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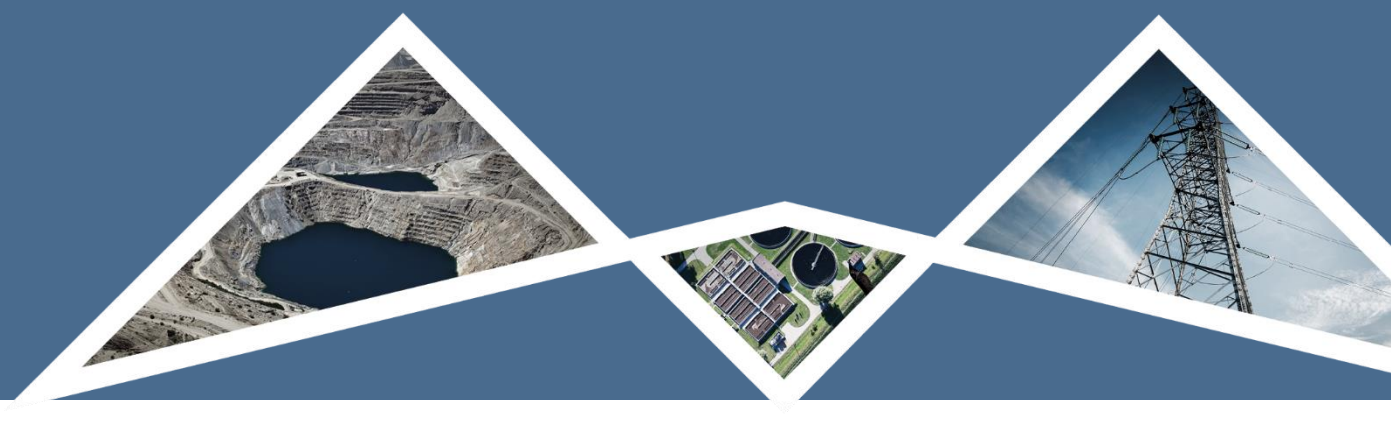
T 011 789 7170 E info@eims.co.za W www.eims.co.za

SCOPING REPORT

PROPOSED ELOFF PHASE 3 PROJECT ENVIRONMENTAL IMPACT ASSESSMENT NEAR DELMAS IN MPUMALANGA PROVINCE



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	NAME	SIGNATURE	DATE
COMPILED:	Nobuhle Hughes John von Mayer		2019/03/27
CHECKED:	John von Mayer Liam Whitlow		2019/04/11
AUTHORIZED:	Liam Whitlow		2019/06/11

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2019/06/11	**ORIGINAL DOCUMENT**	**Scoping Report for Public Review**

Table of Contents

List of Figures

List of Tables

Appendices

Appendix A: Environmental Assessment Practitioner (EAP) Curriculum Vitae

Appendix B: Maps

Appendix C: Public Participation

Appendix D: Specialist Reports

Abbreviations

CMA	:	Catchment Management Agency
DEA	:	Department of Environmental Affairs
DMR	:	Department of Mineral Resources
DWA	:	Department: Water Affairs
DWS	:	Department of Water Affairs and Sanitation
EA	:	Environmental Authorisation
EAP	:	Environmental Assessment Practitioner
EIA	:	Environmental Impact Assessment
EIMS	:	Environmental Impact Management Services
ELWU	:	Existing Lawful Water Use
EMPr	:	Environmental Management Programme
ESA	:	Early Stone Age
GA	:	General Authorisation
GHG	:	Greenhouse Gas
GN	:	Government Notice
GTIS	:	Gross Tonnes In Situ
HGM	:	Hydrogeomorphic
HIA	:	Heritage Impact Assessment
I&AP	:	Interested and Affected Party
IBA	:	Important Bird Area
IWML	:	Integrated Waste Management Licence
LOM	:	Life of Mine
MAE	:	Mean Annual Evaporation
mamsl	:	metres above mean sea level
MAP	:	Mean Annual Precipitation
MAR	:	Mean Annual Runoff
mbs	:	metres below surface
MCM	:	Million cubic metres
MPHG	:	Mpumalanga Highveld
MPRDA	:	Minerals and Petroleum Resources Development Act, 2002
MT	:	Million Tonnes
NEM:WA	:	National Environmental Management: Waste Amendment Act, 2008
NEMA	:	National Environmental Management Act, 2002
NEMA	:	National Environmental Management Act, 1998
NGDB	:	National Groundwater Database

NHRA	:	National Heritage Resources Act, 1999
NWA	:	National Water Act, 1998
ONAs	:	Other Natural Areas
PHRA	:	Provincial Heritage Resources Authority
RoM	:	Run of Mine
tpm	:	Tonnes per Month
WMA	:	Water Management Area
WUL	:	Water Use Licence

EXECUTIVE SUMMARY

Eloff Mining Company (Pty) Ltd has been granted a Mining Right (MP30/5/1/2/2/10169MR), in terms of the Minerals and Petroleum Resources Development Act (Act 28 of 2002 – MPRDA) as amended, for the mining of the Eloff Coal Resource (Eloff Project) and further applied for Environmental Authorisation ("**EA**") for the mining of coal and associated activities for Phase 1 Pit 1 of the Eloff Project which has been granted on the 25th April 2019. In addition to the above, Eloff Mining Company wishes to apply for EA for the development of Eloff Phase 3 ("**Phase 3 Project"**) opencast mining pit and associated infrastructure on the south-eastern part of the Eloff Project mining right area.Phase 3. The proposed Phase 3 Project covers an extent of approximately 251 hectares (ha) over portions 14, 15, 16, 18, 19, 20, 22, 23, 24 and 59 of the farm Strydpan 243 IR, and is located approximately 7.5km south-east of the town Delmas in Victor Khanye Local Municipality, within the Nkangala District Municipality, Mpumalanga Province. The proposed Phase 3 Project is anticipated to use a standard truck and shovel mining method based on strip mining design and layout. The existing Coal Handling and Processing Plant (CHPP) at the adjacent Kangala Colliery will be utilised, and it is anticipated that no new surface infrastructure such as offices, dams, stores facility, workshops, or change house will be required for the project.

A full Environmental Impact Assessment (EIA) process is being undertaken in support of the EA application. A new Water Use Licence Application (WULA) for the relevant water uses associated with the project is also underway as a separate application which is being undertaken by GCS Water and Environmental Consultants (GCS).

PURPOSE OF THE SCOPING REPORT

The purpose of the scoping process is to:

- Identify the policies and legislation that are relevant to the activity;
- To motivate the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the preferred location;
- To identify and confirm the preferred activity and technology alternative through an impact and risk assessment and ranking;
- Where appropriate, to identify and confirm the preferred site, through a detailed site selection process, which includes an impact and risk assessment process including cumulative impacts and a ranking process of all the identified alternatives focusing on the geographical, physical, biological, social, economic, and cultural aspects of the environment;
- To identify the key issues to be addressed in the assessment phase;
- To agree on the level of assessment to be undertaken, including the methodology to be applied, the expertise required, as well as the extent of further consultation to be undertaken to determine the impacts and risks the activity will impose on the preferred site through the life of the activity, including the nature, significance, consequence, extent, duration and probability of the impacts to inform the location of the development footprint within the preferred site; and
- To identify suitable measures to avoid, manage, or mitigate identified impacts and to determine the extent of the residual risks that need to be managed and monitored.

PUBLIC PARTICIPATION PROCESS

The Public Participation Process (PPP) for the proposed project has been undertaken in accordance with the requirements of the MPRDA, and National Environmental Management Act (NEMA) in line with the principles of Integrated Environmental Management (IEM). The PPP commenced on the 10th August 2018 with an initial notification and call to register as interested and affected parties (I&APs). The comments received from I&APs during the initial call to register and commenting period so far have been captured in Public Participation Report

in Appendix C, and a summary of the issues raised and sections addressing the issues is presented in Table 12 of Section 7.7. The main issues raised being on the following:

- Impact of blasting and vibrations, particularly on existing infrastructure;
- Impact of mining activities on groundwater and surface water resources;
- Social impacts including mining activities impact on landowner and surrounding communities' infrastructure;
- Employment concerns (i.e. loss of employment and job security from the potential loss of viable farming operations);
- Concerns about potential land use impacts and constraints;
- Request for details on the formal process of lodging complaints/grievance mechanism;
- Concerns about cumulative impacts due to existing mining activities in the area; and
- Information requests and project participation inquiries.

Comments received during this Scoping Report review period will also be collated and added to the Public participation Report and the summary in Table 12 of Section 7.7 updated accordingly for inclusion in the finalised Scoping Report to be submitted to the DMR. Should the DMR accept the Scoping Report, an EIA Report including an EMPr, will also be compiled and presented for public comment as part of this EIA process during which time further stakeholder engagement will take place.

This Scoping Report has been made available for public review and comment for a period of 30 days from the 12th June 2019 until the 13th July 2019. Contact details are provided below:

- Environmental Impact Management Services (Pty) Ltd (EIMS)
- P.O. Box 2083 Pinegowrie 2123
- Phone: 011 789 7170 / Fax: 011 787 3059
- Contact: Cheyenne Muthukarapan
- Email: kangala@eims.co.za

PROJECT ALTERNATIVES AND ENVIRONMENTAL IMPACT ASSESSMENT

A scoping assessment was undertaken to identify all the potential risks and impacts associated with each phase of the proposed mining as well as potentially feasible alternatives. A broad range of alternatives including location, process, technology and activity options were considered during scoping and the following will be assessed in more detail during the EIA phase:

- Location Alternatives – The sensitivity-based approached of determining the location of infrastructure will guide further investigations;
- Process Alternatives – Options for the location and handling of discard, dewatering of the mining pit area / mine workings, and a suitable water supply;
- Technology Alternatives – The transport of coal by road from the pit to the processing plant; and
- Activity Alternatives – The option of mining within the project area will be assessed in more detail during the EIA phase. The no-go or 'do nothing' option is the same as keeping the current *status quo* of farming, and provides the baseline against which the impacts of other alternatives should be compared.

The background information from the neighbouring Kangala Colliery and Eloff Phase 1 Project EIA and MWP documents as well as specialist studies undertaken for the proposed Eloff Phase 3 project, including the screening of all the activities underway and planned to ensure that all the potential impacts have been identified. Each of the identified risks and impacts at the various project phases were assessed. The assessment criteria

include the nature, extent, duration, magnitude / intensity, reversibility, probability, public response, cumulative impact, and irreplaceable loss of resources.

The most significant risks and impacts identified were those that remain high in terms of significance even post mitigation measures being considered. The following impacts were determined to have a potentially moderate - high negative final significance:

- Decline in air quality during operations;
- Ground vibration impact on houses during operations;
- Ground vibration impact on boreholes during operations;
- Ground vibration impact on heritage sites during operations;
- Ground vibration impact on power lines during operations;
- Ground vibration impact on broilers during operations;
- Air blast impact on houses during operations;
- Air blast impact on heritage sites during operations;
- Air blast impact on broilers during operations;
- Fly rock impact on roads during operations;
- Fly rock impact on boreholes during operations;
- Fly rock impact on heritage houses during operations;
- Fly rock impact on power lines during operations;
- Leachate from coal and waste material stockpiles during operations;
- Loss of land capability from opencast mining during construction and operations;
- Blasting in and round wetlands during operations;
- Soil excavations in and around wetlands during operations;
- Net GGP impact during decommissioning as well as rehabilitation and closure;
- Net employment impact during decommissioning as well as rehabilitation and closure;
- Forex savings during decommissioning as well as rehabilitation and closure;
- Fiscal Income during decommissioning as well as rehabilitation and closure;
- Economic development per capita during decommissioning as well as rehabilitation and closure;
- Country and industry competitiveness during decommissioning as well as rehabilitation and closure;
- Black economic transformation during decommissioning as well as rehabilitation and closure;
- Alternative land-use during decommissioning as well as rehabilitation and closure; and
- Need and desirability during decommissioning as well as rehabilitation and closure.

The negative impacts, in particular, will be further assessed during the EIA phase of the project. Potential mitigation measures have been identified and will be refined based on input from the Environmental Assessment Practitioner (EAP), public consultation, and specialist assessments during the EIA phase of the project. The

associated EMPr will identify appropriate mitigation mechanisms for avoidance, minimisation and / or management of the negative impacts and enhancement of the positive.

1 INTRODUCTION

Eloff Mining Company (Pty) Ltd has been granted a Mining Right Mining Right (MP30/5/1/2/2/10169MR), in terms of the Minerals and Petroleum Resources Development Act (Act 28 of 2002 – MPRDA) as amended, for the mining of the Eloff Coal Resource (Eloff Project) and further applied for Environmental Authorisation ("**EA"**) for the mining of coal and associated activities for Phase 1 Pit 1 of the Eloff Project which has been granted on the 25th April 2019. In addition to the above, Eloff Mining Company wishes to apply for EA for the development of a Eloff Phase 3 ("Phase 3 Project) opencast mining pit and associated infrastructure on the southern-eastern part of the Eloff Project mining right and adjacent to the existing Kangala Colliery covering an extent of approximately 251 hectares (ha) (herein referred to as the Phase 3 Project). The proposed Phase 3 Project extends over portions 14, 15, 16, 18, 19, 20, 22, 23, 24 and 59 of the farm Strydpan 243 IR located approximately 7.5km south-east of the town Delmas in Victor Khanye Local Municipality, within the Nkangala District Municipality, Mpumalanga Province. The proposed Phase 3 Project is anticipated to use a standard truck and shovel mining method based on strip mining design and layout. The existing Coal Handling and Processing Plant (CHPP) at the adjacent Kangala Colliery will be utilised, and it is anticipated that no new surface infrastructure such as offices, dams, stores facility, workshops, or change house will be required for the project.

A full Environmental Impact Assessment (EIA) process is being undertaken in support of the EA application. A new Water Use Licence Application (WULA) for the relevant water uses associated with the project is also underway as a separate application which is being undertaken by GCS Water and Environmental Consultants (GCS).

The following main rights, licenses, authorisations and permits are currently in place and have been considered in the compilation of this report (Table 1).

Table 1: Mining rights, licenses, authorisations and permits held by Eloff Mining Company and neighbouring Kangala Coal Mine.

Document	Applicable Properties	Reference Number
Eloff Project Mining Right (2019)	Various portions of the farms Droogefontein 242IR; Strydpan 243IR; and Stompiesfontein 273IR (a total of 181 properties)	MP30/5/1/2/2/10169MR
Eloff Phase 1 Pit 1 EA Enviornmental Authorisation	Portions 8, 9, 11, 12, 13, 14, 15, 17, 18, 19, 21, 22, 23, 27, 28, 29, 30, 63, 64, 65, 66, 69, and 70 of the farm Strydpan 243 IR	MP30/5/1/2/2/10169EM
Kangala Colliery Mining Right (2012)	Portion 1 and Remaining Extent of Portion 2 of the farm Wolvenfontein 244 IR	MP30/5/1/2/2/429MR
Kangala Colliery EMPr Update (2014)	Portion 1 and the Remaining Extent of Portion 2 of the farm Wolvenfontein 244 IR	MP30/5/1/2/2/429EM
Kangala Colliery Enviornmental Authorisation (2012)	Portion 1 and the Remaining Extent of Portion 2 of the farm Wolvenfontein 244 IR	17/2/3/N-21
Kangala Colliery Enviornmental Authorisation (2013) – Amendment	Portion 1 and the Remaining Extent of Portion 2 of the farm Wolvenfontein 244 IR	17/2/3/N-21
Kangala Colliery Waste Management Licence (2012)	Portion 1 and the Remaining Extent of Portion 2 of the farm Wolvenfontein 244 IR)	12/9/11/L445/6
Kangala Colliery Water Use Licence (2016)	Portion 1 and Remaining Extent of Portion 2 of the farm Wolvenfontein 244 IR	04/B20A/A/4683

Document	Applicable Properties	Reference Number
Water Use Licence – Amendment (2013)	Portion 1 of the farm Wolvenfontein 244 IR	04/B20A/ABCGIJ/1506
Kangala Colliery Water Use Licence (2012)	Portion 1 of the farm Wolvenfontein 244 IR	04/B20A/ABCGIJ/1506
Kangala Colliery NHRA Demolition Permit (2013)	Farm Wolvenfontein 244 IR	Permit ID 229

Therefore, it is in addition to the authorisations and licenses listed in Table 1, that Eloff Mining Company wishes to apply for EA in accordance with the National Environmental Management Act (NEMA) 2014 EIA Regulations for the relevant listed activities associated with the proposed Phase 3 Project new opencast mining pit extension on portions 14, 15, 16, 18, 19, 20, 22, 23, 24 and 59 of the farm Strydpan 243 IR.

1.1 REPORT STRUCTURE

This report has been compiled in accordance with the 2014 NEMA EIA Regulations, as amended. A summary of the report structure, and the specific sections that correspond to the applicable regulations, is provided in Table 2 below.

Table 2: Report structure

Environmental Regulation	Description – NEMA Regulation 982 (2014) as amended	Section in Report
Appendix 2(2)(a):	Details of – i. The Environmental Assessment Practitioner (EAP) who prepared the report; and ii. The expertise of the EAP, including a curriculum vitae;	1
Appendix 2(2)(b):	The location of the activity. Including – i. The 21-digit Surveyor General code of each cadastral land parcel; ii. Where available, the physical address and farm name; iii. Where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;	2
Appendix 2(2)(c):	A plan which locates the proposed activity or activities applied for at an appropriate scale, or, if it is – i. A linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or ii. On a land where the property has not been defined, the coordinates within which the activity is to be undertaken;	2
Appendix 2(2)(d):	A description of the scope of the proposed activity, including – i. All listed and specified activities triggered; ii. A description of the activities to be undertaken, including associated structures and infrastructure;	3
Appendix 2(2)(e):	A description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process;	4

Environmental Regulation	Description – NEMA Regulation 982 (2014) as amended	Section in Report
Appendix 2(2)(f):	A motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location;	5
Appendix 2(2)(h):	A full description of the process followed to reach the proposed preferred activity, site and location within the site, including – i. Details of all alternatives considered; ii. Details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs; iii. A summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them; iv. The environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; v. The impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts – a. Can be reversed; b. May cause irreplaceable loss or resources; and c. Can be avoided, managed or mitigated; vi. The methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives; vii. Positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; viii. The possible mitigation measures that could be applied and level of residual risk; ix. The outcome of the site selection matrix; x. If no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such; and xi. A concluding statement indicating the preferred alternatives, including preferred location of the activity;	6, 7, 8, 9 and 10
Appendix 2(2)(i):	A plan of study for undertaking the environmental impact assessment process to be undertaken, including –	10

Environmental Regulation	Description – NEMA Regulation 982 (2014) as amended	Section in Report
	i. A description of the alternatives to be considered and assessed within the preferred site, including the option of not proceeding with the activity; ii. A description of the aspects to be assessed as part of the environmental impact assessment process; iii. Aspects to be assessed by specialists; iv. A description of the proposed method of assessing the environmental aspects, including a description of the proposed method assessing the environmental aspects to be assessed by specialists; v. A description of the proposed method of assessing duration and significance; vi. An indication of the stages at which the competent authority will be consulted; vii. Particulars of the public participation process that will be conducted during the environmental impact assessment process; and viii. A description of the tasks that will be undertaken as part of the environmental impact assessment process; ix. Identify suitable measures to avoid, reverse, mitigate or manage identified impacts and to determine the extent of the residual risks that need to be managed and monitored;	
Appendix 2(2)(j)	An undertaking under oath or affirmation by the EAP in relation to – i. The correctness of the information provided in the report; ii. The inclusion of comments and inputs from stakeholders and interested and affected parties; and iii. Any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties;	13
Appendix 2(2)(k):	An undertaking under oath or affirmation by the EAP in relation to the level of agreement between the EAP and interested and affected parties on the plan of study for undertaking the environmental impact assessment;	13
Appendix 2(2)(l):	Where applicable, any specific information required by the competent authority; and	N/A
Appendix 2(2)(m):	Any other matter required in terms of section 24(4)(a) and (b) of the Act.	N/A

1.2 DETAILS OF THE EAP

EIMS has been appointed by Eloff Mining Company as the Independent EAP and to assist in preparing and submitting the EA application, Scoping and EIA Reports, and undertaking a Public Participation Process (PPP) in support of the proposed Phase 3 Project. The contact details of the EIMS consultant who compiled this Scoping Report are as follows:

- Name of the consultant: Nobuhle Hughes
- Tel No.: 011 789 7170
- Fax No.: 011 787 3059
- E-mail address: kangala@eims.co.za

1.3 EXPERTISE OF THE EAP

1.3.1 EAP QUALIFICATIONS

In terms of Regulation 13 of the EIA Regulations (GN R. 982) as amended, an independent EAP, must be appointed by the applicant to manage the application. EIMS has been appointed by the Applicant as the EAP to assist with compiling the necessary reports and undertaking the statutory consultation processes, in support of the proposed Phase 3 Project. EIMS is compliant with the definition of an EAP as defined in Regulations 1 and 13 of the EIA Regulations, as well as Section 1 of the NEMA. This includes, *inter alia*, the requirement that EIMS is:

- Objective and independent;
- Has expertise in conducting EIA's;
- Comply with the NEMA, the environmental regulations and all other applicable legislation;
- Takes into account all relevant factors relating to the application; and
- Provides full disclosure to the applicant and the relevant environmental authority.

The Curriculum Vitae (indicating the experience with environmental impact assessment and relevant application processes) of the consultant that is involved in the EIA process and the compilation of this Scoping Report is presented in Appendix A.

1.3.2 SUMMARY OF THE EAP'S PAST EXPERIENCE

EIMS is a private and independent environmental management-consulting firm that was founded in 1993. EIMS has in excess of 20 years' experience in conducting EIA's, including many EIA's for mines and mining related projects. Please refer to the EIMS website (www.eims.co.za) for examples of EIA documentation currently available. Nobuhle Hughes is a senior consultant at EIMS and has been involved in numerous significant projects the past 7 years that she has been with the firm. She has experience in Project Management, small to large scale Environmental Impact Assessments, Environmental Auditing, Water Use Licensing, and Public Participation.

1.3.3 SPECIALIST CONSULTANTS

Specialist studies are being undertaken to address the key issues that require further investigation and these include the impact on biodiversity, wetlands, hydrology, hydrogeology, soils, heritage, air quality, social environment, land use, visual and climate change impacts, as well as impacts from blasting and vibrations. A closure cost assessment will also be included as part of the specialist studies conducted during the EIA phase. The specialist studies involved the gathering of data relevant to identifying and assessing preliminary environmental impacts that may occur as a result of the proposed Phase 3 Project. These preliminary impacts were assessed according to pre-defined impact rating methodology (Section 9).

The specialists have also recommended appropriate preliminary mitigation / management or optimisation measures to minimise potential negative impacts or enhance potential benefits, respectively. The specialist declarations of independence are included in the specialist reports presented in Appendix D.

2 DESCRIPTION OF THE PROPERTY

Table 3 indicates the farm portions that fall within the proposed Eloff Phase 3 Project ("Phase 3 Project") including details on the location of the proposed opencast mining pit as well as the distance from the proposed project area to the nearest towns.

Table 3: Locality details

Farm Name	**Mining Right holder** Eloff Mining Company is applying for EA and IWULA for the proposed Phase 3 Project which entails anopencast mining pit located on the following farms: • Portions 14, 15, 16, 18, 19, 20, 22, 23, 24 and 59 of farm Strydpan 243 IR.		
Application Area (Ha)	The proposed Phase 3 Project covers an extent of approximately 251 hectares (ha) including the proposed softs material ("topsoil and sub soils") stockpile berms area to the west of the new mining pit.		
Magisterial District	Nkangala District Municipality.		
Distance and direction from nearest towns	The proposed project area is located approximately 7.0km south-west of the town Delmas and approximately 6.0km south-east of the town Eloff in the Victor Khanye Local Municipality, within the Nkangala District Municipality, Mpumalanga Province. The geographic coordinates at the centre of the site are approximately: 26°12'35.76" S and 28°38'43.20" E.		
21-digit Surveyor General Code for each Portion	**Farm Name:**	**Portion:**	**21 Digit Surveyor General Code**
	Strydpan 243 IR	14	T0IR00000000024300014
	Strydpan 243 IR	15	T0IR00000000024200015
	Strydpan 243 IR	16	T0IR00000000024300016
	Strydpan 243 IR	18	T0IR00000000024300018
	Strydpan 243 IR	19	T0IR00000000024300019
	Strydpan 243 IR	20	T0IR00000000024300020
	Strydpan 243 IR	22	T0IR00000000024300022
	Strydpan 243 IR	23	T0IR00000000024300023
	Strydpan 243 IR	24	T0IR00000000024300024
	Strydpan 243 IR	59	T0IR00000000024300059

Figure 1 and Figure 2 indicate the locality of the proposed location of the Phase 3 Project and the existing Kangala Coal Mine where the infrastructe (plant etc) is located.

2.1 SURROUNDING LAND USES

The proposed project footprint is situated approximately 7.0 km from the town of Delmas and 6.0 km from Eloff both within the Victor Khanye Local Municipality which is part of the Nkangala District Municipality, Mpumalanga Province. The proposed Phase 3 Project area, and its surroundings, can be described as the coal-energy-industrial complex for both the Gauteng and Mpumalanga provinces, and on the other hand is an area comparatively productive in maize and crop farming. The proposed site is located within an area that is predominantly under cultivation, besides the existing mining activities. These agricultural areas also have isolated farmsteads that are comprised of farm buildings including residential buildings and storage facilities. There are also some areas of remaining natural vegetation in close proximity.

The major land use types on site and its vicinity include:

- Three large areas of settlement including Sundra, Eloff and Delmas that lie to the north of the project area, the closest being Delmas and Eloff which are approximately 7.0km and 6.0km to the north of the proposed Phase 3 Project;
- Two areas (Vischkuil and Droogfontein) which are identified as urban but are in fact areas of small holdings. Activities within these areas appear to include intensive / industrial agriculture such as agricultural tunnels as well as large individual private houses; and
- A number of other large coal mines including one approximately 3.2km to the east and one approximately 2.2km to the south of the proposed Phase 3 Project.

There is only one protected area in the vicinity of the proposed site which is the Marievale Bird Sanctuary, a Provincial Nature Reserve located approximately 16km from the proposed project area. Due to the distance and the fact that there are already other existing mines in close proximity, it is highly unlikely that this protected area will be affected by the proposed project.

There are numerous regional roads in the area including the R42 which runs approximately 1.4km to the south and the R55 which runs approximately 3.8km to the north of the proposed Phase 3 Project.

2.2 PROPERTY OWNERSHIP

As stated above, the proposed location of the Phase 3 Project involves portions 14, 15, 16, 18, 19, 20, 22, 23, 24 and 59 of the farm Strydpan 243 IR. All these properties are owned by Eloff Mining Company but are currently being leased for farming purposes.

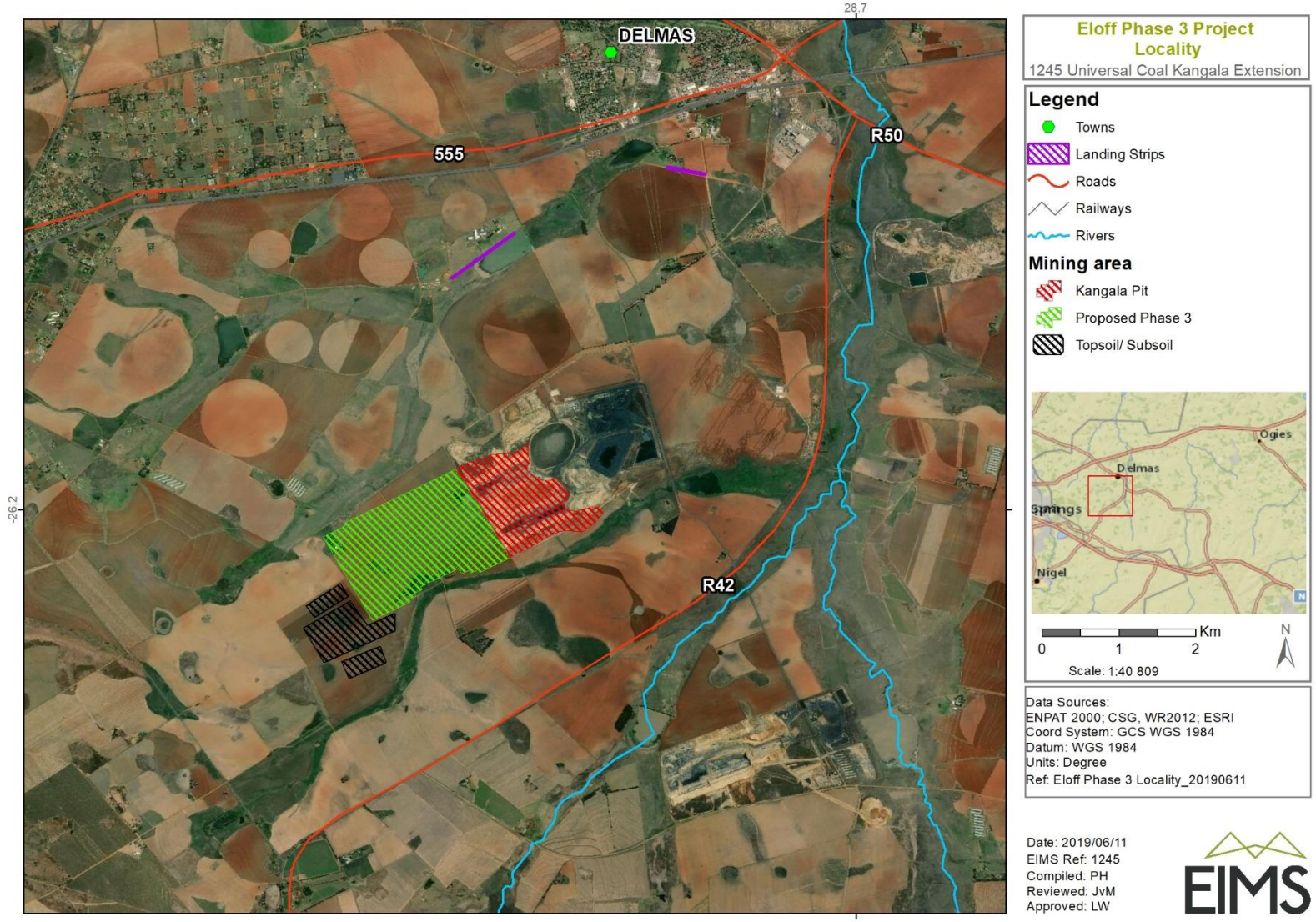


Figure 1: Aerial imagery locality map indicating the existing Kangala Colliery and the proposed Eloff Phase 3 Project

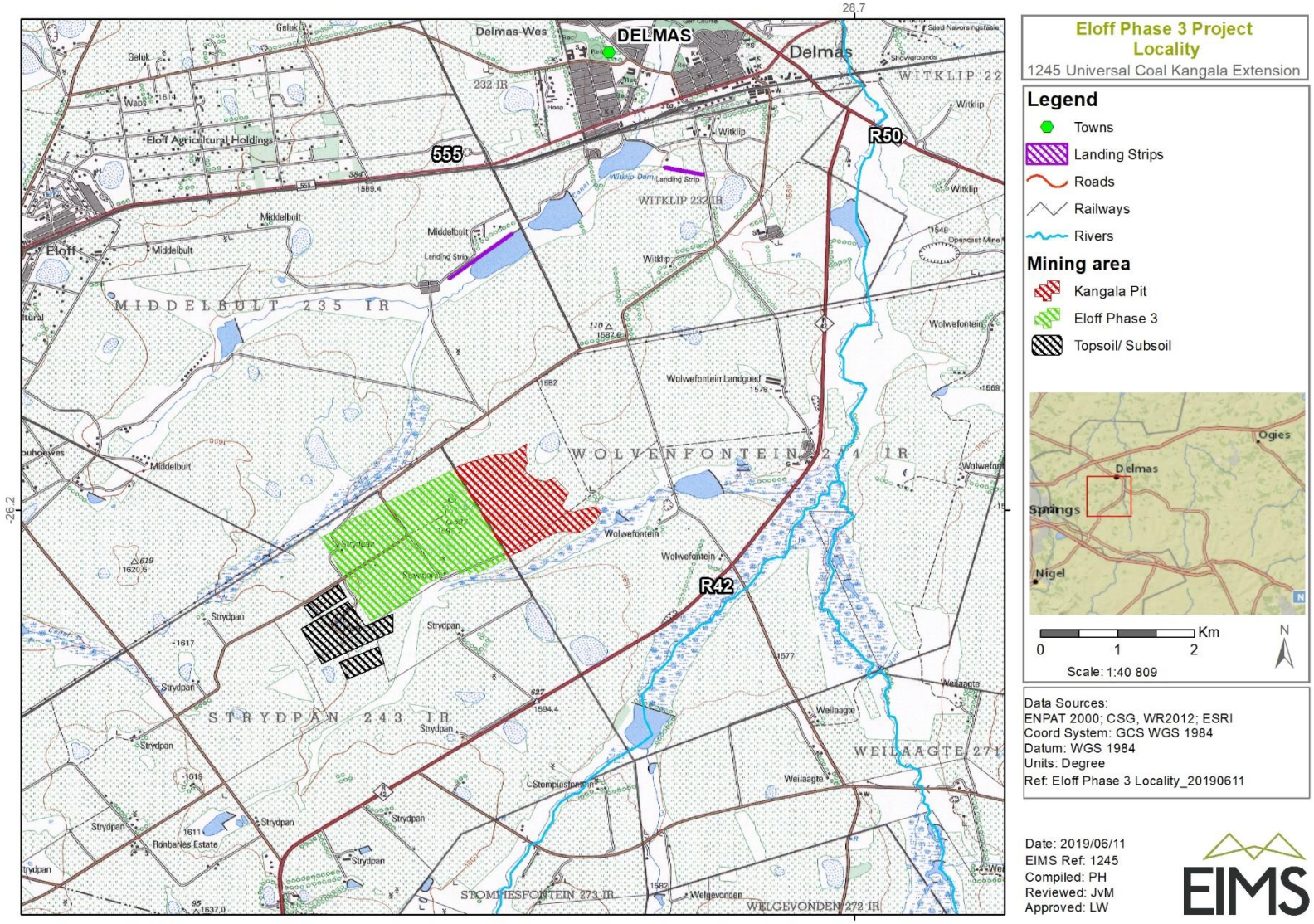


Figure 2: Topographical locality map indicating the existing Kangala Colliery opencast mining pit and the proposed Phase 3 Project

3 DESCRIPTION AND SCOPE OF THE PROPOSED PROJECT

The section below provides a detailed project description for the proposed Eloff Phase 3 Project. The majority of key information presented in this chapter was obtained from the Mining Works Programme (MWP) for the Eloff Phase 3 Project as well as the neighbouring Kangala Colliery. The aim of the project description is to indicate the proposed activities to take place at the Eloff Phase 3 Project area. Furthermore, the detailed project description below is designed to facilitate the understanding of the proposed project related activities which are anticipated to lead to the preliminary impacts identified and assessed in this Scoping Report, and for which management measures have been, or will be designed.

It is important to note that there are several other projects pertaining to Mining Right and EA applications or amendments to existing authorisations taking place in the vicinity of the proposed Eloff Phase 3 Project. These are briefly explained below towards ensuring understanding of the proposed Eloff Phase 3 Project in relation to other project activities taking place in close proximity (Figure 3).

1. There is the existing Kangala Colliery which is on portion 1 and RE of portion 2 of the farm Wolvenfontein 244IR, an extent of 951 hectares (ha). Kangala Colliery has a mining right and approved MWP as well as EMPr, these were obtained in 2012. An update or amendment to the approved EMPr, through an EIA process, was undertaken in 2014.
2. The greater Eloff Coal Resources (Eloff Project) mining right application involving numerous portions of the farms Droogefontein 242 IR, Strydpan 243 IR and Stompiesfontein 273 IR, an overall extent of 8,818.61 ha. The mining right application was submitted and accepted by the Department of Mineral Resources (DMR) in February 2017. The mining right was received in January 2019;
3. Phase 1 Pit 1 EA in support of the Eloff Project mining right application, whereby Phase 1 Pit 1 pertains to the proposed first opencast mining pit within the Eloff Project area. The EA for Phase 1 Pit 1 has been approved and granted.
4. Eloff Phase 3 Project is an EA application for a new mining pit on portions 14, 15, 16, 18, 19, 20, 22, 23, 24 and 59 of the farm Strydpan 243 IR, which falls within the Eloff Project mining right area.

The remainder of this section and overall scoping report pertains to the Eloff Phase 3 Project (Item 4 in the list above) which involves a new opencast mining pit adjacent to the existing Kangala Colliery pit.,

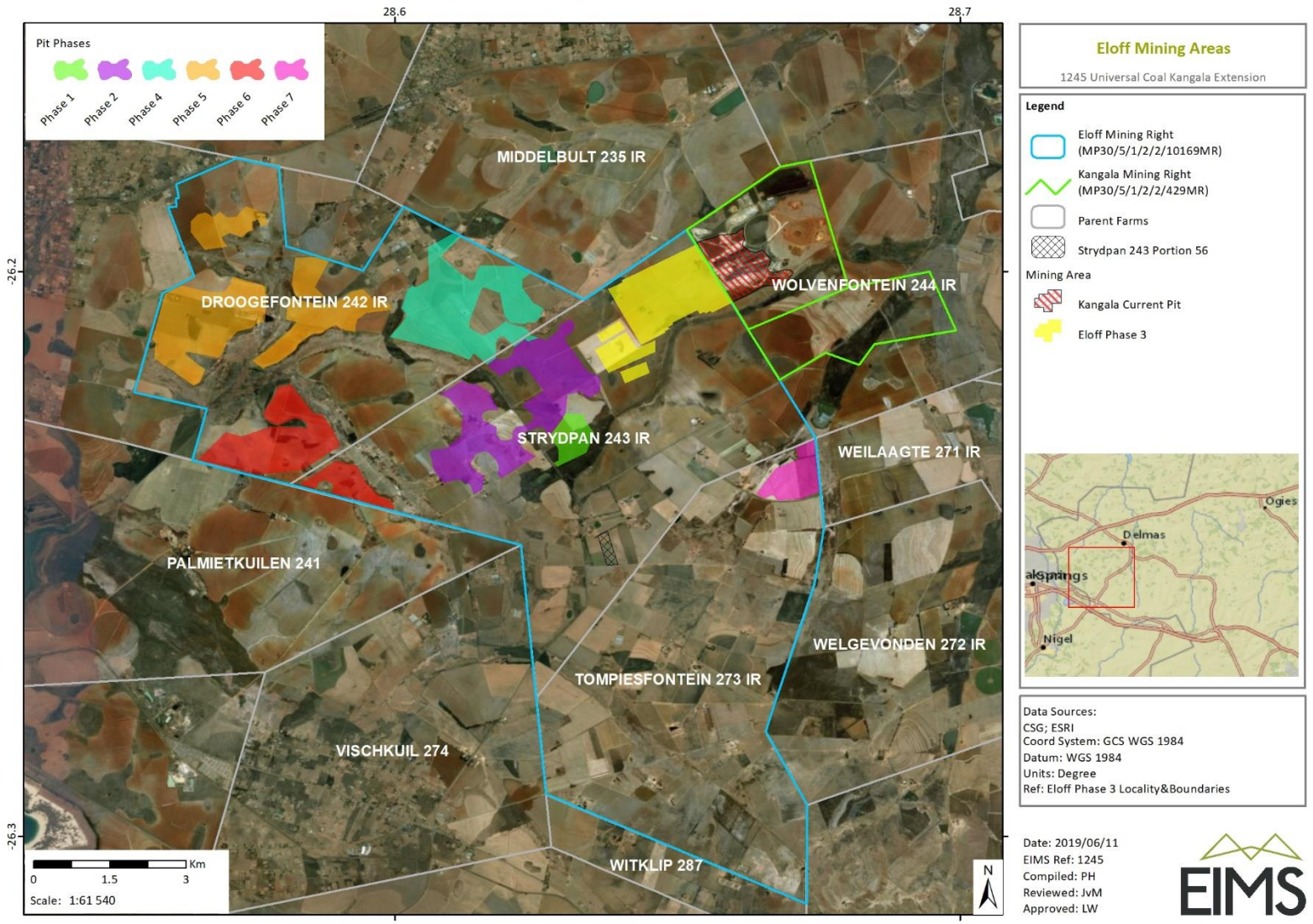


Figure 3: Locality map indicating the Eloff mining areas which includes the Eloff Phase 3 Project and its close proximity to the Kangala Colliery existing mining pit

3.1 RESOURCE DETAILS

The proposed project area lies within the Delmas Coalfield. This coalfield lies west of the Witbank Coalfield and north of the Highveld Coalfield and along the northern edge of the Main Karoo sedimentary basin. The basement rocks to this sub-basin of the Karoo, consist of granite of Archaen age, quartzite of the Witwatersrand Supergroup, lavas of the Ventersdorp Supergroup, rocks belonging to the Transvaal Supergroup (i.e. dolomite and chert of the Malmani Subgroup of the Chuniespoort Group and shale and sandstone of the Pretoria Group).

Three major coal seams are present in the area where the Eloff Phase 3 Project is proposed. These are named from the base upwards: The Bottom, Middle and Top Seam. Whilst the Middle and Top Seams are discrete units which can respectively be correlated directly with the Witbank 4 and 5 Seams, the Bottom Seam is a complex coal zone that is difficult to correlate. It is commonly thought to represent a combination of the 1, 2 and 3 Seams, with the major portion being equivalent to the 2 Seam. In general, the seam has a thickness of between 0.5m and 1.0m with an isolated maximum of 1.47m. The depth of the seam below surface varies from just over 20m in the north to a maximum of 90.21m in the Stompiesfontein Basin, with a maximum depth of approximately 70m within the proposed project area.

A detailed seam profile or stratigraphic sequence is presented in Figure 4 to illustrate the coal seams, coal plies, and partings. For practical mining reasons, a series of mining selections have been allocated, in order for the coal seams and plies to be subdivided and combined into logical mining units.

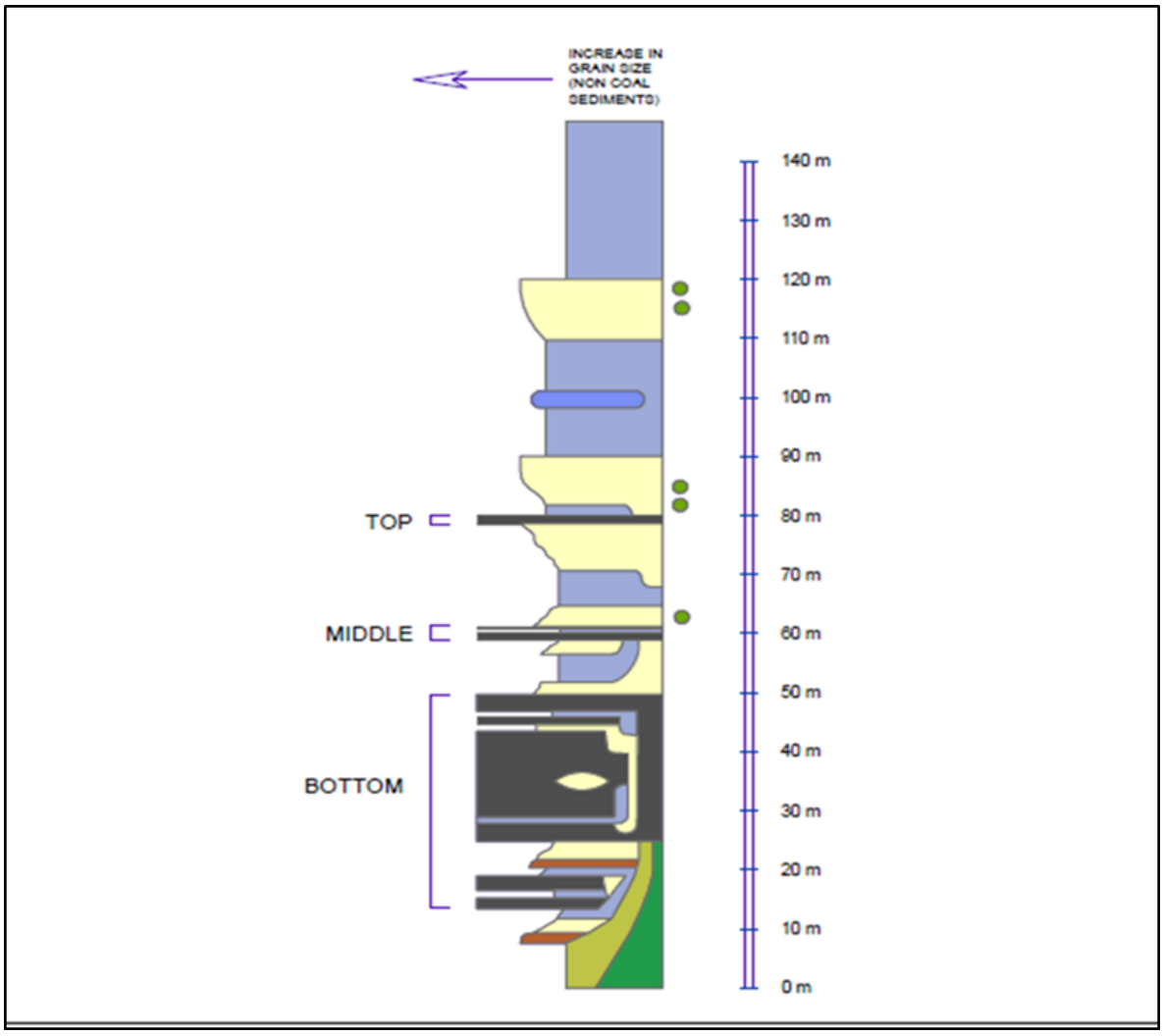


Figure 4: Stratigraphic sequence, coal seams and plies at the proposed Eloff Phase 3 Project

3.2 DESCRIPTION OF ACTIVITIES TO BE UNDERTAKEN

The Eloff Phase 3 Project involves the opencast mining pit as well as the soil stockpiles which will consist of topsoil and sub soil material, the other associated infrastructure which will be used is located at Kangala Colliery, i.e Discard dump, PCD, Overburden and processing plant will be. Details of the activities associated with the Eloff Phase 3 Project are presented in the following sections and include existing Kangala Colliery infrastructure that will be utilised.

3.2.1 PROPOSED MINING METHOD

The opencast mining pit method proposed for the Eloff Phase 3 Project entails conventional open pit strip mining method. Based on the business philosophy of Eloff Mining Company, the opencast mining operations will be outsourced. All opencast mining contractors apply standard truck and shovel mining methods based on a strip mining design and layout.

The mining method that will be applied, and is similar to current operations at Kangala Colliery, is standard truck and shovel strip mining, whereby mining and rehabilitation will be undertaken concurrently as follows:

- The topsoil is removed by truck and shovel and stored at the designated area;
- Thereafter, the softs will be removed by truck and shovel and stored at the designated material stockpiles;
- Next, cast blasting of the hard overburden material will be employed;
- Roll-over dozing of the hard overburden material will follow, where practical;
- Truck and shovel mining techniques are then applied to remove the hard overburden material in order to expose the various coal seams;
- Finally, the coal seams will be excavated by truck and shovel mining techniques; and
- Any parting or interburden material between the coal seams will be drilled and blasted before being removed by the truck and shovel technique.

The process is repeated on a strip-by-strip basis. Stockpiled overburden material (apart from the topsoil) will then be rolled-over into the void created by the removal of the waste and coal in the previous bench, with the hard overburden and parting / interburden forming the base, followed by the softs, levelled, and finally topsoil will be placed and seeded.

Figure 5 indicates the typical opencast mining sequence which entails initial removal of the overburden which will then be stockpiled close to the opencast mining pit area to ensure it can be replaced back in the initial box cut. The physical mining of the coal seam follows which is then transported to the crushing and screening facility towards processing.

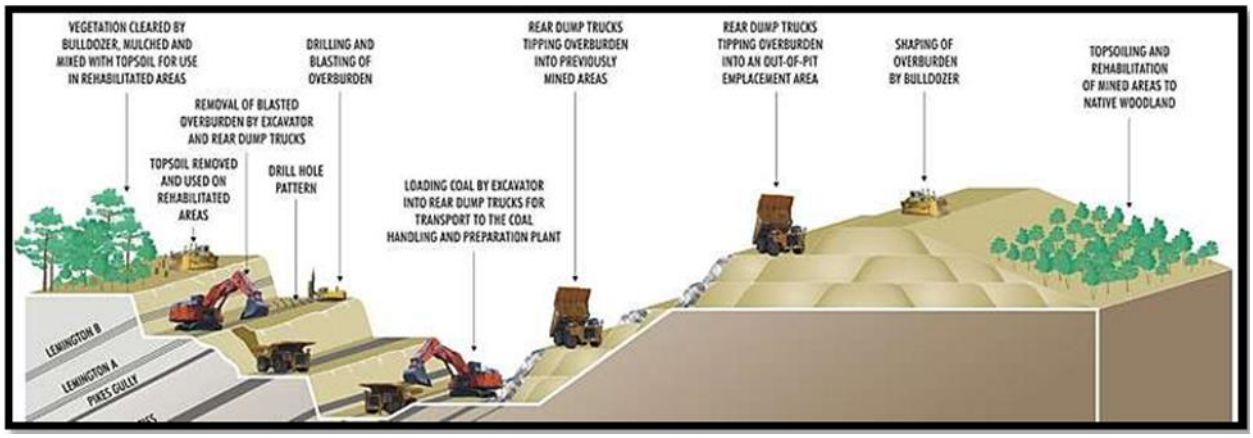


Figure 5: Typical coal surface opencast mining sequence indicating rollover backfill rehabilitation methodology (Surface Mining for Minerals & Metals: gaukartifact)

The mining method currently being undertaken at the existing Kangala Colliery and proposed for the Eloff Phase 3 Project is a conventional opencast pit bench mining method with the stripping operation removing topsoil and subsoil, thereby exposing the hard overburden of the next cut. Initial topsoil discard will be hauled to a designated stockpile area in close proximity to the mining pit and used for rehabilitation at a later stage. Hard and soft overburden material will be separated and also hauled to a designated stockpile area during the initial state. When a steady state of mining is reached, discard material will be backfilled and rehabilitation adequately addressed by means of a backfilling process. Once the overburden has been removed, the Run of Mine (ROM) coal will be transported to the existing Kangala Colliery Coal Handling and Processing Plant (CHPP).

The opencast mining pit area to include portions 14, 15, 16, 18, 19, 20, 22, 23, 24 and 59 of the farm Strydpan 243 IR located adjacent to the existing Kangala Colliery's portions 1 and RE of portion 2 of the farm Wolvenfontein 244 IR, will extend the mining area by approximately 251 ha. In this regard, the Eloff Phase 3 Project requires an EA following an EIA process for the extension area towards the assessment of any new impacts associated with extending the opencast mining pit and its associated infrastructure.

3.2.2 OPENCAST MINING AREAS

The Eloff resource area has a favourable strip ratio for opencast mining.

The current opencast pit at Kangala Colliery will be mined up to August 2019 and mining operations are anticipated to start at the Eloff Phase 3 Project as soon as the required authorisations are in place between 2019 and 2020, with the establishment of the box cut. With the ramping down of the production at Kangala Colliery, the production at the Eloff Phase 3 Project will ramp up and by the Financial Year 2020, the total production is anticipated to be from the Eloff Phase 3 Project.

The broader Eloff Project, of which the Eloff Phase 3 Project is a small portion of, has a ROM reserve of 41.17 Mt in the current planned mining area. The total Eloff Project area contains 784.11 GTIS. Currently only 44.95 Mt of the total GTIS have been converted to ROM reserves through a detailed mining plan with a balance of 739.16 Mt. The balance of the GTIS will be included in the next phase of mine.

Based on the ROM and product production schedule, Eskom and Kusile Power Station products can be produced for 10 years at approximately 430,000 tpm. The mining schedule for the opencast was designed to allow for a continuation of the current steady-state production and a sharp ramp-down of production at the end of the Project life. The period required for mining of the coal in the current Eloff planned mining area reserves, which includes the Eloff Phase 3 Project, is 10 years.

3.2.3 EXISTING MINING INFRASTRUCTURE TO BE UTILISED FOR ELOFF PHASE 3 PROJECT

Mining infrastructure already exists at the neighbouring Kangala Colliery and it is anticipated that the Eloff Phase 3 Project will consist of the opencast mining pit and soil stockpiles only, thereby making use of the existing

Kangala Colliery infrastructure and supplies. The following infrastructure has been established for the opencast mining operations at Kangala Colliery:

- Pit access ramps;
- Haul roads, at the existing opencast pit and to the CHPP;
- Waste dump areas for topsoil, soft overburden, and hard overburden (includes interburden);
- ROM stockpiles for each of the seams at the CHPP;
- Clean water cut-off canals around the:
    - ROM stockpile area, including crushing,
    - Contractors laydown area,
    - Along the haul roads,
    - Around the waste dumps;
- Dirty water catchment drains at the:
    - ROM stockpile area, including crushing,
    - Contractors laydown area,
    - Along the haul roads;
- In-pit sumps for water management;
- PCD situated at the washing plant in close proximity to the opencast operations;
- Piping system for water management;
- Mining contractor's laydown area (compacted pads for the purpose of placing and / or assembling offices, workshops, diesel farm, etc.);
- Waste facility pad;
- Access road from the R42 road to the opencast mining area;
- Weighbridge facility;
- Potable water supply point;
- Bio-disc sewage plant; and
- A power supply point to the opencast contractor's laydown area.

Furthermore, the required surface infrastructure such as offices, stores facility, workshops, and change house also already exists at Kangala and thus does not need to be replicated for the operations at the Eloff Phase 3 Project area. The ROM coal will be transported by either the opencast haul trucks or by conveyor as an alternative, to the tipping point at the existing CHPP at Kangala Colliery. A surface and mine infrastructure layout at the current Kangala Colliery as well as the proposed Eloff Phase 3 Project is indicated in Figure 6.

