifer Protection Classification: A Groundwater Quality Management Index of 4 was estimated for the study area from the ratings for the Aquifer System Management Classification. According to this estimate a medium level groundwater protection is required for the aquifer. Reasonable and sound groundwater protection measures based on the modelling will therefore be recommended to ensure that no cumulative pollution affects the aquifer, even in the long term. DWA's water quality management objectives are to protect human health and the environment. Therefore, the significance of this aquifer classification is that measures must be taken to limit the risk to the following environments: The protection of the underlying aquifer, The protection of the underlying aquifer and the protection of surface water courses and features like the du Toit's stream, the Klein Olifant's river and dams like the Athlone Dam, Kruger's Dam and Pienaars Dam.

Geochemical results: Two geochemical samples were collected in 2020 as per the GPT operating procedure from the onsite waste rock and overburden stockpiles. GPT was accompanied and directed by the relevant mine staff in collecting two representative samples of the waste rock and overburden. The results from the geochemical samples is as follows:

- From the mineral composition results (XRD analysis) of the two analysed samples a dominance in potentially acid generating minerals like pyrite are absent, this could potentially be a limiting factor for acid mine drainage.

- Acid base accounting and Net Acid Generating potential analysis indicated some capacity to generate acid do exists in the collected samples, however the majority of the content in the material have sufficient neutralisation potential to counter the acid production.

- Based on the analysed results regarding the total leached concentrations and total concentrations the analysed samples can be classified as waste type 3. Waste type 3 is a low risk waste. The potential leached of concern include Barium, Copper and Lead.

Form the geochemical samples it can be concluded that the material sampled will most likely not be acid generating. It should however be noted that the properties of the material will vary spatially hence acid generating material at the mine could not be ruled out.

- During Mining: The mining scenario of the planned southeastern opencast were modelled to completion to provide operational advice concerning the regional cone of depression and inflow rates into the opencast mining pit. The phases assumed the completion of planned opencast mining operations to a depth of 40 mbgl. The results indicates that the water entering the mining drain will flow into the open pit area at approximately 1000 m^3/day to 1200m^3/day (about 11l/s). However, the actual inflow could differ significantly from these predictions because of unknown underground conditions and climatic impact, but the trend could be useful.

- The modelled drawdown does reach a pan to the south east of the planned opencast area. The drawdown at the pan be regarded as significant, since the drawdown at this point is modelled to be around 12 mbgl. Local streams and pans are also most likely isolated from the aquifer by a clay layer, hence the impact on the streams is not expected to be significant in reducing the stream flow. Moreover, as the local streams serve mainly as rainwater drainage channels, it is not anticipated that this dewatering will influence the transfer of rainwater to the pans. It is thus concluded that the drawdown from the mining operations will not have significant environmental impacts on the surrounding area.

Post-Mining:

- Predicted groundwater levels indicate that a rise in groundwater will occur and that decant after rebound in so far as daylighting to surface will occur at a eastern section of the mining rights area close to a historical open cast. The regional water level is calculated to rebound in about 10 years. Through the groundwater model results indicates that between 400 and 600 m3 of water will decant to the east of the mining operations. GPT recommends that monitoring needs to be done to assess if decant is occurring east of the mining rights area, and if indeed it does occur it is recommended that a cut of trench should be installed to control the decant at this position since the decant is modelled to be less than 5 l/s.

- After the decommissioning of the mine some discards and exposed reactive mineral surfaces will remain in the mine, this outflow could be contaminated as a result of mine drainage. As sulphate is normally a significant solute in drainage from mines, sulphate concentration from the mine has been modelled as a conservative (non-reacting) indicator of mine drainage pollution. A worst-case scenario was modelled with a starting sulphate concentration of 2 000 mg/litre. The migration of contaminated water from the mining area has been modelled as described, and the results are presented in terms of the extent of the pollution plume in time periods of 10, 25, 50 and 100 years after the operations have ceased. A scenario was modelled for the plume emanating from the planned opencast which will act as a constant source.

Within the limitations of the abovementioned assumptions, the water quality impact of the planned open cast after the decommissioning of the mine is as follows:

- The leachate plume emanating from the mined areas will be largely contained during the first few years while the groundwater in the colliery is still in rebound.
- A sulphate concentration of around 200mg/l will reach a non-perennial tributary after 50 years after decommissioning of the mine after the sulphate concentration will increase as long as the contamination source remains. The non-perennial stream is tributary of the spook spruit which is located south west of the planned open cast.
- Reasonable rehabilitation could result in a declining source concentration. This will result in less contamination on the long term, but the contamination during the first few decades is relatively unchanged.
- The farm dam in the tributary of the spook spruit south west of the planned open cast will also eventually be impacted by contaminant transport as is modelled.

13.1 Recommendations

The following actions are recommended:

- Water quantity and quality data should be collected on a regular, ongoing basis during mine operations. These data will be used to recalibrate and update the mine water management model, to prepare monitoring and audit reports, to report to the regulatory authorities against the requirements of the IWMP and other authorisations and as feedback to stakeholders in the catchment, perhaps via the CMA.
- The practice of depositing discard below the groundwater level is very promising from a groundwater environmental view and should be maintained meticulously during future mining.
- Groundwater monitoring boreholes should be drilled in areas which is expected to be impacted in terms of groundwater quantity and quality. At least one monitoring well is proposed to the east of the current coal processing facility. Another two-groundwater monitoring point is also proposed to the south west of the planned mining area between the non-perennial tributary of the Spook spruit and the planned open cast mine, to assess possible future impacts. It is also recommended that all the new monitoring wells should be aquifer tested in order to accurately update the ground water model with representative aquifer parameters.
- Regularly update the groundwater impact status report and numerical model against monitored data during operations, at least once more before closure.
- The hydrocensus and risk assessment should at least be repeated once before closure to evaluate any impacts

APPENDIX I: SANS 241 RESULTS

Groundwater

Determinant	Risk	Unit	Standard limits	GW1	GW2	GW7	GW11	GW18	GW20	GW33	GW34
Physical and aesthetic determinants											
Conductivity at 25 °C	Aesthetic	mS/m	170	3.80	3.20	28.00	83.60	17.00	13.60	110.00	2.90
Total dissolved solids	Aesthetic	mg/L	1 200	22.00	18.00	186.00	708.00	128.00	66.00	310.00	16.00
pH at 25 °C [b]	Operational	pH units	5 to 9.7	5.45	5.28	6.99	6.92	6.83	6.70	7.41	6.17
Chemical determinants – macro-determinants											
Nitrate as N (NO_3 - N)	Acute health	mg/L	11	0.19	0.10	0.37	0.37	0.71	0.10	0.22	0.10
Sulfate as SO_4^{2-}	Acute health	mg/L	500	5.22	3.22	23.50	329.00	24.40	1.73	10.60	1.00
	Aesthetic	mg/L	250	5.22	3.22	23.50	329.00	24.40	1.73	10.60	1.00
Fluoride as F^-	Chronic health	mg/L	1.5	0.20	0.20	0.33	0.42	0.20	0.20	0.20	0.20
Chloride as Cl^-	Aesthetic	mg/L	300	3.29	3.33	5.01	26.40	5.81	3.61	9.07	1.52
Sodium as Na	Aesthetic	mg/L	200	3.63	3.49	37.70	29.20	11.40	5.09	17.60	4.15
Chemical determinants – micro-determinants											
Iron as Fe	Aesthetic	mg/L	0.3	0.22	0.64	0.04	0.04	0.10	0.14	0.25	0.03
Manganese as Mn	Aesthetic	mg/L	0.1	0.03	0.14	0.01	0.09	0.01	0.24	0.18	0.04
Aluminium as Al	Operational	mg/L	0.3	0.06	0.01	0.08	0.03	0.08	0.04	0.05	0.01
Calcuim as Ca	Operational	mg/L		1.91	1.79	14.50	67.20	12.40	10.40	13.00	1.12
Magnesium as Mg	Operational	mg/L		0.95	0.87	6.31	53.10	4.93	6.71	11.10	0.58
Potassium as K	Operational	mg/L		0.99	0.45	1.81	11.00	2.49	3.25	31.50	0.61
BDL = Below detection limit											

Determinant	Risk	Unit	Standard limits	GW35	GW36	GW40	GW41	GW42	GW43	GW44	GW45	GW46
Physical and aesthetic determinants												
Conductivity at 25 °C	Aesthetic	mS/m	170	11.10	5.10	3.90	43.20	202.00	36.90	4.00	16.30	83.40
Total dissolved solids	Aesthetic	mg/L	1 200	59.00	28.00	22.00	248.00	1918.00	262.00	23.00	93.00	726.00
pH at 25 °C [b]	Operational	pH units	5 to 9.7	7.61	6.04	6.62	6.69	6.98	7.75	5.84	6.53	6.85
Chemical determinants – macro-determinants												
Nitrate as N (NO_3 - N)	Acute health	mg/L	11	0.11	0.10	0.10	0.10	0.10	0.23	0.56	0.96	0.32
Sulfate as SO_4^{2-}	Acute health	mg/L	500	1.00	1.81	1.00	1.00	1177.00	17.70	1.00	10.00	351.00
	Aesthetic	mg/L	250	1.00	1.81	1.00	1.00	1177.00	17.70	1.00	10.00	351.00
Fluoride as F^-	Chronic health	mg/L	1.5	0.26	0.20	0.20	0.20	3.51	0.53	0.20	0.33	0.36
Chloride as Cl^-	Aesthetic	mg/L	300	1.78	5.88	1.58	1.59	3.52	2.87	2.28	1.88	26.40
Sodium as Na	Aesthetic	mg/L	200	4.07	3.59	3.88	5.70	62.90	55.80	3.37	7.82	28.90
Chemical determinants – micro-determinants												
Iron as Fe	Aesthetic	mg/L	0.3	0.04	0.25	0.04	0.15	0.04	0.10	0.06	0.02	0.11
Manganese as Mn	Aesthetic	mg/L	0.1	0.01	0.33	0.07	0.26	0.81	0.01	0.01	0.01	0.13
Aluminium as Al	Operational	mg/L	0.3	0.09	0.02	0.05	0.06	0.14	0.03	0.19	0.05	0.10
Calcuim as Ca	Operational	mg/L		8.87	2.44	1.76	38.90	350.00	14.90	3.21	13.10	66.50
Magnesium as Mg	Operational	mg/L		6.61	1.18	1.04	25.20	93.80	7.32	0.91	6.49	52.50
Potassium as K	Operational	mg/L		2.94	4.97	2.38	8.43	11.10	2.45	1.38	6.41	10.90
BDL = Below detection limit												

Determinant	Risk	Unit	Standard limits	GW47	GW49	GW50	GW51	YKOH	GGF	GWT	GWS	Wind Pump
Physical and aesthetic determinants												
Conductivity at 25 °C	Aesthetic	mS/m	170	70.50	76.30	39.40	84.70	56.10	99.37	30.00	266.00	42.30
Total dissolved solids	Aesthetic	mg/L	1 200	460.00	756.00	282.00	846.00	388.00	872.00	182.67	2782.00	214.00
pH at 25 °C [b]	Operational	pH units	5 to 9.7	7.16	5.52	7.28	7.76	7.44	6.25	7.35	7.06	6.88
Chemical determinants – macro-determinants												
Nitrate as N (NO_3 - N)	Acute health	mg/L	11	0.10	0.31	0.10	0.13	0.10	0.88	2.52	0.22	0.10
Sulfate as SO_4^{2-}	Acute health	mg/L	500	53.40	397.00	64.00	413.00	250.00	536.67	25.60	1669.00	2.87
	Aesthetic	mg/L	250	53.40	397.00	64.00	413.00	250.00	536.67	25.60	1669.00	2.87
Fluoride as F^-	Chronic health	mg/L	1.5	1.26	0.55	0.49	0.20	0.27	0.26	1.45	0.33	0.20
Chloride as Cl^-	Aesthetic	mg/L	300	5.16	3.11	3.99	1.82	3.52	2.74	12.53	9.55	3.06
Sodium as Na	Aesthetic	mg/L	200	26.60	30.20	35.60	20.30	18.80	17.20	39.20	51.87	7.67
Chemical determinants – micro-determinants												
Iron as Fe	Aesthetic	mg/L	0.3	0.05	1.77	0.06	0.03	0.04	0.07	0.03	0.22	10.30
Manganese as Mn	Aesthetic	mg/L	0.1	0.12	6.67	0.13	0.24	0.01	1.14	0.02	12.21	0.32
Aluminium as Al	Operational	mg/L	0.3	0.04	0.11	0.06	0.02	0.04	0.06	0.04	0.08	0.03
Calcuim as Ca	Operational	mg/L		29.00	66.30	22.70	31.10	39.00	116.00	14.00	403.33	30.80
Magnesium as Mg	Operational	mg/L		64.20	41.80	16.60	79.90	30.60	57.67	6.35	198.67	9.76
Potassium as K	Operational	mg/L		14.80	3.49	1.96	21.10	16.10	10.05	3.31	28.13	4.72
BDL = Below detection limit												

Surface Water

Determinant	Risk	Unit	Standard limits	BWS01	BWS05	BWS09	BWR02	BWR03	BWR04	BWR05	BWR06	BWR07	BWR08
Physical and aesthetic determinants													
Conductivity at 25 °C	Aesthetic	mS/m	170	3.80	3.20	28.00	28.67	37.70	13.83	143.67	141.00	13.47	47.83
Total dissolved solids	Aesthetic	mg/L	1 200	2242.67	2681.33	2774.67	174.67	265.33	86.67	1206.00	1212.67	84.33	322.67
pH at 25 °C [b]	Operational	pH units	5 to 9.7	4.64	4.31	6.71	6.71	6.28	6.58	7.02	7.08	7.28	7.18
Chemical determinants – macro-determinants													
Nitrate as N (NO_3 - N)	Acute health	mg/L	11	1.10	0.93	2.38	0.10	0.10	0.10	0.10	0.10	0.10	0.18
Sulfate as SO_4^{2-}	Acute health	mg/L	500	1483.33	1764.67	1592.33	82.07	149.67	38.30	802.67	783.33	15.43	159.87
	Aesthetic	mg/L	250	1483.33	1764.67	1592.33	82.07	149.67	38.30	802.67	783.33	15.43	159.87
Fluoride as F^-	Chronic health	mg/L	1.5	0.40	0.43	0.43	0.28	0.24	0.20	0.45	0.46	0.24	0.27
Chloride as Cl^-	Aesthetic	mg/L	300	2.2	3.66	2.37	13.75	3.64	2.15	10.10	10.06	5.22	23.83
Sodium as Na	Aesthetic	mg/L	200	19.88	28.47	32.60	15.60	9.31	8.05	41.93	40.23	11.05	23.53
Chemical determinants – micro-determinants													
Iron as Fe	Aesthetic	mg/L	0.3	0.41	1.20	0.06	0.16	0.61	0.15	0.07	0.02	0.42	0.07
Manganese as Mn	Aesthetic	mg/L	0.1	5.70	7.03	6.51	0.74	1.89	0.22	0.06	0.09	0.05	0.09
Aluminium as Al	Operational	mg/L	0.3	4.43	4.90	0.13	0.04	0.03	0.02	0.05	0.04	0.10	0.12
Calcuim as Ca	Operational	mg/L		369.33	414.00	380.67	20.70	28.50	8.70	121.00	114.33	7.82	32.77
Magnesium as Mg	Operational	mg/L		132.27	168.00	13.00	9.14	18.97	5.83	121.67	114.00	5.32	26.20
Potassium as K	Operational	mg/L		10.57	18.29	18.37	4.85	8.85	0.97	13.27	12.67	1.25	3.77
BDL = Below detection limit													

APPENDIX II: Geochemical Results

APPENDIX III: Modelling inputs

In this paragraph the setup of the flow model will be discussed in terms of the conceptual model as envisaged for the numerical model, elevation data used, boundaries of the numerical model and assumed initial conditions.

ELEVATION DATA

Elevation data is crucial for developing a credible numerical model, as the groundwater table in its natural state tend to follow topography.

The best currently available elevation data is derived from the STRM (Shuttle Radar Tomography Mission) DEM (Digital Elevation Model) data. The SRTM consisted of a specially modified radar system that flew on board the Space Shuttle Endeavour during an 11-day mission in February of 2000, during which elevation data was obtained on a near-global scale to generate the most complete high-resolution digital topographic database of Earth[12]. Data is available on a grid of 30 metres in the USA and 90 metres in all other areas.

Several studies have been conducted to establish the accuracy of the data and found that the data is accurate within an absolute error of less than five metres and the random error between 2 and 4 metres for Southern Africa[13]. Over a small area as in this study, the relative error compared to neighbouring point is expected to be less than one metre. This is very good for the purpose of a numerical groundwater model, especially if compared to other uncertainties; and with the wealth of data this results in a much-improved model.

[12] http://www2.jpl.nasa.gov/srtm/

[13] Rodriguez, E., et al, 2005. An assessment of the SRTM topographic products. Technical Report JPL D-31639, Jet Propulsion Laboratory, Pasadena, California.

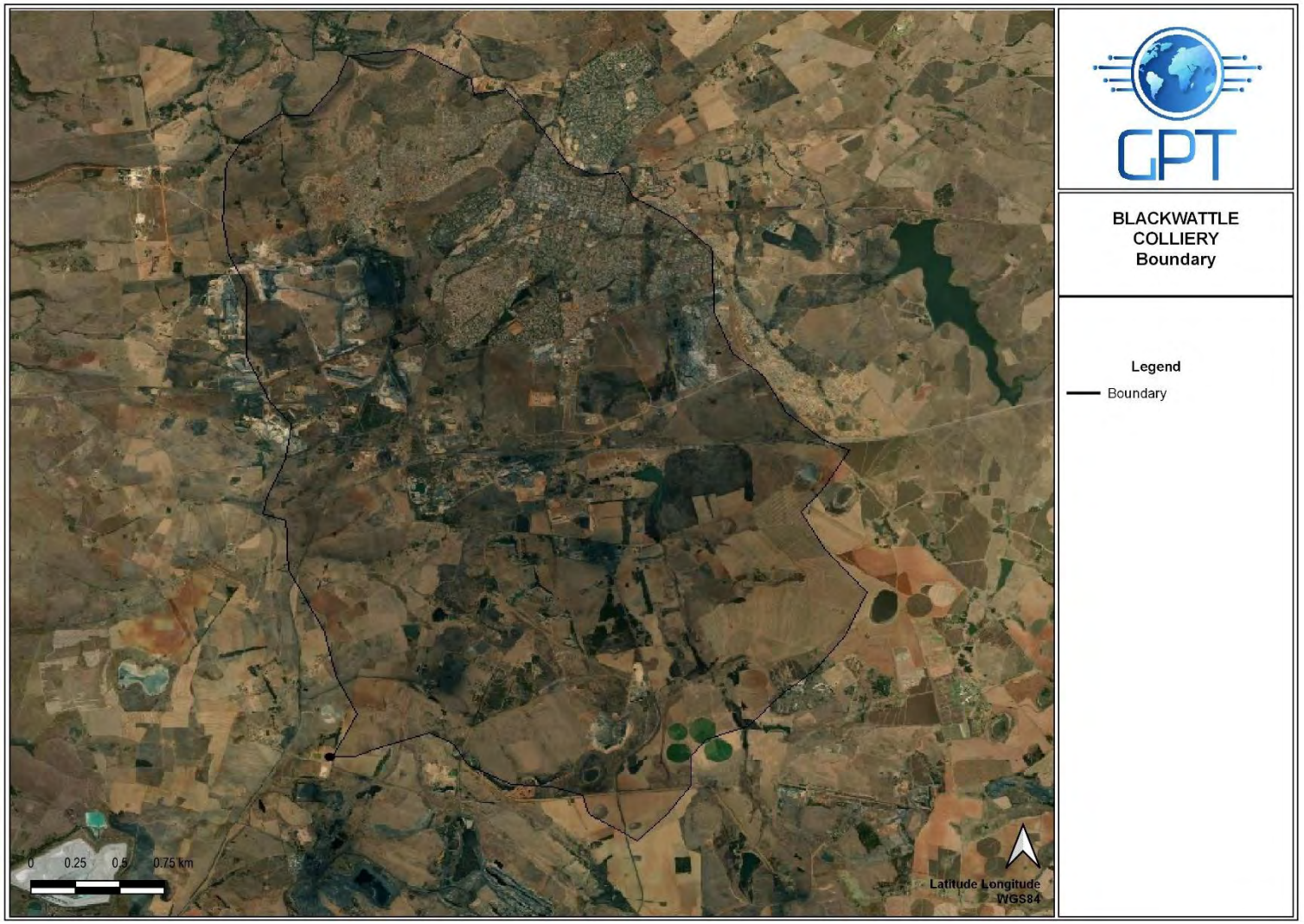


Figure 16 Model Boundaries

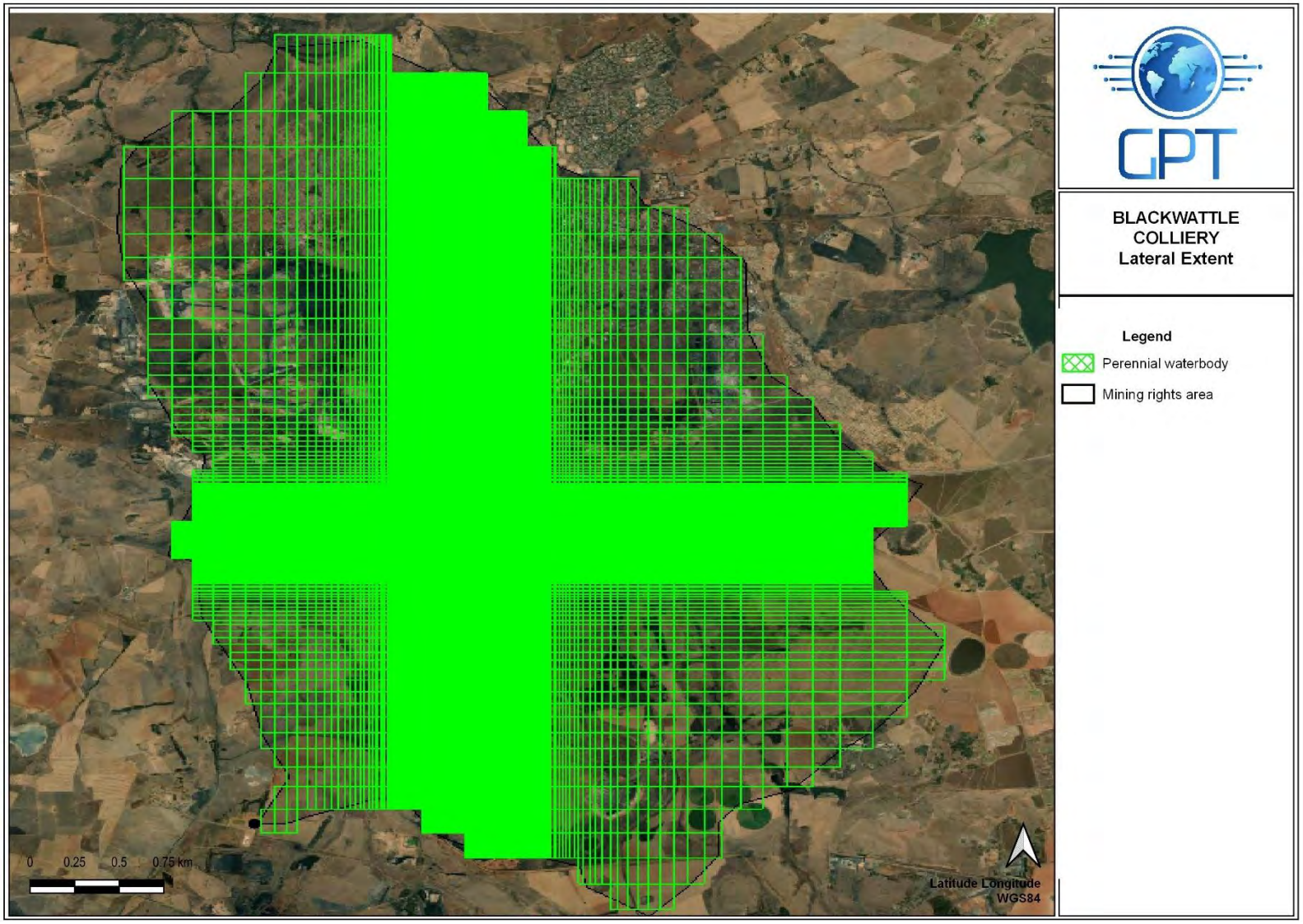


Figure 17: Lateral Delineation of the Regional Model

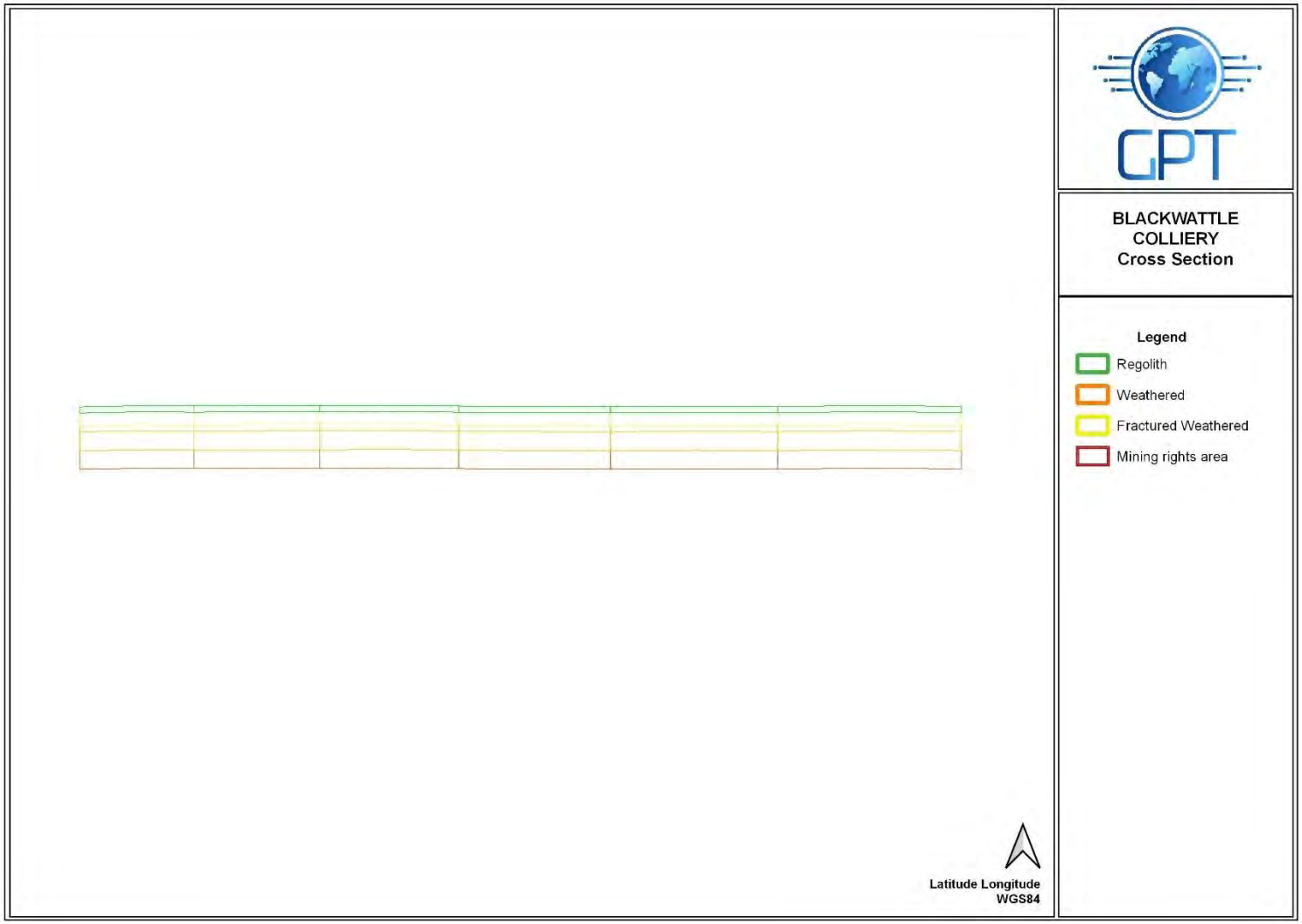


Figure 18: Vertical Delineation of the Modelled Area

Appendix 4

Heritage Study

Archaetnos Culture & Cultural
Resource Consultants
BK 98 09854/23

A REPORT ON AN ARCHAEOLOGICAL IMPACT ASSESSMENT FOR THE EXPANSION OF BLACK WATTLE COLLIERY, CLOSE TO MIDDELBURG, MPUMALANGA PROVINCE

For:

Geovicon
E-mail: Riana Bate - riana@geovicon.co.za

REPORT NO.: AE02306V

By:

Prof. A.C. van Vollenhoven (L.AKAD.SA.)
***Accredited member of ASAPA* (Accreditation number: 166)**
***Accredited member of SASCH* (Accreditation number: CH001),**
&
Johan Smit

7 March 2023

Archaetnos
P.O. Box 55
GROENKLOOF
0027
Tel: 083 291 6104
Fax: 086 520 4173
E-mail: antonv@archaetnos.co.za

Member: AC van Vollenhoven BA, BA (Hons), DTO, NDM, MA (Archaeology) [UP], MA (Culture History) [US], DPhil (Archaeology) [UP], Man Dip [TUT], D Phil (History) [US]

SUBMISSION OF REPORT

Please note that the South African Heritage Resources Agency (SAHRA) or one of its subsidiary bodies needs to comment on this report.

It is the client's responsibility to do the submission via the SAHRIS System on the SAHRA website.

Clients are advised not to proceed with any action before receiving the necessary comments from SAHRA.

DISCLAIMER

Although all possible care is taken to identify all sites of cultural importance during the survey of study areas, the nature of archaeological and historical sites is as such that it always is possible that hidden or subterranean sites could be overlooked during the study. Archaetnos and its personnel will not be held liable for such oversights or for costs incurred as a result thereof.

Should it be necessary to visit a site again as a result of the above mentioned, an additional appointment is required.

Reasonable editing of the report will be done upon request by the client if received within 60 days of the report date. However, editing will only be done once, and clients are therefore requested to send all possible changes in one request. Any format changes or changes requested due to insufficient or faulty information provided to Archaetnos on appointment, will only be done by additional appointment.

Any changes to the scope of a project will require an additional appointment.

EXECUTIVE SUMMARY

Archaetnos cc was requested by Geovicon to conduct an archaeological impact assessment (AIA) for the proposed Black wattle Colliery. The site is located south of Middelburg in the Mpumalanga Province. Black Wattle Colliery is an existing mining operation. The study is aimed at an additional area earmarked for mining. The study forms part of the Environmental Authorisation Process.

The methodology for the study includes a survey of literature and a field survey. The latter was conducted according to generally accepted HIA practices and was aimed at locating all possible objects, sites and features of cultural significance in the area of proposed development.

If required, the location/position of any site was determined by means of a Global Positioning System (GPS), while photographs were also taken where needed. The survey was undertaken by doing a physical survey via off-road vehicle and on foot and covered as much as possible of the area to be studied. Certain factors, such as accessibility, density of vegetation, etc. may however influence the coverage.

All sites, objects, features and structures identified were documented according to the general minimum standards accepted by the archaeological profession. Co-ordinates of individual localities were determined by means of the GPS. The information was added to the description in order to facilitate the identification of each locality.

During this survey one additional site of cultural heritage significance was located within the surveyed area, with another being identified during a previous survey done here in 2020.

The following is recommended:

- Site 1 is a graveyard and graves are always regarded as having a high cultural significance. It should be included in the heritage register and mitigation measures must be implemented if any development activities take place in its vicinity.

    - Two possibilities exist. The first option would be to fence the graves in or demarcate the site and have a management plan drafted for the sustainable preservation thereof. This should be compiled by a heritage expert. This option is relevant when the graves are in no danger of being damaged or destroyed by the development (direct impacts). Secondary impact due to the development activities may still exist and must be managed.

    - The second option is to exhume the mortal remains and to have it relocated. This usually is relevant when the graves will be directly affected (damaged or destroyed) by the development. In this case specific procedures should be followed which includes social

consultation. Graves younger than 60 years may be exhumed only by an undertaker. For those older than 60 years, and unknown graves, an undertaker and archaeologist should be appointed. Permits must be obtained from the Burial Grounds and Graves unit of SAHRA. This procedure is quite lengthy and involves social consultation.

- As site no. 1 is inside of the area of direct impact, Option 2 is recommended.

- Site no. 2 is located within the surveyed area and is deemed to have a negligible heritage significance. The site receives a rating of Local Grade IIIC: The description in the phase 1 heritage report is seen as sufficient recording (low significance) and it may be granted destruction at the discretion of the relevant heritage authority without a formal permit application, subjected to the granting of Environmental Authorization.

- Site 2 from the 2020 survey seems to have been demolished and does no longer exists (but it was documented completely in 2020 and deemed to be of low significance).

- After implementation of the above mitigation measures and upon receiving the necessary comments from the heritage authority, the proposed development may continue.

- It should be noted that the subterranean presence of archaeological and/or historical sites, features or artifacts is always a distinct possibility. Due to the density of vegetation it also is possible that some sites may only become known later on. Operating controls and monitoring should therefore be aimed at the possible unearthing of such features. Care should therefore be taken when development commences that if any of these are discovered, a qualified archaeologist be called in to investigate the occurrence.

- In This regards the following 'Chance find Procedure' should be followed:

    1. Upon finding any archaeological or historical material all work at the affected area must cease.
    2. The area should be demarcated in order to prevent any further work there until an investigation has been completed.
    3. An archaeologist should be contacted immediately to provide advice on the matter.
    4. Should it be a minor issue, the archaeologist will decide on future action, which could include adapting the HIA or not. Depending on the nature of the find, it may include a site visit.
    5. SAHRA's APM Unit may also be notified.
    6. If needed, the necessary permit will be applied for with SAHRA. This will be done in conjunction with the appointed archaeologist.
    7. The removal of such archaeological material will be done by the archaeologist in lieu of the approval given by SAHRA, including any

conditions stipulated by the latter.

8. Work on site will only continue after removal of the archaeological/ historical material was done.

CONTENTS

Page

CURRICULUM VITAE
Prof. Anton Carl van Vollenhoven

PERSONAL INFORMATION

- Born: 20 January 1966, Pretoria, RSA
- Address: Archaetnos, PO Box 55, Groenkloof, 0027
- Cell phone: 083 291 6104
- Nationality: RSA
- E-mail: antonv@archaetnos.co.za

TERTIARY EDUCATION

- BA 1986, University of Pretoria
- BA (HONS) Archaeology 1988 (cum laude), University of Pretoria
- MA Archaeology 1992, University of Pretoria
- Post-Graduate Diploma in Museology 1993 (cum laude), University of Pretoria
- Diploma Tertiary Education 1993, University of Pretoria
- DPhil Archaeology 2001, University of Pretoria.
- MA Cultural History 1998 (cum laude), University of Stellenbosch
- Management Diploma 2007 (cum laude), Tshwane University of Technology
- DPhil History 2010, University of Stellenbosch

EMPLOYMENT HISTORY

Current:

- *August 2007* – present – Managing Director for Archaetnos Archaeologists.
- *Since 2012*: Archaeologist and heritage official, Department of Environment and Agriculture, City of Tshwane
- *Since 2015*: Extraordinary Professor of History at the North-West University

Previous:

- *1988-1991:* Fort Klapperkop Military Museum - Researcher
- *1991-1999:* National Cultural History Museum. Work as Archaeologist, as well as Curator/Manager of Pioneer Museum (1994-1997)
- *1999-2002:* City Council of Pretoria. Work as Curator: Fort Klapperkop Heritage Site and Acting Deputy Manager Museums and Heritage.
- *2002*-2007: City of Tshwane Metropolitan Municipality. Work as Deputy Manager Museums and Heritage.
- *August 2007* – present – Managing Director for Archaetnos Archaeologists.
- *1988-2003*: Part-time lecturer in Archaeology at the University of Pretoria and a part-time lecturer on Cultural Resources Management in the Department of History at the University of Pretoria.
- *2014-2015*: Part-time lecturer for the Honours degree in Museum Sciences in the Department of History and Heritage Studies at the University of Pretoria
- *2020-2022*: Part-time lecturer in History at the North-West University

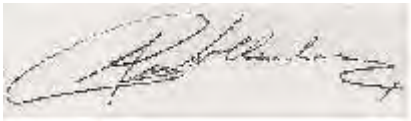
OTHER

- NRF C2 Research rating.
- Has published 42 peer-reviewed and 56 popular articles.
- Hs written 13 books/book contributions/conference proceedings .
- Has been the author and co-author of over 1 118 unpublished reports on cultural resources surveys and archaeological work.
- Has delivered more than 84 papers and lectures at national and international conferences.
- Member of SAHRA Council for 2003 – 2006.
- Member of the South African Academy for Science and Art.
- Member of Association for South African Professional Archaeologists. (Council member since 2022).
- Member of the South African Society for Cultural History (Chairperson 2006-2008; 2012-2014; 2018-2021).
- Has been editor for the SA Journal of Cultural History 2002-2004.
- Editorial member of various scientific journals.
- Member of the Provincial Heritage Resources Agency, Gauteng's Council.
- Member of Provincial Heritage Resources Agency, Gauteng's HIA adjudication committee (Chairperson 2012-2024).

A list of reports can be viewed on www.archaetnos.co.za.

DECLARATION OF INDEPENDENCE

I, Anton Carl van Vollenhoven from Archaetnos, hereby declare that I am an independent specialist within the field of heritage management.

Signed:  Date: 7 March 2023

LIST OF ACRONYMS:

AIA – Archaeological Impact Assessment
CMP – Cultural Management Plan
EAP – Environmental Assessment Practitioner
EIA – Environmental Impact Assessment
HIA – Heritage Impact Assessment
PIA – Palaeontological Impact Assessment
SAHRA –South African Heritage Resources Agency

1. INTRODUCTION

Archaetnos cc was requested by Geovicon to conduct an archaeological impact assessment (AIA) for the expansion of the Black wattle Colliery. The site is located south of Middelburg in the Mpumalanga Province (Figure 1-3). This will be on Portion 3 of the farm Vaalbank 289 JS, south of the N4 national road.

Black Wattle Colliery is an existing mining operation. The study is aimed at an additional area earmarked for mining. The study forms part of the Environmental Authorisation Process. The client indicated the area to be surveyed. It was surveyed via foot and off-road vehicle.

FIGURE 1: LOCATION OF MIDDELBURG IN THE MPUMALANGA PROVINCE. NORTH REFRENCE IS TO THE TOP.

FIGURE 2: LOCATION OF THE SITE IN RELATION TO MIDDELBURG. NORTH REFERENCE IS TO THE TOP.

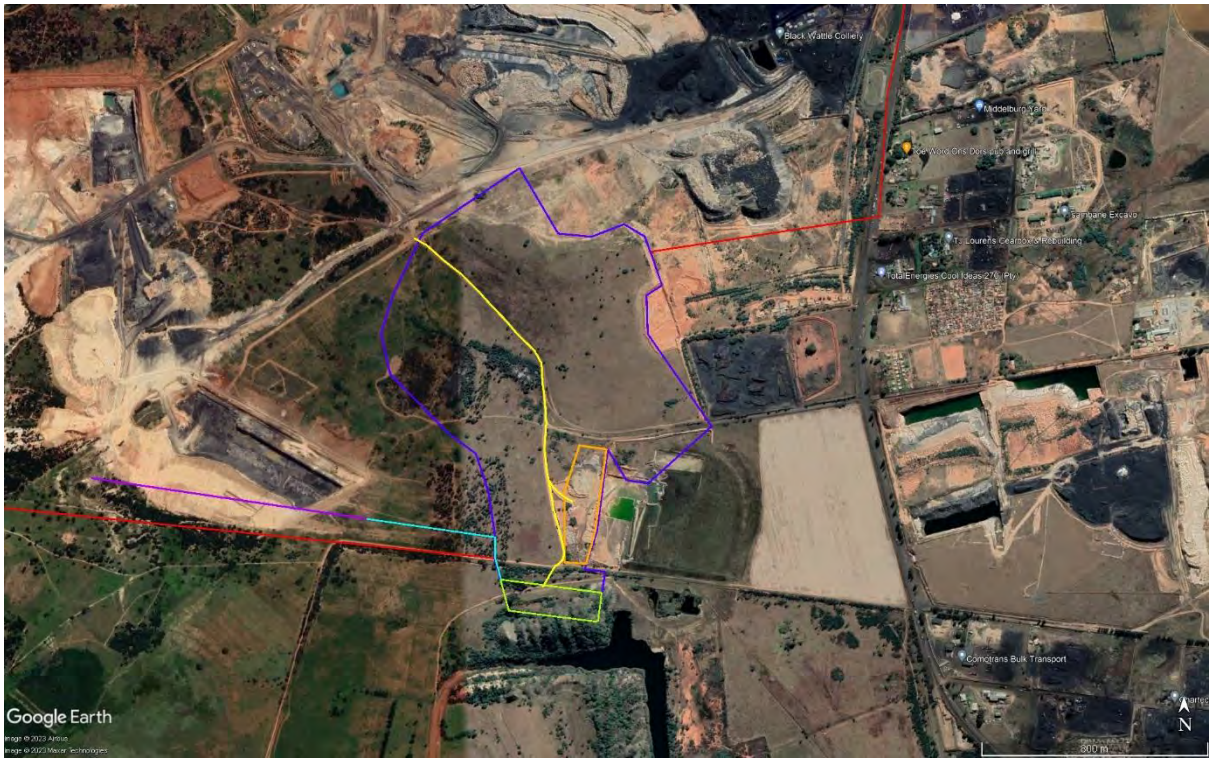


FIGURE 3: ZOOMED IN IMAGE OF THE AFFECTED SITE. NORTH REFRENCE IS TO THE TOP.

2. TERMS OF REFERENCE

The Terms of Reference for the survey were to:

1. Identify objects, sites, occurrences and structures of an archaeological or historical nature (cultural heritage sites) located on the property (see Appendix A).

2. Document the found cultural heritage sites according to best practice standards for heritage related studies.

3. Study background information on the area to be developed.

4. Assess the significance of the cultural resources in terms of their archaeological, historical, scientific, social, religious, aesthetic and tourism value (see Appendix B).

5. Describe the possible impact of the proposed development on these cultural remains, according to a standard set of conventions.

6. Recommend suitable mitigation measures to minimize possible negative impacts on the cultural resources by the proposed development.

7. Review applicable legislative requirements.

3. LEGISLATIVE REQUIREMENTS

Aspects concerning the conservation of cultural resources are dealt with mainly in two acts. The first of these are the National Heritage Resources Act (Act 25 of 1999) which deals with the cultural heritage of the Republic of South Africa. The second is the National Environmental Management Act (Act 107 of 1998) which inter alia deals with cultural heritage as part of the Environmental Impact Assessment process.

3.1 The National Heritage Resources Act

According to the above-mentioned act the following is protected as cultural heritage resources:

a. Archaeological artifacts, structures and sites older than 100 years
b. Ethnographic art objects (e.g. prehistoric rock art) and ethnography
c. Objects of decorative and visual arts
d. Military objects, structures and sites older than 75 years
e. Historical objects, structures and sites older than 60 years
f. Proclaimed heritage sites
g. Grave yards and graves older than 60 years
h. Meteorites and fossils

i. Objects, structures and sites or scientific or technological value.