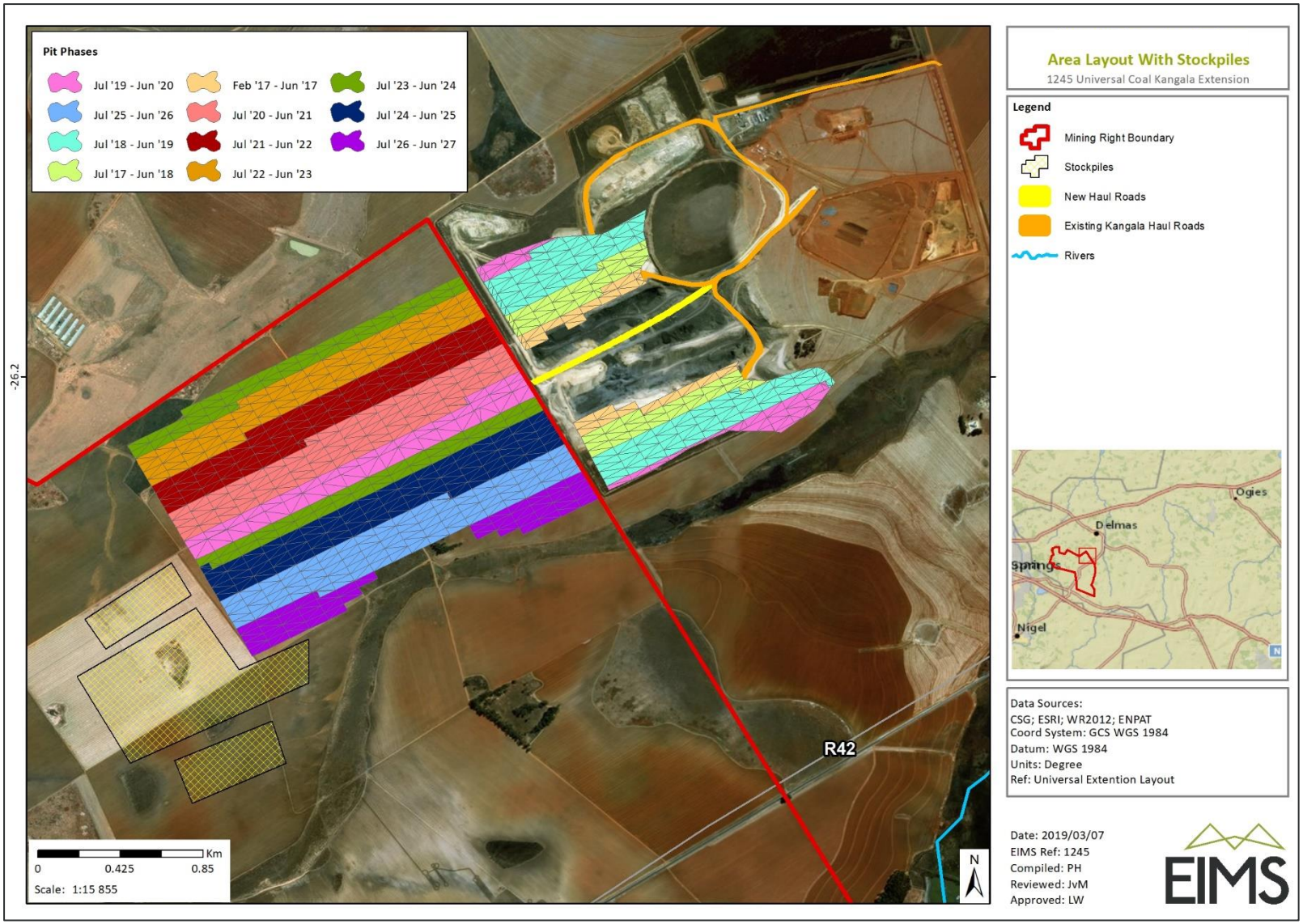


Figure 6: Layout of the current Kangala Colliery infrastructure and the proposed Eloff Phase 3 Project

3.2.4 POWER SUPPLY

There is an existing power supply of 3.5 megavolt amperes (MVA) from Eskom at Kangala Colliery. The power is supplied at 11 kilovolts (kV) and is transformed from 11 kV to 1,000 volts (V) and 400 V through the installation of a substation. No power supply will be required at the Eloff Phase 3 Project area, as only mining operations will be conducted there. When, and if, pumping of water is required, it will be performed by existing diesel pumps. The existing power supply is adequate for the life of the Eloff Phase 3 Project.

3.2.5 WATER SUPPLY

Potable water is also already supplied to the Kangala complex from a borehole and/ or the Rand Water Board. The existing opencast mining contractor's camp area is also supplied with water from a borehole and / or from the Rand Water Board. The CHPP raw make-up water supply is from the existing PCD, which in turn receives its water from the opencast mine, the co-disposal facility, and dirty run-off water.

3.2.6 WATER MANAGEMENT

The existing Kangala Colliery opencast mining areas and the CHPP area each have their own water management infrastructure. The Kangala opencast infrastructure area has canals and / or berms to prevent clean run-off water from reaching the areas classified as pollution areas. Within each operational area, haul roads, stockpile area, contractor's camp, and mining pit, existing dirty water capturing drains allow dirty water to be collected in sumps and either gravitated or pumped to the PCD at the existing CHPP.

The water captured in the PCD is used for dust suppression along the haul roads and at the current ROM stockpile area. Natural evaporation takes place, which also reduces the water contained in the PCD. No dirty water will be released from the opencast area into any natural waterway.

At the Eloff Phase 3 Project area, similar canals and / or berms will be constructed to prevent clean run-off water from reaching the areas classified as pollution or dirty areas. The PCD at Kangala Colliery will be utilised to deal with polluted water from the Eloff Phase 3 Project mining, stockpile dump, and haul road areas. Within each operational area (haul roads, stockpile dump area, contractor's camp, and mining pit), dirty water capturing drains will be constructed that will allow dirty water to be collected in sumps draining into the pit and either gravitated or pumped to the existing PCD.

The proposed project infrastructure is to be positioned such that the upstream clean and dirty water catchment occurs in a south easterly direction. All clean water channels are to be placed upstream of all infrastructure areas to ensure the runoff collected is diverted to the downstream clean water environment or the nearest watercourse. All dirty water channels are to be placed around the dirty area so that runoff is collected in a sump and then pumped to the existing Kangala Colliery PCD. It is proposed by the project hydrologist that that all clean water channels be unlined vegetated trapezoidal channels, whilst all dirty water channels constructed as concrete lined rectangular channels.

The water balance at the project site is such that average volumes pumped from the opencast mining pit will range from 56 068 m3/month to around 121 784 m3/month during the average and wet season, respectively. During the dry season it is anticipated that no water will be pumped to the Kangala Colliery PCD, due to the monthly abstractions exceeding the inflows into the mining pit.

3.2.7 FUEL AND LUBE TACILITIES

At the opencast contractor's laydown area at Kangala Colliery, the following facilities have been established by the contractor:

- Diesel bay area;
- Wash bay area with a silt trap and oil separator;
- Oil, gas, and chemical store; and
- Waste management slab for the placing of the necessary waste disposal bins.

Each facility is designed to ensure that water contaminated with hazardous fluids, diesel and other lubricants used on site, is captured and channelled to the oil separation plant for purification prior to being pumped to the PCD. The oil recovered from the purification process will be stored in oil containers and disposed of according to the existing Waste Management Plan. The Eloff Phase 3 Project will utilise the existing fuel and lubrication facilities at Kangala Colliery.

The facilities are maintained within the care and maintenance strategy of the Kangala complex to ensure operational readiness for when the Eloff opencast mining commences. At the CHPP area complex, the fuel and lubrication facilities have also been established.

3.2.8 ACCESS ROADS

The Phase 3 Project area is well served by paved provincial roads, as shown in Figure 6. The main road serving the area is the R42 which is paved and runs south-east of the project area. This road links to the towns of Delmas and Nigel and crosses the N17 highway with on and off ramps to this highway. The R42 also links with the N12 Johannesburg to Witbank highway.

With regards to road infrastructure to serve the Eloff Phase 3 Project area, no main access roads need to be constructed accept for a new haul road (Figure 6). There is an existing access road to Kangala Colliery and the existing CHPP area. The existing access road includes secondary roads to the various product stockpiles, the mine office complex, and to the contractors' laydown area. The existing access road is also indicated in Figure 6 and will need to be upgraded. The road weighbridges required for weighing the product coal loaded for road transport to the respective markets have been installed at the main gate leading into the Kangala mine.

3.2.9 OFFICES, WORKSHOPS AND CHANGE HOUSES

As set out under Section 3.2.3, all the required general administrative buildings and facilities for Kangala Colliery and the CHPP exist at the respective areas. For the opencast laydown area, the mine has constructed the base area and water management facilities. The opencast mining contractor has made use of the existing facilities at Kangala Colliery and established offices, stores, and workshops facilities. The sewage plant on the Kangala mine is operational and serves the Kangala complex as well as the needs of the opencast mining contractor.

3.2.10 STOCKPILES

It is anticipated that coal mined (ROM) in the Eloff Phase 3 Project opencast operation will be transported to the existing CHPP at Kangala Colliery via haul trucks, prior to processing and preparation to be transported out of the mine to the end user. It was initially anticipated that hard, soft as well as topsoil material will be stockpiled on site to the west of the proposed Eloff Phase 3 Project opencast mining pit area. However, various other stockpile area alternatives, such as utilising the existing Kangala Colliery stockpile area, have been proposed based on findings of the scoping studies and waste classification investigations. The stripped soils consisting of mainly topsoil will be stockpiled separately from the hard and soft overburden. This will ensure that the characteristics of the topsoil stockpile is suitable for the prevailing landscape and drainage conditions once they are replaced during rehabilitation. The topsoil stockpile will be far removed from mining activities so that it will not be accidentally impacted on or need to be frequently moved.

The overall stockpile area alternatives considered for this project are as follows:

1. Locating the discard stockpiles of hard, soft and topsoil material from the proposed Eloff Phase 3 Project on site to the west of the proposed opencast mining pit;
2. Stockpiling the hards, softs and topsoil from the proposed Eloff Phase 3 Project at the existing Kangala Colliery stockpile area;
3. Using the hard and soft discard from the initial box cut of the proposed Eloff Phase 3 Project to fill the final void at the existing Kangala Colliery pit; and
4. Locating the proposed Eloff Phase 3 Project stockpiles on the rehabilitated Kangala area – this may have long term benefits to the rehabilitation at Kangala Colliery as it will assist in the compacting of the mined out areas, as well as the obvious reduction in greenfield areas.

These stockpile area alternatives are further discussed in Section 6.2.2 of this report.

3.2.11 LIST OF MAIN MINING ACTIONS, ACTIVITIES AND PROCESSES OCCURRING ON SITE

The main mining actions, activities and process that are planned to take place on site are listed in Table 4. All actions, activities and processes have been grouped into each of the relevant project phases namely: pre-construction (planning and design), construction, operation, decommissioning, rehabilitation, closure, and post closure. For the purpose of this Scoping Report, the following broad definitions apply:

- Pre-construction refers to the phase in which planning takes place, namely: exploration, environmental studies, finalising designs, etc.;
- Construction refers to the phase in which the site is prepared and infrastructure is established (e.g. vegetation clearance, access road preparation, construction camp establishment, infrastructure placement, etc.);
- Operation refers to the phase in which physical mining and production takes place – this phase will include roll over mining and on-going progressive rehabilitation efforts;
- Decommissioning and rehabilitation refers to the inter-linked phases in which existing infrastructure is removed and final rehabilitation efforts are applied and their success monitored;
- The closure phase commences once the ore-extracting activities of a mine have ceased, and final decommissioning and mine rehabilitation is being completed. This phase usually ceases 3-5 years after physical closure activities and would align with the issuance of a closure certificate; and
- Post-closure refers to the phase in which maintenance and rehabilitation monitoring are undertaken to ensure that the mines closure objectives are met. Post-closure typically commences once a closure certificate has been received. The duration of the post-closure phase is defined by the duration of the applicable residual and latent environmental impacts.

Table 4: List of main action, activities or processes on site and per phase for the Phase 3 Project

Main Activity / Action / Process	Ancillary Activity	Pre-Construction	Construction	Operation	Decommissioning and Rehabilitation	Closure	Post-Closure
Site preparation	Vegetation clearance		As required	As required	As required		
	Planned placement of infrastructure		At start of phase	As required			
	Establishment of construction contractor area		At start of phase	As required			
Human resources management	Employment / recruitment		At start of phase	As required	As required	As required	
	I&AP consultations		At start of phase	On-going	On-going	On-going	
	CSI initiatives		At start of phase	On-going	On-going	On-going	
	Skills development programmes	At start of phase	On-going	On-going	On-going	On-going	
	Environmental awareness training		At start of phase	On-going	On-going	As required	
	HIV/AIDS Awareness programmes		At start of phase	On-going	On-going		
	Integration with Municipalities' strategic long term planning	At start of phase	On-going	On-going	On-going		

Main Activity / Action / Process	Ancillary Activity	Pre-Construction	Construction	Operation	Decommissioning and Rehabilitation	Closure	Post-Closure
Earthworks	Stripping and stockpiling of soils		At start of phase	As required	As required		
	Cleaning, grubbing and bulldozing		At start of phase	As required	As required		
	Digging trenches and foundations		At start of phase	As required	As required		
	Blasting		As required	As required	As required		
	Establishing stormwater management measures		At start of phase	As required	As required		
	Establishment of firebreak		At start of phase	As required	As required		
Civil Works	Establishment of infrastructure		At start of phase	As required			
	Mixing of concrete and concrete works		As required	As required			
	Establishment of dewatering pipelines		At start of phase	As required			
	Access control and security		At start of phase	As required	As required		
	General site management		On-going	On-going	On-going	On-going	
	Drilling		As required	As required			

Main Activity / Action / Process	Ancillary Activity	Pre-Construction	Construction	Operation	Decommissioning and Rehabilitation	Closure	Post-Closure
Opencast mining	Blasting		As required	As required			
	Excavations		As required	As required			
	Removal of overburden by dozing and load haul			As required			
	Establishment of internal haul roads			As required	As required		
	Removal of ore			On-going			
	Pumping of water to existing Kangala Colliery PCD			On-going	On-going		
	Hard and soft overburden stockpiles for backfilling			On-going	On-going		
	Soil management		On-going	On-going	On-going	On-going	
	Water management		On-going	On-going	On-going	On-going	
	Concurrent rehabilitation			On-going	On-going	On-going	
Infrastructure removal	Dismantling and demolition of infrastructure				As required		
	Blasting				As required		
	Safety control				On-going	On-going	

Main Activity / Action / Process	Ancillary Activity	Pre-Construction	Construction	Operation	Decommissioning and Rehabilitation	Closure	Post-Closure
Rehabilitation	Backfilling of pits and voids			On-going	On-going		
	Slope stabilisation			On-going	On-going	On-going	
	Erosion control			On-going	On-going	On-going	
	Landscaping			On-going	On-going	On-going	
	Replacing topsoil			On-going	On-going	On-going	
	Removal of alien / invasive vegetation			On-going	On-going	On-going	
	Re-vegetation			On-going	On-going	On-going	
	Restoration of natural drainage patterns				On-going	On-going	
	Remediation of ground and surface water			On-going	On-going	On-going	
	Rehabilitation of external roads				On-going	On-going	
Maintenance	Initiate maintenance and aftercare program				At end of phase	On-going	Ongoing
	Environmental aspect monitoring			On-going	On-going	On-going	Ongoing

Main Activity / Action / Process	Ancillary Activity	Pre-Construction	Construction	Operation	Decommissioning and Rehabilitation	Closure	Post-Closure
	Monitoring of rehabilitation					On-going	Ongoing
	Monitoring of residual and latent impacts						Ongoing

4 POLICY AND LEGISLATIVE CONTEXT

This section provides an overview of the governing legislation identified which may relate to the proposed project. A summary of the applicable legislation is provided in Table 5 below. The primary legal requirement for this project stems from the need for an EA to be granted by the competent authority, which is the DMR, in accordance with the requirements of both the NEMA and MPRDA. In addition, there are numerous other pieces of legislation governed by many acts, regulations, standards, guidelines and treaties on an international, national, provincial and local level, which should be considered in order to assess the potential applicability of these for the proposed activity. More detail on the legislative framework is presented below.

Table 5: Applicable legislation and guidelines overview

Applicable Legislation and Guidelines	**Reference Where Applied**
(A description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process).	
APPLICABLE LEGISLATION	
<u>Constitution of the Republic of South Africa (Act 108 of 1996)</u>: The constitution of any country is the supreme law of that country. The Bill of Rights in chapter 2 section 24 of the Constitution of South Africa Act (Act 108 of 1996) makes provisions for environmental issues and declares 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 c) 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" Therefore, the EIA is conducted to fulfil the requirement of the Bill of Rights.	Throughout the environmental Scoping and Impact Assessment process.
<u>National Environmental Management Act (Act 107 of 1998 – NEMA); and the EIA Regulations (2014, as amended)</u>: The NEMA (1998) requires that a project of this nature (inclusive of a Mining Right) must undergo a Scoping and Environmental Impact Assessment (EIA); an Environmental Management Programme (EMPr) must also be compiled. Regulations applicable to this project include the following: • EIA Regulations GN R. 982 (2014, as amended) in terms of the NEMA;	Throughout the environmental Scoping and Impact Assessment process.

Applicable Legislation and Guidelines	Reference Where Applied
• EIA Regulations GN R. 983 (2014, as amended) in terms of the NEMA; • EIA Regulations GN R. 984 (2014, as amended) in terms of the NEMA; and • EIA Regulations GN R. 985 (2014, as amended) in terms of the NEMA.	
Minerals and Petroleum Resources Development Act (Act 28 of 2002 – MPRDA) as amended; and the Mineral and Petroleum Resources Development Regulations (2004, as amended): The MPRDA (2002) requires an applicant who wishes to proceed with a mining project to obtain a Mining Right, part of which requires the applicant to obtain Environmental Authorisation in terms of the NEMA.	Throughout the environmental Scoping and Impact Assessment process.
National Water Act (Act 36 of 1998 – NWA): The NWA recognises that water is a scarce and unevenly distributed national resource which must managed encompassing all aspects of water resources. In terms of Chapter 4 of the NWA, activities and processes associated with the proposed Eloff Phase 3 Project and associated infrastructure, are required to be licensed by the Department of Water and Sanitation (DWS). An Integrated Water Use Licence Application (IWULA) has been lodged with the DWS in terms of Section 21 of the NWA and is currently in process. The water uses applied for that require authorisation are as follows: • Section 21 (a); • Section 21 (c) and (i); • Section 21 (g); and • Section 21 (j). Furthermore, an Integrated Water and Waste Management Plan (IWWMP) is being compiled and will be submitted in support of the IWULA after being made available to the public for comment.	A separate Water Use Licence Application for the applicable water uses is underway by GCS Water and Environmental Consultants.
National Heritage Resources Act (Act 25 of 1999 – NHRA): The NHRA aims to promote good management of cultural heritage resources and encourages the nurturing and conservation of cultural legacy so that it may be bestowed to future generations. Due to the extent of the project, some heritage resources and palaeontological features are likely to occur within the Eloff Phase 3 Project boundary area, particularly the following:	Heritage and Palaeontology specialist studies, the environmental Scoping and Impact Assessment Reports, and the EMPr.

Applicable Legislation and Guidelines	Reference Where Applied
• Section 34(1); and • Section 38. Section 34(1) of the NHRA states that, "*no person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority*…" The NHRA is utilised as the basis for the identification, evaluation and management of heritage resources and in the case of CRM those resources specifically impacted on by development as stipulated in Section 38 of NHRA, and those developments administered through NEMA, and MPRDA legislation.	
Specific Environmental Management Acts (SEMAs): The SEMAs refer to specific portions of the environment where additional legislation over and above the NEMA (1998) as amended, is applicable. SEMAs likely to be relevant to this application include the following: • National Environmental Management: Biodiversity Act (Act 10 of 2004); • National Environmental Management: Air Quality Act (Act 39 of 2004); and • National Environmental Management: Waste Act (Act 59 of 2008). SEMAs likely to be applicable in this regard (if any) include the Threatened Or Protected Species (TOPS) permit for the removal of any protected tree species from site, and Waste Management related licencing or registration.	Specialist studies, baseline description for the environmental Scoping and Impact Assessment process, as well as the EMPr.

Applicable Legislation and Guidelines	Reference Where Applied
APPLICABLE GUIDELINES	
Integrated Environmental Management Information Guidelines Series: This series of guidelines was published by the Department of Environmental Affairs (DEA), and refers to various environmental aspects. Applicable guidelines in the series for the Eloff Phase 3 Project include: • Guideline 5: Companion to NEMA EIA Regulations, 2010; • Guideline 7: Public participation; and • Guideline 9: Need and desirability. Additional guidelines published in terms of the NEMA EIA Regulations, 2014 (as amended), in particular: • Guideline 3: General Guide to Environmental Impact Assessment Regulations, 2006; • Guideline 4: Public Participation in support of the EIA Regulations, 2006; and • Guideline 5: Assessment of alternatives and impacts in support of the EIA Regulations, 2006.	The guidelines will be used throughout the environmental Scoping and Impact Assessment process.
Best Practise Guideline (BPG) Series: The BPG series refers to publications by the then Department of Water Affair and Forestry (now Department of Water and Sanitation – DWS) providing best practice principles and guidelines relevant to certain aspects of water management. Best practice guidelines relevant to the proposed Eloff Phase 3 Project include the following: • BPG A4: Pollution Control Dams; • BPG H1: Integrated Mine Water Management; • BPG H2: Pollution Prevention and Minimisation of Impacts; • BPG H3: Water Reuse and Reclamation; • BPG H4: Water treatment; • BPG G1: Storm Water Management; • BPG G2: Water and Salt balances; • BPG G3: Water Monitoring Systems; and • BPG G4: Impact Prediction.	Surface water and groundwater specialist studies, as well as the environmental Scoping and Impact Assessment process.

4.1 APPLICABLE NATIONAL LEGISLATION

The legal framework within which the proposed Eloff Phase 3 Project operates is governed by many Acts, Regulations, Standards and Guidelines on an international, national, provincial and local level. Legislation applicable to the project includes (but is not limited to) those discussed below.

4.1.1 THE MINERAL AND PETROLEUM RESOURCES DEVELOPMENT ACT (MPRDA)

The MPRDA aims to "make provision for equitable access to, and sustainable development of, the nation's mineral and petroleum resources". The MPRDA outlines the procedural requirements that need to be met to acquire mineral and petroleum rights in South Africa. The MPRDA further governs the sustainable utilisation of South Africa's mineral resources. In the event that the proposed activities require material (e.g. sand, gravel, aggregate) for the purposes of construction then the provisions of the MPRDA may apply.

Several amendments have been made to the MPRDA. These include, but are not limited to, the amendment to Section 102 which concerns the amendment of rights, permits, programmes and plans, to requiring the written permission from the Minister for any amendment or alteration; and the Section 5A(c) requirement that landowners or land occupiers receive twenty-one (21) days' written notice prior to any activities taking place on their properties. One of the most recent amendments requires all mining related activities to follow the full NEMA process as per the 2014 EIA Regulations, which came into effect on 4 December 2014 as was amended in April 2017. This Scoping Report pertains to an EA application for the proposed Eloff Phase 3 Project involving the development of a new opencast mining pit within the Eloff Project mining right area.

In support of the EA application submitted for the Eloff Phase 3 Project, the applicant is required to conduct an EIA process comprising of the preparation of environmental Scoping and EIA Reports, an EMPr, as well as Interested and Affected Party (I&AP) consultations, all of which must be submitted to the DMR for adjudication. This report has been compiled in accordance with Regulation 49 of the MPRDA and Regulation 21 and Appendix 2 of the EIA Regulations (2014, as amended) in order to satisfy the criteria for a Scoping Report. Pending presentation of the results of the baseline / scoping studies and inclusion of comments from I&APs, the finalised Scoping Report will be submitted to the DMR for review and acceptance as well as permission to proceed with the Impact Assessment phase of the EIA process. The public review and commenting period for this Scoping Report is from 12th June 2019 until the 13th July 2019. The review and commenting periods for the EIA Report and associated EMPr will be determined at a later date and communicated to all registered I&APs.

4.1.2 THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT (NEMA)

The main aim of the National Environmental Management Act, 1998 (Act 107 of 1998 – NEMA) is to provide for co-operative governance by establishing decision-making principles on matters affecting the environment. In terms of the NEMA EIA Regulations, the applicant is required to appoint an EAP to undertake the EIA process, as well as conduct the public participation process towards an application for EA. In South Africa, EIA's became a legal requirement in 1997 with the promulgation of regulations under the Environment Conservation Act (ECA). Subsequently, NEMA was passed in 1998. Section 24(2) of NEMA empowers the Minister and any MEC, with the concurrence of the Minister, to identify activities which must be considered, investigated, assessed and reported on to the competent authority responsible for granting the relevant EA. On 21 April 2006, the Minister of Environmental Affairs and Tourism (now DEA) promulgated regulations in terms of Chapter 5 of the NEMA. These regulations, in terms of the NEMA, were amended in June 2010 and again in December 2014 as well as April 2017. The 2014 NEMA EIA Regulations (as amended) are applicable to this project. Mining activities, including activities such as the proposed Eloff Phase 3 Project, officially became governable under the NEMA EIA Regulations (as amended) in December 2014.

The objective of the EIA Regulations is to establish the procedures that must be followed in the consideration, investigation, assessment and reporting of the listed activities that have been identified to be triggered by the proposed development/ mining activity. The purpose of these procedures is to provide the competent authority with adequate information to make decisions which ensure that activities which may impact negatively on the environment to an unacceptable degree are not authorised, and that activities which are authorised are undertaken in such a manner that the environmental impacts are managed to acceptable levels.

In accordance with the provisions of Sections 24(5) and Section 44 of the NEMA the Minister has published Regulations (GN R. 982) pertaining to the required process for conducting EIA's in order to apply for, and be considered for, the issuing of an EA. These EIA Regulations provide a detailed description of the EIA process to be followed when applying for EA for any listed activity. The Regulations differentiate between a simpler Basic Assessment Process (required for activities listed in GN R. 983 and GN R. 985) and a more complete EIA process

(activities listed in GN R. 984). In the case of the Eloff Phase 3 Project, there are activities triggered under GN R. 984 and as such a full EIA process is necessary. Table 6 presents all the anticipated listed activities under the NEMA 2014 EIA Regulations (as amended) that are applicable to this project.

An environmental Scoping and Impact Assessment process is reserved for activities which have the potential to result in significant impacts which are complex to assess. Scoping and Impact Assessment studies accordingly provide a mechanism for the comprehensive assessment of activities that are likely to have more significant environmental impacts. Figure 7 below provides a graphic representation of all the components of a full EIA process.

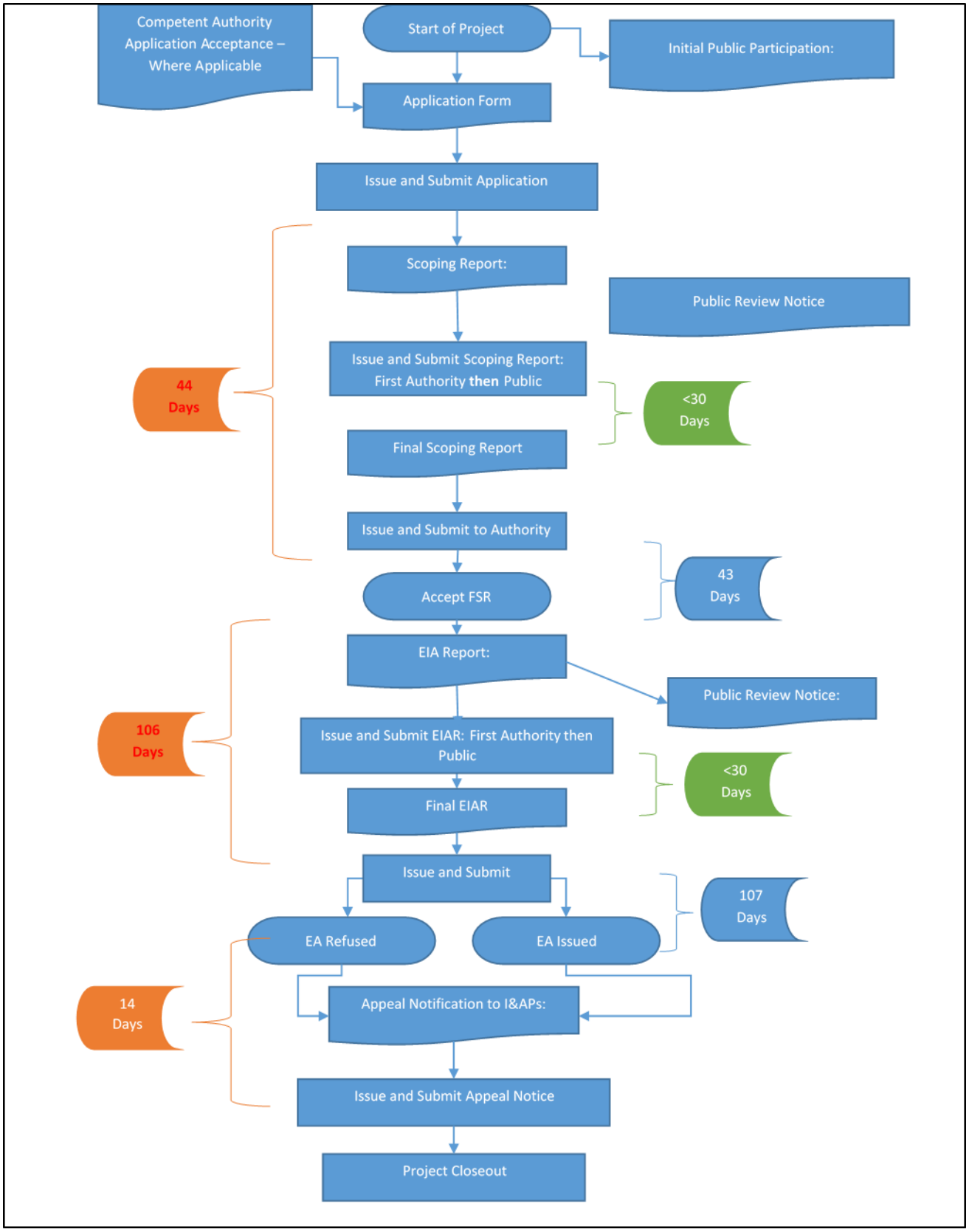


Figure 7: EIA process diagram

Section 24P of the NEMA requires that an applicant for an environmental authorisation relating to prospecting, mining or production must, before the Minister responsible for mineral resources issues the EA, comply with the prescribed financial provision for the rehabilitation, closure and ongoing post decommissioning

management of negative environmental impacts. Therefore, the potential environmental liabilities associated with the proposed activity must be quantified and indicate the method of financial provision in line with the NEMA Financial Provision Regulations (2015) pertaining to the financial provision for prospecting exploration, mining and production. The financial provision costs in line with DMR guidelines will be presented in the EIA Report. Table 6 below indicates the Listed activities in terms of the NEMA 2014 EIA Regulations (as amended) that are applicable to the proposed ELoff Phase 3 Project.

Table 6: Listed activities in terms of the NEMA EIA Regulations (2014) as amended

Name of activity	Aerial extent of the activity	Listed Activity	Applicable listing notice	Waste management authorisation
Stormwater Infrastructure.	<10 000 m^2	X	GNR 983: Activity 9	
Upgrading of road within the 100 m buffer of a watercourse.	3620 m (length) x 10 m (width). Total extent of 36200 m^2	X	GNR 983: Activity 19	
Internal haul roads.	3620 m (length) x 10 m (width). Total extent of 36200 m^2	X	GNR 983: Activity 24	
Change in land use.	Approximately 200 ha	X	GNR 983: Activity 28	
Utilisation of existing pipelines for stormwater transportation.	Approximately 200 mm in diameter and no longer than 1 km	X	GNR 983: Activity 45	
Upgrading of existing internal road for the transportation of RoM.	3620 m (length) x 10 m (width). Total extent of 36200 m^2	X	GNR 983: Activity 56	
Clearance of vegetation.	<50 ha of vegetation to be removed	X	GNR 984: Activity 15	
General mining activities.	Approximately 200 ha	X	GNR 984: Activity 17	

4.1.3 THE NATIONAL WATER ACT (NWA)

The National Water Act, 1998 (Act 36 of 1998 – NWA) makes provision for two types of applications for water use licences, namely individual applications and compulsory applications. The NWA also provides that the responsible authority may require an assessment by the applicant of the likely effect of the proposed licence on the resource quality, and that such assessment be subject to the NEMA EIA Regulations. A person may use water, if the use is –

- Permissible as a continuation of an existing lawful water use (ELWU);
- Permissible in terms of a general authorisation (GA);

- Permissible under Schedule 1; or
- Authorised by a licence.

These water use processes are described in Figure 8.

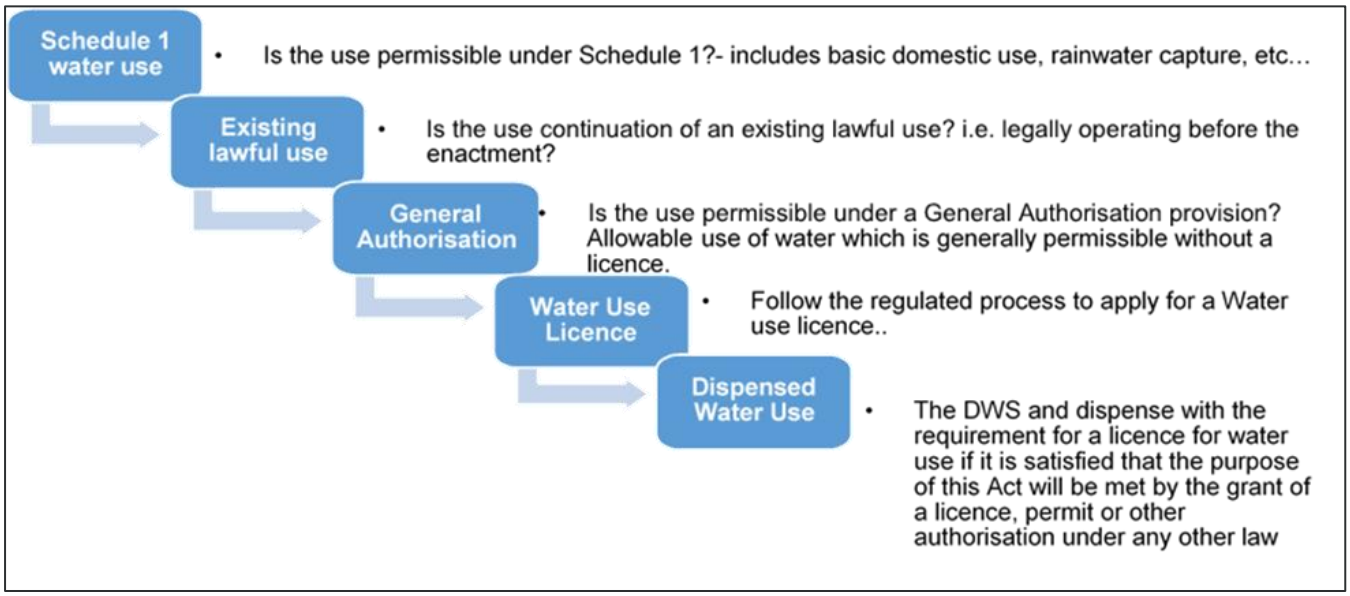


Figure 8: Authorisation processes for new water uses

The NWA defines 11 water uses. A water use may only be undertaken if authorised by the Department of Water and Sanitation (DWS). Water users are required to register certain water uses that actually took place on the date of registration, irrespective of whether the use was lawful or not. The water uses for which an authorisation or licence can be issued include:

- Taking water from a water resource;
- Storing water;
- Impeding or diverting the flow of water in a watercourse;
- Engaging in a stream flow reduction activity contemplated in section 36;
- Engaging in a controlled activity identified as such in section 37(1) or declared under section 38(1);
- Discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduits;
- Disposing of waste in a manner which may detrimentally impact on a water resource;
- Disposing in any manner of water which contains waste from, or which has been heated in, any industrial or power generation process;
- Altering the bed, banks, course or characteristics of a watercourse;
- Removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people; and
- Using water for recreational purposes.

Eloff Mining Company was granted an Integrated Water Use Licence (IWUL) in May 2012 for the existing Kangala Colliery on Portion 1 and the Remaining Extent of Portion 2 of the farm Wolvenfontein 244 IR (Water Use Licence 04/B20A/ABCGIJ/1506), with the latest amendment issued in August 2016 (Water Use Licence 04/B20A/A/4683), for the following water uses:

- Section 21(a): Taking of water from a water resource (groundwater abstraction borehole and opencast workings);
- Section 21 (b): Storage of water (pressed steel tank for domestic use)
- Section 21 (c): Impeding or diverting the flow of water in a watercourse (upgrading of road crossing over a wetland and infrastructure with 500 m for the wetland);
- Section 21 (g): Disposing of waste in a manner which may detrimentally impact on a water resource (sewage treatment facility, pollution control dam, dirty water from stockpile areas and discard facility);
- Section 21 (i): Altering the bed, banks, course or characteristics of a watercourse (upgrading of road crossing over a wetland and infrastructure with 500 m for the wetland); and
- Section 21 (j): Removing, discharging or disposing of water found underground (dewatering from the opencast workings).

Further to the issued IWUL for Kangala Colliery and its amendments, Eloff Mining Company is currently in the process of applying for a new IWUL for the proposed Eloff Phase 3 Project on portions 14, 15, 16, 18, 19, 20, 22, 23, 24 and 59 of the farm Strydpan 243 IR. The new IWUL for the proposed Eloff Phase 3 Project pertains to the water uses described in Table 7.

Table 7: Water uses applicable to the proposed Eloff Phase 3 Project.

Activity #	Listed Activity Description	Reason for Inclusion
NWA Activities		
Section 21 (a)	Taking water from a water resource.	Dewatering of mining pit for use in mining activities and for dust suppression on portions 15, 16, 19 and 20 of the Farm Strydpan 243.
Section 21 (c)	Impeding or diverting the flow of water in a watercourse.	Activities within 500m of HGM 3 (Depression) on portion 22 of farm Strydpan 243; mining through HGM 4 (Seep) on portion 16 of farm Strydpan 243 as a result of the opencast mining pit; mining through HGM 3 (Depression) on portion 19 of farm Strydpan 243 as a result of the opencast mining pit; and a watercourse located within 100m of 1:100 year floodline of the opencast mining pit on portions 15, 24 and 59 of farm Strydpan 243.
Section 21 (g)	Disposing of waste in a manner which may detrimentally impact on a water resource.	Dust Suprresion.

Section 21 (i)	Altering the bed, banks, course or characteristics of a watercourse.	Activities within 500m of HGM 3 (Depression) on portion 22 of farm Strydpan 243; mining through HGM 4 (Seep) on portion 16 of farm Strydpan 243 as a result of the opencast mining pit; mining through HGM 3 (Depression) on portion 19 of farm Strydpan 243 as a result of the opencast mining pit; and a watercourse located within 100m of 1:100 year floodline of the opencast mining pit on portions 15, 24 and 59 of farm Strydpan 243.
Section 21(j)	Removing, discharging or disposing of water found underground.	Removing, discharging or disposing of water found underground on portion 15, 16, 19 and 20 of the farm Strydpan 243 for the opencast mining pit.

4.1.4 NWA GOVERNMENT NOTICE 704 (GN 704)

GN 704 (Government Gazette 20118 of June 1999) was established to provide regulations on the use of water for mining and related activities aimed at the protection of water resources. The five main principle conditions of GN 704 applicable to this project are:

- Condition 4 – which defines the area in which, mine workings or associated structures may be located, with reference to a watercourse and associated flooding. Any residue deposit, dam, reservoir together with any associated structure or any other facility should be situated outside the 1:100 year flood-line. Any underground or opencast mining, prospecting or any other operation or activity should be situated or undertaken outside of the 1:50 year flood-line. Where the flood-line is less than 100 metres away from the watercourse, then a minimum watercourse buffer distance of 100 metres is required for infrastructure and activities;
- Condition 5 – which indicates that no residue or substance which causes or is likely to cause pollution of a water resource may be used in the construction of any dams, impoundments or embankments or any other infrastructure which may cause pollution of a water resource;
- Condition 6 – which describes the capacity requirements of clean and dirty water systems. Clean and dirty water systems must be kept separate and must be designed, constructed, maintained and operated to ensure conveyance the 1:50 year peak flow. Clean and dirty water systems should not spill into each other more frequently than once in 50 years. Any dirty water dams should have a minimum freeboard of 0.8m above full supply level;
- Condition 7 – which describes the measures which must be taken to protect water resources. All dirty water or substances which may cause pollution should be prevented from entering a water resource (by spillage, seepage, erosion, etc.) and ensure that water used in any process is recycled as far as practicable; and
- Condition 10 – which describes the requirements for operations involving extraction of material from the channel of a watercourse. Measures should be taken to prevent impacts on the stability of the watercourse, prevent scour and erosion resulting from operations, prevent damage to in-stream habitat through erosion, sedimentation, alteration of vegetation and flow characteristics, construct treatment facilities to treat water before returning it to the watercourse, and implement control measures to prevent pollution by oil, grease, fuel and chemicals.

These conditions above restrict the proposed Eloff Phase 3 Project opencast mining pit extension from being located within the 1:50 floodline, should the proposed location be less than 100m from the floodline, then a minimum watercourse buffer distance of 100 metres from said infrastructure and activities must be implemented. Furthermore, the clean and dirty water areas within the project are to be kept separate and the relevant infrastructure such as the proposed dirty water channels and sump at the stockpile dump areas and the pit must be designed, constructed, maintained and operated to ensure conveyance the 1:50 year peak flow. Pollution of water resources in the vicinity of the project area is to be prevented and mitigated against. Moreover, should any material be removed from the surrounding watercourses during the construction and operation of the proposed EloffPhase 3 Project, mitigation measures to prevent instability, erosion, sedimentation, alteration and pollution of the watercourse.

4.1.5 CATCHMENT MANAGEMENT STRATEGIES

The country has been divided into nineteen Water Management Areas (WMAs). The delegation of water resource management from central government to catchment level will be achieved by establishing Catchment Management Agencies (CMAs) at WMA level. Each CMA will progressively develop a Catchment Management Strategy (CMS) for the protection, use, development, conservation, management and control of water resources within its WMA. This is to ensure that on a regional scale, water is protected, used, developed, conserved, managed and controlled in a sustainable and equitable manner for the benefit of all persons. The main instrument that guides and governs the activities of a WMA is the Catchment Management Strategy (CMS) which, while conforming to relevant legislation and national strategies, provides detailed arrangements for the protection, use, development, conservation, management and control of the region's water resources. According to DWS' water management areas delineations, Eloff Mining Company's proposed the Eloff Phase 3 Project area falls within the Olifants WMA (WMA 2) (NWA, 2016), and the B20A quaternary catchment which falls within the Highveld lower Ecoregion. The B20A-1308 and B20A-1362 Sub Quaternary Reaches (SQR) of the Bronkhorstspruit are the primary drainage feature associated with the project area. The Olifants WMA is divided into 4 sub-areas, namely: Upper Olifants, Middle Olifants, Lower Olifants and Steelpoort Sub-areas, with the project area falling within the Upper Olifants sub-area.

According to the Olifants WMA Internal Strategic Perspective (2004), the water availability in this sub-area is impacted on by coal mining whereby the mining activities impact on the natural hydrological system by disturbing the integrity of the overlying rock and soil strata resulting in increased infiltration and recharge of the groundwater system. This 'additional' water, although of poor quality, represents extra water which can be utilised in the sub-area. The quantity of the "additional" water needs to be determined. The water volumes stored in the mine workings can also be utilised as dams during drought periods to augment the yield of the system.

The bulk of the water used in the Olifants WMA is by the irrigation sector, which represents 57% of the total requirements. Power generation represents 19% and urban, industrial and mining together a further 19%. Most of the water used in the Upper Olifants Sub-area is for cooling in the thermal power stations, which is a highly consumptive use of water and requires a relatively high quality of water. As a result of the large irrigation developments downstream of Loskop Dam, requirements for water in the Middle Olifants Sub-area are dominated by irrigation. Although the most populous sub-area, water use for urban and rural purposes is relatively low, because of the primary nature of the water use by these sectors. Irrigation and mining are the largest water use sectors in the Steelpoort and Lower Olifants Sub-areas, which reflect the nature of the land-use in these areas.

Based on the scenarios for population and economic growth, initial estimates of possible future water requirements were made for the period until 2025. In addition, provision was made for known and probable future developments with respect to power generation, irrigation, mining and bulk users. (Specific quantities, rather than a general annual growth rate, were allowed for in these sectors.)

The Broad Management Objectives within the Olifants WMA include:

- Water demands must be matched to available resources. Only if groundwater is proved to be inadequate should surface water be considered as a source;

- Groundwater resources form an integral part of integrated water resources development planning and management;
- The conjunctive use of surface and groundwater where feasible is to be encouraged to maximise the optimal use of available water resources;
- Develop local groundwater resources in preference to piping surface water long distances;
- Equitable availability of groundwater resources to all users;
- Management of available resources to ensure long term sustainability;
- Develop knowledge of the groundwater resources;
- Promote awareness of groundwater conservation; and
- Identification of applications for sole use, or conjunctive use, of groundwater.

The proposed Eloff Phase 3 Project has submitted an IWULA to ensure that any water resources (surface and groundwater as well as wetlands) affected by the proposed project activities are licensed and managed in accordance with the relevant water and environmental legislation.

4.1.6 THE NATIONAL ENVIRONMENTAL MANAGEMENT WASTE ACT (NEMWA)

The applicable waste act is no. 59 of 2008: National Environmental Management: Waste Act, 2008 (NEM:WA). On 2 June 2014 the National Environmental Management: Waste Amendment Act came into force. Waste is accordingly no longer governed by the MPRDA, but is subject to all the provisions of the National Environmental Management: Waste Act, 2008 (NEMWA).

Section 16 of the NEMWA must also be considered which states as follows:

1. A holder of waste must, within the holder's power, take all reasonable measures to-
    a) "*Avoid the generation of waste and where such generation cannot be avoided, to minimise the toxicity and amounts of waste that are generated;*
    b) *Reduce, re-use, recycle and recover waste;*
    c) *Where waste must be disposed of, ensure that the waste is treated and disposed of in an environmentally sound manner;*
    d) *Manage the waste in such a manner that it does not endanger health or the environment or cause a nuisance through noise, odour, or visual impacts;*
    e) *Prevent any employee or any person under his or her supervision from contravening the Act; and*
    f) *Prevent the waste from being used for unauthorised purposes.*"

These general principles of responsible waste management will be incorporated into the requirements in the EMPr to be implemented for this project.

Waste can be defined as either hazardous or general in accordance to Schedule 3 of the NEMWA (2014) as amended. "Schedule 3: Defined Wastes" has been broken down into two categories – Category A being hazardous waste; and Category B being general waste.

In order to attempt to understand the implications of these waste groups, it is important to ensure that the definitions of all the relevant terminologies are defined:

- Hazardous waste: means "*any waste that contains organic or inorganic elements or compounds that may, owning to the inherent physical, chemical or toxicological characteristic of that waste, have a detrimental impact on health and the environment and includes hazardous substances, materials or objects within business waste, residue deposits and residue stockpiles*."

- Residue deposits: means "*any residue stockpile remaining at the termination, cancellation or expiry of a prospecting right, mining right, mining permit, exploration right or production right*."
- Residue stockpile: means "*any debris, discard, tailings, slimes, screening, slurry, waste rock, foundry sand, mineral processing plant waste, ash or any other product derived from or incidental to a mining operation and which is stockpiled, stored or accumulated within the mining area for potential re-use, or which is disposed of, by the holder of a mining right, mining permit or, production right or an old order right, including historic mines and dumps created before the implementation of this Act*."
- General waste: means "*waste that does not pose an immediate hazard or threat to health or to the environment and includes – domestic waste; building and demolition waste; business waste; inert waste; or any waste classified as non-hazardous waste in terms of the regulations made under Section 69*."

Furthermore, the NEMWA provides for specific waste management measures to be implemented, as well as providing for the licensing and control of waste management activities. It was determined that the initially proposed on site location of the discard / residue stockpiles of hard, soft and topsoil material to the west of the new opencast mining pit triggered waste management activities in terms of Category B of GN R. 921 which states that "*a person who wishes to commence, undertake or conduct an activity listed under this Category, must conduct an environmental impact assessment process, as stipulated in the environmental impact assessment regulations made under section 24(5) of the National Environmental Management Act, 1998 (Act No. 107 of 1998) as part of a waste management licence application*."

However, findings of the scoping studies and waste classification investigations, as well as the applicant's efforts to avoid and / or minimise the project footprint and environmental disturbance, the location of the discard stockpile area on site was scoped out. In this regard, the option to locate the stockpiles of hard, soft and topsoil material from the Eloff Phase 3 Project at the existing Kangala Colliery stockpile area was selected as preferred, and will be further assessed during the EIA phase (refer to Section 6.2.2).

4.1.7 NEMWA WASTE CLASSIFICATION AND MANAGEMENT REGULATIONS, 2013 (GN R. 634)

These regulations pertaining to waste classification and management, including the management and control of residue stockpiles and residue deposits from a prospecting, mining, exploration or production operation which is relevant to the proposed Eloff Phase 3 Project. The purpose of these Regulations is to –

- Regulate the classification and management of waste in a manner which supports and implements the provisions of the Act;
- Establish a mechanism and procedure for the listing of waste management activities that do not require a Waste Management Licence;
- Prescribe requirements for the disposal of waste to landfill;
- Prescribe requirements and timeframes for the management of certain wastes; and
- Prescribe general duties of waste generators, transporters and managers.

Waste generated from the Eloff Phase 3 Project will need to be classified and managed in accordance with the provisions of the Act, unless part of the waste listed as not requiring classification (Annexure 1 of these Regulations). Waste classification, as presented in Chapter 4 of these regulations, entails the following:

- Wastes listed in Annexure 1 of these Regulations do not require classification in terms of SANS 10234;
- Subject to subregulation (1), all waste generators must ensure that the waste they generate is classified in accordance with SANS 10234 within one hundred and eighty (180) days of generation;
- Waste must be kept separate for the purposes of classification in terms of subregulation (2), and must not be mixed prior to classification;

- Waste-must be re-classified in terms of subregulation (2) every five (5) years, or within 30 days of modification to the process or activity that generated the waste, changes in raw materials or other inputs, or any other variation of relevant factors;
- Waste that has been subjected to any form of treatment must be re-classified in terms of subregulation (2), including any waste from the treatment process.; and
- If the Minister reasonably believes that a waste has not been classified correctly in terms of subregulation (2), he or she may require the waste generator to have the classification peer reviewed to confirm the classification.

Furthermore, Chapter 8 of the Regulations stipulates that unless otherwise directed by the Minister to ensure a better environmental outcome, or in response to an emergency so as to protect human health, property or the environment –

- Waste generators must ensure that their waste is assessed in accordance with the Norms and Standards for Assessment of Waste for Landfill Disposal set in terms of section 7(1) of the Act prior to the disposal of the waste to landfill;
- Waste generators must ensure that the disposal of their waste to landfill is done in accordance with the Norms and Standards for Disposal of Waste to Landfill set in terms of section 7(1) of the Act; and
- Waste managers disposing of waste to landfill must only do so in accordance with the Norms and Standards for Disposal of Waste to Landfill set in terms of section 7 (1) of the Act.

The waste generated from the proposed Phase 3 Project will be classified with this Regulation, if not exempt by Annexure 1. The classified waste must then be assessed in accordance with the National Norms and Standards for the Assessment of Waste for Landfill Disposal (GN R. 635 of 2013) to determine its waste type, prior to disposal in terms of the Disposal of Waste to Landfill Regulations set in terms of section 7 (1) of the Act.

Moreover, Chapter 9 of this Regulation stipulates the requirements for motivation and consideration of listed Waste Management Activities that do not require a WML . The motivation must:

- Demonstrate that the waste management activity can be implemented without unacceptable impacts on, or risk to, the environment or health;
- Must provide a description of the waste;
- Description of waste minimisation or waste management plans; and
- Description of potential impacts, etc.

The transitional provisions under Chapter 6 of this Regulation prescribes timeframes in which all waste must be classified within 18 months from the date of commencement of these Regulations (23 August 2013). Waste streams generated from the proposed Eloff Phase 3 Project activities and not listed under Annexure 1 of this Regulation, mainly the waste rock, will be classified accordingly to SANS 10234 and subsequently managed and disposed or stored in accordance with the relevant legislative requirements.

4.1.8 NEMWA NATIONAL NORMS AND STANDARDS FOR THE ASSESSMENT OF WASTE FOR LANDFILL DISPOSAL, 2013 (GN R. 635)

These Norms and Standards prescribe the requirements for the assessment of waste prior to storage or disposal to landfill. The aim of the waste assessment tests is to characterise the material to be deposited or stored in terms of the above-mentioned waste assessment guidelines set by the DEA. The waste generated at the proposed Eloff Phase 3 Project and not listed under Annexure 1 of the Waste Classification and Management Regulations, must be assessed in accordance to these Norms and Standards to determine the waste type. In terms of Regulation 12(1) of GN R 634 with regards to the classification of waste, the potential level of risk associated with disposal or downstream use of waste must be determined by following the prescribed and appropriate analysis protocol as detailed in these Norms and Standards. The assessment of the waste from the Eloff Phase 3 Project will:

- Identify the chemical substances present in the waste;
- Sampling and analysis to determine the total concentration (TC) and leachable concentration (LC) of the elements and chemical substances that have been identified within the waste according to section 6 of this regulation;
- Based on the TC and LC limits of the identified elements and chemical substances in the analysed waste exceeding the corresponding TC and LC thresholds respectively, the waste type will be determined (Type 0 Waste to Type 4 Waste); and
- The waste type will then be used determine to which landfill class site the waste must be disposed and / or the suitable containment barrier design for storage.

The waste classification and analysis for the Eloff Phase 3 Project is underway and the findings thereof will be included in the EIA Report.

4.1.9 NEMWA NATIONAL NORMS AND STANDARDS FOR THE DISPOSAL OF WASTE TO LANDFILL, 2013 (GN R. 636)

Once the waste has been assessed and waste type determined, these Norms and Standards can be used to determine the minimum requirements for the landfill and containment barrier design. This will distinguish between Class A, Class B, Class C, or Class D landfills and the associated containment barrier requirements. Although these Norms and Standards prescribe the containment barrier or liner design for each determined waste type, the recent amendments in chapter 3 of the regulations to the planning and management of residue stockpiles and residue deposits, a competent person must recommend the pollution control measures suitable for a specific residue stockpile or residue deposit on the basis of a risk analysis as contemplated in regulations 4 and 5 of the regulations. The recommendation should be founded on a risk analysis based on the characteristics and classification in regulation 4 and 5 of these Regulations, towards determining the appropriate mitigation and management measures.

Note that the existing waste facilties at Kangala will be used so there is no requirement for waste licensing for the Eloff Pjhase 3 project.

4.1.10 THE REGULATIONS REGARDING THE PLANNING AND MANAGEMENT OF RESIDUE STOCKPILES AND RESIDUE DEPOSITS AND ASSOCIATED AMENDMENT

These Regulations pertain to the planning and management of residue stockpiles and residue deposits from a prospecting, mining, exploration or production operation were published in 2015 and were amended in 2018. The Regulations and associated amendment relate to the assessment of impacts and the analyses of risks relating to the management of residue stockpiles and residue deposits, and involve the following:

- The identification and assessment of environmental impacts arising from the establishment of residue stockpiles and residue deposits must be done as part of the environmental impact assessment conducted in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998);
- A risk analysis based on the characteristics and the classification set out in regulation 4 (characterisation of residue stockpiles and residue deposits) and 5 (classification of residue stockpiles and residue deposits) of these regulations must be used to determine the appropriate mitigation and management measures; and
- A competent person must recommend the pollution control measures suitable for a specific residue stockpile or residue deposit on the basis of a risk analysis as contemplated in regulations 4 and 5 of these Regulations.

As stated in Section 4.1.9, the Eloff Phase 3 Project will have residue stockpiles which will be subject to these regulations. In this regard, the containment barrier design (including requirements for a liner and nature of the liner), for the storage of the residue stockpiles will be addressed in accordance with chapter 3 of these Regulations and their associated amendments.

However, findings of the scoping studies and waste classification investigations, as well as the applicant's efforts to avoid and / or minimise the project footprint and environmental disturbance, the location of the discard stockpile area on site was scoped out. In this regard, the option to locate the stockpiles of hard, soft and topsoil material from the Eloff Phase 3 Project at the existing Kangala Colliery stockpile area was selected as preferred, and will be further assessed during the EIA phase (refer to Section 6.2.2).

4.1.11 THE NATIONAL ENVIRONMENTAL MANAGEMENT AIR QUALITY ACT (NEMAQA)

The National Environmental Management: Air Quality Act (Act No. 39 of 2004 as amended – NEMAQA) is the main legislative tool for the management of air pollution and related activities. The Object of the Act is:

- To protect the environment by providing reasonable measures for –
    i. the protection and enhancement of the quality of air in the republic;
    ii. the prevention of air pollution and ecological degradation; and
    iii. securing ecologically sustainable development while promoting justifiable economic and social development; and
- Generally, to give effect to Section 24(b) of the constitution in order to enhance the quality of ambient air for the sake of securing an environment that is not harmful to the health and well-being of people.

The NEMAQA mandates the Minister of Environment to publish a list of activities which result in atmospheric emissions and consequently cause significant detrimental effects on the environment, human health and social welfare. All scheduled processes as previously stipulated under the Air Pollution Prevention Act (APPA) are included as listed activities with additional activities being added to the list. The updated Listed Activities and Minimum National Emission Standards were published on the 22nd November 2013 (Government Gazette No. 37054).

According to the NEMAQA, air quality management control and enforcement is in the hands of local government with District and Metropolitan Municipalities as the licensing authorities. Provincial government is primarily responsible for ambient monitoring and ensuring municipalities fulfil their legal obligations, with national government primarily as policy maker and co-ordinator. Each sphere of government must appoint an Air Quality Officer responsible for co-ordinating matters pertaining to air quality management. Given that air quality management under the old Act was the sole responsibility of national government, local authorities have in the past only been responsible for smoke and vehicle tailpipe emission control.

The National Pollution Prevention Plans Regulations were published in March 2014 (Government Gazette 37421) and tie in with the National Greenhouse Gas (GHG) Emission Reporting Regulations which took effect on 3 April 2017. In summary, the Regulations aim to prescribe the requirements that pollution prevention plans of greenhouse gases declared as priority air pollutants, need to comply with in terms of the NEMAQA. The Regulations specify who needs to comply, and by when, as well as prescribing the content requirements. Mines do have an obligation to report on the GHG emissions under these Regulations. All coal mines are required to account for the amount of pollutants discharged into the atmosphere (total emissions for one or more specific GHG pollutants) by 31 March each year.

The findings from the climate change study for the proposed PEloff hase 3 Project indicate that while the GHG emissions from the project are low and will not likely result in a noteworthy contribution to the national climate change on their own, on a local scale the project will have some impact. However, the impacts identified have been allocated mitigation measures towards their management. Moreover, as from the next National Atmospheric Emissions Inventory System(NAEIS) reporting period Eloff Mining Company will have to start reporting on GHG emissions.

Moreover, a draft carbon tax bill was introduced for a further round of public consultation. The Carbon Tax Policy Paper (CTPP) (Department of National Treasury, 2013) stated consideration will be given to sectors where the potential for emissions reduction is limited. Certain production processes indicated in Annexure A of the notice (Government Gazette No. 40996 dated 21 July 2017) with GHG in excess of 0.1 Mt, measured as CO2-eq, are required to submit a pollution prevention plan to the Minister for approval. The Eloff Phase 3 Project operations

fall under "coal mining" production processes specified in Annexure A (Department Environmental Affairs, 2017b).

4.1.12 NATIONAL DUST CONTROL REGULATIONS

Dustfall is assessed for nuisance impact and not for inhalation health impact. The National Dust Control Regulations (Department of Environmental Affairs, 2013) prescribes measures for the control of dust in residential and non-residential areas. Acceptable dustfall rates are measured (using American Standard Testing Methodology (ASTM) D1739:1970 or equivalent) at and beyond the boundary of the premises where dust originates. In addition to the dustfall limits, the National Dust Control Regulations prescribe monitoring procedures and reporting requirements. Dust will be created from the proposed Eloff Phase 3 Project will be managed in accordance with these Regulations.

4.1.13 THE NATIONAL HERITAGE RESOURCES ACT (NHRA)

The National Heritage Resources Act (Act 25 of 1999 – NHRA) stipulates that cultural heritage resources may not be disturbed without authorisation from the relevant heritage authority. Section 34(1) of the NHRA states that, "*no person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority…*" The NHRA is utilised as the basis for the identification, evaluation and management of heritage resources and in the case of Cultural Resource Management (CRM) those resources specifically impacted on by development as stipulated in Section 38 of NHRA, and those developments administered through the NEMA, MPRDA and the Development Facilitation Act (FDA) legislation. In the latter cases the feedback from the relevant heritage resources authority is required by the State and Provincial Departments managing these Acts before any authorisations are granted for a development. The last few years have seen a significant change towards the inclusion of heritage assessments as a major component of Environmental Impact Processes required by the NEMA and MPRDA. This change requires us to evaluate the Section of these Acts relevant to heritage (Fourie, 2008b).

The NEMA 23(2)(b) states that an integrated environmental management plan should, "*…identify, predict and evaluate the actual and potential impact on the environment, socio-economic conditions and cultural heritage*". A study of subsections (23)(2)(d), (29)(1)(d), (32)(2)(d) and (34)(b) and their requirements reveals the compulsory inclusion of the identification of cultural resources, the evaluation of the impacts of the proposed activity on these resources, the identification of alternatives and the management procedures for such cultural resources for each of the documents noted in the Environmental Regulations. A further important aspect to be taken into account of in the EIA Regulations under the NEMA relates to the Specialist Report requirements (Appendix 6 of EIA Regulations 2014, as amended) .

The MPRDA defines 'environment' as it is in the NEMA and, therefore, acknowledges cultural resources as part of the environment. Section 39(3)(b) of this Act specifically refers to the evaluation, assessment and identification of impacts on all heritage resources as identified in Section 3(2) of the NHRA that are to be impacted on by activities governed by the MPRDA. Section 40 of the same Act requires the consultation with any State Department administering any law that has relevance on such an application through Section 39 of the MPRDA. This implies the evaluation of Heritage Assessment Reports in Environmental Management Plans or Programmes by the relevant heritage authorities (Fourie, 2008b).

In accordance with the legislative requirements and EIA rating criteria, the regulations of the South African Heritage Resources Agency (SAHRA) and Association of Southern African Professional Archaeologists (ASAPA) have also been incorporated to ensure that a comprehensive and legally compatible Heritage Scoping Report (HSR) is compiled.

4.1.14 THE NATIONAL FORESTS ACT (NFA)

According to this Act, the Minister may declare a tree, group of trees, woodland or a species of trees as protected. The prohibitions provide that "*no person may cut, damage, disturb, destroy or remove any protected tree, or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a licence granted by the Minister*."

The exact number of protected species on the proposed Eloff Phase 3 Project area is not known at this stage however a biodiversity impact study will be conducted for the EIA phase of the project to verify findings of this Scoping Report as well as to assess in more detail the impacts identified to date and any additional ones.

4.1.15 NATIONAL ENVIRONMENTAL MANAGEMENT BIODIVERSITY ACT (NEMBA) – ALIEN AND INVASIVE SPECIES LIST

This Act is applicable since is protects the quality and quantity of arable land in South Africa. Loss of arable land should be avoided and declared Weeds and Invaders in South Africa are categorised according to one of the following categories, and require control or removal:

- *Category 1a Listed Invasive Species*: Category 1a Listed Invasive Species are those species listed as such by notice in terms of section 70(1)(a) of the Act as species which must be combated or eradicated;
- *Category 1b Listed Invasive Species*: Category 1b Listed Invasive Species are those species listed as such by notice in terms of section 70(1)(a) of the Act as species which must be controlled;
- *Category 2 Listed Invasive Species*: Category 2 Listed Invasive Species are those species listed by notice in terms of section 70(1)(a) of the Act as species which require a permit to carry out a restricted activity within an area specified in the Notice or an area specified in the permit, as the case may be; and
- *Category 3 Listed Invasive Species*: Category 3 Listed Invasive Species are species that are listed by notice in terms of section 70(1)(a) of the Act, as species which are subject to exemptions in terms of section 71(3) and prohibitions in terms of section 71A of Act, as specified in the Notice.

The provisions of this Act have been considered and where relevant will be incorporated into the proposed mitigation measures and requirements of the EMPr.

4.1.16 THE SUB-DIVISION OF AGRICULTURAL LAND ACT

In terms of the Subdivision of Agricultural Land Act (Act 70 of 1970), any application for change of land use must be approved by the Minister of Agriculture, and while under the Conservation of Agricultural Resources Act (Act 43 of 1983) no degradation of natural land is permitted.

4.1.17 THE CONSERVATION OF AGRICULTURAL RESOURCES ACT

The law on Conservation of Agricultural Resources (Act 43 of 1983) aims to provide for the conservation of the natural agricultural resources of the Republic by the maintenance of the production potential of land, by the combating and prevention of erosion and weakening or destruction of the water sources, and by the protection of the vegetation and the combating of weeds and invader plants. In order to achieve the objectives of this Act, control measures related to the following may be prescribed to land users to whom they apply:

- The cultivation of virgin soil;
- The utilisation and protection of land which is cultivated;
- The irrigation of land;
- The prevention or control of waterlogging or salination of land;
- The utilisation and protection of vleis, marshes, water sponges, water courses and water sources;
- The regulating of the flow pattern of run-off water;
- The utilisation and protection of the vegetation;
- The grazing capacity of veld, expressed as an area of veld per large stock unit;
- The maximum number and the kind of animals which may be kept on veld; The prevention and control of veld fires;
- The utilisation and protection of veld which has burned;

- The control of weeds and invader plants;
- The restoration or reclamation of eroded land or land which is otherwise disturbed or denuded;
- The protection of water sources against pollution on account of farming practices;
- The construction, maintenance, alteration or removal of soil conservation works or other structures on land; and
- Any other matter which the Minister may deem necessary or expedient in order that the objects of this Act may be achieved.

Further, different control measures may be prescribed in respect of different classes of land users or different areas or in such other respects as the Minister may determine. Preliminary impacts on the soil, biodiversity and water resources have been identified with regards to the proposed Eloff Phase 3 Project, and mitigation and management measures recommended. These will be updated during the EIA phase of this project and will include input from the detailed impact assessment studies by the various specialists, the EAP, commenting authorities and any related comments from I&APs.

4.1.18 THE SPATIAL PLANNING AND LAND USE MANAGEMENT ACT (SPLUMA)

The Spatial Planning and Land Use Management (Act 16 of 2013 – SPLUMA) is set to aid effective and efficient planning and land use management, as well as to promotes optimal exploitation of minerals and mineral resources. The SPLUMA was developed to legislate for a single, integrated planning system for the entire country. Therefore, the Act provides a framework for a planning system for the country and introduces provisions to cater for development principles; norms and standards; inter-governmental support; Spatial Development Frameworks (SDFs) across national, provincial, regional and municipal areas; Land Use Schemes (LUS); and municipal planning tribunals. Furthermore, the SPLUMA strengthens the position of mining right holders when land needs to be re-zoned for mining purposes. The Eloff Phase 3 Project area is currently zoned as agricultural and should the EA be granted to Eloff Mining Company, Eloff Mining Company will have to apply for the re-zonation of the project area from agriculture to mining, prior to commencement.

4.1.19 NOISE CONTROL REGULATIONS, 1992 (GN R.154)

In terms of section 25 of the ECA, the National Noise Control Regulations (GN R. 154 – NCRs) published in Government Gazette No. 13717 dated 10 January 1992, were promulgated. The NCRs were revised under GN R. 55 of 14 January 1994 to make it obligatory for all authorities to apply the regulations. The Free State Province further promulgated Provincial Regulations (PN 24) in 1998.

The NCRs will need to be considered in relation to the potential noise that may be generated mainly during the construction and decommissioning phases of the proposed project. The two key aspects of the NCRs relate to disturbing noise and noise nuisance.

Section 4 of the Regulations prohibits a person from making, producing or causing a disturbing noise, or allowing it to be made produced or caused by any person, machine, device or apparatus or any combination thereof. A disturbing noise is defined in the Regulations as "*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*."

Section 5 of the NCRs in essence prohibits the creation of a noise nuisance. A noise nuisance is defined as "*any sound which disturbs or impairs or may disturb or impair the convenience or peace of any person.*" Noise nuisance is anticipated from the proposed project particularly to those residents that are situated in close proximity to the project area.

The South African National Standard 10103 also applies to the measurement and consideration of environmental noise and should be considered in conjunction with these Regulations. A noise baseline specialist study has been undertaken as part of the Scoping phase and is included as an appendix to this Scoping Report. Detailed noise impact assessment will be further undertaken in the EIA phase.

4.1.20 NOISE STANDARDS

There are a few South African scientific standards (SABS) relevant to noise from mines, industry and roads. They are:

- South African National Standard (SANS) 10103:2008 – 'The measurement and rating of environmental noise with respect to annoyance and to speech communication';
- SANS 10210:2004 – 'Calculating and predicting road traffic noise';
- SANS 10328:2008 – 'Methods for environmental noise impact assessments';
- SANS 10357:2004 – 'The calculation of sound propagation by the Concave method';
- SANS 10181:2003 – 'The Measurement of Noise Emitted by Road Vehicles when Stationary'; and
- SANS 10205:2003 – 'The Measurement of Noise Emitted by Motor Vehicles in Motion'.

The relevant standards use the equivalent continuous rating level as a basis for determining what is acceptable. The levels may take single event noise into account, but single event noise by itself does not determine whether noise levels are acceptable for land use purposes. With regards to SANS 10103:2008, the recommendations are likely to inform decisions by authorities, but non-compliance with the standard will not necessarily render an activity unlawful per se. The noise assessment undertaken for the proposed Eloff Phase 3 Project considered these noise standards and the preliminary impacts were rated taking these standards into consideration.

4.1.21 ENVIRONMENT CONSERVATION ACT (ECA)

The Environment Conservation Act (Act 73 of 1989 – ECA) was, prior to the promulgation of the NEMA, the backbone of environmental legislation in South Africa. To date the majority of the ECA has been repealed by various other Acts, however Section 25 of the Act and the Noise Regulations (GN R. 154 of 1992) promulgated under this section are still in effect. These Regulations serve to control noise and general prohibitions relating to noise impact and nuisance.

4.2 PERIOD FOR WHICH AUTHORIZATION IS REQUIRED

The authorisation will be required for the duration of the Mining Right.

5 NEED AND DESIRABILITY OF THE PROPOSED PROJECT

This section will examine the need and desirability of the proposed Eloff Phase 3 Project. This section will examine the role of coal as a resource and coal mines as a source of employment particularly with regards to the benefits of continuing and expanding on coal mining operations at the existing Kangala Colliery, whilst taking environmental aspects into consideration.

5.1 COAL AS A RESOURCE

Coal as a resource, is important in South Africa, as it remains the main source or fuel for energy generation. Eskom's existing coal-fired power stations are critical in terms of electricity production towards meeting the energy requirements of South Africa as a whole. As a result, coal mining beneficiation and supply is of paramount importance to South Africa for continued electricity generation in order to meet the current energy demands of the country in the short, medium and long term. Currently, coal provides for more than 70 % of the country's primary energy needs. About 53% of the coal that South Africa produces is used for electricity generation, 33% for petrochemical industries, 12% for metallurgical industries, and 2 % for domestic heating and cooking (Webb, 2015).

Further, the National Development Plan (NDP) identifies the need for South Africa to invest in a strong network of economic infrastructure designed to support the country's medium and long-term economic and social objectives. Energy infrastructure is a critical component that underpins economic activity and growth across the country and therefore, it needs to be robust and extensive enough to meet industrial, commercial and household needs. The NDP envisages that, by 2030, South Africa will have an energy sector that provides reliable and efficient energy service at competitive rates, is socially equitable through expanded access to energy at affordable tariffs and environmentally sustainable through reduced pollution.

Therefore, although recent studies indicate a reduction in the demand for electricity, current electricity demands need to be met and to achieve this the existing supply of coal to Eskom power stations must be maintained, while other energy sources are being investigated and / or established. In this regard, the coal produced at the existing Kangala Colliery and the proposed Eloff Phase 3 Project is for local use within Emalahleni, where Eskom is the largest local buyer. About 25% of South Africa's coal production is also exported, with most of the coal being shipped to Asia. Demand for coal is generally very high for both market segments. Selling prices are generally regarded as stable both currently and in the foreseeable future. The main customer for the Eloff Phase 3 Project coal product will be Eskom and specifically the Majuba and Kendal Power Stations, as well as Kusile Power Station.

Other potential markets for coal within south Africa, as presented in the Eloff MWP, include the following:

- The coal sector in South Africa is set to receive a demand boost from the electricity sector in the form of South Africa's Coal Baseload IPP Procurement Programme, under which the Department of Energy is aiming to procure 2,500 megawatts (MW) of new electricity capacity. These projects will require significant coal supplies.
- After coal consumption for electricity generation, Sasol, which operates coal-to-liquid plants, is the next biggest consumer of coal in South Africa. Sasol's subsidiary, Sasol Mining, supplies the majority of the group's coal needs.
- Other coal consumers in South Africa include industries such as cement, chemicals and steelmaking, small businesses, and households. The largest consumer of metallurgical coal is steelmaker ArcelorMittal South Africa, which has for years sourced the material locally from Exxaro's Tshikondeni Mine in Limpopo. Exxaro closed the mine in September 2014 and the steel producer is importing coking coal from other countries, including neighbouring Mozambique.

5.2 ELOFF PHASE 3 PROJECT BENEFITS

The proposed Eloff Phase 3 opencast mining operations, will allow the continued contribution of the mine to favourable economic impacts on both the local and regional economies. With the current mine infrastructure,

the Run of Mine (ROM) production at Kangala Colliery will continue to 2019 when the reserves will be depleted, which without any intervention will result in a loss of jobs and economy in the region. Therefore, the Eloff Phase 3 Project will extend the profitability and life of the Kangala coal operation by an additional 10 years and secure the jobs of the current 850 employees and approximately 50 new employees for construction phase , due to the extension.

It should also be noted that a significant portion of the coal reserve will be sterilised if the area proposed for the Eloff Phase 3 Project is not mined. Therefore, if the project were not to proceed, the additional economic activity, skills development and available jobs would not be created, and the coal reserves would remain unutilised.

The proposed Eloff Phase 3 Project activities do fit in with the surrounding developments and land uses, which are largely mining related. It is anticipated that if Eloff Mining Company were not to proceed with the proposed Eloff Phase 3 Project, mining of these coal reserves will not necessarily be avoided as another application in terms of the MPRDA can be made by another mining company. Unless the government declares the area "off limits" to mining, or the demand for coal subsides, mining houses will continue to attempt to mine the coal reserves where they have been identified such as within the proposed project area. In summary, the proposed Eloff Phase 3 Project will allow the applicant to continue producing a secure, steady supply of coal for another 10 years for use largely by Eskom as well as allow for the retention of the existing work force.

Moreover, the Eloff Phase 3 Project has taken into consideration environmental impacts that may be triggered by the proposed project activities as part of the EIA process being undertaken, and although the process is still at the Scoping Phase, Eloff Mining Company has made efforts towards minimising the project footprint and potential environmental disturbance as follows:

- Changes to the project layout and size by excluding an area extending further south than the current proposed project area in order to minimise the impact on a watercourse in close proximity (refer to Section 6.1.2); and
- The scoping out of the location of the discard stockpiles of hard, soft and topsoil material on site and opting for the location of the discard at the existing Kangala Colliery stockpile areas thereby reducing the environmental disturbance and footprint of the proposed project (refer to Section 6.2.2).

5.3 NEED AND DESIRABILITY ANALYSIS

The needs and desirability analysis component of the "*Guideline on need and desirability in terms of the Environmental Impact EIA Regulations (Notice 819 of 2014*)" includes, but is not limited to, describing the linkages and dependencies between human well-being, livelihoods and ecosystem services applicable to the area in question, and how the proposed development's ecological impacts will result in socio-economic impacts (e.g. on livelihoods, loss of heritage sites, opportunity costs, etc.). Table 8 below presents the needs and desirability analysis undertaken for the Eloff Phase 3 Project.

Table 8: Needs and desirability analysis for the Eloff Phase 3 Project

Ref No.	Question	Answer
1	**Securing ecological sustainable development and use of natural resources**	
1.1	How were the ecological integrity considerations taken into account in terms of: Threatened Ecosystems, Sensitive and vulnerable ecosystems, Critical Biodiversity Areas, Ecological Support Systems, Conservation Targets, Ecological drivers of the ecosystem, Environmental Management	The following specialist studies are being conducted for the proposed Eloff Phase 3 Project: • Biodiversity; • Noise; • Heritage; • Blasting;

Ref No.	Question	Answer
	Framework, Spatial Development Framework (SDF) and global and international responsibilities.	• Soil; • Social; • Land use; • Wetlands; • Hydrology; • Hydrogeology; • Climate Change • Air quality; and • Visual. The conclusions of these studies, and the identified preliminary impacts and associated mitigation measures will be further assessed in the EIA phase and the results thereof included in the EIA Report and accompanying EMPr. The potential benefits and motivation for the Eloff Phase 3 project is presented in Sections 5.1 and 5.2. Furthermore, considerations from the Nkangala District Municipality and Victor Khanye Local Municipality spatial structures, whereby mining activities in the south of the region especially in the Thembisile Municipality and around Delmas in the centre of the Victor Khanye municipal area are identified as economies to be enhanced, towards contributing to job creation for poor, unskilled workers.
1.2	How will this project disturb or enhance ecosystems and / or result in the loss or protection of biological diversity? What measures were explored to avoid these negative impacts, and where these negative impacts could not be avoided altogether, what measures were explored to minimise and remedy the impacts? What measures were explored to enhance positive impacts?	Refer to baseline ecological information in Section 8, and the impact assessment and mitigation measures in Section 9 of this Scoping Report. Efforts will be made to avoid disturbance to sensitive biodiversity. These sections will be further expanded on in the EIA Report and EMPr.

Ref No.	Question	Answer
1.3	How will this development pollute and / or degrade the biophysical environment? What measures were explored to either avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy the impacts? What measures were explored to enhance positive impacts?	Refer to the alternatives considered for this project in Section 6, the baseline ecological information in Section 8, and the impact assessment and mitigation measures in Section 9 of this Scoping Report. These sections will be further expanded on in the EIA Report and EMPr.
1.4	What waste will be generated by this development? What measures were explored to avoid waste, and where waste could not be avoided altogether, what measures were explored to minimise, reuse and / or recycle the waste? What measures have been explored to safely treat and/or dispose of unavoidable waste?	Refer to Sections 3.2.6 and 3.2.10 of this Scoping Report. These sections discuss the proposed methods to handle and manage waste water as well as the waste rock or discard stockpile dumping areas. Section 6.2.2 describes the alternatives being considered for the location and handling of discard stockpiles. The alternatives take into consideration options to minimise the amount of stockpile material on site and / or ways to reduce their impact on the receiving environment. The proposed waste water management initiatives include the separation of clean and dirty water streams, as well as the use of dirty water channels towards a sump at the stockpile dumping areas, which will drain into the mining pit to be pumped to the existing PCD at Kangala Colliery. The use of existing infrastructure for the project consisting of only the new pit extension, discard stockpiles and haul roads being, will further minimise the disturbance footprint at the project site.
1.5	How will this project disturb or enhance landscapes and / or sites that constitute the nation's cultural heritage? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy the impacts? What	In addition to the baseline heritage and palaeontological findings presented in Section 8 of this Scoping Report as well as the associated specialist Heritage Scoping Report in Appendix D, a Phase 1 Heritage impact assessment and a palaeontological study will be undertaken in the EIA

Ref No.	Question	Answer
	measures were explored to enhance positive impacts?	phase and the findings thereof presented in the EIA Report and EMPr.
1.6	How will this project use and / or impact on non-renewable natural resources? What measures were explored to ensure responsible and equitable use of the resources? How have the consequences of the depletion of the non-renewable natural resources been considered? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy the impacts? What measures were explored to enhance positive impacts?	Refer to the identified impacts, their assessment and recommended mitigation measures in Section 9 of this Scoping Report. It is noted that due to the nature of this project (mining of coal), a non-renewable resource will be depleted. Coal mining does however contribute significantly to the country's economy and power generation needs, and therefore at the current stage mining of coal is still needed within South Africa. The project is located on currently farmed land and thus the project activities will lead to the loss of some agricultural land. However, the LOM is 10 years and the mining method to be used is opencast which entails progressive backfilling and rehabilitation of disturbed land. As such, at the end of the LOM the rehabilitated land can be utilised for agricultural purposes once more. Moreover, as mentioned above, the location of the Eloff Phase 3 Project adjacent to the existing Kangala Colliery pit, allows for the utilisation of existing mining infrastructure thereby reducing the disturbance footprint of the project on the receiving environment. Preliminary impacts from the proposed project have been identified and mitigation measures aimed at avoiding, reducing and / or managing the negative impacts as well as enhancing the positive impacts have been recommended (Section 9).
1.7	How will this project use and / or impact on renewable natural resources and the ecosystem of which they are part? Will the use of the resources and / or impacts on the ecosystem jeopardise the integrity of the	Refer to the identified impacts, their assessment and recommended mitigation measures in Section of this Scoping Report. This aspect will be further

Ref No.	Question	Answer
	resource and / or system taking into account carrying capacity restrictions, limits of acceptable change, and thresholds? What measures were explored to firstly avoid the use of resources, or if avoidance is not possible, to minimise the use of resources? What measures were taken to ensure responsible and equitable use of the resources? What measures were explored to enhance positive impacts?	explored in the EIA phase and findings thereof presented in the EIA Report and EMPr.
1.7.1	Does the proposed project exacerbate the increased dependency on increased use of resources to maintain economic growth or does it reduce resource dependency (i.e. de-materialised growth)?	The proposed Eloff Phase 3 Project will rely on / depend on the extraction of a natural, non-renewable resource (coal) for selling to Eskom. This will contribute to the current coal resource dependency that the current energy policy is based on.
1.7.2	Does the proposed use of natural resources constitute the best use thereof? Is the use justifiable when considering intra- and intergenerational equity, and are there more important priorities for which the resources should be used?	The proposed project will extend the life of the mine in an area where coal reserves have already been identified and are already being mined. Refer to Section 6 for the alternatives considered in this Scoping Report. These will be expanded on in the EIA Report.
1.7.3	Do the proposed location, type and scale of development promote a reduced dependency on resources?	The Kangala Colliery is already an existing mine and the proposed project will be an extension of the existing mine utilising mostly existing infrastructure.
1.8	**How were a risk-averse and cautious approach applied in terms of ecological impacts**	
1.8.1	What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?	In terms of the ecological impacts, the current limitations were cited by the specialist: • The ecological assessment represents the Scoping phase of the project only. After further field surveys a final biodiversity baseline and impact assessment report will be submitted.

Ref No.	Question	Answer
1.8.2	What is the level of risk associated with the limits of current knowledge?	The level of risk is low as previous specialist studies have been conducted in the areas surrounding the proposed project location, and therefore some information is already available.
1.8.3	Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?	Sufficient information was gathered prior to the onset of this process to indicate that the potential mining of additional coal is feasible. In addition, it is noted that this project extends a current mining operation.
1.9	**How will the ecological impacts resulting from this development impact on people's environmental right in terms following?**	
1.9.1	Negative impacts: e.g. access to resources, opportunity costs, loss of amenity (e.g. open space), air and water quality impacts, nuisance (noise, odour, etc.), health impacts, visual impacts, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?	Refer to the identified impacts, their assessment and recommended mitigation measures in Section 9 of this Scoping Report. This aspect will be further explored in the EIA phase and findings thereof presented in the EIA Report and EMPr.
1.9.2	Positive impacts: e.g. improved access to resources, improved amenity, improved air or water quality, etc. What measures were taken to enhance positive impacts?	Refer to the identified impacts, their assessment and recommended mitigation measures in Section 9 of this Scoping Report. This aspect will be further explored in the EIA phase and findings thereof presented in the EIA Report and EMPr.
1.10	Describe the linkages and dependencies between human wellbeing, livelihoods and ecosystem services applicable to the area in question and how the development's ecological impacts will result in socio-economic impacts (e.g. on livelihoods, loss of heritage site, opportunity costs, etc.)?	Refer to baseline ecological information in Section 8, and the impact assessment and mitigation measures in Section 9 of this Scoping Report. These sections will be further expanded in the EIA Report and EMPr.

Ref No.	Question	Answer
1.11	Based on all of the above, how will this development positively or negatively impact on ecological integrity objectives / targets / considerations of the area?	Refer to the identified impacts, their assessment and recommended mitigation measures in Section 9 of this Scoping Report. This aspect will be further explored in the EIA phase and findings thereof presented in the EIA Report and EMPr.
1.12	Considering the need to secure ecological integrity and a healthy biophysical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the "best practicable environmental option" in terms of ecological considerations?	Refer to Section 6 for details of the alternatives considered, as well as this section of the Scoping Report for the advantages and disadvantages of the proposed activity. This aspect will be further expanded on in the EIA Report.
1.13	Describe the positive and negative cumulative ecological / biophysical impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and existing and other planned developments in the area?	Refer to the identified impacts, their assessment and recommended mitigation measures in Section 9 of this Scoping Report. This aspect will be further explored in the EIA phase and findings thereof presented in the EIA Report and EMPr.
2	**Promoting justifiable economic and social development**	
2.1	**What is the socio-economic context of the area, based on, amongst other considerations, the following:**	
2.1.1	The IDP (and its sector plans' vision, objectives, strategies, indicators and targets) and any other strategic plans, frameworks or policies applicable to the area,	According to IHS Global Insight data (2015), the unemployment rate (i.e. the proportion of the population between 14 and 65 years of age who classify themselves as "not employed but looking for work") is around 21.6%. This represents a decrease of approximately 6.6% in the unemployment rate since Census 2011. It is further indicated in the Social Scoping Report (refer to Appendix D) that two most dominant economic sectors in the Victor Khanye Local

Ref No.	Question	Answer
		Municipality (VKLM) are agriculture and mining. Agriculture is predominant in the rural areas around the VKLM, made up mostly of commercial farming (notably maize farming) and mining activities. Since the municipality is viewed as an agricultural area with high potential, the 2017 – 2021 VKLM Integrated Development Plan (IDP) states that agricultural land must be protected against urban sprawl and mining activities (presumably uncontrolled). Moreover, mining operations in the VKLM are made up of mostly coal (3 million metric tons per annum) and silica (2 million metric tons per annum). Given the fact that the mining industry continues to grow, the VKLM IDP identifies an urgent need to establish an "equitable and realistic trade-off that maximises provincial benefits from mining and energy sectors while mitigating any environmental impacts" (VKLM IDP, 2017 – 2021). The proposed Eloff Phase 3 Project will extend the Life of Mine of the Kangala coal mine by 10 years, thus allowing Eloff Mining Company to continue supplying jobs at that mine for a longer time period. The surrounding communities will also continue to benefit through direct and indirect income, as well as the mine's use of local contractors and suppliers.
2.1.2	Spatial priorities and desired spatial patterns (e.g. need for integrated of segregated communities, need to upgrade informal settlements, need for densification, etc.),	The mine will make use of labourers from the local community as far as possible. According to the Nkangala District Municipality Spatial Development Framework (SDF), there are existing mining activities are located in the south of the region which should be enhanced, to contribute to job creation for poor, unskilled workers. It is added that the regeneration of power stations, as well as the new power station in the Victor Khanye area could

Ref No.	Question	Answer
		serve as catalyst to increased demand for coal reserves in the Nkangala District Municipality area. The local economy is indicated in the Victor Khanye Local Municipality Integrated Development Plan (IDP) as relatively diversified with the largest sector, in terms of output as well as proportional contribution being the trade sector. The growing sector is trade sector followed by the agriculture sector and the mining sector. Both sectors contribute to the local economy. The project area is within the area currently characterised by both agriculture and mining activities. The IDP indicates main mining areas to be are around Delmas in the centre of the municipal area, and also in the far north-eastern corner of the Victor Khanye municipal area. It is also indicated in the IDP that the Delmas area is a “high potential” agricultural area, and that it is important that agricultural land is protected. However, there are no spatial planning restrictions on the proposed project area in terms of land use. The project has considered various ways to minimise the footprint of the mining activities thereby reducing the amount of agricultural land to be affected.
2.1.3	Spatial characteristics (e.g. existing land uses, planned land uses, cultural landscapes, etc.), and	Refer to the baseline environment in Section 8 of this Scoping Report. This section will be expanded on in the EIA Report and EMPr.
2.1.4	Municipal Economic Development Strategy ("LED Strategy").	The proposed project will promote and support the sustainability of existing business, as well as assist in increasing local beneficiation and shared economic growth, through extending the LOM by 10 years. The Eloff MWP indicates that LED investment focuses largely on the establishment of a renewable energy business that will create jobs with an investment of ZAR 6,500,000 over five years. Other

Ref No.	Question	Answer
		programmes include education and skills development, social welfare initiatives, and enterprise development.
2.2	Considering the socio-economic context, what will the socio-economic impacts be of the development (and its separate elements/aspects), and specifically also on the socio-economic objectives of the area?	Refer to the identified impacts, their assessment and recommended mitigation measures in Section 9 of this Scoping Report. This aspect will be further explored in the EIA phase and findings thereof presented in the EIA Report and EMPr.
2.2.1	Will the development complement the local socio-economic initiatives (such as local economic development (LED) initiatives), or skills development programs?	The proposed project will increase the life of mine of Kangala coal mine, which will ensure that the community projects initiated by the mine will have an increased life. This will complement the local socio-economic initiatives identified for the area.
2.3	How will this development address the specific physical, psychological, developmental, cultural and social needs and interests of the relevant communities?	Refer to the public participation process undertaken to date in Section 7 of this Scoping Report. Public participation and consultation will continue during the EIA phase as described in Section 10. Furthermore, refer to the identified impacts, their assessment and recommended mitigation measures in Section 9 of this Scoping Report. The impacts will be further explored in the EIA phase and findings thereof presented in the EIA Report and EMPr.
2.4	Will the development result in equitable (intra- and inter-generational) impact distribution, in the short- and long-term? Will the impact be socially and economically sustainable in the short- and long-term?	Refer to the identified impacts, their assessment and recommended mitigation measures in Section 9 of this Scoping Report. This aspect will be further explored in the EIA phase and findings thereof presented in the EIA Report and EMPr.
2.5	**In terms of location, describe how the placement of the proposed development will:**	

Ref No.	Question	Answer
2.5.1	Result in the creation of residential and employment opportunities in close proximity to or integrated with each other.	Refer to Section 6 for details of alternatives considered in this Scoping Report. This aspect will be further explored in the EIA phase and findings thereof presented in the EIA Report and EMPr.
2.5.2	Reduce the need for transport of people and goods.	Refer to Section 6 for details of alternatives considered in this Scoping Report. This aspect will be further explored in the EIA phase and findings thereof presented in the EIA Report and EMPr.
2.5.3	Result in access to public transport or enable non-motorised and pedestrian transport (e.g. will the development result in densification and the achievement of thresholds in terms public transport),	Refer to Section 6 for details of alternatives considered in this Scoping Report. This aspect will be further explored in the EIA phase and findings thereof presented in the EIA Report and EMPr.
2.5.4	Compliment other uses in the area,	Refer to item 1.3 of this table (above). The proposed Eloff Phase 3 Project entails the mining of additional areas in the vicinity of the existing Kangala Colliery. The existing land use, which is the mining of coal, will therefore be complimented by the continuation of the project.
2.5.5	Be in line with the planning for the area.	Refer to item 2.2.1 of this table (above).
2.5.6	For urban related development, make use of underutilised land available with the urban edge.	Not applicable. The proposed Eloff Phase 3 Project area is outside an urban area.
2.5.7	Optimise the use of existing resources and infrastructure.	Refer to Section 3 of this Scoping Report.
2.5.8	Opportunity costs in terms of bulk infrastructure expansions in non-priority areas (e.g. not aligned with the bulk infrastructure planning for the settlement that reflects the spatial reconstruction priorities of the settlement).	Refer to Section 3 of this Scoping Report.

Ref No.	Question	Answer
2.5.9	Discourage "urban sprawl" and contribute to compaction / densification.	The proposed Eloff Phase 3 Project will result in the continued employment of approximately 850 workers. Approximately 50 new employees will be employed for the construction of the proposed Eloff Phase 3 Project, . Employment from the surrounding communities is recommended where possible, such that there will be no significant influx of additional workers to the area as a direct result of the proposed project.
2.5.10	Contribute to the correction of the historically distorted spatial patterns of settlements and to the optimum use of existing infrastructure in excess of current needs.	Refer to items 2.5.7 to 2.5.9 of this table (above).
2.5.11	Encourage environmentally sustainable land development practices and processes.	The proposed land use for the Eloff Phase 3 Project will be developed with effort made towards being environmentally sustainable in the long term. One of the key aspects to ensuring long terms land sustainability will be to ensure successful rehabilitation and post mining land-use capability.
2.5.12	Take into account special locational factors that might favour the specific location (e.g. the location of a strategic mineral resource, access to the port, access to rail, etc.).	Refer to item 1.7.3 of this table (above). The proposed EloffPhase 3 Project is associated with a portion of a strategic mineral resource (coal reserve).
2.5.13	The investment in the settlement or area in question will generate the highest socio-economic returns (i.e. an area with high economic potential).	The proposed project will allow the mine to continue contributing to the local, regional and national Gross Domestic Product (GDPs), and also to the local communities through continued employment of workers and local contractors, as well as other influences and community upliftment programmes that are undertaken by the mine through their SLP.

Ref No.	Question	Answer
2.5.14	Impact on the sense of history, sense of place and heritage of the area and the socio-cultural and cultural-historic characteristics and sensitivities of the area.	Refer to the identified impacts, their assessment and recommended mitigation measures in Section 9 of this Scoping Report. This aspect will be further explored in the EIA phase and findings thereof presented in the EIA Report and EMPr.
2.5.15	In terms of the nature, scale and location of the development promote or act as a catalyst to create a more integrated settlement?	The proposed project will ensure continued employment in the area, as well as programmes implemented from the mine's SLP.
2.6	**How was a risk-averse and cautious approach applied in terms of socio-economic impacts**	
2.6.1	What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?	In terms of the socio-economic impacts, the current knowledge gaps include: • The Social Scoping Report is solely based on secondary data. The sources consulted during the compilation of the report are not exhaustive but deemed sufficient to meet the Scope of Work for the current Scoping phase. No relevant information was deliberately excluded from the said report. • It was assumed that the motivation for, and the ensuing planning and feasibility studies of the Eloff Phase 3 Project were done with integrity, and that the information provided to date by the independent EAP was accurate.
2.6.2	What is the level of risk (note: related to inequality, social fabric, livelihoods, vulnerable communities, critical resources, economic vulnerability and sustainability) associated with the limits of current knowledge?	The level of risk is low as the project is not expected to have far reaching impacts on socio-economic conditions should the recommended mitigation and management measures be implemented and adhered to.

Ref No.	Question	Answer
2.6.3	Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?	As this project extends a current mining operation, and does not constitute a new mine, a cautious approach has been applied.
2.7	**How will the socio-economic impacts resulting from this development, impact on people's environmental right in terms following:**	
2.7.1	Negative impacts: e.g. health (e.g. HIV-Aids), safety, social ills, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?	Refer to the identified impacts, their assessment and recommended mitigation measures in Section 9 of this Scoping Report. This aspect will be further explored in the EIA phase and findings thereof presented in the EIA Report and EMPr.
2.7.2	Positive impacts. What measures were taken to enhance positive impacts?	Refer to the identified impacts, their assessment and recommended mitigation measures in Section 9 of this Scoping Report. This aspect will be further explored in the EIA phase and findings thereof presented in the EIA Report and EMPr.
2.8	Considering the linkages and dependencies between human wellbeing, livelihoods and ecosystem services, describe the linkages and dependencies applicable to the area in question and how the development's socioeconomic impacts will result in ecological impacts (e.g. over utilisation of natural resources, etc.)?	Refer to the identified impacts, their assessment and recommended mitigation measures in Section 9 of this Scoping Report. This aspect will be further explored in the EIA phase and findings thereof presented in the EIA Report and EMPr.
2.9	What measures were taken to pursue the selection of the "best practicable environmental option" in terms of socio-economic considerations?	Refer to the identified impacts, their assessment and recommended mitigation measures in Section 9 of this Scoping Report. This aspect will be further explored in the EIA phase and findings thereof presented in the EIA Report and EMPr.
2.10	What measures were taken to pursue environmental justice so that adverse environmental impacts shall not be	Refer to the identified impacts, their assessment and recommended mitigation measures in Section 9 of this Scoping Report. This aspect will be further

Ref No.	Question	Answer
	distributed in such a manner as to unfairly discriminate against any person, particularly vulnerable and disadvantaged persons (who are the beneficiaries and is the development located appropriately)? Considering the need for social equity and justice, do the alternatives identified, allow the "best practicable environmental option" to be selected, or is there a need for other alternatives to be considered?	explored in the EIA phase and findings thereof presented in the EIA Report and EMPr. Moreover, Eloff Mining Company will, in line with the regulatory requirements, provide financial provision to ensure that the mitigation measures proposed can be carried out. This aspect will also be further addressed in the EIA phase.
2.11	What measures were taken to pursue equitable access to environmental resources, benefits and services to meet basic human needs and ensure human wellbeing, and what special measures were taken to ensure access thereto by categories of persons disadvantaged by unfair discrimination?	By conducting a Scoping and EIA process, the applicant ensures that equitable access to the environment has been considered. Refer to the identified impacts, their assessment and recommended mitigation measures in Section 9 of this Scoping Report. This aspect will be further explored in the EIA phase and findings thereof presented in the EIA Report and EMPr.
2.12	What measures were taken to ensure that the responsibility for the environmental health and safety consequences of the development has been addressed throughout the development's life cycle?	Refer to the identified impacts, their assessment and recommended mitigation measures in Section 9 of this Scoping Report. This aspect will be further explored in the EIA phase and findings thereof presented in the EIA Report and EMPr.
2.13	**What measures were taken to:**	
2.13.1	Ensure the participation of all interested and affected parties.	Refer to the public participation process undertaken to date in Section 7 of this Scoping Report. Public participation and consultation will continue during the EIA phase as described in Section 10.
2.13.2	Provide all people with an opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation,	Refer to the public participation process undertaken to date in Section 7 of this Scoping Report. Public participation and consultation will

Ref No.	Question	Answer
2.13.3	Ensure participation by vulnerable and disadvantaged persons,	continue during the EIA phase as described in Section 10. Advertisements as well as site notices were distributed in and around the project area in English and Afrikaans to assist in understanding the project. Public meetings are also planned to be undertaken in the Scoping and EIA phases of the project. Furthermore, translators will be available at the upcoming public meetings (Scoping and EIA phases) towards ensuring that Interested and Affected Parties can participate in a language they are able to understand as far as possible. Also, public meetings will be undertaken such that women and youth are encouraged to participate and provide input which will then be recorded and submitted with the relevant reports to the competent authority.
2.13.4	Promote community wellbeing and empowerment through environmental education, the raising of environmental awareness, the sharing of knowledge and experience and other appropriate means,	
2.13.5	Ensure openness and transparency, and access to information in terms of the process,	
2.13.6	Ensure that the interests, needs and values of all interested and affected parties were taken into account, and that adequate recognition were given to all forms of knowledge, including traditional and ordinary knowledge,	
2.13.7	Ensure that the vital role of women and youth in environmental management and development were recognised and their full participation therein will be promoted?	
2.14	Considering the interests, needs and values of all the interested and affected parties, describe how the development will allow for opportunities for all the segments of the community (e.g. a mixture of low-, middle-, and high-income housing opportunities) that is consistent with the priority needs of the local area (or that is proportional to the needs of an area)?	Refer to the public participation process undertaken to date in Section 7 of this Scoping Report. Public participation and consultation will continue during the EIA phase as described in Section 10. Furthermore, refer to the identified impacts, their assessment and recommended mitigation measures in Section 9 of this Scoping Report. The impacts will be further explored in the EIA phase and findings thereof presented in the EIA Report and EMPr.

Ref No.	Question	Answer
		Moreover, the current SLP is due for an update, as part of a separate undertaking.
2.15	What measures have been taken to ensure that current and / or future workers will be informed of work that potentially might be harmful to human health or the environment or of dangers associated with the work, and what measures have been taken to ensure that the right of workers to refuse such work will be respected and protected?	Workers at the mine are educated on a regular basis through toolbox talks on the environmental risks that may occur within their work environment, and adequate measures have been taken to ensure that the appropriate personal protective equipment is issued to workers based on the areas that they work in as well as the requirements of their job.
2.16	**Describe how the development will impact on job creation in terms of, amongst other aspects:**	
2.16.1	The number of temporary versus permanent jobs that will be created.	It anticipated that a 50 new jobs will be created through the Eloff Phase 3 Project during construction,. Also, the 850 existing jobs will be maintained for a longer period of time.
2.16.2	Whether the labour available in the area will be able to take up the job opportunities (i.e. do the required skills match the skills available in the area).	
2.16.3	The distance from where labourers will have to travel.	
2.16.4	The location of jobs opportunities versus the location of impacts.	
2.16.5	The opportunity costs in terms of job creation.	
2.17	**What measures were taken to ensure:**	
2.17.1	That there were intergovernmental coordination and harmonisation of policies, legislation and actions relating to the environment.	The Scoping and EIA process requires governmental departments to communicate regarding any application. In addition, all relevant Departments and key stakeholders have been notified about the project by the EAP and registered as Interested and Affected Parties who will continue to be notified

Ref No.	Question	Answer
		and engaged with regarding the project throughout the EIA process.
2.17.2	That actual or potential conflicts of interest between organs of state were resolved through conflict resolution procedures.	The Scoping and EIA process requires governmental departments to communicate regarding any application. In addition, all relevant Departments and key stakeholders have been notified about the project by the EAP and registered as Interested and Affected Parties who will continue to be notified and engaged with regarding the project throughout the EIA process.
2.18	What measures were taken to ensure that the environment will be held in public trust for the people, that the beneficial use of environmental resources will serve the public interest, and that the environment will be protected as the people's common heritage?	Refer to the public participation process undertaken to date in Section 7 of this Scoping Report. Public participation and consultation will continue during the EIA phase as described in Section 10. Furthermore, refer to the identified impacts, their assessment and recommended mitigation measures in Section 9 of this Scoping Report. The impacts will be further explored in the EIA phase and findings thereof presented in the EIA Report and EMPr. Moreover, the SLP will be included in the EIA Report.
2.19	Are the mitigation measures proposed realistic and what long-term environmental legacy and managed burden will be left?	Refer to the identified impacts, their assessment and recommended mitigation measures in Section 9 of this Scoping Report. The impacts will be further explored in the EIA phase and findings thereof presented in the EIA Report and EMPr.
2.20	What measures were taken to ensure that the costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution,	The Eloff Phase 3 Project represented by Eloff Mining Company will provide a Bank guarantee to the DMR. The amount will be calculated using the published DMR guideline document as required by section 54 (1) of the regulations *"Guideline*

Ref No.	Question	Answer
	environmental damage or adverse health effects will be paid for by those responsible for harming the environment?	*Document for the evaluation of Quantum of Closure Related Financial Provision Provided by a Mine"*. Furthermore, in accordance with the NEMA Regulations Pertaining to the Financial Provision for Prospecting Exploration, Mining or Production Operations, an applicant or holder of a right or permit must determine and make financial provision to guarantee the availability of sufficient funds to undertake rehabilitation and remediation of the adverse environmental impacts of prospecting, exploration, mining or production operations. In this regard, Eloff Mining Company needs to include such financial provisions and this will be prepared and submitted along with the EIA Report during the upcoming EIA phase.
2.21	Considering the need to secure ecological integrity and a healthy bio-physical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the best practicable environmental option in terms of socio-economic considerations?	Refer to Section 6 for details of alternatives considered in this Scoping Report. This aspect will be further explored in the EIA phase and findings thereof presented in the EIA Report and EMPr.
2.22	Describe the positive and negative cumulative socio-economic impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and other planned developments in the area?	Refer to the identified impacts, their assessment and recommended mitigation measures in Section 9 of this Scoping Report. The impacts will be further explored in the EIA phase and findings thereof presented in the EIA Report and EMPr.

6 PROJECT ALTERNATIVES

The identification of alternatives is a key aspect of the success of the environmental scoping phase. All reasonable and feasible alternatives must be identified and screened to determine the most suitable alternatives to consider and assess in the EIA phase. There are, however, some significant constraints that have to be taken into account when identifying alternatives for a project of this scope. Such constraints include social, financial and environmental issues, which will be discussed as part of the evaluation of the alternatives for this project. Alternatives can typically be identified according to:

- Location alternatives (including design and layout);
- Process alternatives;
- Technology alternatives; and
- Activity alternatives (including the No-Go option).

For any alternative to be considered feasible such an alternative must meet the need and purpose of the development proposal without presenting significantly high associated impacts. As mentioned in Section 5 of this Scoping Report, the need for the proposed project includes the following key drivers:

For any alternative to be considered feasible such an alternative must meet the need and purpose of the development proposal without presenting significantly high associated impacts. As mentioned in Section 5 of this Scoping Report, the need for the proposed project includes the following key drivers:

- The need to increase the LOM for the mine as the Run of Mine (ROM) at Kangala Colliery is anticipated to be depleted within the year 2019; and
- The need to meet and maintain supply obligations to Eskom, and other potential end users of the coal resource to be mined, thereby contributing to the local and national economy.

In this section the various alternatives considered are described and their advantages and disadvantages are presented where applicable. Furthermore, the feasibility of the considered alternatives, from both a technical as well as environmental perspective, is determined and the result thereof are the alternatives that will be investigated further in the EIA phase, towards the selection of preferred alternatives. Essentially, alternatives represent different means of meeting the general purpose and need of the proposed project through the identification of the most appropriate and feasible method of development, all of which are discussed below.

Alternatives can further be distinguished into discrete or incremental alternatives. Discrete alternatives are overall development options, which are typically identified during the pre-feasibility, feasibility and or scoping phases of the EIA process (DEAT, 2004). Incremental alternatives typically arise during the EIA process and are usually suggested as a means of addressing identified impacts. These alternatives are closely linked to the identification of mitigation and management measures and are not specifically identified as distinct alternatives. This section provides information on the Eloff Phase 3 Project's location, process, technology and activity alternatives under consideration and those that will be assessed further in the upcoming EIA phase.

6.1 LOCATION ALTERNATIVES

Location alternatives can apply to the entire Eloff Phase 3 Project (e.g. the strategic decision to locate the proposed development in Mpumalanga within the Victor Khanye Local Municipality, and adjacent to the existing Kangala Colliery, as well as more specific individual components of the project (e.g. the location of the mining pit, discard stockpiles, etc. within the proposed project area). The proposed location for the Eloff Phase 3 Project is largely due to its proximity to the existing operational Kangala Colliery adjacent to the proposed project area, and which is also owned by the applicant. Kangala Colliery adjacent to the project area presents the opportunity for the Eloff Phase 3 Project to utilise its existing opencast mining infrastructure which has already been subjected to environmental processes including alternative assessments. This proposed location will enable the proposed Eloff Phase 3 Project to reduce its environmental impact footprint, whereby only the opencast mining pit, , haul road and stormwater infrastructure will be required for the operation (details of the project in Section

3). The location of the Eloff Phase 3 Project is discussed further below in relation to the proposed development's properties and layout options.

6.1.1 DEVELOPMENT LOCATION

The land use in and around the proposed Eloff Phase 3 Project area is predominantly consists of agricultural activities (crop farming) with mining related activities in its vicinity. Since the proposed project pertains only to the extension of the opencast mining pit and associated discard stockpiles, whilst utilising existing Kangala Colliery infrastructure for the processing of the coal and transportation to the buyer, the project area footprint and impact on the receiving environment including land use will be largely reduced. The development of the Eloff Phase 3 Project on portions 14, 15, 16, 18, 19, 20, 22, 23, 24 and 59 of the farm Strydpan 243 IR in close proximity or adjacent to the existing Kangala Colliery on portion 1 and remaining extent of portion 2 of the farm Wolvenfontein 244 IR, therefore, is the preferred location alternative (Development Location Alternative S1a).

This development location will minimise the mining activities and infrastructure on site, thereby minimising the project foot print and potential impacts through the optimisation of existing infrastructure. Furthermore, the development location was selected based on the presence of the target coal resource within the Eloff mining right area, such that the identified coal resource can be mined economically utilising a mining method already in operation at the adjacent Kangala Colliery.

In this regard, no other location alternative is being considered for the Eloff Phase 3 Project. The preliminary environmental impacts associated with this location alternative are discussed in Section 9 of this Scoping Report and will be further investigated in the EIA phase.

6.1.2 DESIGN OR LAYOUT

Numerous alternatives were evaluated with regard to the extent of the area to be mined for the Eloff Phase 3 Project, mostly linked to the presence of surface infrastructure within and adjacent to the target coal resource. The utilisation of existing infrastructure will minimise the impact of the proposed extension while allowing for the underlying coal to be accessed, thereby increasing the total coal resources that would be available for extraction over the LOM.

The preliminary layout will be further investigated in the EIA phase, and where necessary additional alternative locations and layout options assessed. If any infrastructure is planned to be located in areas identified as being of high environmental sensitivity or if any other significant environmental concerns are noted with regards to the proposed design and / or layout, then the layout may require to be amended based on these findings. More details regarding the preliminary layout and on-site sensitivities will be provided in the EIA phase once the detailed specialist impact assessment studies have been completed. This scoping phase micro-siting information will be provided to the specialists to inform their impact assessments during the EIA phase.

The 3 layout alternatives that were considered based on the preliminary locations proposed for both the opencast mining pit extension area and the discard stockpile dump areas, are described below:

- **Site Layout Alternative S2a** – The initially proposed mine layout had a wider footprint extending further south than the current proposed project area. The small portion on the extreme south of the project area was deemed not feasible due to its proximity to a watercourse.
- **Site Layout Alternative S2b – Maximum mining over entire area**: This alternative involves mining over the entire proposed opencast mining pit extension area. This option can only be considered if no high-sensitivity and / or no-go areas are identified within the proposed project area. In this site layout alternative, the mining and economically efficient production of coal is emphasised. Less restrictive mitigation measures will be used to protect the environmental features, thus allowing for maximum coal production. This approach has the potential to increase the financial viability of the proposed Phase 3 Project at the potential expense of any identified environmental features on site.
- **Site Layout Alternative S2c – Sensitivity-based approach:** This alternative aims to avoid no-go areas and highly sensitive areas, and takes into account specialist recommendations regarding buffer distances from important environmental features. In this site layout alternative, environmental

resource protection is emphasised and relies on the use and implementation of stringent mitigation and management measures to minimise identified adverse impacts. This development alternative will use environmental specialist planning and evaluation of opencast mining methodologies, mining footprint alteration, and infrastructure placement and logistic options in order to avoid consolidated sensitive environmental features and to locate the proposed development in the least sensitive area.

Layout alternative S1a has been scoped out and only the Process Alternatives S1b and S1c will be addressed further during the EIA phase. It is important to note that during the EIA phase, a balance between alternatives Process Alternatives S1b and S1c may be identified to try and optimise mineral extraction whilst also ensuring adequate environmental and social protection. Overall however, the sensitivity-based approached Process Alternative S1c is preferred and will be the alternative guiding further investigations during the EIA phase.