The national estate (see Appendix D) includes the following:

a. Places, buildings, structures and equipment of cultural significance
b. Places to which oral traditions are attached or which are associated with living heritage
c. Historical settlements and townscapes
d. Landscapes and features of cultural significance
e. Geological sites of scientific or cultural importance
f. Archaeological and paleontological importance
g. Graves and burial grounds
h. Sites of significance relating to the history of slavery
i. Movable objects (e.g. archaeological, paleontological, meteorites, geological specimens, military, ethnographic, books etc.)

A Heritage Impact Assessment (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. It contains different specialist reports, including, but not limited to, archaeology, built environment, palaentology, visual aspects etc.[1]

An Archaeological Impact Assessment (AIA) only looks at archaeological resources. It does however make use of the same methodology generally used for HIA studies.

A Palaeontological Impact Assessment (PIA) is an assessment of palaeontological heritage. Palaeontology is a different field of study, and although also sometimes required by the South African Heritage Resources Agency (SAHRA) [2] should be done by a professional palaeontologist.

The different phases during the HIA/AIA process are described in Appendix E. An AIA/HIA must be done under the following circumstances:

a. The construction of a linear development (road, wall, power line canal etc.) exceeding 300m in length
b. The construction of a bridge or similar structure exceeding 50m in length
c. Any development or other activity that will change the character of a site and exceed 5 000m^2 or involve three or more existing erven or subdivisions thereof
d. Re-zoning of a site exceeding 10 000 m^2
e. Any other category provided for in the regulations of SAHRA or a provincial heritage authority

[1] Please consult SAHRA to determine which of these studies are needed.
[2] Please consult SAHRA to determine whether a PIA is necessary.

Structures

Section 34 (1) of the mentioned act states that no person may demolish any structure or part thereof which is older than 60 years without a permit issued by the relevant provincial heritage resources authority.

A structure means any building, works, device or other facility made by people and which is fixed to land, and includes any fixtures, fittings and equipment associated therewith.

Alter means any action affecting the structure, appearance or physical properties of a place or object, whether by way of structural or other works, by painting, plastering or the decoration or any other means.

Archaeology, palaeontology and meteorites

Section 35(4) of this act deals with archaeology, palaeontology and meteorites. The act states that no person may, without a permit issued by the responsible heritage resources authority (national or provincial):

a. destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or paleontological site or any meteorite;
b. destroy, damage, excavate, remove from its original position, collect or own any archaeological or paleontological material or object or any meteorite;
c. trade in, sell for private gain, export or attempt to export from the Republic any category of archaeological or paleontological material or object, or any meteorite; or
d. bring onto or use at an archaeological or paleontological site any excavation equipment or any equipment that assists in the detection or recovery of metals or archaeological and paleontological material or objects or use such equipment for the recovery of meteorites.
e. alter or demolish any structure or part of a structure which is older than 60 years as protected.

The above mentioned may only be disturbed or moved by an archaeologist, after receiving a permit from the South African Heritage Resources Agency (SAHRA). In order to demolish such a site or structure, a destruction permit from SAHRA will also be needed.

Human remains

Graves and burial grounds are divided into the following:

a. ancestral graves
b. royal graves and graves of traditional leaders
c. graves of victims of conflict

d. graves designated by the Minister
e. historical graves and cemeteries
f. human remains

In terms of Section 36(3) of the National Heritage Resources Act, no person may, without a permit issued by the relevant heritage resources authority:

a. destroy, damage, alter, exhume or remove from its original position or otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves;
b. destroy, damage, alter, exhume or remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority; or
c. bring onto or use at a burial ground or grave referred to in paragraph (a) or (b) any excavation, or any equipment which assists in the detection or recovery of metals.

Unidentified/unknown graves are also handled as older than 60 until proven otherwise.

Human remains that are less than 60 years old are subject to provisions of the **National Health Act** (**Act 61 of 2003**) and to local regulations. Exhumation of graves must conform to the standards set out in the **Ordinance on Excavations** (**Ordinance no. 12 of 1980**) (replacing the old Transvaal Ordinance no. 7 of 1925).

Permission must also be gained from the descendants (where known), the National Department of Health, Provincial Department of Health, Premier of the Province and local police. Furthermore, permission must also be gained from the various landowners (i.e. where the graves are located and where they are to be relocated) before exhumation can take place. Human remains can only be handled by a registered undertaker or an institution declared under the **National Health Act** (**Act 61 of 2003**).

3.2 The National Environmental Management Act

This act (Act 107 of 1998) states that a survey and evaluation of cultural resources must be done in areas where development projects, that will change the face of the environment, will be undertaken. The impact of the development on these resources should be determined and proposals for the mitigation thereof are made.

Environmental management should also take the cultural and social needs of people into account. Any disturbance of landscapes and sites that constitute the nation's cultural heritage should be avoided as far as possible and where this is not possible the disturbance should be minimized and remedied.

4. THE INTERNATIONAL FINANCE CORPORATIONS' PERFORMANCE STANDARD FOR CULTURAL HERITAGE

This standard recognizes the importance of cultural heritage for current and future generations. It aims to ensure that clients protect cultural heritage in the course of their project activities.

This is done by clients abiding to the law and having heritage surveys done in order to identify and protect cultural heritage resources via field studies and the documentation of such resources. These need to be done by competent professionals (e.g. archaeologists and cultural historians). Any possible chance finds, encountered during the project development, also needs to be managed by not disturbing it and by having it assessed by professionals.

Impacts on the cultural heritage should be minimized. This includes the possible maintenance of such sites in situ, or when not possible, the restoration of the functionality of the cultural heritage in a different location. When cultural historical and archaeological artifacts and structures need to be removed, this should be done by professionals and by abiding to the applicable legislation. The removal of cultural heritage resources may, however, only be considered if there are no technically or financially feasible alternatives. In considering the removal of cultural resources, it should be outweighed by the benefits of the overall project to the affected communities. Again, professionals should carry out the work and adhere to the best available techniques.

Consultation with affected communities should be conducted. This entails that such communities should be granted access to their cultural heritage if this is applicable. Compensation for the loss of cultural heritage should only be given in extra-ordinary circumstances.

Critical cultural heritage may not be impacted on. Professionals should be used to advise on the assessment and protection thereof. Utilization of cultural heritage resources should always be done in consultation with the affected communities in order to be consistent with their customs and traditions and to come to agreements with relation to possible equitable sharing of benefits from commercialization.

5. METHODOLOGY

5.1 Survey of literature

A survey of literature was undertaken in order to obtain background information regarding the area. Sources consulted in this regard are indicated in the bibliography.

5.2 Reference to other specialist desktop studies

One previous heritage report has been done at the Black Wattle Colliery (Van Vollenhoven et.al. 2020). Many reports have however been done in the vicinity of Middelburg. Information from these are discussed below. Other specialist reports are also being conducted for the project.

5.3 Public consultation and stakeholder engagement

Public consultation will be done in by the EAP.

5.4 Physical field survey

The survey was conducted according to generally accepted HIA practices and was aimed at locating all possible objects, sites and features of cultural significance in the area of proposed development. One regularly looks a bit wider than the demarcated area, as the surrounding context needs to be taken into consideration.

If required, the location/position of any site was determined by means of a Global Positioning System (GPS)[3], while photographs were also taken where needed. The survey was undertaken by doing a physical survey via off-road vehicle and on foot and covered as much as possible of the area to be studied (Figure 4).

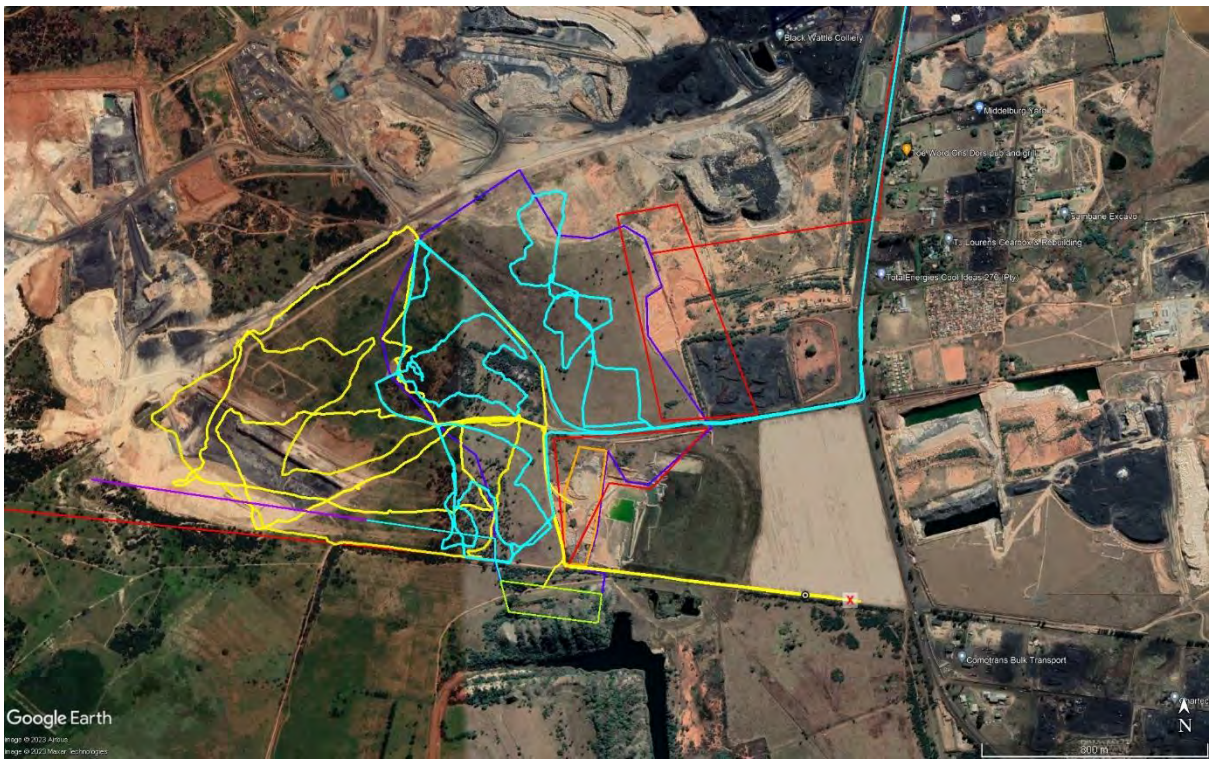


FIGURE 4: TRACK ROUTE OF THE SURVEY – YELLOW (CURRENT AND BLUE (2020) (RED LINES INDICATE ACTIVE MINING AREAS).

[3] A Garmin Oregon 550 with an accuracy factor of a few meters.

The surveyed site mainly consists of open grassland next to an open cast mine, which lies to the north and east thereof. There are two old coal dump heaps in the western side of the surveyed area. The mining activities on the east were already within the surveyed area's borders, indicted by the red borders in Figure 4 which could not be surveyed (but is completely disturbed in any event). Thus, the area is mostly disturbed by human activity. The site is approximately 70 Ha in size and the survey took 4 hours to complete.

The surveyed area had medium to low vegetation growth with the exception of black wattle and eucalyptus thickets on the western border of the surveyed site. Accordingly, both the vertical and horizontal archaeological visibility were influenced positively. The trees in the western part of the surveyed area shows signs of being chopped down, another sign of disturbance within the area.

5.5 Documentation

All sites, objects, features and structures identified were documented according to the general minimum standards accepted by the archaeological profession. Co-ordinates of individual localities were determined by means of the GPS. The information was added to the description in order to facilitate the identification of each locality.

5.6 Evaluation of Heritage sites

The evaluation of heritage sites is done by giving a field rating of each (see Appendix C) using the following criteria:

- The unique nature of a site
- The integrity of the archaeological deposit
- The wider historic, archaeological and geographic context of the site
- The location of the site in relation to other similar sites or features
- The depth of the archaeological deposit (when it can be determined or is known)
- The preservation condition of the site
- Uniqueness of the site and
- Potential to answer present research questions.

6. CONDITIONS AND ASSUMPTIONS

The following conditions and assumptions have a direct bearing on the survey and the resulting report:

1. Cultural Resources are all non-physical and physical man-made occurrences, as well as natural occurrences associated with human activity (Appendix A). These include all sites, structures and artifacts of importance, either individually or in groups, in the history, architecture and archaeology of human (cultural) development. Graves and cemeteries are included in this.

2. The significance of the sites, structures and artifacts is determined by means of their historical, social, aesthetic, technological and scientific value in relation to their uniqueness, condition of preservation and research potential. The various aspects are not mutually exclusive, and the evaluation of any site is done with reference to any number of these aspects.

3. Cultural significance is site-specific and relates to the content and context of the site. Sites regarded as having low cultural significance have already been recorded in full and require no further mitigation. Sites with medium cultural significance may or may not require mitigation depending on other factors such as the significance of impact on the site. Sites with a high cultural significance require further mitigation (see Appendix C).

4. The latitude and longitude of any archaeological or historical site or feature, is to be treated as sensitive information by the developer and should not be disclosed to members of the public.

5. All recommendations are made with full cognizance of the relevant legislation.

6. It has to be mentioned that it is almost impossible to locate all the cultural resources in a given area, as it will be very time consuming. Developers should however note that the report should make it clear how to handle any other finds that might occur.

7. In this case much of the surveyed area has been disturbed by recent human activities. Accordingly, these areas are seen as low risk areas to reveal heritage sites due to it being almost entirely disturbed.

8. The vegetation cover in certain areas was reasonably dense and high, which had a negative effect on both the horizontal and the vertical archaeological visibility. However in most of the area the visibility was good.

9. Existing mining areas (red borders in Figure 4) could not be investigated but is entirely disturbed and thus will not have any heritage sites inside.

7. DESCRIPTION OF THE PHYSICAL ENVIRONMENT

The surveyed area consists mostly of open fields with thickets of alien trees on the western side of the surveyed area (Figure 5). Mining infrastructure like dirt roads for hauling trucks are located in the site (Figure 6) and mining is currently taking place on the eastern border of the surveyed area and in certain areas this already encroaches in the survey area (Figure 7). There are old coal dumps located in the western part of the surveyed area in between the thickets of trees, indicating earlier disturbance (Figure 8).

The vegetation consists mostly of low to medium grasses. The surveyed area has scattered clumps of eucalyptus and black wattle trees with the largest and densest located to the western side (Figure 9-10).

The topography of the area is reasonably flat, with gradual sloping towards the southwest, the soil is sandy and loosely compacted. There are no distinctive natural features.

FIGURE 5: GENERAL VIEW OF THE SURVEYED AREA.

FIGURE 6: VIEW OF A DIRT ROAD USED BY MINING TRUCKS IN THE SURVEYED AREA.

FIGURE 7: ACTIVE MINING ON THE EASTERN BORDER OF THE SURVEYED AREA.

FIGURE 8: VIEW OF OLD COAL DUMP IN THE WEST OF THE SURVEYED AREA.

FIGURE 9: OPEN GRASSLAND IN THE SURVEYED AREA

FIGURE 10: EUCALUPTUS AND BLACK WATTLES GROWING IN THE SURVEYED AREA.

8. HISTORICAL CONTEXT

During this survey one site of cultural heritage significance was identified. During a survey done in 2020, some graves and historical structures were identified (Figure 11) at Black Wattle Colliery (Van Vollenhoven et.al. 2020: 24-31). It should be noted that

Site 1 from the 2020 survey falls within the borders of the proposed development. Thus, Site 1 is included herewith and will require mediation before the development can continue. Site 2 from the 2020 survey seems to have been demolished and does no longer exists (but it was documented completely in 2020 and deemed to be of low significance).

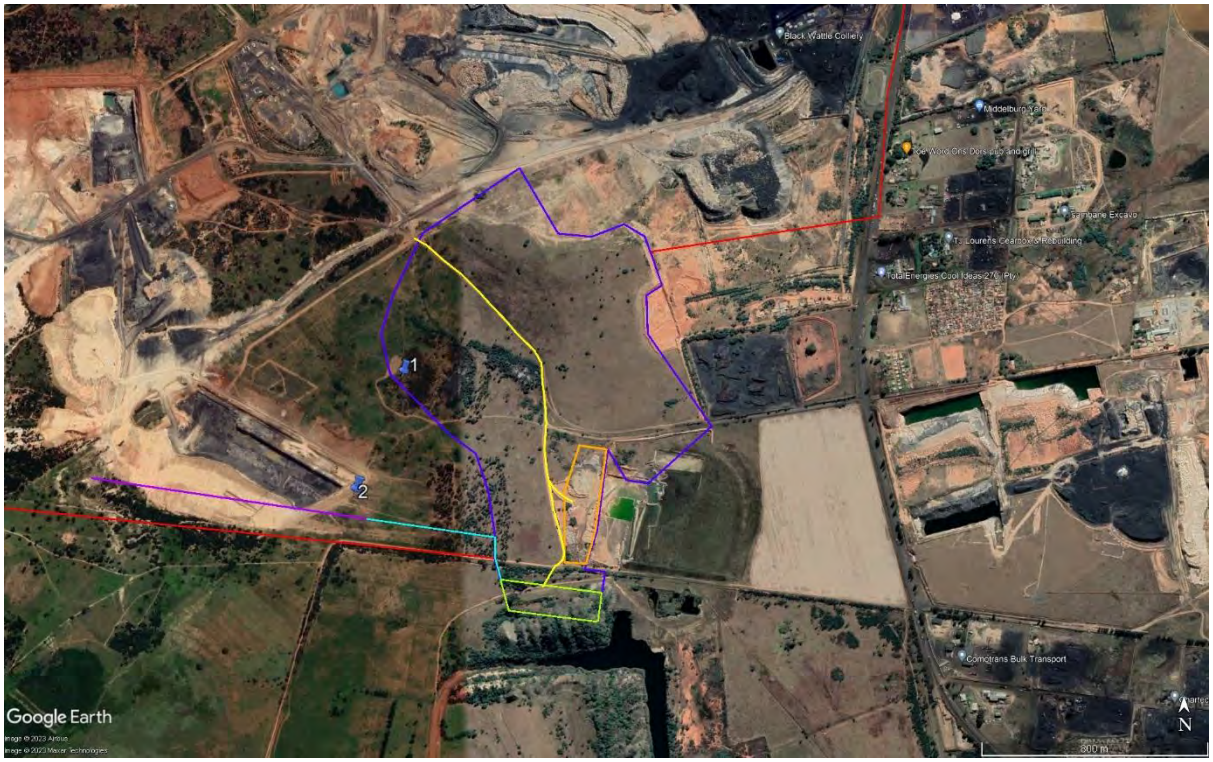


FIGURE 11: LOCATIONS OF SITES IDENTIFIED IN PAST SURVEY (BLUE PINS).

Some background information is also provided in order to place the surveyed area in a broad historical and geographical context and to contextualize possible finds that could be unearthed during construction activities. This geographical area is not well-known as one containing many prehistoric sites. One however has to realize that this most likely only indicates that not much research has been done here before.

Apart from the 2020 survey indicated above, no other report was identified on SAHRIS on this colliery, but many heritage reports were done in the wider geographical area of the surveyed area. These however either indicated that nothing of heritage significance was found, or the sites that were found has no contextual link to the current surveyed area (SAHRIS database; Archaetnos' database). Applicable information is however included below.

8.1 Stone Age

The Stone Age is the period in human history when lithic material was mainly used to produce tools (Coertze & Coertze 1996: 293). In South Africa the Stone Age can be divided in three periods. It is, however, important to note that dates are relative and only provide a broad framework for interpretation.

The division for the Stone Age according to Korsman & Meyer (1999: 93-94) is as follows:

- Early Stone Age (ESA) 2 million – 150 000 years ago;
- Middle Stone Age (MSA) 150 000 – 30 000 years ago; and
- Late Stone Age (LSA) 40 000 years ago – 1850 - A.D.

No Stone Age sites are indicated on a map contained in a historical atlas of this area (Bergh 1999: 4). The closest known Stone Age occurrence is that of rock art close to the Olifants River to the south of Witbank, i.e. south-west of the surveyed area (Bergh 1999: 5). This however should rather be seen as a lack of research in the area and not as an indication that such features do not occur.

However, no natural shelters were seen during the survey and therefore it is possible that these people did not stay here for long times. The close vicinity of water sources and ample grazing would have made it a prime spot for hunting and obtaining water during the past. Therefore, one may assume that Stone Age people probably would have moved through the area.

8.2 Iron Age

The Iron Age is the name given to the period of human history when metal was mainly used to produce metal artifacts (Coertze & Coertze 1996: 346). In South Africa it can be divided in two separate phases according to Van der Ryst & Meyer (1999: 96-98), namely:

Early Iron Age (EIA) 200 – 1000 A.D.
Late Iron Age (LIA) 1000 – 1850 A.D.

Huffman (2007: xiii) however, indicates that a Middle Iron Age should be included. His dates, which now seem to be widely accepted in archaeological circles, are:

Early Iron Age (EIA) 250 – 900 A.D.
Middle Iron Age (MIA) 900 – 1300 A.D.
Late Iron Age (LIA) 1300 – 1840 A.D.

No Iron Age sites are indicated in a historical atlas around the town of Middelburg, but this may only indicate a lack of research. The closest known Iron Age occurrences to the surveyed area are Late Iron Age sites that have been identified to the west of Bronkhorstspruit and in the vicinity of Bethal (Bergh 1999: 7-8). Late Iron Age sites were however identified during a previous survey on the farm Middelburg Town and Townlands 287 JS (Van Vollenhoven & Pelser 2009: 11-19).

The good grazing and access water in the area would have provided a good environment for Iron Age people although building material seem to be reasonably scarce. One would therefore expect that Iron Age people may have utilized the area. This is the same reason why white settlers moved into this environment later.

8.3 Historical Age

The Historical Age started with the first recorded oral histories in the area. It includes the in-migration of people that were able to read and write. Due to factors such as population growth and a decrease in mortality rates, more people inhabited the country during the recent historical past. Therefore, and because less time has passed, much more cultural heritage resources from this era have been left on the landscape. It is important to note that all cultural resources older than 60 years are potentially regarded as part of the heritage and that detailed studies are needed to determine whether these indeed have cultural significance. Factors to be considered include aesthetic, scientific, cultural and religious value of such resources.

At the beginning of the 19th century the Phuthing, a South Sotho group, stayed to the south-east of Middelburg. The Koni of Makopole stayed to the north-east and the Ndzundza Ndebele to the east. During the Difaquane they fled to the south, south-west and north-west as Mzilikazi's impi moved in from the southeast. During this time the Swazi also moved into this area (Bergh 1999: 10-11; 109).

The first white people to move through this area were the party of the traveler, Robert Scoon who passed through during 1836 (Bergh 1999: 13). Although the Voortrekkers moved across the Vaal River during the 1830's, it seems as if white people only settled here after 1850 (Bergh 1999: 14-15).

The town of Middelburg was established in 1872 (Bergh 1999: 20). During the Anglo-Boer War (1899-1902) both the Boer and British forces occupied the town, but no skirmishes took place close thereto (Bergh 1999: 51). There were however concentration camps for both white and black people during this time at Middelburg (Bergh 1999: 54).

One may therefore expect to find farm buildings, structures and objects in the area. Many graveyards from this period have been identified in surrounding areas during past surveys (Archaetnos database). One of these were at Black Wattle Colliery and some historical structures were also identified here (Van Vollenhoven et.al. 2020: 24-31).

9. DISCUSSION OF HERITAGE SITES IDENTIFIED

Two sites of cultural heritage significance were identified during the survey.

9.1 Site no. 1 – graves

Site no. 1 was identified during survey done in 2020 (Van Vollenhoven et.al. 2020: 24-29) and visited again during 2023. This is a graveyard of about 24 m long and about 14 m wide and is located next to the plantation area to the east. The site is not fenced in. The graves are orientated east to west. There is evidence of activity, digging of a trench, in the past that has covered some of the graves and more graves could be present underneath the earth mound (Figure 12-15).

GPS: 25°50'47.94"**S** 29°26'30.06"**E**

The headstones are made of natural rock, cement and metal plaques. The grave dressings are made of natural stone and bricks. Graves goods are present at some of the graves. The total number of graves are approximately 32, with no graves 60 years or older, 5 graves younger than 60 years and 27 unmarked graves. The oldest grave belongs to Zanek Mavis Zimu – 11/11/1972 and the youngest is that of Futeka Masileleis – 09/02/1995.

The following legible information was noted:
Gugu Merse Skhosana – 04/02/1986
Phinrile Masmane – 31/08/1986
Joannah Sibanyoni – -/-/1988

FIGURE 12: GRAVES AT SITE NO. 1.

FIGURE 13: EXAMPLE OF GRAVE GOODS AT SITE NO. 1.

FIGURE 14: VIEW OF GRAVEYARD AT SITE NO. 1.

FIGURE 15: EARTH MOUND COVERING GRAVE AT SITE NO. 1.

Cultural significance Table: Site 1

A place is considered to be part of the national estate if it has cultural significance because of -	**Applicable or not**	**Rating: 1 - Neglible/ 2 -Low/ 3 - Low-Medium/ 4 - Medium/ 5 - Medium-High/ 6 - High/ 7 - Very High**
Its importance in the community or pattern of South Africa's history	Y	**High**
Its possession of uncommon, rare, or endangered	N	

aspects of South Africa's natural or cultural history		
Its potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage	Y	**High**
Its importance in demonstrating the principal characteristics of a particular class of South Africa's natural or cultural places or objects	N	
Its importance in exhibiting particular aesthetic characteristics valued by a community cultural group	N	
Its importance in demonstrating a high degree of creative or technical achievement at a particular period	N	
Its strong or special association with a particular community or cultural group for social, cultural or spiritual reasons	Y	**High**
Its strong or special association with the life or work of a person, group or organization of importance in the history of South Africa	N	

Sites of significance relating to the history of slavery in South Africa	N	
Reasoned assessment of significance using appropriate indicators outlined above:		**High**

Integrity scale:
1 – Bad state of preservation, but no contextual information
2 – Bad state of preservation and includes contextual information
3 – Reasonable state of preservation, but no contextual information
4 – Reasonable state of preservation and includes contextual information
5 – Good state of preservation, but no contextual information
6 - Good state of preservation and includes contextual information
7 – Excellent state of preservation, but no contextual information
8 – Excellent state of preservation and includes contextual information

Field-rating = Cultural significance x Integrity
= **High** (6)x 4
= 24

Graves are always regarded as having a high cultural significance. The field rating is Local Grade IIIB. It should be included in the heritage register and mitigation measures must be implemented if any development activities take place in its vicinity.

Two possibilities exist. The first option would be to fence the graves in or demarcate the site and have a management plan drafted for the sustainable preservation thereof. This should be compiled by a heritage expert. This option is relevant when the graves are in no danger of being damaged or destroyed by the development (direct impacts). Secondary impact due to the development activities may still exist and must be managed.

The second option is to exhume the mortal remains and to have it relocated. This usually is relevant when the graves will be directly affected (damaged or destroyed) by the development. In this case specific procedures should be followed which includes social consultation. Graves younger than 60 years may be exhumed only by an undertaker. For those older than 60 years, and unknown graves, an undertaker and archaeologist should be appointed. Permits must be obtained from the Burial Grounds and Graves unit of SAHRA. This procedure is quite lengthy and involves social consultation.

The site is inside of the area of direct impact. Therefore Option 2 is recommended.

9.2 Site no. 2 – Historic Structure - Reservoir

This is a cement reservoir of about 13 m diameter and is set in the ground. The structure is most likely older than 60 years of age (Figure 16-17).

GPS: 25°50'43.53"**S** 29°26'35.24"**E**

FIGURE 16: VIEW OF RESERVOIR AT SITE 3.

FIGURE 17: CLOSE UP VIEW OF THE RESERVOIR.

Cultural significance Table: Site 3

A place is considered to be part of the national estate if it has cultural significance because of -	**Applicable or not**	**Rating: 1 - Negligible / 2 -Low/ 3 - Low-Medium/ 4 - Medium/ 5 - Medium-High/ 6 - High/ 7 - Very High**
Its importance in the community or pattern of South Africa's history	Y	**Negligible**
Its possession of uncommon, rare, or endangered aspects of South Africa's natural or cultural history	N	
Its potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage	Y	**Negligible**
Its importance in demonstrating the principal characteristics of a particular class of South Africa's natural or cultural places or objects	N	
Its importance in exhibiting particular aesthetic characteristics valued by a community cultural group	N	
Its importance in demonstrating a high degree of creative or technical achievement at	Y	**Negligible**

a particular period		
Its strong or special association with a particular community or cultural group for social, cultural or spiritual reasons	N	
Its strong or special association with the life or work of a person, group or organization of importance in the history of South Africa	N	
Sites of significance relating to the history of slavery in South Africa	N	
Reasoned assessment of significance using appropriate indicators outlined above:		**Negligible**

Integrity scale:
1 – Bad state of preservation, but no contextual information
2 – Bad state of preservation and includes contextual information
3 – Reasonable state of preservation, but no contextual information
4 – Reasonable state of preservation and includes contextual information
5 – Good state of preservation, but no contextual information
6 - Good state of preservation and includes contextual information
7 – Excellent state of preservation, but no contextual information
8 – Excellent state of preservation and includes contextual information

Field-rating = Cultural significance x Integrity
= **Negligible** (1)x 3
= 3

The site therefore receives a rating of Local Grade IIIC: The description in the phase 1 heritage report is seen as sufficient recording (low significance) and it may be granted destruction at the discretion of the relevant heritage authority without a formal permit application, subjected to the granting of Environmental Authorization.

10. CONCLUSION AND RECOMMENDATIONS

The survey of the proposed Black wattle Colliery was completed successfully. During the survey two sites of cultural heritage significance was identified (Figure 18).

FIGURE 18: LOCATION OF THE SITES IDENTIFIED DURING THIS SURVEY (YELLOW PIN) AND THE SURVEY FROM 2020 (BLUE PIN).

The following is recommended:

- Site 1 is a graveyard and falls within the surveyed area. Graves are always regarded as having a high cultural significance. It should be included in the heritage register and mitigation measures must be implemented if any development activities take place in its vicinity.

    - Two possibilities exist. The first option would be to fence the graves in or demarcate the site and have a management plan drafted for the sustainable preservation thereof. This should be compiled by a heritage expert. This option is relevant when the graves are in no danger of being damaged or destroyed by the development (direct impacts). Secondary impact due to the development activities may still exist and must be managed.

    - The second option is to exhume the mortal remains and to have it relocated. This usually is relevant when the graves will be directly affected (damaged or destroyed) by the development. In this case specific procedures should be followed which includes social

consultation. Graves younger than 60 years may be exhumed only by an undertaker. For those older than 60 years, and unknown graves, an undertaker and archaeologist should be appointed. Permits must be obtained from the Burial Grounds and Graves unit of SAHRA. This procedure is quite lengthy and involves social consultation.

- Since site no. 1 is inside of the area of direct impact, Option 2 is recommended.

- Site no. 2 is located within the surveyed area and is seen to have a negligible heritage significance. The site receives a rating of Local Grade IIIC: The description in the phase 1 heritage report is seen as sufficient recording (low significance) and it may be granted destruction at the discretion of the relevant heritage authority without a formal permit application, subjected to the granting of Environmental Authorization.

- Site 2 from the 2020 survey seems to have been demolished and does no longer exists (but it was documented completely in 2020 and deemed to be of low significance).

- After implementation of the above mitigation measures and upon receiving the necessary comments from the heritage authority, the proposed development may continue.

- It should be noted that the subterranean presence of archaeological and/or historical sites, features or artifacts is always a distinct possibility. Due to the density of vegetation it also is possible that some sites may only become known later on. Operating controls and monitoring should therefore be aimed at the possible unearthing of such features. Care should therefore be taken when development commences that if any of these are discovered, a qualified archaeologist be called in to investigate the occurrence.

- In This regards the following 'Chance find Procedure' should be followed:

    1. Upon finding any archaeological or historical material all work at the affected area must cease.
    2. The area should be demarcated in order to prevent any further work there until an investigation has been completed.
    3. An archaeologist should be contacted immediately to provide advice on the matter.
    4. Should it be a minor issue, the archaeologist will decide on future action, which could include adapting the HIA or not. Depending on the nature of the find, it may include a site visit.
    5. SAHRA's APM Unit may also be notified.
    6. If needed, the necessary permit will be applied for with SAHRA. This will be done in conjunction with the appointed archaeologist.
    7. The removal of such archaeological material will be done by the archaeologist in lieu of the approval given by SAHRA, including any

conditions stipulated by the latter.

8. Work on site will only continue after removal of the archaeological/ historical material was done.

11. REFERENCES

Archaetnos database.

Bergh, J.S. 1999. **Geskiedenisatlas van Suid-Afrika: die Vier Noordelike Provinsies**. (Van Schaik, Pretoria).

Coertze, P.J. & Coertze, R.D. 1996. **Verklarende vakwoordeboek vir Antropologie en Argeologie**. (R.D. Coertze, Pretoria).

Huffman, T.N. 2007. **Handbook to the Iron Age**. (University of KwaZulu-Natal Press, Scottsville).

International Finance Corporation. 2012. **Overview of performance standards on Environmental and Social Sustainability. Performance Standard 8, Cultural Heritage.** World Bank Group.

Knudson, S.J. 1978. **Culture in retrospect.** Chicago: Rand McNally College Publishing Company.

Korsman, S.A. & Meyer, A. 1999. Die Steentydperk en rotskuns. Bergh, J.S. (red.). **Geskiedenisatlas van Suid-Afrika. Die vier noordelike provinsies.** Pretoria: J.L. van Schaik.

Republic of South Africa. 1999. **National Heritage Resources Act** (No 25 of 1999). Pretoria: the Government Printer.

Republic of South Africa. 1998. **National Environmental Management Act** (no 107 of 1998). Pretoria: The Government Printer.

Republic of South Africa. 1980. Ordinance on Excavations **(Ordinance no. 12 of 1980). The Government Printer: Pretoria.**

Republic of South Africa. 2003. **National Health Act** (Act 61 of 2003). The Government Printer: Pretoria.

SAHRA's SAHRIS database.

Van der Ryst, M.M. & Meyer, A. 1999. Die Ystertydperk. Bergh, J.S. (red.). **Geskiedenisatlas van Suid-Afrika. Die vier noordelike provinsies**. (J.L. van Schaik, Pretoria).

Van Vollenhoven, A.C. & Pelser, A.J. 2009.**A report on a cultural heritage impact assessment on a portion of portion 27 of the farm Middelburg Town and Townlands 287 JS in Middelburg, Mpumalanga Province**. (Unpublished report, Wonderboompoort, Archaetnos).

Van Vollenhoven, A.C., Smit, J. & Viljoen, D. 2020. **A report on an archaeological impact assessment for the proposed Black Wattle Colliery, close to Middelburg, Mpumalanga Province**. (Unpublished report, Groenkloof, Archaetnos).

APPENDIX A

DEFINITION OF TERMS:

Site: A large place with extensive structures and related cultural objects. It can also be a large assemblage of cultural artifacts, found on a single location.

Structure: A permanent building found in isolation, or which forms a site in conjunction with other structures.

Feature: A coincidental find of movable cultural objects.

Object: Artifact (cultural object).

(Also see Knudson 1978: 20).

APPENDIX B

DEFINITION/ STATEMENT OF HERITAGE SIGNIFICANCE:

Historic value:	Important in the community or pattern of history or has an association with the life or work of a person, group or organization of importance in history.
Aesthetic value:	Important in exhibiting particular aesthetic characteristics valued by a community or cultural group.
Scientific value:	Potential to yield information that will contribute to an understanding of natural or cultural history or is important in demonstrating a high degree of creative or technical achievement of a particular period
Social value:	Have a strong or special association with a particular community or cultural group for social, cultural or spiritual reasons.
Rarity:	Does it possess uncommon, rare or endangered aspects of natural or cultural heritage.
Representivity:	Important in demonstrating the principal characteristics of a particular class of natural or cultural places or object or a range of landscapes or environments characteristic of its class or of human activities (including way of life, philosophy, custom, process, land-use, function, design or technique) in the environment of the nation, province region or locality.

APPENDIX C

SIGNIFICANCE AND FIELD RATING:

Cultural significance:

- Negligible – The site has no heritage significance, although it may be older than 60 years.

- Low - A cultural object being found out of context, not being part of a site or without any related feature/structure in its surroundings. A site with minimal importance which is decreased by its bad state of decay.

- Low-Medium - A site of lesser importance, which is increased by a good state of preservation and contextual importance (e.g. a specific community).

- Medium - Any site, structure or feature being regarded less important due to a number of factors, such as date and frequency. Also any important object found out of context.

- Medium-High - A site that has high importance due to its age or uniqueness, but which decreases due to its bad state of decay.

- High - Any site, structure or feature regarded as important because of its age or uniqueness. Also any important object found within a specific context.

- Very High - A site of exceptional importance due to its age, uniqueness and good state of preservation.

Heritage significance:

- Grade I Heritage resources with exceptional qualities to the extent that they are of national significance

- Grade II Heritage resources with qualities giving it provincial or regional importance although it may form part of the national estate

- Grade III Other heritage resources of local importance and therefore worthy of conservation

Field ratings:

National Grade I significance: The site should be managed as part of the national estate, should be nominated as Grad I site, should be maintained in situ with a protected buffer zone and a CMP must be recommended. Score above 50.

Provincial Grade II significance: The site should be managed as part of the provincial estate, should be nominated as Grade II site, should be maintained in situ with a protected buffer zone and a CMP must be recommended. Score between 40 and 50.

.

Local Grade IIIA: The site should be included in the heritage register and not be mitigated (high significance), should be maintained in situ with a protected buffer zone and a CMP must be recommended. Score between 37 and 40.

Local Grade IIIB: The site should be included in the heritage register and may be mitigated (high/ medium significance). Mitigation is subject to a permit application lodged with the relevant heritage authority. Score between 6 and 36.

Local Grade IIIC: The description in the phase 1 heritage report is seen as sufficient recording (low significance) and it may be granted destruction at the discretion of the relevant heritage authority without a formal permit application, subjected to the granting of Environmental Authorization. Score below 5.

APPENDIX D

PROTECTION OF HERITAGE RESOURCES:

Formal protection:

National heritage sites and Provincial heritage sites – grade I and II
Protected areas - an area surrounding a heritage site
Provisional protection – for a maximum period of two years
Heritage registers – listing grades II and III
Heritage areas – areas with more than one heritage site included
Heritage objects – e.g. archaeological, palaeontological, meteorites, geological specimens, visual art, military, numismatic, books, etc.

General protection:

Objects protected by the laws of foreign states
Structures – older than 60 years
Archaeology, palaeontology and meteorites
Burial grounds and graves
Public monuments and memorials

APPENDIX E

HERITAGE IMPACT ASSESSMENT PHASES

1. Pre-assessment or scoping phase – establishment of the scope of the project and terms of reference.
2. Baseline assessment – establishment of a broad framework of the potential heritage of an area.
3. Phase I impact assessment – identifying sites, assess their significance, make comments on the impact of the development and makes recommendations for mitigation or conservation.
4. Letter of recommendation for exemption – if there is no likelihood that any sites will be impacted.
5. Phase II mitigation or rescue – planning for the protection of significant sites or sampling through excavation or collection (after receiving a permit) of sites that may be lost.
6. Phase III management plan – for rare cases where sites are so important that development cannot be allowed.

Appendix 5

Final Rehabilitation, Decommissioning and Mine Closure Plan

Black Wattle Colliery (Pty) Limited

Final Rehabilitation, Decommissioning and Mine Closure Plan

Compiled in terms of Appendix 4 of the NEMA Regulations pertaining to the Financial Provision for Prospecting, Exploration, Mining or Production Operations (GNR 1147)

For
The determination of financial provision as contemplated in the NEMA for the costs associated with the undertaking of management, rehabilitation and remediation of environmental impacts from mining operations

Black Wattle Colliery

DMRE Reference No.: MP 30/5/1/2/3/2/1 (10140) MR

April 2023

Document No: 4289/2023

GEOVICON Environmental
Environmental & Geological Consultants

Report Type:	Final Rehabilitation, Decommissioning and Mine Closure Plan
Project Title:	Opencast extension Project
Compiled for:	Black Wattle Colliery Proprietary Limited
Compiled by:	R.N Maseko BSc Hons.
Reviewed by:	O.T. Shakwane, B.Sc. Hons. Pr. Sci.Nat and Registered EAP
Geovicon Reference:	4289/2023
Version:	Draft
Date:	April 2023
Distribution List:	Environmental Department at Black Wattle Colliery

Disclaimer:

The results and conclusions of this report are limited to the Scope of Work agreed between Geovicon Environmental (Pty) Limited and the Black Wattle Colliery Proprietary Limited for whom this report/ investigation has been conducted. All work conducted by Geovicon Environmental (Pty) Limited is done in accordance with the Geovicon Standard Operating Procedures.

Copyright:

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 regarding 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)
R. Maseko, BSc. Hons

This report was reviewed by:

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

CONTENTS PAGE

FIGURES

TABLES

ABBREVIATIONS

TERMS	DEFINITION
DMRE	Department of Mineral Resources and Energy
DWA	Department of water Affairs
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner

TERMS	DEFINITION
EAPASA	Environmental Assessment Practitioners Association of South Africa
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme Report
I&APs	Interested and Affected Parties
IAIA	International Association for Impact Assessment
IWUL	Integrated Water Use Licence
IWUL's	Integrated Water Use Licences
eWULAAS	Electronic Water Use Licence Application and Authorisation System
LoM	Life of Mine
MAMSL	Meters above mean sea level
MPRDA	Mineral and Petroleum Resources Development Act
NEMA	National Environmental Management Act
NEMWA	National Environmental Management: Waste Act

TERMS	DEFINITION
NWA	National Water Act
PCD	Pollution Control Dam
ROM	Run of Mine
SACNASP	South African Council for Natural Scientific Professions

EXECUTIVE SUMMARY

Black Wattle Colliery is owned by Black Wattle Colliery (Pty) Limited and is an opencast mining operation situated on the remainder of portion 27 of the farm Middelburg Town and Townlands 287 JS and a portion of the remainder of portion 2 of the farm Uitkyk 290 JS, portions 3, 14, 27 and a portion of mineral area 1 (a portion of portion 3) of the farm Vaalbank 289 JS, within the Magisterial District of Middelburg, Mpumalanga Province.

Black Wattle Colliery is located approximately 3 km south of Middelburg at the intersection of the N4 freeway and the R35 Middelburg-Bethal Provincial Road. It lies within the Steve Tshwete Local Municipality and Nkangala District Municipality in the Mpumalanga Province. Black Wattle Colliery is an opencast strip mine near Middelburg, Mpumalanga. Black Wattle Colliery extracts the No. 1 and No. 2 coal seams within the Witbank Coalfields. The coal reserves in the project area were formerly mined using the underground method and was changed to opencast method due to poor roof wall encountered in the underground workings. The coal products from the current mining operation are targeted for both local and international markets. Coal is processed on site using a Dense Medium Separation (DMS) coal washing plant. Arising mineral residue from the coal washing process during the life of mine have resulted in one mineral residue deposit facility, which is no longer active. Mineral residue from the coal processing is now sold as low-quality coal product to the local market hence the mineral residue deposit facility is no longer a necessity. Black Wattle Colliery is operated under a mining right granted by the DMRE (DMRE Ref. No.: MP 30/5/1/2/2/22 (10140) MR), an approved EMPR and an issued Water Use License (WUL) (License no: 04/B12D/AGJ/466).