6.2 PROCESS ALTERNATIVES

Process alternatives imply the investigation of alternative processes or methods to achieve the same goal for the proposed EloffPhase 3 Project. This includes using environmentally friendly designs or materials and re-using scarce resources like water and non-renewable energy sources. Process alternatives will be defined and implemented as incremental alternatives during the EIA phase and in the EMPr. Specific process alternatives which will be considered for the EloffPhase 3 Project are discussed below.

6.2.1 MINING METHOD

The opencast mining method (Process Alternative P1a) has several factors that make it more favourable when compared to other mining methods such as underground mining and these include the following:

- Economic and financial – higher productivity during the ROM and lower capital and operating costs to mine (i.e. more cost effecting as more coal can be extracted and more quickly);
- Technical – allows for improved geological certainty of reserves, and possible exposure of lower grade reserves because of the lower operational costs. Furthermore, there is increased recovery of ore / coal and fewer restrictions or limitations on mining equipment / machinery in terms of size and weight than there would be for underground mining; and
- Safety – working conditions are safer for the mine workers with regards to toxic gas and the risk of cave in or loose material which can be easily seen, removed or avoided.

Despite the factors mentioned above, there are environmental concerns regarding opencast mining due to the method's anticipated disturbance footprint on the receiving environment. However, the environmental impacts from the proposed Eloff Phase 3 Project are being addressed as part of this EIA process and the other related legal requirements that must be undertaken and authorisations obtained prior to approval. Further, the opencast mining method allows for progressive and concurrent backfilling and rehabilitation of affected land throughout the ROM, thereby limiting the affected receiving environment throughout operations. Additional mitigation measures to address all identified potential environmental impacts will be included in the EMPr towards ensuring that any environmental sensitivities and impacts are managed in accordance with the relevant legislation. The location of the proposed mining pits extension adjacent to the existing Kangala Colliery further supports the use of opencast mining as it allows for the opportunity to utilise the existing opencast mining infrastructure and services at Kangala Colliery, thereby minimising the amount of new disturbance within the project area.

In this regard, no other mining method has been considered as this would not only entail extensive amounts of new infrastructure on site to accommodate mining activities required by a new method such as underground mining in an area not previously equip for such activities. Lastly, the seam of the target coal reserves has a thickness of between 0.5m and 1.0m with an isolated maximum of 1.47m with a maximum depth of approximately 70m within the proposed project area. These characteristics of the shallow coal resource are better suited for opencast mining than underground mining which favours coal reserves at depths of over 1000m.

6.2.2 WASTE HANDLING

The construction and mostly operation of the Eloff Phase 3 Project will result in the generation and accumulation of significant quantities of waste water which may be defined as hazardous, from both the stockpile dumping areas and the mining pit extension area. All waste including waste water and discard from the Eloff Phase 3 Project activities will be handled and managed in accordance with the relevant NEMWA legislation and as such an IWML application is part of this EIA process.

With regards to waste water, the clean and dirty water will be separated at all times towards ensuring that the dirty water does not contaminate any clean water resources. The dirty water will be channelled through drains leading to a sump at the stockpile dump areas, which will then drain into the mining pit towards being pumped to the existing PCD at Kangala Colliery. There are no other alternatives being considered for the handling of waste water as the proposed process has taken environmental sensitivities and technical constraints into consideration, the use of the existing PCD allows the Eloff Phase 3 Project footprint to be reduced. This alternative will not be assessed further in the EIA phase however, the impacts associated with the proposed waste water process will be updated accordingly and the mitigation measures refined based on the detailed impact assessments to be undertaken during the EIA phase of the project.

There are 4 alternatives proposed for the handling and storage of the discard in the form of residue stockpiles, and these are as follows:

- **Process Alternative P2a – Stockpiles stored to the west of the proposed mining pit extension area**: This option involves stockpiling the separated hard and soft discard as well as topsoil material on the western edge of the proposed mining pit extension area. Although the topsoil is proposed to be temporarily stored on site to be utilised for rehabilitation purposes at a later stage, the hard and soft discard material is likely to be permanently located on site thereby impacting on the current land use through the reduction of available agricultural land. This consideration prompted the proposal of three other alternatives for the residue stockpiles as discussed below;
- **Process Alternative P2b – Using the existing Kangala Colliery stockpile area**: This option involves continuing to use the stockpile area at the existing Kangala Colliery pit for the Phase 3 Project as well. According to the Eloff MWP, mining the Phase 3 Project will only commence once the current pit at Kangala Colliery has been mined out and rehabilitated, and as such the current Kangala Colliery stockpiles would have been removed / used. Therefore, this option proposes that the area where the current Kangala Colliery stockpile areas are located which is already transformed, be used for Phase 3 Project thereby minimising the disturbance footprint at the proposed project area. This option would also eliminate the need for a new WML for the stockpile dump areas as the stockpile areas at Kangala Colliery are already licensed;
- **Process Alternative P2c – Locating the new stockpiles at the rehabilitated Kangala Colliery pit area**: This option would involve locating the Phase 3 Project stockpiles on the rehabilitated area where the Kangala Colliery pit was located. Once again, this alternative is based on that mining the Phase 3 Project will only commence once the current pit at Kangala Colliery has been mined out and rehabilitated, and as such the Kangala Colliery pit would be rehabilitated by the time the Phase 3 Project activities commence. This option will further aid in the compaction of the Kangala Colliery rehabilitated area; and
- **Process Alternative P2d – Initial Eloff Phase 3 Project discard to be used to backfill voids at the Kangala Colliery**: This options is a hybrid of the alternatives above whereby in an effort to avoid double handling of the discard material and to reduce hauling distances, the discard or material excavated from the initial box cut at the Phase 3 Project could be used to fill / backfill the final voids at Kangala Colliery.

Alternative P2b (location of the discard stockpiles at the existing Kangala Colliery stockpile area has been selected as the most feasible and preferred alternative to be further assessed during the EIA phase. Therefore, the proposed project layout as indicated in Figure 6 will be revised moving forward to exclude the stockpile areas as presented in Figure 9 below.

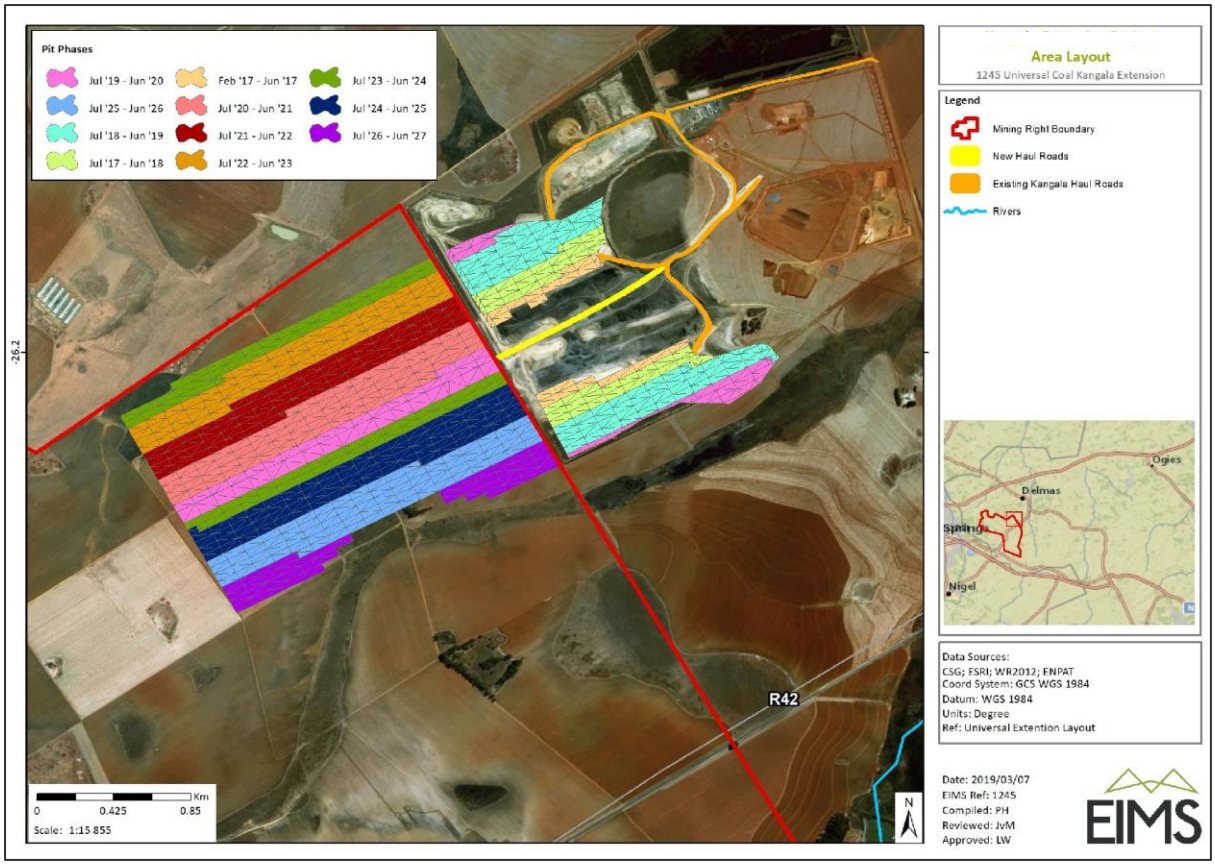


Figure 9: Revised Eloff Phase 3 Project layout excluding the initially proposed stockpile areas to the west of the project area

6.2.3 DEWATERING

Water encountered in mining operations can be either from direct rainfall into mine workings and surface runoff from surrounding areas; or groundwater seepage from surrounding aquifers. Two alternatives were identified for addressing the dewatering of the proposed opencast mining pit, and these are:

- **Process Alternative P3a – Dewater-store-discharge**: This process would pump the water out of the mining pit workings, followed by storage in the PCD and discharge. The relevant discharge legislation will be adhered to and is part of lodged WULA for the Eloff Phase 3 Project; and
- **Process Alternative P3b – Pump-store-evaporate**: This process alternative involves the dewatering of the mine workings where the coal reserves are located. This would involve dewatering by pumping the water into the open void and allowing the water to evaporate gradually. The relevant water storage legislation will be adhered to, in this regard.

The alternative involving discharging the treated mine workings water (Process Alternative P3a) will be assessed further in the EIA phase, and as stated above, has been allocated for by the inclusion of both Section 21 (g) and 21 (j) water uses in the submitted WULA.

6.2.4 WATER SUPPLY

Water Two alternatives for the supply of water to the opencast mining pit extension area were identified, namely:

- **Process Alternative P4a – Using water obtained from dirty water containment facilities**: This option involves utilising dirty water from the containment facilities (e.g. stockpile dump area sumps containing dirty runoff water, and Kangala Colliery PCD holding dirty water from the pit, etc.) for some of the

mining activities such as dust suppression at the haul roads and coal beneficiation processes at the CHPP; and

- **Process Alternative P4b – Water from existing licensed water resources**: Potable water is already supplied to the Kangala complex from a borehole and / or the Rand Water Board, and similarly it is anticipated that the potable water for the Eloff Phase 3 Project will be sourced from existing licenced resource such as boreholes and / or municipal supply whereby the amount of water utilised for the project is to be within the allocated thresholds for the water source. The relevant abstraction legislation will be adhered to in this regard.

It is anticipated that a combination of the above-mentioned alternatives with regards to water supply to the Phase 3 Project will be implemented and these alternatives will not be assessed further in the EIA phase.

6.3 TECHNOLOGY ALTERNATIVES

The selection of the technology alternatives or techniques to be adopted for the construction and operation of the Eloff Phase 3 Project are described in this section. The technology alternative considered relate to transportation options to get the coal from the opencast mining pit extension area to the Kangala Colliery CHPP.

There are two potential coal product transport options or technology alternatives considered for taking the coal from the proposed opencast mining pit to the existing Kangala Colliery processing infrastructure and subsequently to the end buyer. The feasibility of these options hinges on the proximity of the existing transport infrastructure to the proposed extension area in order to be able to minimise the amount of new transportation infrastructure required. In this regard, the following transport alternatives have been considered:

- **Technology Alternative T1a – Transportation of the coal product by road:** This involves the transport of the coal product from the mining pit area via haul road to join existing road networks within the Kangala Colliery towards getting the coal to the existing CHPP. This option is most feasible as there is already an existing road network in close proximity to the proposed extension project area leading to the Kangala Colliery CHPP, and the coal product from the Eloff Phase 3 Project will be processed at the existing Kangala Colliery CHPP; and

- **Technology Alternative T1b – Transportation of coal product by conveyor**: This option involves the transport of the coal from the Eloff Phase 3 Project mining pit by conveyor to the existing Kangala Colliery CHPP. There is no existing coal conveyor network in close proximity to the proposed project area, therefore this option would require the establishment of new infrastructure covering a significant distance between the coal product collection point and l processing facility.

In this regard, the conveyor technology alternative has been scoped out and only the road transportation option will be investigated further in the EIA phase.

6.4 ACTIVITY ALTERNATIVES

The current land use within and around the Eloff Phase 3 Project area comprise largely of agriculture, as well as mining activities. Mining operations as a land use, are often viewed as directly competing and eventually replacing existing land uses. However, a mixed land use approach consisting of both mining and continued agriculture is possible. Current agricultural activities in the vicinity and within the proposed Eloff Phase 3 Project area will be able to continue where no mining infrastructure is located, particularly because the proposed project only involves the extension of the opencast mining pit and its associated discard stockpiles rather than a full new mining operation and its associated infrastructure. All other mining infrastructure required for the Eloff Phase 3 Project other than the new pit and possibly the stockpile areas, will be from the existing Kangala Colliery.

Furthermore, several alternatives towards further reducing the project area footprint have been proposed and are being assessed, and these include handling and location options of the discard stockpile areas, as well as coal product transportation infrastructure. Furthermore, the mining method proposed for the project (opencast mining) is an extension of the existing operation at Kangala Colliery thereby reducing the need for all new mining infrastructure within the project area as many of the facilities required are already in place at the existing Kangala Colliery.

The EIA process being undertaken includes the assessment of potential impacts and the identification of environmental sensitivities within and in the vicinity of the proposed Eloff Phase 3 Project area thereby allowing for the recommendation of mitigation measures towards the avoidance, minimisation and / or management of the anticipated impacts. The EIA process outcomes will play a role in determining the mining activity footprint for the project, in relation to existing surrounding land uses.

Taking all the above into account, two activity alternatives have been considered in this Scoping Report with regards to the Phase 3 Project, and these are:

- **Activity Alternative A1 – Mining**: This option relates to the land within the proposed project area being used for mining activities. The extent of the mining activities will be subject to the findings of the EIA process guided by the sensitivity-based approach; and
- **Activity Alternative A2 – Farming**: This option relates to continuing with the current land use within the project area which is farming (i.e. cultivation / livestock).

The current land uses in and round the project area indicate that local farming activities are already exposed to mining and the two land uses are able to co-exist. The combination of mining and agriculture activities is therefore recommended as an activity alternative to be assessed further in the EIA phase, whereby mining infrastructure is located in a manner that environmental sensitivities area avoided as far as possible and farming practices continue where no mining infrastructure is located.

6.5 NO-GO ALTERNATIVE

The no-go option (Process Alternative A3) means 'do nothing' or the option of not undertaking the proposed Eloff Phase 3 Project or any of its alternatives, and therefore links to the above activity alternative of continuing with the current farming land use. As such, the 'do nothing' alternative or keeping the current *status quo* of farming also provides the baseline against which the impacts of other alternatives should be compared.

The land use scoping study in Appendix D indicates that both mining and agricultural activities are critical in the local municipality's economy. Scoping preliminary assessments of the two activity alternatives (mining and agriculture) suggest that opencast mining as a land use will yield more economic benefits in the short-term than agriculture. Furthermore, farming practises are able to commence after the previously mined areas are suitably rehabilitated in accordance with the relevant legislation thereby allowing for the economic benefits from agriculture to continue. The projected mining benefits are mostly in relation to the project's strategic value of supplying coal to Eskom, whereby the Gross Geographic Product (GGP) addition will outstrip that of agriculture over an economic generation by a significant amount, and the mining alternative will add more jobs to the local municipality. Once again, these benefits are largely in the short-term (the proposed LOM for the Phase 3 Project being 10 years).

The net employment benefit to the economy which is estimated at 113 people and the net GGP addition for the life of the project is R1.7 billion in 2017 Rands. Cognisance must be taken that the gross new employment for the mine at steady state is 300 employees, but this is reduced by a factor of 9/25 years to adjust for its shorter life span whereby 25 years is a rule of thumb of an economic generation. A similar amount of people would need to be employed during the first two years of mining operation. In addition to this, it should be noted that the GGP for the project is discounted heavily to address the inherent risk in mine economic failure. In the case of the Phase 3 Project, once a bankable feasibility study is complete and a competence persons report has been undertaken, the inherent riskiness of mining viability reduces dramatically.

The implication of not undertaking the Phase 3 Project, whereby additional coal resources would be mined, would entail a reduction in the existing Kangala Colliery's overall LOM as well as compromising its ability to ensure a consistent coal supply to its buyers including extended local and regional economic benefits. Moreover, since the area adjacent to the proposed Eloff Phase 3 Project site is currently largely agriculture, should the no-go alternative be preferred then most likely the Kangala Colliery will cease to operate and the existing mining areas will have to be rehabilitated. However, an opportunity for other mining applications for rights to access the coal reserves remaining in the area would persist which would likely require more infrastructure than the proposed Eloff Phase 3 Project.

The no-go alternative would mean that the benefits of local and regional employment at the mine would not be realised in the long term. The potential employment and economic benefits will therefore be fore-gone. The no-go alternative would maintain the current environmental *status quo* at the site thereby reducing the potential LOM at Kangala by approximately 10 years.

6.6 ALTERNATIVE ASSESSMENT

This section describes the advantages and disadvantages of the various alternatives described above. Input from specialists was obtained in order to complete this section, as presented in Table 9. Table 9 further details which alternatives are to be taken forward for further investigation in the EIA phase.

Table 9: Summary of alternative options for assessment in EIA phase

Alternative Category		Ref	Alternative description	Advantages	Disadvantages / Impacts / Risks	Extent, Duration and Significance of potential impacts for each alternative	Additional Comments	Carried forward into EIA?
Process Alternatives	Mining method	P1a	• Opencast mining	• Shallow and low stripping ratio. • Continue with current mining practice. • Surface impacts limited to the extent of the mining area. • This will result in a total loss of catchment yield but only during mining. • Less technically intensive. • Generally safer than other underground mining. • Less expensive, particularly as most of the infrastructure already exists at Kangala Colliery. • Increased ability to remove complete	• Complete surface disturbance. • Irreplaceable loss of surface resources. • Dewatering and dirty water separation will be required. • Significant surface health and nuisance impacts. • Dust creation. • Basting and vibrations impacts.	• Surface disturbance: *Significance: High* *Duration: Permanent* *Probability: High* *Reversibility: Moderate* *Irreplaceable loss: Yes* • Dust Creation: *Significance: High* *Duration: Long-term* *Probability: High* *Reversibility: Low* *irreplaceable loss: No* • Blasting and vibrations: *Significance: High* *Duration: Long-term* *Probability: High* *Reversibility: Low* *Irreplaceable loss: Yes* Health and Nuisance Impacts: *Significance: High* *Duration: Long-term* *Probability: High* *Reversibility: Low* *Irreplaceable loss: Yes*	• Adjacent Kangala Colliery is an opencast mine. • Best suited mining method for shallow coal resource, as indicated in the Eloff MWP.	✓

Alternative Category		Ref	Alternative description	Advantages	Disadvantages / Impacts / Risks	Extent, Duration and Significance of potential impacts for each alternative	Additional Comments	Carried forward into EIA?
				mineral / coal resource.				
	Location and handling of discard stockpiles	P2a	• Storage of discard consisting of hard, soft and topsoil material on the western edge of the Phase 3 Project area.	• Close proximity to the project pit area.	• Visual impact of stockpiles. • Complete surface disturbance. • Irreplaceable loss of surface resources.	• Surface disturbance: *Significance: High* *Duration: Permanent* *Probability: High* *Reversibility: Moderate* *Irreplaceable loss: Yes*		X
		P2b	• Storage of discard consisting of hard, soft and topsoil material at the Kangala Colliery stockpile area.	• Close proximity to Phase 3 Project pit area. • Reduced mining activity footprint at the project site. • Utilisation of already transformed land.	• Visual impact of stockpiles.	• Ground water contamination due to runoff and seepage: *Significance: Moderate – High* *Duration: Long-term* *Probability: Moderate* *Reversibility: None* *Irreplaceable loss: Yes*		✓
		P2c	• Storage of discard consisting of hard, soft and topsoil material at the rehabilitated Kangala Colliery pit area.	• Close proximity to Phase 3 Project pit area. • Reduced mining activity footprint at the project site.	• Visual impact of stockpiles.	• Ground water contamination due to runoff and seepage: *Significance: Moderate – High* *Duration: Long-term* *Probability: Moderate* *Reversibility: None*		X

Alternative Category		Ref	Alternative description	Advantages	Disadvantages / Impacts / Risks	Extent, Duration and Significance of potential impacts for each alternative	Additional Comments	Carried forward into EIA?
						Irreplaceable loss: Yes		
		P2d	• Initial box cut discard used to backfill voids at Kangala Colliery.	• Available material for backfilling and rehabilitation. • Reduce final void size. • Rehabilitation of the backfilled site thereby reducing hydrological and soil impacts. • Reduction of stockpile material and stockpile area footprint.	• Limited amounts of discard material will be used and therefore some will still need to be stockpiled.	• Ground water contamination due to runoff and seepage: *Significance: Moderate – High* *Duration: Long-term* *Probability: Moderate* *Reversibility: None* *Irreplaceable loss: Yes*		X
	Dewatering	P3a	Pump-store-discharge.	• Reduce impact on groundwater system because smaller surface volumes to drive any pollution plumes. • Longer before post-mine floods; longer before decant treatment. • Positive impacts resulting from	• Need very large treatment system to permit timeous dewatering of workings. • No buffer facility for future water requirements. • Potential water quality impacts if discharge is of poor quality. In addition,	• Water quality impacts: *Significance: Moderate - High* *Duration: Long-term* *Probability: Moderate* *Reversibility: None* *Irreplaceable loss: Yes* • River baseflow increase: *Significance: Moderate* *Duration: Medium-term*		✓

Alternative Category		Ref	Alternative description	Advantages	Disadvantages / Impacts / Risks	Extent, Duration and Significance of potential impacts for each alternative	Additional Comments	Carried forward into EIA?
				the discharge of good water quality allowing for the proliferation of more sensitive organisms downstream. • Discharge of water may also serve to support wetland areas associated with the discharge point. • Water will contribute to the catchment yield.	water quantity impacts (altered flows) may also negatively affect local water resources. • River baseflows will increase. This may have negative consequence in the dry season as the river systems are designed for lower base flows. This may also temporarily affect the river system *i.t.o.* river bank stability and hydrodynamics due to increased flow velocities.	*Probability: Moderate* *Reversibility: None* *Irreplaceable loss: Yes*		
		P3b	Pump-store-evaporate.	• Penstock area gives a buffer capacity during peak pumping times. • Increased retention times can result in	• If storage gets too full, it will serve as driver for contaminant plume. • Potential risk in storage of large quantities of	• Potential groundwater contamination: *Significance: Moderate - High* *Duration: Long-term* *Probability: Moderate* *Reversibility: None*		X

Alternative Category		Ref	Alternative description	Advantages	Disadvantages / Impacts / Risks	Extent, Duration and Significance of potential impacts for each alternative	Additional Comments	Carried forward into EIA?
				improved water quality of evaporating water. • Seasonal discharge variations and instream flow requirements could be accommodated if there is enough capacity in the existing penstock area.	contaminated water (spillage). In addition, water quantity impacts (altered flows) may also negatively affect local water resources. • Greater surface area of disturbed land not rehabilitated.	*Irreplaceable loss: Yes* • Water quality impacts (altered flows): *Significance: Moderate - High* *Duration: Long-term – Permanent* *Probability: Moderate* *Reversibility: Low* • *Irreplaceable loss: Yes*		
	Water supply	P4a	• Water for activities such as dust suppression obtained from dirty water containment facilities (e.g. Kangala Colliery PCD, etc.).	• Assist to reduce water to be treated. • Reduced use of clean water thus reducing overall water impact. • This will reduce the risk of surface water discharge.	• No significant disadvantages or impacts identified at this stage.			✓
		P4b	• Water from licenced ground or surface water resources (e.g. borehole abstraction,	• No additional application for permits or licensing required.	• Clean groundwater resources to be used for potable water within the community and at the mine.	• Impact on water resources through hydrological alteration: *Significance: High* *Duration: Permanent*		✓ *The feasibility of this alternative*

Alternative Category		Ref	Alternative description	Advantages	Disadvantages / Impacts / Risks	Extent, Duration and Significance of potential impacts for each alternative	Additional Comments	Carried forward into EIA?
			municipal water, etc.).		• Groundwater resources availability. • Negative impacts to water resources in the catchment through hydrological alteration (reduction in water availability).	*Probability: Moderate* *Reversibility: Low* *Irreplaceable loss: Yes*		*depends on feedback from DWS during EIA phase.*
Technology Alternatives	Coal product transport options	T1a	• Use of roads to transport coal product.	• Flexible to connect to existing Kangala Colliery transport network and processing plant. • Limited anticipated soil, aquatic and wetland impacts as there are existing road networks.	• Dust impacts due to vehicle entrainment. • Road safety and traffic impacts. • Loss of agricultural land use for the new roads.	• Dust Creation: *Significance: High* *Duration: Long-term* *Probability: Moderate* *Reversibility: Low* *Irreplaceable loss: No*		✓
		T1b	• Use of conveyor to transport coal product.	• Low dust impact.	• End point for the coal being transported needs to be very close to the proposed extension. • No existing conveyor infrastructure.	• Surface disturbance leading to impacts on biodiversity: *Significance: Moderate – High* *Duration: Medium-term*		X

Alternative Category		Ref	Alternative description	Advantages	Disadvantages / Impacts / Risks	Extent, Duration and Significance of potential impacts for each alternative	Additional Comments	Carried forward into EIA?
					• Potential additional soil, wetland and hydrological impacts associated with the construction of the conveyor.	*Probability: High* *Reversibility: Moderate* *Irreplaceable loss: Yes*		
Activity Alternatives	Land-use alternatives	A1	• Land used for mining.	• Economic advantages include continued employment for mine workers, as well as local and regional economic benefits in the short term. • opportunity to return to farming lad use post-closure of the mining activities.	• Potential for hydrological and chemical modification in local soils, wetlands and aquatic ecosystems.	• Mining impacts identified above as well as in Section 9 of this report.	• Kangala Colliery is an already operational mine, continued mining at the adjacent Phase 3 Project area is considered the most feasible land use going forward unless environmental impacts associated with the extension cannot be mitigated to acceptable levels.	✓

Alternative Category		Ref	Alternative description	Advantages	Disadvantages / Impacts / Risks	Extent, Duration and Significance of potential impacts for each alternative	Additional Comments	Carried forward into EIA?
		A2	• Land used for farming (crop cultivation / livestock).	• Land will be restored to original use consisting of livestock grazing and crop cultivation. • Reduced risk for water contamination and subsequent wetland and aquatic ecological degradation.	• Potential water quality, hydrological and soil impacts associated with agriculture. This includes nutrient input from livestock and cultivation practices as well as the physical alteration of the watercourse banks.	• Soil impacts associated with farming: *Significance: Moderate – High Duration: Long-term – Permanent Probability: Moderate Reversibility: Moderate Irreplaceable loss: Yes* • Hydrological impacts associated with farming (alteration of watercourses): *Significance: Moderate – High Duration: Long-term – Permanent Probability: Moderate Reversibility: Low Irreplaceable loss: Yes*		X *Sub-optimal land use*
		A3	• No-go alternative which is the equivalent of	• Reduced risk for water contamination	• Agricultural and residential activities will likely take place	• Similar to impacts for farming activities above due to the fact		✓

Alternative Category		Ref	Alternative description	Advantages	Disadvantages / Impacts / Risks	Extent, Duration and Significance of potential impacts for each alternative	Additional Comments	Carried forward into EIA?
			continuing with existing farming land use.	and subsequent wetland and aquatic ecological degradation. • Reduced risk to the health and safety of the local communities. • Reduced social and visual impacts.	if the no-go alternative is followed. This may result in potential impacts to soils, wetlands and aquatic ecology.	that current agricultural and residential activities will likely take place if the no-go alternative is selected as preferred.		
Location Alternatives	Micro-siting location alternatives	S1a	• Initially larger Phase 3 Project area extending further south of the currently proposed project area.	• Stand-alone coal basin. • Mining all coal in basin. • Access to more coal product. • Most of the mining infrastructure already exists at the Kangala Colliery.	• Increased disturbance footprint. • Direct impact on watercourse.	• Surface disturbance leading to impacts on biodiversity: *Significance: Moderate – High* *Duration: Medium-term* *Probability: High* *Reversibility: Moderate* *Irreplaceable loss: Yes* • Impact on water resources through hydrological alteration: *Significance: High*		X

Alternative Category	Ref	Alternative description	Advantages	Disadvantages / Impacts / Risks	Extent, Duration and Significance of potential impacts for each alternative	Additional Comments	Carried forward into EIA?
					Duration: Permanent *Probability: Moderate* *Reversibility: Low* *Irreplaceable loss: Yes*		
	S1b	• Maximum mining over entire proposed Phase 3 Project area.	• Stand-alone coal basin. • Mining all coal in basin. • Most of the mining infrastructure already exists at the Kangala Colliery.	• Unregulated, buffer insensitive mining can result in permanent impacts to soil, wetland habitats as well as downstream aquatic ecosystems.	• Ecological impacts due to surface disturbance, however this alternative will only be considered if the on-site investigations reveal no areas within the project area are of particular environmental concern or sensitivity.	• Only possible should no sensitivities be identified during the duration of the EIA process which is highly unlikely as at scoping phase preliminary impacts and receiving environment sensitivities have already been identified.	X
	S1c	• Sensitivity-based approach (avoid / buffer environmentally sensitive areas).	• The avoidance of wetland and riverine areas and the preservation of a buffer zone can assist in the regulation of	• Less mining area for the proposed extension therefore making the Phase 3 Project less economically viable and profitable.	• No significant impacts apart from the economic impact on the mine.		✓

Alternative Category		Ref	Alternative description	Advantages	Disadvantages / Impacts / Risks	Extent, Duration and Significance of potential impacts for each alternative	Additional Comments	Carried forward into EIA?
				potential water quality impacts and reduce ecosystem degradation overall.				

7 STAKEHOLDER ENGAGEMENT

The Public Participation Process (PPP) is a requirement of several pieces of South African legislation and aims to ensure that all relevant Interested and Affected Parties (I&APs) are consulted, involved and their opinions are taken into account, and a record included in the reports submitted to relevant authorities. The process aims to ensure that all stakeholders are provided an opportunity as part of a transparent process which allows for a robust and comprehensive environmental study. The PPP for the proposed project needs to be managed sensitively and according to best practises in order to ensure and promote:

- Compliance with international best practise options;
- Compliance with national legislation;
- Establish and manage relationships with key stakeholder groups; and
- Encourage involvement and participation in the environmental study and authorisation / approval process.

As such, the purpose of the PPP and stakeholder engagement process is to:

- Provide an opportunity for I&APs to obtain clear, accurate and comprehensible information about the proposed activity, its alternatives or the decision and the environmental impacts thereof;
- Provide I&APs with an opportunity to indicate their view-points, issues and concerns regarding the activity, alternatives and / or the decision;
- Provide I&APs with the opportunity to suggest ways of avoiding, reducing or mitigating negative impacts of an activity and enhancing positive impacts;
- Enable the applicant to incorporate the needs, preferences and values of I&APs into the activity;
- Provide opportunities to avoid and resolve disputes and reconcile conflicting interests;
- Enhance transparency and accountability in decision-making;
- Identify all significant issues for the project; and
- Identify possible mitigation measures or environmental management plans to minimise and / or prevent environmental impacts associated with the project.

The PPP for this project has been undertaken in accordance with the requirements of the MPRDA and NEMA, as well as in line with the principles of Integrated Environmental Management (IEM). IEM implies an open and transparent participatory process, whereby stakeholders and other I&APs are afforded an opportunity to comment on the project.

7.1 LEGAL COMPLIANCE

The PPP must comply with several important sets of legislation that require public participation as part of an application for authorisation or approval, namely:

- The Mineral and Petroleum Resources Development Act (Act No. 28 of 2002 – MPRDA);
- The National Environmental Management Act (Act No. 107 of 1998 – NEMA);
- The National Environmental Management Waste Act (Act No. 59 of 2008 – NEMWA); and
- The National Water Act (Act No. 36 o1998 – NWA).

Adherence to the requirements of the above-mentioned Acts will allow for an Integrated PPP to be conducted, and in so doing, satisfy the requirement for public participation referenced in the Acts. The details of the Integrated PPP followed are provided below.

7.2 GENERAL APPROACH TO PUBLIC PARTICIPATION

The PPP for the proposed Phase 3 Project has been undertaken in accordance with the requirements of the MPRDA, NWA and NEMA, as well as in line with the principles of Integrated Environmental Management (IEM). IEM implies an open and transparent participatory process, whereby stakeholders and other I&APs are afforded an opportunity to comment on the project. The PPP for the proposed Phase 3 Project have been undertaken in accordance with Chapter 6 of the NEMA EIA Regulations (2014, as amended).

7.3 IDENTIFICATION OF INTERESTED AND AFFECTED PARTIES

The I&AP databases compiled for various past environmental authorisation processes in the vicinity of the proposed Phase 3 Project have been utilised towards compiling a pre-notification register of key I&APs to be notified of the Environmental Authorisation Application. The I&AP database includes amongst others: landowners, communities, regulatory authorities and other specialist interest groups. Additional I&APs have been registered during the initial notification and call to register period. The I&APs database will continue to be updated throughout the duration of the EIA process. A full list of I&APs is attached in Appendix C.

7.3.1 LIST OF AUTHORITIES IDENTIFIED AND NOTIFIED

The following Government Authorities were notified of the proposed project:

- Mpumalanga Department of Agriculture, Rural Development, and Land Administration
- Mpumalanga Department of Economic Development and Tourism
- Mpumalanga Department of Health
- Mpumalanga Department of Human Settlement
- Mpumalanga Department of Public Works, Roads and Transport
- Mpumalanga Department of Social Development
- Mpumalanga Department of Water and Sanitation
- Mpumalanga Lakes District Protection Group
- Mpumalanga Tourism and Parks Agency
- National Department of Environmental Affairs
- National Department of Mineral Resources
- National Department of Agriculture, Forestry and Fisheries
- National Department of Rural Development and Land Reform
- National Department of Water and Sanitation
- Cooperative Governance and Traditional Affairs (COGTA)
- Nkangala District Municipality
- Victor Khanye Local Municipality
- South African National Roads Agency Limited (SANRAL)
- Eskom Holdings SOC Limited
- Transnet SOC Limited
- South African National Parks (SanParks)
- South African Heritage Resources Agency (SAHRA)

7.3.2 OTHER KEY STAKEHOLDERS IDENTIFIED AND NOTIFIED

The following key stakeholders have been identified and notified of the proposed project:

- Mpumalanga Landbou / Agriculture
- Delmas Agricultural Council
- Birdlife South Africa
- Wildlife & Environmental Society of South Africa (WESSA)
- AFGRI
- Agri Mpumalanga

- South African National Biodiversity Institute (SANBI)
- Mpumalanga Wetland Forum
- Endangered Wildlife Trust
- Adjacent landowners

7.4 INITIAL NOTIFICATION OF I&APS

The PPP commenced on the 10th August 2018 with an initial notification and call to register for a period of 30 days, ending on the 10th September 2018. Initial call to register notifications were conducted as presented below.

7.4.1 REGISTERED LETTERS, FAXES AND EMAILS

Registered letters, emails and facsimiles (faxes) were prepared and distributed to the identified relevant authorities, affected and adjacent landowners and legal occupiers, ward councillors and other pre-identified key stakeholders. The notification documents included the following information:

- The purpose of the proposed project;
- Details of the MPRDA, NEMA and NWA Regulations that are anticipated to be applicable and must be adhered to;
- List of anticipated activities to be authorised;
- Location and extent of activities to be authorised;
- Details of the affected properties (including a locality map or an indication of where the locality map may be viewed or obtained);
- Brief but sufficient detail of the intended operation to enable I&APs to assess / surmise what impact the project will have on them or on the use of their land (if any);
- Initial call to register duration; and
- Contact details of the EAP.

In addition, a registration form was included in the registered letters, emails and facsimiles distributed to I&APs and it included a request for the following information from I&APs:

- Provide information on current land uses and their location within the area under consideration;
- Provide information on the location of environmental features on site,
- State how and to what standard or extent they perceive these identified features are likely to be impacted upon by the proposed project;
- Provide information on how they consider that the proposed Phase 3 Project will impact on them or their socio-economic conditions;
- Make proposals as to how the potential impacts on identified environmental features, their infrastructure, and socio-economic concerns may be managed, avoided or mitigated;
- Details of the landowner and information on lawful occupiers;
- Details of any communities existing within the area;
- Details of any Tribal Authorities within the area;
- Details of any other I&APs that need to be notified;
- Details on any land developments proposed; and
- Any specific comments or concerns regarding the proposed Phase 3 Project application for environmental authorisation.

Proof of the registered letters, emails and facsimiles that were distributed during the initial notification and call to register period are attached in Appendix C.

7.4.2 SITE NOTICES AND POSTERS

14 Site notices were placed along the perimeter of the proposed project area and its surroundings on 3rd August 2018. Furthermore, A3 posters (English and Afrikaans) were placed at three public areas / venues in the vicinity of the proposed project area. The on-site notices and posters included the following information:

- Project name;
- Applicant name;
- Project location;
- Description of the environmental authorisation application process;
- Legislative requirements; and
- Relevant EAP contact person details for the project.

Please refer Appendix C for proof of site notice and poster placement.

7.4.3 BACKGROUND INFORMATION DOCUMENT

Included in the I&AP notification letters, emails and facsimiles, was a Background Information Document (BID). The BID includes the following information:

- Project name;
- Applicant name;
- Project location;
- Map of affected project area;
- Description of the environmental authorisation application process;
- Information on document review; and
- Relevant EAP contact person details for the project.

Please refer to Appendix Cfor a copy of the BID issued to I&APs.

7.4.4 ONE-ON-ONE CONSULTATION

Further to the site notices and A3 poster placement, one-on-one consultations with the community were conducted where possible, whereby the EAP endeavoured to consult with as many I&APs (affected and surrounding landowners, farm workers and land occupiers within and adjacent to the proposed project area, as well as the community at large) during the site notice and poster placement site visit. Encountered I&APs were presented with an A4 size notification as well as a verbal explanation of the project and the EIA and public participation processes. The consultations were as far as possible undertaken in the language of choice of the community member (mostly in isiZulu and Afrikaans). Furthermore, the community members were given an opportunity to provide comment and / or express their concerns regarding the proposed project, as well as to sign the initial notification register towards being included in the I&AP database for future consultation. All comments received to date were recorded and are included in the Issues and Responses Report (Appendix C) and summarised in Table 12 under Section 7.7) .

7.4.5 NEWSPAPER ADVERTISEMENTS

Two advertisements (English and Afrikaans) were placed on the 10th August 2018 in the Streeknuus newspaper which was indicated to have the widest reach within the project area and its vicinity towards notifying the public regarding the proposed ELoff Phase 3 Project. An English notice was also published in the Mpumalanga Provincial Gazette on the 3rd August 2018. The details of the advertisements are presented in Table 10 below.

Table 10: Details of initial notification and call to registered advertisements

Newspaper	Language(s)	Date/ Issue
Mpumalanga Provincial Gazette	English	03 August 2018 (Provincial Notice 106 of 2018, Volume 25 No. 2953)
Streeknuus	English and Afrikaans	10 August 2018

The newspaper advertisements and the provincial e-gazette included the following information:

- Project name;
- Applicant name;
- Project location;
- Description of the environmental authorisation application process;
- Legislative requirements; and
- Relevant EAP contact person details for the project.

As stated in sections above, I&APs were provided a period from 10th August 2018 to 10th September 2018, to register for the proposed project. It is important to note however, that I&AP registration is on-going and will continue through the EIA process.

7.5 NOTIFICATION OF AVAILABILITY OF SCOPING REPORT

Notification regarding the availability of this Scoping Report for public review has been given in the following manner:

- Registered letters with details on where the Scoping Report is available from, as well as the duration of the public review comment period, were distributed to all registered I&APs (which includes key stakeholders, affected and surrounding landowners, and registered occupiers);
- Facsimile notifications with information similar to that in the registered letter described above, were distributed to all registered I&APs; and
- Email notifications with a letter attachment containing the information described above were also distributed to all registered I&APs.

The Scoping Report was made available for public review at the Delmas Pubic Library from the 12th June 2019 until the 13th July 2019, for a period of 30 days.

Table 11: Details of Scoping Report adverts

Newspaper	Language(s)	Date/ Issue
Streeknuus	English and Afrikaans	13 June 2019

7.6 PUBLIC MEETING

A public meeting is scheduled at the Delmas Afgri Hall during the Scoping Report public review period on 3 July 2019. The main objectives of the public meeting are to share available information with the I&APs pertaining to the findings of the Scoping phase studies, as well as to provide the I&APs with the opportunity to ask questions, raise potential issues and concerns, and to make comments on the proposed project. Details of the venue, date

and time of the public meeting were included in the Scoping Report availability notifications distributed to registered I&APs.

7.7 ISSUES AND REPONSES

Issues raised to date have been addressed in a transparent manner and the full details (such as the comment received, the name of the I&AP who commented, the issue raised and the main aspect of the raised issue, as well as the response provided to the I&AP) included in the Public Participation Report (Appendix C). A summary of the key issues / comments raised and an indication of where these issues are addressed in this Scoping Report, is presented in Table 12 below.

Table 12: Summary of issues raised by I&APs

Issue / Comment Raised	Aspect	Where Issue is Addressed
Request for registration.	Registration.	Section 7.3 – Identification of I&APs.
Contact detail provided for inclusion in the project database.	Contact details.	Section 7.3 – Identification of I&APs.
Impact of mining activities on farmsteads and community houses.	Blasting and vibrations impacts. Social impacts (including impact on existing infrastructure).	Section 9.3.9– Blasting and vibrations impacts and proposed mitigation measures. Section 9.3.10– Social impacts and proposed mitigation measures.
Request for means of communicating with and lodging complaints to the mine.	Formal complaints process.	Section 9.3.10 – Social impacts and proposed mitigation measures.
Concern from landowner about the drying out of private boreholes.	Impact on hydrogeology (groundwater).	Section 9.3.3 – Hydrogeology impacts and proposed mitigations measures.
Blasting impacts on the farm animals.	Blasting and vibration impacts. Social impacts (including impact on existing infrastructure).	Section 9.3.9 – Blasting and vibration impacts and proposed mitigations measures. Section 9.3.10 – Social impacts (including impact on existing infrastructure).
Blasting without notification to surrounding landowners and community.	Blasting and vibration impacts. Social impacts (including communication with I&APs).	Section 9.3.9 – Blasting and vibration impacts and proposed mitigations measures. Section 9.3.10 – Social impacts and proposed mitigation measures.

Issue / Comment Raised	Aspect	Where Issue is Addressed
Impacts of mining activities on landowners and communities in close proximity to the proposed project.	Social impacts.	Section 9.3.10 – Social impacts and proposed mitigation measures.
Requests for project information such as maps, property details, notification documentation and reports.	Request for Information.	Appendix C – Public participation Report.
The effect of the proposed mining operations on the dolomitic aquifer underlying the area which is important for the domestic water supply of surrounding farmers as well as Delmas and Eloff residents.	Impact on hydrogeology (groundwater).	Section 9.3.3 – Hydrogeology impacts and proposed mitigations measures.
The loss of employment, job security and viable farming operations as a result of the sterilisation of agricultural land.	Social impacts (including employment concerns). Impact on soils. Impact on land use.	Section 9.3.6 – Impacts on soils and proposed mitigation measures. Section 9.3.10 – Social impacts and proposed mitigations measures. Section 9.3.11 – Impacts on land use and proposed mitigations measures. Section 6 – Activity alternatives have been considered and will be further assessed in the EIA phase.
Concern that the project area in which earmarked for Extensive Agriculture and is understood to be zoned as “commercial agriculture”. In terms of the Delmas Town Planning Scheme, 2007, “mining” is a use not	Impact on land use (land use constraints).	Section 9.3.11– Land use impacts and their proposed mitigations measures.

Issue / Comment Raised	Aspect	Where Issue is Addressed
permitted within land zoned as commercial agriculture.		
The cumulative impact of the proposed project and existing mining operations.	Cumulative impacts.	Section 9.1.1 – Impact Assessment Methodology which includes the consideration of cumulative effects.
Request for one-on-one meetings.	Project correspondence with I&APs.	Section 7.2 – General approach to public participation. Section 7.6 – Public meetings.
Interest on activity that takes place within the Olifants Water Management Area which may have an impact on water resources.	Impact on hydrology.	Section 9.3.4 – Hydrology impacts and their proposed mitigations measures.
Concerns regarding the location of the project area in relation to surrounding communities and the need for the maintenance of adequate buffer zones.	Social impacts. Impact on land use.	Section 9.3.10 – Social impacts and their proposed mitigation measures. Section 9.3.11 – Impacts on land use and their proposed mitigation measures. Section 6 – Location alternatives have been considered and will be addressed further in the EIA phase.

8 ENVIRONMENTAL ATTRIBUTES AND BASELINE

This section of the Scoping Report provides a description of the environment that may be affected by the proposed Phase 3 Project. Aspects of the biophysical, social and economic environment that could be directly or indirectly affected by, or could affect, the proposed extension have been described. Baseline information sourced from the various scoping phase specialist studies has been utilised to prepare the environmental attributes baseline below.

8.1 TOPOGRAPHY

A National Aeronautics and Space Administration (NASA) Shuttle Radar Topography Mission (SRTM) (V3.0, 1 arcsec resolution) Digital Elevation Model (DEM) was obtained from the United States Geological Survey (USGS) Earth Explorer website. Basic terrain analysis was performed on this DEM using the SAGA GIS software that encompassed slope and channel network analyses in order to detect catchment areas and potential drainage lines respectively. The following processes have been considered for the desktop assessment:

- The project area is gently sloping to the north east, with an elevation range from approximately 1570 meter above sea level (masl) to 1620 masl (Figure 10);
- The project area is dominated by flat / gentle slopes between 0% and 4% without any major height changes within the project boundaries (Figure 11); and
- The northern portion is north facing, with the remainder being east facing (Figure 12).

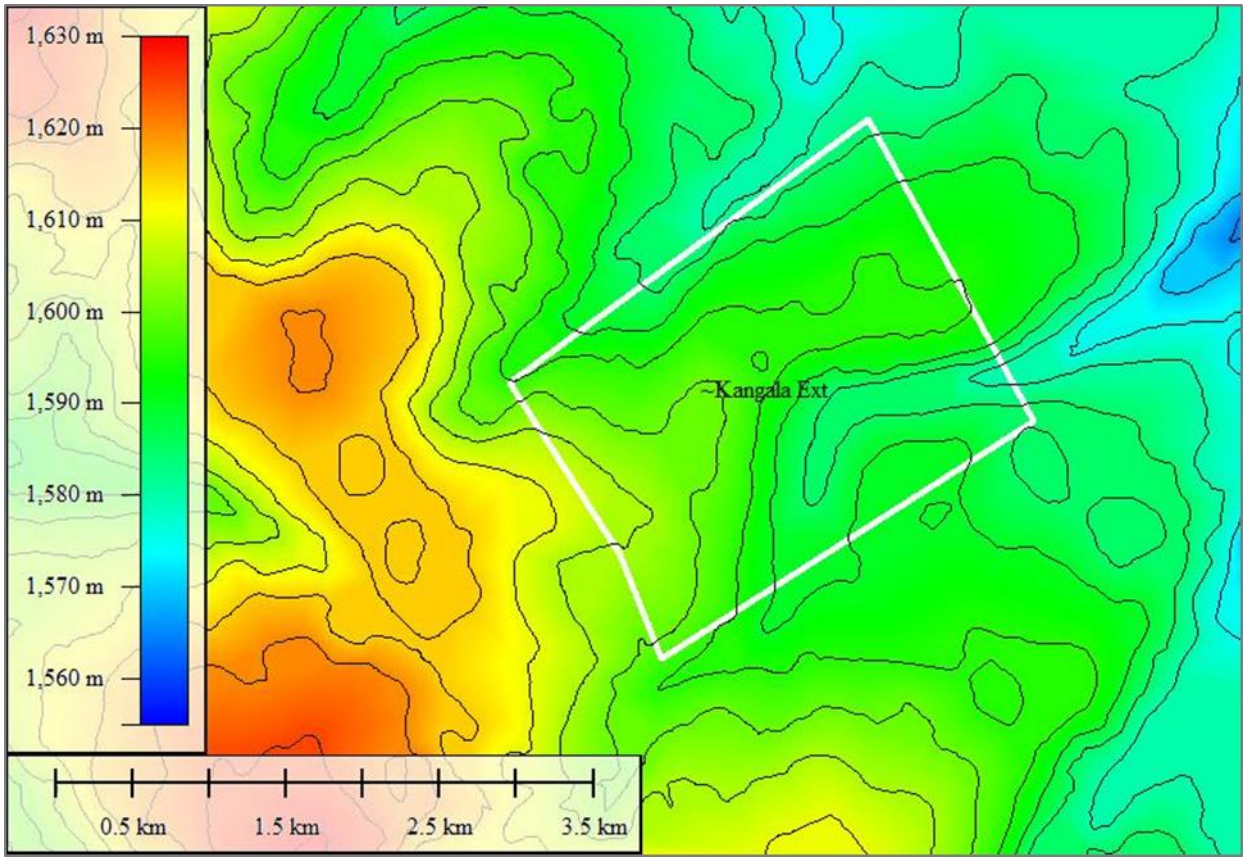


Figure 10: The Relief Map for the Eloff Phase 3 Project area

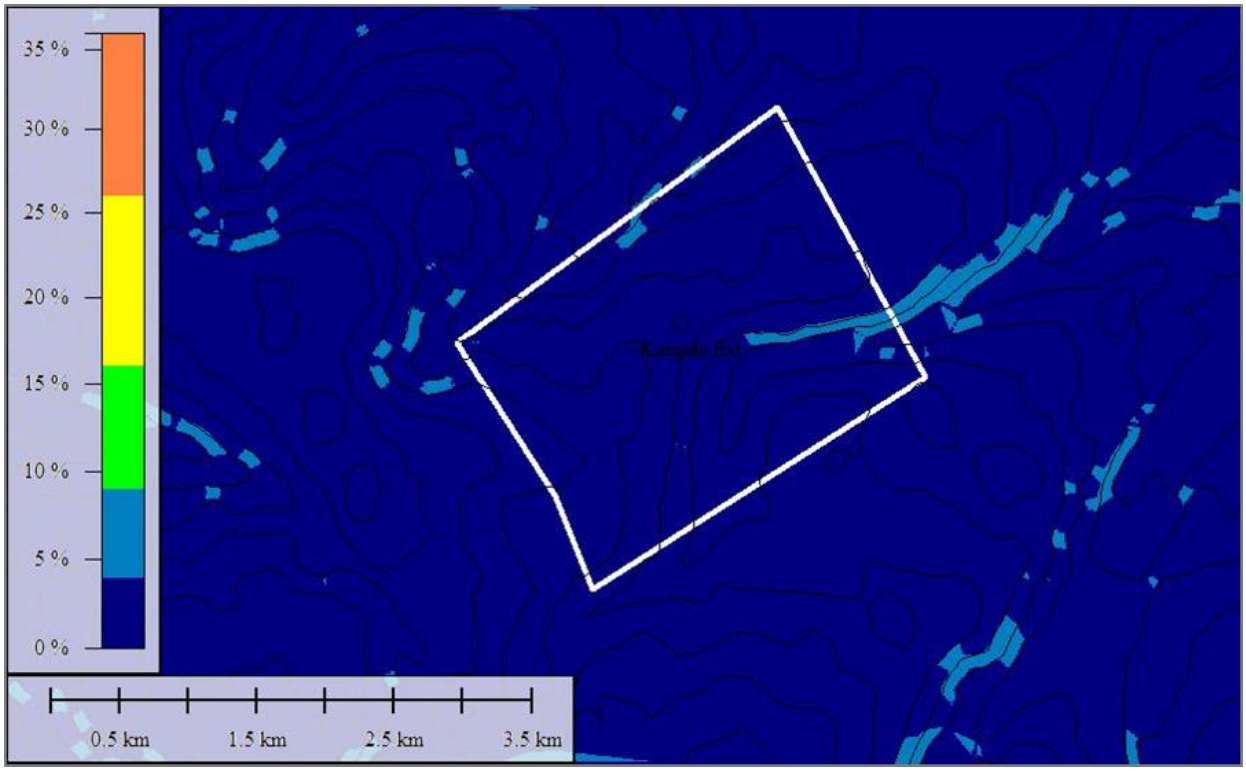


Figure 11: The Slope Percentage map for Eloff Phase 3 Project area

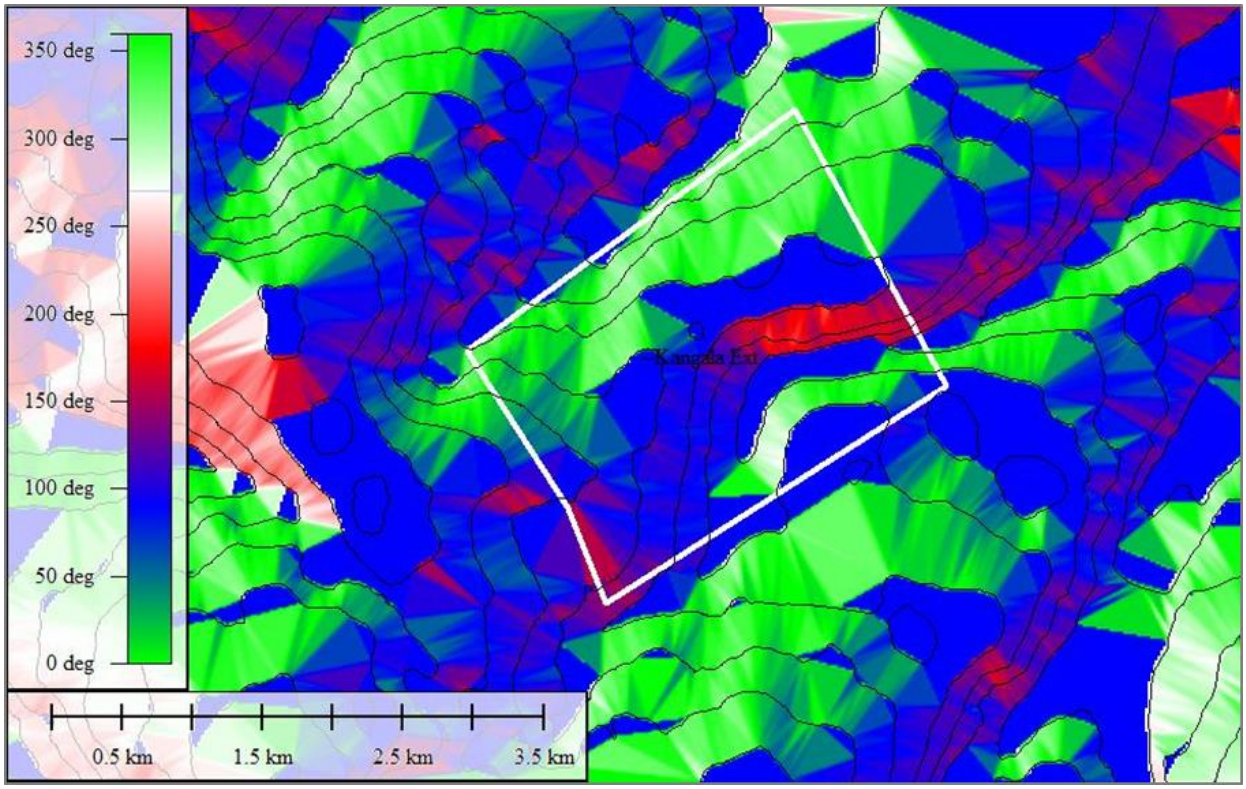


Figure 12: The Slope Aspect map for Phase 3 Project area

8.2 GEOLOGY

According to the geology excerpt from the Eloff MWP (Exxaro Coal Central, 2016), the region consists of the following pre-Karoo lithologies, i.e. granite basement rocks of Archean age, quartzite of the Witwatersrand

Supergroup, lava of the Ventersdorp Supergroup, dolomite (Malmani Subgroup), chert, quartzite and shale from the Pretoria Group (Transvaal Supergroup). These are overlain in places by the Karoo Supergroup which consists of diamictite (tillite) of the Dwyka Group followed by sandstone, shale, mudstone and coal of the Vryheid Formation (Ecca Group).