In terms of the MPRDA and NEMA, Black Wattle Colliery (Pty) Limited is responsible for ensuring that mining at Black Wattle Colliery is undertaken in such a manner that does not result in unacceptable pollution, ecological degradation or damage to the environment. In view of the above, Black Wattle Colliery (Pty) Limited must ensure that the Black Wattle Colliery mining area is rehabilitated to a state where there is a sustainable post mining land usage with no long term negative environmental impacts. This in essence implies that the area under the control of Black Wattle Colliery (as indicated in the Mining Right MP 30/5/1/2/2/22 (10140) MR) must be rehabilitated in such a manner as to ensure a sustainable post mining land use, as well as the prevention or management of post mining negative environmental effects.

Further to the above, Black Wattle Colliery (Pty) Limited recently acquired additional coal reserves from South 32 SA Coal Holdings (Pty) Limited on land adjacent to their mining right area (a portion of portion 3 of the farm Vaalbank 289 JS and portion 24 and 29 of the farm Goedehoop 315 JS). The acquisition of this coal reserve will extend the life of mine of Black Wattle Colliery by ten years. South 32 SA Coal Holdings (Pty) Limited entered into an agreement with Black Wattle Colliery (Pty) Limited to abandoned and transfer a part of portion of portion 3 of the farm Vaalbank 289 JS and portion 24 and 29 of the farm Goedehoop 315 JS from their mining right to Black Wattle Colliery (Pty) Limited. Black Wattle Colliery (Pty) Limited has accepted the transfer and intends on incorporating the land covered by the coal reserves in question into their Mining Right.

As a result, Black Wattle Colliery (Pty) Limited has lodged an application in terms of section 102 of the MPRDA to amend the Mining Right MP 30/5/1/2/2/22 MR (10140 MR) to include the property secured under the said transferal, and the mining right area will now measure 1210.1198 Ha. In order to comply with the requirements of the MPRDA and NEMA for the above-mentioned mining right variation, which has triggered NEMA listed activities, Black Wattle Colliery (Pty) Limited has applied for an environmental authorization for listed activities triggered by the proposed opencast mining extension operation.

This document outlines changes at Black Wattle Colliery's mining right area as a result of the expansion of the mining right area i.e., extension of the opencast mining area together with infrastructure and facilities associated with the extension. Infrastructure and facilities associated with the opencast extension project will include haul roads, water management structures (storm water diversion structures), a dirty water pipelines, and a topsoil stockpile. The existing offices, workshops, pollution control dam, pipeline system and carbonaceous overburden stockpiling areas will be used for servicing the proposed opencast extension project. Note that the existing structures occur within the current Black Wattle Colliery mining right area.

The National Environmental Management Act, 1998 (Act 107 of 1998), (NEMA) requires that any person or entity that intends on undertaking activities listed in government notices 983, 984 and 985, as amended must obtain an environmental authorisation in terms of section 24D of the NEMA before undertaking such activities. Activities that will require an environmental authorisation in terms of the above-mentioned act were identified for the proposed opencast extension and are listed in a table contained in this report.

In addition to the above, section 24P of NEMA requires a holder of a mining right to assess his or her environmental liability in a prescribed manner and increase his or her financial provision to the satisfaction of the Minister responsible for mineral resources. Section 24P of NEMA further requires the holder of a mining right to submit an audit report to the Minister responsible for mineral resources on the adequacy of the financial provision from an independent auditor. The determination of financial provision as contemplated in the NEMA for the cost associated with the undertaking of management, rehabilitation and remediation of environmental impacts from mining operations must be determined in terms of the NEMA Regulations pertaining to the Financial Provision for Prospecting, Exploration, Mining or Production Operations (GN R 1147). The above-mentioned regulations requires the holder of a mining right to undertake a review of the requirements and cost for the following for their mining operations i.e. annual rehabilitation (as reflected in an annual rehabilitation plan), final rehabilitation, decommissioning and closure of the mining operations at the end of the life of operations (as reflected in a final rehabilitation, decommissioning and mine closure plan) and remediation of latent or residual environmental impacts which may become known in the future, including the pumping and treatment of polluted or extraneous water (as reflected in an environmental risk assessment report).

In view of the above, Black Wattle Colliery (Pty) Limited has undertaken the financial provision for Black Wattle Colliery in terms of the above-mentioned NEMA Regulations. This report concerns the requirement for the compilation and submission of the final rehabilitation, decommission and mine closure plan. The plan has been developed in compliance with appendix 4 of the GN 1147. This report aims to identify a post-mining land use that is feasible through providing the vision, objectives, targets and criteria for final rehabilitation, decommissioning and closure of the project; outlining the design principles for closure; explaining the risk assessment approach and outcomes and link closure activities to risk rehabilitation; detailing the closure actions that clearly indicate the measures that will be taken to mitigate and/ or manage identified risks and describes the nature of residual risks that will need to be monitored and managed post closure; committing to a schedule, budget, roles and responsibilities for final rehabilitation, decommissioning and closure of each relevant activity or item of infrastructure; identifying knowledge gaps and how these will be addressed and filled; detailing the full closure costs for the life of project at increasing levels of accuracy as the project develops and approaches closure in line with the final land use proposed; and outlining monitoring, auditing and reporting requirements. The report is submitted as one of the two reports submitted for the financial provision determination for Black Wattle Colliery for the financial year ending February 2022/ 2023.

SECTION ONE

Introduction

1. INTRODUCTION

1.1 OVERVIEW OF THE PROJECT

1.1.1 Name of the Applicant

Black Wattle Colliery (Pty) Ltd

1.1.2 Name of the Proposed Project

Black Wattle Colliery Opencast Expansion 2022 Project

1.1.3 Name of the Mining Project

Black Wattle Colliery Opencast Expansion 2022 Project

1.1.4 Address of the Mining Project

Postal Address:

Black Wattle Colliery (Pty) Limited

P. O. Box 1704

Middelburg

1050

Physical Address:

Portion 4

Farm Vaalbank 289 JS

1.1.5 Project Manager

Mr. R. Grobler

Cell: 083 250 7371

1.1.6 Contact Person

Mr. Robert Grobler (Email: robert@blackwattle.co.za)

Black Wattle Colliery (Pty) Limited

P.O Box 1963

Cramerview, 2060

1.2 DETAILS OF PERSON OR PERSONS THAT PREPARED THE PLAN

1.2.1 Name and contact details of the EAP

EAP:	Mr. Ornassis Tshepo Shakwane
IAIA Membership No.:	3847
Company:	Geovicon Environmental (Pty) Limited

Postal Address:

P.O. Box 4050

MIDDELBURG, 1050

Tel: (013) 243 5842

Fax: (086) 632 4936

Cell No.: 0824981847

1.3 DETAILS OF THE PROFESSIONAL REGISTRATIONS AND EXPERIENCE OF THE PERSON THAT PREPARED THE PLAN

Geovicon Environmental (Pty) Limited was appointed by Black Wattle Colliery (Pty) Ltd as the independent environmental consultant to compile this SR for the proposed Black Wattle opencast expansion 2022 Project and has no vested interest in the project.

Geovicon Environmental (Pty) Limited is a geological and environmental consulting company. The company was formed in 1996, and currently has twenty-six years' experience in the geological and environmental consulting field. Geovicon Environmental (Pty) Limited has successfully completed consulting projects in the Mining sector (coal, gold, base metals, 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 and in 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 shareholders i.e., O.T. Shakwane, J.M. Bate and T.G. Tefu.

The Curriculum Vitae of the Environmental Assessment Practitioner (EAP) and the assistant who were involved in the compilation of this report are as follows:

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, EIA, environmental risk assessment and environmental management systems with several tertiary institutions. He has worked within the three state departments tasked with mining and environmental management i.e., Department of Water and Sanitation (Gauteng and Mpumalanga Region), DMRE (Mpumalanga Region) and Department of Agriculture, Conservation and Environment (Gauteng Region). Mr. Shakwane has been in the consulting field since 2004 and has undertaken environmental impact assessments for mining operations similar to the proposed Black Wattle Colliery Opencast Expansion Project. Mr. Shakwane is the appointed EAP (reviewer) for the NEMA EIA application and the EIA process for the proposed Black Wattle Colliery Opencast Expansion Project. Mr. Shakwane has been involved in the field of EIA for the past nineteen years.

He is registered with the Environmental Assessment Practitioners Association of South Africa and South African Council for Natural Scientific Professions as an Environmental Assessment Practitioner and a Professional Natural Scientist in terms of section 24H of the National Environmental Management Act, (Act 107 of 1998) and section 20(3) of the Natural Scientific Professions Act, 2003 (Act 27 of 2003), respectively. He is also a member of the International Association for Impact Assessment, South Africa.

Mr. Ornassis Tshepo Shakwane of Geovicon Environmental (Pty) Limited, hereby declares that he is an independent EAP and that Geovicon Environmental (Pty) Limited have no business, financial, personal, or other interest in this project in respect of which Geovicon Environmental (Pty) Limited is appointed. Furthermore, no circumstances exist that may compromise the objectivity of Geovicon Environmental (Pty) Limited, excluding fair remuneration for work performed in connection with this report.

1.4 WHO WILL EVALUATE THE FINAL REHABILITATION, DECOMMISSIONING AND MINE CLOSURE PLAN?

According to regulation 23 of the NEMA EIA Regulations, 2014, an applicant for an environmental authorisation must submit to the competent authority an environmental impact assessment report, including plans, report and calculations contemplated in the Financial Provisioning Regulations. According to the Environmental Impact Assessment Regulations Listing Notices 1, 2 and 3, the Minister responsible for mineral resources is the competent authority where the application is a mining application. In view of the above and since the application in question is a mining application, the Minister responsible for the DMRE is the competent authority.

Regulation 23 of the NEMA EIA Regulations, 2014 further requires that the plans, report, and calculations contemplated in the Financial Provisioning Regulations be subjected to a public participation process of at least 30 days and the plans, report and calculations must reflect the incorporation of comments received, which must include any comments of the competent authority. In view of the above the draft final rehabilitation, decommissioning and mine closure plan (this document) for the proposed Opencast extension project together with the risk assessment report is made available to the potential and registered interested and affected parties, including the DMRE, Mpumalanga Regional Office (eMalahleni), for their evaluation and commenting

In addition to this, the DWS has an overall responsibility for and authority over water resource management in the Republic of South Africa, which includes the allocation and use of water in the interest of the public. In view of the above, a person is only entitled to use water if the water use is permissible under the National Water Act (Act No. 36 of 1998). Hence the water use licence application lodged in the IWULAAS system. In conjunction to the lodged application, a mine closure/rehabilitation plan in accordance to the regulations of the National Water Act, 1998 (Act No. 36 of 1998), as amended must be submitted.

2. PROJECT OVERVIEW

2.1 MATERIAL INFORMATION AND ISSUES THAT HAVE GUIDED THE DEVELOPMENT OF THE PLAN

The following were used to develop the final rehabilitation, decommissioning and closure plan for Black Wattle Colliery i.e.:

- Guideline Document for the Evaluation of the Quantum of Closure Related Financial Provision Provided by a Mine, by the DMRE (January, 2005);
- National Environmental Management Act 107 of 1998, Financial Provisioning Regulations, 2015, as amended (GN R 1147);

- Chamber of Mines of South Africa's Guidelines for the rehabilitation of mined land;
- Survey data, which include both the aerial survey and ground truth survey obtained during site visits;
- A computer-based programme was used for the determination of the sizes of the surface areas used in this report;
- Current unit rates provided by the DMRE were used for the calculations of the closure cost;
- The approved EMPR and the Integrated Water and Waste Management Plan (IWWMP) for Black Wattle Colliery were used during the development of this report; and
- Final Rehabilitation, Decommissioning and Mine Closure Plan for the existing Black Wattle Colliery.

2.2 LOCATION

The proposed Black Wattle Colliery Opencast Expansion Project is situated on a portion of portion 3 of the farm Vaalbank 289 JS and portion 24 and 29 of the farm Goedehoop 315 JS, situated within the Magisterial District of Middelburg, Mpumalanga Province. The proposed Black Wattle Colliery Opencast Expansion Project area is located approximately 8 km south of Middelburg (Figure 1) at the intersection of the N4 freeway and the R35 Middelburg-Bethal provincial road.

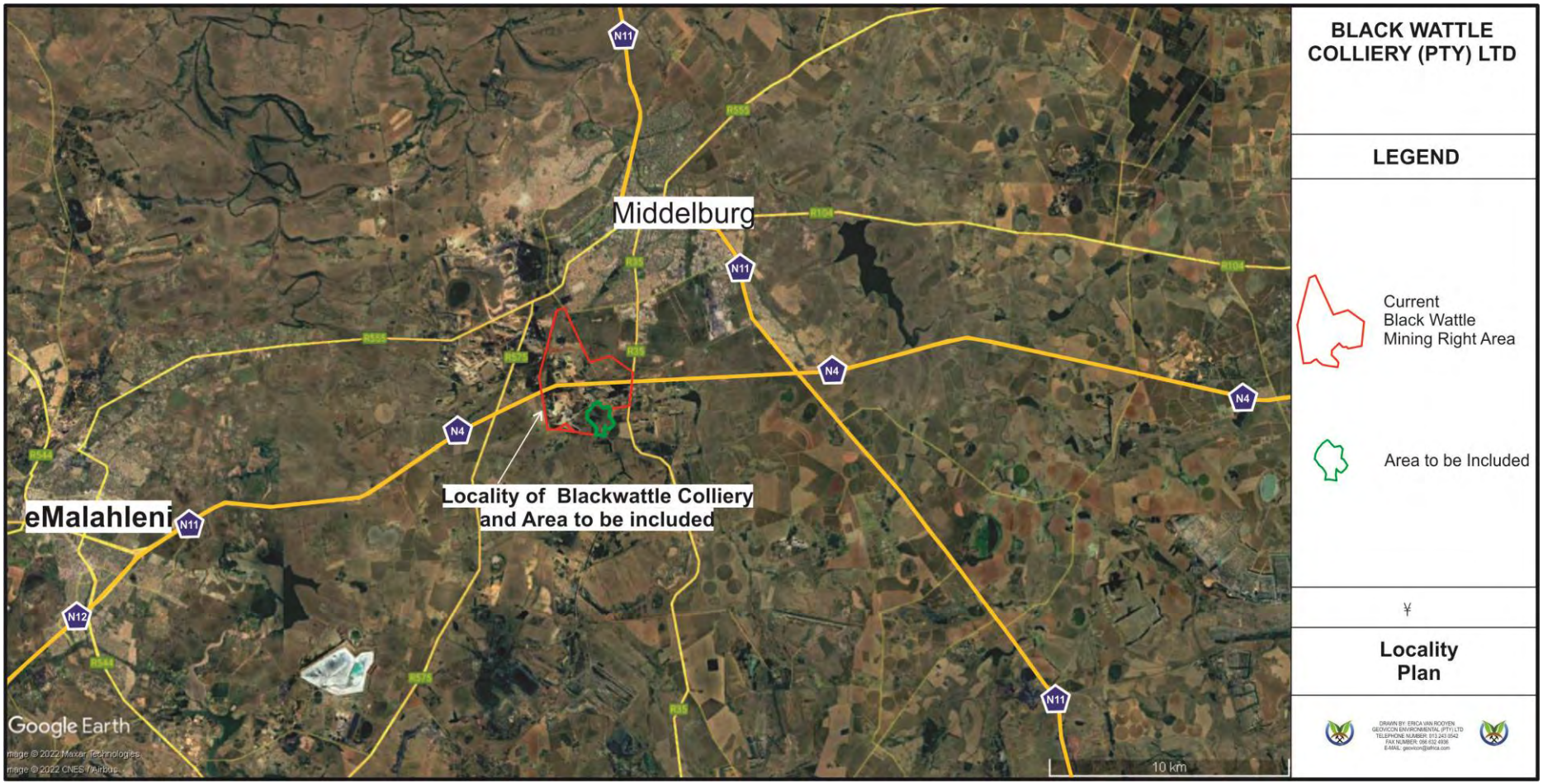


Figure 1: Location of the proposed opencast expansion

2.3 DESCRIPTION OF THE ACTIVITY

2.3.1. Existing operations

The infrastructure for the current operations includes the following:

Office/Workshop Complex:

- The office/workshop complex will consist of the following i.e.:
- Main office (administrative) buildings,
- Workshops (Mine and mining contractors workshops),
- Ablution facilities (chemical toilets or septic/conservancy tanks. Chemical toilets will be used at the opencast workings and the change house will be linked to the septic/conservancy tanks.
- Water and electrical distribution installations. A pipelines network will be used for the conveyance of water within the complex. Should electricity be supplied from Eskom, a network of electrical power lines will be used for the supply of electricity from the Eskom power lines to the mine's substation. Note that currently only fuel energy will be used for the mine.

Mining sections:

The mining sections consist of the following facilities and infrastructure i.e.:

- Access roads and haul roads
- Raw coal crushing and screening plant facility,
- Coal processing facility (including a filter press plant)
- R.O.M. coal stockpiling area.
- Mining contractors hard parks
- A weighbridge
- Pollution control dams, and
- Mine access control points (security points

2.3.2. Description of the proposed opencast expansion project.

The project will comprise of the following activities, which are described in more detail below i.e.:

- Access/haul roads,
- Topsoil stockpiles
- Opencast pits
- Water management structures (storm water diversion structures and a pipeline).

Opencast Expansion

Opencast mining, using the truck and shovel lateral rollover mining method will be undertaken. Mining will commence from the initial box-cut, which will mostly likely be connected to the existing and currently operational opencast workings. Access to the opencast pit will be via a pit ramp. Access and haul roads that will be extended from the nearby existing road infrastructure will be used to access the opencast mining area and for the haulage of material from the opencast.

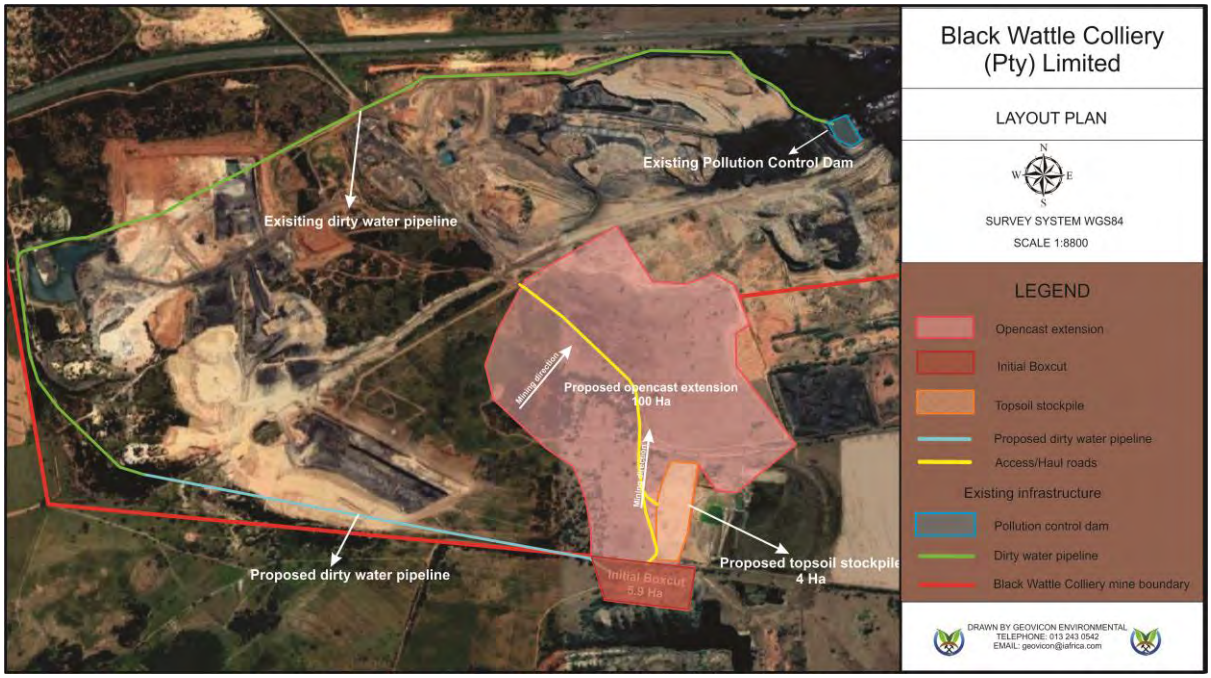
The soft overburden will be removed by mechanical methods. The hard overburden will be drilled and blasted and then removed by mechanical methods. The coal will also be drilled and blasted prior to removal.

Topsoil stockpile

Topsoil material will be stripped from the opencast and surface infrastructure areas and will be stockpiled at the dedicated topsoil stockpiling areas. The stripped soils will be stockpiled as per the recommendation from the soil specialist report. The topsoil material will therefore be used later to cover the backfilled opencast voids.

Haul and Access Road

A haul road will be constructed to access the Black Wattle Colliery Opencast Expansion 2022 Project area. The constructed haul road will join the existing Black Wattle opencast haul road. The road will be used for the haulage of overburden and coal material from the proposed project.



2.4 Details of the Mining Right, Licences and Authorisations

Black Wattle Colliery is operated under a mining right and approved EMPr (DMRE Ref No: MP 30/5/1/2/2/22 MR (10140 MR) granted in terms of Section 23(1) and Section 39(4) of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA).

In addition to the above-mentioned EMPr, Black Wattle also has IWUL's approved in terms of Chapter 4 of the National Water Act, 1998 (Act No. 36 of 1998) (NWA) which include the following

- Integrated Water Use Licenses No: 04/B12D/AGJ/466.
- Integrated Water Use Licenses No: 06/B11H/CGIJ/11901.

2.5 LIFE OF MINE

The planned life of mine of the proposed opencast expansion is approximately 10 years. The construction phase is scheduled to start in 2024 whilst decommissioning and closure of the project is expected to occur in 2033.

2.6 ENVIRONMENTAL AND SOCIAL CONTEXT

Environmental studies were conducted to understand the current state of the environment at the Opencast extension area. The studies also include the mitigation measures recommended by specialists for each aspect, all included in the EIA and EMPr report. Below are the summaries of the studies to give an overview of the environment.

2.6.1. Location of the project area

Black Wattle Colliery is located within the Mpumalanga province. The province is characterised by a mild to warm summer rainfall climate and cool to cold winters. Sharp frost is a common occurrence during winter. The hottest months in the region have been measured in December and January, whilst the coldest months are June and July. The days during summer are generally warm, but a substantial drop in temperature occurs during the winter nights. The elevation in the study area ranges from 1582m to 1617m.

2.6.2. Geology

The local geology of the areas under investigation was determined from existing borehole cores and geological knowledge obtained during prospecting and mining activities on the Black Wattle Colliery. Information from surrounding mines was also used where necessary to verify and collaborate the interpretations.

Four coal seams are present in the area under consideration, numbered upwards as the No. 1 coal seam; No. 2 coal seam designated No.2 Upper seam and the No. 2 Lower seam where the seam is split by channel type sandstone; No. 3 coal seam and the No. 4 coal seam. The local stratigraphy of the Middle Ecca group is discussed below from the base upwards.

The No. 1 coal seam consists of a lustrous coal with an average thickness of 3.15 meters with a general westerly thinning. A thin mudstone/siltstone parting occurs near the base, giving rise to the formation of a No. 1 Lower coal seam.

Where present this No. 1 Lower seam is generally inferior in quality and is represented by a dull coal.

The No. 1 coal seam and No. 2 coal seams are separated by a distinctive parting of course grained to gritty sandstone (gritstone). Thin mudstone bands occur within the sandstone layer. The thickness of this sandstone parting layer varies considerably over the area under investigation, but generally attains a thickness of 0, 5 meters. In the west, the No. 1 and No. 2 coal seams merge (i.e., the sandstone parting is not present).

The No. 2 Lower coal seam has an average thickness of 2.82 meters. This seam can be divided into three distinct bands.

- The lower or bottom band consists of a lustrous coal with bright laminated coal concentrated at the base. This band has an average thickness of 0, 75 meters.
- The middle band consists of dull inferior coal grading to carbonaceous mudstone/siltstone with an average thickness of 0, 7 meters.

- The top band has a 1.5 to 2. 0-meter thickness consisting of a good quality lustrous coal containing several large mineral pyretic inclusions and calcareous layers (2 mm – 20 mm in thickness).

The roof of the No. 2 Lower coal seam consists of a competent sandstone layer with a minimum thickness of ~0, 7 meters and an average thickness of 2, 0 meters (note that this layer forms part of the parting between the No. 2 Lower and No. 2 Upper coal seams). The parting between the No. 2 lower coal seam and the No. 2 Upper coal seam consists of inter-layered sandstone and mudstone layers. This parting has a varying thickness of between 3. 0 to 3.7 meters.

The No. 2 Upper coal seam consists of dull to inferior coal grading to interlaminated mudstone/coal layer with an average thickness of 0.5 meters. A massive dark grey carbonaceous mudstone layer with an average thickness of 7.5 meters occurs directly above the No. 2 Upper coal seam. This carbonaceous mudstone layer is overlain by alternating sandstone and siltstone layers with an average package thickness of 4.8 meters. The No. 3 coal seam consists of a lustrous to mixed bright coal layer with a consistent thickness (where present) of ~0.4 meters.

The parting between the No. 3 coal seam and the No. 4 coal seam consists of a ~ 10 meter upward fining package of sandstone, siltstone, and mudstone layers. The No. 4 coal seam (where present) has an average thickness of 2.8 meters. A mudstone/siltstone in-seam parting of ~ 0.25 meters occurs 2.10 meters above the base. The coal seam is dull to lustrous. Occasional pyretic zones occur throughout the seam. The No. 4 coal seam is overlain by a ~2.0-meter-thick carbonaceous mudstone layer which is in turn overlain by a massive, very coarse grained (gritty) sandstone layer.

2.6.3. Topography

Black Wattle Colliery (Pty) Ltd. is situated in the Highveld section of Mpumalanga. The general elevation of the area ranges between 1550mamsl and 1650mamsl.

The highveld plateau of Mpumalanga, on which the development site is located, is known for its gently rolling to slightly broken topography, with pans dotting inter-stream landform crests. The site is situated in total on a near-level crestal area with some adjoining upper midslopes. There are no drainage channels apart from a slightly sloping crestal seep that appears to drain into a rehabilitated mined area to the north.

Surface drainage from the proposed opencast extension is in a north to north-western direction into the tributary of the Spook Spruit that flows into the Olifants River a few kilometres downstream (to the north) of the site. The proposed opencast extension area attains surface elevation that ranges between 1582 and 1617 meters above sea level.

2.6.4. Soil, land capability and land-use

Apart from the small wetland seep mentioned above, and mining disturbances, the soil mantle consists in its entirety of moderately deep to deep, as well as shallow, well-drained, reddish loams of the Hutton and Mispah forms. In places, deeper subsoils contain abundant very fine quartz gravel derived from gritstone, reducing the water holding capacity. The underlying material in number of soil profiles consists of an indurated iron pan “skin”, one or two centimetres thick, covering weathered, but also hard, sandstone, gritstone or shale.

Table 1: Land capability in terms of the Chamber of Mines’ guidelines.

Land	Description	Soil-landform	8-Class	Area

capability map units		map units	system equivalents	ha	%
I-t	Class I – Wetland: temporary	Lo	Class V	1.21	1.32
II-mh	Class II – Arable land with moderately high agricultural potential	Hu	Class I Class II Class III	43.34	47.19
III	Class III – Grazing land	Hu-Ms Wb	Class IV Class VI Class VII	33.92	36.94
IV	Wilderness land	Wb	Class VII	13.36	14.56
Total				91.83	100

Table 2:Current land use

LAND USE CODE	CURRENT LAND USE	AREA	
		ha	%
B	Degraded woodlot land; currently unused grassland with scattered to somewhat dense stands of trees or bush (eucalyptus and wattle); sporadically used for informal wood collecting by vagrants	8.55	9.30
G	Previously cultivated or woodlot areas; currently unused grassland with few to scattered trees (wattle)	60.47	65.83
H	Haulage roads	2.53	2.76
M	Active mining	13.36	14.56
Re	Mined land in process of being rehabilitated; mostly poor or no plant covering; incipient gully erosion in places	5.95	6.48
R	Other roads	1.00	1.09
	Total	91.86	100.0

2.6.5. Biodiversity

Threatened ecosystems

The proposed Blackwattle Colliery Opencast Expansion 2022 Project is situated within the Rand Highveld grassland vegetation unit (Gm 11) / ecosystem, in the Mesic Highveld Grassland Bioregion of the Grassland biome (South African National Biodiversity Institute – SANBI).

The vegetation unit / ecosystem associated with the Blackwattle Colliery Opencast Extension Project area is vulnerable. According to Government Notice 1002, Government Gazette No. 34809, 9 December 2011), vulnerable ecosystems are considered threatened ecosystems since it is ecosystems that have a high risk of undergoing significant degradation of ecological structure, function, or composition as a result of human intervention, although they are not critically endangered ecosystems or endangered ecosystems.

The project area was mostly utilised for monocrop cultivation and livestock grazing. Tree stands, probably declared invader tree stands, are also indicated in the area. Farm dams were associated with the local streams. However, the current land use within and surrounding the proposed is

monocrop production and livestock grazing. Mining activities are indicated on the southern side of the project area.

The project area is not situated within, or in proximity, to any areas indicated in the South African Conservation Areas Database (SACAD), or the South African Protected Areas Database (SAPAD).

Sensitive, vulnerable, highly dynamic, or stressed ecosystems, such as coastal shores, estuaries, wetlands, and similar systems require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure

The proposed Blackwattle Colliery Project area is not situated in the vicinity of any River Freshwater Ecosystem Priority Area or any strategic water source of South-Africa.

According to the South African National Biodiversity Institute, GIS-based electronic application, 2018: National Biodiversity Assessment - National Wetlands Map 5, the proposed Blackwattle Colliery Project area is situated in the vicinity of the following national wetland types viz. channelled valley bottom wetlands, seepage wetlands and depression / pan wetlands, falling into the Mesic Highveld Grassland, Group 4, wetland ecosystem / vegetation type (SANBI). The ecosystem threat status assessment indicates the following categories for wetland types in this wetland ecosystem viz. Channelled valley bottom wetlands – Least threatened; Depression wetlands – Endangered; Flats – Endangered; Floodplain wetlands – Endangered; Seep wetlands – Least threatened; Unchannelled valley bottom wetlands – Least threatened; Valleyhead seep wetlands – Critically endangered (Mbona et. al. 2015).

Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs)

According to the Mpumalanga Biodiversity Sector Plan GIS-based electronic application (Mpumalanga Tourism and Parks Agency (MTPA), 2019), the proposed Blackwattle Colliery Project Area and surrounding areas are situated in terrestrial assessment categories of “Heavily Modified”, meaning 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; “Moderately modified – old lands” meaning areas which were modified within the last 80 years but were at some point abandoned, including old mines and old cultivated lands, collectively termed “old lands”; and “Other Natural Areas (ONA)”, meaning 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..

According to the Mpumalanga Biodiversity Sector Plan GIS-based electronic application (Mpumalanga Tourism and Parks Agency (MTPA), 2019), the areas where the above-mentioned activities are located, are primarily situated in freshwater assessment categories of “Heavily Modified” meaning areas that have experienced a form of land use that has resulted in the near complete loss of biodiversity and a degree of loss of ecological function; “Other Natural Areas” meaning 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; “Ecological Support Areas (ESA) – Wetlands” meaning areas that support the hydrological functioning of rivers, water tables, freshwater biodiversity as well as providing a host of ecosystem services through their ecological infrastructure. They need to be maintained in a healthy condition; “Ecological Support Areas (ESA) – Important Sub-catchments” meaning sub-catchments that either contain river FEPAs and/or Fish Support Areas; and “Dams” meaning artificial water bodies which may have impacted on wetlands or river systems. These areas may, however, still have a recharge effect on wetlands, groundwater, and river systems.

2.6.6. Sensitive landscape

Wetland areas identified in the vicinity of the area are indicated in the figure below.

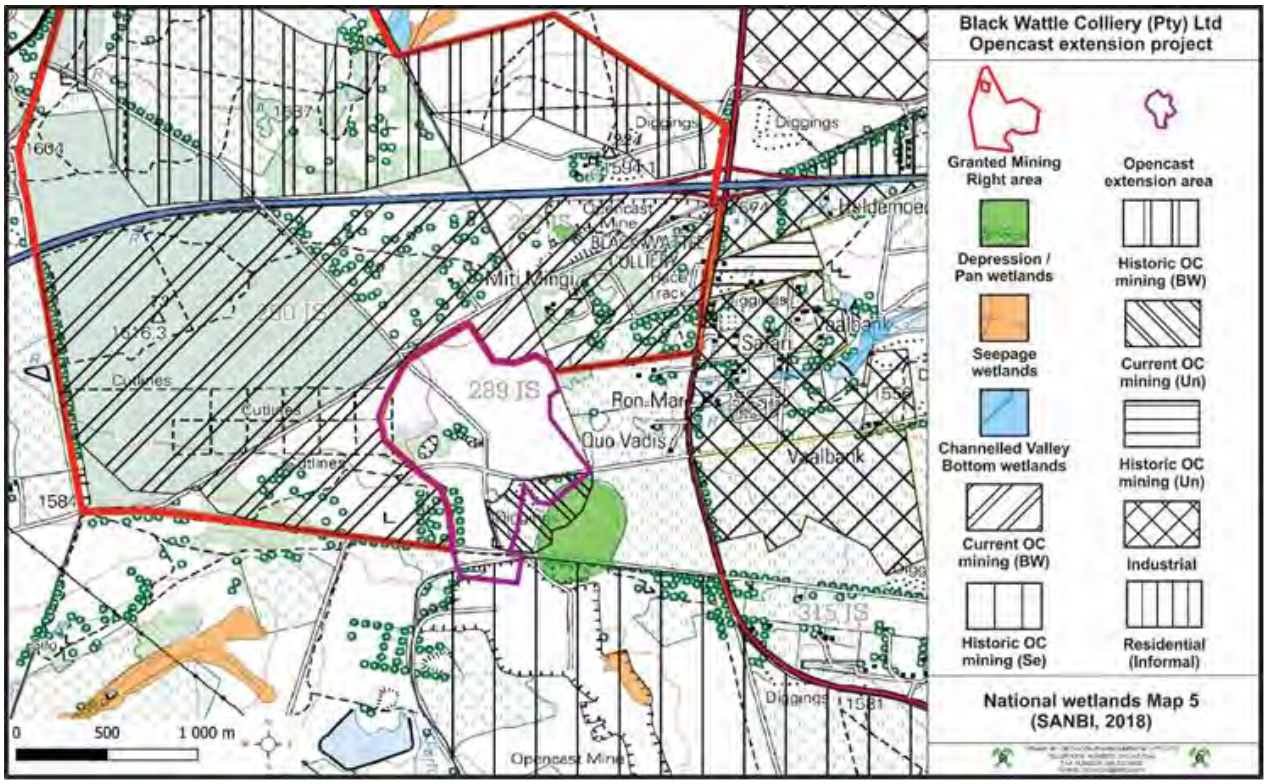


Figure 2: Wetland areas identified.

Although wetland habitat integrity goes beyond that which can be observed during soil surveys, certain pointers are given (Table 3).

Table 3: Present ecological status

Criteria	Attributes	Notes	Score	Confidence
Area 4 (Wetlands north of the N4)				
Hydrology	Flow modification	One small farm dam	4	4
		Possible additions of pumped mine water upstream of study area	4	2
	Permanent inundation	One small farm dam	4	4
Water quality	Water quality modification	Not investigated		
	Sediment load modification			
Hydraulic/	Canalisation	None observed		

Geomorphic	Topographic alteration	None observed		
Biota	Terrestrial encroachment	Not investigated		
	Indigenous vegetation removal			
	Invasive plant encroachment			
	Alien fauna			
	Over-utilisation of biota	None observed		
Area 3				
Hydrology	Flow modification	One small impoundment	4	4
	Permanent inundation			
Water quality	Water quality modification	Not investigated		
	Sediment load modification			
Hydraulic/ Geomorphic	Canalisation	None observed		
	Topographic alteration	Contour banks in abandoned cultivated fields	4	1
Biota	Terrestrial encroachment	Not investigated		
	Indigenous vegetation removal			
	Invasive plant encroachment	Wattle	4	2
	Alien fauna	Not investigated		
	Over-utilisation of biota	None observed		
Area 2 (Grass pan)				
Hydrology	Flow modification	Opencast mined portion; ditches, berms and road	4	2
	Permanent inundation	In opencast mined portion	4	1
Water quality	Water quality modification	Not investigated		
	Sediment load modification	Not investigated		

Hydraulic/ Geomorphic	Canalisation	Ditches	4	2
	Topographic alteration	Sandy material removal; topsoil mounds	4	1
Biota	Terrestrial encroachment	Not investigated		
	Indigenous vegetation removal			
	Invasive plant encroachment			
	Alien fauna			
	Over-utilisation of biota			

Scoring guidelines per attribute:

Natural, unmodified = 5; largely natural = 4; moderately modified = 3; largely modified = 2; seriously modified = 1; critically modified = 0

Relative confidence of score:

Very high confidence = 4; High confidence = 3; moderate confidence = 2; marginal/low confidence = 1

2.6.7. Surface water

Black Wattle Colliery mining right area falls within the lower parts of the Klein Olifants River, which in turn falls within the Upper Olifants River catchment. The Black Wattle Colliery mining right area drains into three streams i.e., Du Toit Spruit to the northwest, Vaalbankspruit to the east and the Spookspruit to the west. These streams delineate the sub catchments affected by the proposed Black Wattle Colliery mining area.

Runoff water from the Du Toit Spruit will flow towards the Athlone Dam and ultimately to the Kruger dam. The Athlone dam is utilised for fishing and recreation purposes, whilst the Kruger dam is considered a back-up water supply for the town of Middelburg. The Vaalbankspruit flows towards the Klein Olifants River whilst the Spookspruit flows towards the Olifants River.

The proposed opencast extension project is situated within the Spook Spruit sub-catchment. Based on the current water quality analysis from the water monitoring conducted by Black Wattle Colliery, the water quality of the Spookspruit has been affected by the nearby coal mining operations.

The Vaalbankspruit (BWR02), downstream from Black Wattle Colliery indicated water of good quality with no significant impacts from coal mining. There was a general increase in variable concentrations over the quarter, which is comparable to the cyclic trend evident in previous years. The Vaalbankspruit downstream of the Pienaars dam Wall (BWR 8) indicated water of good quality during the current reporting period with a general increase in chemical variables as well as heavy metal concentrations.

The Du Toitspruit origin (BWR 03) experienced a significant decrease in variable concentrations during the current monitoring period. BWR 03 indicated water of good quality during the current reporting period. Monitoring point BWR 04 indicated water of good quality with a general increase in chemical variables as well as heavy metals.

Water samples collected within the Spookspruit (BWR 05 & BWR 06) indicate that the stream is affected by upstream mining activities, both indicated water of poor quality with elevated levels of chemical variables. The tributary of the Spookspruit (BWR 07) that has its origin closest to the Black Wattle Colliery workings indicated water of good quality with no signs of impacts from coal mining.

2.6.8. Groundwater

During the current reporting period, groundwater monitoring localities south of Black wattle Colliery such as GW 1, GW 44 and GW 45 indicated a general increase in variable concentrations and water of good quality. pH levels for monitoring localities GW 1 and GW 44 were non-compliant with the Water Quality Targets for domestic use as prescribed in South African Water Quality Guidelines. Monitoring locality GW 2 could not be sampled during the current monitoring period due to the presence of bees within the casing.

Monitoring localities GW 20, GW 33, GW 34, GW 35, GW 36 and Windmill all indicated water of good quality with low chemical variables during the current reporting period. Manganese concentration for monitoring localities GW 20, GW 34, GW 36 and Windmill exceeded the Water Quality Targets for domestic use as prescribed in South African Water Quality Guidelines. pH levels for monitoring localities GW 33, GW 34 and GW 36 were non-compliant with the Water Quality Targets for domestic use as prescribed in South African Water Quality Guidelines

Monitoring Localities GW 7, GW 11, GW 18 and GW 43 are situated to the east of Black Wattle Colliery, indicated water of good quality with a general decrease in heavy metals concentrations. GW 42 is located adjacent to the PCD, indicated water of poor quality during the current recording period with elevated salts and sulphates. GW 42 indicate that there is possible seepage that filters out from the pollution control dams.

Monitoring localities GW 38 and GW 39 could not be sampled during the current monitoring period because no access was provided. Monitoring localities GW 40 and GW 41 indicated water of good quality during the current reporting period. Monitoring locality YKOH indicated water of good quality with a significant decrease in water quality variables.

Groundwater monitoring at GGF, GWT and GWS commenced in February 2017. Borehole GWT indicated an increase in variable concentrations and water of good quality. Boreholes GGF and GWS indicated water of poor quality with elevated levels of salts and sulphates. Indication of possible seepage that filters out from the mining area, these monitoring localities should be investigated.

Groundwater monitoring at boreholes GW 46, GW 47, GW 48, GW 49, GW 50 and GW 51 commenced in November 2018. Monitoring localities GW 47 indicated water of poor quality during the current reporting period with a significand increase in chemical variables. GW 48 was dry during the current reporting period and no sample could be obtained. GW 46, GW 49, GW 50 and GW 51 indicated water of good quality during the current monitoring period.

Based on the monitoring results presented in this report it is evident that the surface disposal sites on Black Wattle Colliery has a significant potential for acid mine water formation. The increased utilization of the surface infrastructure for carbonaceous material storage and wastewater disposal will increase this potential to pollute over time. As such, remedial actions and mitigation measures must be implemented immediately to prevent further contamination and reduce the impacts presently occurring.

2.6.9. Air quality

Black Wattle Colliery is situated within the Steve Tshwete local municipal area. This area is dominated by mining, agricultural practices, industries, and residential areas. These activities have the potential to generate particulates that may cause air pollution.

Potential impacts that the proposed project may have on air quality include the generation of dust during the construction and operation phase. Dust generated will be as a result of vehicle movement over cleared surfaces. Potential sensitive receptors associated with this project will be identified and the impacts of the proposed activities over the receptors determined. A suitably qualified air quality specialist will be appointed to undertake the air quality study.

2.6.10. Sites of archaeological and cultural interest

An archaeological assessment was undertaken to ensure that the development of the Opencast area may not disturb heritage sites. In view of the above and in order to ensure that the identified sites are protected and demolished in a proper manner, Archaetnos cc was appointed to undertake an Archaeological Impact Assessment to determine the most appropriate manner of demolishing and management of the potentially affected heritage sites. The study revealed that there are 2 heritage sites in the vicinity of the area.

2.6.11. Socio context

Black Wattle Colliery is situated within the Steve Tshwete Local Municipality. The major economic activities in the region include mining, agriculture, government, forestation, tourism etc. Agriculture, mining, trade/ retail/ commercial activities and tourism are the key economic activities within the Steve Tshwete municipal area.

Initial assessment of the social aspects relating to the closure aspects of Black Wattle Colliery – Opencast Extension has determined that there are no social; aspects that may influence the closure of Black Wattle Colliery – Opencast Extension. The planned after mining land use for Black Wattle Colliery – Opencast Extension is grazing with some areas to be used as agricultural land. There is no plan by the mine and the municipality to use the land within Black Wattle Colliery – Opencast Extension for community development projects.