Figure 13 and Figure 14shows the regional and local geology (respectively) of the project area, indicating that the site is underlain by lithologies of the Vryheid Formation (Ecca Group), localized dolerite intrusions and younger alluvium. The Vryheid Formation consists of beds of soft, dark grey sandy shale, which alternates with thick beds of yellow to white cross-bedded sandstone and grit with a few coal seams (GSSA, 1989). There are three major coal seams that occur in the project area namely the Bottom, Middle and Top seams (Exxaro Coal Central, 2016).

The 1:250 000 scale geological map indicates Malmani Subgroup dolomite (Transvaal Supergroup) to the north-east of the project area. A report by Saxum Mining in 2015 titled: “Highwall Profile Definition and Stability Assessment for the Eloff Project – June 2015”, noted the following:

- A stratigraphic cross section drawn indicates geological complexity from north to south;
- The depth to the Bottom coal seam ranges from ~62 m on the northern side to ~96 m in the southern side, which is displaced due to a dolerite sill intrusion;
- The dolerite intrusion influences the resource significantly and has caused a reduction in the minable coal; and
- It is suggested that the dolerite intrusion has divided the resource into an eastern and western portion. The dolerite on the eastern side occurs below the Dwyka tillite and occurs as a flat transgressive sill-like body.

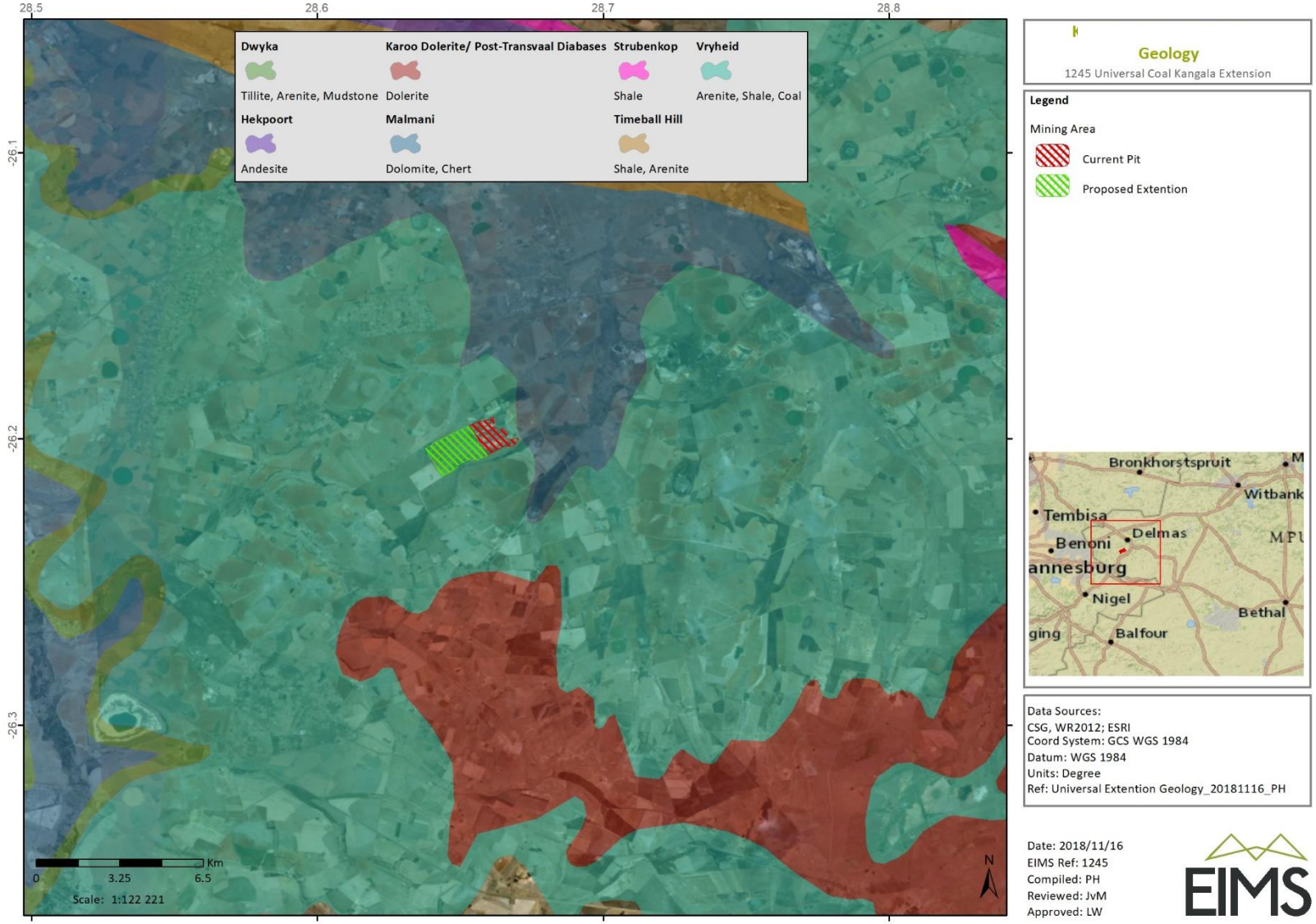


Figure 13: Regional geological map

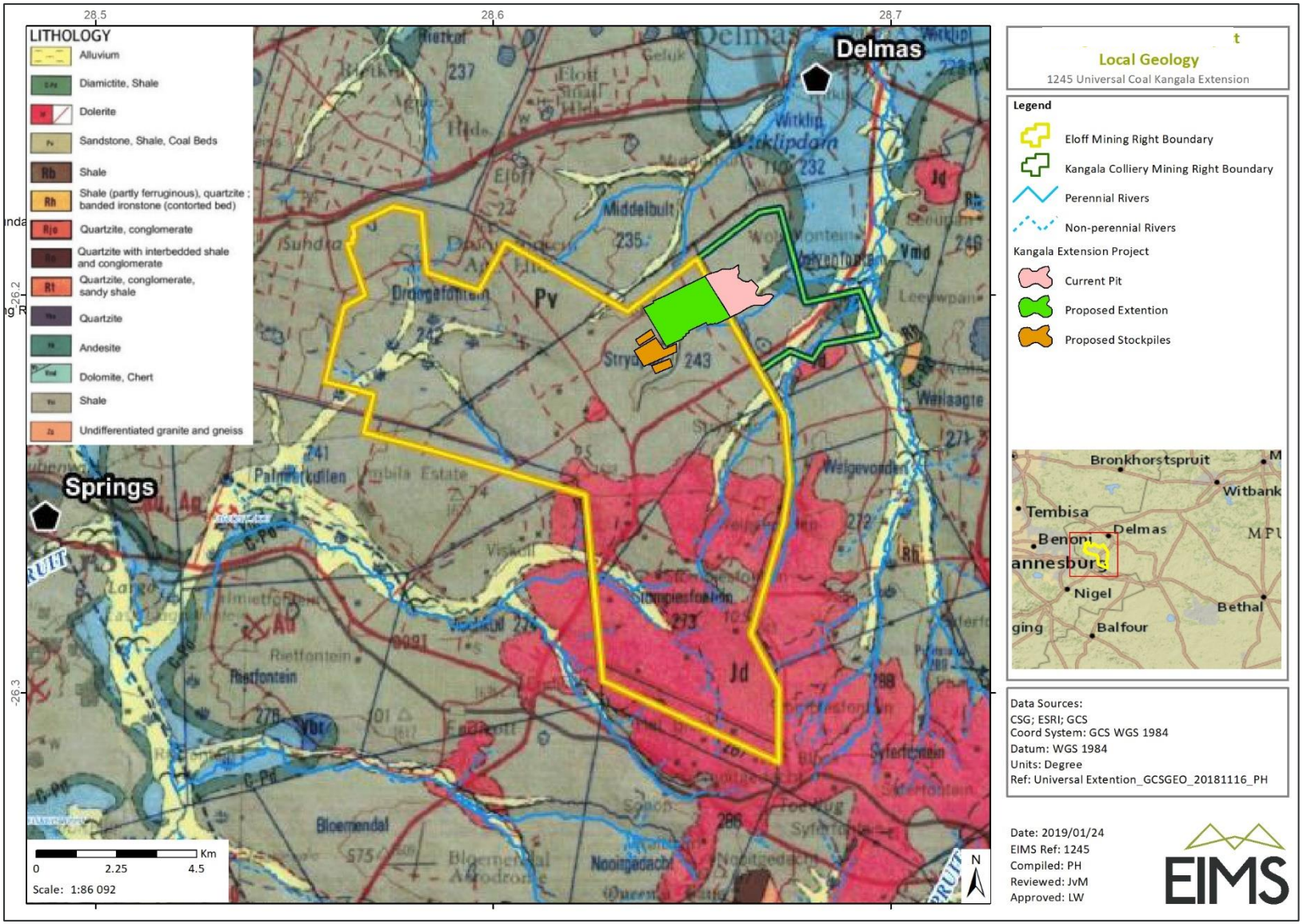


Figure 14: Local geology of the Eloff mining right area within which the Eloff Phase 3 project is located

8.3 CLIMATE

The Eloff Phase 3 Project area falls within the Eastern Highveld Grassland region (Gm12) (Mucina & Rutherford, 2006). Strongly seasonal summer rainfall, with very dry winters. The mean annual precipitation (MAP) is between 650–900 mm (overall average: 726 mm), whereby the MAP is relatively uniform across most of this unit, but increases significantly in the extreme southeast. The coefficient of variation in MAP is 25% across most of the unit, but drops to 21% in the east and southeast. There is an incidence of frost from 13–42 days, but this is higher at higher elevations. Figure 15 illustrates the climate summary for the Eastern Highveld Grassland.

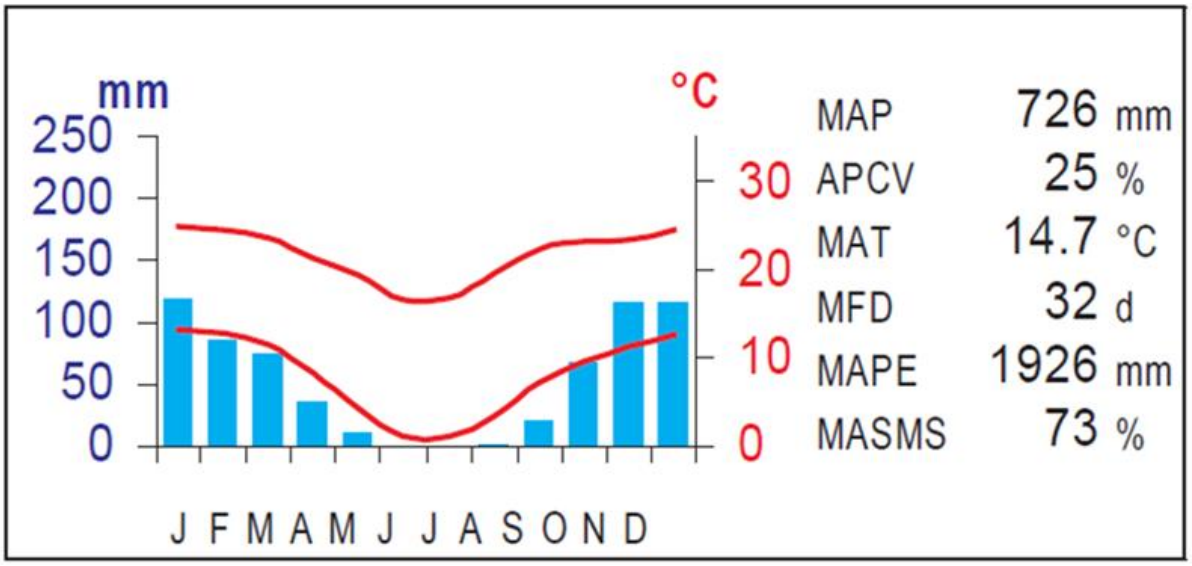


Figure 15: The climate summary for the Eastern Highveld Grassland (Gm 12) region (Mucina & Rutherford, 2006)

The regional average, maximum and minimum temperatures range between 16.5°C, 36.1°C and -2.1°C, respectively. The month of June experiences the lowest temperature of approximately -2.1°C whereas the maximum temperature of 36.1°C occurs in September. During the day, temperatures increase to reach maximum at around 14:00 in the afternoon. Ambient air temperature decreases to reach a minimum at around 06:00 (i.e. just before sunrise).

According to the rainfall data from the Delmas Vlakplaas Weather Station between 1979 and 2009, the mean annual precipitation, on a more local level of the project area, is 681 mm (Maartens, 2011). Precipitation occurs as showers and thunderstorms and falls mainly from October to March (about 58 days of measurable rain per year) with the maximum falls occurring in November, December and January. Rainstorms are often violent (up to 120 mm can occur in one day) with severe lightning and strong winds, sometimes accompanied by hail. The winter months are dry with the combined rainfall in June, July and August making up only 3.1 % of the annual total according to the data obtained from the Delmas Vlakplaas Weather Station.

Furthermore, wind data indicated that during the period of 2014 – 2016 the wind field was dominated by strong winds from the north, west-northwest, east and east-southeast. The strongest winds (more than 6 m/s) were recorded from the northwest and west-northwest, occurring mostly during the day (06:00 to 18:00). Calm conditions occurred 6.0% of the time. An increase in dominant winds from the east and east-southeast occurred at night (18:00 to 06:00). Seasonal wind fields vary considerably. During spring and winter months, the dominant winds are from the north, west-northwest and east. The summer season is dominated by winds from the east and southeast, whereas the autumn season is dominated by easterly, south-easterly, and north-westerly winds.

The land type database (Land Type Survey Staff, 1972 – 2006) indicates that the project falls within the Bb3 land type (Figure 17). The Bb3 land type is dominated by the crest (1) and midslope (3) terrain units (Figure 16). These landscape positions are dominated by Avalon and Hutton soil forms. The valley bottom (5) positions are dominated by Rensburg, Katspruit, and Willowbrooke soil forms. The geology is dominated by shale, sandstone, clay, conglomerate, limestone and marl of the Ecca Group; shale and tillite of the Dwyka Formation, Karoo Sequence; dolerite; occasional Ventersdorp lava, Witwatersrand quartzite and slat; and dolomiteolis.

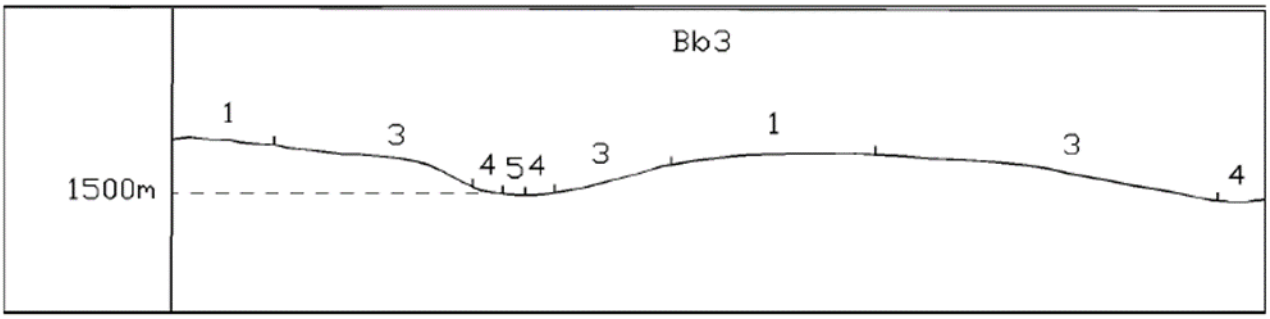


Figure 16: An illustration of the terrain units of the Bb3 land type

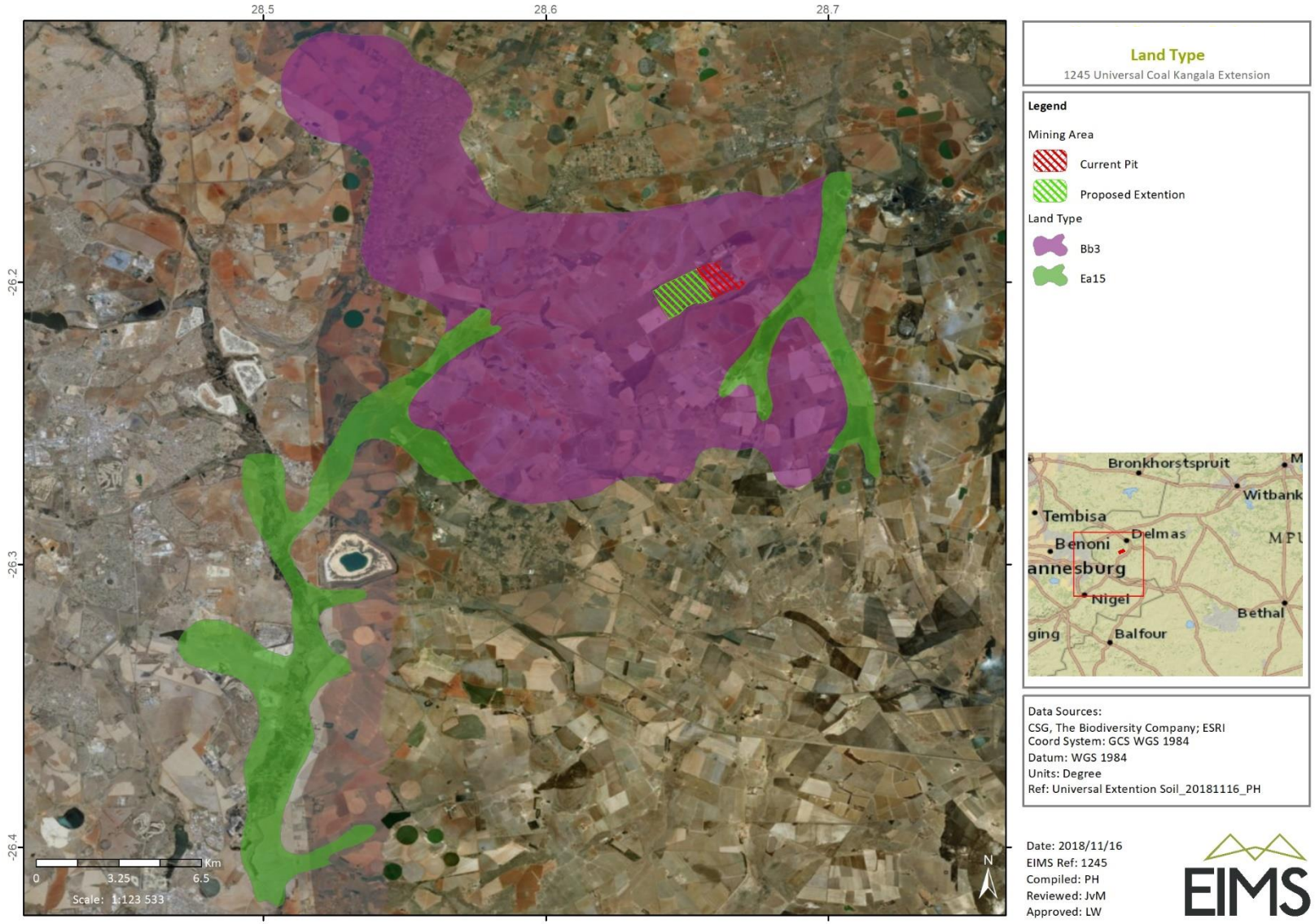


Figure 17: Land type map for the Eloff Phase 3 Project area

8.4 LAND CAPABILITY

The project area is gentle in relief with slopes of less than 4%. The land type data suggest that soils of the Hutton and Avalon soil forms are present in the crest to midslope positions, with Rensburg, Katspruit, and Willowbrooke soil forms in the valley bottoms. The average land capability based on the land type data is that of a class III (moderate cultivation). Class III land would pose moderate limitations to agriculture with some erosion hazard potential and would require special conservation practice and tillage methods. The farming method for this land capability would require the rotation of crops and ley (50%).

8.5 LAND USE ECONOMICS

The land use economics scoping study was conducted by Strategy for Good in August 2018 for the proposed Eloff Phase 3 Project, the full report is available in Appendix D. The current land use seems to be croplands with some depressions within the project boundary, the area to the east of the project area has been mined. In general, however, the dominant land use of the surrounding area is cultivated land / agriculture, predominately maize cropping and to a lesser extent other crop plants such as Soya. Remaining areas of natural vegetation are utilised for livestock grazing predominately by cattle. Other land uses nearby include extensive coal mining operations, most of which are opencast mines.

The District is predominantly a rural area, comprising extensive farming, nature reserves and mining areas. There are approximately 165 towns and villages distributed throughout the area. The Nkangala District has a dispersed spatial structure that can mainly be ascribed to the distribution of natural resources (e.g. coal) which determined the location of many settlements, and the former homeland areas to the north which are under Traditional Authority.

8.5.1 SALIENT ECONOMIC BASELINE ASPECTS

This distorted spatial structure makes the provision of community facilities costly and problematic. It results in the duplication of facilities and services, which is evident from the analysis of community facilities in the District. The threshold levels for the provision of community services are, however, low in rural areas due to vast distances and low population densities characterising these areas.

The spatial distribution of people reflects that there are three distinguishable groups of people affected by poverty, namely:

- Tribal Authority Areas: The main concentration of poor people is in the north west of the Nkangala District. The conglomeration of settlements in these areas present communities displaced. These areas have limited local economies, because expenditure until recently mainly occurred closer to employment centres;
- Informal Settlements: The second concentration of poor people is communities residing in informal settlements on the periphery of towns, specifically the informal settlements situated around main city centres. The population densities in these areas are very high, with poor access to basic infrastructure and community facilities. These areas also have no local economies and are reliant on the main centres for employment and business activities; and
- Farms and Mining Villages: The third category of poor people resides in the rural areas on small mining villages and on farms. The communities residing on farms are particularly vulnerable, as they do not have ownership of the land where they are staying and are affected by evictions and unfair labour practices. These communities must travel long distances to the major centres in the Nkangala District to access community facilities and economic activities and are highly reliant on public transport, which is generally poor.

The N4 and N11 freeways create economic opportunities for the Nkangala District through trade opportunities associated with the Maputo and Richards Bay harbours as well as tourism opportunities associated with some of the main tourism centres in South Africa. The inherent potential to this initiative is however not optimally utilised at this stage.

The R540, which runs from the N4 freeway through Emakhazeni and Dullstroom, provides a link with the tourist attractions located in the Graskop, Lydenburg, Sabie, Pilgrim's Rest and Hoedspruit areas (Tourism Triangle) which should be protected and further enhanced in future. The road network in southern parts of the district is frequently damaged due to high volumes of coal haulage.

The NDM Industrial Development Strategy identified significant potential for manufacturing in the District in other centres like Victor Khanye, Emakhazeni, KwaMhlanga, Kwaggafontein and Siyabuswa but most of this potential is latent at this stage. Agriculture is very important to the economy of the district. The southern regions of Nkangala are suitable to crop farming, specifically for fresh produce such as maize and vegetables. The northern regions are suitable for cattle farming and game farms. Agri-processing and export opportunities in view of the linkages to two harbours are not fully utilised while agricultural activity in Thembisile Hani and Dr JS Moroka is at a very low (mainly subsistence) level.

The Nkangala District offers considerable tourism potential. The economy of the eastern areas of the District is already growing due to the increasing popularity of tourist destinations in the Emakhazeni Municipality. The north western areas of the District also offer opportunities for tourism, through the consolidation of the various nature reserves and open spaces in Dr JS Moroka and Thembisile Hani, but this potential is unexploited at this stage.

The agriculture and tourism sectors have the potential to employ large numbers of relatively unskilled workers. Hence, these sectors should be targeted in order to use indigenous resources to create jobs. The greatest challenge that Nkangala faces is in terms of the availability of water resources, as well as the distribution and management of water services in the former homeland areas.

8.5.2 GROSS GEOGRAPHIC ANALYSIS

Nkangala had a Gross Geographic Product (GGP) of R112.3 billion in 2015 and this made up 41.2% of the province's GGP. Nkangala's GGP is 3.1% of the national Gross domestic product (GDP) as at 2015, and this is, relatively speaking, a significant GGP in South Africa. Unfortunately, the average annual growth rate of the Nkangala economy between 2005 and 2015 was only 1.4% and did not match the increase in the population growth rate. The GGP of Victor Khanye at 2015 current prices was R9.6 billion which was 7.8% of the district municipality. Again, relatively speaking, R9.6 billion is a large economy for a local municipality.

The sectoral breakdown of Nkangala shows that agricultural and mining had respective GGP's of R2.1 billion and R45.9 billion. These made up 43% of Nkangala's total GGP of R112.3 billion in 2015. To put this in perspective, mining and agriculture today comprise ~ 10% of the South African economy. The total of coal mining and electricity production makes up 50% of the Nkangala economy, whereas the national equivalent comparison is 12%. This is an indication of how skewed the Nkangala economy is.

In the case of Victor Khanye, the agricultural sector is relatively higher as a proportion of its own GGP compared with the equivalent for Nkangala. In the latter, most of the mining takes place in Emalahleni and Steve Tshwete. The average annual growth rate of agriculture in Nkangala was 1.8% between 2005 and 2015, and for mining it was a relatively low growth rate of 0.9%. The construction and finance sectors had the highest growth rates of all the sectors in the economy.

The Tress index which measures the degree of concentration of an area's economy on a sectoral basis shows that Nkangala has a relatively high concentrated economy as was indicated above where mining and electricity made up more than 50% of the total production in the district. As is to be expected, when a Tress index is high, then one would expect the location quotient for a number of sectors will also be high. A location quotient measures the comparative advantages of one region over another. In the case of Nkangala, the location quotient for mining and electricity respectively is 5 and 2.5 times higher than that of South Africa. On the one hand, this simply corroborates that Nkangala is rich in coal resources, and subsequently power generation plants, which is an undoubted comparative advantage. On the other hand, it also indicates that unless these comparative advantages are widely used for economic diversification, Nkangala's economy may not be sustainable.

8.5.3 LABOUR AND POVERTY

In 2015, Nkangala had a working age population of 920 000 people. Of this amount, the economically-active population was only 573 000 people. The economically-active population had an average annual growth of 3.4%, which confirms that the influx of work seekers, given that the total population growth rate in SA is much lower. Therefore, the labour force participation rate which is the economically-active population, as a percentage of the total working age population in 2015, was 62.3%. This is 9% more than the national average of 57.9%.

Nkangala's employment as at the end of 2015, were 361 000 people, which is 63% of the economically-active people. That puts the unemployment rate at 37% in Nkangala. Using the same yardstick (please note that different commentators use different calculations), this unemployment rate is higher than the 26% for the whole of SA. The reason why Nkangala has such a high unemployment rate is because two of its rural municipalities, Thembisile Hani and Dr JS Moroka have high unemployment rates (around 50% on average), and this reduces the rate for the district. In addition, all the job seekers entering the local economy do not get formal employment.

The effective demand per job every year is on average a paltry 11 000 jobs per annum, whereas the effective supply of labour is 16 000 per annum. Thus, over a ten-year period, the net supply of labour, that did not get a job, amounted to 50 000 people. To understand the dire unemployment situation in Nkangala, and by extension the rest of SA, in the former's case it has 355 000 people employed, and 514 000 without a job. This is effective 59% of the working age population without a job, regardless of how the official statistics calculate the measures.

Due to the highly capital-intensive nature of mining and electricity, one now finds that the majority of Nkangala's employment is in wholesale, retail, and community and business services. It can be argued that these are in fact multiplier jobs created by agriculture, mining and power generation. A very high number of people (32 900) work for other households. Further, between agriculture, mining and electricity, there are respectively 16 000, 49 200 and 12 100 employees. This makes up only 21% of employment, compared to contributing over 60% to the GGP. In other words, the other economic sectors that contribute 40% to the Nkangala GGP provide 79% of the jobs.

The unemployment rate for Victor Khanye is 21.6%, being the second lowest of all the municipalities in the Nkangala district. Steve Tshwete had the lowest unemployment rate at 16.4%. The poverty rate in Victor Khanye stands at 34.1% which is higher than the 32.3% rate for the Nkangala District. The overall percentage of people in Nkangala living in poverty has decreased by a third between 2005 and 2015.

The Human Development Index, which is a composite index of three basic dimensions being life expectancy, adult literacy rate and GDP per capita, has improved by 20% in the last 10 years, and this is a significant improvement. The Emalahleni and Steve Tshwete municipalities have the highest of the human development indices, with Victor Khanye following in third position out of the 6 local municipalities.

In conclusion, the Nkangala economy is spear-headed by the coal and electricity production industries and, as a result, has attracted many job-seekers into the area. Over the last decade, the area has generated more jobs relative to the economic base than that of the whole of South Africa, but with the in-migration came increased poverty because the job-seekers were unable to find jobs. Nkangala has two rural and relatively poor municipalities, but Victor Khanye, the project labour area, is relatively wealthy compared with many other municipalities in South Africa. Witbank, Middelburg and Delmas areas are well developed, and are well-known for their competencies in coal mining and power generation. This is to the project's advantage as it is located in close proximity to these more prosperous areas.

8.6 TRANSPORTATION, INFRASTRUCTURE AND TRAFFIC

The local municipality within which the proposed Phase 3 project is located, is linked to major metropolitan areas like Johannesburg, the City of Tshwane and Emalahleni by the N12 freeway which is regarded as part of the "Maputo Corridor." The railway line running through VKLM also forms part of this corridor, which connects South Africa's northern provinces with the nearest deep-sea port at Maputo. The VKLM is regarded as a gateway to the inner Mpumalanga Province. Several provincial roads run through VKLM and converge at Delmas:

- R50 that links Tshwane with Standerton;
- R42 that links with Bronkhorstspruit;
- R555 that links Springs with Emalahleni;
- R548 that links with Balfour; and
- R42 that links with Nigel.

The total number of households across the VKLM amounts to 24,268 with an average occupancy rate of 3.5 persons per household. Of these, an estimated 3,300 households are living in informal settlements. The majority of households (84%) have access to piped water. Of these, 55% have piped water inside the house and a further 29% have piped water inside the yard. Almost all houses (92%) have electricity either in the form of a pre-paid meter (64%) or a conventional meter (28%). Only 1% of households have no access to any toilet facilities. Over two thirds (72%) refuse is removed at least once a week by the local authority.

The following infrastructure exists within the project area and its immediate surroundings:

- Various secondary farm roads;
- Opencast coal mines and related infrastructure and activities;
- Farm dams and at least one large man-made dam;
- Power lines;
- Telephone lines;
- Agricultural homesteads; and
- Dwellings.

8.7 DEMOGRAPHICS AND EMPLOYMENT STATISTICS

Nkangala District Municipality (Nkangala) is one of three district municipalities in the Mpumalanga Province. The headquarter of Nkangala is in Middelburg (Steve Tshwete Municipality). Nkangala is composed of 6 local municipalities, of which Victor Khanye is the one where the project is located. Economically, when one thinks of Nkangala, South Africa's coal and electricity nexus arises. Nkangala is well-known for powering much of South Africa and hence the project, at first glance, ought to be suitable for this area. Victor Khanye Local Municipality is situated on the Western Highveld of Mpumalanga Province covering a geographic area of approximately 1567 square kilometres. The prominent towns and settlements in the municipality include Arbor, Argent, Delmas and Lionelton.

The population size of VKLM was recorded by Statistics South Africa in 2016 as 84,150 (population density: 53.6 per km^2). This represents an annual growth rate of approximately 2.3% since the 2011 census, when the population size stood at 75,452. VKLM has had the third highest population growth rate in the province, according to the VKLM IDP (2017-2021) this is the result of economic growth and consequent increase in available job opportunities.

According to the Stats SA community Survey (2016), Black Africans account for 86% of the population, with the remaining 14% made up of White, Asian, Coloured and Indian population groups. The most prominent language spoken at home is isiZulu (44%) followed by isiNdebele (25%) and then Afrikaans (13%). Just over half (52%) of the population are male.

In terms of age distribution, the working-age population (aged between 15 and 64) accounts for 68.7% of the population of VKLM. Persons under the age of 14 make up 27.5% of the population. The fact that the majority of the population is of working age is in line with the conclusion made in the IDP – namely, that the population growth observed is as a result of migration in the hopes of economic development and job opportunities.

Out of the inhabitants of VKLM who are over the age of 15 years, 10.7% have no schooling or did not finish school, whereas 27.6% completed Matric. Persons with limited education tend to find themselves restricted to

unskilled manual work (VKLM IDP, 2017-2021). According to IHS Global Insight data (2015), the unemployment rate (i.e. the proportion of the population between 14 and 65 years of age who classify themselves as "not employed but looking for work") is around 21.6% – this represents a decrease of approximately 6.6% in the unemployment rate since the 2011 Census.

On average, almost half (42.5%) of households in VKLM live in absolute poverty, which is defined as an annual household income of R 19 200 or less (or ≤ R 1 600 per month) for a family of 4, i.e. the family is unable to meet their basic food needs. A further third (37.7%) of households are considered lower middle-class (defined as a household income of ≤ R 76 000 per annum). One in every five (19.8%) households fall into the higher income bracket (a household income of R 76 801 or more per annum).

The closest populations to the Project site are located on the farm Middelbult (approximately 3 km north - 138 people), the farm Droogefontein (approximately 3 km west - 723 people) and Eloff town (approximately 5 km northwest - 3,243 people).

Ward 7, in which the proposed project area is located, has a total estimated population of 10,230 people (2011 Census), at an average population density of 12.4 people per km^2 – indicative of the largely rural nature of the ward. This is indicative of a negative population growth rate of approximately -1% per annum between the period 2001 and 2011, which is likely attributable to agricultural land being purchased for mining developments and the resultant out-migration of farmers, their families and farm workers. More than two thirds (69.8%) of the current population in Ward 7 are Black African, followed by White (13,7%) population group. The most widely spoken languages in the ward are isiZulu (29.4%), Afrikaans (26.5%) and isiNdebele (18.4%).

8.8 SOCIAL

A social scoping assessment study was undertaken by NLN Consulting in August 2018 for the Phase 3 Project. The Phase 3 Project is within Nkangala District Municipality which is one of three districts of the Mpumalanga Province. It covers a geographical area of 16,758 km^2 and consists of 160 towns and villages. Despite the fact that Nkangala is the smallest of the three districts, it is the economic hub of Mpumalanga. The district is made up of six local municipalities, namely Emalahleni, Steve Tshwete, Emakhazeni, Thembisile Hani, Dr JS Moroka and Victor Khanye. The district has an average population density of 83.3 people per km^2.

The Phase 3 Projects falls within the Victor Khanye Local Municipality (VKLM), one of six local municipalities with the Nkangala District. Delmas and Eloff are two of the five major towns and settlements located in the VKLM which are in close proximity to the proposed project area. Delmas is also the "headquarters" for VKLM as it has well-developed infrastructure. The VKLM covers a geographic area of approximately 1,570 km^2. The other prominent settlements with the VKLM are Botleng, Sundra and Delpark.

A summary of VKLM socio-economic make-up is depicted in Figure 18. VKLM (spatial summary) is described in more detail in the ensuing subsections. Unless otherwise indicated, the VKLM profile is based on data obtained from the Statistics South Africa 2016 Community Survey. Further to the above, according to the Victor Khanye Local Municipality IDP the municipality is currently characterised by an increase in coal mining and related activities. Other important sectors in the municipal area are agriculture, agricultural product processing, industrial and manufacturing. Natural resources make a significant and direct contribution to the municipality's economy. The Spatial Development perspective of the Victor Khanye Local Municipality, through alignment with the district's SDF, translates the IDP of the municipality into spatial principles and strategies and thus constitutes the spatial implementation of the IDP. In this regard, Delmas, Botleng, Delpark, Eloff and Sundra are the main formal urban areas which are predominantly residential areas within the local municipality with Delmas incorporating a residential area, central business district and industrial area. The remainder of the municipal area is characterised by small settlements, several agricultural holding areas, commercial agriculture and mining.

The local economy is relatively diversified with the largest sector, in terms of output as well as proportional contribution being the trade sector. The growing sector is trade sector followed by the agriculture sector and the mining sector. The rural areas of the municipality predominantly consists of extensive commercial farming and mining activities. The municipality is a major maize producing area where commercial farming occurs primarily in the following areas: Union Forest Plantation Eloff, Rietkol, Springs, and Sundra Agricultural Holdings. These areas are primarily extensive residential with non-conforming land uses. As the Delmas area is a "high

potential" agricultural area, it is important that agricultural land must be protected against urban sprawl and mining activity, etc. Mining activities are concentrated mainly on coal and silica. The main mining areas are around Delmas in the centre of the municipal area, and also in the far north-eastern corner of the municipal area. Importantly, there is a growing urgency to establish an equitable and realistic trade-off that maximises the provincial benefits from mining and energy sectors while mitigating any environmental impacts.

Unemployment level has been reduced from 28.2 to 21.6 in terms of Global insight figures this reduction is as a results of an increase in investments in our local economy. The employment situation is expected to improve over the medium term with additional jobs expected in the mining sector (Victor Khanye Local Municipality IDP, 2017-2022). Leading industries in employment comprise of Trade (18.7%), Agriculture (18.2%) and Community Services contributing (14.3%). However, the former two sectors are experiencing a decline in employment in the last few years whilst Community Services has increased and Mining as an employer has grown and now contributes 12.7%. There current spatial summary in the Victor Khanye Local municipality IDP does not highlight any land use or development restrictions within the proposed project area except the need to protect agricultural land and the importance of mitigating environmental impacts from mining activities.

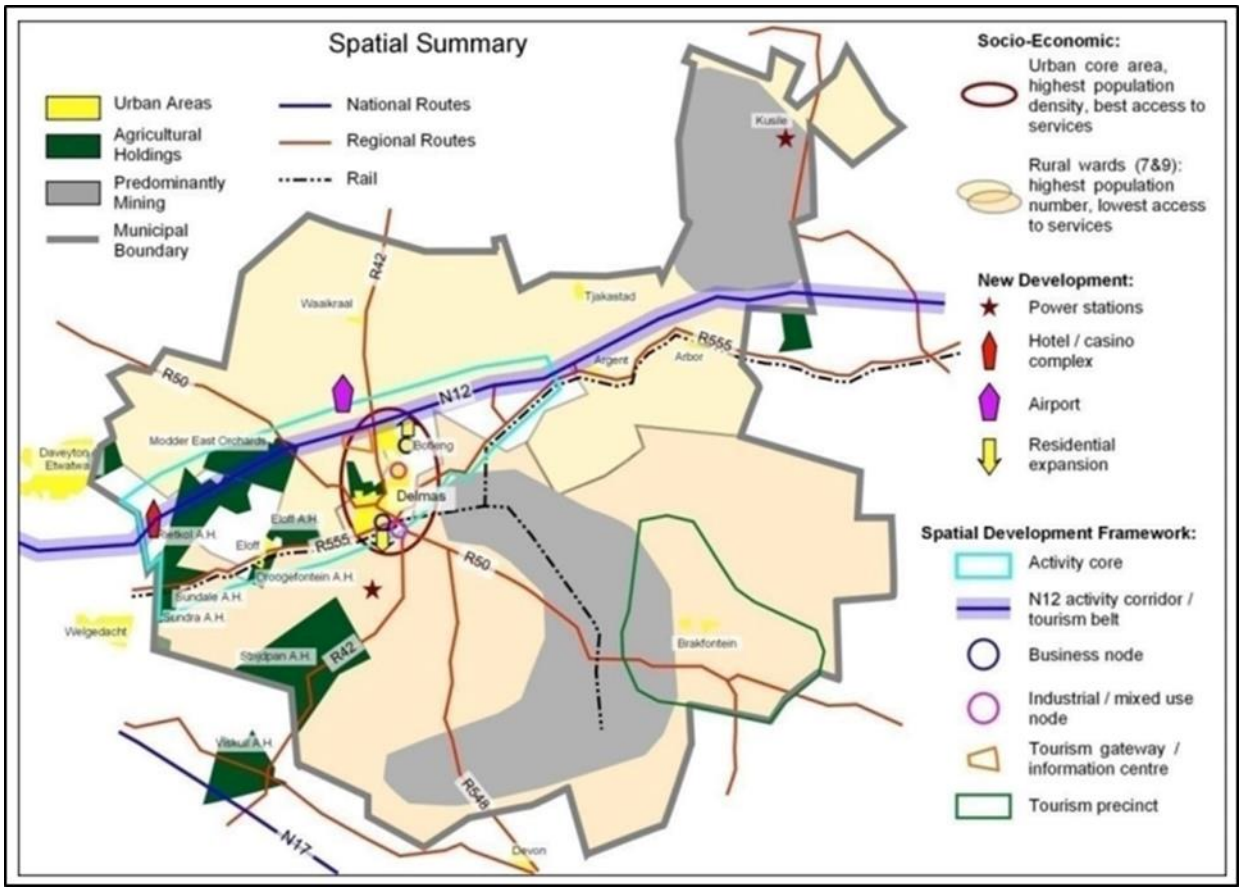


Figure 18: Victor Khanye local municipality spatial summary

8.9 CULTURAL AND HERITAGE RESOURCES

A heritage scoping assessment for the Phase 3 Project was undertaken by PGS Heritage in August 2018. The high-level archival research focused on available information sources that were used to compile a general background history of the project area and surrounds.

Historical topographic maps were available for utilisation in the screening and scoping (Topographical map 2628BA – First edition 1965). The aerial photography on which the map was based dates to 1956 and its survey work was undertaken in 1966. The maps were utilised to identify structures that could possibly be older than 60 years and thus protected under Section 34 and 35 of the NHRA. Many of the structures identified are farmsteads and "huts" demarcated as homesteads.

Analysis of historical maps and aerial photography identified definite structures (Figure 19) that include:

- Dwellings;
- Clusters of dwellings (homesteads and farmsteads);
- Burial grounds; and
- Structures / buildings.

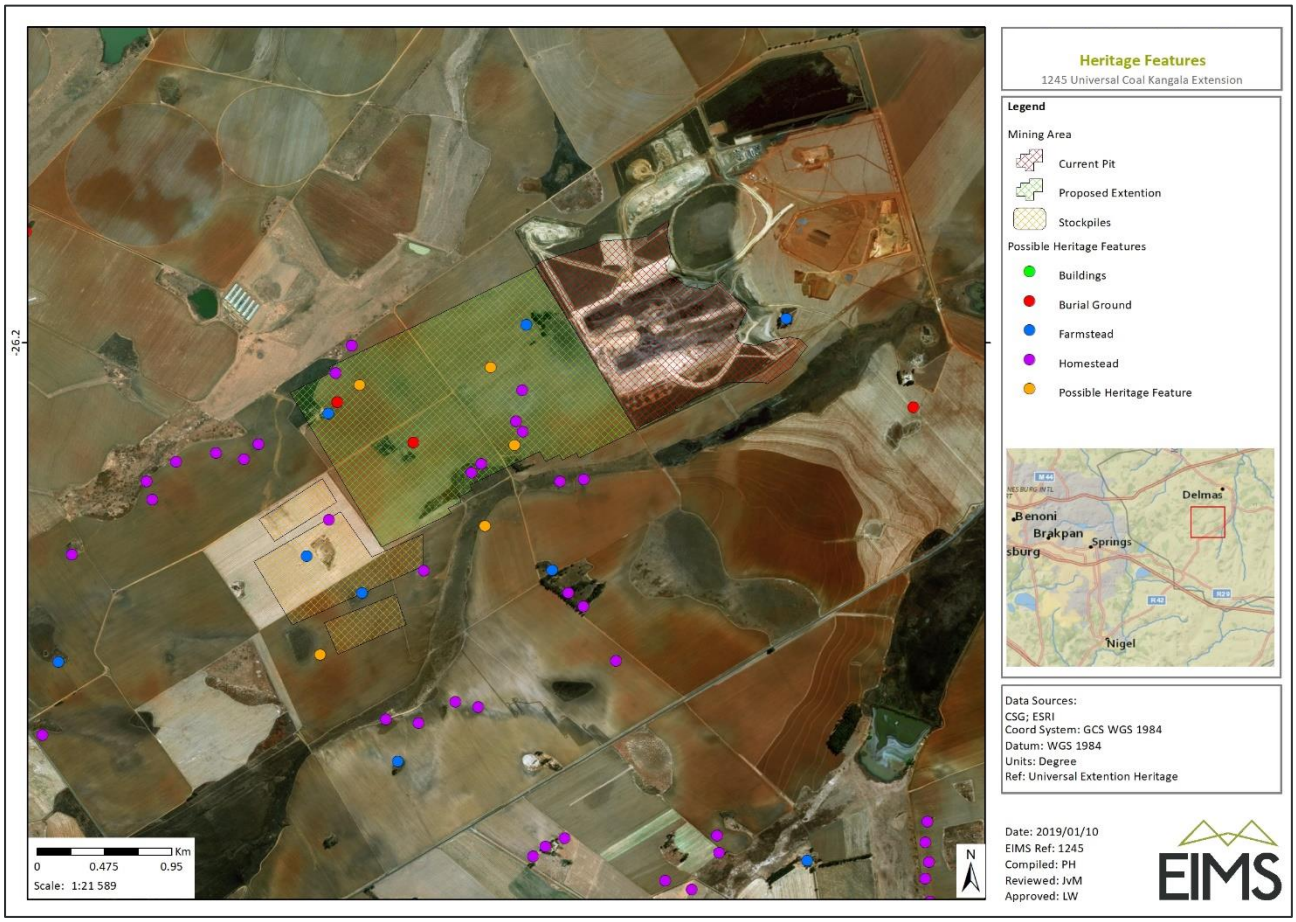


Figure 19: Potential heritage features within and around the Phase 3 Project area

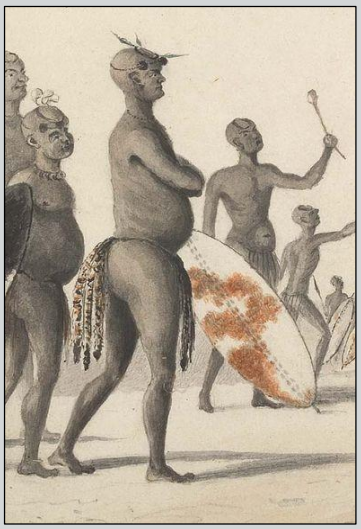
The Archaeological background of the project area is presented in Table 13 below.

Table 13: Summary of archival data found on the general area

Date	Description
2.5 million to 250 000 years ago	The Earlier Stone Age (ESA) is the first phase identified in South Africa's archaeological history and comprises two technological phases. The earliest of these is known as Oldowan and is associated with crude flakes and hammer stones. It dates to approximately 2 million years ago. The second technological phase is the Acheulian and comprises more refined and better made stone artefacts such as the cleaver and bifacial hand axe. The Acheulian dates to approximately 1.5 million years ago.

Date	Description
	No Early Stone Age sites are known in the vicinity of the project area. However, this is probably due more to a lack of research on the surroundings of the project area rather than a lack of sites.
250 000 to 40 000 years ago	The Middle Stone Age (MSA) is the second oldest phase identified in South Africa's archaeological history. This phase is associated with flakes, points and blades manufactured by means of the so-called 'prepared core' technique. A Middle Stone Age site is known from Primrose Ridge in Germiston (Harcus, 1945) (situated roughly 34 km west of the present project area), as well as two sites near Brakpan (Gaigher, 2013) (located roughly 16.6 km south-west of the present project area). However, no Middle Stone Age sites are known in the direct vicinity of the project area. However, this is probably due to a lack of research on the surroundings of the project area rather than a lack of sites.
40 000 years ago, to the historic past	The Later Stone Age (LSA) is the third archaeological phase identified and is associated with an abundance of very small artefacts known as microliths. No Later Stone Age sites are known in the vicinity of the project area. However, this is in all likelihood rather due to a lack of research focus on the surroundings of the project area than a lack of sites.
AD 1450 – AD 1650	The Uitkomst facies of the Blackburn Branch of the Urewe Ceramic Tradition represents the first Iron Age period to be identified for the surroundings of the project area. This facies can likely be dated to between AD 1650 and AD 1820. The decoration on the ceramics associated with this facies is characterised by stamped arcades, appliqué of parallel incisions, stamping, as well as cord impressions, and is described as a mixture of the characteristics of both Ntsuanatsatsi (Nguni) and Olifantspoort (Sotho). The Uitkomst facies (with the Makgwareng facies) is seen as the successor to the Ntsuanatsatsi facies. The Ntsuanatsatsi facies is closely related to the oral histories of the Early Fokeng and represents the earliest known movement of Nguni people out of Kwazulu-Natal into the inland areas of South Africa. In terms of this theory, the Bafokeng settled at Ntsuanatsatsi Hill in the present- day Free State Province. Subsequently, the BaKwena lineage broke away from the Bahurutshe cluster and crossed southward over the Vaal River to come in contact with the Bafokeng. As a result of this contact, a Bafokeng-Bakwena cluster was formed, which moved northward and became further 'Sotho-ised' by coming into increasing contact with other Sotho-Tswana groups. This eventually

Date	Description
	resulted in the appearance of Uitkomst facies type pottery which contained elements of both Nguni- and Sotho-Tswana speakers (Huffman, 2007). No sites associated with the Uitkomst facies are known from the surroundings of the project area.
AD 1700 – AD 1840	The Buispoort facies of the Moloko branch of the Urewe Ceramic Tradition is the next phase to be identified within the project area's surroundings. It is most likely dated to between AD 1700 and AD 1840. The key features on the decorated ceramics include rim notching, broadly incised chevrons and white bands, all with red ochre (Huffman, 2007). It is believed that the Madikwe facies developed into the Buispoort facies. The Buispoort facies is associated with sites such as Boschhoek, Buffelshoek, Kaditshwene, Molokwane and Olifantspoort (Huffman, 2007). No sites associated with the Buispoort facies are known from the surroundings of the project area.
AD 1821 – AD 1823	After leaving present-day KwaZulu-Natal, the Khumalo Ndebele (more commonly known as the Matabele) of Mzilikazi migrated through the general vicinity of the project area under discussion before reaching the central reaches of the Vaal River in the vicinity of Heidelberg in 1823 (www.mk.org.za). Two different settlement types have been associated with the Khumalo Ndebele. The first of these is known as Type B walling and was found at Nqabeni in the Babanango area of KwaZulu-Natal. These walls stood in the open without any military or defensive considerations and comprised an inner circle of linked cattle enclosures (Huffman, 2007). The second settlement type associated with the Khumalo Ndebele is known as Doornspruit and comprises a layout which from the air has the appearance of a 'beaded necklace'. This layout comprises long scalloped walls (which mark the back of the residential area) which closely surround a complex core, which in turn comprises a number of stone circles. The structures from the centre of the settlement can be interpreted as kitchen areas and enclosures for keeping small stock. It is important to note that the Doornspruit settlement type is associated with the later settlements of the Khumalo Ndebele, in areas such as the Magaliesberg Mountains and Marico, and represents a settlement under the influence of the Sotho with whom the Khumalo Ndebele intermarried. The Type B settlement is associated with the early Khumalo Ndebele settlements and conforms more to the typical Zulu form of settlement. As the Khumalo Ndebele passed through the general vicinity of the project area shortly after leaving Kwazulu-Natal, one can assume that their settlements here would have

Date	Description
	conformed more to the Type B than the Doornspruit type of settlement. It must be stressed however that no published information could be found which indicates the presence of Type B sites in the general vicinity of the project area. No sites associated with this period of the archaeological history of the surroundings of the project area are presently known.
	 Figure 20: King Mzilikazi of the Matabele. This illustration is by Captain Cornwallis Harris in c. 1838 (www.sahistory.org.za).
1832	At this time, a Zulu impi of King Dingane moved through the general vicinity of the project area on their way to attack the Matabele of Mzilikazi, who were settled along the Magaliesberg Mountains (Bergh, 1999).
1836	The first Voortrekker parties started crossing over the Vaal River at this time. The earliest Voortrekker party to cross over the Vaal River was the one under the leadership of Louis Trichardt and Johannes Jacobus Janse van Rensburg. Although the exact route followed by the Trichardt-Janse van Rensburg party was not recorded, one suggestion is that they passed through the strip of land in-between the Bronkhorst Spruit in the west and the Wilge River to the east (Bergh, 1999). These two rivers are located to the east of Delmas.
1841 – 1850	These years saw the early establishment of farms by the Voortrekkers in the general vicinity of the project area (Bergh, 1999).
1845	Both the district and town of Lydenburg were established in this year (Bergh, 1999). The district of Lydenburg at the time encompassed a massive land mass, and it would appear that the project area fell just within this newly proclaimed district at the time.

Date	Description
1857	The district of Pretoria was established in 1857, with the town of that name established in 1855 (Bergh, 1999). The project area now fell within this newly proclaimed district.
1866	The town and district of Heidelberg were established in this year (Bergh, 1999). The project area fell within the Heidelberg district at this time.
1883 - 1887	In 1883, the farm, "The Springs" was surveyed by James Brooks. Coal was discovered on the farm in 1887 and the region soon became the most productive coal mining region in the country. Unfortunately, the low quality and inflammable nature of the coal resulted in most of the coal mines closing down after better quality coal was discovered in Witbank (Erasmus, 2004).
1899 – 1902	The South African War took place during this time. No events or activities during the war can be associated with the present project area. However, a number of such events and activities are known from the general vicinity. These will be briefly mentioned in the paragraphs below. Skirmishes or battles from the surrounding landscape include an action between a British force under the command Lieutenant-General J.D.P. French and a Boer commando of some 1 000 men on 23 July 1900. The main component of the battle occurred a short distance to the east and south-east of the present-day town of Delmas, at a distance of roughly 20 km east of the present project area (Changuion, 2001). Another incident occurred during the early morning of 26 December 1900, when a section of the Heidelberg Commando of some 350 men attacked the town of Benoni, as well as some of the gold mines surrounding the town, including the Kleinfontein Mine. The attack was a success, and according to some eye witnesses resulted in 22 British casualties (eight killed and 14 wounded), as well as the capture of three prisoners by the Boer commando (Blake, 2012). It is also interesting to note that the Boer Commando used the farm Rietkol as a meeting place from where the attack on Benoni proceeded (Blake, 2012).