2.7 STAKEHOLDERS ISSUES AND COMMENTS

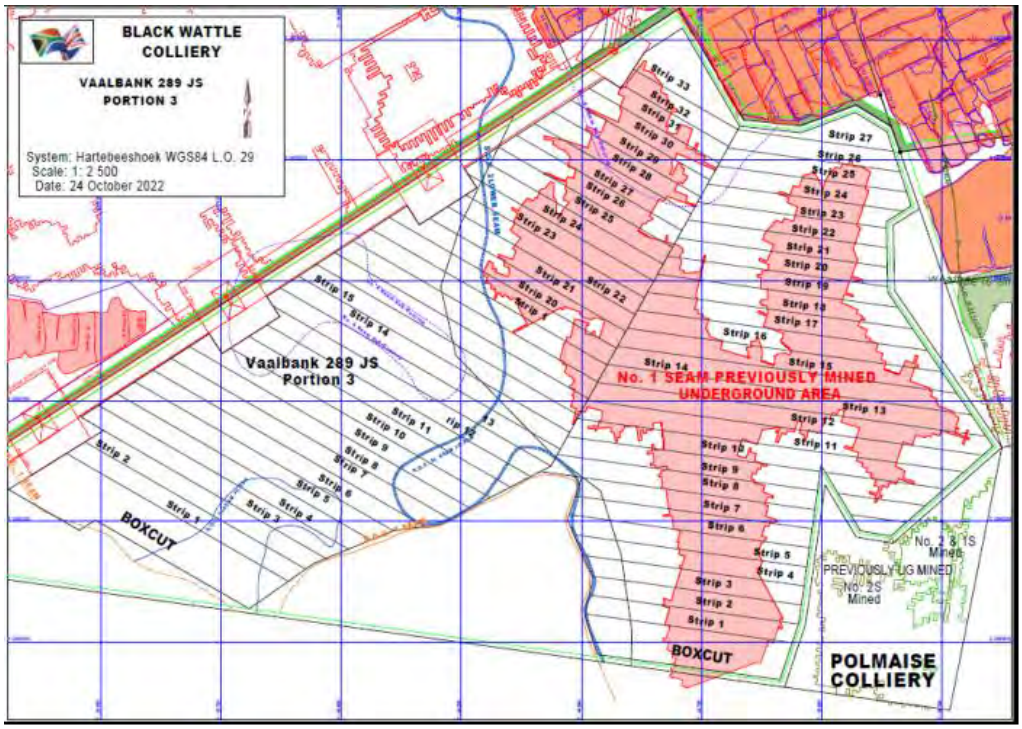
A public participation process will be undertaken during the Section 102 – EIA/ EMPr application process for the opencast extension. In addition to the above, Black Wattle Colliery (Pty) Limited is in continuous communication with the communities and property owners in close proximity to the mining right area. Black Wattle (Pty) Limited is also in constant communication with the relevant state authorities having jurisdiction over the mining operation at Black Wattle Colliery.

A public meeting will be held during this EIA phase meeting on the 28 April 2023. All closure issues raised in the above communications will be used to inform the final rehabilitation, decommissioning and mine closure plan.

2.8 MINE PLAN AND SCHEDULE

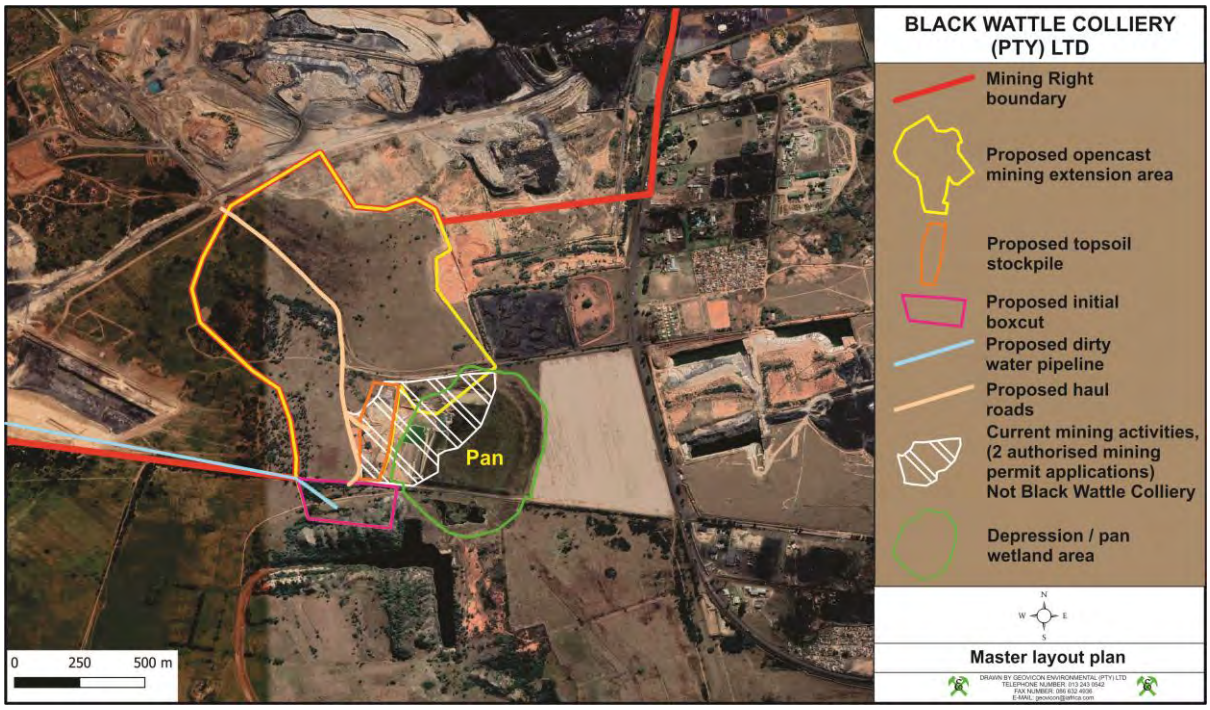
2.8.1. Description of the Mine Plan

The proposed Opencast mining will be undertaken using the truck and shovel lateral rollover mining method will be undertaken. Mining will commence from the initial box-cut, which will mostly likely be connected to the existing operational opencast workings. Access to the opencast pit will be via a pit ramp.



2.8.2. Areas to be disturbed by proposed project

Surface areas to be disturbed by the proposed mining operation are indicated in the master layout plan below



2.8.3. Development of infrastructure and structures

The sequence of the LoM will be divided by the phases of the project i.e., construction, operation, decommissioning and closure phases.

During the construction phase,

An initial box cut will be constructed as depicted in the surface layout plan. Access pit ramps will be constructed within the initial box cut for access to the mining pits°. Topsoil from the initial box cuts will be stripped to a depth as specified by the soil specialist and will be removed to the proposed topsoil stockpile. Subsoil from the box cuts will be stripped and stockpiled separately at the proposed subsoil stockpile.

Hard overburden material from the initial box cuts will be drilled, blasted and removed to the existing hards overburden stockpile and softs overburden material will be removed and stockpiled at the proposed soft overburden stockpile. Finally, all coal material will be drilled, blasted, removed to the existing R.O.M. coal stockpile for crushing and screening before being sold to the destined clients

The operational phase will consist of mining at the proposed opencast expansion will be undertaken by opencast mining method. The following will occur after the opening of the first cut at the opencast expansion mining area. The opencast pit will migrate forward as per the mining plan. Successive cuts will not exceed the width and length as specified in the mining layout plan. Following the removal of the extractable coal reserves, material from successive cuts will be used to backfill preceding cuts. Each cut will be systematically filled with overburden first, subsoil second and topsoil last viz. Overburden from the next cut will be drilled, blasted and placed in the first cut, subsoil from the third cut will be used to cover the overburden placed in the first cut, and topsoil from the fourth cut will be placed over the subsoil in the first cut.

Since concurrent rehabilitation will be undertaken during the operational phase, only the final voids will require rehabilitation. Rehabilitation of the voids will include the following i.e., the hards, subsoil and topsoil overburden stockpiled during the construction phase of the opencast project will be used to backfill the final voids. Method of material placement will be placement of hards overburden first, followed by subsoil material and finally layer of topsoil. The final void will be filled to surface and shaped to ensure that the area is free draining.

The shaped area will be topsoiled and re-vegetated with a recommended seed mix or as per the land use requirements of the Black Wattle Colliery Closure Objectives

3. ENVIRONEMNTAL RISK ASSESSMENT

3.1 RISK ASSESSMENT METHODOLOGY

The methodology applied in the Black Wattle Colliery – Opencast Extension environmental risk assessment was informed by Black Wattle Colliery (Pty) Limited's risk assessment matrix. A risk register was created. The risk register comprised a number of fields, grouped as follows: risk identification, risk analysis, and risk mitigation.

See Table 4 for the above-mentioned risk matrix used to assess the risk.

3.2 IDENTIFICATION OF RISK INDICATORS AND RISK MONITORING

Risk identification is the process of finding, recognising and describing risks. Workshop participants were asked to identify and describe the risk cause, event, indicators, impact and monitoring requirements for each risk associated with each facility at Black Wattle Colliery – Opencast Extension.

In addition, during the EIA meeting, stakeholders will be given a chance to add any additional risk that needs to be accounted for.

All risk indicators are described in the table detailing the findings of the risk assessment. The findings of the risk assessment are detailed in the environmental risk assessment report.

3.3 RE-ASSESSMENT OF THE RISKS

All the risks identified in 2023 will be re-assessed (2024 update of this document) with all new and previously identified risks that are still relevant remained in the assessment.

3.4 CHANGES TO THE RISK ASSESSMENT RESULTS

No changes to the risk assessment were recorded as this is the initial risk assessment. This document will be reviewed in 202 and the necessary changes will be conducted.

Table 4: Black Wattle Colliery – Opencast Expansion Risk Assessment Matrix

Risk Matrix		**Hazard Effects / Consequence**. Where an event has more than one " loss type" choose the consequence with the highest rating				
Consequence (Loss Type) Additional loss types may exist, choose and rate accordingly		**1** **Insignificant**	**2** **Minor**	**3** **Moderate**	**4** **Major**	**5** **Catastrophic**
Safety and Health (Harm to people)		First aid case/ exposure to minor health risk.	Medical treatment case/ exposure to major health risk.	Lost time injury/ reversible impact on health.	Single fatality or loss of quality of life. Irreversible.	Multiple fatalities/ fatal impact on health.
Environmental Impact		Minimal environmental harm - L1 incident.	Material environmental harm.	Serious environmental harm.	Major environmental harm.	Extreme environmental harm. Irreversible.
Business Interruption, Equipment Damage		No disruption to operation < R20k.	Brief disruption to operation/ R20k - R100k.	Partial shutdown R1M to R10M.	Partial loss of operation R10M to R75M.	Substantial or total loss/ >R75M.
Legal and Regulatory		Low level legal issue.	Minor legal issue; noncompliance.	Serious breach of law, investigation report.	Major breach of law. Considerable prosecution.	Very considerable penalties and prosecution.
Social – Community, Impact on Reputation		Slight impact-public awareness may exist but no public concern.	Limited impact- local public concern.	Considerable impact, regional public interest.	National impact. National public interest.	International impact.
Possibility	**Examples**	**Risk Rating**				
5 (Almost Certain)	One or more a year. To re-occur within a year.	**11 (M)**	**16 (M)**	**20 (H)**	**23 (H)**	**25 (H)**
4 (Likely)	Less than once a year re-occur within 5 years.	**7 (L)**	**12 (M)**	**17 (M)**	**21 (H)**	**24 (H)**
3 (Possible)	Happened at some time. To happen within 10 years.	**4 (L)**	**8 (M)**	**13 (M)**	**18 (H)**	**22 (H)**
2 (Unlikely)	Happened at some time. To happen within 20 years.	**2 (L)**	**5 (L)**	**9 (M)**	**14 (M)**	**19 (H)**
1 (Rare)	Never been known to occur.	**1 (L)**	**3 (L)**	**6 (L)**	**10 (M)**	**15 (M)**
Risk Rating	**Risk Level**	**Guideline for Risk Matrix**				
18 to 25	H - High	Eliminate, avoid, implement specific action plans/ procedures to manage and monitor.				
8 to 17	M - Medium	Proactively manage.				
1 to 7	L - Low	Actively manage as appropriate.				

3.5 IDENTIFICATION OF INDICATORS SENSITIVE TO POTENTIAL RISKS AND THE RISK MONITORING

The identification of indicators (receptors) that are sensitive to the potential risks and monitoring of such risks was conducted through the evaluation of the proposed activities, impact identified by environmental impact assessment through environmental studies conducted by various specialists, stakeholder inputs and views and a risk assessment workshop.

- The following receptors were identified for the proposed project i.e.:
  - Biophysical environment including but not limited to
  - Sensitive environmental components (sensitive landscapes)
  - Biodiversity (flora and fauna)
  - Soil
  - Watercourses and groundwater
- Social including but not limited to
  - Surrounding communities
  - Landowners and occupiers
  - commercial establishments and industrial/mining processes

3.6 IDENTIFICATION OF CONCEPTUAL CLOSURE STRATEGIES TO AVOID, MANAGE AND MITIGATE IMPACTS AND RISK.

The identification of conceptual closure strategies was conducted during the risk assessment process. All significant environmental risks were evaluated to determine their impacts on the environment and social structure within the project study area. The environment and social attributes were studied and their importance to the general community were determined. Through the risk identification process, all risks that may have an impact on the value or importance of the environment and social attributes of the project were identified and measures to protect the value or importance of the environment and social attributes were recommended, which aims to ensure that the closure objectives are achieved.

THE CONCEPTUAL CLOSURE STRATEGIES ARE SUMMARIZED BELOW:

Avoidance of decant from the mine workings:

Optimization of the mine designs to prevent potential decant.

Monitoring of affected water resource

Avoidance of contamination from the rehabilitated contaminated overburden stockpile

Remove all the carbonaceous materials from the overburden stockpile area.

Remove all contaminated soils below the overburden stockpile area.

Avoidance of seepage and over-spilling of the PCD during closure phase:

Monitoring of the lining integrity and capacity of the pollution control dam by a suitably qualified person.

Management of PCD

Monitoring of the groundwater resource in the vicinity of the dam.

Avoiding the compaction and erosion of soils over rehabilitated areas:

All decommissioned and rehabilitated surfaces will be ripped and re-vegetated with the recommended seed-mix from a specialist.

Re-vegetation must be conducted as soon as possible to stabilize the soil and prevent soil loss during the rainy season.

Areas showing signs of erosion must be rectified as soon as possible

4. CLOSURE DESIGN PRINCIPLES

4.1 LEGAL AND GOVERNANCE FRAMEWORK

This section of the plan has been compiled to explain the closure legal and governance framework requirements for Black Wattle Colliery – Opencast Extension. As was stated in the guideline for the rehabilitation of mined land compiled by the Chamber of Mines of South Africa, significant changes have and still are occurring in the laws relating to mine closure. This legal framework may change and have already changed during the approval process of this plan.

South African legislation is clear on the obligation on mining companies to prevent environmental damage and defines clear responsibilities associated with mine rehabilitation and closure. In view of the above, rehabilitation and closure activities should therefore be guided and controlled by legal requirements contained in a number of South African Acts and Regulations. The essence of these requirements is contained in the following key legislation i.e. The Constitution of South Africa (Act 108 of 1996), The Mineral and Petroleum Resources Development Act 2002 (Act 28 of 2002), as amended, the National Environmental Management Act, 1998 (Act 107 of 1998), as amended and the National Water Act, 1996 (Act 56 of 1996), as amended, together with regulations promulgated under some of these acts.

According to the above legislation the following principles govern the closure of mining operations.

- Legal compliance;
- Sustainability;
- Cradle to grave concept;
- Risk based approach;
- Continued improvement;
- Inclusive environmental consideration; and
- Communication and public participation.

In view of the above, Black Wattle Colliery (Pty) Limited will plan and implement mine closure for Black Wattle Colliery – Opencast Extension as much as possible to be in compliance with the above principles and legislation.

4.2 CLOSURE VISION, OBJECTIVES AND TARGETS

4.2.1 Black Wattle Colliery – Opencast Extension Closure Vision

The closure vision for Black Wattle Colliery – Opencast Extension reads as follows:

At Black Wattle Colliery – Opencast Extension, we inspire to ensure that at closure the mining area is restored to an environment that will support sustainable land use that will align to the local and regional development plans. We inspire to leave an environment that is safe for our wildlife and will have no harm to human health and safety. We inspire to close the mine in a manner that comply with all legislative requirements.

4.2.2 Black Wattle Colliery – Opencast Extension Closure Objectives and Targets

The closure objectives for Black Wattle Colliery – Opencast Extension are as follows:

- Rehabilitation of areas disturbed as a consequence of mining to a land capability that will support and sustain a predetermined post-mine closure land use;
- Removal of all infrastructure that cannot be beneficially re-used (if any are added as the existing structure will be used), as per agreements established, and returning the associated disturbed land to the planned final land use;
- Removal of existing contaminated material from mine-affected areas;
- Re-instatement of a self-sustaining ecosystems over the rehabilitated infrastructure and mining affected areas, requiring minimum on-going maintenance to facilitate a walk away situation;
- Establishment of final landforms that are stable and safe in the long run;
- Management of mine-affected water to prevent long-term risk of contamination of surface- and underground water sources, which include where possible treatment thereof;
- Prevention of acid mine drainage; and
- Monitoring and maintenance of rehabilitation areas and water treatment processes forming part of mine closure to ensure the long-term effectiveness and sustainability of measures implemented.

Regarding closure targets for Black Wattle Colliery – Opencast Extension, the mine will ensure that the rehabilitation of disturbed areas, removal of infrastructure, management of rehabilitated areas and management of mine affected water and water leaving the mining area is undertaken such that it ensures compliance with all relevant standards as published by the relevant state authorities.

4.3 Closure and Post Closure Options

In order to determine possible closure and post closure options for Black Wattle Colliery – Opencast Extension it was necessary to understand what the state of the environment within and around the Black Wattle Colliery mining right area. The state of the environment is determined based on the state in terms of the physical, biological, social and economic environments. The state of the environment for Black Wattle Colliery has been briefly describe in section 2 of this report. Based on the state of the environment, closure opportunities and constraints were listed. The following opportunities were viz, noted land availability, useable surface infrastructure, presence of a stream with dams within the mining right area and the groundwater supply infrastructure. Regarding the constraints the following were identified i.e., the area has been disturbed by underground mining, there is a possibility that groundwater contamination may persists within the area for some time and decant of groundwater is predicted.

Based on the above, three closure and post closure options were looked at i.e. (i) rehabilitation of all mined areas with the dismantling and removal of all infrastructure (if any are to be added as the main operation has the majority of infrastructure required), (ii) rehabilitation of the mined areas leaving all re-usable building infrastructure and (iii) rehabilitation of the mined areas leaving all mine related infrastructure. The above options were decided upon based on the post mining land use, which

include use of land for grazing and/ or arable purposes where some of the existing infrastructure will be used and use of the land for wilderness uses such as game farming and fishery.

4.4 MOTIVATION FOR THE PREFERRED OPTION

In view of the pre-mining land use, immediate surrounding land uses being predominantly agricultural, the closure option where grazing and agriculture would be the post mining land uses opted for. Note that existing infrastructure that can be re-used for grazing purposes will remain post mining, this is also dependant on if any new infrastructure will be constructed.

Based on the state of the environment at the Black Wattle Colliery – Opencast Extension mining right area, which include the quality of the soils within rehabilitated areas, the limited availability of the water within the tributaries of the Spookspruit and the lack of a presence of dams within the stream, grazing/ agriculture will be the best possible post mining land use at the Black Wattle Colliery – Opencast Extension.

4.5 CLOSURE AND POST CLOSURE PERIOD

Before we can determine the periods for closure and post closure, it is necessary that we give clarity on what closure is. The MPRDA does not provide a clear definition of mine closure however according to section 43 (3) of the MPRDA, three scenarios can trigger a need for application of a closure certificate. These are the lapsing, abandonment or cancellation of the right or permit, cessation of a mining operation, or completion of the prescribed closing plan to which a right, permit or permission relate. In the absence of a clear definition of mine closure, any of the above-mentioned scenarios can be used to define what or when a mine is closed. In view of the above we define mine closure as the period in which the closure plan for a mine is completed. According to our closure plan (this report), closure will include the period when decommissioning and final rehabilitation is undertaken at Black Wattle Colliery – Opencast Extension and post closure will involve the period when care and maintenance is undertaken on the rehabilitated area and when monitoring of the environment is undertaken. Once the above is completed, the mine will have enough information to motivate for the application of a closure certificate.

In view of the above, the planned closure for Black Wattle Colliery – Opencast Extension and the requirement of Regulation 7 of the GN 1147, the closure and post closure period for Black Wattle Colliery – Opencast Extension will be three and seven years, respectively, which together will be ten years.

4.6 RESEARCH ON CLOSURE OPTIONS

No research has been initiated by Black Wattle Colliery (Pty) Limited regarding the post closure land use decided upon. Available data obtained through Black Wattle Colliery – Opencast Extension's available environmental studies and available literature, there is currently no need for research.

Black Wattle Colliery (Pty) Limited is however currently investigating the most suitable method for managing the predicted decant water from one of its opencast areas. Due to the low volumes of decant water, it is currently assumed that a passive treatment method will be used for the treatment of the predicted decant water.

In addition to the above and should the available information not provide enough information to the implementation of the preferred closure and after closure option, research on the final land use option may need to be instituted by Black Wattle Colliery (Pty) Limited. One suggestion would be the

treatment of water found within the opencast voids (existing operation) and then used for agricultural purposes (via the centre pivot irrigation method).

4.7 CLOSURE ACTIONS ASSUMPTIONS

Below are the assumptions made in order to develop for Black Wattle Colliery – Opencast Extension closure actions. These have been divided into infrastructure, mining, water management, monitoring and after care maintenance.

4.7.1 Infrastructure

The following assumptions have been made for all infrastructure removal at the mine. It must be noted that no to very limited infrastructure will be used at the opencast extension as the main infrastructure required is already present at the current mining operation. The following are general closure assumptions in the event that infrastructure will be constructed at the opencast expansion.

- Information on infrastructure components such as heights, footprint areas, etc. will be obtained from measurements conducted by Geovicon Environmental (Pty) Limited from drawings and plans provided by Black Wattle Colliery, as well as referring to the photographs taken during the site visit. The required quantities for calculating closure cost will then be determined using this information.
- Considerations that a number of structures will be beneficially re-used after closure will be taken during the calculation of closure cost determination and the full decommissioning and rehabilitation of all structures. Agreements will also be established for transfer/ handover.
- An allowance has been made for the removal of carbonaceous material from product stockpile areas and haul roads and to dispose thereof within the available areas at the mining right area. Assumptions has been made those contaminants and hazardous substances from contractors' yards, workshops, explosives magazines, diesel tank bay area and the like will be disposed of at the nearest general and hazardous waste disposal sites.
- All gravel roads that will not be utilised for access to farms or other similar activities will be deep ripped, profiled and vegetated.
- All infrastructure and building footprint areas, as well as areas that are likely to be compacted such as material stockpile areas, will be ripped and shaped as required to facilitate positive drainage.

4.7.2 Mining aspects

Black Wattle Colliery – Opencast Expansion will make use of the truck and shovel opencast mining method for the extraction of coal.

Opencast pits will be used for access to opencast mineable coal seams. To date no mining has taken place and thus no backfilling, shaping, topsoiling and reseeding has been conducted.

In view of the above, no final rehabilitation, decommissioning and closure assumptions were made regarding the mining areas. The future mined out area will be covered under care and maintenance.

4.7.3 Water management facilities

The following water management facilities are planned at the opencast extension: 1) clean- and dirty water diversion berms, 2) water contained within the opencast pit (dirty water pumped to existing

PCD) and 3) dirty water trenches that will direct water to the pit. None of these facilities will be used after closure.

4.7.4 Post mining water management

Black Wattle Colliery (Pty) Limited will investigate the most suitable method for managing the predicted decant water from the opencast extension. Due to the low volumes of predicted decant water, it is currently assumed that a passive treatment method will be used for the treatment of the predicted decant water. Revegetation will be conducted as soon as possible to prevented silted surface runoff from leaving the rehabilitated area and flowing into the tributary (downstream of the opencast extension) of the Spookspruit.

4.7.5 After mining care, monitoring and maintenance

Aftercare and maintenance can be defined as the activities that are necessary to ensure that the rehabilitation measures implemented are self-sustaining, or that such actions gain a state of equilibrium with its surroundings.

This implies that;

- the areas rehabilitated must be erosion free, or at least comparable with areas in the immediate vicinity that were not affected by mining activities;
- the mining activities that were conducted on the area must not be a source of pollution as far as surface- or groundwater is concerned. (i.e., any measures implemented on the site must be self-sufficient and prevent contaminants from entering the natural environment);
- the mining area does not give rise to air contamination; and
- the post-mining land use has been achieved, and is self-sustainable.

If one takes into consideration that soil settlement is normally achieved within a 3 – 4-year period, then one can safely make the assumption that stability should be achieved within a 4-year period. Likewise, a self-sustaining vegetation cover should be achieved within a 3 – 4-year period (if any necessary follow-up seeding is timeously undertaken).

Due to the fact that no carbonaceous material will be left exposed on site, the probability of air pollution arising from the mining area is considered unlikely, but should be monitored for a certain period to prove this assumption.

Surface- and groundwater studies and long-term monitoring have indicated that if the area is rehabilitated correctly and the proposed measures put in place, the probability of long-term surface- and groundwater contamination will be slight and contained.

During this period, yearly risk assessments will be necessary, to timeously determine any latent impacts, and management strategies thereof.

With the above in mind, the mine will be liable to monitor, and take any action necessary to prove the above.

For the purpose of determining the cost to achieve the above, the following assumptions regarding after mining care, monitoring and maintenance were made:

- A maintenance manager must be employed to ensure that all actions are timeously conducted. The amount of time that such maintenance manager will need to undertake his

duties will decrease on a yearly basis. The monthly salary for the manager has been escalated by 8% per annum;

- Follow-up erosion control and seeding has been accounted for a period of 4 years, where after the area will be stable;
- Water quality monitoring (surface- and groundwater) will continue on all water quality monitoring points for a period of 5 years (monthly surface water monitoring and quarterly groundwater monitoring points). Thereafter, the frequency will change to quarterly for surface water and twice yearly for groundwater. Cost for water monitoring was escalated at a rate of 4% per annum;
- Soil monitoring will be conducted after 4 years to identify the quality thereof and if any fertiliser and/ or other chemicals need to be added to achieve the final land use;
- Air quality monitoring will be conducted for a period of 4 years after rehabilitation. Cost for monitoring has been escalated at a rate of 4% per annum; and
- Risk assessments and post-mining rehabilitation cost will be determined for a 10-year period as prescribed in Regulation 7 of GN R 1147/ 2015 (Act. 107 of 1998).

5. FINAL POST-MINING LAND USE DESCRIPTION

5.1 PROPOSED POST-MINING LAND USE

5.1.1 Final post-mining land use identification methodology

The selection and finalisation of the after-mining land use for Black Wattle Colliery – Opencast Extension has been conducted according to the following methodology.

The pre-mining environmental studies together with their updates and associated EIA processes were used in deciding on the final after mining land use. During the undertaking of pre-mining environmental studies, their update and their respective EIA processes, the envisaged after mining land use was determined. This was also communicated to the interested and affected parties, which included the communities around the mine, government departments, local government councils and private land owners.

The state of the environment as describe in this report was also considered for the decision on the final after mining land use. This included the status of the rehabilitated areas (availability of the land, conditions of the soils, land capability etc.), the condition of the Spookspruit, the drainage characteristics of the site, the climatic conditions, access to the site and the local and regional development plans.

Social aspects were also considered in determining the final after mining land use and include the local and regional social and economic development plans. Community engagement in this regard is fundamental. Communities were involved in the decision of the final land use only during the mining right and amendment EIA processes. It is therefore necessary that the mine continue engaging with the communities during the life of mine.

The sustainability of the land use has also been considered in the decision on the final post mining land use.

5.1.2 Overall project final post-mining land use

Based on the above, grazing, and in some areas, agriculture, was identified as the overall final after mining land use for Black Wattle Colliery – Opencast Extension.

5.1.3 Infrastructure/ activity final post-mining land use

All mine related infrastructure (if any are to be constructed or added). will be removed during decommissioning of the mine.

6. CLOSURE ACTIONS

6.1 SPECIFIC TECHNICAL SOLUTIONS RELATED TO INFRASTRUCTURE AND FACILITIES FOR THE CLOSURE OPTION/S

The following infrastructure will be removed from the mine site in order to pave a way for the commissioning of the final after mining land use option i.e., the any temporary infrastructure placed at the mining area, stockpiles and access/ haul roads.

The removal of the infrastructure will be based on whether the structure is still useable or unusable (post-mining land use applicability).

The following methodology will be used for all useable structures:

- All steel structures will be dismantled by a competent contractor. All useable material recovered during the dismantling will be removed from site for sale;
- The collapsed material will then be spread in preparation for gas cutters to proceed;
- A hydraulic hammer will be used to remove the remaining structure that were not removed by the excavator, which may include slabs, plinths, bases and foundations; and
- The excavated areas will then be covered with 1m subsoil, the disturbed areas top soiled with 300 mm of topsoil and vegetation will be established.

Regarding the access/ haul road, the following will be undertaken:

- All road related structures (stop signs, markers etc.) will be removed;
- The compacted roads will be ripped and scarified to depth of 300 mm;
- Berms, not made of carbonaceous material, will be pushed onto the road and levelled; and
- The areas will be shaped, top soiled with 300 mm of topsoil and vegetated.

6.2 THREATS, OPPORTUNITIES AND UNCERTAINTIES ASSOCIATED WITH THE PREFERRED CLOSURE OPTION

6.2.1 Threats

Threats that have been identified for the preferred option include vandalism, theft and misuse of facilities and neglect of remaining facilities.

6.2.2 Opportunities

Opportunities identified for the preferred option include the continued use of the rehabilitated mining area, opportunity for local small-scale farmers and entrepreneurs, local economic development, job creation and the maintenance of the rehabilitated area. If any decant occurs, a passive treatment system can be developed to assist with long-term water treatment.

7. SCHEDULE OF ACTIONS FOR FINAL REHABILITATION, DECOMMISSIONING AND CLOSURE

7.1 SCHEDULE OF ACTIONS FOR FINAL REHABILITATION, DECOMMISSIONING AND CLOSURE

Table 5: Schedule of actions for final rehabilitation, decommissioning and closure

Rehabilitation actions	Assumptions and schedule drivers
Final rehabilitation, decommissioning and closure	
Activity/ area: Steel structures (if any are to be constructed)	
Dismantling, collapsing and spreading (for reclamation) of all steel structures. All useable material recovered during the dismantling will be removed from site for sale.	A competent contractor will be employed to dismantle all steel structures.
Removal of all the remaining structures that were not removed by the excavator, which may include slabs, plinths, bases and foundations.	A hydraulic hammer will be used to demolish such structures. The concreted areas will be demolished to a depth of one meter below surface.
Activity/ area: Opencast	
Opencast to be backfilled with material that was removed initially.	This will be conducted by the appointed contractors using material stockpiled adjacent to the opencast.
Topsoil to be placed on the backfilled area at a depth of 300 mm.	Area to be levelled as per the closure designs done prior to the commencement of mining. Topsoil must not be used at other areas or for other purposes as this will prevent the proper thickness of soil cover.

Rehabilitation actions	Assumptions and schedule drivers
Area to be revegetated.	An appropriate vegetation mix will be used for revegetating the area. Once the vegetation has been established, agricultural activities can be conducted on the predetermined areas.
Activity/ area: Access and haul Roads	
Load and haul all foreign and carbonaceous material from the access/ haul road.	All carbonaceous material and contaminated soils to a depth on one meter over the stockpiling area will be removed.
Levelling of berms around the access/ haul roads.	The levelling will be conducted such that the area is free draining.
Seeding of the levelled berms and rehabilitated access/ haul road.	A suitably qualified person will be employed to recommend the seed mixture to be used and a suitably qualified contractor will be employed to conduct the seeding
Post Mine Closure	
Activity/ area: Entire mining right area (care, maintenance and monitoring)	
Visual inspection of all rehabilitated areas.	A dedicated manager will be employed for ensuring that the area is inspected and all areas requiring attention will be identified and issues addressed.
Undertaking of monitoring of the environment i.e., water resource monitoring, air quality monitoring and rehabilitation monitoring.	An independent contractor will be employed for undertaking the monitoring programme. Reports on the findings will be drafted and all issues raised will be investigated and addressed.
Follow up erosion control and seeding over areas showing erosion gullies.	The above-mentioned manager will be responsible for identifying eroded areas and suitably qualified persons will be employed to repair and seed the damaged areas.
Environmental risk assessment.	A suitably qualified person will be used in undertaking the environmental risk assessment on an annual basis.

7.2 MANAGEMENT OF EXTRANEOUS DECANT WATER

Black Wattle Colliery (Pty) Limited has commissioned Geovicon Environmental (Pty) Limited to develop water treatment models for Black Wattle Colliery's – Opencast Extension.

This will include the determination of the treatment method and to determine the capital and operational expenditure for the treatment of the possible decant water.

A desktop study conducted to date was utilised to determine initial cost for the management of the decant water. For the purposes of this costing, it was assumed that a passive water treatment plant would be constructed at Black Wattle Colliery's – Opencast Extension.

8. ORGANISATION'S CLOSURE CAPACITY

8.1 ORGANISATIONAL STRUCTURE

The organisational structure for Black Wattle Colliery is presented below as Figure 3. Of importance is that the environmental division at Black Wattle Colliery reports to the Mine Manager who in turn reports to the technical director of Black Wattle Colliery (Pty) Limited, the owner of the company and mining operations.

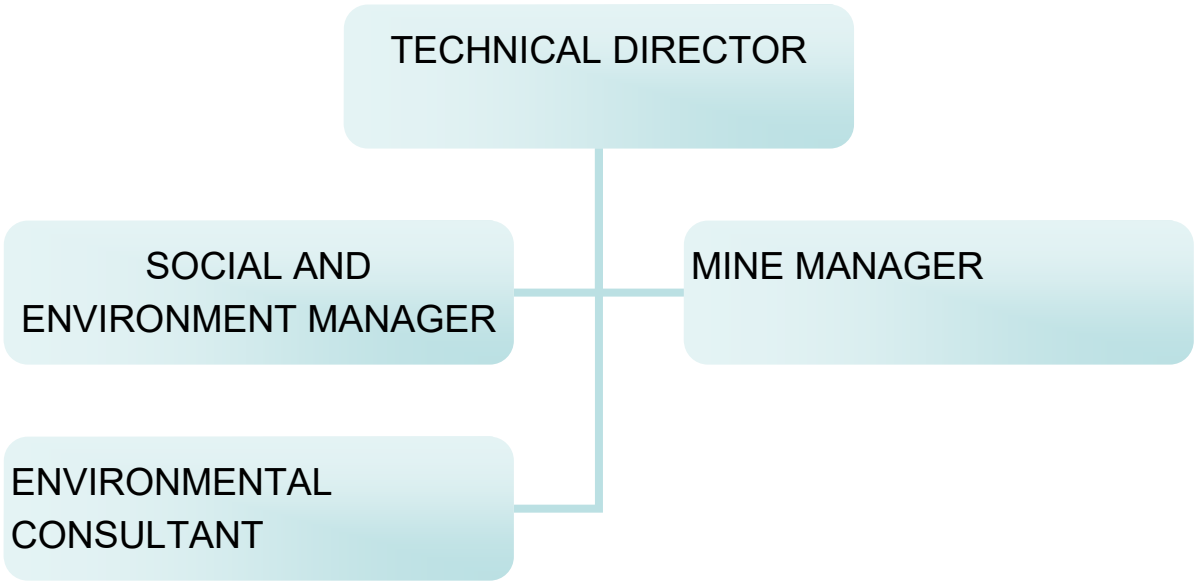


Figure 3: Organogram for Black Wattle Colliery

8.2 RESPONSIBILITIES

8.2.1 Technical Director

A technical director is a senior technical person who possesses a high level of skill in mining and associated activities. He is recognized as an expert in the mining industry. His responsibilities are as follows:

- Development and implementation strategies in conjunction with the mine and owners of the mine;
- Assessment and management of technical risks that may impact on the mine in terms of mining, metallurgy, permitting, environmental and social issues;
- Establishment of standards and procedures to track and measure the mine's progression;

- Evaluation of the team(s) within the mine and identifying strengths, problem areas, and developing plans for improving performance; and
- Evaluation of mining parameters and constraints for Black Wattle Colliery within the coal industry.

8.2.2 Mine manager

A mine manager is a person appointed by the owners of the company owning the mine, in this case Black Wattle Colliery (Pty) Limited, to be responsible for the control, management and direction of a mine, in this case Black Wattle Colliery. The responsibilities of a mine manager are as follows:

- Overall management of mining projects;
- Assists in staffing, outlining project plans, setting project goals/deadlines, and evaluating performance;
- Ensures the safety and health of mine workers;
- Ensures the compliance with conditions of environmental authorisations issued to the mine;
- Recommends corrective action when problems are detected; and
- Reports to the technical director of the company.

8.2.3 Environmental Managers

An environmental manager is a person that has been appointed by a mining company to ensure that the mine complies with the external (international, national and local government) and internal environmental requirements. The following are the responsibilities of an environmental manager:

- Developing and implementing environmental strategies and action plans that ensure the mine complies with the environmental laws;
- Coordinating all aspects of pollution control, waste management, recycling, environmental management, conservation and renewable energy;
- Ensuring the implementation of environmental policies and practices;
- Ensuring compliance with environmental legislation and keeping up to date with new regulations and legislation;
- Liaising with relevant bodies such as state authorities and the public;
- Auditing, analysing and reporting environmental performance to internal personnel and regulatory bodies;
- Carrying out impact assessments to identify, assess and reduce the mine's environmental risks and financial cost;
- Promoting and raising awareness, at all levels of the mine, of the impact of emerging environmental issues;
- Developing and implementing environmental management systems to continually improve the impact of the organisation on the environment;
- Coordinating public meetings and consultations on environmental matters;

- Managing relations with the board of directors, senior management and internal staff;
- Training staff at all levels in environmental issues and responsibilities; and
- Writing environmental reports;

Black Wattle Colliery (Pty) Limited has appointed Geovicon Environmental (Pty) Limited to be responsible for the environmental auditors at Black Wattle Colliery. Geovicon Environmental (Pty) Limited reports to the mine manager who in turn reposts to the technical director.

8.3 CLOSURE TRAINING AND CAPACITY BUILDING

Black Wattle Colliery (Pty) Limited is committed in ensuring that their employees, contractors and visitors are informed on environmental matters relating to the mine at Black Wattle Colliery (this includes the opencast extension area). To this extent Black Wattle Colliery (Pty) Limited provides training, which assist in capacity building for its employees at Black Wattle Colliery. The training that is connected to environmental management include the following training for employees/ contractors and visitors.

8.3.1 Mine Employees

All employees, current and new, as well as contractors undergoes induction that includes environmental awareness training and explanation of the environmental policy. Depending on a person's job category, training is performed on significant aspects pertinent to their area of work. At the end of this training, personnel are required to complete the awareness test. Re-testing or re-induction may be required if the test was failed.

All personnel performing tasks which can cause significant or major environmental impacts are made competent on the basis of training, education and/ or experience.

In addition to the above, Black Wattle Colliery (Pty) Limited undertakes the following training in a bid to build capacity of their employees i.e., SHE representative training, lifting equipment, first aid and operator certification. This training although not necessarily environmental, does assist in the management of identified environmental risks.

8.3.2 Visitors

All visitors to any controlled access areas of the mine are required to undertake a shorter "*visitors' induction*", which highlights the main safety and environmental aspects relevant to short term visitors at the mine.

9. DESCRIPTION OF GAPS IN THE PLAN

The specialist assessments undertaken for the EIA/ EMPr were used for the drafting of this report. These were based on conservative methodologies and potential negative impacts could be of smaller magnitude than predicted, while benefits could be of a larger extent than predicted. The reports outlined any 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 the risk assessment.

10. RELINQUISMENT CRETERIA

Relinquishment of Black Wattle Colliery's – Opencast Extension after mining will require formal acceptance from the relevant regulators that all obligations under the relevant laws and approved closure reports associated with the mine site, including achievement of after mining land use, have been met and, if required, that arrangements for future management and maintenance of the mine site have been agreed to by the subsequent owners or land managers.

Where relinquishment requires the transfer or return of ownership or management of infrastructure and/ or land to other parties, Black Wattle Colliery (Pty) Limited must demonstrate that these parties have been involved in the process and understand their responsibilities and liabilities associated with the transfer. Any transfer of residual liability to the subsequent owners or land managers, including management of contaminated sites, must be clearly communicated, agreed to and documented, to the satisfaction of the relevant state authorities. There must be an explicit, written legal agreement with the subsequent land managers to accept the mining legacy obligations and any outstanding cost of remediation, monitoring and reporting.

Appropriate investigations will be carried out to identify, assess and remediate any contaminated sites within the mining area. All legal requirements relating to contaminated land will have to be adhered to by Black Wattle Colliery (Pty) Limited before relinquishment of the mine site.

A closure certificate for Black Wattle Colliery (which will be for the entire mining right area and include the opencast extension) must be obtained by Black Wattle Colliery (Pty) Limited before the relinquishment of the mine site. As mentioned above, Black Wattle Colliery (Pty) Limited will ensure that the new owners are aware of and understand all conditions under which the closure certificate has been issued.

11. CLOSURE COST ESTIMATION PROCEDURE

11.1 CLOSURE COST ESTIMATION

11.1.1 Closure Cost Methodology

The following methodology of cost determination was used for determining the closure cost for Black Wattle Colliery's – Opencast Extension:

- Calculation of the cost for final rehabilitation, decommissioning and closure of the mine was determined as per the "*guideline document for the evaluation of the quantum of closure-related financial provision provided by a mine*", revision 1.6 of September 2004;
- The quantum for financial provision was calculated to cover the final closure of the mine. The calculation assumes that the mine does the closure and rehabilitation work themselves; and
- The closure cost was determined based on current unit rates provided by the DMRE.

11.1.2 Closure Costs Calculations

The determination of the cost for the 2023/24 financial year's final rehabilitation, decommissioning and closure of the mine for Black Wattle Colliery's – Opencast Expansion is expanded in Table 6. Areas used in the cost determination are depicted in the accompanying plan.

Based on the calculations indicated in Table 6, the estimated cost for final rehabilitation, decommissioning and closure for Black Wattle Colliery's – Opencast Extension is R 5 079 570.49 The determined cost is inclusive of VAT.