Date	Description
	 Figure 21: Henning Petrus Nicolaas Viljoen (left) of the Heidelberg Commando, who's diary provides an eyewitness account of the attack on Benoni and its mines on 26 December 1900 (Blake, 2012). The image on the right depicts Lieutenant-General J.D.P. French, the commanding officer of the British force at the battle which occurred in close proximity to Delmas on 23 July 1900 (Changuion, 2001:77).
1902	After the end of hostilities in 1902, the new Witwatersrand District was created from farms which were previously located in the districts of Krugersdorp, Heidelberg and Pretoria. The project area now fell within the district of Witwatersrand (Bergh, 1999).
1907	The town of Delmas was laid out on the farm Witklip and comprised 192 residential stands, 48 smallholdings (of 4 hectares each) with a commonage of 134 hectares. It was established by the owner of Witklip, who was a Frenchman named Frank Dumat (Erasmus, 2004). The name Delmas was derived from the French phrase 'de le mas', which means 'of the small farm' (www.sa-venues.com).

The analysis further identified possible area of heritage sensitivity based on landform as well as vegetation changes. The SAHRIS palaeontological sensitivity map rates the project as underlain by geological strata with a high palaeontological significance.

From the historical map analysis, a minimum of two burial grounds are present on the property. Burial grounds and graves have high heritage significance and are given a Grade 3A significance rating. Various farmsteads and homesteads were identified for project during the HIA phase of the project. Structures older than 60 years are protected under Section 34 of the NHRA and will be evaluated and graded for heritage significance during the Heritage Impact Assessment phase. Refer to Table 14 for the identified burial grounds and structures and their applicable legislation.

Table 14: Tangible heritage site in the project area

Name	Description	Legislative protection
Architectural Structures	Possibly older than 60 years	NHRA Sect 3 and 34
Burial grounds	Graves	NHRA Sect 3 and 36 and MP Graves Act

Based on the SAHRIS database (Figure 22), a full Palaeontological Impact assessment will be required as part of the HIA study.

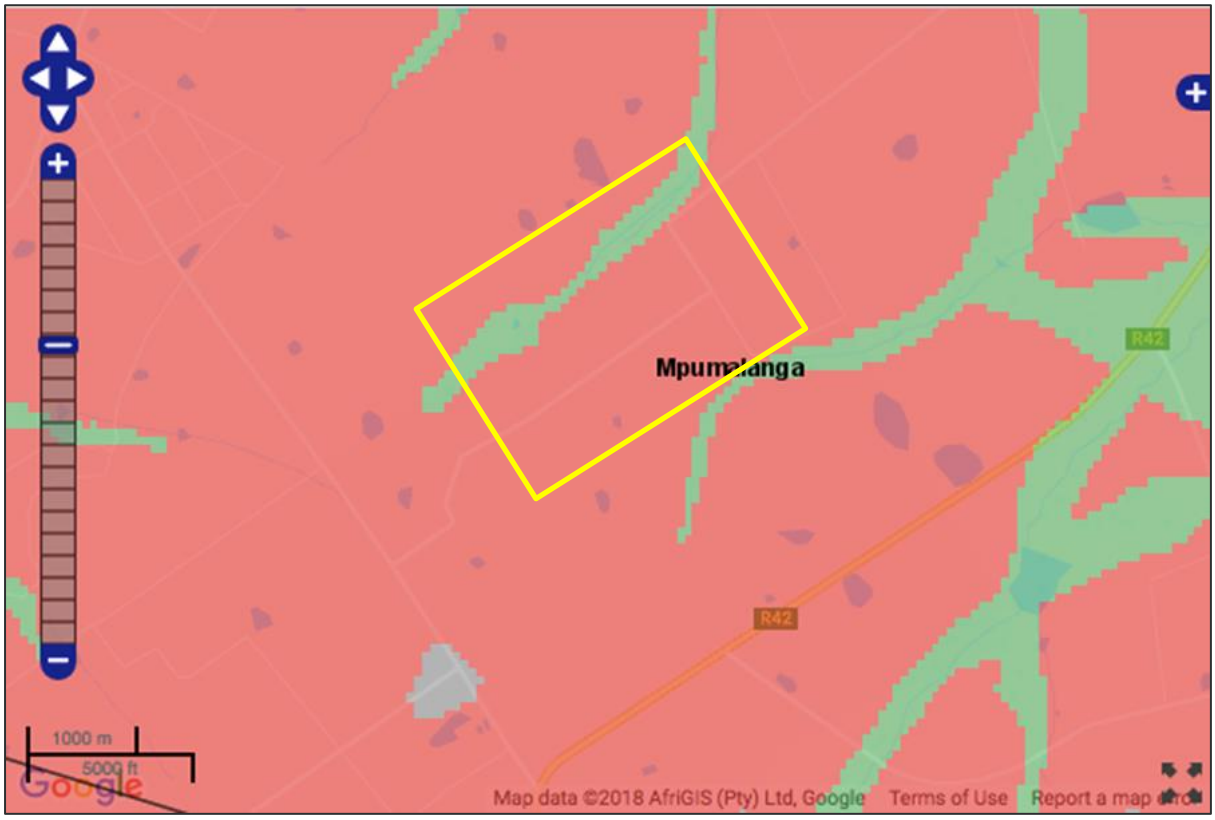


Figure 22: Palaeontological Heritage Sensitivity map. As can be viewed, most of the area is highly sensitive. Yellow demarcates the approximate project area

8.10 FLORA

The findings of the Biodiversity study by the Biodiversity Company in August 2018 were utilised for the flora and fauna baseline assessment in this section, the full report is available in Appendix D. The Phase 3 Project area is situated within the grassland biome. This biome is centrally located in southern Africa, and adjoins all except the desert, fynbos and succulent Karoo biomes (Mucina & Rutherford, 2006). Major macroclimatic traits that characterise the grassland biome include:

- Seasonal precipitation; and
- The minimum temperatures in winter (Mucina & Rutherford, 2006).

The grassland biome is found chiefly on the high central plateau of South Africa, and the inland areas of KwaZulu-Natal and the Eastern Cape. The topography is mainly flat and rolling but includes the escarpment itself. Altitude varies from near sea level to 2 850 m above sea level. Grasslands are dominated by a single layer of grasses. The amount of cover depends on rainfall and the degree of grazing. The grassland biome experiences summer rainfall and dry winters with frost (and fire), which are unfavourable for tree growth. Thus, trees are typically absent,

except in a few localized habitats. Geophytes (bulbs) are often abundant. Frosts, fire and grazing maintain the grass dominance and prevent the establishment of trees.

The grassland biome comprises many different vegetation types. The project area is situated within one vegetation type; namely the Eastern Highveld Grassland (GM12) according to the vegetation map of South Africa (Mucina & Rutherford, 2006) (Figure 23).

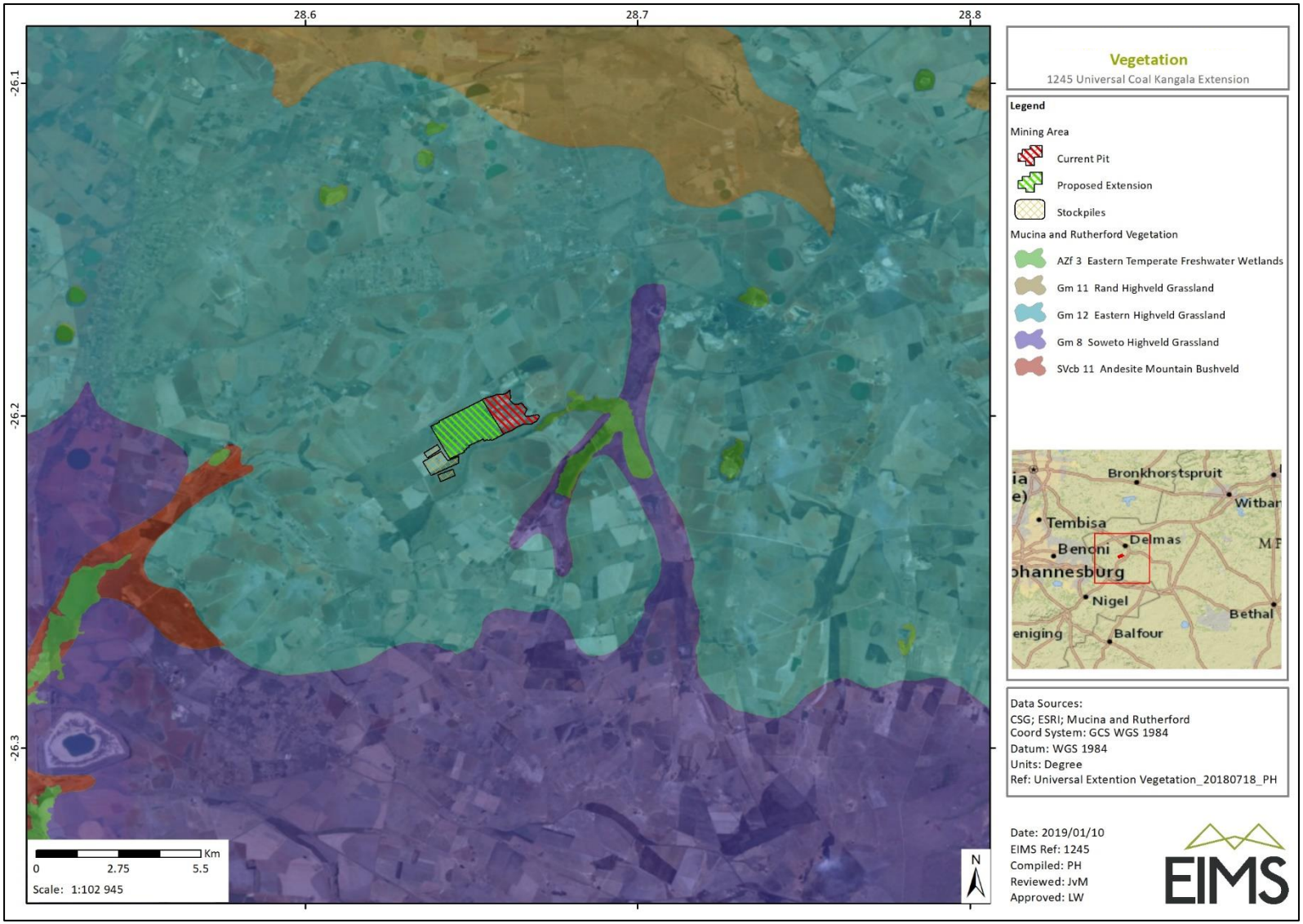


Figure 23: The Phase 3 Project area showing the vegetation type based on the Vegetation Map of South Africa, Lesotho & Swaziland (BGIS, 2017)

This vegetation type occurs on slightly to moderately undulating planes, including some low hills and pan depressions. The vegetation is a short dense grass land dominated by the usual highveld grass composition (*Arsitida*, *Digitaria*, *Erafrostsis*, *Themeda*, *Tristachya*, etc.) with small scattered rocky outcrops with, wiry sour grasses and some woody species. Some 44% of the vegetation type is transformed primarily by cultivation, plantations, mines, urbanisation and by building of dams. No serious alien invasions are reported (Mucina & Rutherford, 2006).

8.10.1 IMPORTANT PLANT TAXA

Important plant taxa are those species that have a high abundance, a frequent occurrence or are prominent in the landscape within a particular vegetation type (Mucina & Rutherford, 2006). The following species are important in the Eastern Highveld Grassland vegetation type:

- **Graminoids**: *Aristida aequiglumis, A. congesta, A. junciformis subsp. Galpinii, Brachiaria serrata, Cynodon dactylon, Digitaria monodactyla, D. tricholaenoides, Elionurus muticus, Eragrostis chloromelas, E. curvula, E plana, E racemosa E sclerantha Heteropogon contortus, Loudetia simplex, Microchloa caffra, Monocymbium ceresiiforme, Setaria sphacelata, Sporobolus africanus, S. pectinatus, Themeda triandra, Trachypogon spicatus, Tristachya leucothrix, T. rehmanni, Alloteropsis semialata subsp. eckloniana, Andropogon appendiculatus, A schirensis, Bewsia biflora, Ctenium concinnum, Diheteropogon amplectens, Eragrostis capensis, E. gummiflua, E. patentissima, Harpochloa falx, Panicum natalense, Rendlia altera, Schizachyrium sanguineum, Setaria nigrirostris, Urelytrum agropyroides*;
- **Herbs**: *Berkheya setifera, Haplocarpha scaposa, Justicia anagalloides, Acalypha angusta, Chamaecrista mimosoides, Dicoma anomala, Euryops gilfillanii, E. transvalensis subsp. setilobus, Helichrysum aureonitens, H caespititium, H. callicomum, H. oreophilum, H. caespititium, H. oreophilum, H rugulosum, ipomoea crassipes, Pentanisia prunelloides subsp. latifolia, Selago densiflora, Senecio coronatus, Vernonia oligocephala, Wahlenbergia undulata*;
- **Geophytic herbs**: *Gladiolus crassifolius, Haemanthus humilis subsp. hirsutus, Hypoxis rigidula var. pilosissima, Ledebouria ovatifolia*;
- **Succulent herb**: *Aloe ecklonis*; and
- **Low shrubs**: *Anthospermum rigidum* subsp. *pumilum*, *Stoebe plumosa*.

8.10.2 CONSERVATION STATUS

According to Mucina & Rutherford (2006), the Eastern Highveld Grassland vegetation type is classified as Endangered on a regional level. The national target for conservation protection for this vegetation types is 24%, but only a few patches are statutorily conserved in Nooitgedacht Dam and Jericho Dam Nature Reserves and in private reserves (Holkranse, Kransbank, Morgenstond).

Some 44% of this vegetation type has, however, already been transformed including at the proposed project area primarily by cultivation, plantations, mines, urbanisation and by building of dams. Cultivation may have had a more extensive impact, indicated by land-cover data. No serious alien invasions are reported, but *Acacia mearnsii* can become dominant in disturbed sites. Erosion is very low.

Based on the Plants of Southern Africa (BODATSA-POSA, 2016) database, 393 plant species have the potential to occur in the area. Of the 393-plant species associated with this region, five (5) species are listed as being Species of Conservation Concern (SCC), Table 15. On a local scale, however, the project area and its vicinity is highly transformed by agricultural activities and existing mining operations and thus no indigenous flora of conservation concern is likely to remain on site.

Table 15: Plant Species of Conservation Concern (SCC) expected to occur within the region of the project area (BODATSA-POSA, 2016)

Family	Scientific Name	Author	SANBI listing (2017)	Ecology
Aizoaceae	*Khadia beswickii*	(L.Bolus) N.E.Br.	VU	Indigenous; Endemic
Fabaceae	*Indigofera hybrida*	N.E.Br.	VU	Indigenous; Endemic
Apocynaceae	*Pachycarpus suaveolens*	(Schltr.) Nicholas & Goyder	VU	Indigenous
Aizoaceae	*Delosperma leendertziae*	N.E.Br.	NT	Indigenous; Endemic
Orchidaceae	*Habenaria bicolor*	Conrath & Kraenzl.	NT	Indigenous

8.11 FAUNA

Faunal assessment at the proposed project area included the scoping of the following faunal categories: avifauna, mammals as well as reptiles and amphibians. The regional species expected to occur on site for each faunal category are presented below. However, once again it should be noted that on a local level the area is highly transformed by agricultural activities and existing mining operations and as such it is unlikely that these species listed below are found on site.

8.11.1 AVIFAUNA

Based on the South African Bird Atlas Project, Version 2 (SABAP2) database, 288 bird species are expected to occur in the vicinity of the project area (pentads 2605_2835, 2605_2480, 2605_2845, 2610_2835, 2610_2840, 2610_2845, 2615_2835, 2615_2840,2615_2845). Of the expected bird species, twenty-four (24) species (8.3%) are listed as SCC either on a regional (21) or global scale (15) (Table 16).

The SCC includes the following:

- Three (3) species that are listed as Endangered (EN) on a regional basis;
- Seven (7) species that are listed as Vulnerable (VU) on a regional basis; and
- Twelve (11) species that are listed as Near Threatened (NT) on a regional basis.

On a global scale, four (4) species are listed as VU and ten (10) species as NT (Table 16).

Table 16: List of bird species of regional or global conservation importance that are expected to occur in pentads 2605_2835, 2605_2480, 2605_2845, 2610_2835, 2610_2840, 2610_2845, 2615_2835, 2615_2840, 2615_2845 (SABAP2, 2017, Eskom, 2014; IUCN, 2017).

Species	Common Name	Conservation Status		Likelihood of occurrence
		Regional (SANBI, 2016)	IUCN (2017)	
Alcedo semitorquata	Kingfisher, Half-collared	NT	LC	Moderate
Anthropoides paradiseus	Crane, Blue	NT	VU	High
Calidris ferruginea	Sandpiper, Curlew	LC	NT	Moderate
Charadrius pallidus	Plover, Chestnut-banded	NT	NT	Moderate
Ciconia abdimii	Stork, Abdim's	NT	LC	High
Circus macrourus	Harrier, Pallid	NT	NT	Moderate

Species	Common Name	Conservation Status		Likelihood of occurrence
		Regional (SANBI, 2016)	IUCN (2017)	
Circus maurus	Harrier, Black	EN	VU	Moderate
Circus ranivorus	Marsh-harrier, African	EN	LC	High
Coracias garrulus	Roller, European	NT	LC	Moderate
Eupodotis caerulescens	Korhaan, Blue	LC	NT	Moderate
Eupodotis senegalensis	Korhaan, White-bellied	VU	LC	Moderate
Falco biarmicus	Falcon, Lanner	VU	LC	High
Falco vespertinus	Falcon, Red-footed	NT	NT	High
Geronticus calvus	Ibis, Southern Bald	VU	VU	High
Glareola nordmanni	Pratincole, Black-winged	NT	NT	Moderate
Mirafra cheniana	Lark, Melodious	LC	NT	Moderate
Mycteria ibis	Stork, Yellow-billed	EN	LC	High
Neotis denhami	Bustard, Denham's	VU	NT	Moderate
Oxyura maccoa	Duck, Maccoa	NT	NT	High
Phoeniconaias minor	Flamingo, Lesser	NT	NT	High
Phoenicopterus ruber	Flamingo, Greater	NT	LC	High
Podica senegalensis	Finfoot, African	VU	LC	Moderate
Sagittarius serpentarius	Secretarybird	VU	VU	High
Tyto capensis	Grass-owl, African	VU	LC	High

8.11.2 MAMMALS

The IUCN Red List Spatial Data (IUCN, 2017) lists 84 mammal species that could be expected to occur within the project area. Of these species, 12 are medium to large conservation dependant species, such *Ceratotherium simum* (Southern White Rhinoceros) and *Tragelaphus oryx* (Common Eland) that, in South Africa, are generally restricted to protected areas such as game reserves. These species are not expected to occur in the project area and are removed from the expected SCC list.

Of the remaining 73 small to medium sized mammal species, twelve (12) (17.4%) are listed as being of conservation concern on a regional or global basis (Table 17).

The list of potential species includes:

- Two (2) that are listed as Endangered (EN) on a regional basis;
- Three (3) that are listed as Vulnerable (VU) on a regional basis; and
- Eight (8) that are listed as Near Threatened (NT) on a regional scale (Table 17).

On a global scale, 1 species is listed as EN, 2 are listed as VU and 2 as NT (Table 17).

Table 17: List of mammal species of conservation concern that may occur in the project area as well as their global and regional conservation statuses (IUCN, 2017; SANBI, 2016).

Species	Common name	Conservation Status	
		Regional (SANBI, 2016)	IUCN (2017)
Aonyx capensis	Cape Clawless Otter	NT	NT
Atelerix frontalis	South Africa Hedgehog	NT	LC
Cloeotis percivali	Short-eared Trident Bat	EN	LC
Crocidura mariquensis	Swamp Musk Shrew	NT	LC
Felis nigripes	Black-footed Cat	VU	VU
Leptailurus serval	Serval	NT	LC
Panthera pardus	Leopard	VU	VU
Parahyaena brunnea	Brown Hyaena	NT	NT
Pelea capreolus	Grey Rhebok	NT	LC
Poecilogale albinucha	African Striped Weasel	NT	LC
Redunca fulvorufula	Mountain Reedbuck	EN	LC
Smutsia temminckii	Temminck's Ground Pangolin	VU	VU

8.11.3 HERPETOFAUNA (REPTILES & AMPHIBIANS)

Based on the IUCN Red List Spatial Data (IUCN, 2017) and the ReptileMap database provided by the Animal Demography Unit (ADU, 2017) 17 reptile species are expected to occur in the project area (Appendix D). Of the expected reptile species, only one (1) is regarded as a SCC, namely *Crocodylus niloticus* (Nile Crocodile) which is listed as Near Threatened (NT) regionally (Table 18). Although this species is listed as expected to occur in the region, the lack of very large water bodies or rivers which this species requires, and the lack of recent records for the surrounding area, suggest that the likelihood of occurrence is low (Table 18).

Table 18: List of reptile species of conservation concern that may occur in the project area as well as their global and regional conservation statuses (IUCN, 2017; *Bates et al*., 2014)

Species	Common name	Conservation Status		Likelihood of Occurrence
		Regional (SANBI, 2016)	IUCN (2017)	
Crocodylus niloticus	Nile Crocodile	VU	LC	Low

8.12 HYDROLOGY (SURFACE WATER)

The hydrological study informing this hydrology baseline was conducted by SD Hydrological Services (Pty) Ltd on behalf of GCS (Pty) Ltd in August 2018, the full hydrology report is presented in Appendix D. The project area falls within the Olifants WMA with the major rivers falling within the mentioned WMA being the Elands, Wilge, Steelpoort and the Olifants River. Majority of the runoff from the project area is eventually drained north into the Olifants River.

8.12.1 REGIONAL HYDROLOGY AND TOPOGRAPHY

The project area falls within the north western boundary of the B20A quaternary catchments. The quaternary catchment B20A has a net mean annual runoff (MAR) of 25.60 million cubic meters (mcm), and is based on the (WR2012, 2015).

The Bronkhorstspruit River has its headwaters at the B20A quaternary catchment, and eventually flows into the Wilge River further downstream, which joins the larger Olifants River. The Olifants River then flows eastwards into Mozambique beyond the Olifants WMA. The project area is located on the joint upstream boundary of the

Olifants WMA and quaternary catchment B20A. All runoff emanating from the upstream boundary of the project area contributes to flow in the downstream tributaries of the Bronkhorstspruit.

Average elevations at the upstream boundary of quaternary catchment B20A range from 1600 meters above mean sea level (mamsl) to 1690 mamsl, and decreases to between 1570 – 1590 mamsl further downstream at the banks of the downstream tributaries. Average slopes range between 1% and 3 % and is characterised as flat. The hydrological setting of the project site is indicated in Figure 24. The digital elevation model (DEM) was sourced from the USGS website (http://hydrosheds.cr.usgs.gov/dataavail.php).

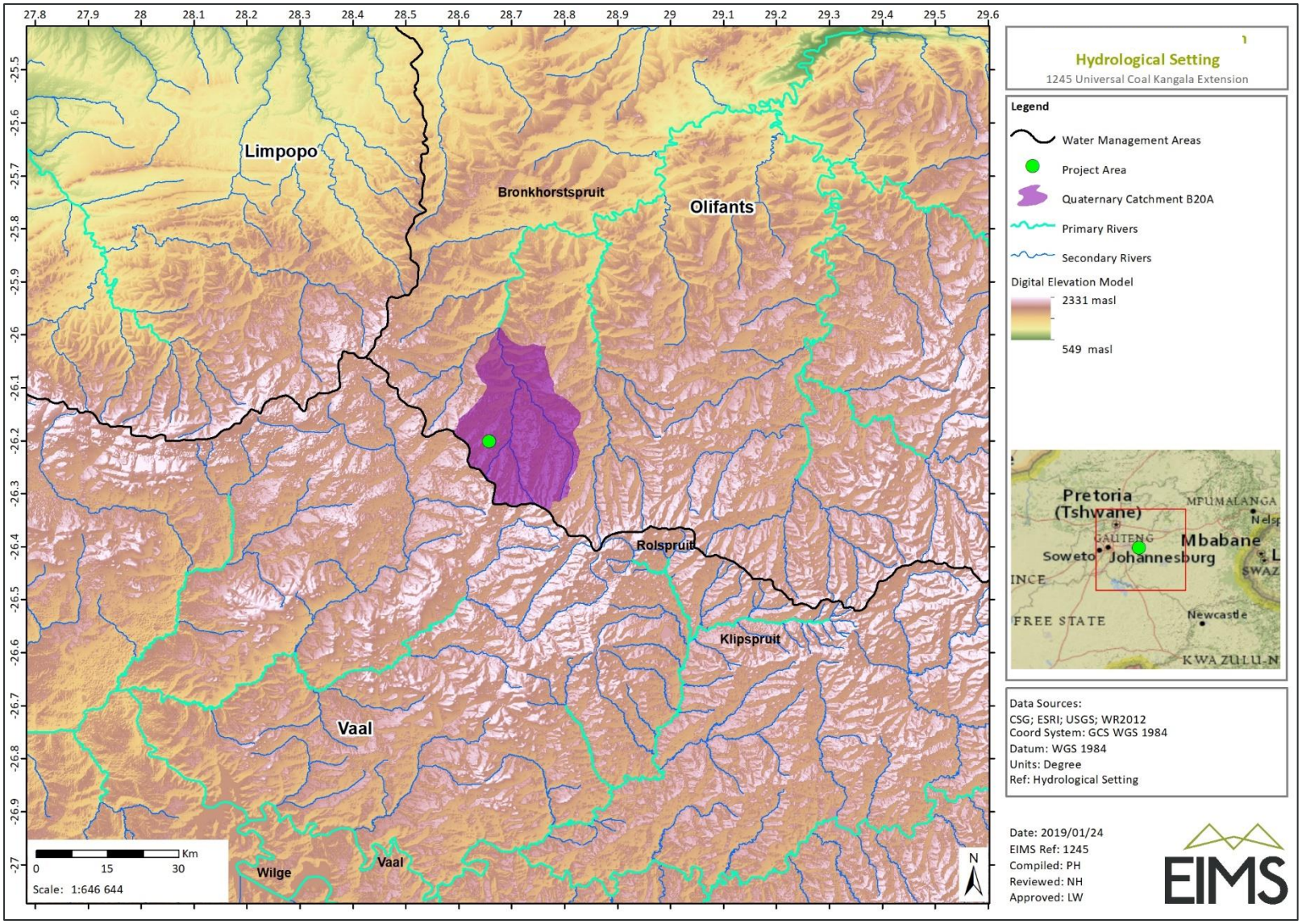


Figure 24: Summary of hydrological setting

8.12.2 RAINFALL

Rainfall data was extracted from two sources, these include:

- The Daily Rainfall Extraction Utility program; and
- Water Resources of South Africa 2005 Study (WR, 2005).

Summary of the six nearest rainfall stations as per the output from the design rainfall program, together with the monthly rainfall obtained from WR2005 is shown below in Table 19.

Table 19: Summary of monthly rainfall

Months	Rietfontein 0476737 W	Vlakplaas 0477494 W	Strydpan 0477224 W	Droogefontein 0477191 W	Delmas (POL) 0477309 W	Rietkuil 0477459 W	WR2005
January	114	118	117	111	118	114	118
February	94	90	101	100	96	86	90
March	81	76	82	81	85	90	84
April	42	34	44	40	41	41	40
May	19	16	17	15	19	18	17
June	6	5	6	6	6	7	7
July	7	5	7	6	6	6	5
August	7	8	11	7	8	6	6
September	24	21	24	21	22	20	19
October	57	61	60	63	67	63	66
November	106	104	106	102	102	103	105
December	117	98	108	112	106	117	109
MAP (mm)	**674**	**637**	**682**	**664**	**676**	**671**	**669**

Based on the above estimations it is observed that the MAP ranges between 637 mm to 669 mm, with the average MAP of the six nearest stations estimated to be 671 mm. The MAP obtained from the WR2005 study for quaternary catchment B20A is slightly conservative (669 mm) when compared to the six stations and is therefore selected as the adopted MAP for the project area.

Based on the rainfall pattern shown in Table 19, it is observed that the dry season extends between the months of April to September, with the wet season ranging from October to March. Majority of the total MAP falls within the wet (summer) season and accounts for greater than 85 percent of the MAP (Figure 25).

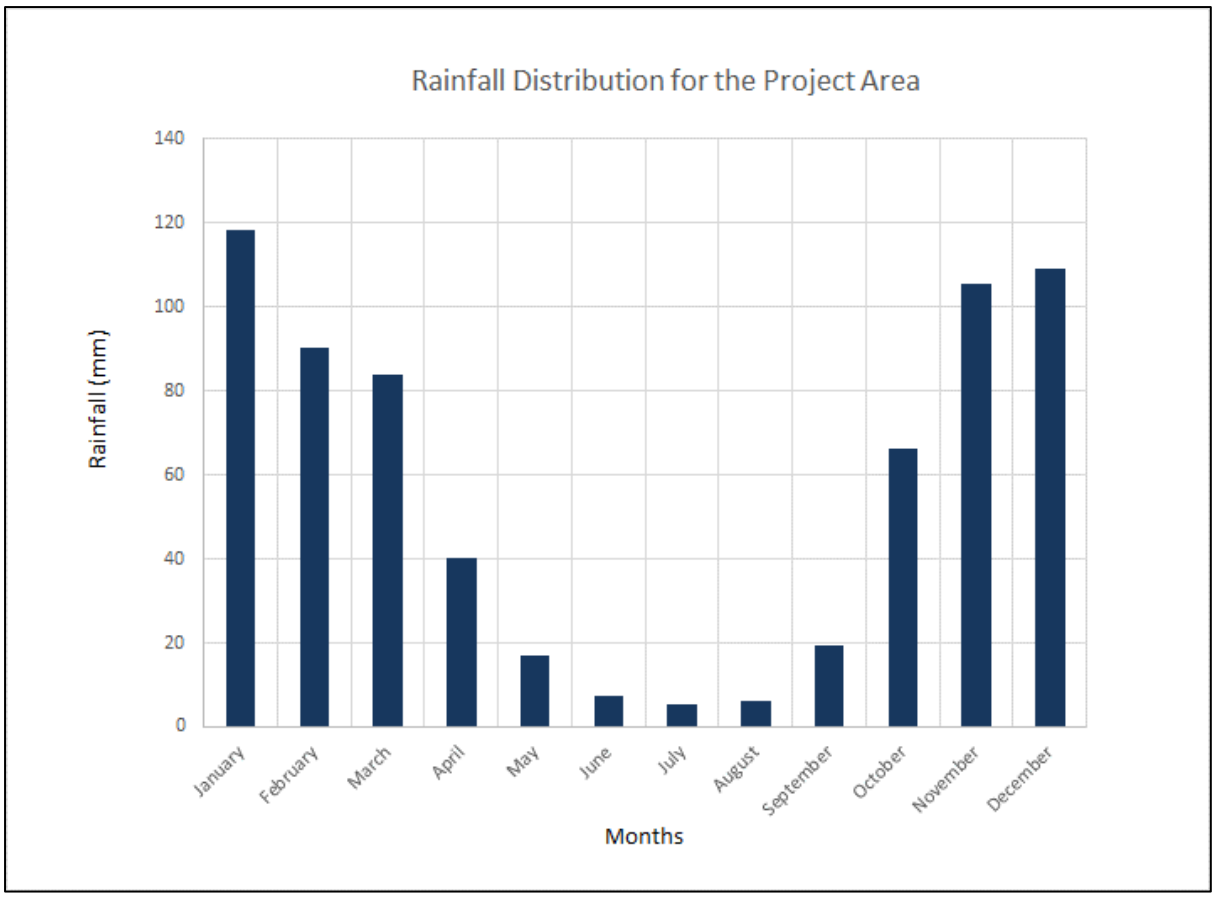


Figure 25: Summary of rainfall distribution

8.12.3 EVAPORATION

High evaporation rates are experienced between the months of October to March but decrease, with peak monthly evaporation of 153 mm occurring in December. Lower evaporation occurs between the months of May to August and range from 67 mm to 92 mm. It is observed that throughout the year evaporation rates exceeds the monthly rainfall, resulting in a negative climatic water balance.

8.12.4 STORM RAINFALL DEPTHS

The summary of the rainfall depths for the 5-minute duration up to the 1-day storm duration for various recurrence intervals are shown below in Table 20, and will be used in the calculation of peak flows for all catchments.

Table 20: Summary of storm rainfall depths

Duration	Rainfall Depth (mm)						
(m/h/d)	1:2 year	1:5 year	1:10 year	1:20 year	1:50 year	1:100 year	1:200 year
5 m	9.8	13	15.3	17.6	20.8	23.3	25.9
10 m	14.5	19.3	22.7	26.2	30.9	34.6	38.6
15 m	18.3	24.4	28.7	33	39	43.7	48.6
30 m	23.2	30.9	36.3	41.8	49.3	55.3	61.6
45 m	26.6	35.4	41.7	48	56.6	63.5	70.7
1 h	29.4	39.1	46	52.9	62.5	70	77.9
1.5 h	33.7	44.8	52.8	60.7	71.7	80.4	89.5
2 h	37.2	49.5	58.2	67	79.1	88.7	98.7
4 h	43.8	58.3	68.5	78.9	93.1	104.4	116.2
6 h	48.2	64.1	75.4	86.8	102.5	114.9	127.9
8 h	51.6	68.6	80.7	92.9	109.7	123	136.9
10 h	54.3	72.3	85.1	97.9	115.6	129.6	144.3
12 h	56.7	75.5	88.8	102.2	120.7	135.3	150.6
16 h	60.7	80.8	95	109.4	129.2	144.8	161.2
20 h	64	85.2	100.2	115.3	136.1	152.7	169.9
24 h	66.8	88.9	104.6	120.4	142.1	159.4	177.4
1 d	55.6	73.9	87	100.1	118.2	132.5	147.5

8.12.5 WATER QUALITY AND CATCHMENT HYDROLOGY

Six surface water localities, as well as the three waste water localities were sampled in April 2018 within the adjacent Kangala Colliery mining area, the majority of other potential sampling localities were dry or the water stagnant. A drinking water locality was also sampled and analysed. The physical and chemical water quality was assessed, whereby the physical water quality refers to the water quality properties such as temperature, electrical conductivity, pH and oxygen content that may be determined by physical method. The physical water quality focusses on three parameters, namely: pH – the scale of acidity (affects the corrosive effect and taste of water), EC – electrical conductivity or TDS – total dissolved solids (indicates the salinity and quantity of dissolved substances).

The chemical quality of the water refers to the nature and concentrations of dissolved substances such as organic or inorganic compounds, including metals, in the water body. Many chemicals in water are essential for the biotic community and may form an integral part of the nutritional requirements. However, elevated levels may be limiting for some of the downstream water users. Furthermore, for drinking water, the WRC Quality of Domestic Water Supplies guidelines are used for classification of the water qualities observed. The Department of Water and Forestry (now Department of Water and Sanitation – DWS) has developed a useful colour coding system for evaluating the prevailing water quality of water used for domestic purposes.

Sampling results for the 6 surface water localities at Kangala Colliery sampled in April 2018 were as follows:

- **Dam Upstream of Kangala Mine (INJ01)** – In April 2018, the water sampled at this locality could be described as **neutral, non-saline and moderately soft**. The WUL (groundwater) limits were exceeded by the recorded orthophosphate and iron concentration, while the SANS standard limits were exceeded by the concentrations of aluminium and iron. The water is classified as **marginal (class 2)** for domestic use (WRC, 1998).
- **Stream outflow from Kangala mine area (INJ02)** – In April 2018, the water sampled at this locality could be described as **neutral, non-saline and moderately soft**. Both the WUL limit and the SANS drinking water standard limit for manganese were exceeded in April 2018. Accordingly, the water is classified **as good (class 1)** for domestic use (WRC, 1998).

- **Stream upstream from Kangala mine (INJ06)** – In April 2018, the water sampled at this locality could be described as **neutral, non-saline and slightly hard**. The orthophosphate concentration exceeded the limit stipulated by the WUL while the SANS drinking water standard was not exceeded. In April 2018, the water quality from this locality is classified as **ideal (class 0)** for domestic use (WRC, 1998).
- **Stream upstream from Kangala mine (INJ07)** – In April 2018, the water sampled at this locality could be described as **neutral, non-saline and slightly hard**. Both the WUL limit and the SANS drinking water standard limit for manganese were exceeded in April 2018 and the WUL limits were further exceeded by the recorded concentration of orthophosphate. Accordingly, the water is classified as **good (class 1)** for domestic use (WRC, 1998).
- **Stream upstream from Kangala mine (INJ08)** – In April 2018, the water sampled at this locality could be described as **neutral, non-saline and slightly hard**. Both the WUL limit and the SANS drinking water standard limit for manganese were exceeded in April 2018 and the WUL limits were further exceeded by the recorded concentration of orthophosphate. Accordingly, the water is classified as **good (class 1)** for domestic use (WRC, 1998).
- **Stream downstream from mine (INJ10)** – The water sampled at locality INJ10 could be described as **neutral, non-saline and slightly hard** in April 2018. Both the WUL limit and the SANS drinking water standard limit for manganese were exceeded in April 2018 and the WUL limits were further exceeded by the recorded concentration of orthophosphate. Accordingly, the water is classified as **good (class 1)** for domestic use (WRC, 1998).

Slight fluctuations in aluminium and iron in concentrations at all 6 sampled surface water localities are evident, but are more profound in localities INJ01 and INJ06. There was an increase in the concentrations recorded for locality INJ01 while a slight decrease in concentration was recorded for locality INJ06 between March and April 2018. As the pH is neutral, it is likely that the concentration found in the water is present as particulate metals and not in the dissolved, more bioavailable (and thus more toxic) form. As these localities are situated upstream from Kangala Colliery, the increases are likely the result of upstream activities unrelated to the mining operations at Kangala Colliery.

Sampling results for the 3 waste water localities at Kangala Colliery sampled in April 2018 were as follows:

- **Discard Facility Effluent (DFE**) – The discard facility effluent could be described as **neutral, very saline and very hard** in April 2018. Both the Kangala WUL groundwater limits and the General Limit were exceeded by the (EC) value, as well as the concentration of manganese. The WUL groundwater limits were further **exceeded by the concentrations of sulphate, calcium and magnesium**.
- **Pollution Control Dam (PCD)** – The water from the pollution control dam could be described as **neutral, very saline and very hard**. Both the Kangala WUL groundwater limits and the General Limit were exceeded by the EC value, as well as the concentration of manganese. The WUL groundwater limits were further **exceeded by the concentrations of sulphate, calcium and magnesium**.
- **Sew age Treatment Plant Effluent (STPE)** – The water from the pollution control dam could be described as **neutral, very saline and very hard**. Both the Kangala WUL groundwater limits and the General Limit were exceeded by the EC value while WUL groundwater limits were further exceeded by the concentrations of sulphate, calcium and magnesium.

The above waste water qualities are expected in untreated process water and the WUL limits are simply used as a comparative guideline. As the General Limit is exceeded by EC and manganese, however, care should be taken to contain this water and prevent seepage / overflow / discharge into the environment. The re-use of this water in the plant may also have detrimental effects on processes / equipment.

Furthermore, in April 2018, the drinking water could be described as **neutral, non-saline and moderately soft**. None of the measured variables exceeded either the WRC Domestic Use guideline or the SANS 241 drinking water standard. Therefore, the water may be classified as **good (class 1)** for domestic use and consumption.

A summary of the catchment hydrology, is shown below in Table 21.

Table 21: Summary of catchment hydrology

Name	Area (km2)	Length of longest watercourse (m)	Height Difference (m)	Rainfall Intensity (Q50)	Tc (hours)	C-Factor
Clean water catchment	1.6951	3812	28.82	56	1.22	0.29
Dirty water catchment	0.2850	1676	13.5	86	0.63	0.54

8.13 WETLANDS

A wetlands scoping study was prepared by the Biodiversity Company in March 2018, the findings of the baseline assessment are presented in this section with the full report presented in Appendix D. According to the land type database (Land Type Survey Staff, 1972-2006) the project area is located within the Bb3 land type. The dominant soil forms on the upper and mid-slopes include the Hutton, Glencoe and Avalon forms, with pans also represented. The Rensburg and Katspruit soil forms are largely representative in the lower lying and valley bottom areas.

The geology of the land type is classified as:

- Shale, sandstone, clay, conglomerate, limestone and marl of the Ecca Group;
- Shale and tillite of the Dwyka Formation and Karoo Sequence;
- Occasional Ventersdorp lava, Witwatersrand quartzite and slate; and
- Dolomite.

8.13.1 WETLAND NATIONAL FRESHWATER PRIORITY AREAS

A total of five (5) Freshwater Ecological Priority Areas (FEPA) wetland types were identified within the assessment area of the project. The systems are either regarded as natural or artificial systems. There is a gap in the dataset, and no details pertaining to the wetland condition and rank for this area are available. Based on this, this desktop information is omitted from the study, and this study will place emphasis in the extent of the delineated wetland areas. The FEPA wetland systems are listed in Table 22. The location of the FEPA wetlands in reference to the project area are provided in Figure 26.

Table 22: NFEPA description for the FEPA systems

Classification Levels				Wetland Vegetation Class	Natural / Artificial	Wetland Condition	Rank
L1 (System)	L2 (Ecoregion)	L3 Landscape Position	L4 Hydrogeomorphic (HGM) Classification				
Inland System	Highveld	Slope	Seep	Mesic Highveld Grassland	-	-	-
Inland System	Highveld	Valley Floor	Channelled	Mesic Highveld Grassland	-	-	-
Inland System	Highveld	Valley Floor	Floodplain	Mesic Highveld Grassland	-	-	-

Classification Levels				Wetland Vegetation Class	Natural / Artificial	Wetland Condition	Rank
L1 (System)	L2 (Ecoregion)	L3 Landscape Position	L4 Hydrogeomorphic (HGM) Classification				
Inland System	Highveld	Bench	Flat	Mesic Highveld Grassland	-	-	-
Inland System	Highveld	Bench	Depression	Mesic Highveld Grassland	-	-	-

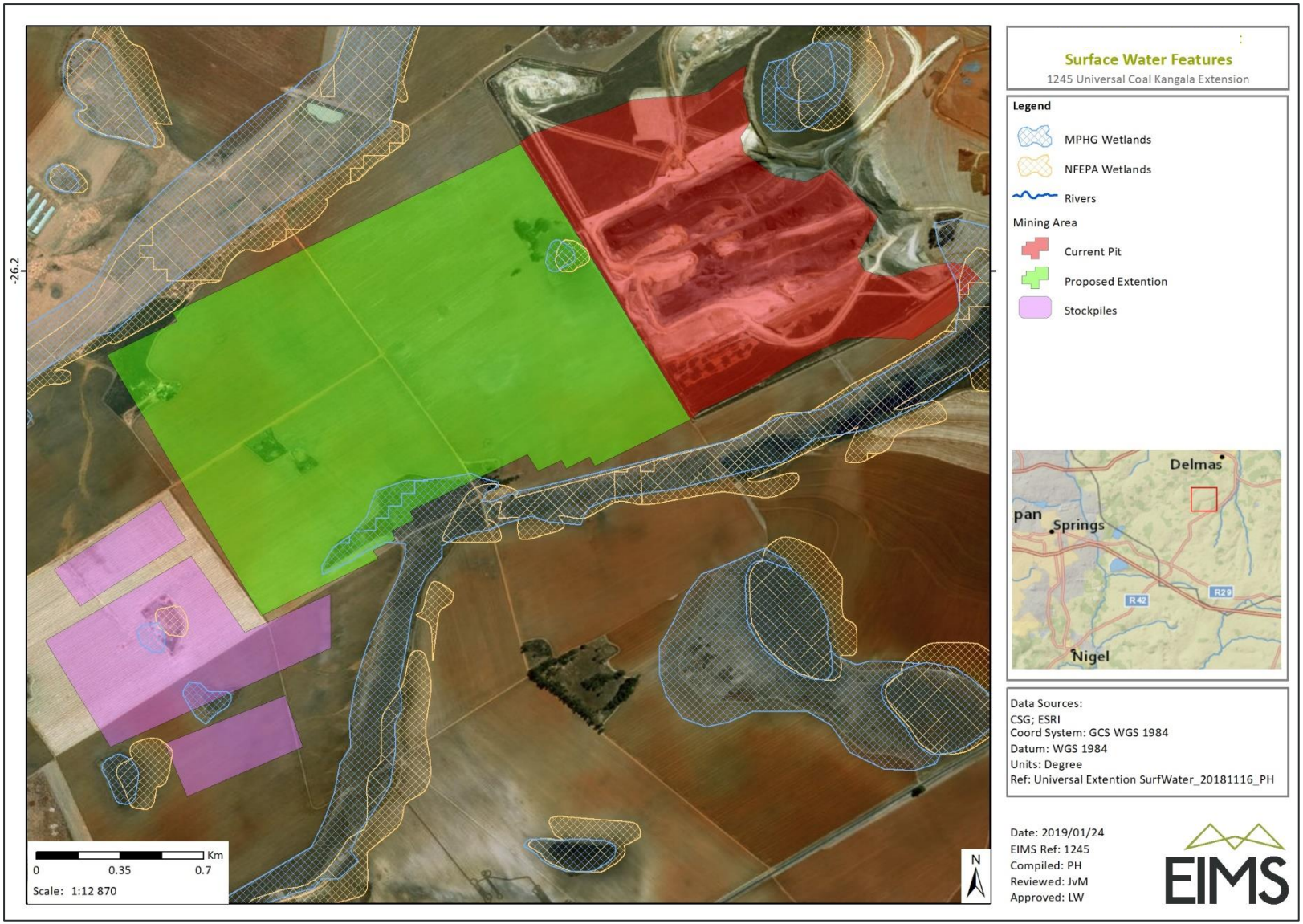


Figure 26: The FEPA and Mpumalanga Highveld (MPHG) wetlands in the vicinity of the Eloff Phase 3 Project area

8.13.2 THE MPUMALANGA HIGHVELD WETLANDS

The Mpumalanga Highveld (MPHG) wetlands dataset was also considered for the proposed mining project, with numerous HGM types located within the assessment area. The dominant wetland type within the assessment area was channelled valley bottom systems, with depression and seepage areas comprising a lower extent of the assessment area (Figure 26, Figure 27 and Figure 28). The status of the wetlands within the project assessment area varies from Moderately Modified (Class C) to Largely / Heavily Modified (Class Z). From this desktop dataset it is likely that some wetland areas may be lost as a result of the project. In the event that these wetland areas (and associated buffers) cannot be avoided, a wetland offset strategy may be required.

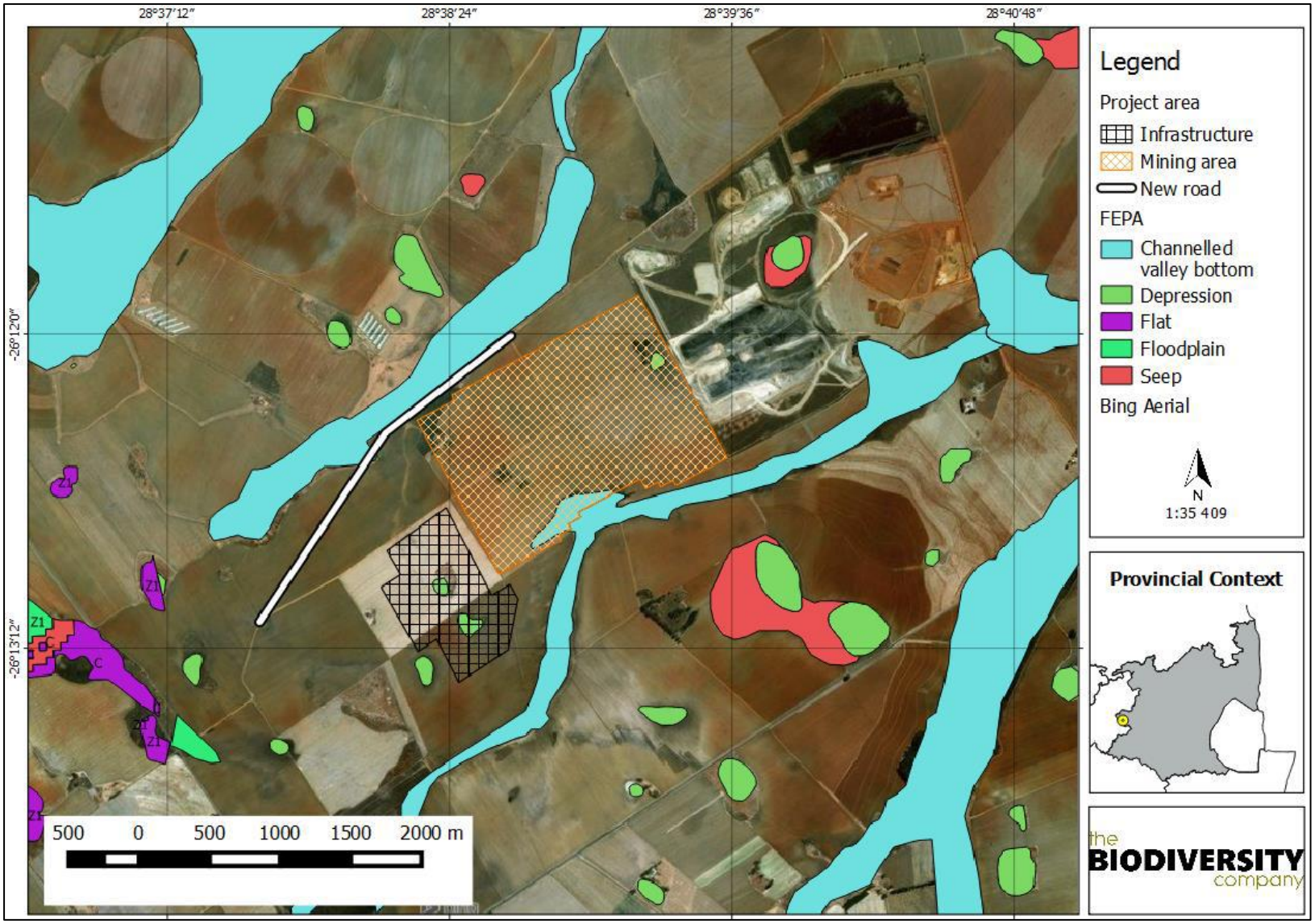


Figure 27: The FEPA and MGHG wetland types within and around the Phase 3 Project area

Figure 28: The delineated wetland systems within 500m of the Phase 3 Project area

8.14 HYDROGEOLOGY (GROUNDWATER)

A hydrogeology study was undertaken by GCS Water and Environmental Consultants in August 2018, the full report is presented in Appendix D. Based on their study of all groundwater related aspects and previous groundwater studies, they conceptualize the hydrogeological system underlying the proposed project as follows:

- The project area falls within the summer rainfall region of South Africa and receives on average ~ 669 mm of rainfall per year.
- The surface topography can be described as being undulating with a vertical difference of nearly 160 meters between the lowest and highest surface elevations.
- The non-perennial Dwars-in-die-wegvlei and tributaries of the Bronkhorstspruit cut through the western and eastern sections respectively of the Eloff mining right area, while the same Bronkhorstspruit tributaries also cut through the Kangala Colliery mining right area.
- According to the geological map, the vicinity of the subject area is characterised, in places, by outcropping dolerite (possibly dykes and sills). From a hydrogeological point, weathering around and fracturing within dolerite can lead to enhanced aquifer properties associated with groundwater flow and storage. In particular, long and thick low-permeability dykes act as barriers for much of the topography-driven groundwater flow (Kebede, 2013); therefore, they play a key role in the groundwater flow and storage in the karoo geology. The mapping (detection and delineation) of these hydraulic features can effectively be undertaken by geophysical techniques such as electrical resistivity surveys.
- The dolerite intrusions have a significant effect on the hydrogeology of the area. According to Vivier (1996) the two main advantages of intrusions are that they are easily located using geophysics and that they are usually surrounded by fracture zones. The disadvantages listed by Vivier (1996) are that due to the impermeable nature of the intrusion the aquifer is divided into compartments where little or no inter-compartmental flow can occur, and also the intrusion will act as a no-flow boundary resulting in drawdown and recovery rates of boreholes nearby being larger than desired for a production borehole.
- Three aquifer systems are present, namely a shallow aquifer composed of soil and weathered bedrock, a deeper fractured rock aquifer hosted within the solid / unweathered Karoo Supergroup bedrock and a dolomitic aquifer associated with the underlying Transvaal Supergroup rocks (Malmani Subgroup).
- At this point in time there remains an uncertainty as to the degree of interaction between the dolomitic aquifer and the overlying Karoo Supergroup aquifer/s (Ecca Group), however the general belief is that the low hydraulic properties of the Dwyka Group rocks (mainly tillite and diamictite) that separate the dolomite from the overlying mining activities greatly restrict interaction (if any). The saturated hydraulic conductivity of the fractured rock aquifer (Ecca Group) was found to vary between $1x10^{-1}$ and $1x10^{-3}$ m/day, while a hydraulic conductivity of between 10 and 100 m/day is considered representative of the dolomitic aquifer (Malmani Subgroup).
- The shallow weathered zone aquifer receives on average approximately 3% recharge from rainfall, while the fractured Karoo Supergroup aquifer/s receives between 1 and 3%. Where dolomite outcrop occurs, recharge is expected to vary between 2 and 6% of the mean annual rainfall.
- The interpretation of the geophysics (ERT) results indicated that the subject area is characterised by shallow (10-31m) decomposed and transition (low resistive) zones underlying resistive substratum. This implies that most of the groundwater will be found in the decomposed and transition zones while the underlying substratum will possibly act as a confining layer. As a result, the drill targets were recommended targeting the shallow decomposed and transition zones of the underlying lithology.
- Based on the borehole logs the site is mostly underlain by shale, and no major water strikes were found.
- Natural groundwater flow in the project area is towards the west/north-west and north-east at an average velocity/flux of approximately 3.5 m/y.

- Groundwater levels generally vary between ±2.4 and 58 metres below surface (mbs) with the average being nearly 14 mbs.
- Water levels in excess of ±14 meters deep are considered to be affected by groundwater abstraction for domestic / other purposes, however impacts are largely restricted due to the generally low hydraulic properties of the aquifer host rock.
- Transmissivity values calculated from the aquifer testing ranged between 0.50 and 0.86 m2/day and are typical for the encountered formations.
- The laboratory results showed a good water quality with all constituents compliant with the SANS 241-1: 2015 standard for drinking water.
- The saturated weathered zone and geological structures (dykes and faults) within the project area were identified as possible pathways along which groundwater and potential contamination may migrate at accelerated rates.
- Numerous groundwater user boreholes were located during the hydrocensus / user surveys, five of which are located within a one kilometre radius of the proposed new opencast pit. Four of these boreholes are located in the pit and/or waste rock stockpile footprint areas and will be demolished during the life of mine (EF, EBA03, EBA30/KGA39 and KGA40) - note that only boreholes EBA30/KGA39 and KGA40 were in use at the time of the surveys. Borehole KGA41 is situated in the up gradient groundwater flow direction.
- No major or perennial rivers / streams are located within close proximity of the proposed new mining activities that may potentially act as receptors of contamination.
- The planned opencast pit is expected to intersect the groundwater table, at which point groundwater is expected to migrate towards and eventually flow into it. The rate of groundwater influx is determined by the hydraulic properties of the aquifer host rock as well as the groundwater hydraulic gradient (i.e. increase in mining depth will result in an increase in gradients and groundwater influx).