Table 6: Final rehabilitation, decommissioning and closure cost determination

"Rules-based" assessment of the quantum for financial provision							
CALCULATION OF THE QUANTUM							
Mine:	BLACK WATTLE COLLIERY (PTY) LIMITED	Location:	Magisterial District of Middelburg, Mpumalanga Province.				
Evaluators:	O.T Shakwane of Geovicon Environmental (Pty) Limited	Date:	13/04/2023				
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^2	0.00	R 19.47	1.00	1.10	R 0.00
2 (A)	Demolition of steel buildings & Structures	m^2	0.00	R 271.16	1.00	1.10	R 0.00
2 (B)	Demolition of reinforced concrete buildings & structures	m^2	0.00	R 399.61	1.00	1.10	R 0.00
3	Rehabilitation of access roads	m^2	30000.00	R 48.53	1.00	1.10	R 1 601 408.78
4 (A)	Demolition & rehabilitation of electrified railway lines	m	0.00	R 470.96	1.00	1.10	R 0.00
4 (B)	Demolition & rehabilitation of non electrified railway lines	m	0.00	R 256.88	1.00	1.10	R 0.00
5	Demolition of housing &/or administration facilities	m^2	0.00	R 542.33	1.00	1.10	R 0.00
6	Opencast rehabilitation including final voids & ramps	ha	1.90	R 284 292.18	1.00	1.10	R 594 170.66
7	Sealing of shafts, adits & inclines	m^2	0.00	R 145.57	1.00	1.10	R 0.00
8 (A)	Rehabilitation of overburden & spoils	ha	0.00	R 189 528.11	1.00	1.10	R 0.00
8 (B)	Rehabilitation of processing waste deposits & evaporation ponds (basic)	ha	0.00	R 236 053.85	0.80	1.10	R 0.00
8 (C)	Rehabilitation of processing waste deposits & evaporation ponds (acidic	ha	0.00	R 685 612.28	0.80	1.10	R 0.00
9	Rehabilitation of subsided areas	ha	0.00	R 158 717.49	1.00	1.10	R 0.00
10	General surface rehabilitation	ha	4.00	R 150 138.25	1.00	1.10	R 660 608.29
11	River diversions	ha	0.00	R 150 138.25	1.00	1.10	R 0.00
12	Fencing	ha	0.00	R 171.26	1.00	1.10	R 0.00
13	Water management	ha	0.00	R 57 086.78	1.00	1.10	R 0.00
14	2 to 3 years of maintenance & aftercare	ha	4.10	R 19 980.38	1.00	1.10	R 90 037.89
15 (A)	Specialist study	SUM	2.00	R 200 000.00	1.00	1.00	R 400 000.00
15 (B)	Specialist study	SUM	0.00	R 1 000 000.00	1.00	1.00	R 0.00
						Sub Total 1	
						(Sum of items 1 to 15 Above)	**R 3 346 225.62**
	Multiply by Weighting factor 2	1.1		R 334 622.56			R 334 622.56
1	Preliminary and general	Add 12% if subtotal 1 is less than R100,000,000.00					R 401 547.07
2	Contingencies	Add 10% of subtotal 1					R 334 622.56
						Sub Total 2	
						(Subtotal 1 plus sum of management & contingencies)	**R 4 417 017.82**
						VAT (15%)	R 662 552.67
		(Subtotal 2 plus VAT)			**GRAND TOTAL**		**R 5 079 570.49**

11.1.3 Closure Cost Assumptions

The following assumptions have been made for the determination of the closure cost:

Information on possible infrastructure elements such as heights, footprint areas, etc. were obtained/ estimated from measurements conducted by Geovicon Environmental (Pty) Limited from drawings and plans provided by Black Wattle Colliery, previous closure cost and photographs/ observations taken/ made during the site visits. The required quantities for calculating closure cost were then determined using this information.

Allowance has been made to remove/ demolish concrete columns, footings and plinths to 1m below final ground level, as well as a nominal allowance for the removal of additional concrete.

It is anticipated that a number of structures may in the future be identified that can be beneficially re-used and agreements established for transfer/hand-over. However, such considerations are not reflected in this closure cost determination and the full decommissioning and rehabilitation of all structures has been costed for.

An allowance has been made for the removal of carbonaceous material from all areas and to dispose thereof onto the nearest co-disposal facility; as well as for the disposal of contaminants and hazardous substances from contractors' yards, workshops, explosives magazines, diesel tank bay area and the like.

All gravel roads that are not utilised for access to farms or other similar activities will be deep ripped, profiled and vegetated.

All infrastructure and building footprint areas, as well as areas that are likely to be compacted such as material stockpile areas, will be ripped and shaped as required to facilitate positive drainage;

Allowance has also been made for general surface rehabilitation over all infrastructure and building complex areas; which would involve establishing pioneer vegetation where feasible, towards creating a self-sustaining natural community, and integrating into the surrounding land use/ s.

12. REQUIREMENTS FOR MONITORING, AUDITING AND REPORTING

12.1 INTERNAL, EXTERNAL AND LEGISLATED AUDITS

Table 7: Schedule of internal, external and legislated audits

Responsible person	Date and frequency of audit	Approach to address and close out audit results and schedule	Legislated/ Not Legislated
Internal Audits			
Black Wattle Colliery	Internal Water Use License audit.	Reports compiled and outcomes discussed with mine management. Action plans drafted and implemented.	Legislated

Black Wattle Colliery	Monthly environmental inspections.	Reports compiled and outcomes discussed with mine management. Action plans drafted and implemented.	Not Legislated
External Audits			
Independent external auditor	External Water Use License audit.	Reports compiled and outcomes discussed with mine management. Action plans drafted and implemented.	Legislated
Independent external auditor	EMP Environmental Audit Report.	Reports compiled and outcomes discussed with mine management. Action plans drafted and implemented.	Legislated
Independent external auditor	GN 704 audits.	Reports compiled and outcomes discussed with mine management. Action plans drafted and implemented.	Legislated

12.2 INTERNAL AND EXTERNAL REPORTING

All audits as mentioned above will be reported to the mine management and relevant state authority. Only on a written request and should it be legally binding, will Black Wattle Colliery (Pty) Limited consider making the outcomes of the above audits available to interested and affected parties.

Reports submitted to the mine management will be reviewed and discussed with the authors in order to develop action plans to address any issues arising from the reports.

12.3 MONITORING PLAN

12.3.1 Monitoring Programme

Care and maintenance will be required over areas from which infrastructure, structure and associated mining activities had been removed and decommissioned and rehabilitated.

Provision for monitoring should therefore be made. In view of the type of mining that was conducted at Black Wattle Colliery's – Opencast Extension, the following monitoring will be undertaken i.e., surface water, groundwater and air quality monitoring.

Water quality monitoring (surface and groundwater monitoring) will continue on all water quality monitoring points for a period of 5 years (monthly for surface and quarterly for groundwater monitoring points). Thereafter, the frequency will change to quarterly for surface water and twice yearly for groundwater. The following parameters will be analyzed:

Physical Parameters:

- Groundwater levels; and
- Surface water flows

Chemical Parameters:

- Laboratory analyses:
    - Anions and cations (Ca, Mg, Na, K, NO_3, Cl, SO_4, F, Fe, Mn, Al, & Alkalinity)
    - Other parameters (pH, EC, TDS)

Air quality monitoring will be conducted for a period of 4 years after rehabilitation. Dust fallout will be monitored during this monitoring period.

12.3.2 Approach on analysing Monitoring Results

Monitoring results will be examined for any deviations from the previous results or baseline database. Any concerns will be discussed with the mine management and if corrective measures are necessary, the mine is advised so.

On a quarterly (first five years after closure) and yearly (after five years after closure) basis, a water quality report will be compiled for the mine, which the mine will also submit to the Department of Water Affairs – Olifants River Catchment (Bronkhorstspruit Office).

The quarterly water quality monitoring reports will consist of the following:

- Chemical data for each monitoring locality presented in tabular format;
- Time series graphical representation of chemical data for each monitoring point;
- Time series statistical analysis for each monitoring point;
- Graphical compliance representation for selected chemical variables and water quality targets (DWAF);
- Graphical representation of static water levels of the monitoring boreholes;
- A site-specific discussion on each sampling locality;
- A general discussion (summary) on the ground and surface water quality prevalent; and
- Recommendations.

Results of the monitoring will be used to update the ground- and surface water studies where necessity arises. This will be used to re-assess the identified risks and determine the effectiveness of the management measures determined during the risk assessments.

13. MOTIVATION FOR ANY AMENDMENTS

Since this is the first report compiled, this section will not be applicable for this reporting period.

REGULATION 13 (3) OF GN R 1147 SIGNING OFF

Signed and approve by

R. Grobler, Director of Black Wattle Colliery (Pty) Limited.

Signed …… Date……

Signed and approved by:

……, auditor for Black Wattle Colliery (Pty) Limited.

Signed…… Date……

Appendix 1 of the Final Rehabilitation, Decommissioning and Mine Closure Plan

Environmental Risk Assessment Report

Black Wattle Colliery (Pty) Limited

Environmental Risk Assessment Report

Compiled in terms of Appendix 5 of the NEMA Regulations pertaining to the Financial Provision for Prospecting, Exploration, Mining or Production Operations (GN R 1147)

For
The determination of financial provision as contemplated in the NEMA for the costs associated with the undertaking of management, rehabilitation and remediation of environmental impacts from mining operations

Black Wattle Colliery

DMRE Reference No.: MP 30/5/1/2/3/2/1 (10140) MR

April 2023

Document No: 4290/2023

GEOVICON Environmental

Environmental & Geological Consultants

CONTENTS PAGE

TABLES

EXECUTIVE SUMMARY

Black Wattle Colliery is owned by Black Wattle Colliery (Pty) Limited and is an opencast mining operation situated on the remainder of portion 27 of the farm Middelburg Town and Townlands 287 JS and a portion of the remainder of portion 2 of the farm Uitkyk 290 JS, portions 3, 14, 27 and a portion of mineral area 1 (a portion of portion 3) of the farm Vaalbank 289 JS, within the Magisterial District of Middelburg, Mpumalanga Province.

Black Wattle Colliery is located approximately 3 km south of Middelburg at the intersection of the N4 freeway and the R35 Middelburg-Bethal Provincial Road. It lies within the Steve Tshwete Local Municipality and Nkangala District Municipality in the Mpumalanga Province. Black Wattle Colliery is an opencast strip mine near Middelburg, Mpumalanga. Black Wattle Colliery extracts the No. 1 and No. 2 coal seams within the Witbank Coalfields. The coal reserves in the project area were formerly mined using the underground method and was changed to opencast method due to poor roof wall encountered in the underground workings. The coal products from the current mining operation are targeted for both local and international markets. Coal is processed on site using a Dense Medium Separation (DMS) coal washing plant. Arising mineral residue from the coal washing process during the life of mine have resulted in one mineral residue deposit facility, which is no longer active. Mineral residue from the coal processing is now sold as low-quality coal product to the local market hence the mineral residue deposit facility is no longer a necessity. Black Wattle Colliery is operated under a mining right granted by the DMRE (DMRE Ref. No.: MP 30/5/1/2/2/22 (10140) MR), an approved EMPR and an issued Water Use License (WUL) (License no: 04/B12D/AGJ/466).

In terms of the MPRDA and NEMA, Black Wattle Colliery (Pty) Limited is responsible for ensuring that mining at Black Wattle Colliery is undertaken in such a manner that does not result in unacceptable pollution, ecological degradation or damage to the environment. In view of the above, Black Wattle Colliery (Pty) Limited must ensure that the Black Wattle Colliery mining area is rehabilitated to a state where there is a sustainable post mining land usage with no long term negative environmental impacts. This in essence implies that the area under the control of Black Wattle Colliery (as indicated in the Mining Right MP 30/5/1/2/2/22 (10140) MR) must be rehabilitated in such a manner as to ensure a sustainable post mining land use, as well as the prevention or management of post mining negative environmental effects.

Further to the above, Black Wattle Colliery (Pty) Limited recently acquired additional coal reserves from South 32 SA Coal Holdings (Pty) Limited on land adjacent to their mining right area (a portion of portion 3 of the farm Vaalbank 289 JS and portion 24 and 29 of the farm Goedehoop 315 JS). The acquisition of this coal reserve will extend the life of mine of Black Wattle Colliery by ten years. South 32 SA Coal Holdings (Pty) Limited entered into an agreement with Black Wattle Colliery (Pty) Limited to abandoned and transfer a part of portion of portion 3 of the farm Vaalbank 289 JS and portion 24 and 29 of the farm Goedehoop 315 JS from their mining right to Black Wattle Colliery (Pty) Limited. Black Wattle Colliery (Pty) Limited has accepted the transfer and intends on incorporating the land covered by the coal reserves in question into their Mining Right.

As a result, Black Wattle Colliery (Pty) Limited has lodged an application in terms of section 102 of the MPRDA to amend the Mining Right MP 30/5/1/2/2/22 MR (10140 MR) to include the property secured under the said transferal, and the mining right area will now measure 1091.1769 Ha. In order to comply with the requirements of the MPRDA and NEMA for the above-mentioned mining right variation, which has triggered NEMA listed activities, Black Wattle Colliery (Pty) Limited has applied for an environmental authorization for listed activities triggered by the proposed opencast mining extension operation.

This document concerns changes at Black Wattle Colliery's mining right area as a result of the expansion of the mining right area i.e., extension of the opencast mining area together with infrastructure and facilities associated with the extension. Infrastructure and facilities associated with the opencast extension project will include access/ haul roads and water management structures (storm water diversion structures and a dirty water pipelines), mobile offices, ablution facilities, in pit coal stockpiling pads and overburden stockpiles (top/ sub soils and softs excluding carbonaceous material). The existing offices, workshops, and other structures such as carbonaceous overburden stockpiling areas will be used for servicing the proposed opencast extension project. Note that the existing structures occur within the current Black Wattle Colliery mining right area.

The National Environmental Management Act, 1998 (Act 107 of 1998), (NEMA) requires that any person or entity that intends on undertaking activities listed in government notices 983, 984 and 985, as amended must obtain an environmental authorisation in terms of section 24D of the NEMA before undertaking such activities. Activities that will require an environmental authorisation in terms of the above-mentioned act were identified for the proposed opencast extension and are listed in a table contained in this report.

In addition to the above, section 24P of NEMA requires a holder of a mining right to assess his or her environmental liability in a prescribed manner and increase his or her financial provision to the satisfaction of the Minister responsible for mineral resources. Section 24P of NEMA further requires the holder of a mining right to submit an audit report to the Minister responsible for mineral resources on the adequacy of the financial provision from an independent auditor. The determination of financial provision as contemplated in the NEMA for the cost associated with the undertaking of management, rehabilitation and remediation of environmental impacts from mining operations must be determined in terms of the NEMA Regulations pertaining to the Financial Provision for Prospecting, Exploration, Mining or Production Operations (GN R 1147). The above-mentioned regulations requires the holder of a mining right to undertake a review of the requirements and cost for the following for their mining operations i.e. annual rehabilitation (as reflected in an annual rehabilitation plan), final rehabilitation, decommissioning and closure of the mining operations at the end of the life of operations (as reflected in a final rehabilitation, decommissioning and mine closure plan) and remediation of latent or residual environmental impacts which may become known in the future, including the pumping and treatment of polluted or extraneous water (as reflected in an environmental risk assessment report).

In view of the above, Black Wattle Colliery (Pty) Limited has undertaken the financial provision for Black Wattle Colliery in terms of the above-mentioned NEMA Regulations. This report concerns the requirement for the compilation and submission of the final rehabilitation, decommission and mine closure plan. The plan has been developed in compliance with appendix 4 of the GN 1147. This report aims to identify a post-mining land use that is feasible through providing the vision, objectives, targets and criteria for final rehabilitation, decommissioning and closure of the project; outlining the design principles for closure; explaining the risk assessment approach and outcomes and link closure activities to risk rehabilitation; detailing the closure actions that clearly indicate the measures that will be taken to mitigate and/ or manage identified risks and describes the nature of residual risks that will need to be monitored and managed post closure; committing to a schedule, budget, roles and responsibilities for final rehabilitation, decommissioning and closure of each relevant activity or item of infrastructure; identifying knowledge gaps and how these will be addressed and filled; detailing the full closure costs for the life of project at increasing levels of accuracy as the project develops and approaches closure in line with the final land use proposed; and outlining monitoring, auditing and reporting requirements. The report is submitted as one of the three reports submitted for the financial provision determination for Black Wattle Colliery for the financial year ending February 2021/ 2022.

SECTION ONE

Introduction

1. INTRODUCTION

1.1 DETAILS OF PERSON OR PERSONS THAT PREPARED THE PLAN

1.1.1 Name and contact detail of the EAP

EAP: Mr. Ornassis Tshepo Shakwane

IAIA Membership No.: 3847

Company: Geovicon Environmental (Pty) Limited

Postal Address:

P.O. Box 4050

MIDDELBURG, 1050

Tel: (013) 243 5842

Fax: (086) 632 4936

Cell No.: 082 498 1847

1.2 DETAILS OF THE PROFESSIONAL REGISTRATIONS AND EXPERIENCE OF THE PERSON THAT PREPARED THE PLAN

Geovicon Environmental (Pty) Limited is a geological and environmental consulting company. The company was formed during 1996, and currently has nineteen years' experience in the geological and environmental consulting field. Geovicon Environmental (Pty) Limited has successfully completed consulting projects 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 owners who are directors in the company 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 projects similar to this report as an environmental assessment practitioner.

Mr. T.G. Tefu is geologist. He obtained his BSc. in geology at the University of Witwatersrand. He worked with several mining companies and was also employed by the then Department of Mineral Resources' Environmental Management directorate.

Mrs J.M Bate obtained her BSc Degree in 1982 and BSc (Honns) (Entomology) in 1983 from the University of Pretoria. She obtained her MSc Degree from the University of Stellenbosch in 1986. She worked for the Agricultural Research Council, Grain Crops Institute as a Researcher for fourteen years, where she delivered papers at different congresses of the Entomological Society as well as the Crop Production Society. She is the author of five scientific papers as well.

Mr. M.D Bate, founder of Geovicon Environmental (Pty) Limited, is used by the company on an ad hoc (consultancy) basis. He is also a qualified geologist. Mr. Bate is appointed as the chairman for the board of the company. He is a qualified geologist.

He obtained his BSc (geology) from the Potchefstroom University for CHE in 1993, and completed his honours degree (cum Laude) in geology in 1994. He obtained his MSc (cum Laude) in 1995.

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 determination of the financial provision for Black Wattle Colliery's – Opencast Extension.

2. ENVIRONEMNTAL RISK ASSESSMENT PROCESS

2.1 DESCRIPTION OF THE RISK ASSESSMENT METHODOLOGY

The methodology applied in Black Wattle Colliery's – Opencast Extension environmental risk assessment was informed by Black Wattle Colliery (Pty) Limited's risk assessment matrix. A risk register was created. The risk register comprised a number of fields, grouped as follows: risk identification, risk analysis, and risk mitigation.

See Table 1 for the above-mentioned risk matrix used to assess the risk.

2.2 ENVIRONMENTAL RISK SUBSTANTIATION

A dedicated risk assessment was conducted for Black Wattle Colliery's – Opencast Extension operation, in April 2023. This was conducted in the form of a workshop/ virtual meeting with mine personnel. The purpose of the prescribed assessment was to identify environmental risks associated with the closure and post closure phases of Black Wattle Colliery's – Opencast Extension.

The identification of risks during the risk assessment were mainly based on past experience and results predictive models. None of the risks has manifested as yet. The following will be conducted in order to substantiate the risks i.e.:

- Risk monitoring will be conducted for all identified risks;
- Predictive models will be updated based on the monitoring results;
- Where possible research will be conducted to substantiate the risks;
- Results of published research will be conducted to substantiate the risks; and

- Outcomes of monitoring from surrounding mining operations can also be used in substantiation of the risks.

Following the above actions, should the risks not be substantiated and it can be proven that the risks will not manifest, the risk will be removed from the risk register.

Should it be proven that the risk is highly likely to manifest, proposed risk management actions must be initiated.

If the manifestation of the risk cannot be neither confirmed or the risk substantiated, the above actions will be continued in a bid to substantiate the risk.

2.2 RISK ASSESSMENT RESULTS CHANGES

The risk assessment will be conducted once every year (during February as part of the pecuniary provision report) in order to determine if new risks are identified or changes in the risk assessment should be affected.

To date no reassessment has been conducted hence there are no changes to the results of this risk assessment. This is because mining has not yet commenced and this report forms part of the NEMA application process.

Table 1: Black Wattle Colliery's – Opencast Extension risk assessment matrix

Risk matrix		**Hazard effects/ consequence**. Where an event has more than one "*loss type*" choose the consequence with the highest rating				
Consequence (loss type) Additional loss types may exist, choose and rate accordingly		**1** **Insignificant**	**2** **Minor**	**3** **Moderate**	**4** **Major**	**5** **Catastrophic**
Safety and health (Harm to people)		First aid case/ exposure to minor health risk.	Medical treatment case/ exposure to major health risk.	Lost time injury/ reversible impact on health.	Single fatality or loss of quality of life. Irreversible.	Multiple fatalities/ fatal impact on health.
Environmental impact		Minimal environmental harm – L1 incident.	Material environmental harm.	Serious environmental harm.	Major environmental harm.	Extreme environmental harm. Irreversible.
Business interruption, equipment damage		No disruption to operation < R20k.	Brief disruption to operation/ R20k – R100k.	Partial shutdown R1m to R10m.	Partial loss of operation R10m to R75m.	Substantial or total loss > R75m.
Legal and regulatory		Low level legal issue.	Minor legal issue; noncompliance.	Serious breach of law/ investigation report.	Major breach of law. Considerable prosecution.	Very considerable penalties & prosecution.
Social – community, impact on reputation		Slight impact-public awareness may exist but no public concern.	Limited impact- local public concern.	Considerable impact/ regional public interest.	National impact. National public interest.	International impact.
Possibility	**Examples**	**Risk Rating**				
5 (Almost Certain)	One or More a year. To re occur within a year.	**11 (M)**	**16 (M)**	**20 (H)**	**23 (H)**	**25 (H)**
4 (Likely)	Less than once a year re occur within 5 years.	**7 (L)**	**12 (M)**	**17 (M)**	**21 (H)**	**24 (H)**
3 (Possible)	Happened at some time. To happen within 10 years.	**4 (L)**	**8 (M)**	**13 (M)**	**18 (H)**	**22 (H)**
2 (Unlikely)	Happened at some time. To happen within 20 years.	**2 (L)**	**5 (L)**	**9 (M)**	**14 (M)**	**19 (H)**
1 (Rare)	Never been known to occur.	**1 (L)**	**3 (L)**	**6(L)**	**10 (M)**	**15 (M)**
Risk Rating	**Risk Level**	**Guideline for Risk Matrix**				
18 to 25	H - High	Eliminate, avoid, implement specific action plans / procedures to manage and monitor.				
8 to 17	M - Medium	Proactively manage.				
1 to 7	L - Low	Actively manage as appropriate.				

Table 2: Results/ findings of the Black Wattle Colliery's – Opencast Extension environmental risk assessment

Facility	Drivers that could result in the manifestation of the risks (Risk event)	Triggers which can be used to identify that the risk has manifested (Risk impact)	Latent risk (Yes/ No)	Timeframe of risk manifestation	Risk rating			Monitoring action (Prior & post manifestation)	Mitigation measure alternatives
					Possibility	Consequence	Risk level		
Mine access/ haul roads									
Mine access/ haul roads	• Extreme rainfall event	Excessive silt, contaminated with coal debris and soil erosion that will result in the contamination of water resources.	No	Only during decommissioning and closure.	3	2	8 (M)	Inspection during decommissioning and closure activities. Surface water monitoring.	Separation of clean and dirty water.
Mined out opencast mining area									
Rehabilitated opencast area.	• Surface settling; • Extreme rainfall event; • Alien vegetation infestation.	Surface water ponding, soil erosion, diversion of clean water run-off, safety of people and wild life, contamination of water resources, ingress of water to the opencast workings, reduction in indigenous vegetation.	No	Closure phase.	2	2	5 (L)	Visual observation of settlement cracks, ponding areas and areas with alien vegetation infestation via site inspections. Groundwater and surface water monitoring.	Maintenance of rehabilitated areas.
	• Groundwater plume and possible decant.	Contamination of water resources by the decant water and pollution plume from the opencast areas.	Yes	Operational, closure and post closure phases	4	3	17 (M)	Visual observation of signs of decant via site inspections. Groundwater and surface water monitoring.	Collection and management of decant water through passive treatment. Ensure that no groundwater usage within the zone of impact is allowed.
Infrastructure areas									
Mine office and stores complex (if any are to be constructed).	• Hazardous substance spillages (paints, thinners, hydrocarbons etc.).	Safety risk to employees.	No	Decommissioning, closure and post closure.	1	1	1 (L)	Physical observation of the areas used for waste disposal.	Construct and maintain a properly designed hazardous and constructed waste storage facility. Remove and dispose hazardous waste.
Mine workshop complex (if any are to be constructed).	• Hazardous substance spillages (hydrocarbons).	Contaminated surface water run-off, groundwater contamination.	No	Decommissioning, closure and post closure.	2	1	2 (L)	Physical observation of the areas used for waste disposal.	Remediate and rehabilitated area with waste spillages. Dispose removed material in an appropriate waste disposal facility.
Dirty water management areas									
Dirty water diversion trenches and berms.	• Extreme rainfall event; • Flooding.	Contamination of surface- and groundwater. Safety risk to people and wildlife.	No	Decommissioning, closure and post closure.	3	2	8 (M)	Surface- and Groundwater Monitoring. Site inspections to determine the condition of the dams in terms of safety standards.	Ensure that all contamination material is removed from the bottom of the trenches and disposed of properly. Ensure that the trenches are closed and left in a condition that will not pose safety risks to after mining land users.
Non-operational land									
Non-operational land within the mining right area.	• Veld fires.	Wild life, people and crops.	No	Decommissioning, closure and post closure.	3	2	8 (M)	Site inspection of the area to confirm that veld fire prevention measures are still in place and that signs of veld fires are detected timeously.	Ensure that fire breaks are in place and that they are well maintained especially during winter seasons.

3. ENVIRONEMNTAL RISK ASSESSMENT

3.1 RISK MONITORING RESULTS AND FINDINGS

Table 3: Risk monitoring results and findings

Facility	Drivers that could result in the manifestation of the risks (Risk event)	Triggers which can be used to identify that the risk has manifested (Risk Impact)	Monitoring Actions	Summary of monitoring results and findings for the previous year
Mine access/ haul roads.	• Extreme rainfall event.	Excessive silt, contaminated with coal debris and soil erosion that will result in the contamination of water resources.	Inspection during decommissioning and closure activities. Surface- and groundwater monitoring.	N/A – Operation is yet to commence.
Rehabilitated opencast area.	• Surface settling; • Extreme rainfall event; • Alien vegetation infestation.	Surface water ponding, soil erosion, diversion of clean water run-off, safety of people and wild life, contamination of water resources, ingress of water to the opencast workings, reduction in indigenous vegetation.	Visual observation of settlement cracks, ponding areas and areas with alien vegetation infestation via site inspections. Groundwater and surface water monitoring.	N/A – Operation is yet to commence.
	• Groundwater plume and possible decant.	Contamination of water resources by the decant water and pollution plume from the opencast areas.	Visual observation of signs of decant via site inspections. Groundwater and surface water monitoring.	N/A – Operation is yet to commence.
Mine office and stores complex (if any are to be constructed).	• Hazardous substance spillages (paints, thinners, hydrocarbons etc.).	Safety risk to employees.	Physical observation of the areas used for waste disposal.	N/A – Operation is yet to commence.
Mine workshop complex (if any will be constructed).	• Hazardous substance spillages.	Contaminated surface water run-off, groundwater contamination.	Physical observation of the areas used for waste disposal.	N/A – Operation is yet to commence.
Dirty water diversion trenches and berms.	• Extreme rainfall event; • Flooding.	Contamination of surface- and groundwater. Safety risk to people and wildlife.	Surface- and groundwater monitoring. Site inspections to determine the condition of the dams in terms of safety standards.	N/A – Operation is yet to commence.

Non-operational land within the mining right area.	• Veld fires.	Wild life, people and crops.	Site inspection of the area to confirm that veld fire prevention measures are still in place and that signs of veld fires are detected timeously.	N/A – Operation is yet to commence.

3.2 ALTERNATIVES TO MITIGATE OR MANAGE THE IMPACTS FROM RISKS ON MANIFESTATION

Below are the risks that were identified during the risk assessment and the alternatives that were considered for mitigating the impacts from the identified risks.

3.2.1 Contamination of surface water resources by contaminated silted runoff water

The following alternatives were considered:

- Undertaking separation of clean and dirty storm water at the site where silt is generated. (Preferred option); and
- Construction of a silt trap for the collection of silted water.

3.2.2 Contamination of groundwater regime by dirty water areas of the mine

The following alternatives were considered:

- Removal of all contaminating material (coal and discard) and rehabilitation of the dirty water areas (Preferred option).
- Removal of contaminating material and ensuring proper rehabilitation of the area.

3.2.3 Contamination of water resources by extraneous decant water

The following alternatives were considered:

- Collection of decant water in an evaporation dam. The evaporation dam will be designed such that it is able to contain the maximum decant water predicted with the idea of evaporating some of the water to prevent the overflowing of the dam.
- Passive treatment of the decant water. The decant water will be allowed to feed into a treatment system by gravity. The treatment system has not been finalised as yet. However, it is proposed that the system will be in the form of an artificial wetland where water will be passed through while being treated. More research and investigations are being conducted for the alternative (Preferred option).
- Pumping of decant water into the main PCD situated at the main mining operations. Decant will occur after the closure of the mine.

3.2.4 Infestation of rehabilitated lands with alien vegetation

The following alternatives were considered:

- Removal of all alien vegetation within the mining right area (Preferred option).
- Use of the forestation for small scale foresters and for community to obtain wood for fire and home improvement.

3.2.5 Destruction of property, loss of life and cause of injury due to uncontrolled veld fires.

No alternatives were looked at for the risk since the only way to manage the risk is by appointing an ECO to conduct regular inspections and have a fire management procedure in.

3.3 MOTIVATION FOR THE PREFERRED MITIGATION/ MANAGEMENT OPTION

3.3.1 Contamination of surface water resources by contaminated silted runoff water

Black Wattle Colliery (Pty) Limited opted to manage the contamination of surface water resources from silted runoff water by separation of clean and dirty storm water at the site where silt is generated for the following reasons:

- It complies with the requirements of the regulations under the GN 704;
- This ensures that Black Wattle Colliery's – Opencast Extension complies with the approved EMPR;
- This will ensure that the mine does not have detrimental impacts on the surrounding water users;
- It will ensure that clean water is kept clean and will allow for the maximum return of unaffected water to the water resources;
- All dirty water emanating from the rehabilitation activity will be contained; and
- Ensures the protection of the water resources through reduction of pollution at source, minimisation of impacts on water resources and allows the re-use of the collected water.

3.3.2 Contamination of groundwater regime by dirty water areas of the mine

Black Wattle Colliery (Pty) Limited opted to manage the contamination of groundwater resources from the dirty water areas of the mine by the removal of all contaminating material (coal and carbonaceous material) and rehabilitation of the dirty water areas for the following reasons:

- It complies with the requirements of the regulations under the GN 704;
- This ensures that Black Wattle Colliery's – Opencast Extension complies with the approved EMPR;
- This will ensure that the mine does not have detrimental impacts on the surrounding water users;
- This option will ensure that the impact of the risk on water resources at closure is reduced to acceptable levels; and
- Loss of water to the water resources will be minimised.

3.3.3 Contamination of water resources by extraneous decant water

Black Wattle Colliery (Pty) Limited opted to manage the contamination of water resources by polluted decant water by a passive treatment of the decant water for the following reasons:

- The option will ensure that Black Wattle Colliery's – Opencast Extension complies with the relevant laws pertaining to the mine closure in relation to water management;
- Implementation of the option will ensure that water and land use risks from Black Wattle Colliery's – Opencast Extension are managed;
- Implementation of the option will ensure that a long-term pollution control and risk/ hazard management is attained at Black Wattle Colliery's – Opencast Extension; and
- The closure option will allow Black Wattle Colliery's – Opencast Extension a good chance to meet the objectives and parameters that may in future be set for regional strategies, catchment management strategies, reserve determinations, water resources strategies, resource quality objectives, etc.

3.3.4 Infestation of rehabilitated lands with alien vegetation

Black Wattle Colliery (Pty) Limited opted to manage the infestation of rehabilitated lands with alien vegetation by total removal of all alien vegetation within the mining right for the following reasons:

- Improve ecological integrity of the natural systems;
- Where possible this option will assist in maximize social benefits; and
- The option will ensure the promotion of appropriate use of land that is cleared.

3.4 DESCRIPTION OF THE PREFERRED ALTERNATIVE IMPLEMENTATION

Below are the risks that were identified during the risk assessment and the alternatives that were considered for mitigating the impacts from the identified risks

3.4.1 Contamination of surface water resources by contaminated silted runoff water

The following will be undertaken during implementation of the preferred option:

- Use of excavator or TLB for the excavation of the storm water diversion trenches around the rehabilitation area;
- Dozing and hauling the upper 100mm layer to remove all carbonaceous material (including any material within the excavated storm water diversion trenches/ berms); and
- Scarifying and seeding the dozed area.

3.4.2 Contamination of groundwater regime by dirty water areas of the mine

The following will be undertaken during implementation of the preferred option:

- Removal of the remaining coal product (if any is present at the extension area or on the associated access/ haul roads), contaminated sediments and soils within the dirty area;
- Load and hauling of removed contaminated material from the site to a disposal area;
- Load and hauling of soil cover material to the site (from topsoil stockpiles places during the opencast extension mining operation);
- Levelling of the soil cover over the contaminated areas and reshaping thereof; and

- Seeding of the contaminated areas with the recommended seed mixture.

3.4.3 Contamination of water resources by extraneous decant water

Black Wattle Colliery (Pty) Limited is still in the process of determining the best passive water treatment option for Black Wattle Colliery. On completion of this exercise, an implementation plan for the proposed option will be submitted for approval.

3.4.4 Infestation of rehabilitated lands with alien vegetation

The following will be undertaken during implementation of the preferred option:

- Demarcation of areas infested with alien invasive plant species;
- Identification of all plant species that must be eradicated. A map showing the location of the identified species will be generated;
- Areas will then be delineated according to their priorities based on the type of species to be eradicated;
- A budget that includes the areas to be eradicated and the funds to be spent will then be generated, which will determine the time period it will take to remove all the alien and invasive plant species;
- Eradication will then be undertaken based on the eradication mentioned above. A chemical will be used to spray the plants to be eradicated. The plants will, after a few months, wilt and eventually dry out. Once dried out, the plants will be removed by members of the local community. The removed invasive vegetation will be discarded at the appropriate facility; and
- The area will thereafter be monitored for new plant growth, which will be eradicated as determined above. This will be undertaken until such time that all alien and invasive plants are removed.

3.4.5 Destruction of property, loss of life and cause of injury due to uncontrolled veld fires.

The implementation of the preferred option will include the demarcation, construction and maintenance of fire breaks around the properties within Black Wattle (Pty) Limited's – Black Wattle Colliery mining right area (this will include the opencast extension area).

4. CLOSURE DESIGN PRINCIPLES

4.1 CLOSURE COST ESTIMATION

4.1.1 Closure Cost Methodology

The following methodology of cost determination was used for determining the cost for closure for Black Wattle Colliery's – Opencast Extension:

- The closure cost for this report include cost to be incurred for the remediation and management of latent or residual environmental impacts which may become known in future, including the pumping and treatment of polluted decant water;
- The closure cost provided in this report were based on the latent risks identified during the risk's assessment;
- The closure cost was determined based on current contractor rates within the Greater Middelburg/ Ermelo Area;
- Rates for site establishment/ de-establishment was based on a 130 km radius; and
- For the purpose of this closure assessment, it was assumed that passive water treatment will be used or the management of decant was predicted for Black Wattle Colliery's – Opencast Extension.

4.1.2 Closure Costs Calculations

Table 4: Cost for the final rehabilitation, decommissioning and closure including management of latent risks

"Rules-based" assessment of the quantum for financial provision							
CALCULATION OF THE QUANTUM							
Mine:	BLACK WATTLE COLLIERY (PTY) LIMITED	**Location:**	Magisterial District of Middelburg, Mpumalanga Province.				
Evaluators:	O.T Shakwane of Geovicon Environmental (Pty) Limited	**Date:**	13/04/2023				
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^2	0.00	R 19.47	1.00	1.10	R 0.00
2 (A)	Demolition of steel buildings & Structures	m^2	0.00	R 271.16	1.00	1.10	R 0.00
2 (B)	Demolition of reinforced concrete buildings & structures	m^2	0.00	R 399.61	1.00	1.10	R 0.00
3	Rehabilitation of access roads	m^2	30000.00	R 48.53	1.00	1.10	R 1 601 408.78
4 (A)	Demolition & rehabilitation of electrified railway lines	m	0.00	R 470.96	1.00	1.10	R 0.00
4 (B)	Demolition & rehabilitation of non electrified railway lines	m	0.00	R 256.88	1.00	1.10	R 0.00
5	Demolition of housing &/or administration facilities	m^2	0.00	R 542.33	1.00	1.10	R 0.00
6	Opencast rehabilitation including final voids & ramps	ha	1.90	R 284 292.18	1.00	1.10	R 594 170.66
7	Sealing of shafts, adits & inclines	m^3	0.00	R 145.57	1.00	1.10	R 0.00
8 (A)	Rehabilitation of overburden & spoils	ha	0.00	R 189 528.11	1.00	1.10	R 0.00
8 (B)	Rehabilitation of processing waste deposits & evaporation ponds (basic)	ha	0.00	R 236 053.85	0.80	1.10	R 0.00
8 (C)	Rehabilitation of processing waste deposits & evaporation ponds (acidic	ha	0.00	R 685 612.28	0.80	1.10	R 0.00
9	Rehabilitation of subsided areas	ha	0.00	R 158 717.49	1.00	1.10	R 0.00
10	General surface rehabilitation	ha	4.00	R 150 138.25	1.00	1.10	R 660 608.29
11	River diversions	ha	0.00	R 150 138.25	1.00	1.10	R 0.00
12	Fencing	ha	0.00	R 171.26	1.00	1.10	R 0.00
13	Water management	ha	0.00	R 57 086.78	1.00	1.10	R 0.00
14	2 to 3 years of maintenance & aftercare	ha	4.10	R 19 980.38	1.00	1.10	R 90 037.89
15 (A)	Specialist study	SUM	2.00	R 200 000.00	1.00	1.00	R 400 000.00
15 (B)	Specialist study	SUM	0.00	R 1 000 000.00	1.00	1.00	R 0.00
						Sub Total 1	
						(Sum of items 1 to 15 Above)	**R 3 346 225.62**
	Multiply by Weighting factor 2	1.1		R 334 622.56			R 334 622.56
1	Preliminary and general	Add 12% if subtotal 1 is less than R100,000,000.00					R 401 547.07
2	Contingencies	Add 10% of subtotal 1					R 334 622.56
						Sub Total 2	
						(Subtotal 1 plus sum of management & contingencies)	**R 4 417 017.82**
						VAT (15%)	R 662 552.67
		(Subtotal 2 plus VAT)			**GRAND TOTAL**		**R 5 079 570.49**

4.1.3 Closure Cost Assumptions

The following assumptions have been made for the determination of the closure cost:

Based on the result of the groundwater modelling study, it has been assumed that latent risk in terms of decanting of polluted groundwater from one of the rehabilitated opencast areas will manifest within the post-closure phase of the mine. It will only be during the decommissioning and closure phase that the passive treatment (construction of an artificial wetland) will be implemented.

The cost for management of this risk in this report thus include the construction of the artificial wetland and care and maintenance of the wetland. Note that the care and maintenance budget provided in the final rehabilitation, decommissioning and mine closure plan has covered the passive treatment facility.

Allowance has been made for surface and groundwater monitoring over 5 years after closure under the final rehabilitation, decommissioning and mine closure plan. This will be sufficient to cover the monitoring to be conducted for the proposed passive treatment.

Care and maintenance of the rehabilitated areas over a ten-year period post closure has been assumed. All gravel roads that are not utilised for access to farms or other similar activities will be deep ripped, profiled and vegetated.

4.1.4 Cost of Monitoring Post Closure

For the purpose of determining the cost to achieve the above, the following assumptions were made:

Water quality monitoring (surface- and groundwater) will continue on all water quality monitoring points for a period of 5 years (monthly for surface and quarterly for groundwater monitoring points) after closure. Thereafter, the frequency will change to quarterly for surface water and bi-annually for groundwater. Cost for water monitoring was escalated at a rate of 4% per annum.

Air quality monitoring will be conducted for a period of 4 years after rehabilitation. Cost for monitoring has been escalated at a rate of 4% per annum. The cost for monitoring post closure is attached in the closure cost calculations under the final rehabilitation, decommissioning and mine closure plan.

4.2 CAPITAL, OPERATING, REPLACEMENT AND MAINTENANCE COSTS

4.2.1 Care and Maintenance

Regarding the latent risks identified, care and maintenance will be defined as the activities that are necessary to ensure that the decant water treatment measures and groundwater management measures implemented during the decommissioning, closure and post closure phase are self-sustaining, or that such actions gain a state of equilibrium with its surroundings.

This implies that;

- The mining activities that were conducted on the area must not be a source of pollution as far as surface- or groundwater is concerned. (i.e., any measures implemented on the site must be self-sufficient and prevent contaminants from entering the natural environment); and
- The post-mining land use has been achieved, and is self-sustainable.

Surface- and groundwater studies and long-term monitoring have indicated that if the area is rehabilitated correctly and the proposed measures put in place, the probability of long-term surface and groundwater contamination will be slight and contained.

During this period, yearly risk assessments will be necessary, to timeously determine any latent impacts, and management strategies thereof. With the above in mind, the mine will be liable to monitor, and take any actions necessary to prove the above.

For the purpose of determining the cost to achieve the management of the identified latent risks, the following assumptions were made:

- A maintenance manager will be employed to ensure that all actions are timeously conducted. This include ensuring that the facility established for the treatment of decant water is well maintained. The amount of time that such maintenance manager will need to undertake his duties will decrease on a yearly basis. The monthly salary for the manager has been escalated by 8% per annum;
- Water quality monitoring (surface- and groundwater) will continue on all water quality monitoring points for a period of 5 years (monthly for surface and quarterly for groundwater monitoring points). Thereafter, the frequency will change to quarterly for surface water and bi-annually for groundwater. Cost for water monitoring was escalated at a rate of 4% per annum.
- Risk assessments and post-mining rehabilitation cost will be determined for a 10-year period as prescribed in Regulation No. R 1147/2015 (Act. 107 of 1998).

4.2.2 Post Closure Water Management

Black Wattle Colliery (Pty) Limited has commissioned Geovicon Environmental (Pty) Limited to develop water treatment models for Black Wattle Colliery's – Opencast Extension.

This will include the determination of the treatment method and to determine the capital and operational expenditure for the treatment of the possible decant water.

A desktop study was utilised to determine initial cost for the management of the decant water. For the purpose of this costing, it was assumed that passive water treatment methods would be used at Black Wattle Colliery's – Opencast Extension. This will be in the form of an artificial wetland, which will be used to treat the decant water. Once treated, a number of options are available for the use of water which include discharge into the water resource, use of water irrigation and discharge of the treated water into a dam that will be used for livestock watering and/ or irrigation purposes.

The cost for the management of polluted decant water from the mine has been included in the cost calculation table under this report.

5. REQUIREMENTS FOR MONITORING, AUDITING AND REPORTING

5.1 PRIOR TO RISK MANIFESTATION

5.1.1 Monitoring

All actions to be undertaken for the monitoring of the identified risks are described in Table 3. These actions will be undertaken to determine if the risk is manifesting or not.

The results of the risk monitoring will be analysed and reported in accordance to the mine environmental monitoring programme.

5.1.2 Auditing

Internal and external audits will be used for this purpose. These will be reported to as per the requirements for each audit. See Table 4 under section 12 of the final rehabilitation, decommissioning and mine closure plan.

5.2 ON AND DURING RISK MANIFESTATION

5.2.1 Monitoring

Once the risk has manifested, the following monitoring will be undertaken.

Surface water risks

Surface water monitoring will be conducted within the impacted areas. Samples will be taken immediately on manifestation and will continue once every week for a month and thereafter as per recommendation from the surface water specialist.

Groundwater risks

Once groundwater contamination has taken place, the current groundwater monitoring will be continued. Where necessary and if recommended so by a groundwater a specialist, the frequency and positions of the groundwater sampling will be increased.