A vertical cross section through the proposed opencast pit from west to east is provided in Figure 29.

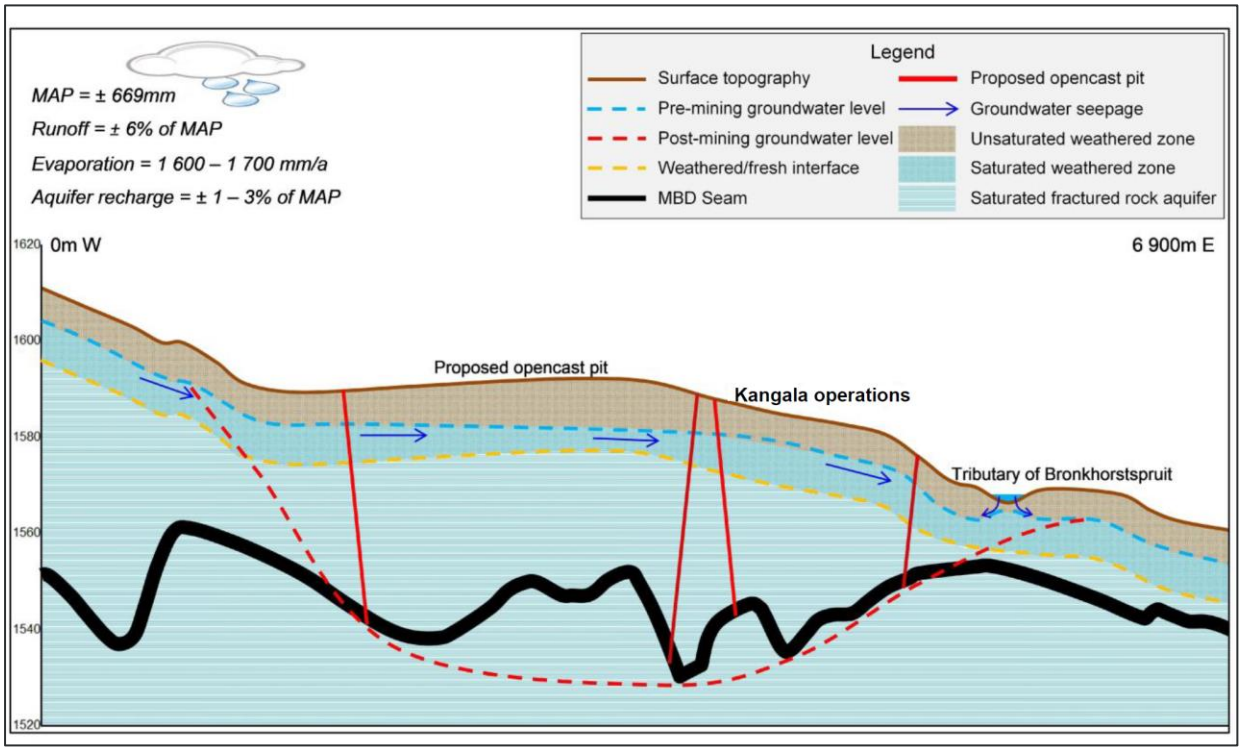


Figure 29: Vertical cross section through the proposed opencast pit from west to east (GCS Conceptual Model)

8.15 EXISTING INFRASTRUCTURE (BLASTING AND VIBRATION)

The blasting and vibrations scoping study was undertaken by Blast Management and Consulting in July 2018, the findings thereof make up this section and the full report presented in Appendix D. The receiving environment is considered the area expected to be influenced directly adjacent to the Phase 3 Project area and specifically the area adjacent to the proposed pit extension area. The area of influence is not expected to exceed a distance range of 3500m radius around the pit extension area. Figure 29 shows the basic layout for the mine area and infrastructure, and Figure 31 shows the anticipated receiving environment or existing infrastructure around the Phase 3 Project area.

The different ranges of various preliminary potential Points of Interest (POI) and their ranges from the proposed pit area are indicated in . These points are locations of preliminary potential receptors, the final list of receptors or types of receptors will be confirmed after on-site assessments during the EIA phase

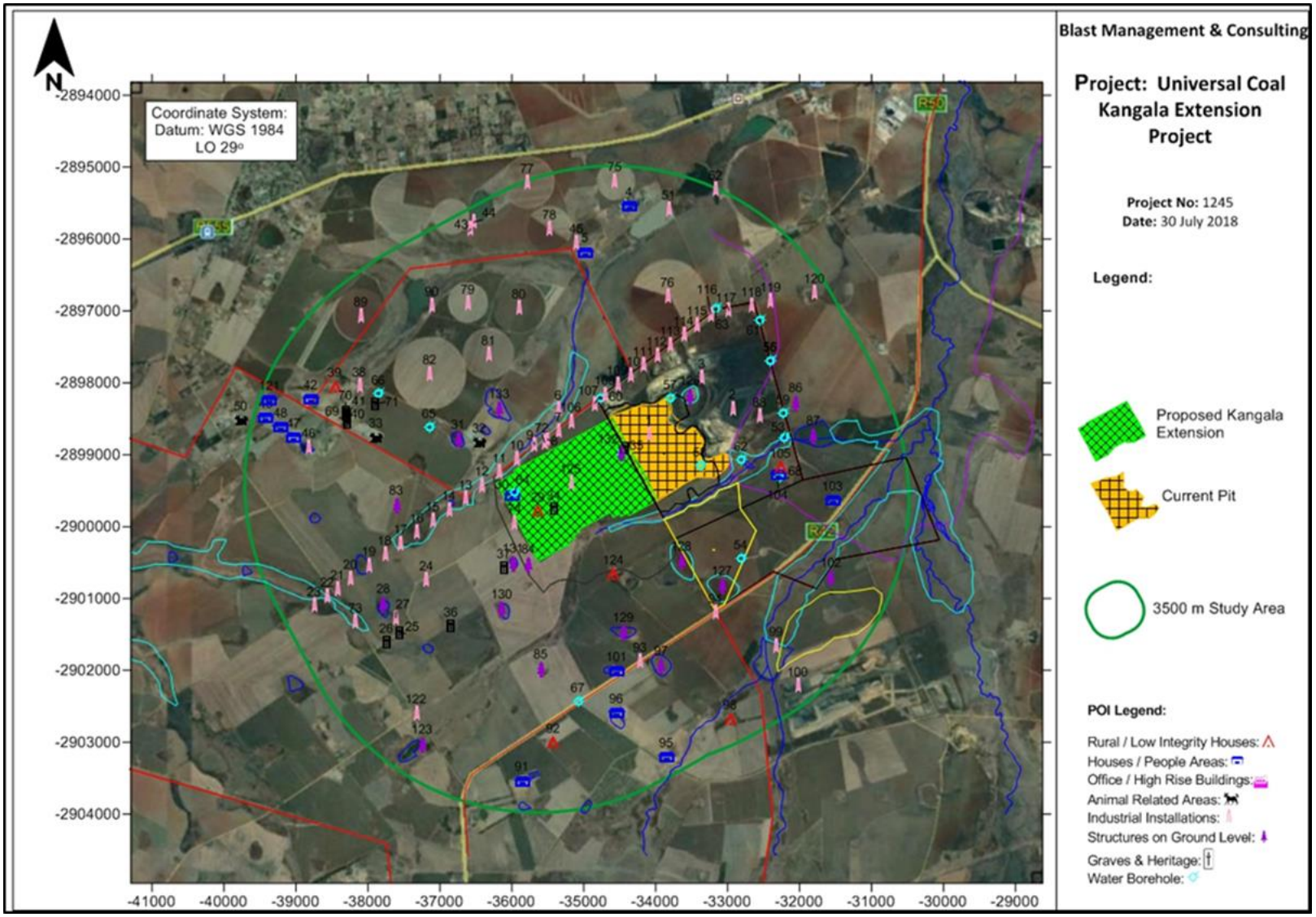


Figure 30: Anticipated receiving environment (existing infrastructure) around the Phase 3 Project area

Figure 31: Points of Interest (POI) and their ranges from the proposed pit area

8.16 VISUAL RESOURCES

The visual scoping study was conducted by Environmental Planning and Design in August 2018 and its findings are presented in this section, the full report is presented in Appendix D. The project area is defined by the limit of visibility of the proposed project. As an initial guide the limit has been set at 19.6km from the proposed site being the approximate limit of visibility of the stockpiles being the tallest items associated with the proposed development.

Landscape Character is defined as "a distinct, recognisable and consistent pattern of elements in the landscape that makes one landscape different from another" (UK Guideline). Landscape Character is a composite of a number of influencing factors including:

- Landform and drainage;
- Nature and density of development; and
- Vegetation patterns.

8.16.1 LANDFORM AND DRAINAGE

The regional area generally falls from the south west to the north east. The general landform is comprised of low undulating ridgelines that are aligned with the general direction of fall. Ridgelines in the vicinity of the site are approximately 40-60m above valley floors. The non-perennial streams that drain the area flow to the north-west into the Olifants River. This system flows through the Kruger Park into Mozambique and then into the Indian Ocean. The proposed site is located on a shallow sloping broad ridgeline. The proposed mining extension falls from a mid-high point of approximately 1603mamsl to a low point at its eastern extremity of approximately 1582mamsl. This results in an approximate fall along the length of the site of approximately 1:45. This landform is likely to have a number of implications for visibility of the proposed development.

8.16.2 LANDCOVER

The site is located within an area that is predominantly under cultivation. These farm areas also have isolated farmsteads that are comprised of farm buildings including buildings used for residential and storage uses. There are also bands of natural vegetation in close proximity to the proposed mine extension. Other major landcover types include:

- Three large areas of settlement including Sundra, Eloff and Delmas that lie to the north, the closest being Delmas which is approximately 3.8km to the north of the proposed mine extension; and
- Two areas (Vischkuil and Droogfontein) that are indicated as urban are in fact areas of small holdings. Activities within these areas appear to include intensive / industrial agriculture such as agricultural tunnels as well as large individual private houses.

A number of other large coal mines including one approximately 3.2km to the east and one approximately 2.2km to the south of the proposed mine extension. There is only one protected area in the vicinity of the proposed site. This is the Marievale Bird Sanctuary which is a Provincial Nature Reserve which is approximately 16km from the proposed mine extension. Due to the distance and the fact that there are other existing mines in close proximity, it is highly unlikely that this protected area will be affected by the proposed mine extension. There are a number of regional roads in the area including the R42 which runs approximately 1.4km to the south and the R55 which runs approximately 3.8km to the north of the proposed mine extension.

8.16.3 VEGETATION PATTERNS

The main natural vegetation types as defined by Mucina and Rutherford in the vicinity of the proposed mine extension include:

- Eastern Highveld Grassland; and
- Soweto Highveld Grassland.

Whilst botanically these vegetation types may be very different, in visual terms they are both short dense grasslands which in themselves are unlikely to provide any screening. It is obvious from the landcover analysis that only small areas of natural vegetation exist in close proximity to the proposed mine extension. It is possible that some natural areas have been invaded by alien tree species. If this is the case then it is possible that a significant amount of localised screening could be provided.

8.16.4 LANDSCAPE CHARACTER AREAS AND VISUAL ABSORPTION CAPACITY

Landscape Character Areas (LCAs) are defined as "single unique areas which are the discrete geographical areas of a particular landscape type". Visual Absorption Capacity (VAC) is defined as the landscape's ability to absorb physical changes without transformation in its visual character and quality. Where elements that contrast with existing landscape character are proposed, VAC is dependent on elements such as landform, vegetation and other development to provide screening of a new element. The scale and texture of a landscape is also critical in providing VAC, for example; a new large-scale industrial development located within a rural small-scale field pattern is likely to be all the more obvious due to its scale.

As the topography is very similar throughout the project area, landscape character is generally defined by the extent of development and transformation of vegetation types. The affected landscape can be broadly divided into the following LCAs:

- The Mining Urban LCA;
- The Rural Mining LCA;
- The Rural Natural LCA;
- The Small Holding LCA; and
- The Urban LCA.

The proposed mine extension will be located largely within the Rural Mining LCA.

8.16.5 LANDSCAPE QUALITY AND IMPORTANCE

The majority of the affected landscape appears to be largely transformed by a combination of mining activity, agriculture and settlement. The most natural and perhaps the most sensitive LCA to possible change associated with the proposed development is the Rural Natural LCA although views of mining activities are likely to be possible from the majority of this LCA (Figure 32). The proposed mine extension will extend marginally into this LCA. It seems unlikely that there are critical high-quality landscapes in the vicinity of the proposed site that are worthy of preservation. It seems more likely that specific views associated with sensitive visual receptors will be the main concern. There is only one protected area that is close to the south western edge of the Approximate Limit of Visibility. This area is located close to other existing mines. Due to distance and the current setting, it is unlikely to be sensitive to the landscape change that could result from the proposed development.

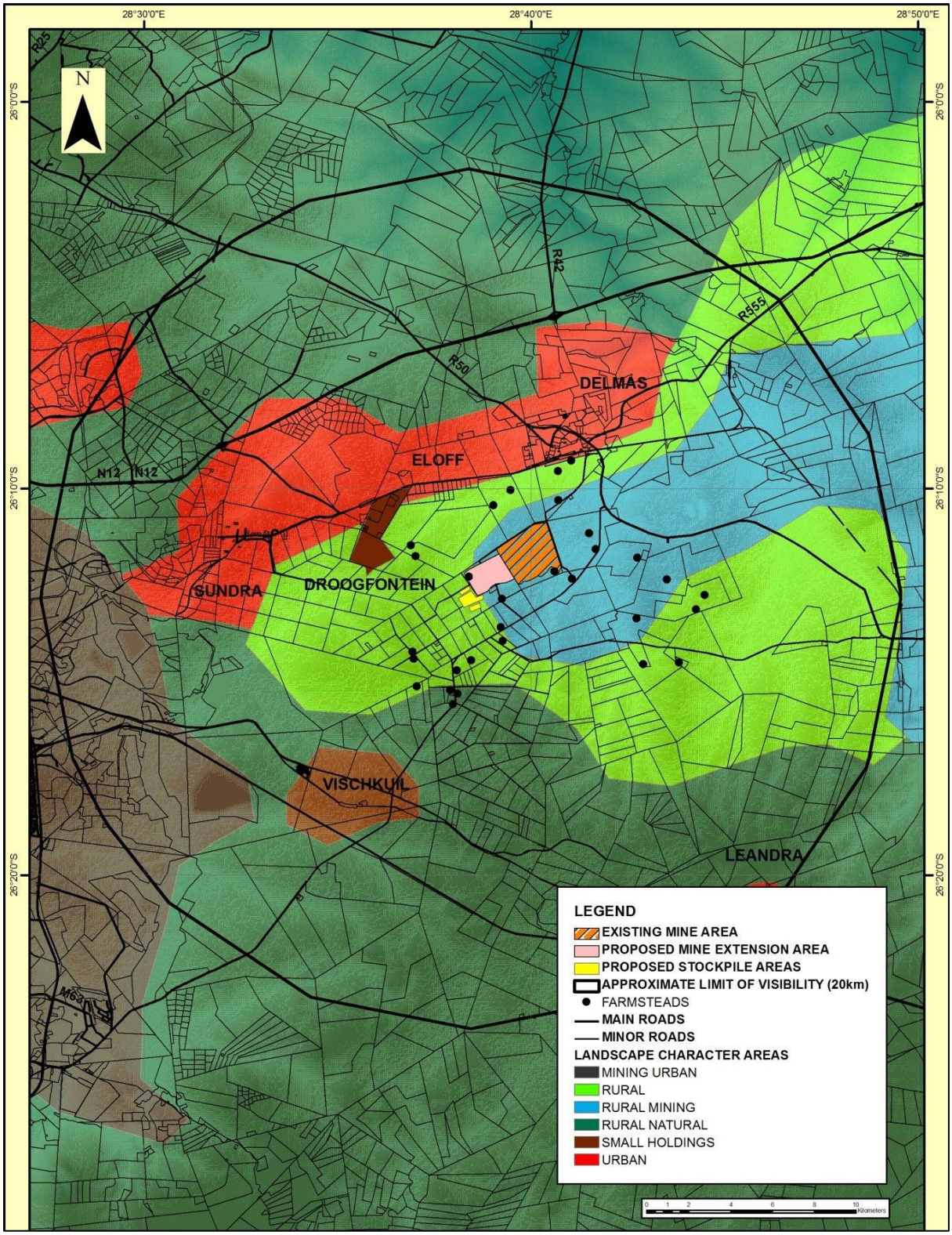


Figure 32: LCAs and sensitive receivers

8.16.6 VISUAL RECEPTORS

This section is intended to highlight possible Receptors within the landscape which due to use could be sensitive to landscape change. They include:

- Area Receptors –

- The urban areas to the north and south of the project site including Delmas, Eloff, Sundra and Devon. Areas associated with this use could be sensitive to possible changes in outlook associated with the proposed development. However, it seems likely that due to distance, and the VAC of the landscape, the majority of these areas will be subject to minimal visual impact. These impacts are likely to be limited to the urban edge,
- The two areas of smallholdings, Droogfontein and Vischkuil. It is possible that closest properties could be affected and subject to use may be sensitive, and
- The Marievale Bird Sanctuary, however due to distance and the fact that there are other mining activities in close proximity to this receptor, it is unlikely that it will be sensitive.

- Linear Receptors which include the R555 which runs approximately 3.7km to the north and the R42 which runs approximately 1.8km to the south of the proposed mine extension. There are also a number of other minor local roads, one of which runs adjacent to the northern boundary of the proposed mine extension. Given that these roads are likely to be used as local distributor routes and that they are unlikely to have significant recreational or tourism importance, these receptors are likely to have a low level of sensitivity to the likely landscape change.
- Point Receptors which include isolated homesteads and small rural settlements most of which are likely to be associated with agricultural uses of the surrounding rural area. It is possible but unlikely that a number may also be used for recreational and tourism activities. Subject to location and the degree of screening provided by vegetation around the homesteads, these could be sensitive to the landscape change.

8.17 NOISE

The noise scoping study was conducted by Enviro Acoustic Research in July 2018, the findings related to the baseline noise environment are presented in this section. Ambient sound levels will be measured during the future Environmental Noise Impact Assessment (ENIA). Ambient sound levels were previously measured for other projects in the area, including quarterly measurements done for Dangote Cement Delmas and an ENIA done for Stuart Coal. While this data is not applicable to the soundscape close to this project, it did allow the author the opportunity to visit the site and gauge the typical sound character of the area.

Mining and industry have changed the soundscape directly (due to the activities of the mines and industry) as well as indirectly (due to increased traffic). While most of the area has a rural developmental character, the increased industry (including agricultural activities such as poultry farming) did raise the ambient sound levels in the area, especially in the vicinity of the industry as well as the R42. Taking a precautious stance, it will be assumed that the ambient sound levels are typical of a rural noise district at all receptors.

Potential receptors in and within approximately 2,000m around the proposed development activities were identified as 1 to 6 (Figure 33). It should be noted that each of these dots may represent a small farming community, including the farmer and the various workers that stay on the farm (close to the main dwelling). Furthermore, based on the location of the proposed development and the potential noise-sensitive developments, there are a risk of a noise impact on these receptors.

Figure 33: Aerial image indicating potentially noise-sensitive receptors

8.18 AIR QUALITY

The air quality scoping study was undertaken by Airshed Planning Professionals in October 2018 and the findings of the study are presented in this section, full details are presented in Appendix D. Below are the findings of the scoping air quality assessment described in terms of the following:

- Local AQSRs;
- The atmospheric dispersion potential;
- Baseline or pre-development ambient air pollutant contributors; and
- Pre-development ambient air pollutant levels.

Readily available terrain and land cover data was obtained from the United States Geological Survey (USGS) via the Earth Explorer website (U.S. Department of the Interior, U.S. Geological Survey, 2016). Use was made of Shuttle Radar Topography Mission (SRTM) (90 m, 3 arc-sec) data and Global Land Cover Characterisation (GLCC) data for Africa. An understanding of the atmospheric dispersion potential of the area is essential to an air quality impact assessment. In the absence of on-site meteorological data (that is required for atmospheric dispersion modelling), use was made of MM5 modelled meteorological data for the study site for the period 2014-2016. There is available ambient monitoring data (PM10 concentrations and dust fallout levels) in the Project area for the period 2015-2018. Potential air quality sensitive receptors (AQSRs) were identified from Google Earth imagery.

8.18.1 AIR QUALITY SENSITIVE RECEPTORS

Air Quality Sensitive Receptors (AQSRs) generally include places of residence and areas where members of the public may be affected by atmospheric emissions generated by mining/industrial activities. The nearest receptors to the project location are farmsteads, residential areas, schools, a hospital and agricultural holdings (Figure 34).

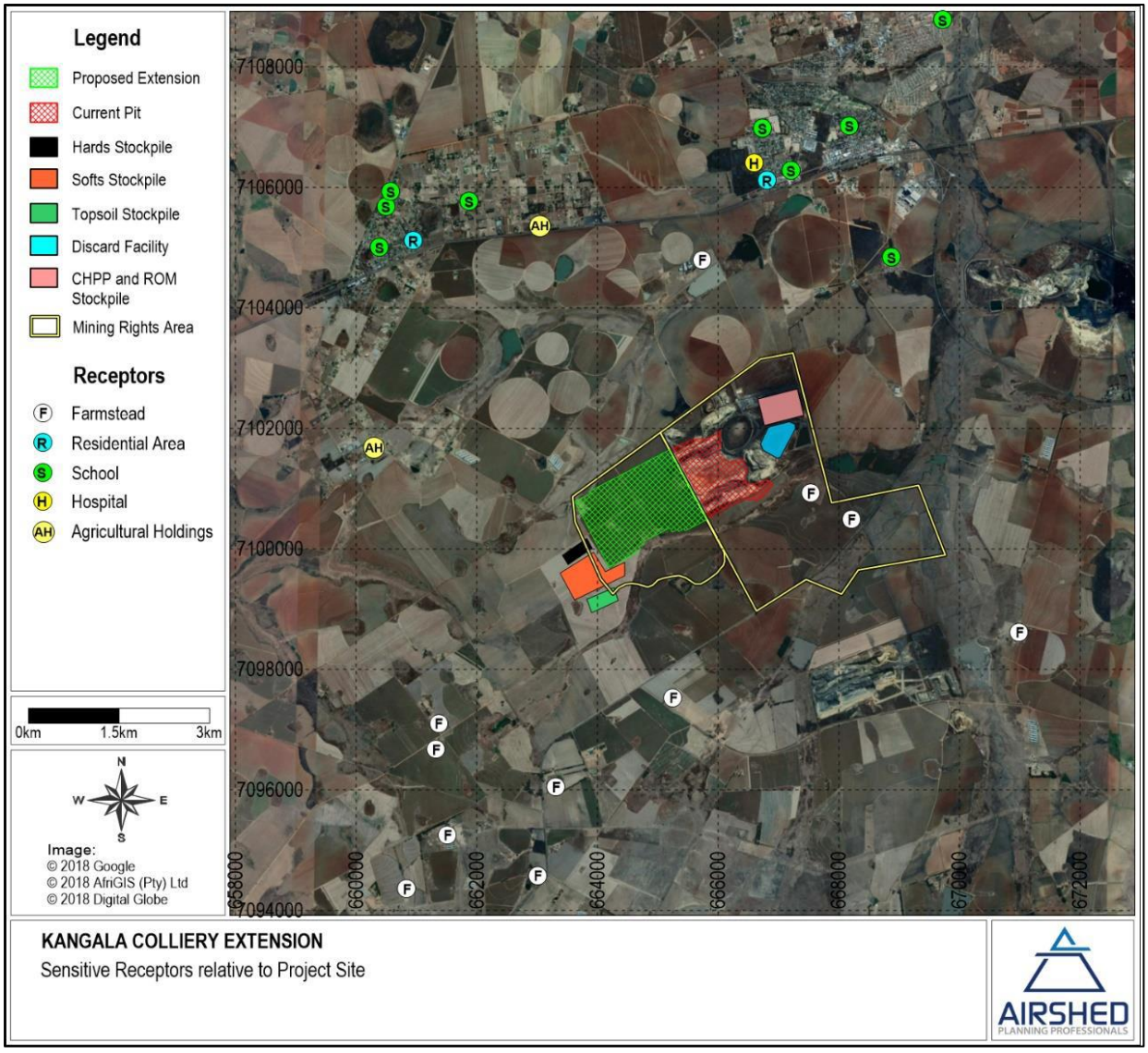


Figure 34: Location of air quality sensitive receptors relative to the project

8.18.2 ATMOSPHERIC STABILITY

The new generation air dispersion models differ from the models traditionally used in a number of aspects, the most important of which are the description of atmospheric stability as a continuum rather than discrete classes. The atmospheric boundary layer properties are therefore described by two parameters; the boundary layer depth and the Monin-Obukhov length, rather than in terms of the single parameter Pasquill Class.

The Monin-Obukhov length (LMo) provides a measure of the importance of buoyancy generated by the heating of the ground and mechanical mixing generated by the frictional effect of the earth's surface. Physically, it can be thought of as representing the depth of the boundary layer within which mechanical mixing is the dominant form of turbulence generation (CERC, 2004). The atmospheric boundary layer constitutes the first few hundred metres of the atmosphere. During daytime, the atmospheric boundary layer is characterised by thermal turbulence due to the heating of the earth's surface. Night-times are characterised by weak vertical mixing and the predominance of a stable layer. These conditions are normally associated with low wind speeds and lower dilution potential.

Diurnal variation in atmospheric stability, as calculated from on-site data, and described by the inverse Monin-Obukhov length and the boundary layer depth is provided in Figure 35. The highest concentrations for ground level, or near-ground level releases from non-wind dependent sources would occur during weak wind speeds and stable (night-time) atmospheric conditions.

For elevated releases, unstable conditions can result in very high concentrations of poorly diluted emissions close to the stack. This is called looping (Figure 35 (c)) and occurs mostly during daytime hours. Neutral conditions disperse the plume fairly equally in both the vertical and horizontal planes and the plume shape is referred to as coning (Figure 35 (b)). Stable conditions prevent the plume from mixing vertically, although it can still spread horizontally and is called fanning (Figure 35 (a)) (Tiwary & Colls, 2010).

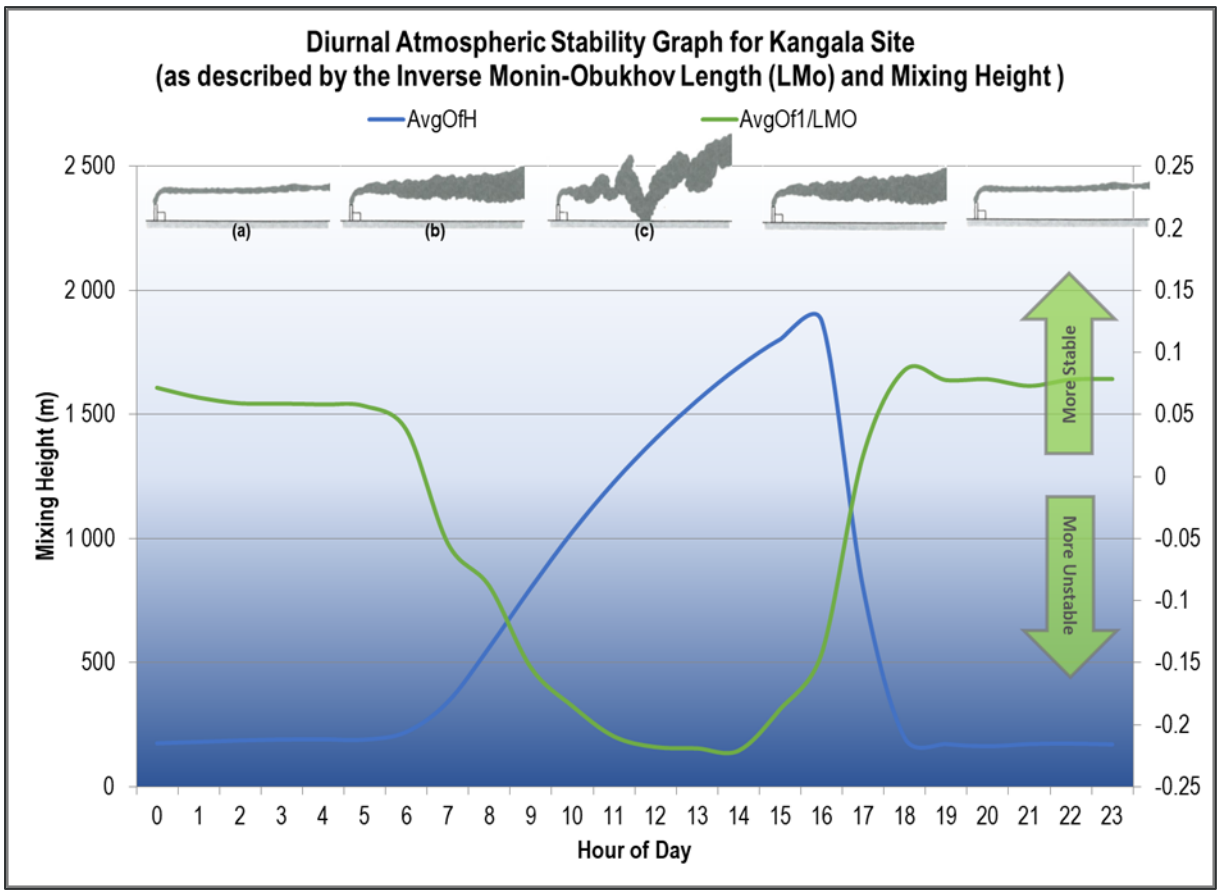


Figure 35: Diurnal atmospheric stability (MM5 modelled data for the study site, 2014 to 2016)

8.18.3 SURFACE WIND FIELD

The wind field determines both the distance of downward transport and the rate of dilution of pollutants. The generation of mechanical turbulence is a function of the wind speed, in combination with the surface roughness. The wind field for the study area is described with the use of wind roses. Wind roses comprise 16 spokes, which represent the directions from which winds blew during a specific period. The colours used in the wind roses below, reflect the different categories of wind speeds; the yellow area, for example, representing winds in between 4 and 5 m/s. The dotted circles provide information regarding the frequency of occurrence of wind speed and direction categories. Calm conditions are periods when the wind speed was below 1 m/s. These low values can be due to “meteorological” calm conditions when there is no air movement; or, when there may be wind but it is below the anemometer starting threshold. AERMET, the meteorological pre-processor to AERMOD, treats calm conditions (wind speeds <1 m/s) as missing data, which can result in overly conservative concentration estimates simulated in AERMOD. The Regulations regarding Air Dispersion Modelling (DEA, 2014) suggest that all wind speeds greater than or equal to the anemometer starting threshold and less than 1 m/s be replaced with the value of 1 m/s. This approach was been adopted.

The period wind field and diurnal variability in the wind field from the modelled MM5 data are shown in Figure 36 and Figure 37, while the seasonal variations in the wind field are provided in Figure 38. During the 2014 to

2016 period, the wind field was dominated by strong winds from the north, and north-northeast. The strongest winds (more than 6 m/s) were recorded from the north-northwest, north and north-northeast, occurring mostly during the day (06:00 to 18:00). An increase in dominant winds from the north-northeast occurred at night (18:00 to 06:00). Seasonal wind fields vary - during spring and summer the dominant winds are from the north and north-northeast, with very little wind from the south, whereas the autumn and winter seasons are dominated by northerly winds with an increase in winds from the south and the east.

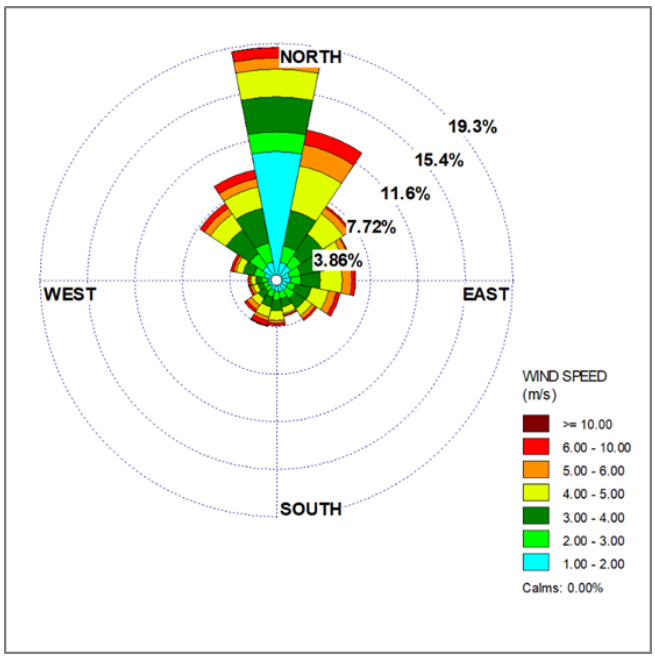


Figure 36: Period average wind rose (MM5 modelled data for the study site, 2014 to 2016)

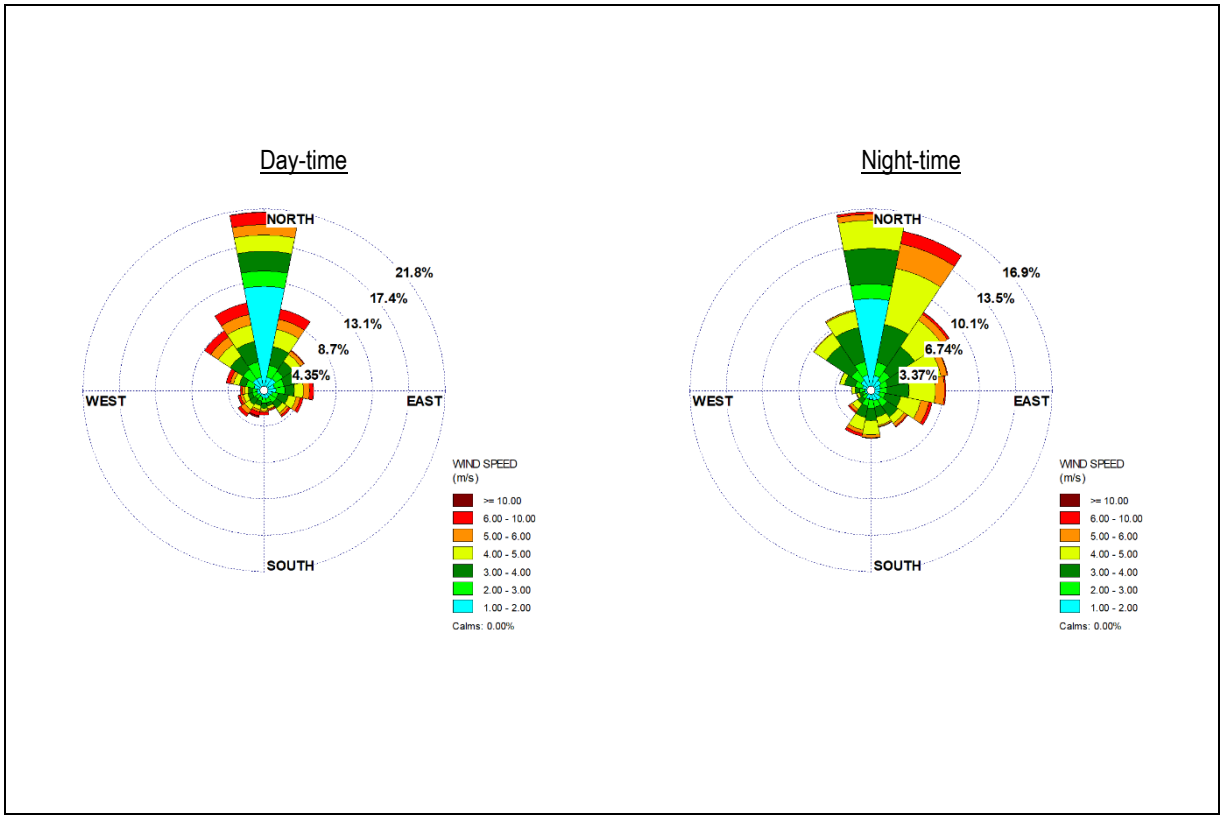


Figure 37: Day-time and night-time wind roses (MM5 modelled data for the study site, 2014 to 2016)

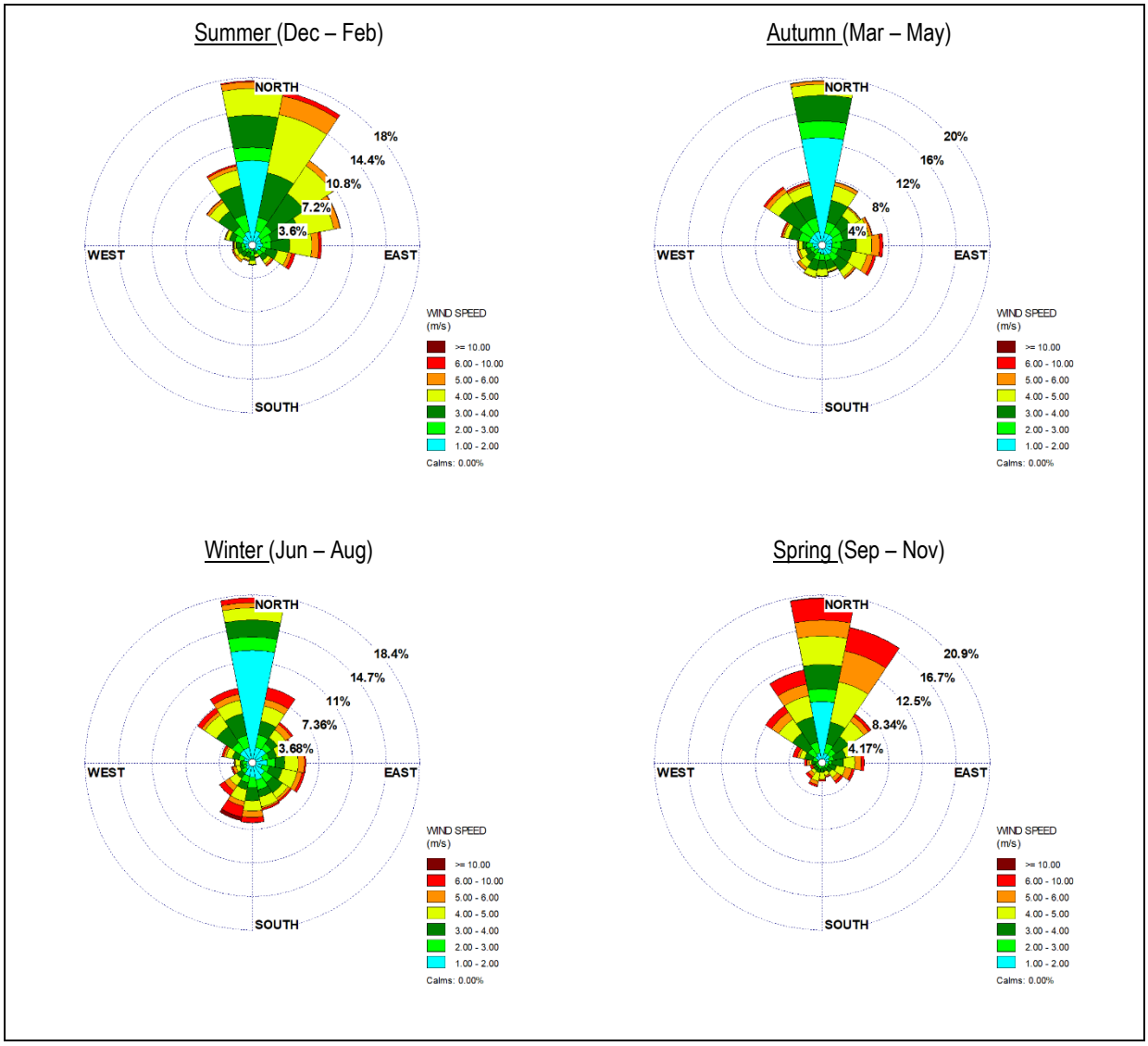


Figure 38: Seasonal wind roses (MM5 modelled data for the study site, 2014 to 2016)

8.18.4 EXISTING SOURCES OF EMISSIONS NEAR THE PROJECT SITE

Power generation, mining activities, farming and residential land-uses occur in the vicinity of the proposed Phase 3 Project. These land-uses contribute to baseline pollutant concentrations via vehicle tailpipe emissions, household fuel combustion, biomass burning and various fugitive dust sources. Long-range transport of particulates, emitted from remote tall stacks and from large-scale biomass burning in countries to the north of South Africa, has been found to contribute to background fine particulate concentrations within the South African boundary (Andreae*, et al*., 1996; Garstang, Tyson, Swap, & Edwards, 1996; Piketh, Annegarn, & Kneen, 1996; Swap *et al.*, 2003).

Power Generation

The closest power station is Kendal Power Station, situated approximately 32 km to the north-east of the Project site. Processing emissions and fugitive emission sources from these operations mainly comprise of boiler operations, materials handling operations (i.e. tipping, off-loading and loading, conveyor transfer points), vehicle entrainment from plant roads and windblown dust from open areas. These activities result in PM, NOx, CO, SO2, VOC and diesel particulate matter (DPM) releases.

Metallurgical Manufacturing

There are metallurgical manufacturing operations located in the vicinity of the Project. Processing emissions and fugitive emission sources from these operations mainly comprise of dryer and smelter operations, materials handling operations (i.e. tipping, off-loading and loading, conveyor transfer points), vehicle entrainment from plant roads and windblown dust from open areas. These activities result in PM, NOx, CO, SO2, VOC, DPM and trace metal releases.

Mining Operations

There are numerous existing and proposed mines located in the vicinity of the Project. Fugitive emissions sources from mining operations mainly comprise of land clearing operations (i.e. scraping, dozing and excavating), materials handling operations (i.e. tipping, off-loading and loading, conveyor transfer points), vehicle entrainment from haul roads, wind erosion from open areas and drilling and blasting. These activities mainly result in fugitive PM releases with NOx, CO, SO2, VOC and DPM being released during blasting operations as well as a result of diesel combustion and storage. The closest mines are Leeuwpan and Stuart opencast coal mines to the north-east at distances of 7km and 11.5 km, respectively.

Agricultural operations

Agriculture is a land-use within the area surrounding the site. Particulate matter is the main pollutant of concern from agricultural activities as particulate emissions are deriving from windblown dust, burning crop residue, and dust entrainment as a result of vehicles travelling along dirt roads. In addition, pollen grains, mould spores and plant and insect parts from agricultural activities all contribute to the particulate load. Should chemicals be used for crop spraying, they would typically result in odoriferous emissions. Crop residue burning is an additional source of particulate emissions and other toxins.

Miscellaneous Fugitive Dust Sources

Fugitive PM emissions are generated through entrainment from local paved and unpaved roads, and erosion of open or sparsely vegetated areas. The extent of particulate emissions from the main roads will depend on the number of vehicles using the roads, and on the silt loading on the roadways. The extent, nature and duration of road-use activity and the moisture and silt content of soils are required to be known in order to quantify fugitive emissions from this source. The quantity of windblown dust is similarly a function of the wind speed, the extent of exposed areas and the moisture and silt content of such areas.

Vehicle Tailpipe Emissions

Air pollution from vehicle emissions may be grouped into primary and secondary pollutants. Primary pollutants are those emitted directly into the atmosphere, and secondary, those pollutants formed in the atmosphere as a result of chemical reactions, such as hydrolysis, oxidation, or photochemical reactions. Notable primary pollutants emitted by vehicles include CO2, CO, hydrocarbons (HCs), SO2, NOx, DPM and Pb. Secondary pollutants include: NO2, photochemical oxidants (e.g. ozone), HCs, sulphur acid, sulphates, nitric acid, nitric acid and nitrate aerosols. Hydrocarbons emitted include benzene, 1.2-butadiene, aldehydes and polycyclic aromatic hydrocarbons (PAH). Benzene represents an aromatic HC present in petrol, with 85% to 90% of benzene emissions emanating from the exhaust and the remainder from evaporative losses. Vehicle tailpipe emissions are localised sources and unlikely to impact far-field. The R555 and R42 provincial roads are in close proximity to the project area and are both busy roads. The R42 provincial road crosses through the centre of the Project area in a north-east to south-west direction. The R555 provincial road runs along the north western boundary of the Project area.

Household Fuel Burning

Energy use within the residential sector is given as falling within three main categories, viz.: (i) traditional - consisting of wood, dung and bagasse, (ii) transitional - consisting of coal, paraffin and liquefied petroleum gas (LPG), and (iii) modern – consisting of electricity (increasingly this includes the use of renewable energy). The typical universal trend is given as being from (i) through (ii) to (iii). Pollutants include products of combustion (CO, NOx, SO2 and VOC), unburned HC and PM.

8.18.5 MEASURED BASELINE AIR QUALITY

Particulates represent the main pollutant of concern in the assessment of mining operations. The particulates in the atmosphere may contribute to visibility reduction, pose a threat to human health, or simply be a nuisance due to their soiling potential.

Measured Ambient Air Pollutant Concentrations

A Met-One E-Sampler is used to measure PM10 concentrations at Kangala Colliery. The E-Sampler was installed on 22 April 2015 at the main truck entrance near a security booth on the border of the mine. On 12 April 2016, the E-sampler was relocated to the nearby training centre (-26.202342°S; 28.677159°E) which is located further away from the main truck entrance. The E-Sampler was relocated as per the request of the client due to its close proximity to the haul road (Rayten Engineering Solutions, Air Quality Monthly Monitoring Report, 14 October 2016). The PM10 concentrations that were measured between 22 April 2015 and 30 April 2016 regularly exceeded the daily NAAQS during the May to October period (65 exceedances). After the relocation of the monitoring station to UD-001 the frequency of exceedance was reduced to 13 exceedances between 1 May 2016 and 30 April 2017; 3 exceedances between 1 May 2017 and 30 April 2018; and 9 exceedances in the 3-month period 1 May 2018 to 31 July 2018. The annual average concentration was calculated from the monthly concentrations over the measuring period and was estimated to be 46 µg/m³ (2015/2016); 23 µg/m³ (2016/2017); and 26 µg/m³ (2017/2018).

Modelled Ambient Air Pollutant Concentrations

The Project is located within the Highveld Priority Area, but outside the modelled ambient "hotspot" areas where annual concentrations due to industrial sources exceed the PM10 NAAQS. The modelled PM10 predictions as provided in the Highveld Priority Area Management Plan (which excluded the mining operations and domestic fuel burning operations) show that the project is located outside the areas where more than 4 days of exceedance per year may be expected.

8.18.6 DUSTFALL RATES

The dustfall monitoring network consists of five buckets located at the existing Kangala Colliery and its surroundings (Figure 39). Both dustfall and PM10 is measured at UD-001, which is located within the Kangala mining rights area. Dustfall rates are as measured during the period January 2015 to June 2018 (Figure 40). The residential limit of 600 mg/m2/day was exceeded at UD-003 more than twice per year, and for sequential months, during the 2015/2016, 2016/2017, and 2017/2018 sampling periods. The only other monitoring stations where exceedances were recorded are UD-001 and UD-004; however, the exceedances were not in sequential months.

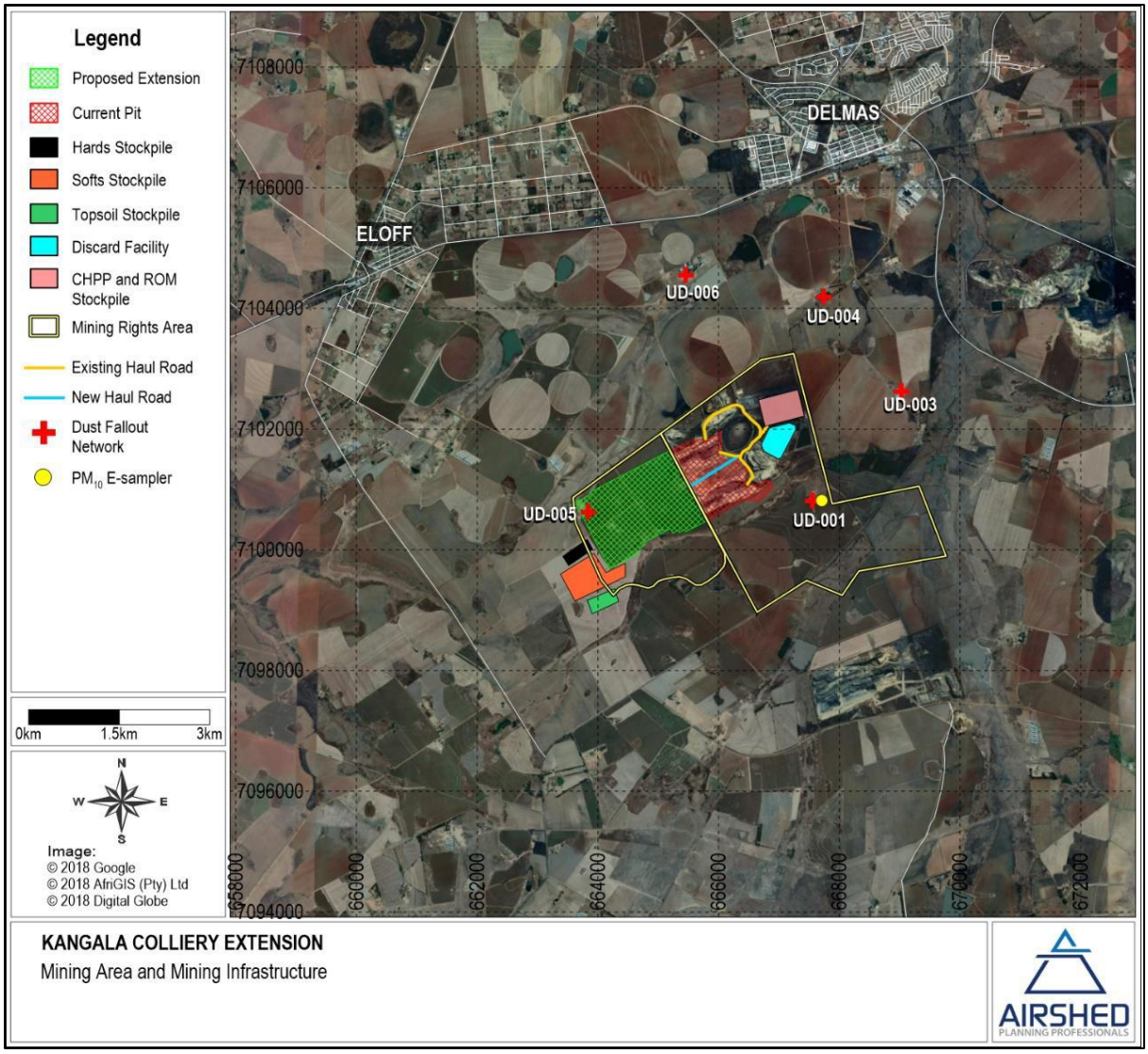


Figure 39: Dustfall out monitoring network locations

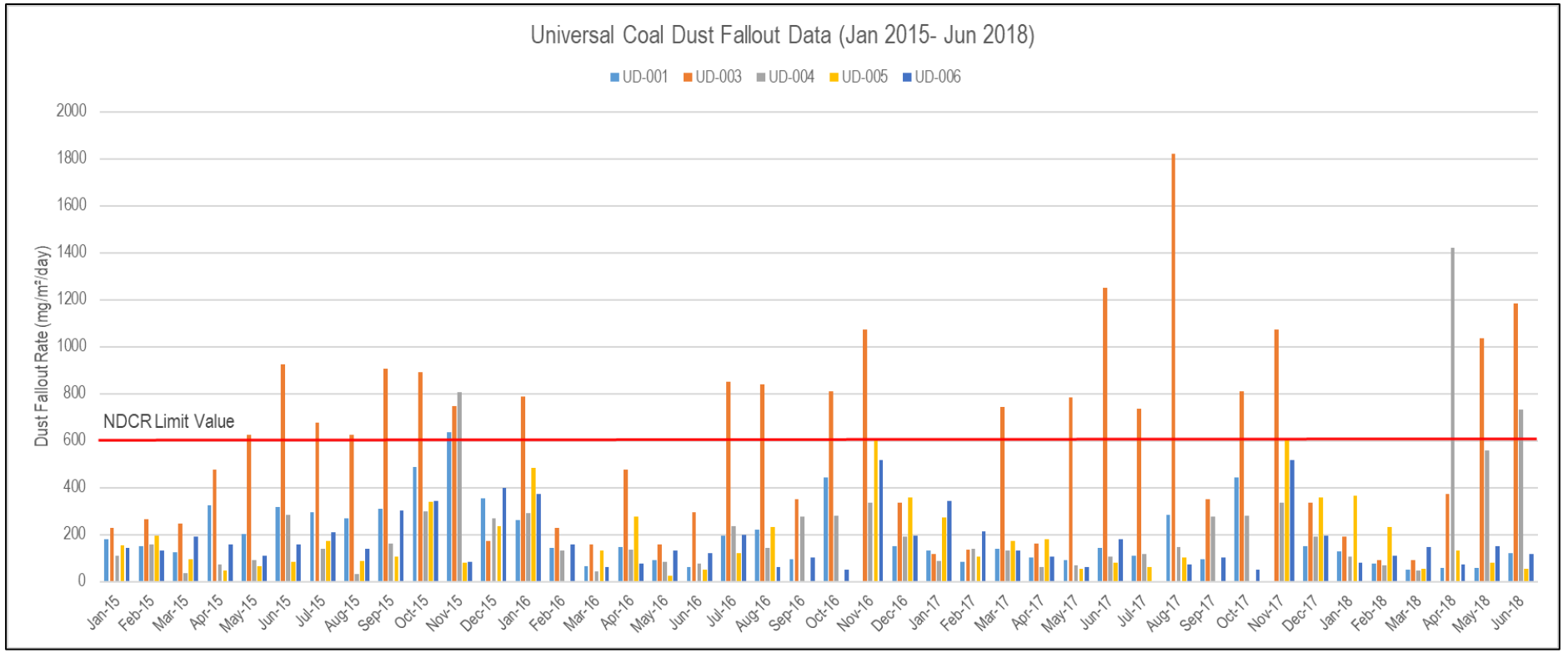


Figure 40: Monthly dustfall rates sampled at Kangala Colliery and its surroundings (January 2015 – June 2018)

8.19 CLIMATE CHANGE

The climate change scoping study, pertaining to the calculation of the carbon footprint and determine the greenhouse gas (GHG) emissions arising from the operations of the Phase 3 Project, was undertaken by Airshed Planning Professionals in October 2018 and the full details thereof are presented in Appendix D. Below are some of the findings regarding the climate and socio-economic environment of the project area, and how it may be affected by climate change. The proposed Phase 3 project activities are anticipated to result in greenhouse gas impacts in the project area. The requirement is in preparation for the proposed carbon taxation which is likely to take effect as of next year. An updated draft carbon tax bill was introduced in December 2017 (Minister of Finance, 2017) to provide for the imposition of a tax on the carbon dioxide equivalent (CO_2eq) of GHG emissions. Similarly, as for carbon taxation, GHG emissions are also required to be reported for the National Greenhouse Gas Emissions Reporting Regulations (NGER) (Department of Environmental Affairs, 2017a). All coal mines are required to account for the amount of pollutants discharged into the atmosphere (total emissions for one or more specific GHG pollutants) by 31 March each year.