Surface subsidence

Visual observation and where necessary surveys will be used for monitoring the risks after manifestation. This will be continued until it can be proven that the risk has been managed.

Contamination from hazardous wastes

Visual observation over the contaminated areas with, where necessary, taking of soil samples will be used for monitoring the risks after manifestation. This will be continued until it can be proven that the risk has been managed.

REGULATION 13 (3) OF GN R 1147 SIGNING OFF

Signed and approve by

R. Grobler, Director of Black Wattle Colliery (Pty) Limited.

Signed …… Date……

Signed and approved by:

……, auditor for Black Wattle Colliery (Pty) Limited.

Signed…… Date……..

Appendix 6

Black Wattle Colliery Environmental Awareness Plan

ENVIRONMENTAL AWARENESS PLAN

BLACK WATTLE COLLIERY

In terms of Regulation 1(1) (m) under Appendix 4 of the NEMA EIA Regulations, 2014 as amended, Black Wattle Group (Pty) Limited must, as part of their EMPr, compile, submit and implement an environmental awareness plan for Black Wattle Colliery. The above-mentioned environmental awareness plan must describe the manner in which Black Wattle Group (Pty) Limited intends to inform their employees at Black Wattle Colliery of any environmental risk which may result from their work; and the manner in which risks must be dealt with in order to avoid pollution or the degradation of the environment.

This document therefore concerns the detail of the environmental awareness plan for Black Wattle Colliery as required by Regulation 1(1) (m) under Appendix 4 of the NEMA EIA Regulations, 2014 as amended.

In view of the above, Black Wattle Group (Pty) Limited has developed an environmental awareness plan for the Black Wattle Colliery, which is explained in more detail below.

Note that the responsible person will revise these environmental awareness procedures from time to time. The date of commencement of the revised procedure will always be indicated to prevent confusion.

This Environmental Awareness Plan (Standard Training Procedure) sets out the mine's training objectives regarding to environmental awareness. It is a stand-alone procedure, which serves to improve awareness, training and competency in the environmental field. It contains no detail on the actual training initiatives but rather serves to ensure that a responsible person is appointed to deal with and increase environmental awareness on the mine.

Scope

This Environmental Training Standard Procedure sets out the mine's training objectives regarding environmental awareness. It is a stand-alone procedure, which serves to improve awareness, training and competency in the environmental field. It contains no detail on the actual training initiatives but rather serves to ensure that a responsible person is appointed to deal with and increase environmental awareness on the mine.

Objectives

The following are the objectives set for this standard procedure:

- To explain and aid the personnel involved in training with regards to Environmental Management System (EMS);
- To clarify the EMS training and ensure that all employees are correctly instructed with regards to the environment.

Safety risks associated with activities

There were no hazards identified in applying this standard procedure.

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.

Legal requirements

The following legislation and standards apply to this Standard Procedure:

- Employment Equity Act 55 of 1998 – AREAS WHERE EMPLOYMENT EQUITY ARE DEFINED, INCLUDING TRAINING & DEVELOPMENT.
- National Environmental Management Act 107 of 1998 – RECOMMENDATIONS FOR INSTITUTIONAL CO-OPERATION DEVELOPMENT.
- AMENDED NEMA EIA REGULATIONS, 2014 – DEVELOPMENT OF AN ENVIRONMENTAL AWARENESS PLAN.

Induction Programme

An Induction Programme (Black Wattle Colliery induction), which includes an environmental awareness programme was established for Black Wattle Colliery. During the training sessions various topics will be discussed such as, but not limited to: Water Pollution Prevention, Good Environmental Housekeeping, etc. Through the Induction Programme, the mine manager, safety officer, or any other responsible appointed person will ensure that all staff receives training in:

Administrative requirements and procedures, which includes the Environmental Emergency and awareness

Procedures

Resource conservation and environmental reporting and general environmental awareness for mine related environmental issues.

All employees (including contractor employees) to undergo Black Wattle Colliery induction. Black Wattle Colliery induction includes training and awareness on environmental issues on the mine 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 gets updated to ensure that it is still applicable. Consideration is given to:

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

- Trends in audit findings.

Trainee needs

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 Black Wattle Colliery. The following categories are considered, via:

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

Each of these categories has different responsibilities and therefore has different knowledge requirements and environmental awareness training needs to obtain that knowledge.

Training Planning

Identified and agreed training needs shall be included in budgets. Course attendance (other than at the internal induction courses) shall be scheduled on the basis of the importance of task contribution to the maintenance, effectiveness and improvement of the objectives.

General environmental awareness training

General awareness training will be offered to operators, processors and employees in the other various sections of the mine during the safety toolbox talks. This will be conducted on a 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 will be 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) reps /Environmental officers.
- The topics are displayed on the notice boards of all mining sections.
- Ad hoc environmental awareness sessions to various departments/sections are conducted on request. The presentations will focus on the environmental issues relevant to individual tasks.

Job specific environmental awareness training

Job specific training will be developed to address urgent training needs as identified /required. The training material will 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.

Competency training

Management (training official/environmental officer if available) is responsible for the environmental competency and awareness training of middle management and supervisors. This training is conducted on a one to one basis and 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 are determined through the following:

- Trend analysis and reporting
- Analysis of work areas during visits and audits
- Trend analysis of monthly incidents as recorded per mine section.

Certification

Photocopies of certificates issued after completion of a training course are maintained in the staff member's file and Training Department's records.

Records

Environmental awareness and training records will be kept at a safe and accessible place on site

Appendix 7

Screening Tool Report

SCREENING REPORT FOR AN ENVIRONMENTAL AUTHORIZATION AS REQUIRED BY THE 2014 EIA REGULATIONS – PROPOSED SITE ENVIRONMENTAL SENSITIVITY

EIA Reference number: MP 30/5/1/2/2/22 MR (10140 MR)

Project name: Black Wattle Opencast expansion 2022

Project title: Black Wattle Opencast expansion 2022

Date screening report generated: 03/11/2022 11:19:28

Applicant: Black Wattle Colliery Limited

Compiler: Geovicon Environmental (Pty) Limited

Compiler signature:

.....

Application Category: Mining|Mining Right

Table of Contents

Proposed Project Location

Orientation map 1: General location

General Orientation: Black Wattle Opencast expansion 2022

Map of proposed site and relevant area(s)

Cadastral details of the proposed site

Property details:

No	Farm Name	Farm/ Erf No	Portion	Latitude	Longitude	Property Type
1	UITKYK	290	0	25°49'47.95S	29°25'56.12E	Farm
2	VAALBANK	289	0	25°50'27.25S	29°28'49.62E	Farm
3	RIETFONTEIN	314	0	25°52'5.24S	29°24'7.81E	Farm
4	GOEDEHOOP	315	0	25°53'3.84S	29°26'40.93E	Farm
5	MIDDELBURG TOWN AND TOWNLANDS	287	0	25°46'29.31S	29°27'20.04E	Farm
6	VAALBANK	289	27	25°50'26.42S	29°27'18.84E	Farm Portion
7	VAALBANK	289	60	25°50'13.52S	29°27'30.62E	Farm Portion
8	VAALBANK	289	72	25°50'8.72S	29°27'33.29E	Farm Portion
9	RIETFONTEIN	314	2	25°50'50.42S	29°24'45.76E	Farm Portion
10	VAALBANK	289	68	25°50'25.83S	29°27'30.57E	Farm Portion
11	GOEDEHOOP	315	29	25°51'27.41S	29°26'48.38E	Farm Portion
12	VAALBANK	289	14	25°50'14.81S	29°27'11.45E	Farm Portion
13	UITKYK	290	2	25°49'50.29S	29°25'56.7E	Farm Portion
14	RIETFONTEIN	314	54	25°51'15.37S	29°24'33.17E	Farm Portion
15	MIDDELBURG TOWN AND TOWNLANDS	287	307	25°49'55.99S	29°27'33.72E	Farm Portion
16	RIETFONTEIN	314	63	25°50'2.6S	29°25'5.86E	Farm Portion
17	VAALBANK	289	4	25°50'17.04S	29°27'20.54E	Farm Portion
18	UITKYK	290	6	25°49'29.99S	29°25'23.97E	Farm Portion
19	RIETFONTEIN	314	18	25°50'36.31S	29°24'18.63E	Farm Portion
20	VAALBANK	289	49	25°50'3.06S	29°27'31.23E	Farm Portion
21	VAALBANK	289	28	25°50'36.04S	29°27'16.74E	Farm Portion
22	VAALBANK	289	61	25°50'17.24S	29°27'30.57E	Farm Portion
23	VAALBANK	289	73	25°50'6.12S	29°27'33.75E	Farm Portion
24	RIETFONTEIN	314	14	25°51'50.72S	29°24'22.04E	Farm Portion
25	GOEDEHOOP	315	24	25°51'11.75S	29°26'34.44E	Farm Portion

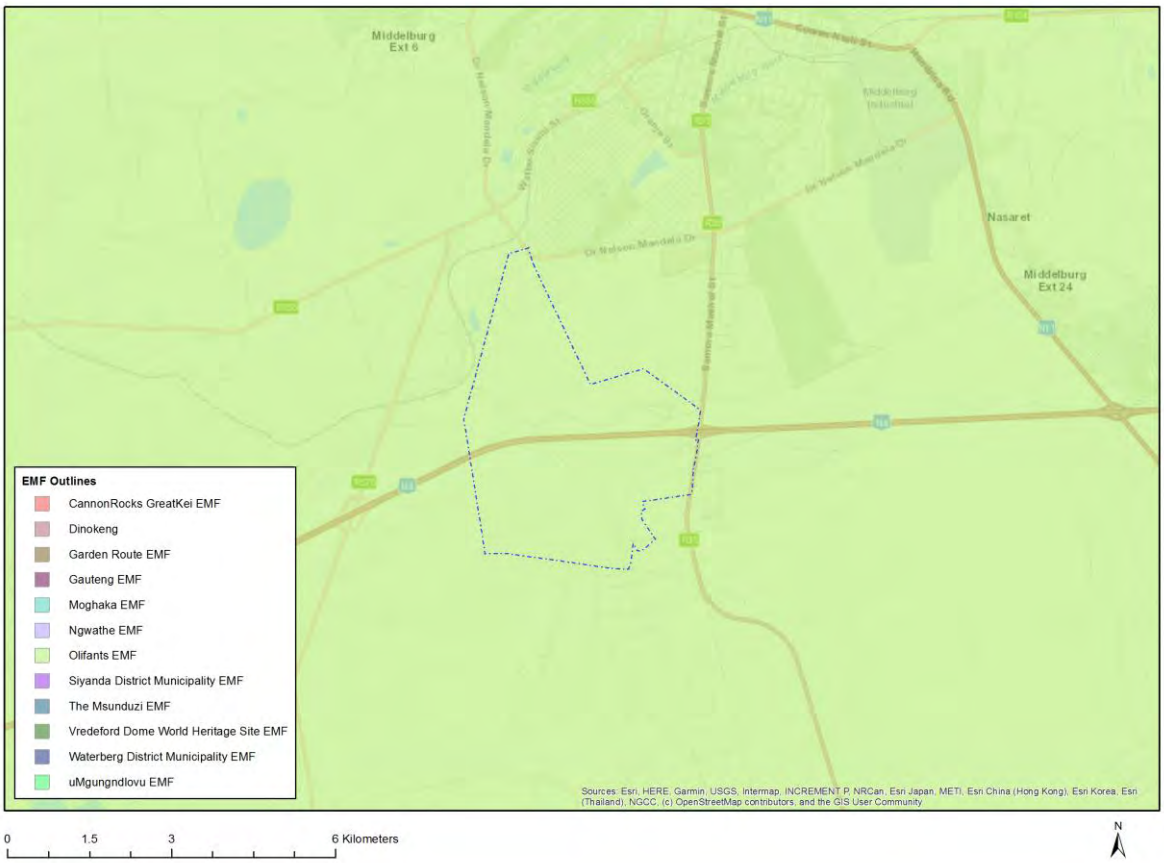
26	MIDDELBURG TOWN AND TOWNLANDS	287	27	25°48'9.4S	29°27'47.44E	Farm Portion
27	VAALBANK	289	3	25°50'49.2S	29°26'36.77E	Farm Portion
28	UITKYK	290	7	25°48'56.29S	29°25'47.97E	Farm Portion
29	RIETFONTEIN	314	39	25°49'51.8S	29°25'9.41E	Farm Portion
30	GOEDEHOOP	315	34	25°51'24.28S	29°25'48.04E	Farm Portion

Development footprint[1] vertices:
No development footprint(s) specified.

Wind and Solar developments with an approved Environmental Authorisation or applications under consideration within 30 km of the proposed area

No	EIA Reference No	Classification	Status of application	Distance from proposed area (km)
1	14/12/16/3/3/2/759	Solar PV	Approved	12.4

Environmental Management Frameworks relevant to the application



[1] "development footprint", means the area within the site on which the development will take place and incudes all ancillary developments for example roads, power lines, boundary walls, paving etc. which require vegetation clearance or which will be disturbed and for which the application has been submitted.

Environmental Management Framework	LINK
Olifants EMF	https://screening.environment.gov.za/ScreeningDownloads/EMF/Zone_46,_67,_78,_80,_92,_103,_122,_129.pdf

Environmental screening results and assessment outcomes

The following sections contain a summary of any development incentives, restrictions, exclusions or prohibitions that apply to the proposed development site as well as the most environmental sensitive features on the site based on the site sensitivity screening results for the application classification that was selected. The application classification selected for this report is: **Mining|Mining Right**.

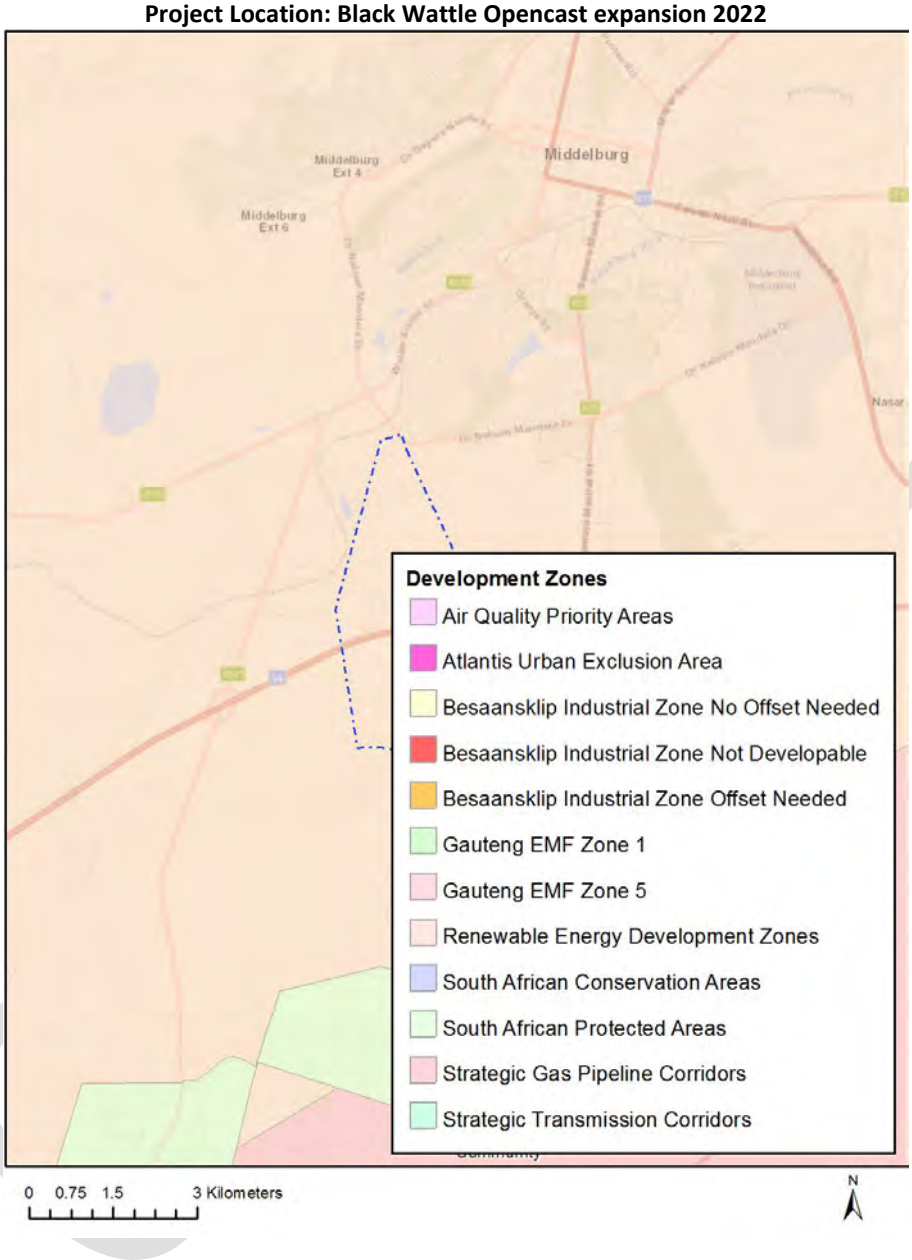
Relevant development incentives, restrictions, exclusions or prohibitions

The following development incentives, restrictions, exclusions or prohibitions and their implications that apply to this site are indicated below.

Incentive, restriction or prohibition	Implication
Strategic Transmission Corridor-International corridor	https://screening.environment.gov.za/ScreeningDownloads/DevelopmentZones/Combined_EGI.pdf
Air Quality-Highveld Priority Area	https://screening.environment.gov.za/ScreeningDownloads/DevelopmentZones/HIGHVELD_PRIORITY_AREA_AQMP.pdf
Renewable energy development zones 9-Emalahleni	https://screening.environment.gov.za/ScreeningDownloads/DevelopmentZones/Combined_REDZ.pdf

Map indicating proposed development footprint within applicable development incentive, restriction, exclusion or prohibition zones

Project Location: Black Wattle Opencast expansion 2022



Proposed Development Area Environmental Sensitivity

The following summary of the development site environmental sensitivities is identified. Only the highest environmental sensitivity is indicated. The footprint environmental sensitivities for the proposed development footprint as identified, are indicative only and must be verified on site by a suitably qualified person before the specialist assessments identified below can be confirmed.

Theme	Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Agriculture Theme		X		
Animal Species Theme		X		

Aquatic Biodiversity Theme	X			
Archaeological and Cultural Heritage Theme		X		
Civil Aviation Theme		X		
Defence Theme				X
Paleontology Theme	X			
Plant Species Theme			X	
Terrestrial Biodiversity Theme	X			

Specialist assessments identified

Based on the selected classification, and the environmental sensitivities of the proposed development footprint, the following list of specialist assessments have been identified for inclusion in the assessment report. It is the responsibility of the EAP to confirm this list and to motivate in the assessment report, the reason for not including any of the identified specialist study including the provision of photographic evidence of the site situation.

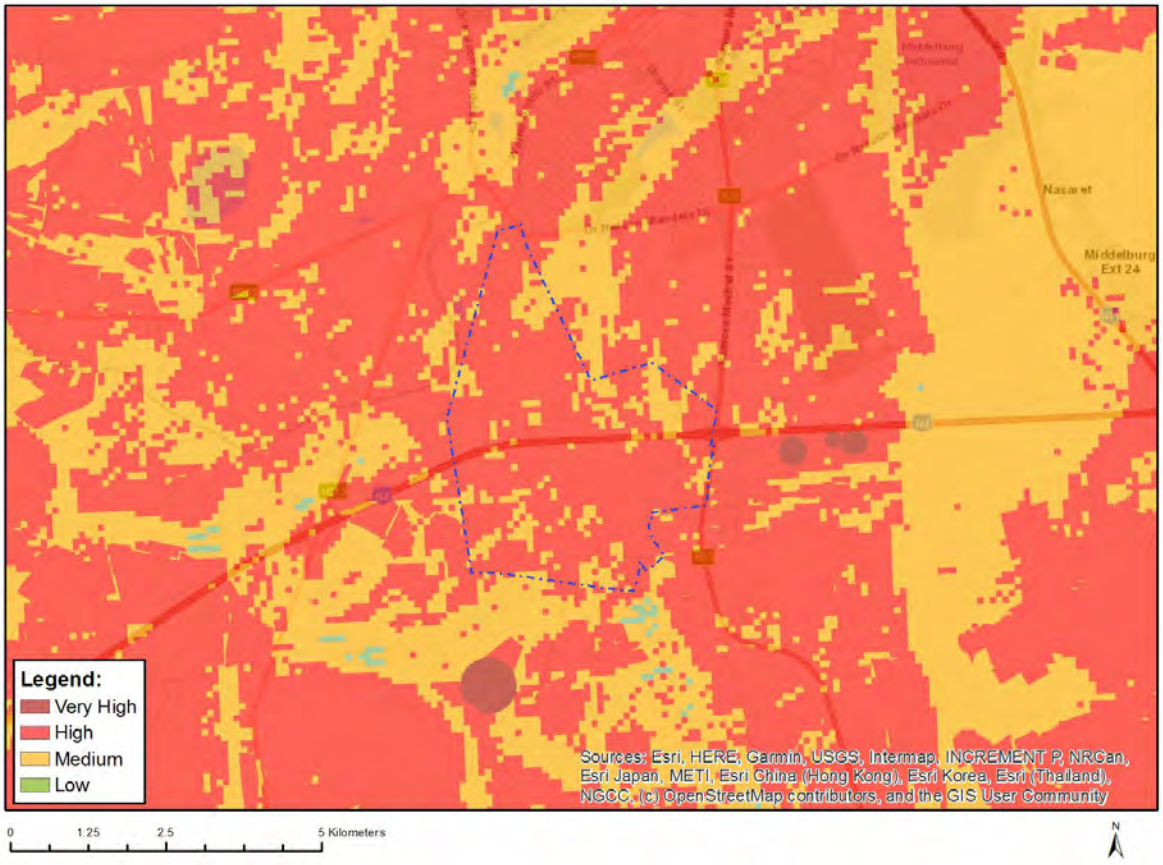
No	Specialist assessment	Assessment Protocol
1	Agricultural Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Agriculture_Assessment_Protocols.pdf
2	Landscape/Visual Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
3	Archaeological and Cultural Heritage Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
4	Palaeontology Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
5	Terrestrial Biodiversity Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Terrestrial_Biodiversity_Assessment_Protocols.pdf
6	Aquatic Biodiversity Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Aquatic_Biodiversity_Assessment_Protocols.pdf
7	Hydrology	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols

	Assessment	/Gazetted_General_Requirement_Assessment_Protocols.pdf
8	Noise Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Noise_Impacts_Assessment_Protocol.pdf
9	Radioactivity Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
10	Traffic Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
11	Geotechnical Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
12	Climate Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
13	Health Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
14	Socio-Economic Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
15	Ambient Air Quality Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
16	Seismicity Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
17	Plant Species Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Plant_Species_Assessment_Protocols.pdf
18	Animal Species Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Animal_Species_Assessment_Protocols.pdf

Results of the environmental sensitivity of the proposed area.

The following section represents the results of the screening for environmental sensitivity of the proposed site for relevant environmental themes associated with the project classification. It is the duty of the EAP to ensure that the environmental themes provided by the screening tool are comprehensive and complete for the project. Refer to the disclaimer.

MAP OF RELATIVE AGRICULTURE THEME SENSITIVITY

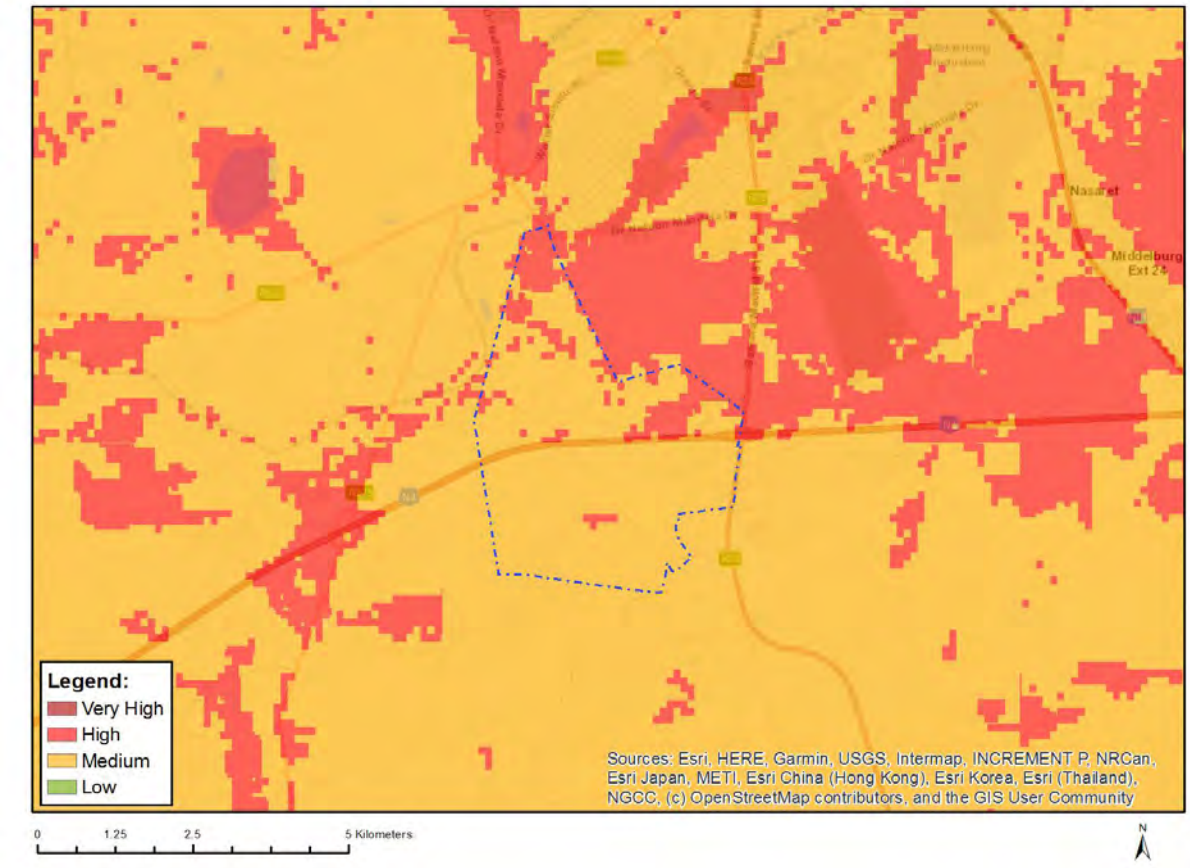


Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	Land capability;09. Moderate-High/10. Moderate-High
High	Annual Crop Cultivation / Planted Pastures Rotation;Land capability;06. Low-Moderate/07. Low-Moderate/08. Moderate
High	Annual Crop Cultivation / Planted Pastures Rotation;Land capability;09. Moderate-High/10. Moderate-High
Medium	Land capability;06. Low-Moderate/07. Low-Moderate/08. Moderate

MAP OF RELATIVE ANIMAL SPECIES THEME SENSITIVITY



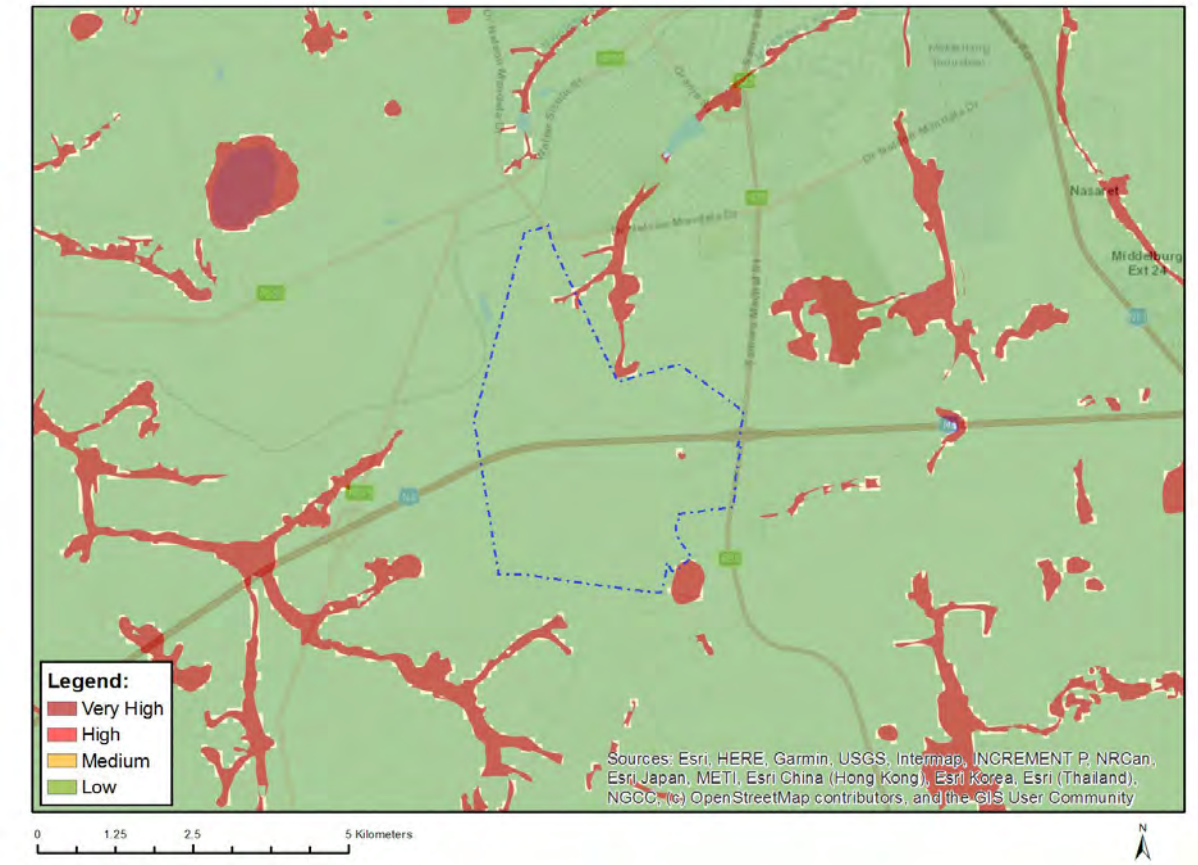
Where only a sensitive plant unique number or sensitive animal unique number is provided in the screening report and an assessment is required, the environmental assessment practitioner (EAP) or specialist is required to email SANBI at eiadatarequests@sanbi.org.za listing all sensitive species with their unique identifiers for which information is required. The name has been withheld as the species may be prone to illegal harvesting and must be protected. SANBI will release the actual species name after the details of the EAP or specialist have been documented.

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	Aves-Tyto capensis
High	Aves-Circus ranivorus
High	Aves-Sagittarius serpentarius
High	Aves-Eupodotis senegalensis
Medium	Aves-Tyto capensis
Medium	Aves-Sagittarius serpentarius
Medium	Aves-Eupodotis senegalensis
Medium	Mammalia-Crocidura maquassiensis
Medium	Mammalia-Dasymys robertsii
Medium	Mammalia-Hydrictis maculicollis
Medium	Mammalia-Ourebia ourebi ourebi
Medium	Reptilia-Kinixys lobatsiana

MAP OF RELATIVE AQUATIC BIODIVERSITY THEME SENSITIVITY

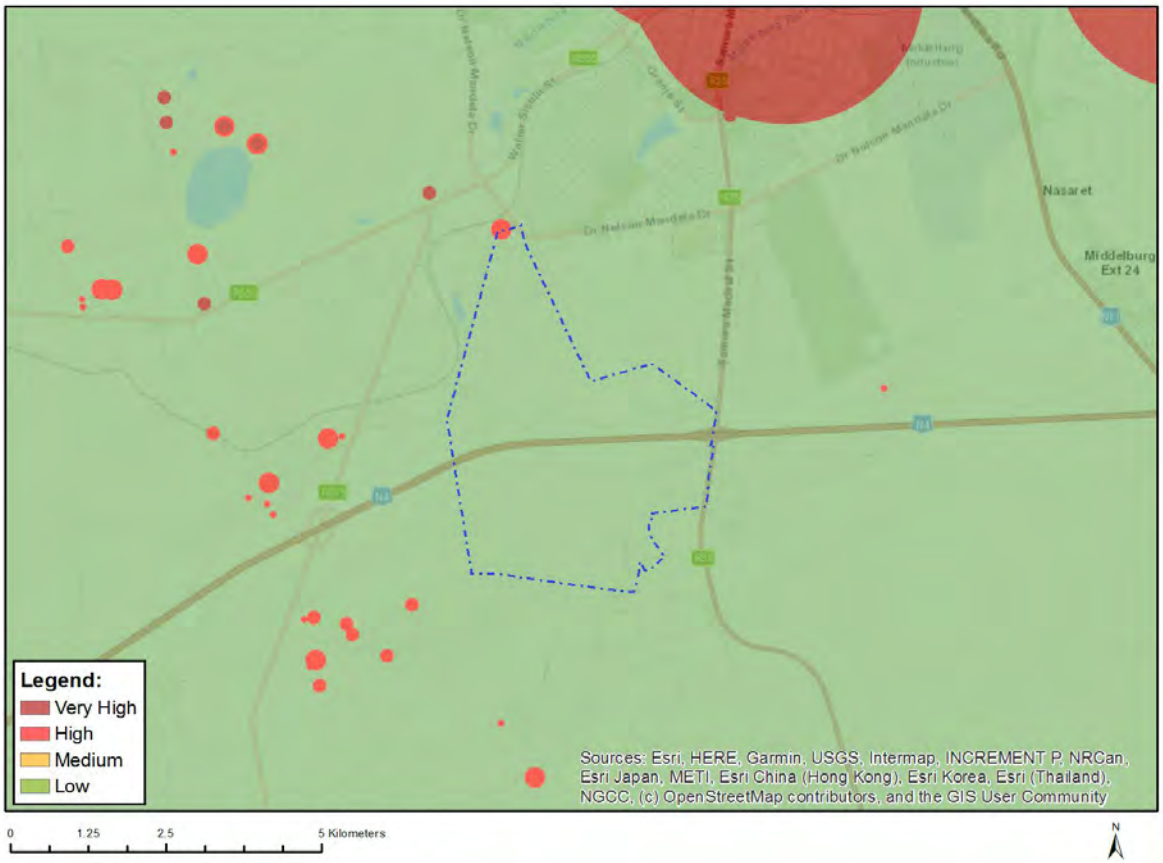


Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low sensitivity
Very High	Aquatic CBAs
Very High	Wetlands and Estuaries

MAP OF RELATIVE ARCHAEOLOGICAL AND CULTURAL HERITAGE THEME SENSITIVITY

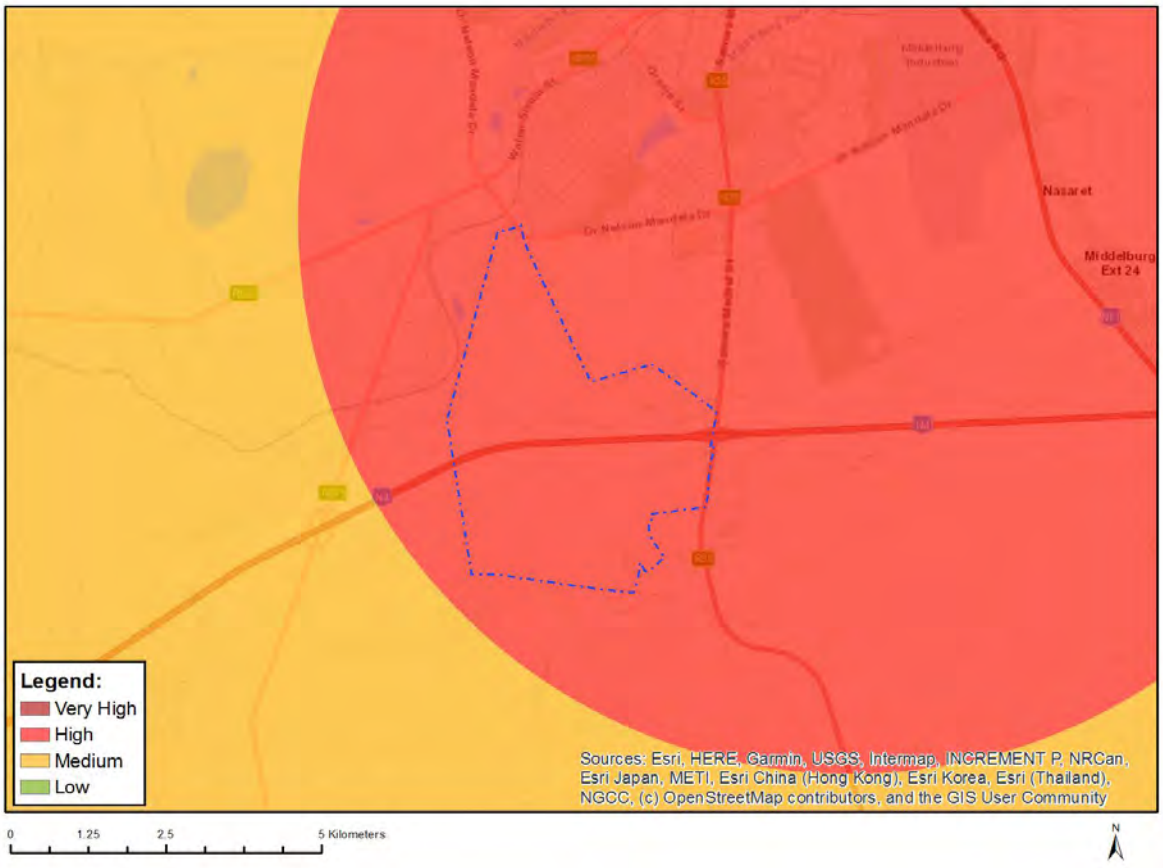


Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	Within 150m of a Grade IIIa Heritage site
Low	Low sensitivity

MAP OF RELATIVE CIVIL AVIATION THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	Within 8 km of other civil aviation aerodrome

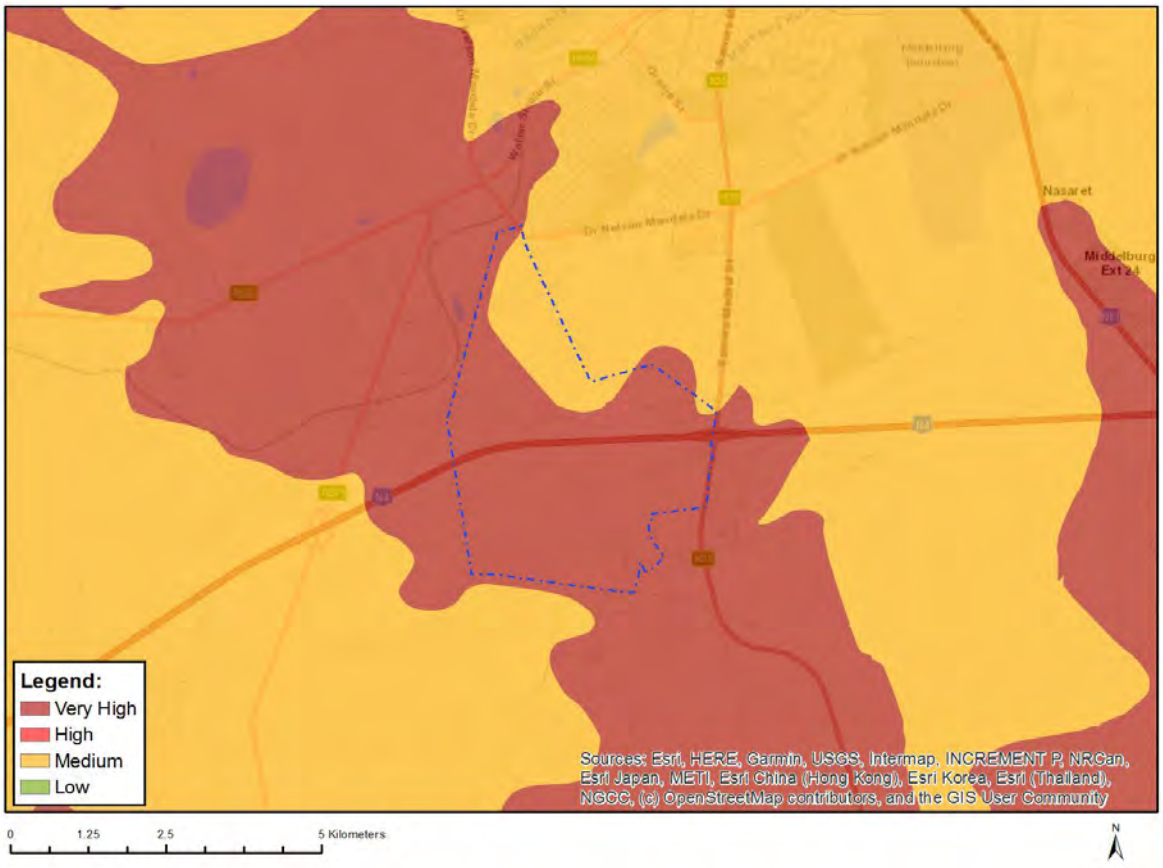
MAP OF RELATIVE DEFENCE THEME SENSITIVITY

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity

MAP OF RELATIVE PALEONTOLOGY THEME SENSITIVITY

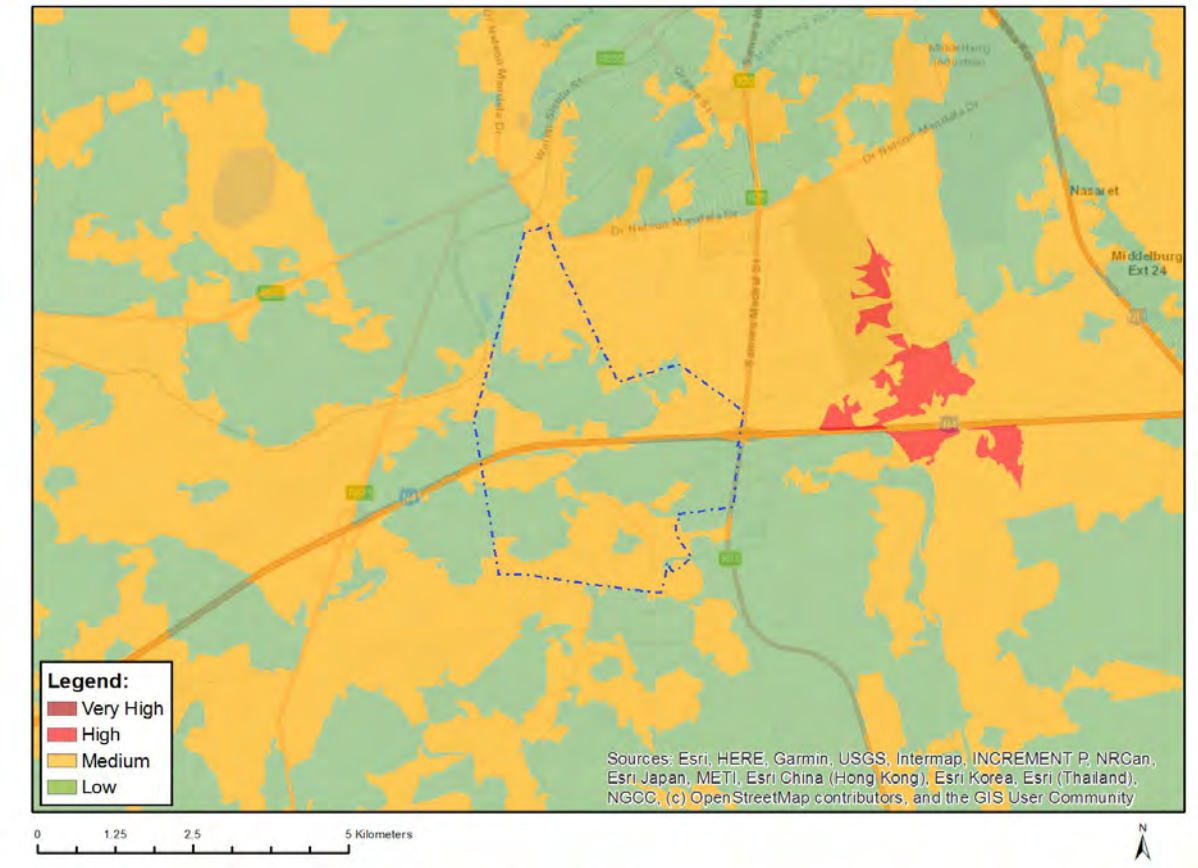


Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Medium	Features with a Medium paleontological sensitivity
Very High	Features with a Very High paleontological sensitivity

MAP OF RELATIVE PLANT SPECIES THEME SENSITIVITY



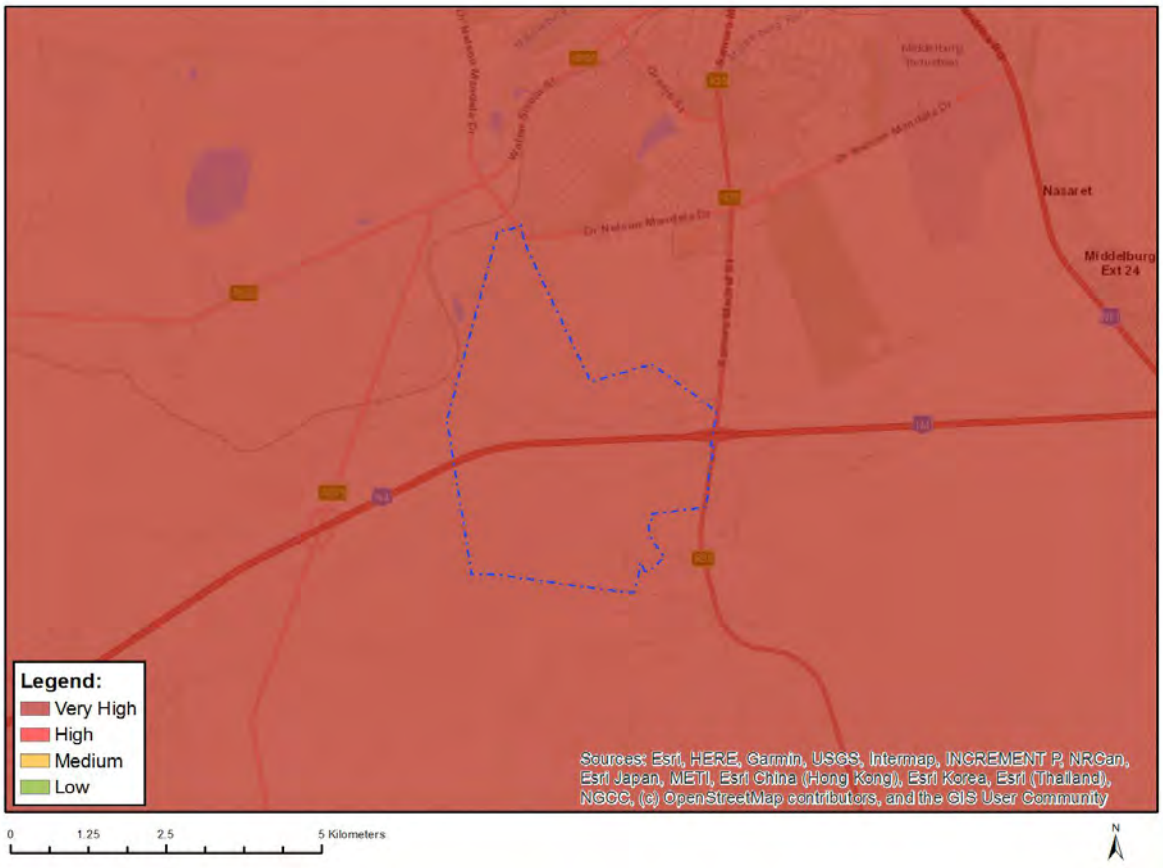
Where only a sensitive plant unique number or sensitive animal unique number is provided in the screening report and an assessment is required, the environmental assessment practitioner (EAP) or specialist is required to email SANBI at eiadatarequests@sanbi.org.za listing all sensitive species with their unique identifiers for which information is required. The name has been withheld as the species may be prone to illegal harvesting and must be protected. SANBI will release the actual species name after the details of the EAP or specialist have been documented.

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
		X	

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity
Medium	Sensitive species 1252
Medium	Sensitive species 601
Medium	Pavetta zeyheri subsp. middelburgensis
Medium	Sensitive species 933
Medium	Sensitive species 691
Medium	Pachycarpus suaveolens
Medium	Brachycorythis conica subsp. transvaalensis

MAP OF RELATIVE TERRESTRIAL BIODIVERSITY THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Very High	Critical biodiveristy area 2
Very High	Protected Areas Expansion Strategy
Very High	Vulnerable ecosystem

Appendix 8

Noise Study

ENVIROROOTS

GEOVICON ENVIRONMENTAL (PTY) LTD

ENVIRONMENTAL NOISE IMPACT ASSESSMENT

FOR THE

BLACKWATTLE MINE PROJECT, STEVE TSHWETE LOCAL MUNICIPALITY, MPUMALANGA PROVINCE

DATE: MARCH 2023

Tel/Cell: 084 444 2414

Email: chantel.enviroroots@gmail.com

Reg No: 2017/322089/07

Director: C. Muller (B.Sc. Hons. Environmental Science)

PROJECT DETAILS

PROJECT TITLE:	Environmental Noise Impact Assessment for the BlackWattle Mine Project, Steve Tswhete Local Municipality, Mpumalanga Province
COMPANY:	EnviroRoots (Pty) Ltd
AUTHOR:	Shaun Weinberg
	PO Box 1082
ADDRESS:	Bapsfontein
	1510
MOBILE:	083 255 8954
EMAIL:	shaun@enviroroots.co.za
SIGNATURE:	
QUALITY REVIEW:	Chantel Muller
MOBILE	084 444 2414
EMAIL:	chantel@enviroroots.co.za
SIGNATURE:	
DATE:	16 March 2023
EXTERNAL REVIEW:	Acoustech (Pty) Ltd – In review
REVIEWER:	Jean Knoppersen
MOBILE:	082 456 0977
EMAIL:	jean@acoustech.co.za
SIGNATURE:	
DATE:	16 March 2023
PROJECT CONSULTANT:	Geovicon Environmental
DOCUMENT DISTRIBUTION:	
Geovicon Environmental	30 March 2023

DETAILS OF SPECIALIST & DECLARATION OF INTEREST

environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

PROJECT TITLE

BLACKWATTLE MINE PROJECT, STEVE TSHWETE LOCAL MUNICIPALITY, MPUMALANGA PROVINCE

Contact person:	Shaun Weinberg		
Postal code:	2047		
Telephone:	011 648 4998	Cell:	083 255 8954
E-mail:	shaun@enviroroots.co.za	Fax:	086 551 7830
Professional affiliation(s)	Acoustech Consulting Pty (Ltd) EnviroRoots Pty (Ltd) Engineering Council of South Africa South African Institute of Electrical Engineers		
Project Consultant:	Geovicon Environmental		

I, Shaun Weinberg, declare that-

General declaration:

I act as the independent specialist;

I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;

I declare that there are no circumstances that may compromise my objectivity in performing such work;

I have no, and will not engage in, conflicting interests in the undertaking of the activity;

Signature of the specialist, review and consultant:

Name of company: EnviroRoots Pty (Ltd)

Name of specialist and reviewee (if applicable): Shaun Weinberg, (Ltd), Chantel Muller - EnviroRoots Pty (Ltd)

Date:30/03/2023

NATIONAL ENVIRONMENTAL ACT (ACT NO. 107 OF 1998), GN NO. 326 OF 07 APRIL 2017 REGULATIONS, APPENDIX 7

Relevant referencing to the Appendix 6 of the National Environmental, Management Act, 1998 (Act No. 107 of 1998) is made below:	
Information requirements	**Reference**
(1) A specialist who prepared the report (a) details of- (i) the specialist who prepared the report. (ii) the expertise of that specialist to compile a specialist report including a curriculum vitae.	**Appendix E** & Specialist Declaration
(b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	Specialist Declaration Section
(c) an indication of the scope of, and the purpose for which, the report was prepared. (cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change.	Section **2**
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used.	Section **2**
(f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives.	Section **7**
(g) an identification of any areas to be avoided, including buffers;	Section **8**
(h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers.	Section **7**
(i) a description of any assumptions made and any uncertainties or gaps in knowledge.	Section **5**
(q) any other information requested by the competent authority.	None

EXECUTIVE SUMMARY

EnviroRoots Pty (Ltd) was appointed by Geovicon Environmental (project team or main consultant) to determine the potential noise impact of the proposed BlackWattle Mine Project, and for an Environmental Authorisation purpose. The project footprint is based near Mmiddelburg within the Steve Tshwete Local Municipality, Mpumalanga Province

The scope of work for this Environmental Noise Impact Assessment (ENIA) is to determine if the project will comply with National Government Notice (GN) R154 legislative requirements (Government Gazette 13717 of 10 January 1992). The project is proposed opencast pits extensions.

Two (2) receptors within proximity (+- 1,000m) of the infrastructure footprint were identified. Based on the measurements and site observations, the following Rating Levels were proposed for receptors:

- Suburban Rating for receptors.

Five phases were assessed namely the Planning, Construction, Operational, Closure and Post Closure Phases. The outcome of the Significance Ratings for the Operational phase (important long-term) highlighted the following:

- During the night – Low Environmental Consequence for receptors.

To ensure that the noise compliance is achieved under all circumstances, to minimise the potential of a disturbing noise, and to ensure compliance of the footprint boundary limits, the following key mitigation options should be implemented:

- It should be noted that the use of reverse alarms on pits (if not sufficiently obscured by berms and pit highwalls) could cause a noise nuisance at the receptors R1.
- An annual noise measurements programme is recommended during all phases. Should a valid noise complaint be lodged, the measurement frequencies should be increased.
- Should the layout assessed in this report change, the new layout should be reviewed in terms of environmental acoustics.

With mitigation measures implemented the project activities would comply to GN R154 legislation. In terms of noise the project does not present a fatal flaw. International Finance Corporation (IFC) guidelines (Table 1.7.1 - Noise Level Guidelines) targets will also be achieved should mitigation be implemented. It is the specialist's opinion that the project may be authorised in terms of noise, with mitigation measures adhered to.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1 INTRODUCTION

EnviroRoots Pty (Ltd) was appointed by Geovicon Environmental (project team or main consultant) to determine the potential noise impact of the proposed BlackWattle Mine Project extensions, and for an Environmental Authorisation purpose. The project footprint is based near Middelburg within the Steve Tshwete Local Municipality, Mpumalanga Province

The scope of works of this Environmental Noise Impact Assessment (ENIA) is to determine if the project will comply with GN R154 legislation requirements (Government Gazette 13717 10 January 1992). The project footprint is presented in **Figure 1**.

2 REPORT LAYOUT & TERMS OF REFERENCE (ToR)

The noise impact study comprised an investigation of:

- The measurements of existing noise levels at the noise sensitive site/s. The subsequent determination of the baseline setting (SANS 10103:2008 Rating Level) within the study area.
- The estimated noise emission from the proposed project.
- Calculated potential for a noise impact or disturbing noise (National Noise Control Regulations GN R154).
- Mitigation requirements and recommendations where applicable.
- Conclusions and recommendations as well as statement whether the project should be authorised (in terms of noise).

The study was done in terms of guidelines SANS10302:2008, SANS10103:2008 and National Noise Control Regulations GN R154 criteria. Reference is also made in terms of Appendix 6 of the National Environmental, Management Act, 1998 (Act No. 107 of 1998) and International Finance Corporation (IFC) guidelines (Table 1.7.1- Noise Level Guidelines).

3 INDICATIVE PROJECT DESCRIPTION AND BASELINE COMPONENTS

3.1 BASIC PROJECT OVERVIEW

This report is only for the proposed extension on the existing Black Wattle Layout (**Figure 2**). Only the extension or this area under investigation will be conducted in this Environmental Noise impact assessment.

The proposed project will include the following infrastructure and activities:

- Opencast mining extension to an existing mining footprint.
- Stockpiling of overburden and waste rock for use in backfilling of the opencast void.
- Stockpiling of ROM and product.
- The regional setting of the project (extension area, or area under investigation) is also presented in **Figure 1.**

3.2 INTERESTED AND AFFECTED PARTIES (I&AP'S)

Receptors were identified by means of desktop assessment (GoogleEarth®, +-1,000m from the project footprint). Receptor localities are presented in **Figure 2**. Receptors co-ordinate localities are also presented in **Appendix D** (WGS 84 coordinates). It should be noted that receptors are based within an area that have light industry business as well as heavy vehicle movement along the R35 route.

3.3 TRANSPORTATION NETWORKS[1]

The most important municipal route in terms of calculable/measurable acoustics is the R35 offramp through the local communities. Available information was sourced from studies for the route (see Section **3.5**). Route specifications included:

- The route speeds are approximately above -60 km/h on study area portions. This is relevant for road tyre interaction above app. 60 km/h.
- The local routes are medium in traffic volume (100 > ADDT), medium percentage heavy vehicles (+ 10 %).

3.4 INDUSTRIAL, MINING AND LAND USES

The land zoning was not investigated for this report, it is expected to be suburban, industrial or mining (existing mining areas within study area). Numerous businesses exist within the receptors study area, including light industrial activities (e.g. truck maintenance operations).

3.5 AVAILABLE INFORMATION & I&AP COMMENTS

No comments were officially lodged regarding noise, and during the compilation of this report.

[1] http://www.mp-rams.co.za/rams/rams.html

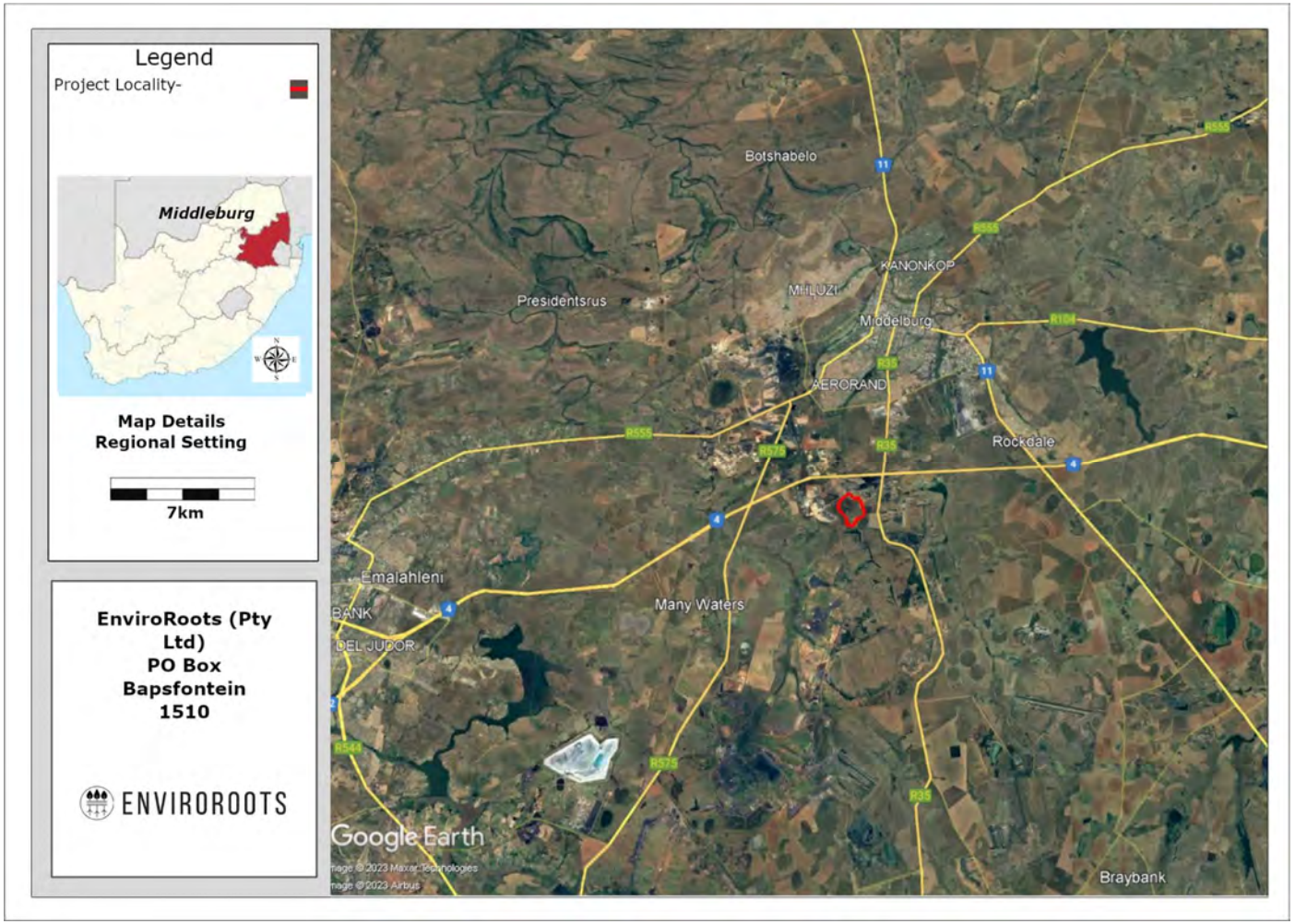


Figure 1: Project footprints regional setting

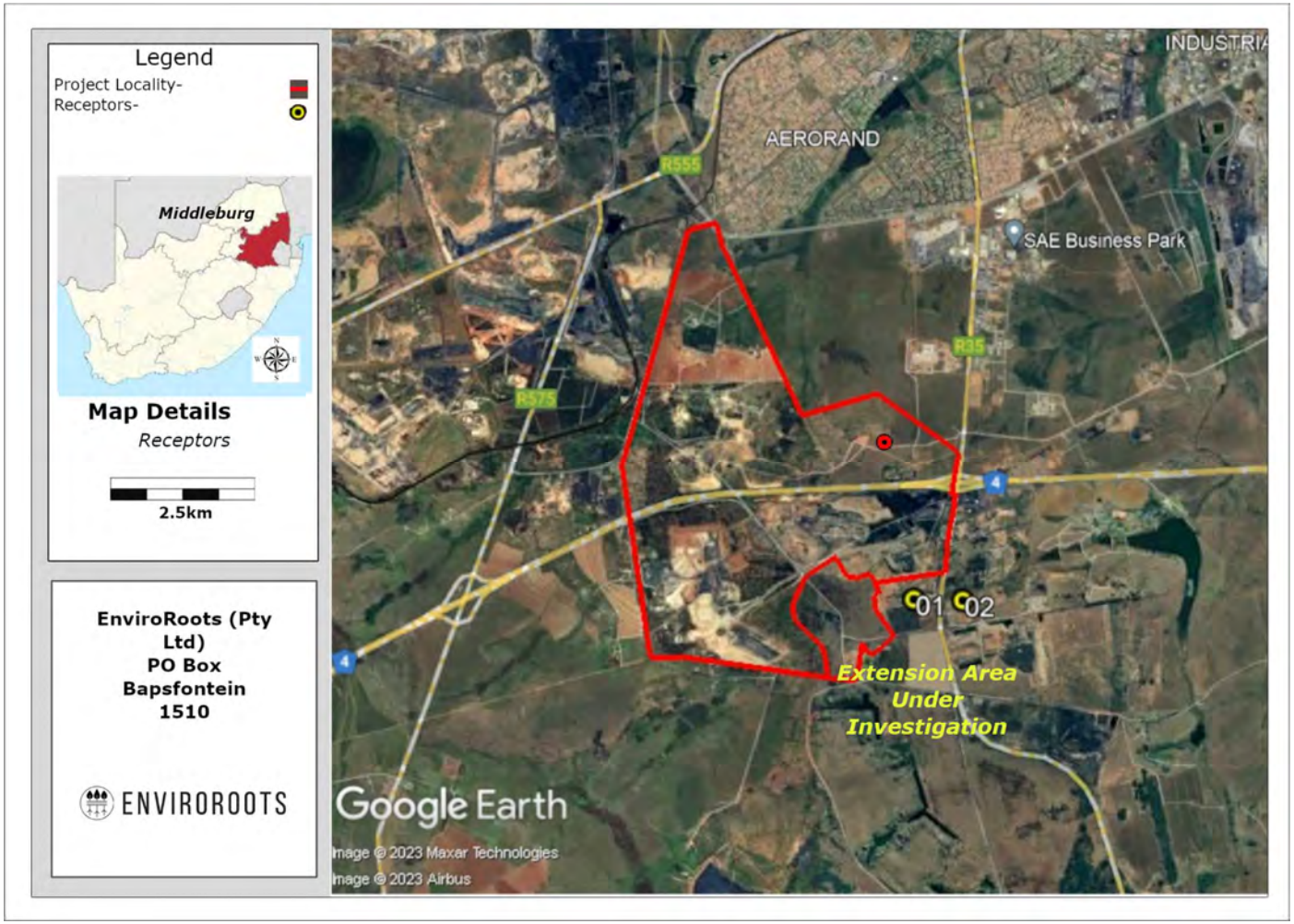


Figure 2: Interested & Affected Parties (Noise-Sensitive Developments)

4 LEGAL FRAMEWORK

The legal framework listed in this section will be the focus of the full ENIA phase. It also forms the basic requirements of the Impact Assessment phase.

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

This act lists noise pollution as a matter which falls under the jurisdiction of local government with assistance from the provincial government.

4.2 THE ENVIRONMENTAL CONSERVATION ACT, 1989 (ACT NO 73 OF 1989)

This act makes provision for the National Noise Control Regulations, but these relate only to local authorities that request the application of such regulations. In 1996, the responsibility of administering the Noise Control Regulations was devolved to provincial level but only Gauteng, Free State and Western Cape Provinces have promulgated their regulations. Although this act has been largely superseded by the National Environmental Management Act, 1998 (Act No. 107 of 1998), the Noise Regulations will still be promulgated in terms of the original Act.

4.3 THE NOISE CONTROL REGULATIONS GN R154

No noise control legislation exists within the Mpumalanga Province or the Steve Tshwete Local Municipality, with reference to the National GN R154 National Noise Control Regulations. The National legislation has set pieces for industrial and controlled areas, residential or business areas. The National Noise Control legislation defines the following:

Section 1:

- Ambient sound level - means the reading on an integrating impulse sound level meter taken at a measuring point in the absence of any alleged disturbing noise at the end of a total period of at least 10 minutes, after such meter had been put into operation;
- Disturbing noise - means a noise level which exceeds the zone sound level or, if no zone sound level has been designated, a noise level which exceeds the ambient sound level at the same measuring point by 7-dBA or more;
- Noise nuisance - means any sound which disturbs or impairs or may disturb or impair the convenience or peace of any person.
- Controlled area is as follows –

  c) industrial noise in the vicinity of an industry -

  - the reading on an integrating impulse sound level meter, taken outdoors at the end of a period of 24 hours while such meter is in operation, exceeds 61 dBA; or

- the calculated outdoor equivalent continuous W-weighted sound pressure level at a height of at least 1,2 metres, but not more than 1,4 metres, above the ground for a period of 24 hours, exceeds 61 dBA

It also should be noted:

Section 7 Exemptions:

(1) The provisions of these Regulations shall not apply, if-

(a) the emission of sound is for the purposes of warning people of a dangerous situation; or

(b) the emission of sound takes place during an emergency."

The definition of a disturbing noise (+7 dBA from Rating Level SANS 10103:2008) forms the basis upon which a non-compliance in terms of South African legislation is made.

4.4 SANS GUIDELINES (SABS)

SANS 10103:2008, the Measurement and Rating of Environmental Noise with Respect to Annoyance, and to Speech Communication. Besides measurement techniques etc, this document provides noise levels that are expected in various areas (Rating Level). These are used by the Noise Regulations as limits of noise in the various areas. The acceptable rating levels for various districts are given in **Table 1,** being the maximum noise level that is acceptable at the boundary of the property for any district. It should be noted that for industries operating in an industrial zone a 24-hour 70 dBA LAIeq is acceptable.

SANS 10328:2008, Methods for environmental noise impact assessments. The document sets out the methodology to compile a comprehensive Environmental Nosie Impact Assessment. Stipulations include methodologies and minimum requirements, as well as various noise sources for investigations.

SANS10210:2004, Calculating and predicting road traffic noise. The document defines the prediction and measurement relating to road traffic noise.

Table 1: Acceptable external noise levels within a district according to SANS 10103:2008

Type of District	Equivalent Continuous Rating Level for Noise ($L_{Req,T}$) (dBA)					
	Outdoors			Indoors with open windows		
	Day-night ($L_{Req,dn}$)	Daytime ($L_{Req,d}$)	Night-time ($L_{Req,n}$)	Day-night ($L_{R,Dn}$)	Daytime ($L_{Req,d}$)	Night-time ($L_{Req,n}$)
a) Rural districts	45	45	35	35	35	25
b) Suburban districts (little road traffic)	50	50	40	40	40	30
c) Urban districts	55	55	45	45	45	35

d) Urban districts (with workshops, business premises and main roads)	60	60	50	50	50	40
e) Central business districts	65	65	55	55	55	45
f) Industrial districts	70	70	60	60	60	50

4.5 APPENDIX 6 OF THE NATIONAL ENVIRONMENTAL, MANAGEMENT ACT, 1998 (ACT NO. 107 OF 1998)

Appendix 6 of the National Environmental, Management Act (NEMA), 1998 (Act No. 107 of 1998) EIA Regulations sets out minimum requirements from the authorities for a specialist to conduct an Environmental Study. The legislation checklist relevant for an Environmental Noise Impact Assessment has been compiled and is presented on page iii of this document.

4.6 ISO14001:2015

ISO 14001:2015 sets out the criteria for an environmental management system and can be certified to. It assists companies in setting out environmental management programmes to reduce waste and energy.

4.7 INTERNATIONAL GUIDELINES AND REGULATIONS

4.7.1 WORLD HEALTH ORGANIZATION. NIGHT NOISE GUIDELINES FOR EUROPE. 2009

The guideline sets out LAMax,inside, LNight,outside and SEL (Sound Exposure Level) criterion for Europe. The focus of the study is to help future legislation pieces for Europe's member states. The international standard makes use of the fast setting (LAFeq). The paper focus is mainly on noise sources that could generate maximum noise levels at a receptor, and the criteria to determine the extent of the impact (during night-time hours). These include transportation networks i.e. roads.

The Lnight Refers to the EU definition in Directive 2002/49/EC: equivalent outdoor sound pressure level associated with a noise source during night-time (at least 8 hours). The document identified long-term health effects such as yearly average of night noise level outside at the facade (Lnight, outside), as well instantaneous noises (LAmax), impacting on sleep motility (transportation networks, road, rail and air traffic). Motility is the term used for accelerations of the body or body parts during movement. It is measured with actimeters in a laboratory setting.[2]

[2] Brink, Müller and Schierz (2006)

4.7.2 INTERNATIONAL FINANCE CORPORATION. ENVIRONMENTAL, HEALTH, AND SAFETY (EHS) GUIDELINES. GENERAL EHS GUIDELINES: ENVIRONMENTAL NOISE MANAGEMENT

The World Bank Group set out standards for Residential, institutional and educational areas (55/45 dBA[3], note Fast setting for measurements). The document has options to reduce noise acceptable levels, as stipulated below.

Noise reduction options that should be considered include:

- Selecting equipment with lower sound power levels.
- Installing silencers for fans.
- Installing suitable mufflers on engine exhausts and compressor components.
- Installing acoustic enclosures for equipment casing radiating noise.
- Improving the acoustic performance of constructed buildings, apply sound insulation.
- Installing acoustic barriers without gaps and with a continuous minimum surface density of 10 kg/m2 in order to minimize the transmission of sound through the barrier. Barriers should be located as close to the source or to the receptor location to be effective.
- Installing vibration isolation for mechanical equipment.
- Limiting the hours of operation for specific pieces of equipment or operations, especially mobile sources operating through community areas.
- Re-locating noise sources to less sensitive areas to take advantage of distance and shielding
- Siting permanent facilities away from community areas if possible.
- Taking advantage of the natural topography as a noise buffer during facility design.
- Reducing project traffic routing through community areas wherever possible.
- Planning flight routes, timing and altitude for aircraft (airplane and helicopter) flying over community areas.
- Developing a mechanism to record and respond to complaints.

4.7.3 EQUATOR PRINCIPALS

The Equator Principles (EPs) is a risk management framework, adopted by financial institutions, for determining, assessing, and managing environmental and social risk.

4.7.4 GUIDELINES ON NOISE & FAUNAL

Studies relating to elevated anthropogenic noise levels on faunal species are not as comprehensive as noise effects on humans. The extent of fauna species is also diverse and include terrestrial as well as marine species. Studies into acoustical ecology has been conducted since the 1970's[4]. There also exists no legislation in South Africa regarding noise and fauna.

[3] Note - Fast setting for sound level meter
[4] Autumn Lyn Radle The Effect Of Noise On Wildlife: A Literature Review. 2007

Animals are dependent on their acoustical environment as they use of acoustic stimuli for communication, locating prey or predators[5]. The noise that could affect animals are further separated into continuous noises (e.g. road traffic) as well as impulsive noise events (military, aeroplanes, blasting etc.)[6]. It should be further noted that the environments for domesticated, agricultural animals differs from those in the natural environment. Stress and performance levels in animal husbandry sectors are attributed to noise levels[7], however the livestock is demarcated to an enclosed area. Wildlife react to the anthropogenic related noises in different manner depending on the species, environment or noise source. The ToR of this study remains the identification of the baseline Rating level, and the increase of the project in terms of acoustics at a receptor (if applicable).

4.7.5 BLASTING & VIBRATION

Blasting and Vibrations does not have methodologies or legislation in South Africa. Blasting and vibrations is a study into the effect of earthworks blasting in terms of ground, surface and air vibrations. It also studies rock blasting into the surrounding environment. The effects of blasting vary depending on the structure under consideration, the intensity of the blast, the distance of the blast etc. The vibration depends on the frequency as well as the vibration (in millimeters). Blasting is a specialist's study and could only be considered in the SANS10103:2008 as a +5 to 10 dBA (impulsive sound, however it should be noted that blasting only occurs irregularly). Blasts are a highly controlled event with warning prior to the noise.

4.7.6 DIRECTIVE 2000/14/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL OF 8 MAY 2000

Sets outs guidelines on the control of noise levels generated by equipment in the European states.

5 APPROACHES AND METHODS

The procedures, as detailed in SANS 10328:2008 and SANS10103:2008 have been applied to the noise measurements and assessments made in this report. A summary of the approach to this study is outlined below.

5.1 MEASUREMENT CRITERION

5.1.1 NOISE POLICY DOCUMENTS FOR REGION

No by-laws have been promulgated for Mpumalanga Province or for the Steve Tshwete Local Municipality. The SANS10103:2008 guidelines methodology was used.

[5] R.C. Kull and C.McGarrity.Noise Effects on Animals: 1998 – 2002 Review. Geo-Marine Inc. U.S.A.
[6] Ronald P. Larkin. Effects of military noise on wildlife: a literature review
[7] J. Brouček. Effect of Noise on Performance, Stress, and Behaviour of Animals. NAFC - Research Institute for Animal Production Nitra, Slovak Republic. 2014

5.1.2 FIELDWORK ASSESSMENT OF THE SITE

Field assessments in and around the site were undertaken. This included the identification of the noise sensitive stakeholders, existing noise sources and other baseline noise contributors. Viable and alternative measurement localities at the identified monitoring localities were further investigated to ensure measurements were not influenced by extraneous noise sources (e.g. an air-conditioning condenser unit near measured locality).

5.1.3 EXISTING BASELINE – NOISE MEASUREMENTS

Baseline measurements were conducted on the 10 March 2023 at a total of one (1) locality. Measurements were analysed to compile a subjective and objective determination of the Rating levels (LReq) based on the LAIeq measurements. Measurements were a minimum of 10-minutes.

Furthermore, certain statistical values and variables such as the LA90 LAMax, LAmin, (fast) third octave data (dBZ) were logged and considered. Prior to onsite investigations and measurements, a desktop assessment was conducted to identify key measurement areas and made use of online resources (GoogleEarth® etc.).

No longer-term measurements could be conducted as no safe area exists to conduct longer-term measurements (see limitations section). For a Rating level determination 10-minute measurement (day and night), desktop assessment (of development of the area) as well as onsite investigations can be considered sufficient. If longer-term measurements are requested by local municipal authorities, the security area for a 2-day period should be supplied, whereby the security activities cannot influence measurements. The raw data SLM log sheet and metrological data will be available to relevant stakeholders upon request.

5.2 MODELLED SCENARIOS

The modelled scenario was designed and based on the layout as supplied by the main consultant. The significant noise sources were identified, and noise contours developed. The modelled scenario took into consideration the following:

- Corrections for ground conditions (obtained from Environmental Potential Altus, site observations) and metrological conditions.
- Ground elevation contours (if available).
- Building facades (if information available). Onsite investigations will be compiled to determine the design and acoustical corrections (both development and receptors) based on dwelling layouts/specifications (if feasible).
- Noise modelling based on future predicted noise climate. Sound Power Levels (SPL) will be sourced online.

- Numerous methodologies will be incorporated/considered for modelling and calibration (increased confidence in findings). These include CoRTN: 1996 (UK), RLS90 (German), ISO 9613-2, SANS 10357:2008, CoRN Calculation of Railway Noise (1995 - Department of Transport, UK) etc.
- Contours represented illustrate $L_{Aeq,T}$. If any corrections were considered, it will be stated within the modelled scenario namely:
  - T = correction for a k_n night correction.
  - Specified adjustments for tonal character, impulsiveness (impulsive or highly impulsive).
  - $L_{Req,n}$ and $L_{Req,d}$.
- Noise contour representation will be developed focusing on pre-mitigation and post-mitigation effectiveness (if required).

5.3 ESTIMATION OF NOISE IMPACTS

5.3.1 NOISE POLICY DOCUMENTS FOR REGION

No by-laws have been promulgated for Mpumalanga Province or for the Nkangala District Municipality. The National Noise Control Regulations GN R154 was used.

5.3.2 IMPACT ASSESSMENTS METHODOLOGY

This section outlines the methodology used to assess impacts associated with the proposed project. Potential positive and negative impacts associated with the proposed Project are also discussed. Five phases will be assessed namely the Planning, Construction, Operational, Closure & Post Closure Phases.

The noise impact was determined with reference to legal standards (where applicable) and the specifications and guidelines provided in the SABS standards document (SANS 10103:2008). Significance of impacts can be subjective and legal minimum requirements and good engineering practice have therefore been used in each case to determine what is reasonable.
To make the judgment, the impact matrix considered the following:

- The measured ambient noise levels as described in measurement section above.
- The identified SANS 10103: 2008 "typical rating levels for noise in districts" based on the measured ambient noise levels.
- The extent of potential impacts has taken into consideration the probable community response to increases in sound levels, based on SANS 10103:2008. Important components and nature of the noise, such as impulsiveness and occurrence of pure tones, have also been accounted for by including correction factors as per SANS10103:2008.
- A non-compliance (and high risk) will be a calculated + 7 dBA (GN R154) above the SANS 10103: 2008 Rating level.

- The potential for a noise nuisance (e.g. compliant noise, but with a character or situation that could still create a noise issue).

The significance of the identified impacts will be determined using the approach outlined below. From a technical, conceptual or philosophical perspective the focus of impact assessment ultimately narrows down to a judgment on whether the predicted impacts are significant or not. The concept of significance is at the core of impact identification, prediction, evaluation and decision-making.

The determination of significant impacts relates to the degree of change in the environmental resource measured against some standard or threshold. Potential impacts were assessed using the calculations and rating system, as outlined in **Table 2** and based on the findings of the baseline assessment and dispersion simulations. This rating system is based on Impact significance as defined by DEAT (2002).

This incorporates two aspects for assessing the potential significance, i.e. occurrence and severity, which are further sub-divided as indicated in **Table 3**. The impact ranking is applied before and after the implementation of mitigation and management measures. Impacts associated with the proposed project were assessed according to their Magnitude, Duration, Scale and Probability of occurrence. These terms are briefly described below in the table, highlighting the methodology used to define each criterion and in the compliant of the impact matrix system.

Table 2: Significance Points Quantification

MAGNITUDE	**DURATION**
The Noise Control Regulations (National) criteria of 7 dBA above SANS 10103:2008 Rating level determines the "High" or "Very High" selection. 7 dBA increase above Rating levels would be a non-compliance with National legislation.	The duration of the project is determined by the phase of investigation. The construction phase (months) could be considered as shorter in relation to the longer operational phase (years or decades), with noise levels in the operational phase likely to occur for an extended period.
SCALE	**PROBABILITY**
The extent of the calculated or measured noise levels could extend as far as: Site only – as far as the project footprint. Local – Calculated or measured noise levels extends into	The probability is determined by the SANS 10103:2008 table 5 "Categories of community or group response" and is calculated as the excess of the change in the $L_{Req,T.}$ It has been further defined by the author to ensure a more comprehensive assessment, and includes: None.

MAGNITUDE	DURATION
neighbouring farm portions or past the project footprint. Regional – Calculated or measured noise levels could extend over a provincial scale National – The extent of the projects noise capability extends Nationally.	Improbable – Little to no potential for a measurable or calculable noise level. Low probability - 0 to 10 dBA. It is further defined that a calculable noise levels are between 0 – 5 dBA at least +50% of the time or 5 – 10 dBA 25% of the time. Low-medium probability - 5 – 15 dBA – Sporadic complaints (further defined as a worst-case calculable scenario or measured outcome that indicates minor-moderate noise increase over the $L_{Req,T}$ frame. There is a potential for noise levels to exceed 5-dBA at area of investigation approximately +50% of the time. Medium probability - 10 to 20 dBA – Widespread complaints (further defined as the potential to change the Rating level or exceed targeted boundary conditions over a $L_{Req,T}$ period). Highly probable - >15 dBA – Threats of community or group action (certainty of an impact (at receptors) from a constant calculable and measurable noise source).

Assigning a significance score to each targeted criterion will enable an impact matrix system to help identify potential areas of concern, non-compliances, potential areas of disturbing noise or noise nuisances. Each factor considers the SANS10103:2008 criteria or National Noise Control Regulations GNR 154 to ensure that non-compliance in terms of legislation would require mitigation measures.
The impact assessment is based on subjective and objective assessment to ensure a comprehensive assessment of the potential noise impacts. The following factors and criteria have been used to assess the impacts of the various project phases and the components associated with each of these phases (see **Table 3** below).

Table 3: Significance Points Quantification

MAGNITUDE	Score	DURATION	Score
Very high/don't know - The targeted 7-dBA above the Rating level is calculated at receptors. This will be a none-compliance in terms of the Noise Control Regulations GN R154. Noise levels which exceed 61 dB (depending on National or provincial requirements) at the boundary of the property for a controlled area.	10	**Permanent** – Noise levels continue after closure.	5

MAGNITUDE	Score	DURATION	Score
High – An increase of 5 < 7 dB above the identified Rating level is calculated at receptors.	8	**Long-term** - Noise levels continuous throughout operational phase, extend from the operational phase and cease after the closure-phase or at the end of Life of Project (LoP).	4
Moderate – An increase of 3 < 5 dB above the identified Rating level is calculated at receptors.	6	**Medium-term** – Noise levels occur intermittently during operational phase.	3
Low – An increase of 0 < 3 dB above the identified Rating level is calculated at receptors.	4	**Short-term** – Noise levels ceases after the construction phase.	2
Minor – No increase above the Rating level is expected (at receptors).	2	**Intermittent irregular**	1
SCALE	**Score**	**PROBABILITY**	**Score**
National – Noise levels extend over provincial levels	5	**Highly probable –** Very-strong group response i.t.o SANS 10103:2008.	5
Regional – Noise levels will extend over a municipal or provincial level.	4	**Medium probability** – Strong group response i.t.o SANS 10103:2008. Should a potential for a noise nuisance be identified due to the noise characteristics (e.g. tonality or impulsive event), this or "definite" will be selected. There are corrections for such characteristics that will be considered (e.g. +12 dBA for highly impulsive noises).	4
Local – Noise levels extends onto the adjacent farm portions.	3	**Low-medium probability** – Sporadic complaints to Medium group response i.t.o SANS 10103:2008	3
Site only – Noise levels will extend the footprint of the project.	2	**Low** – Little group response i.t.o SANS 10103:2008.	2
Directly Adjacent – Noise levels only audible directly adjacent to activity.	1	**Improbable** – Little group response	1
None	0	**None**	0

Significance Points (SP)= (Magnitude + Duration + Scale) x Probability. The maximum value is 100 significance points (SP). The potential environmental impacts are then rated as being of a High (SP >75), Moderate (SP 46 – 75), Low (SP ≤15 - 45) or Negligible (SP < 15) significance. A Significance Point will be assigned to impacts without mitigation, and then if the project applies recommended mitigation (significance with mitigation). The non-compliance with legislation will trigger score which requires mitigation options to ensure that the development complies with legislation and no impact at the area of investigation ensues.

Table 4: Categories Describing Environmental Significance

Score	Category	Description
SP > 90	Fatally Flawed	Project should not be authorised. There is no possible mitigation that could offset the impact.
SP 75 < 89	High	Project can be authorised but with strict conditions and high levels of compliance and enforcement. Monitoring-mitigation is essential.
SP 45 < 74	Moderate	Impact is real, but not substantial in relation to other impacts that might take effect within the bounds of those that could occur. Project can be authorised but with conditions and routine inspections. Mitigation measures are feasible and must be implemented.
SP 15 <44	Low	Impact is of a low order and therefore likely to have little real effect. Project can be authorised with low risk of environmental degradation Mitigation is either easily achieved or little mitigation is required.
SP < 14	Negligible	Zero impact
+	Positive Impact	Positive effects are anticipated

The mitigation options were proposed to each receptor(s) where a Moderate Significance Points (or higher) rating was identified (and during each phase). The scenario was then reassessed (Significance Points) taking into consideration a proposed mitigation option(s) and the effectiveness thereof. Mitigation options per phase were ranked according to their importance and included:

- Mitigations highlighted as Authorisation - should be incorporated into the Environmental Authorisation to ensure compliance with legislation GN R154.
- Mitigations highlighted as EMPr - should be incorporated within the Environmental Management Plan Report for the Environmental Control Officer (ECO) or similar representative to incorporate during various phases (Environmental Awareness plan (Safety, Health and Environmental induction or SHE) or Emergency Preparedness Procedure (EPP) etc). These mitigation options would help ensure a low rating or ensure compliance.

- Mitigation options highlighted as recommended - not a mandatory requirement, however, is recommended to assist the project in terms of smaller noise generating noise sources, noise characteristics from construction/operations etc.). Will assist in keeping the potential noise nuisance minimal.

5.4 ASSUMPTIONS AND LIMITATIONS

5.4.1 MEASUREMENTS

There are limitations and uncertainties regarding acoustical measurements. Noise levels have the potential to fluctuate based on numerous components, including:

- The noise level may change from day to day due to activities within a community (e.g. road traffic fluctuations, see point below) or even at a singular dwelling itself. Dwelling related infrastructure (e.g. air-conditioning units, swimming pool pumps etc.) that has the potential to influence noise levels in terms of dB.
- Seasonal changes have the potential to influence sound levels directly (e.g. rain) or indirectly (influence from faunal communication, see point below).
- Faunal communication measurement fluctuations due to seasonal, time of day or night etc. Certain fauna communicates during certain hours e.g. cicada may only audible during night-hours, crepuscular birds are only audible during evening or night hours, crickets may be more audible active as seasons get hotter etc.
- Measurements near mining and industries fluctuates depending on equipment in use, capacity load in use, unforeseen equipment in care and maintenance. Certain equipment may not be running optimally, with the consequence been excessive elevated noise levels (e.g. gas leaks, conveyor pulley roller squeaking, excessive vibrations (and associated noise) from unmaintained dampers on equipment etc.
- Road traffic noise fluctuates due to time of measurement investigation (e.g. peak traffic morning or evening conditions, early morning hours etc.; and
- Metrological conditions can influence noise measurements. These include inversion and diffraction in the temperature layer, change in temperature and humidity etc.
- No longer-term measurements could be conducted as no safe area exists to conduct longer-term measurements. For a Rating level determination 10-minute measurement (day and night), desktop assessment (of development of the area) as well as onsite investigations can be considered sufficient. If longer-term measurements are requested by local municipal authorities, the security area for a 2-day period should be supplied, whereby the security activities cannot influence measurements.

5.4.2 MODELLED SCENARIOS

The assessment of the noise impact of the site on the surrounding receptors is based on a worst-case approach. The simulation conditions and variables were configured as follows:

- The noise point sources were positioned at approximate geometric centre of mass of the equipment above the ground plane (DGM in SoundPLAN) and approximate altitudes (e.g. rooftop condenser units). If the noise sources are situated closer to the ground, the impact may be less than if the sources are raised higher off the ground.
- The ground effect was considered by modelling the ground at each site with a sound absorption coefficient of 0.75 across mid-high frequencies. This approximation was made considering that the Concawe method suggests a fully absorptive (absorption coefficient of '1') characteristic for ground that consists of dense vegetation, with moist conditions. At the other end of the spectrum ('0'), a reflective characteristic is suggested where hard surfaces and minimal vegetation exist with dry conditions.
- To simulate the worst-case condition when low atmospheric sound absorption can be expected (for low to mid frequencies), the following parameters were used in the simulations: air temperature of 20 ºC; atmospheric pressure of 1013.25 mbar and humidity of 80 %.
- Dynamic factors such as meteorological conditions, which include wind velocity, temperature inversion and clouds, have not been considered in the simulations. Static calculations are presented only.
- Under temperature inversion conditions, sound propagation can extend much further afield. This condition is however difficult to cater for due to the number of variables and was not factored in during the simulation. An increase of up to 6 dBA from the predicted noise levels could result due to such conditions.
- The ground was modelled with elevation contours of 50 m intervals. These intervals provide sufficient detail over the distances encountered for modelling purposes.
- The presented noise contours are only one scenario based on an over engineered principal of the maximum capacity of the project. The contours will not be applicable during all times and is only a tool to assist with the potential worst-case impact assessment.
- Sound Power Levels (SPL) sourced for the modelled scenario made use of online resources, no measurements were conducted to determine the SPL of equipment.
- SPL used will likely represent a worst-case maximum output from the loudest point on the equipment (i.e. an exhaust port from a FEL) at maximum full load capacity. As such the modelled noise sources are a worst-case scenario for each piece of equipment; and
- Many models consider noise contours in a hemispherical fashion. Noise sources can be directional e.g. speakers or exhaust ports.

5.4.3 PROJECT SPECIFICATION LIMITATIONS

Project specific limitations included:

- Longer-term measurements (as well as night measurements and 48-hour measurements) are unfeasible due to safety issues of equipment and consultant. Site investigations, measurements (in terms of the SANS10103:2008) and desktop assessment is deemed as sufficient to

determine the Rating level. Implementing equipment near a security would also be unfeasible due to the influence of extraneous security noises.

6 BASELINE SOUND PRESSURE MEASUREMENTS

Photos and information of and measurement localities is presented in **Appendix D** and **Appendix E**, with the measured localities also presented in **Figure 3** (SLM certificate in **Appendix G**). The noise measurement localities were decided on based on receptors identified prior to fieldwork, via a desktop assessment and by means of discussions with the project team. Ten-minute LAIeq (SANS10103:2008) measurements were conducted during the daytime (22:00 – 06:00 [8]) safe periods within the study area.

6.1 ATTENDED MEASUREMENTS – ML01

Monitoring was conducted the community just east of PieenarDam. Equivalent values (impulse setting) are presented in **Table 5.** The quietest open space on the southern footprint was sought. At all times safety along the measurement areas was considered (access onto private routes). Multiple places were sought to measure, most areas were noisy (over reflection of lowest Rating). Subsequent analysis of the data, desktop information and onsite investigations concluded:

- Calculated LAIeq was 44,3 dBA – The measurements, onsite investigations and desktop assessment reflected a developed suburban area (community, local traffic and business-related sounds measured).
- Measurements and site observations indicated a suburban or higher Rating;

Table 5: Measurements – Shorter-term measurements

Point	Locality	Measured LAIeq,10min (dBA)
ML01	Inside community	**LAIeq,10min** = 43,9

6.2 BASELINE NOISE LEVELS FINDINGS AND IDENTIFIED SANS10103:2008 RATING LEVELS

Based on the measurements the following Rating Levels was selected for receptors:

- Suburban Rating for both communities;

[8] SANS10103:2008 criterion

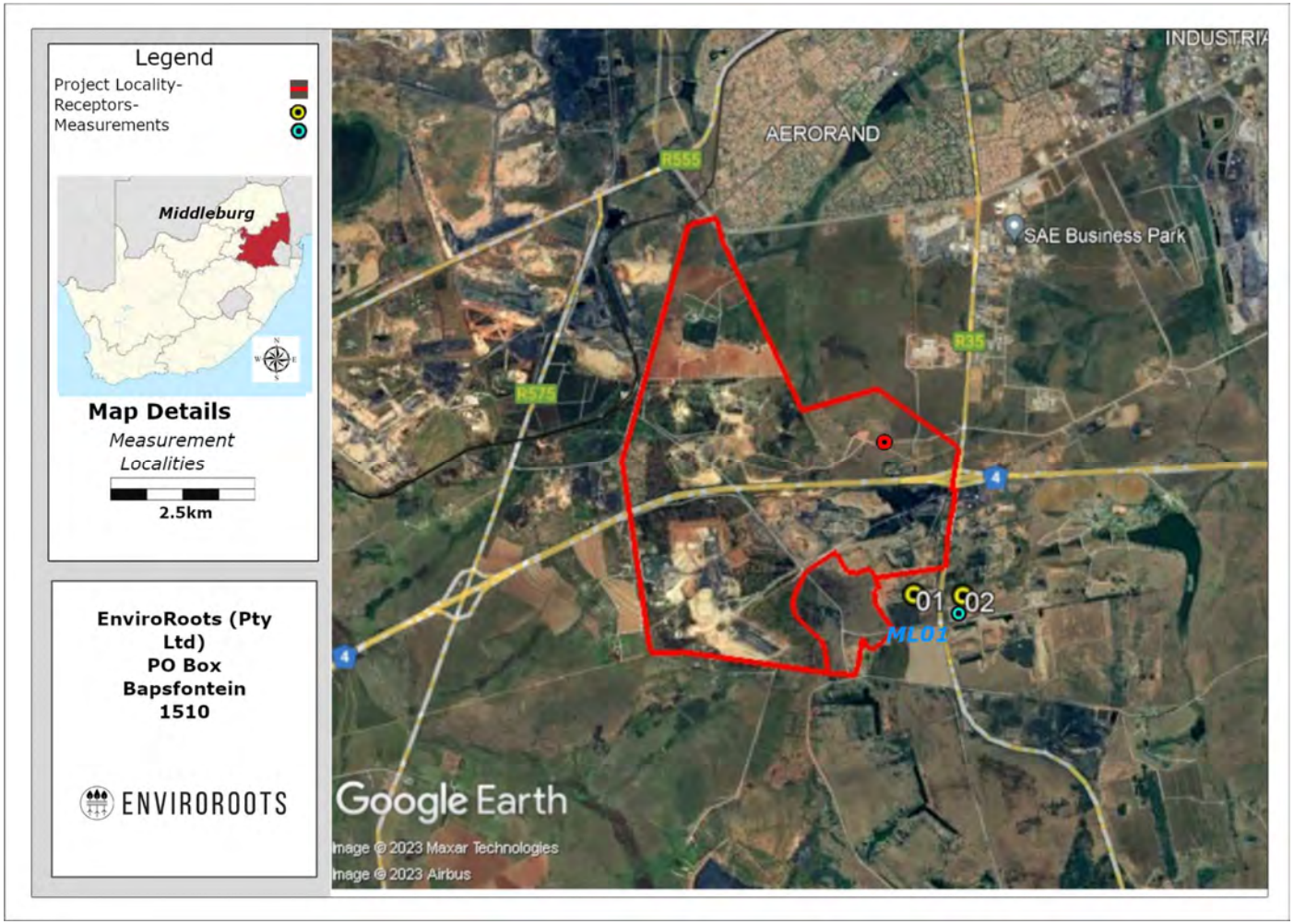


Figure 3: Measurement localities within the study area

7 NOISE IMPACT ASSESSMENT

A worst-case controlled scenario was used to help identify potential issues, identify the significance rating and potential noise impacts in terms of legislation requirements. The Sound Power Levels (SPL) were selected based on the noise levels presented in **Appendix C.**[9] Mitigation options were ranked according to their significance (see Section **5.3.2**) considering mitigation to be included in the Environmental Authorisation requirements, Environmental Management Programme (EMPr) or a general recommendation (not a mandatory mitigation option). Five phases will be assessed namely the Planning, Construction, Operational, Closure & Post Closure Phases.

7.1 PLANNING PHASE ASSESSMENT

No noise is envisaged during this phase. It is however an important phase to implement certain mitigation options. The planning phase could incorporate design elements or management mitigation options which could be applied to the various phases under investigation. The planning phase mitigation options will be identified (if required) once the impact assessment of other phases has been assessed.

7.2 CONSTRUCTION PHASE ASSESSMENT

The assessment made use of one moderately high SPL apparatus operating at maximum capacity. The noise source was assessed in a linear fashion on the closest point of any footprint boundaries (or fixed infrastructure locality) in relation to the receptors. It was selected to make use of a moderately high SPL apparatus (see max operations of Jawcrusher diesel ca 250 kW or Pneumatic breaker) operating at the project footprint, over a day period (see **Appendix B**).

The assessment considered day-time activities, it is assumed that most/all construction will occur during daytime periods. Assessment is not relevant for all hours or for the full construction period. It is an assessment of a potential scenario occurring at some stage during the construction period (e.g. removal of topsoil, grading of access roads etc. as close as feasible possible to a receptor, while remaining on its relevant footprint or corridor). The following main noise generating activities were considered for a modelled investigated scenario(s):

- The removal of topsoil or preparation of stockpile, plant or tailing area;
- The implementation of concrete and surface related infrastructure (e.g. plant area). The following was considered
    - General and civil construction related activities are generally kept to daytime hours (06:00 – 22:00).
    - Noisy construction equipment may include vibration, mixing and placing equipment (cranage etc.). Small construction equipment also include drilling, compaction (vibration), grinding etc.

[9] https://www.fhwa.dot.gov/Environment/noise/construction_noise/handbook/handbook09.cfm

- During the night-times concrete and surface related infrastructure activities may be required as deadlines need to be met or pouring of concrete over extended hours may be required. These activities are usually short-term and occurring rarely.

The linear noise representation is presented below in **Figure 4**. The impact assessment rating is further presented in **Table 6** and **Table 7**. The outcome of the modelled scenario and impact assessment highlighted the following key points:

- During the day – Low Environmental Consequence for receptors.

Basic mitigation is recommended to ensure compliance with the Noise Control Regulations under all circumstances or to cover unforeseen circumstances. See proceeding section **8**.

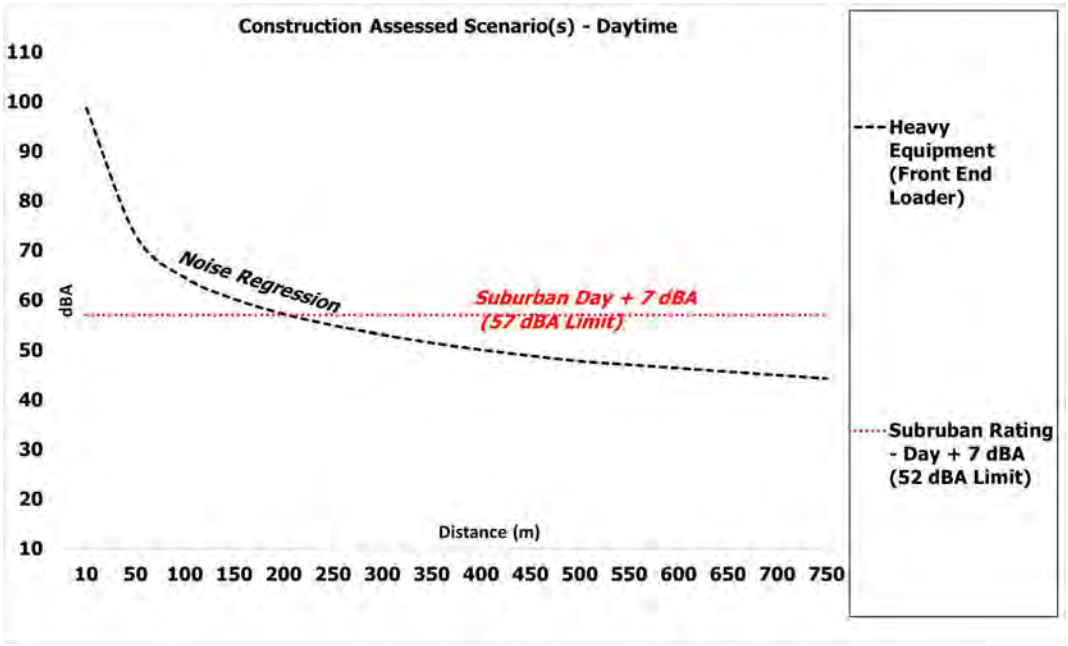


Figure 4: Construction noise levels – Linear representation of a noisy construction activities (daytime)

Table 6: Calculated Noise and Baseline Rating Levels – Day Construction

Calculated Noise and Baseline Rating Levels				
I&AP	**Rating Level (Day dBA)**	**Calculated $L_{Req,T}$ (dBA)**	**Increase above Rating (dBA)**	**Comment**
R1	50	<50	No	During the day, construction activities unlikely to exceed 7 dBA limits at receptors.
R2	50	<50	No	

Table 7: Environmental Impact Assessment – Day Construction

Environmental Impact Assessment Significant Points Quantification											
		Before mitigation					After mitigation				
Evaluation areas	Impact summary	Probability	Duration	Scale	Magnitude	Significance	Probability	Duration	Scale	Magnitude	Significance
R1		2	2	2	4	**24**	2	2	2	2	**12**
R2		2	2	2	4	**24**	2	2	2	2	**12**

7.3 OPERATIONAL PHASE ASSESSMENT

The assessment made use of online moderately high SPL equipment operating localities presented in **Appendix B**. The following main noise generating activities were considered for a modelled Operational investigated scenario(s):

- The following corrections for open cast pits included:

Investigations	Tailings and stockpiles - Modelled scenarios	
Point sources	**Primary corrections**	See section **0** and **Appendix B** for the SPL. One moderately high SPL equipment was selected for stockpiles and tailings areas. Equivalent values are continuous.
	Berm and barrier correction	One open cast pits (pit high walls and berms) at 1m high.
	Tones or impulsive corrections	None. It should be noted that reverse alarms are exempt from this assessment but could create a noise nuisance.

The outcome of the modelled contours is presented in **Figure 5**. Modelled contours are presented in increments of 5 dBA from the 40-dBA indicator. The impact assessment for the project is presented in **Table 8** and **Table 9.** The outcome of the assessment indicated the following:

- During the night – Low Environmental Consequence for receptors.

The most important phase is this Operational Phase, with the outcome highlighting the requirements for mitigation (see EMPr proceeding section **8**).

Table 8: Calculated Noise and Baseline Rating Levels – Operational Phase

Calculated Noise and Baseline Rating Levels				
I&AP	Rating Level (Night dBA)	Calculated $L_{Req,T}$ (dBA)	Increase above Rating (dBA)	Comment
R1	40	40	No	**Note** -During night-times reverse alarms could cause a noise nuisance at receptors (open cast).
R2	40	<40	No	

Table 9: Environmental Impact Assessment - Night-time Operational

Environmental Impact Assessment Significant Points Quantification											
		Before mitigation					After mitigation				
Evaluation areas	Impact summary	Probability	Duration	Scale	Magnitude	Significance	Probability	Duration	Scale	Magnitude	Significance
R1		3	4	2	4	**36**	3	2	2	2	**18**
R2		2	4	2	4	**32**	3	2	2	2	**18**

7.4 CLOSURE & POST-CLOSURE PHASE ASSESSMENT

The impact will be similar/lower than the busier/noisier Construction Phase (refer to Section **7.1**). While the Construction phase is deadline oriented (due to the proceeding Operational Phase), the Closure and Post-Closure Phases are usually less busy and noisier. The Post-Closure Phase may require infrequent activities to maintain rehabilitation and would be the least noisy Phase for consideration.

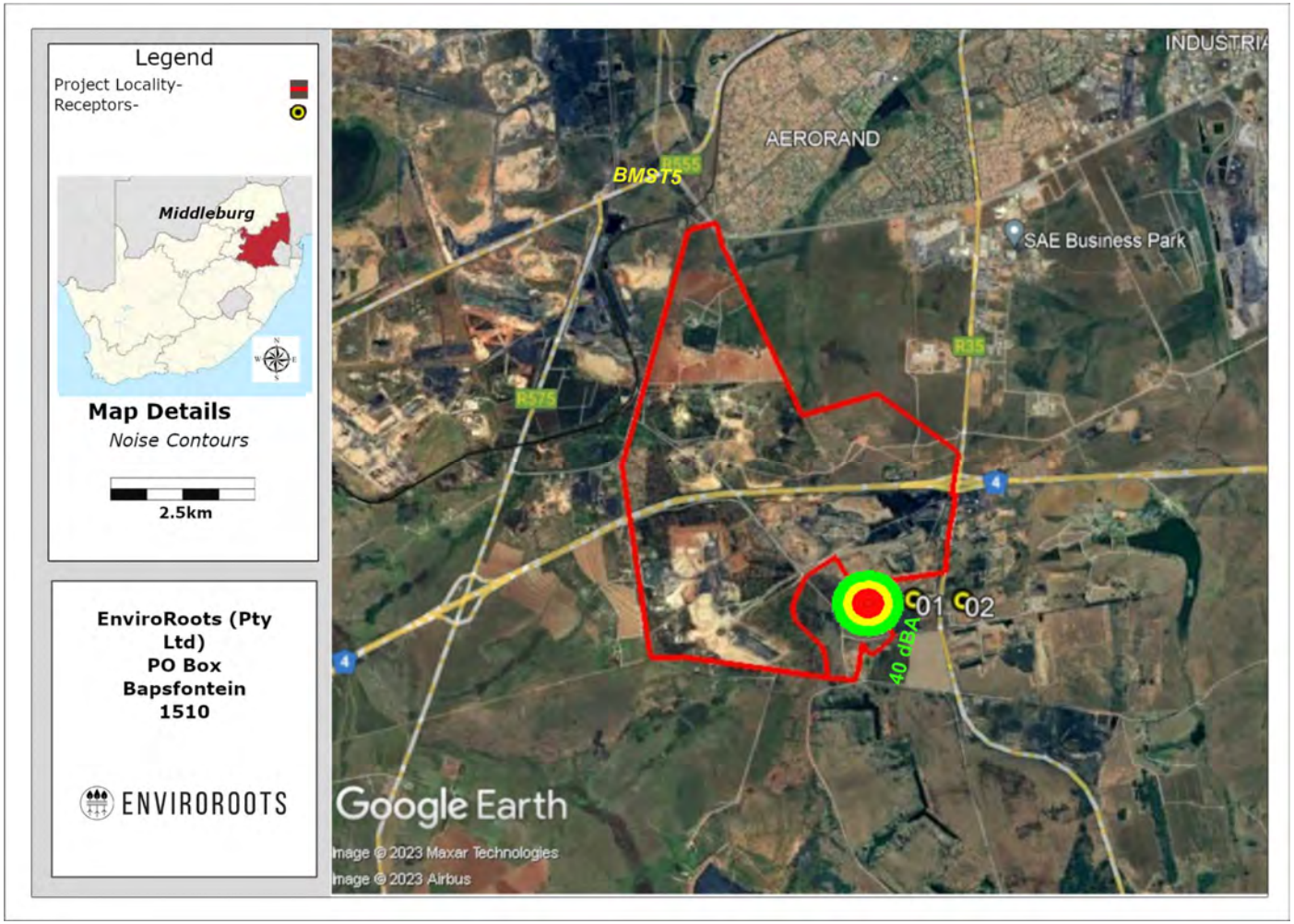


Figure 5: Equivalent Continuous Rating Level - noise contours LReq,T – Operational Phase

8 MITIGATION OPTIONS, EMPR/AUTHORISATION REQUIREMENTS AND MONITORING PROGRAMME

8.1 MITIGATION – ALL PHASES

The Management Plan in terms of noise mitigation is presented in **Table 10**. Mitigation options per phase were ranked according to their importance and included:

- Mitigations highlighted as Authorisation - should be incorporated into the Environmental Authorisation to ensure compliance with legislation GN R154.
- Mitigations highlighted as EMPr - should be incorporated within the Environmental Management Programme Report for the Environmental Control Officer (ECO) or similar representative to incorporate during various phases (Environmental Awareness plan (Safety, Health and Environmental induction or SHE) or Emergency Preparedness Procedure (EPP) etc). These mitigation options would help ensure a low rating or ensure compliance; and
- Mitigation options highlighted as recommended - not a mandatory requirement, however, is recommended to assist the project in terms of smaller noise generating noise sources, noise characteristics from construction/operations etc.). Will assist in keeping the potential noise nuisance minimal.

Should a mitigation option be deemed unfeasible (due to costs, or other issues) an alternative should be sought as a replacement.

Table 10: Mitigation options per phase

Activity	Potential Impact	Mitigation (EMPr Requirements or Environmental Authorisation requirement)	Timeframe/responsible person(s)
Construction/Closure			
General Construction Activities	**Low** significance – **Receptor R1**	**- Recommended** (not compulsory) – Construction crew must conduct toolbox talks to educate their employees and ensure that they are aware of the legislation regarding noise. Should a noisy construction activity occur off the project footprint and near a receptor, the Environmental Coordinator should inform the receptor prior to the activity. Should noisy night-time activity occur (after 9pm, e.g. concrete pouring) the Environmental Coordinator should make receptors aware of the activity prior to the occurrence.	Prior/during to construction phase (including design phase), ECO, Environmental Coordinator.
Operational Phases			
All phases and general mitigation options			
Open cast pits	**Low** significance (night) – **Receptor R1**	**-EMPr** – **Barrier/berm** – The developer should maintain berms around the opencast pits **when operating within 300m of receptor R1** as per **Figure 2.** The berm/acoustical barrier should consider the following: – The berms should be solid (aggregate, brick etc. no foliage e.g. trees). – **The height should be as high as feasibly possible**. **The higher the berm/pit highwall, the less the noise impact will be**–The berm/barrier will assist in the spill over points (create an acoustical shadow at 90^0), but not the return of noise levels due to refraction in the atmosphere temperature layers.	

Activity	Potential Impact	Mitigation (EMPr Requirements or Environmental Authorisation requirement)	Timeframe/responsible person(s)
		– Should equipment not be able to operate behind berms (the acoustical shield), the operations with direct sight to **receptor R1** at these areas be minimised during night hours (see further point below). Operations not fully enclosed by berms, should consider lower noise generating capacity when operating within direct line of sight to receptors (less reversing i.e. reveres alarms, minimise tipping (impact noises), equipment that generate lower noise (SPL). – Berms or the selected acoustical barrier should enclose all sides when implementing a berm **within 300m of a receptor R1** (i.e., when implementing a berm to specifically mitigate acoustics within 500m of a receptor)**.** – The acoustical shield needs to be implemented as feasibly close as possible to the stockpiles or tips of stockpile footprints.	
All phases	N/a	**EMPr** – Should a receptor(s) identified in this report be relocated, then the impact, mitigation as well as EMPR monitoring be disregarded. As noted, all receptors on the project footprint will be relocated.	Project team/ Environmental Co-ordinator.
All phases	N/a	**- Recommended** (not compulsory) – Should the layout change as assessed in the report, the report layout must be reviewed in terms of environmental acoustics.	Project team
All phases	N/a	**-EMPr** – A contact line should be made available to receptors should a valid noise complaint arise whereby receptors could lodge a complaint (and documented). Should a valid noise complaint be lodged, it is advised that the Environmental co-ordinator	Environmental Co-ordinator.

Activity	Potential Impact	Mitigation (EMPr Requirements or Environmental Authorisation requirement)	Timeframe/responsible person(s)
		contact an acoustical consultant with experience in noise monitoring to evaluate the complaint.	
All phases	N/a	**- Inclusion in Authorisation** – A Environmental Noise Measurement Programme (Monitoring Programme) needs to be implemented. See Section **8.2**. An independent acoustical consultant should investigate operations. Monitoring must be done to assess for a disturbing noise or a noise nuisance, identifying any potential acoustical issues (e.g. equipment that is broken that could be creating exceeding noise levels). This will also ensure that future community/receptor encroachment or development can be tracked (documentation of development of the area and environmental acoustics). The compliance in terms of noise levels at the project boundary is also required.	Environmental Coordinator.
All phases	N/a – **Receptor R1**	**-Recommended** (not compulsory) - The project should consider reverse alarms that do not generate a high noise nuisance due to its tonality. Although heavy vehicle reverse alarms are exempt from noise legalisation (GN R154) and needs to meet occupational health and safety standards, certain reverse alarms are less intrusive (less tonal more broadband character etc.).	Prior to operational phase (design phase), ECO, Environmental Coordinator and project engineers.

8.2 ENVIRONMENTAL MONITORING PROGRAMME

The Environmental Monitoring Programme is presented below in **Table 11**.

Table 11: Environmental Monitoring Programme

Environmental Monitoring Programme
EMPr Monitoring Programme: – Measurements should be conducted in terms of L_{AIeq} equivalent values (impulse), with statistical and octave data logged (if uncertain about L_{AIeq} or due to limitations). Metrological (wind) conditions should be logged. International (fast) measurements could be considered for comparison with the International Finance Corporation requirements (if required). – Where feasible longer term (+24 hours) unattended or 10-minute measurements should be attempted to represent a maximum capacity of evaluated scenario, and at/near receptors (or project footprint). – The annual measurement report should be reviewed after the first 2 years. – The ToR of the report should include SANS10103:2008 methodologies in it, with the Noise Control Regulations limits applied. **Frequency:** – Annual noise measurements to be conducted at receptors **R1 and R2** (see **Figure 2**). – Monitoring at the project footprint plant boundary needs to be conducted. Although no receptors are at the boundary, the noise spill over extent into neighbouring properties must be assessed. The person conducting the measurements needs to assess the best locality to determine plant boundary measurements, with the crusher area the best place to consider. – Measurements should further be conducted during all phases including construction, operational and closure phases. – Should a valid noise complaint be lodged, the measurement frequencies increased to quarterly or monthly. **Target Criterion:** – The methodology as proposed by SANS10103:2008 should be used. Compliance with the Noise Control Regulations should be met (no increase of +7dBA from identified Rating). – The boundary of the property/farm portion/mining rights area should not be exceeded by 61 dBA 24 hour or similar (controlled zone).

9 CONCLUSIONS & SUMMARY

To ensure that the noise compliance is achieved under all circumstances, to minimise the potential of a disturbing noise, and to ensure compliance of the footprint boundary limits, the following key mitigation options should be implemented:

- It should be noted that the use of reverse alarms on pits (if not sufficiently obscured by berms and pit highwalls) could cause a noise nuisance at the receptors R1.
- An annual noise measurements programme is recommended during all phases. Should a valid noise complaint be lodged, the measurement frequencies should be increased.
- Should the layout assessed in this report change, the new layout should be reviewed in terms of environmental acoustics.

LIST OF APPENDICES

APPENDIX A

Glossary of Terms & Acronyms

To ensure that there is a clear interpretation of this report the following meanings should be applied to the acoustic terminology.

- **App. –** Approximately**.**
- **Ambient sound level** or **ambient noise** means that the totally encompassing sound in a given situation at a given time, and usually composed of sound from many sources, both near and far. Note that ambient noise includes the noise from the noise source under investigation. The use of the word *ambient* should however always be clearly defined (compare with *residual noise*).
- **A-weighted sound pressure level (SPL) (noise level) (L_{pA}), in decibels:**
  The sound pressure level of A-weighted sound pressure is given by the equation:
  $L_{pA} = 10 \log (p_A/P_o)^2$ where:
  P_A is the A-weighted sound pressure, in Pascals; and
  P_o is the reference sound pressure (p_o = 20 micro Pascals (μPa))
  Note: The internationally accepted symbol for sound pressure level, dB(A), is used.
- **dB(A)** means the value of the sound pressure level in decibels, determined using a frequency weighting network A. (The "A"-weighted noise levels/ranges of noise levels that can be expected in some typical environments are given in Table A1 at the end of this appendix).
- **Disturbing noise** means a noise level that exceeds the outdoor equivalent continuous rating level of the time-period and neighbourhood as given in Table 2 of SANS 10103:2004. For convenience, the latter table is reproduced in this appendix as Table A1.
- **Equivalent continuous A-weighted sound pressure level ($L_{Aeq,T}$)** means the value of the A-weighted sound pressure level of a continuous, steady sound that, within a specified time interval, has the same mean-square should pressure as a sound under consideration whose level varies with time.
- **Equivalent continuous rating level ($L_{Req,T}$)** means the equivalent continuous A-weighted sound pressure level during a specified time interval, plus specified adjustments for tonal character and impulsiveness of the sound and the time of day.
- **Equivalent continuous day/night rating level ($L_{R,dn}$)** means the equivalent continuous A-weighted sound pressure level during a reference time interval of 24-hours, plus specified adjustments for tonal character and impulsiveness of the sound and the time of day. (An adjustment of 10dB is added to the night-time rating level).
- **Integrating sound level meter** means a device that integrates a function of the root mean square value of sound pressure over a period of time and indicates the result in dBA.

- **LoP –** means Life of Project.
- **Min.** means minimum.
- **Noise** means any acoustic phenomenon producing any aural sensation perceived as disagreeable or disturbing by an individual or group. Noise may therefore be defined as any *unwanted* sound or sound that is *loud, unpleasant or unexpected*.
- **Noise climate** is a term used to describe the general character of the environment with regard to sound. As well as the ambient noise level (quantitative aspect), it includes the qualitative aspect and the character of the fluctuating noise component.
- **Noise Control Regulations** means the regulations as promulgated by the Department of Environmental Affairs and Tourism and to be used by the provincial authorities to prepare their specific regulations. The Gauteng and Free State Provinces have promulgated their own regulations and thus sections of the project are governed by the Gauteng Noise Control Regulations and the Noise Control Regulations for the Free State Province.
- **Noise impact criteria** means the standards applied for assessing noise impact.
- **Noise level** means the reading on an integrating impulse sound level meter taken at a measuring point in the presence of any alleged disturbing noise at the end of a total period of at least 10 minutes after such a meter was put into operation, and, if the alleged disturbing noise has a discernible pitch, for example, a whistle, buzz, drone or music, to which 5dBA has been added. (the "A" weighted noise levels/ranges of noise levels that can be expected in some typical environments are given in Table A2 at the end of this appendix).
- **Noise nuisance** means any sound which disturbs or impairs or may disturb or impair the convenience or peace of any reasonable person considering the quantitatively measurable such as barking dogs, etc. (compared with disturbing noise which is measurable).
- **Noise-sensitive Development** means and Interested or Affected Party (I&AP), receptor or any other party that has a concern about an activity.
- **Residual sound level** means the ambient noise that remains at a position in a given situation when one or more specific noises are suppressed (compare with *ambient noise).*
- **Sound exposure level or SEL** means the level of sound accumulated over a given time interval or event. Technically the sound exposure level is the level of the time-integrated mean square A-weighted sound for stated time or event, with a reference time of one second.
- **Sound power level** indicates the total acoustic energy that a machine, or piece of equipment, radiates to its environment.
- **Sound (pressure) level** means the reading on a sound level meter taken at a measuring point.

- **SANS 10103** means the latest edition of the South African Bureau of Standards Code of Practice SANS 10103 titled The Measurement and Rating of Environmental Noise with Respect to Land *Use, Health, Annoyance and to Speech Communication.*
- **SANS 0210** means the latest edition of the South African Bureau of Standards Code of Practice SANS 0210 entitled *Calculating and Predicting Road Traffic Noise.*
- **SANS 10328** means the latest edition of the South African Bureau of Standards Code of Practice SANS 10328 titled *Methods for Environmental Noise Impact Assessments.*
- **SEL** - Sound Exposure Level.
- **Sound** means the aural sensation caused by rapid, but very small, pressure variations in the air. In quantifying the subjective aural sensation, "loudness", the letters dBA after a numeral denote two separate phenomena:
    - "dBA", short for decibel, is related to the human's subjective response to the change in amplitude (or largeness) of the pressure variations.
    - The "A" denotes the ear's different sensitivity to sounds at different frequencies. The ear is very much less sensitive to low (bass) frequency pressure variations compared to mid-frequencies.
    - The level of environmental sound usually varies continuously with time. A human's subjective response to varying sounds is primarily governed by the total sound energy received. The total sound energy is the average level of the fluctuating sound, occurring during a period of time, multiplied by the total time period. In order to compare the effects of different fluctuating sounds, one compares the average sound level over the time period with the constant level of a steady, non-varying sound that will produce the same energy during the same time period. The average energy of sound varying in amplitude is thus equivalent to the continuous, non-varying sound. The two energies are equivalent.

Refer also the various South African National Standards referenced above and the Noise Control Regulations for additional, in some instances, more detailed definitions.

APPENDIX B

Sound Power Levels (SPL) of Typical Equipment[10][11].

Noise Source	Sound Power (dBA)		Constant Operating Sound Power (dBA)
	Max (peak)	Min	
Pile driver (Impact noise)			132
Pneumatic chip hammer	131	121	
Jack Hammers, Rock Drills	130	112	
Rock drill			130
Trucks (All types)	127	99	
Tractors	126	108	
Front End/Wheel loader	125	70	
Backhoes	124	101	
Scrapers, Graders	124	111	
Pneumatic Wrenches	121	116	
Concrete Mixers	120	106	
Crane max	120	107	
Mechanical shovel			120
Pavers			120
Pneumatic breaker			120
Air Compressors	119	106	
Concrete joint cutter	119	116	
Portable saw	119	105	
Jawcrusher diesel ca 250 kW			118
Bulldozer	117	110	
Breaker, mini-robot mounted			115
Piling, vibrating hammer			115
Concrete Pumps	114	109	
Roller Compactor	114	104	
Earth Tamper	113	107	
Generators	113	103	
Concrete Vibrator	112	101	
Cutter, circular, steel (electric)			112
Hammer	112	104	
Impact crusher			112
Earthmover	111	104	
Drill rig, rotary type (diesel)			110
Road grinder (petrol)			108

[10] https://www.fhwa.dot.gov/Environment/noise/construction_noise/handbook/handbook09.cfm
[11] www.fhwa.dot.gov

Road sweeper			107
Water jetting unit (diesel)	107	94	
Dredger, Suction, Grout pumps	105	103	
Road ripper, excavator mounted			105
Concrete crusher	103	94	
Poker, vibratory, hand-held (electric)			102
Generator, portable			100
Power pack (diesel)			100
Power swivel			100
Trucks (Typical onsite)			99

APPENDIX C

Short-List of Projects

Monitoring & Reporting	Comic-Con Noise Management and Monitoring Report. Kyalami DSTV Delicious Festival (2018 & 2019) Noise Management and Monitoring Report. Heineken Kylami Monitoring Report (2019). KEM JV Noise Survey (2018). Nokeng Fluorspar Mine Quarterly Monitoring Reports. Gold 1 Environmental Annual Measurements. Kloof, Rand Uranium and Driefontein Annual measurement report (2019). Metsi a Me biological remediation project (monitoring, management & reporting), Corobrik (monitoring & reporting), Sedibeng Breweries (surface and ground water monitoring and reporting), Vanadium Mine (Thabazimbi – ground water & surface water). Doxa Deo (Doxa Deo), Harties Dredging (Rand Water), Xstrata Coal – Witbank Regional, Sephaku Delmas (AGES), Amakhala Emoyeni WEF (Windlab Developments), Transnet Noise Analysis (Aurecon), Unica Iron and Steels's Babelgi Plant Operations (Unica), Dangote Cement Aganang Quarterly Monitoring Report (Exigo), Sephaku Cement Delmas Quarterly Monitoring Report (Exigo), Bauba A Hlabirwa Mining bi-annual reports. Glencore Mototolo Concentrator Report.
Mining and Industry	BECSA – Middelburg (Golder Associates), Kromkrans Colliery (Geovicon Environmental), SASOL Borrow Pits Project (JMA Consulting), Tweefontein Colliery (Cleanstream), Goedehoop Colliery (Geovicon), Delft Sand (AGES), Brandbach Sand (AGES), Schoongesicht (CleanStream), Bauba A Hlabirwa Mining North & Southern Clusters.
Transportation Networks	K220 Road Extension (Urbansmart), Boskop Road (MTO), Davel-Swaziland-Richards Bay Rail Link (Aurecon), Tshwane Rapid Transport Project, Phase 1 and 2 (NRM Consulting/City of Tshwane), Swaziland Rail Link – Assessment of 4 Schools in Swaziland (Aurecon), Extension of Atterbury Road, City of Tshwane (Bokomoso).
Small research developments	Delta BEC SADIC Sterreweg ENIA.Lothair Residential ENIA. TCTA AMD Project Baseline (AECOM), Christian Life Church (UrbanSmart), Kosmosdale (UrbanSmart), Louwlardia K220 (UrbanSmart), Richards Bay Port Expansion (AECOM), Babalegi Steel Recycling (AGES), Safika Slag Milling Plant (AGES), Seshego-D Waste Disposal (Enviroxcellence), Zambesi Safari Equipment (Owner), Noise Annoyance Assessment due to the Operation of the Gautrain (Thornhill and Lakeside Residential Estate), Richards Bay Port Expansion (AECOM), Babalegi Steel Recycling (AGES), Safika Ladium (AGES), Safika Cement Isando (AGES), uMzimkhulu Landfill Site (Nzingwe Consultancy), Proposed Linksfield Residential Development (Bokomoso).

APPENDIX D

Co-ordinates of Measurements and Receptors (WGS 84, Lat. Long.)

Measurement Locality	Latitude	Longitude
NSD		
R1	25°50'39.50"S	29°27'18.21"E
R2	25°50'39.98"S	29°27'38.48"E

APPENDIX E

Photos of Measurements

Figure Monitoring 1: Locality ML01

APPENDIX F

References

1. Autumn Lyn Radle The Effect of Noise on Wildlife: A Literature Review. 2007
2. Environment Conservation Act, 1989 (Act 73 of 1989).
3. J. Brouček. Effect of Noise on Performance, Stress, and Behaviour of Animals. NAFC - Research Institute for Animal Production Nitra, Slovak Republic. 2014
4. http://www.mp-rams.co.za/rams/rams.html
5. National Environment Management Act (NEMA 2006).
6. Noise Control Regulations (Attached to the Act No 73 of 1989).
7. Occupational Health and Safety Act, 1993.
8. R.C. Kull and C.McGarrity.Noise Effects on Animals: 1998 – 2002 Review. Geo-Marine Inc. U.S.A.
9. Ronald P. Larkin. Effects of military noise on wildlife: a literature review
10. SANS 10328: 2008. 'Methods for environmental noise impact assessments.'
11. SANS 10103:2008. 'The measurement and rating of environmental noise with respect to land use, health, annoyance and to speech communication.'
12. SANS 10357: 2004. 'The calculation of sound propagation by the Concawe method.'
13. "SoundPLAN, designing a sound environment." URL http://www.soundplan.com/.
14. South African National Roads Agency SOC Ltd. South African Pavement Engineering Manual Chapter 12. Construction Equipment and Method Guidelines. 2013
15. The Constitution of the Republic of South Africa Act, 1996 (Act No. 108 of 1996).
16. World Health Organization. Night Noise Guidelines for Europe. 2009
17. www.fhwa.dot.gov – Construction Noise Handbook
18. www.fhwa.dot.gov/Environment/noise/construction_noise/handbook/handbook09.cfm

APPENDIX G

Sound Level Meter Calibration Certificate

sanas
Calibration Laboratory
148
1302

M AND N ACOUSTIC SERVICES (Pty) Ltd
Co. Reg. No. 2012/203938/07 VAT NO. 4300255876 BEE Status: Level 4
P.O. Box 61713 Pierre van Ryneveld, 0045
No. 15, Mustang Avenue
Pierre van Ryneveld, 0045
Tel: 012 689-2007 (076 920 3070) * Fax: 086 211 4690
E-mail: admin@mnacoustics.co.za / marianka@mnacoustics.co.za
Website: www.mnacoustics.co.za

CERTIFICATE OF CALIBRATION

CERTIFICATE NUMBER	2022-AS-1021
ORGANISATION	ACOUSTECH ACOUSTIC CONSULTINGS & PROJECT MANAGEMENT
ORGANISATION ADRESS	P.O.BOX 752595, GARDENVIEW, 2047
CALIBRATION OF	INTEGRATING SOUND LEVEL METER complete with built-in ⅓-OCTAVE/OCTAVE FILTER, ½" PRE-AMPLIFIER and ½" MICROPHONE
MANUFACTURERS	BSWA
MODEL NUMBERS	308, MA 231T and 231
SERIAL NUMBERS	560144, 560614 and 551011
DATE OF CALIBRATION	11 – 12 AUGUST 2022
RECOMMENDED DUE DATE	AUGUST 2024 (SEE REMARKS 4.8)
PAGE NUMBER	PAGE 1 OF 6

This certificate is issued in accordance with the conditions of approval granted by the South African National Accreditation System (SANAS). This Certificate may not be reproduced without the written approval of SANAS and M and N Acoustic Services.

The measurement results recorded in this certificate were correct at the time of calibration. The subsequent accuracy will depend on factors such as care, handling, frequency of use and the number of different users. It is recommended that re-calibration should be performed at an interval, which will ensure that the instrument remains within the desired limits and/or manufacturer's specifications.

The South African National Accreditation System (SANAS) is member of the International Laboratory Accreditation Cooperation (ILAC) Mutual Recognition Arrangement (MRA). This arrangement allows for mutual recognition of technical test and calibration data by member accreditation bodies worldwide. For more information on the arrangement please consult www.ilac.org

Calibrated by:	Authorized/Checked by:	Date of Issue:
W.S. SIBANYONI (CALIBRATION TECHNICIAN)	M. NAUDÉ (SANAS TECHNICAL SIGNATORY)	15 AUGUST 2022

Director: Marianka Naudé