8.19.1 GREENHOUSE GAS EMISSIONS FROM COAL MINING ACTIVITIES

The opencast coal mining process starts with land clearing for the removal of vegetation and topsoil by using bulldozers and scrapers, which may create damage to soil quality and vegetation as well as release large amounts of dust (Ghose, 2007). After land clearing, drilling and blasting are performed to reach the coal seam. Vertical blast holes are drilled from the surface and vary in diameter from 25 to 100 cm. In some mines, horizontal holes are drilled into the overburden with the drill sitting on the coal surface. The holes are generally charged with explosives that are a mixture of ammonium nitrate and fuel oil in dry mix, slurry, or emulsion forms. Often in practice, large quantities of nitrogen dioxide (NO_2) are released from blasts, which are observed as intense orange plumes (Pandey and Gautam, 2017).

After drilling and blasting of hard overburden, when the coal seam is exposed, the block of coal may be drilled and blasted (if hard) which releases coal dust. Coal dust itself acts as a medium for transportation and dispersal of pollutants in the surface environment, and its chemical composition contains metals like Fe, Cu, Zn, Mn, Pb, Cd, Cr, Ni, Co, V, Ti, Br, Zr, etc., and organic pollutants (Pandey and Gautam, 2017). The sources of GHG emissions associated with coal mining activities are shown in Table 23.

Table 23: Typical sources of GHG emissions associated with coal mining (Pandey and Gautam, 2017)

Activity	Pollutants	Sources of GHG
Coal seam exploitation (mining emissions).	Coal dust, CO, NOx, CO2, methane (NH4)1[1] and noise from opencast activities.	Direct energy use (fuel combustion), indirect energy use (electricity consumption) and fugitive emissions.
Mechanical coal preparation (post-mining emissions).	Coal dust, CO, NOx, CO2, NH4 and noise from materials handling of ROM coal, coal preparation waste (stone, sludge, slime, sewage, flotation tailings) and used chemicals.	Fugitive emissions.
Transportation (post-mining emissions).	Noise and coal dust from electricity and diesel fuel.	Direct energy use.
Low temperature oxidation	Once coal is exposed to oxygen in air, the coal oxidises to produce CO2.	Fugitive emissions.
Spontaneous combustion	On occasions, when the heat produced by low temperature oxidation is trapped, the temperature rises and an active fire may result (with rapid CO2 formation).	Combustion emissions.

8.19.2 BASELINE AND FUTURE CLIMATE PROJECTED FOR THE DELMAS REGION

The project area falls within the Highveld climatic zone which is characterised by moderate summers, cold winters and summer rainfall (Digby Wells Environmental, 2014). The near-future and far-future climate in

[1] Coal mine methane (CMM) is the term given to the gas trapped in coal seams. The gas is released once the seams are mined and can then escape to the atmosphere. Lloyd and Cook (2005) measured the release of methane from surface mining in South African collieries, through (1) the collection of samples from exposed seams, drill holes and interburden strata; (2) sealing the samples in gas tight containers for transport and crushing in the laboratory to release the methane content; and (3) analysing the results using the standard USBM graphical method to determine lost gas volumes. They found that the combination of low seam-gas contents in the coals mined from surface, and the low concentration of methane in the seam gases, means that the contribution from surface mining of coal to greenhouse gas releases by the industry can effectively be ignored. Even if the seam-gas content were as high as 0.1m3/t and the methane content were as high as 50% of the total seam gas, then the approximately 100Mt of coal plus intraburden mined annually would contribute <3000t (3Gg) CH4/annum.

Southern Africa was projected and published in a Climate Change Reference Atlas (CCRA) by the South African Weather Service (SAWS) in 2017 (http://www.weathersa.co.za/images/SAWS_CC_REFERENCE_ATLAS_PAGES.pdf), based on Global Climate Change Models (GCMs) projections and the Rossby Centre Regional Model (RCA4). Projected changes are defined relative to a historical 30-year period (1976 to 2005). The design description of the methodology employed in the climate change projections are presented in the full Climate Change Report presented in Appendix D of this Scoping Report. The findings are listed below:

Low mitigation scenario (RCP8.5)

- Near-future period (2036-2065) – This period is projected to be significantly warmer than the baseline period of 1976-2005. Most years are projected to be 2°C to 2.5°C warmer than the baseline average temperature. The seasonal average temperatures are expected to increase for all seasons, viz. 2°C to 2.5°C (summer and autumn) and 2.5°C to 3°C (winter and spring). The rainfall climatology is projected to remain variable, with some wet years projected to occur outside of that simulated for the baseline period (median change of 10 to 20mm more rainfall per year). The seasonal average rainfall is expected to increase in summer (10 to 20mm increase in rainfall) and decrease during the other seasons (5-10mm decrease in autumn, winter and spring); and
- Far-future period (2066-2095) – Further drastic warming is projected over the Delmas region for this period, with annual median temperature anomalies ranging between 4 and 4.5°C. The seasonal average temperatures are expected to increase for all seasons, viz. 3.5°C to 4°C (summer), 4°C to 4.5°C (autumn), and 4.5°C to 5°C (winter and spring). The region is also projected to become systematically drier (median change of 5 to 10mm less rainfall per year). The drastically higher temperatures may impact negatively on water availability from local dams due to higher evaporation rates. The seasonal average rainfall is expected to increase in summer 20 to 30mm increase in rainfall) and decrease during the other seasons (5-10mm decrease in autumn and winter, and 30 to 50mm decrease in spring).

Modest to high mitigation scenario (RCP4.5)

- Near-future period (2036-2065) – Similar to that projected for the case of low mitigation in that most years are projected to be 1.5 °C to 2 °C warmer than the baseline average temperature. The seasonal average temperatures are expected to increase for all seasons, viz. 1.5°C to 2°C (summer and autumn) and 2°C to 2.5°C (winter and spring). The climate is projected to become drier (median change of 5 to 10mm less rainfall per year), with likely fewer dry years than projected for the low mitigation scenario. The seasonal average rainfall is expected to increase in summer (5 to 10mm increase in rainfall) and decrease during the other seasons (0-5mm decrease in autumn and winter, and 10 to 20mm decrease in spring); and
- Far-future period (2066-2095) – Temperature changes in the Delmas region under modest- high mitigation are projected to range between 2.5°C and 3°C above that of the baseline climatology. The seasonal average temperatures are expected to increase for all seasons, viz. 2°C to 2.5°C (summer and autumn) and 2.5°C to 3°C (winter and spring). The climate is projected to become drier (median change of 0 to 5mm less rainfall per year), but with likely fewer dry years occurring when compared to the case of low mitigation. The seasonal average rainfall is expected to increase in summer (median increase of 20 to 30mm) and decrease during the other seasons (5-10mm decrease in autumn and winter, and 10 to 20mm decrease in spring).

9 ENVIRONMENTAL IMPACT ASSESSMENT

This section aims to identify and preliminarily assess the potential environmental impacts associated with the proposed Phase 3 Project. This impact assessment will be used to guide the identification and selection of preferred alternatives, and management and mitigation measures, applicable to the proposed activities. The preliminary assessment will also serve to focus the subsequent EIA phase on the key issues and impacts.

9.1 APPROACH AND METHODOLOGY

This section presents the proposed approach to assessing the identified potential environmental impacts with the aim of determining the relevant environmental significance.

9.1.1 METHOD OF ASSESSING IMPACTS

The impact assessment methodology is guided by the requirements of the NEMA EIA Regulations. The broad approach to the significance rating methodology is to determine the environmental risk (ER) by considering the consequence (C) of each impact (comprising Nature, Extent, Duration, Magnitude, and Reversibility) and relate this to the probability/likelihood (P) of the impact occurring. This determines the environmental risk. In addition, other factors, including cumulative impacts, public concern, and potential for irreplaceable loss of resources, are used to determine a prioritisation factor (PF) which is applied to the ER to determine the overall significance (S).

The significance (S) of an impact is determined by applying a prioritisation factor (PF) to the environmental risk (ER). The environmental risk is dependent on the consequence (C) of the particular impact and the probability (P) of the impact occurring. Consequence is determined through the consideration of the Nature (N), Extent (E), Duration (D), Magnitude (M), and Reversibility (R) applicable to the specific impact.

For the purpose of this methodology the consequence of the impact is represented by:

$$C = \frac{(E+D+M+R) \times N}{4}$$

Each individual aspect in the determination of the consequence is represented by a rating scale as defined in Table 24.

Table 24: Criteria for determining impact consequence

Aspect	Score	Definition
Nature	- 1	Likely to result in a negative/ detrimental impact
	+1	Likely to result in a positive/ beneficial impact
Extent	1	Activity (i.e. limited to the area applicable to the specific activity)
	2	Site (i.e. within the development property boundary),
	3	Local (i.e. the area within 5 km of the site),
	4	Regional (i.e. extends between 5 and 50 km from the site)
	5	Provincial / National (i.e. extends beyond 50 km from the site)

Aspect	Score	Definition
Duration	1	Immediate (<1 year)
	2	Short term (1-5 years),
	3	Medium term (6-15 years),
	4	Long term (the impact will cease after the operational life span of the project),
	5	Permanent (no mitigation measure or natural process will reduce the impact after construction).
Magnitude/ Intensity	1	Minor (where the impact affects the environment in such a way that natural, cultural and social functions and processes are not affected),
	2	Low (where the impact affects the environment in such a way that natural, cultural and social functions and processes are slightly affected),
	3	Moderate (where the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way),
	4	High (where natural, cultural or social functions or processes are altered to the extent that it will temporarily cease), or
	5	Very high / don't know (where natural, cultural or social functions or processes are altered to the extent that it will permanently cease).
Reversibility	1	Impact is reversible without any time and cost.
	2	Impact is reversible without incurring significant time and cost.
	3	Impact is reversible only by incurring significant time and cost.
	4	Impact is reversible only by incurring prohibitively high time and cost.
	5	Irreversible Impact

Once the C has been determined, the ER is determined in accordance with the standard risk assessment relationship by multiplying the C and the P. Probability is rated / scored as per Table 25.

Table 25: Probability scoring

Aspect	Score	Definition
Probability	1	Improbable (the possibility of the impact materialising is very low as a result of design, historic experience, or implementation of adequate corrective actions; <25%),
	2	Low probability (there is a possibility that the impact will occur; >25% and <50%),
	3	Medium probability (the impact may occur; >50% and <75%),
	4	High probability (it is most likely that the impact will occur- > 75% probability), or
	5	Definite (the impact will occur).

The result is a qualitative representation of relative ER associated with the impact. ER is therefore calculated as follows:

ER= C x P

Table 26: Determination of environmental risk

Consequence					
5	5	10	15	20	25
4	4	8	12	16	20
3	3	6	9	12	15
2	2	4	6	8	10
1	1	2	3	4	5
	1	2	3	4	5
	Probability				

The outcome of the environmental risk assessment will result in a range of scores, ranging from 1 through to 25. These ER scores are then grouped into respective classes as described in Table 27.

Table 27: Significance classes

Environmental Risk Score	
Value	Description
< 9	Low (i.e. where this impact is unlikely to be a significant environmental risk),

≥9; <17	Medium (i.e. where the impact could have a significant environmental risk),
≥ 17	High (i.e. where the impact will have a significant environmental risk).

The impact ER will be determined for each impact without relevant management and mitigation measures (pre-mitigation), as well as post implementation of relevant management and mitigation measures (post-mitigation). This allows for a prediction in the degree to which the impact can be managed / mitigated.

9.1.2 IMPACT PRIORITISATION

In accordance with the requirements of Appendix 3(3)(j) of the NEMA 2014 EIA Regulations (GN R. 982), and further to the assessment criteria presented in the Section above it is necessary to assess each potentially significant impact in terms of:

- Cumulative impacts; and
- The degree to which the impact may cause irreplaceable loss of resources.

In addition, it is important that the public opinion and sentiment regarding a prospective development and consequent potential impacts is considered in the decision-making process.

In an effort to ensure that these factors are considered, an impact prioritisation factor (PF) will be applied to each impact ER (post-mitigation). This prioritisation factor does not aim to detract from the risk ratings but rather to focus the attention of the decision-making authority on the higher priority/significance issues and impacts. The PF will be applied to the ER score based on the assumption that relevant suggested management/mitigation impacts are implemented.

Table 28: Criteria for determining prioritisation

Public response (PR)	**Low (1)**	**Issue not raised in public response.**
	Medium (2)	Issue has received a meaningful and justifiable public response.
	High (3)	Issue has received an intense meaningful and justifiable public response.
Cumulative Impact (CI)	Low (1)	Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is unlikely that the impact will result in spatial and temporal cumulative change.
	Medium (2)	Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is probable that the impact will result in spatial and temporal cumulative change.
	High (3)	Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is highly probable/definite that the impact will result in spatial and temporal cumulative change.
Irreplaceable loss of resources (LR)	Low (1)	Where the impact is unlikely to result in irreplaceable loss of resources.

Irreplaceable loss of resources (LR)	Medium (2)	Where the impact may result in the irreplaceable loss (cannot be replaced or substituted) of resources but the value (services and/or functions) of these resources is limited.
	High (3)	Where the impact may result in the irreplaceable loss of resources of high value (services and/or functions).

The value for the final impact priority is represented as a single consolidated priority, determined as the sum of each individual criteria represented in Table 29. The impact priority is therefore determined as follows:

Priority = PR + CI + LR

The result is a priority score which ranges from 3 to 9 and a consequent PF ranging from 1 to 2 (Table 29).

Table 29: Determination of prioritisation factor

Priority	Ranking	Prioritisation Factor
3	Low	**1**
4	Medium	**1.17**
5	Medium	**1.33**
6	Medium	**1.5**
7	Medium	**1.67**
8	Medium	**1.83**
9	**High**	**2**

In order to determine the final impact significance, the PF is multiplied by the ER of the post mitigation scoring. The ultimate aim of the PF is to be able to increase the post mitigation environmental risk rating by a full ranking class, if all the priority attributes are high (i.e. if an impact comes out with a medium environmental risk after the conventional impact rating, but there is significant cumulative impact potential, significant public response, and significant potential for irreplaceable loss of resources, then the net result would be to upscale the impact to a high significance).

Table 30: Final environmental significance rating

Environmental Significance Rating	
Value	Description
< -10	Low negative (i.e. where this impact would not have a direct influence on the decision to develop in the area).

≥ -10 < -20	Medium negative (i.e. where the impact could influence the decision to develop in the area).
≥ -20	High negative (i.e. where the impact must have an influence on the decision process to develop in the area).
0	No impact
< 10	Low positive (i.e. where this impact would not have a direct influence on the decision to develop in the area).
≥ 10 < 20	Medium positive (i.e. where the impact could influence the decision to develop in the area).
≥ 20	High positive (i.e. where the impact must have an influence on the decision process to develop in the area).

9.2 IDENTIFICATION OF IMPACTS

Potential environmental impacts were identified during the Scoping phase. These impacts were identified by the EAP, the appointed specialists, as well as information sort or received from the public. Table 31 provides the list of preliminary impacts identified during scoping, some of which will be further assessed in the EIA phase. Moreover, Table 32 presents the combined details of the preliminary impact assessment calculations undertaken towards determining the pre- and post-mitigation impact significance, as well as the final significance scores.

Without proper mitigation measures and continual environmental management, most of the identified impacts may potentially become cumulative, affecting areas outside of their originally identified zone of impact. The potential cumulative impacts have been identified, evaluated, and mitigation measures suggested which will be updated during the detailed EIA phase level of investigation. When considering cumulative impacts, it is vitally important to bear in mind the scale at which different impacts occur. There is potential for a cumulative effect at a broad scale, such as regional deterioration of air quality, as well as finer scale effects occurring in the area surrounding the activity. The main impacts which have a cumulative effect on a regional scale are related to the transportation vectors that they act upon. For example, air movement patterns result in localised air quality impacts having a cumulative effect on air quality in the region. Similarly, water acts as a vector for distribution of impacts such as contamination across a much wider area than the localised extent of the impact source. At a finer scale, there are also impacts that have the potential to result in a cumulative effect, although due to the smaller scale at which these operate, the significance of the cumulative impact is lower in the broader context.

Table 31: Identified environmental impacts

Main Activity/ Action/ Process	Ancillary Activity	Geo-physical (geology, topography, air, water, etc.)	Biological	Socio-economic	Heritage and Cultural
Site Preparation (Planning)	• Vegetation clearance • Removal of any existing on site infrastructure • Planned placement of infrastructure • Establishment of construction contractor area	• Loss of land capability and agricultural potential			
Human Resources Management (Planning)	• Employment / recruitment • I&AP consultations (where necessary) • Corporate Social Investment initiatives • Skills development programmes • Environmental awareness training • HIV/AIDS awareness programmes • Integration with municipalities' strategic long-term planning				
Earthworks (Construction)	• Stripping and stockpiling of soils • Cleaning, grubbing and bulldozing • Removal of building waste and cleared vegetation	• Sedimentation of downstream drainage / watercourses • Hydrocarbon fuel spillage • Reduction of catchment yield • Flooding of proposed infrastructure	• Alien vegetation infestation • Loss of, or impaired ecosystem services • Further loss and fragmentation of the vegetation	• Project-induced in-migration • Labour draw down from other sectors • Employment and income creation	• Impact on burial grounds and graves • Impact on structures older than 60 years • Impact on chance finds heritage resources

Main Activity/ Action/ Process	Ancillary Activity	Geo-physical (geology, topography, air, water, etc.)	Biological	Socio-economic	Heritage and Cultural
	• Digging trenches and foundations • Blasting • Establishing stormwater management measures • Establishment of firebreak	• Loss of land capability and agricultural potential • Loss of surface roughness • Loss of seepage (infiltration) areas • Alteration to surface runoff flow volumes • Alteration of patterns of flows (increased flood peaks) • Impaired water quality • Increase in sediment inputs and turbidity • Increased nutrient inputs • Inputs of toxic organic contaminants • Inputs of toxic heavy metal contaminants • Erosion	community as well the destruction of a portion of a Vulnerable vegetation type • Displacement, direct mortalities and disturbance of faunal community (including multiple threatened species) due to habitat loss and disturbances (such as dust and noise) • Loss of movement corridor that animals use to migrate between fragmented habitats • Loss of fauna and flora (direct and indirect) • Direct loss of wetlands	• Increased demand for housing and services • Social disintegration and conflict • Defiant social behaviour • Nuisance factor • Change of character • Impact on urban edge • Impact on farmsteads • Impact on local roads • Net GGP impact • Net employment impacts • Forex savings • Fiscal income • Economic development per capita • Black economic transformation • Country and industry competitiveness • Loss of agricultural land and production (change in land use) • Need and desirability	
Civil Works (Construction)	• Establishment of infrastructure and services • Mixing of concrete and concrete works	• Sedimentation of downstream drainage/watercourses • Hydrocarbon fuel spillage • Reduction of catchment yield • Flooding of proposed infrastructures	• Alien vegetation infestation • Loss of, or impaired ecosystem services • Further loss and fragmentation of the	• Project-induced in-migration • Labour draw down from other sectors • Employment and income creation	• Impact on burial grounds and graves • Impact on structures older than 60 years

Main Activity/ Action/ Process	Ancillary Activity	Geo-physical (geology, topography, air, water, etc.)	Biological	Socio-economic	Heritage and Cultural
	• Establishment of dewatering infrastructure • Establishment of chemical storage area • Establishment of general waste area • Access control and security • General site management	• Loss of land capability • Loss of surface roughness • Loss of seepage (infiltration) areas • Alteration to surface runoff flow volumes • Alteration of patterns of flows (increased flood peaks) • Impaired water quality • Increase in sediment inputs & turbidity • Increased nutrient inputs • Inputs of toxic organic contaminants • Inputs of toxic heavy metal contaminants • Pathogen inputs (i.e. disease-causing organisms) • Erosion • Decline in air quality	vegetation community as well the destruction of a portion of a Vulnerable vegetation type • Displacement, direct mortalities and disturbance of faunal community (including multiple threatened species) due to habitat loss and disturbances (such as dust and noise) • Loss of movement corridor that animals use to migrate between fragmented habitats	• Increased demand for housing and services • Social disintegration and conflict • Defiant social behaviour • Dewatering of aquifer leading to reduction in water supply • Nuisance factor • Change of character • Impact on urban edge • Impact on farmsteads • Impact on local roads • Net GGP impact • Net employment impacts • Forex savings • Fiscal income • Economic development per capita • Black economic transformation • Country and industry competitiveness • Alternative land-use • Need and desirability	• Impact on chance finds heritage resources
Opencast Mining (Operation)	• Drilling • Blasting • Excavations	• Dewatering of aquifer leading to loss of river and wetland base flow		• Ground vibration impact on houses, roads, boreholes, heritage sites, power lines and broilers	

Main Activity/ Action/ Process	Ancillary Activity	Geo-physical (geology, topography, air, water, etc.)	Biological	Socio-economic	Heritage and Cultural
	• Removal of overburden by dozing and load haul • Establishment of internal haul roads from pit to existing processing plant at Kangala Colliery • Removal of ore • Establishment of stockpiles • Dewatering of pit • Pumping of water to PCD • Waste rock dumps for backfilling • Soil management • Water management • Concurrent rehabilitation • Water treatment	• Leachate from coal and waste material stockpiles - should be of marginal quality • Sedimentation/pollution of downstream drainage/watercourse • Reduction of catchment yield • Flooding of proposed infrastructures • Loss of land capability • Direct loss of wetlands • Loss of, or impaired ecosystem services • Loss of seepage (infiltration) areas • Loss of aquifers (and recharge) • Alteration to surface runoff flow volumes • Alteration of patterns of flows (increased flood peaks) • Impaired water quality • Increase in sediment inputs & turbidity • Increased nutrient inputs • Inputs of toxic organic contaminants • Inputs of toxic heavy metal contaminants • Pathogen inputs (i.e. disease-causing organisms) • Alien vegetation infestation • Erosion		• Air blast impact on houses, roads, borehole, heritage sites, power lines and broiler • Fly rock impact on houses, roads, boreholes, heritage sites, power lines and broilers • Increase in noise levels at surrounding receptors due to operational mining activities in the day • Increase in noise levels at surrounding receptors due to operational mining activities at night • Tax income • Employment and income creation • Conversion of land use • Social investment in the local community • Change of character • Impact on urban edge • Impact on farmsteads • Impact on local roads • Net GGP impact • Net employment impacts	

Main Activity/ Action/ Process	Ancillary Activity	Geo-physical (geology, topography, air, water, etc.)	Biological	Socio-economic	Heritage and Cultural
		• Decline in air quality		• Forex savings • Fiscal income • Economic development per capita • Black economic transformation • Country and industry competitiveness • Alternative land-use • Need and desirability	
Infrastructure Removal (Decommissioning)	• Blasting • Safety control • Backfilling of pits and voids	• Siltation of water resources • Loss of land capability • Decline in air quality		• Increase in noise levels at surrounding receptors due to decommissioning activities during the day • Change of character • Impact on urban edge • Impact on farmsteads • Impact on local roads • Net GGP impact • Net employment impacts • Forex savings • Fiscal income • Economic development per capita • Black economic transformation • Country and industry competitiveness	

Main Activity/ Action/ Process	Ancillary Activity	Geo-physical (geology, topography, air, water, etc.)	Biological	Socio-economic	Heritage and Cultural
				• Alternative land-use • Need and desirability	
Rehabilitation (Closure)	• Slope stabilisation • Erosion control • Landscaping • Replacing topsoil • Removal of alien/invasive vegetation • Re-vegetation • Restoration of natural drainage patterns • Remediation of ground and surface water • Rehabilitation of external roads • Initiate maintenance and aftercare program	• Migration of residual contamination after rehabilitation • Decanting of poor-quality water from rehabilitated pit • Siltation of water resources • Decline in air quality		• Increase in noise levels at surrounding receptors due to closure activities • Net GGP impact • Net employment impacts • Forex savings • Fiscal income • Economic development per capita • Black economic transformation • Country and industry competitiveness • Alternative land-use • Need and desirability	
Maintenance (Post-closure)	• Environmental aspect monitoring • Monitoring of rehabilitation	• Contamination of water resources from residue stockpiles and mining activities decant			

9.3 DESCRIPTION AND ASSESSMENT OF IMPACTS

The following potential impacts were identified during the scoping phase assessment. As a result of the scoping phase assessment and the sensitivity mapping exercise, a preferred layout alternative will be identified to be assessed further in the EIA phase. These preliminary impact significance ratings will be subject to amendment based on the detailed impact assessment to be undertaken by the project specialists, input from the EAP, as well as results of public and key stakeholder consultations to be undertaken during the EIA phase.

Several impacts have been identified as having a high final significance at the Scoping phase. Note that the scoping phase impact assessment is based on a worst-case scenario for potential impacts and no specialist site visits were completed at this stage. These are not considered fatal flaws however detailed EIA studies and site visits by the specialists are required in order to determine whether these impacts can be reduced to acceptable levels .

9.3.1 PRELIMINARY IMPACTS ON HERITAGE RESOURCES

The following preliminary impacts on the heritage resources within the project area were identified and assessed for the various project phases (planning and design, construction, operation, decommissioning, rehabilitation and closure, as well as post-closure). No impacts on the heritage resources have been identified that will occur during the Planning and Design Phase, Operational Phase, Decommissioning Phase, Rehabilitation and Closure Phase, as well as Post-Closure Phase. Below are the construction phase preliminary impacts on heritage resources identified during scoping, as well as their impact rating.

A. Impact on burial grounds and graves

From the historical map analysis, a minimum of two burial grounds are present on the property. Burial grounds and graves have high heritage significance and are given a Grade 3A significance rating.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Impact on burial grounds and graves	Construction	-18.75	-3.25	-4.33

Proposed Preliminary Mitigation

- Assess and grade burial grounds and graves during HIA and propose mitigation measures.

B. Impact on structures older than 60 years

Various farmsteads and homesteads were identified for study during the HIA phase of the project. Structures older than 60 years are protected under Section 34 of the NHRA.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Impact on structures older than 60 years	Construction	-18.75	-3.25	-4.33

Proposed Preliminary Mitigation

- Assess and grade structure during HIA and propose mitigation measures.

C. Impact on chance find heritage resources

There may be chance findings of material of heritage significance during construction.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Impact on chance find heritage resources	Construction	-6.50	-6.00	-7.00

Proposed Preliminary Mitigation

- Develop heritage management guidelines during the HIA Phase.

9.3.2 PRELIMINARY IMPACTS ON BIODIVERSITY

The following preliminary impacts on the biodiversity within the project area were identified and assessed for the various project phases (planning and design, construction, operation, decommissioning, rehabilitation and closure, as well as post-closure). No impacts on the ecological receiving environment have been identified that will occur during the Planning and Design Phase, and Post-closure Phase. Below are the preliminary impacts on biodiversity identified during scoping for the construction, operation, decommissioning and rehabilitation as well as closure phases, including their impact rating.

A. Further loss and fragmentation of the vegetation community as well the destruction of a portion of a Vulnerable vegetation type

The proposed project activities will result in some direct loss of habitats, direct mortalities and displacement of flora. The removal of natural vegetation to accommodate the opencast mining pit and discard stockpiles is likely to fragment remaining vegetation communities and impact on vegetation types of significant importance. However, a large portion of the project area is already transformed or modified by agricultural activities and existing mining operations. Therefore, this will probably be minimal relative to existing impacts on site and will be localised at any one point in time.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Further loss and fragmentation of the vegetation community as well the destruction of a portion of a Vulnerable vegetation type	Construction Operation Decommissioning Rehabilitation and Closure	-17.50	-4.00	-6.67

Proposed Preliminary Mitigation

- As far as possible, the proposed discard stockpiles for hards, softs and topsoil should be placed in areas that have already been disturbed, the ONA's / Moderate biodiversity importance areas that are present should be avoided;
- It is recommended that areas to be developed be specifically demarcated so that during the construction phase and operational phase, only the demarcated areas be impacted upon. All mining

and stockpile areas, and access roads must be clearly demarcated from surrounding natural areas and entrance into these areas should be closely monitored;

- It should be made an offence for any staff to bring any plant species into any portion of the project site. No plant species whether indigenous or exotic should be brought into the project area, to prevent the spread of exotic or invasive species;
- Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion during flood events. This will also reduce the likelihood of encroachment by alien invasive plant species;
- Any topsoil that is removed during construction must be appropriately removed and stored according to the national and provincial guidelines, specifically the Department of Environmental Affairs and Forestry, 2005 (DWAF, 2005) This includes on-going maintenance of such topsoil piles so that they can be utilised during decommissioning phases and re-vegetation;
- Compilation of and implementation of an alien vegetation management plan for the entire site, including the surrounding project area and especially the wetland areas;
- All livestock must be kept out of the wetland and grassland areas in order to prevent overgrazing of potential SCC avifauna habitat; and
- No domestic animals are to be allowed in to the project area under any circumstances, especially any dogs and cats. Any and all feral cats which may enter the project area must be removed immediately.

B. Displacement, direct mortalities and disturbance of faunal community due to habitat loss and disturbance

Land clearing destroys local wildlife habitat and can lead to the loss of local breeding grounds, nesting sites and wildlife movement corridors such as rivers, streams and drainage lines, or other locally important features.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Habitat fragmentation and edge effects	Construction Operation Decommissioning Rehabilitation and Closure	-18.75	-4.00	-6.67

Proposed Preliminary Mitigation

- A qualified environmental control officer must be on site when construction begins to identify species that will be directly disturbed and to relocate fauna / flora that are found during construction (this includes all species of flora and fauna);
- Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion during flood events. This will also reduce the likelihood of encroachment by alien invasive plant species;
- Any topsoil that is removed during construction must be appropriately removed and stored according to the national and provincial guidelines, specifically the Department of Environmental Affairs and Forestry, 2005 (DWAF, 2005) This includes on-going maintenance of such topsoil piles so that they can be utilised during decommissioning phases and re-vegetation;

- Compilation of and implementation of an alien vegetation management plan for the entire site, including the surrounding project area and especially the wetland areas;
- Staff should be educated about the sensitivity of faunal species and measures should be put in place to deal with any species that are encountered during the construction process. The intentional killing of any animals including snakes, lizards, birds or other animals should be strictly prohibited; and
- No domestic animals are to be allowed in to the project area under any circumstances, especially any dogs and cats. Any and all feral cats which may enter the project area must be removed immediately.

C. Loss of movement corridor that animals use to migrate between fragmented habitats

Land clearing destroys local wildlife habitat and can lead to the loss of local breeding grounds, nesting sites and wildlife movement corridors such as rivers, streams and drainage lines, or other locally important features.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Displacement of faunal species	Construction Operation Decommissioning Rehabilitation and Closure	-17.00	-4.00	-7.50

Proposed Preliminary General Mitigation

- As far as possible, the proposed discard stockpiles for hards, softs and topsoil should be placed in areas that have already been disturbed, the ONA's / Moderate biodiversity importance areas that are present should be avoided;
- It is recommended that areas to be developed be specifically demarcated so that during the construction phase and operational phase, only the demarcated areas be impacted upon. All mining and stockpile areas, and access roads must be clearly demarcated from surrounding natural areas and entrance into these areas should be closely monitored;
- A qualified environmental control officer must be on site when construction begins to identify species that will be directly disturbed and to relocate fauna / flora that are found during construction (this includes all species of flora and fauna);
- A site-specific walk-through survey prior to commencement of activity informed by the findings from the detailed EIA phase assessment:
    - Demarcate the stockpiles in previously disturbed areas and / or habitats with lower sensitivity,
    - Obtain permits for any listed/protected species found on site,
    - Search and rescue, where appropriate;
- Staff should be educated about the sensitivity of faunal species and measures should be put in place to deal with any species that are encountered during the construction process. The intentional killing of any animals including snakes, lizards, birds or other animals should be strictly prohibited;
- The areas rated as highly sensitive in the project area should be avoided as far as possible during the construction and operational phases. All efforts must be made to minimise access to this area from

construction workers and machinery including locating activities on the boundaries of existing disturbances and using existing access roads as much as possible; and

- No domestic animals are to be allowed in to the project area under any circumstances, especially any dogs and cats. Any and all feral cats which may enter the project area must be removed immediately.

9.3.3 PRELIMINARY IMPACTS ON HYDROGEOLOGY

The following preliminary impacts on the hydrogeological resources within the project area were identified and assessed for the various project phases (planning and design, construction, operation, decommissioning, rehabilitation and closure, as well as post-closure). No impacts on the hydrogeological receiving environment have been identified that will occur during the Planning and Design Phase, Construction Phase and Decommissioning Phase. Below are the preliminary impacts on hydrogeological resources identified during scoping for the operational, rehabilitation and closure, as well as post-closure phases, including their impact rating.

A. Lowering of the local groundwater levels (i.e. dewatering of the aquifer)

Opencast mining is planned to occur below the local groundwater table, meaning that an influx of groundwater is expected from year one of mining. Pit dewatering is therefore envisaged, which will ultimately lead to a lowering of the local groundwater levels (i.e. dewatering of the aquifer). A flow model was used to simulate / predict the groundwater level impacts resulting from the planned opencast mining (i.e. simulation of groundwater depression cone). An area of approximately 9km^2 was simulated to be affected by the pit dewatering activities (i.e. area simulated to experience decreases in groundwater levels during the LOM).

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Lowering of the local groundwater levels (i.e. dewatering of the aquifer)	Operation	-15.00	-15.00	-22.50

Proposed Preliminary Mitigation

- Landowners with boreholes within the anticipated Cone of Depression Pit for dewatering (which was indicated to be 9km^2), which will be necessary to ensure dry and safe working conditions, should be identified and agreement be sort with regards to either compensation for the impact on their water source or arrangements made for an alternative water supply that is of similar quality or better than their current source that is anticipated to be affected by the dewatering activities.

B. Leachate from coal and waste material stockpiles - should be of marginal quality

The detailed waste classification that was done by Digby Wells in 2017 revealed that the targeted coal and waste rock material that would typically be generated by the proposed new mining activities should only produce small amounts of acid. Leachate from coal and waste material stockpiles should therefore be of marginal quality.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Leachate from coal and waste material stockpiles	Operation	-12.00	-4.50	-6.75

– should be of marginal quality			

Proposed Preliminary Mitigation

- Surface areas should be lined to prevent poor-quality seepage from reaching and contaminating the underlying groundwater, where necessary, in accordance with the outcomes of the waste classification and assessment findings and applicable residue stockpile legislation;
- Surface areas should be bunded to prevent clean surface water runoff from being contaminated by dirty surface areas; and
- Stockpiles and dirty footprint areas should be kept as small as practically possible.

C. Migration of residual contamination after rehabilitation

The general low hydraulic properties of the Karoo aquifer underlying the MRA is expected to limit the potential groundwater quality impacts associated with the opencast pit and waste rock stockpiles. The groundwater depression cone will affect local groundwater flow directions and cause groundwater and any potential contamination within this affected area to move inwards towards the pit (i.e. the pit effectively acts as a sink for both groundwater and contamination and will continue to do so until water levels have recovered from the impacts of pit dewatering). Any migration of contamination away from the opencast pit will only occur after groundwater levels have recovered. The proposed waste rock stockpiles areas are located within the area affected by pit dewatering (groundwater depression cone), which is why their plumes were simulated to migrate in the direction of the opencast pit. Even though the waste rock stockpiles would have been rehabilitated, the down gradient movement of residual contamination will continue for some time after closure.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Migration of residual contamination after rehabilitation	Rehabilitation and Closure Pos-closure	-12.00	-5.50	-8.25

Proposed Preliminary Mitigation

- Dedicated plume monitoring boreholes should be drilled in the down gradient groundwater flow direction and sampled at quarterly intervals to monitor plume migration; and
- Should the monitoring program indicate significant plume migration, interception trenches and/or rehabilitation boreholes may be considered.

D. Decanting of poor-quality water from rehabilitated pit

Decanting of potentially poor-quality water from the backfilled opencast pit. The expected time it will take the proposed pit to fill with water after mine closure was calculated with the use of volume / recharge calculations from the numerical flow and contaminant transport model. The flow model was used to simulate / predict the groundwater level impacts resulting from the planned opencast mining (i.e. simulation of groundwater depression cone). The groundwater flow model was also used to simulate / predict the volume of groundwater mine inflow during the LOM. Simulated groundwater inflow varies between ±80 m^3/d (0.9 l/s) and 280 m^3/d (3.2 l/s) over the LOM.

The main aim or objective of the mass transport model was to simulate / predict the groundwater quality related impacts resulting from the planned opencast mining activities (i.e. simulation of contaminant / plume migration).

Impacts on groundwater quality during the operational phase of mining are expected to be relatively low, mainly due to the opencast pit acting as a sink for both groundwater and contamination and the short LOM. An area (including entire project footprint area) of nearly 3.5 km^2 was simulated to be affected by the contamination.

Following the mine closure simulation, the mass transport model was run for an additional 50 years to simulate / predict the post-closure migration of residual contamination. Post-closure decanting of the rehabilitated pit is expected to occur at a surface elevation of 1 589 meters above mean sea level (mamsl) and at a predicted rate of approximately 119 728 m3/y, or 3.8 l/s. Although the waste rock stockpiles were removed from the model simulations, residual contamination from these historical source areas was simulated to continue to migrate towards the rehabilitated pit even after 25 years. Groundwater levels were simulated to have largely recovered from the impacts of pit dewatering at 50 years post closure, resulting in the pit no longer acting as a sink. Contamination was simulated to have migrated an average distance of approximately 300 meters, which calculates to an average seepage velocity of 6m/y. Plume concentrations (TDS) were simulated to increase over time (i.e. ± 850% increase from mine closure to 25 years post closure and a further ± 120% increase over the next 25 years to reach ±1 300 mg/l). However, at 50 years post closure no user boreholes were simulated to be affected by the contamination.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Decanting of poor-quality water from rehabilitated pit	Rehabilitation and Closure Post-closure	-20.00	-5.50	-8.25

Proposed Preliminary Mitigation

- A monitoring borehole should be drilled into the rehabilitated opencast pit to monitor the rate at which it fills with water;
- This same monitoring borehole can also be used to manage the water levels and prevent the pit from decanting;
- The pit should be flooded as quickly as possible to minimise the oxidation of metal sulphides (Acid Mine Drainage – AMD. Once the pit is flooded, surface water should be diverted away from it; and
- A final void is, however, the preferred method of managing the post-closure decant.

9.3.4 PRELIMINARY IMPACTS ON HYDROLOGY

The following preliminary impacts on the hydrological resources within the project area were identified and assessed for the various project phases (planning and design, construction, operation, decommissioning, rehabilitation and closure, and post-closure). No impacts on hydrology have been identified that will occur during the Planning and Design Phase, and Post-closure Phase. Below are the preliminary impacts on hydrological resources for the construction, operation, decommissioning as well as rehabilitation and closure phases identified during scoping, including their impact rating.

A. Damage to infrastructure – flooding of proposed infrastructures

Floodlines will be required on all major watercourses within close proximity to the proposed infrastructures. Based on GN 704 requirements, the mine infrastructure in question should fall outside of the 1:100-year floodline or the 100 m away, whichever is greater.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Damage to infrastructure – flooding of proposed infrastructures	Construction	-12.00	-7.50	-10.00

Proposed Preliminary Mitigation

- The floodline modelling was undertaken for two river sections;
- A stormwater Management Plan complying with the requirements of GN704 must be developed and implemented for the mine areas; and
- All infrastructures falling within the 1:100-year floodline for the two rivers need to be re-positioned.

B. Decline in water quality – hydrocarbon fuel spillage

During the construction phase, a high volume of traffic by vehicles will occur due to the transport of equipment / material to site. Potential Spillages of hydrocarbons unto the site area is therefore envisaged. If no mitigation measures are present, hydrocarbon spillages can easily be washed downstream by heavy rains, and end up in the downstream drainages / watercourse.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Decline in water quality – hydrocarbon fuel spillage	Construction Operation	-7.50	-4.50	-6.00

Proposed Preliminary Mitigation

- All vehicles must be serviced timeously to ensure the potential for leakages of hydrocarbons are minimised.

C. Decline in water quality – sedimentation of downstream drainage / watercourse

During the construction phase loose, or disturbed, material as a result of construction activities such as soil and debris may be washed into the nearest downstream drainages/watercourses during normal to heavy infrequent rainfall events. This will result in sedimentation of the downstream affected drainage / watercourse.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Decline in water quality – sedimentation of downstream drainage / watercourse	Construction Operation	-7.50	-4.50	-6.00

Proposed Preliminary Mitigation

- To reduce the risk of sedimentation to downstream drainages / watercourses from dirty water areas such as temporary topsoil / material stockpile areas and any additional dirty water areas, a temporary stormwater management plan should be implemented;
- This will include construction of ditches and runoff containment areas, such that all contaminated runoff emanating from the topsoil / material stockpile areas together with any additional dirty water areas are conveyed and contained within the site area; and
- Mining activities should be undertaken during the dry season to limit the possibility of normal to heavy infrequent rainfall events.

D. Altered hydrological regime – reduction of catchment yield

Reduction of catchment yield as a result of the footprint areas of the mining pit extension, stockpile dump areas, and haul roads as the footprint areas will no longer form part of the natural downstream catchment thereby potentially resulting in a decrease of runoff downstream.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Altered hydrological regime – reduction of catchment yield	Construction Operation	-9.00	-9.00	-12.00

Proposed Preliminary Mitigation

- The loss of catchment area as a result of the mining infrastructure cannot be mitigated;
- The only way to mitigate the impacts is to not proceed with the mining option. Therefore, the impact rating for pre- and post-mitigation measures will remain unchanged; and
- It should also be noted that the footprint area is less than 1% of the total quaternary catchment area of B20A and will therefore result in a negligible loss in runoff.

E. Damage to infrastructure – flooding of proposed infrastructure

During the operational phase of a mine expansion or change in the mining footprint area may result in additional areas falling within the delineated floodline area or 100 m river buffer.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Damage to infrastructure – Flooding of proposed infrastructure	Operation	-12.00	-7.50	-10.00

Proposed Preliminary Mitigation

- The current floodlines should be used, and updated if required, depending on additional project infrastructure placement and / or expansion in the project footprint area; and
- Any opencast mining operation or activity should be situated or undertaken in accordance with the GN 704 conditions or the relevant exemption application.

F. Decline in Water Quality – sedimentation / pollution of downstream drainage / watercourse

During the operational phase of the mine, a stormwater management plan (SWMP) which adheres to GN 704 requirements in terms of separation of clean and dirty water is required so as to ensure no mixing of clean and dirty water occurs. Lack of proper stormwater controls will result in dirty water contaminating the downstream clean water environment. A conceptual SWMP has been developed and details the proposed placement of clean and dirty water channels together with their respective conceptual sizing. All clean and dirty water controls were sized based on the 1:50 year storm event as per the Water Act's GN 704 requirements. Dust suppression is also required in the Waste Rock Dump and Open Pit Areas throughout the operational phase of the mine.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Decline in Water Quality – Sedimentation / pollution of downstream drainage / watercourse	Operation	-7.50	-4.50	-6.00

Proposed Preliminary Mitigation

- Development and implementation of a SWMP in accordance with the requirements of GN 704 of the NWA.

G. Water Quality Deterioration – siltation of water resources

Activities during this phase include dismantling and removal of major equipment and infrastructure, rehabilitation of disturbed areas including stockpile dumps and pits, backfilling of the open pits using overburden and waste. The major impacts to consider in the decommissioning and closure phase will be siltation of surface water resources as a result of soil erosion influenced by removal of infrastructures.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Water Quality Deterioration – Siltation of water resources	Decommissioning Rehabilitation and Closure	-12.00	-7.50	-10.00

Proposed Preliminary Mitigation

- Ensure that the surface profile is rehabilitated to promote natural runoff drainage and avoid ponding of water within the rehabilitated area;
- Surface inspection should be continuously undertaken to allow runoff to drain onto the downstream drainage /rivers; and
- All rehabilitated areas must be established with vegetation.

9.3.5 PRELIMINARY IMPACTS ON WETLANDS

The following preliminary impacts on the wetlands within the project area were identified and assessed for the various project phases (planning and design, construction, operation, decommissioning, rehabilitation and

closure, and post-closure). No impacts on wetlands have been identified that will occur during the Planning and Design Phase, Decommissioning Phase, Rehabilitation and Closure Phase, or Post-closure Phase. Below are the preliminary impacts on wetland resources for the construction and operation phases identified during scoping, as well as their impact rating.

A. Impact from clearing of vegetation

The clearance of vegetation during construction for the creation of access routes as well as the new mining pit and stockpiles areas is anticipated to potentially impact on the project area in the form of the direct and indirect loss of some delineated wetlands. The DWS buffer tool recommends at a desktop level that the required buffer for opencast mining be 180m. The Mpumalanga Tourism and Parks Agency (MPTA) request a minimum buffer width of 100m from the edge of the delineated wetland. Further, a minimum buffer zone of 175m is recommended for the wetlands with regards to a mining operation (Macfarlane *et al*. 2009). These minimum buffer widths which are aimed at protecting core wetland habitat and aquatic functioning, are calculated based on a simple classification of wetland types and land use categories, broadly grouped as riverine and palustrine systems. Ecological and landscape characteristics are then assessed to establish the need to increase the buffer width, if at all. The largest risks posed by the project during the construction phase is that of "increased sediment inputs and turbidity" as a result of clearance of vegetation.

pact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Impact from clearing of vegetation	Construction	-8.00	-6.00	-8.00

Proposed Preliminary Mitigation

- The project layout area pertains to the mining pit and discard stockpiles for hards, softs and topsoil. These areas must be demarcated to ensure the correct footprint area of the areas of disturbance;
- All personnel and contractors to undergo Environmental Awareness Training. A signed register of attendance must be kept for proof. Discussions are required on sensitive environmental receptors within the project area, with particular reference to the wetland systems;
- Prior to construction, fences or other effective barriers should be erected in such a manner to prevent access and damage to the wetland and associated buffer areas. Where fences cannot be erected, these sensitive areas must be clearly demarcated, and sign posted;
- An alien invasive plant management plan needs to be compiled and implemented prior to construction and continued through the life of the mine, to control and prevent the spread of invasive aliens. Clean mining vehicles on-site, and prioritise the cleaning of mining vehicles gaining access from surrounding areas;
- Demarcate footprint areas to be cleared to avoid unnecessary clearing. Exposed areas which are not going to be utilised in the future must be ripped and vegetated to increase surface roughness; and
- Create energy dissipation at discharge areas to prevent scouring. Temporary and permanent erosion control methods may include silt fences, retention basins, detention ponds, interceptor ditches, seeding and sodding, riprap of exposed areas, erosion mats, and mulching.

B. Impact from soil excavations

Soil excavations during construction lead to the removal of top and sub-soil layers, result in the stockpiling of soils as well as the changes in the topography and slope, which subsequently likely to impact upon the wetlands in the vicinity of the project area.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Impact from soil excavations	Construction	-10.00	-7.50	-10.00

Proposed Preliminary Mitigation

- Any possible contamination of topsoil must be avoided. Spill kits must be available and on hand to clean these spills;
- Where applicable, materials must be stored in leak-proof, sealable containers or packaging. Materials must also be stored in bunded areas which can accommodate the required volumes;
- Drip trays or any form of oil absorbent material must be placed underneath mining vehicles / machinery and equipment (in operation and not storage) when not in use;
- No servicing of equipment on site unless absolutely necessary;
- Leaking equipment shall be repaired immediately or be removed from site to facilitate repair;
- All vehicles and equipment must be well maintained to ensure that there are no oil or fuel leakages;
- All contaminated soil / yard stone shall be removed and be placed in containers;
- A specialist Contractor shall be used for the bio-remediation of contaminated soil where the required remediation material and expertise is not available on site. Alternatively, the mine may undertake or contract the disposal of contaminated soil at a licenced and registered facility if necessary;
- All personnel and contractors to undergo Environmental Awareness Training. A signed register of attendance must be kept for proof. Discussions are required on sensitive environmental receptors within the project area, with particular reference to the wetland systems;
- Prior to construction, fences or other effective barriers should be erected in such a manner to prevent access and damage to the wetland and associated buffer areas. Where fences cannot be erected, these sensitive areas must be clearly demarcated, and sign posted; and
- Demarcate footprint areas to be cleared to avoid unnecessary clearing. Exposed areas which are not going to be utilised in the future must be ripped and vegetated to increase surface roughness.

C. Impact from heavy duty vehicle use

Vehicles particularly heavy vehicles on site during construction may lead to spills, leaks and dust precipitation. The movement of such vehicles my also promote the spread of alien vegetation.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Impact from heavy duty vehicle use	Construction	-8.00	-6.00	-7.00

Proposed Preliminary Mitigation

- Any possible contamination of topsoil must be avoided. Spill kits must be available and on hand to clean these spills;
- Drip trays or any form of oil absorbent material must be placed underneath mining vehicles/machinery and equipment (in operation and not storage) when not in use;
- Construct cut-off berms downslope of working areas;
- No servicing of equipment on site unless absolutely necessary;
- All vehicles and equipment must be well maintained to ensure that there are no oil or fuel leakages;
- All contaminated soil / yard stone shall be removed and be placed in containers;
- A specialist Contractor shall be used for the bio-remediation of contaminated soil where the required remediation material and expertise is not available on site. Alternatively, the mine may undertake or contract the disposal of contaminated soil at a licenced and registered facility if necessary;
- All personnel and contractors to undergo Environmental Awareness Training. A signed register of attendance must be kept for proof. Discussions are required on sensitive environmental receptors within the project area, with particular reference to the wetland systems; and
- An alien invasive plant management plan needs to be compiled and implemented prior to construction and continued through the life of the mine, to control and prevent the spread of invasive aliens. Clean mining vehicles on-site, and prioritise the cleaning of mining vehicles gaining access from surrounding areas.

D. Impact from light vehicles, machine and equipment use

Light vehicles as well as machinery and equipment used on site during construction may result in spills, leaks and dust precipitation which may impact on the surrounding wetlands.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Impact from light vehicles, machine and equipment use	Construction	-6.00	-6.00	-7.00

Proposed Preliminary Mitigation

- Any possible contamination of topsoil must be avoided. Spill kits must be available and on hand to clean these spills;
- Where applicable, materials must be stored in leak-proof, sealable containers or packaging. Materials must also be stored in bunded areas which can accommodate the required volumes;
- Drip trays or any form of oil absorbent material must be placed underneath vehicles/machinery and equipment when not in use;
- Construct cut-off berms downslope of working areas;
- No servicing of equipment on site unless absolutely necessary;
- Leaking equipment shall be repaired immediately or be removed from site to facilitate repair;
- All vehicles and equipment must be well maintained to ensure that there are no oil or fuel leakages;
- All contaminated soil / yard stone shall be removed and be placed in containers;

- A specialist Contractor shall be used for the bio-remediation of contaminated soil where the required remediation material and expertise is not available on site. Alternatively, the mine may undertake or contract the disposal of contaminated soil at a licenced and registered facility if necessary;
- All personnel and contractors to undergo Environmental Awareness Training. A signed register of attendance must be kept for proof. Discussions are required on sensitive environmental receptors within the project area, with particular reference to the wetland systems; and
- An alien invasive plant management plan needs to be compiled and implemented prior to construction and continued through the life of the mine, to control and prevent the spread of invasive aliens. Clean mining vehicles on-site, and prioritise the cleaning of mining vehicles gaining access from surrounding areas.

E. Impact from staff, personnel and contractors

Activities of staff, personnel and contractors during the construction phase of the proposed project particularly in relation to ablutions and waste management are likely to affect the wetlands in the vicinity of the project area.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Impact from staff, personnel and contractors	Construction	-6.75	-4.50	-5.25

Proposed Preliminary Mitigation

- The project layout area pertains to the mining pit and discard stockpiles for hards, softs and topsoil. These areas must be demarcated to ensure the correct footprint area of the areas of disturbance;
- Any possible contamination of topsoil must be avoided. Spill kits must be available and on hand to clean these spills;
- Where applicable, materials must be stored in leak-proof, sealable containers or packaging. Materials must also be stored in bunded areas which can accommodate the required volumes;
- Drip trays or any form of oil absorbent material must be placed underneath mining vehicles / machinery and equipment (in operation and not storage) when not in use;
- Construct cut-off berms downslope of working areas;
- No servicing of equipment on site unless absolutely necessary;
- Leaking equipment shall be repaired immediately or be removed from site to facilitate repair;
- All vehicles and equipment must be well maintained to ensure that there are no oil or fuel leakages;
- All contaminated soil / yard stone shall be removed and be placed in containers;
- A specialist Contractor shall be used for the bio-remediation of contaminated soil where the required remediation material and expertise is not available on site. Alternatively, the mine may undertake or contract the disposal of contaminated soil at a licenced and registered facility if necessary;
- All personnel and contractors to undergo Environmental Awareness Training. A signed register of attendance must be kept for proof. Discussions are required on sensitive environmental receptors within the project area, with particular reference to the wetland systems; and
- An alien invasive plant management plan needs to be compiled and implemented prior to construction and continued through the life of the mine, to control and prevent the spread of invasive aliens. Clean

mining vehicles on-site, and prioritise the cleaning of mining vehicles gaining access from surrounding areas.

F. Impact from construction materials

The materials and solutions stored on site and used during construction may lead to spills and leaks, and subsequently untreated run-off.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Impact from construction materials	Construction	-3.50	-3.50	-4.08

Proposed Preliminary Mitigation

- The project layout area pertains to the mining pit and discard stockpiles for hards, softs and topsoil. These areas must be demarcated to ensure the correct footprint area of the areas of disturbance;
- Any possible contamination of topsoil must be avoided. Spill kits must be available and on hand to clean these spills;
- Where applicable, materials must be stored in leak-proof, sealable containers or packaging. Materials must also be stored in bunded areas which can accommodate the required volumes;
- Drip trays or any form of oil absorbent material must be placed underneath mining vehicles / machinery and equipment (in operation and not storage) when not in use;
- Construct cut-off berms downslope of working areas;
- No servicing of equipment on site unless absolutely necessary;
- Leaking equipment shall be repaired immediately or be removed from site to facilitate repair;
- All vehicles and equipment must be well maintained to ensure that there are no oil or fuel leakages;
- All contaminated soil / yard stone shall be removed and be placed in containers;
- A specialist Contractor shall be used for the bio-remediation of contaminated soil where the required remediation material and expertise is not available on site. Alternatively, the mine may undertake or contract the disposal of contaminated soil at a licenced and registered facility if necessary; and
- All personnel and contractors to undergo Environmental Awareness Training. A signed register of attendance must be kept for proof. Discussions are required on sensitive environmental receptors within the project area, with particular reference to the wetland systems.

G. Impact from blasting activities on wetlands

Blasting activities in and around the mining pit during operations may lead to the direct loss of wetlands as well as cause coal and dust precipitation which will have an indirect impact on the surrounding wetlands.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Impact from blasting	Operation	-20.00	-20.00	-36.67

Proposed Preliminary Mitigation

- Dust suppression must be continuous, and vehicles speeds reduced and minimized to reduce dust precipitation;
- All personnel and contractors to undergo Environmental Awareness Training. A signed register of attendance must be kept for proof. Discussions are required on sensitive environmental receptors within the project area, with particular reference to the wetland systems;
- Prior to construction, fences or other effective barriers should be erected in such a manner to prevent access and damage to the wetland and associated buffer areas. Where fences cannot be erected, these sensitive areas must be clearly demarcated, and sign posted;
- Construct cut-off berms downslope of working areas;
- Create energy dissipation at discharge areas to prevent scouring. Temporary and permanent erosion control methods may include silt fences, retention basins, detention ponds, interceptor ditches, seeding and sodding, riprap of exposed areas, erosion mats, and mulching;
- Limit the extent (or size) of the void, rehabilitation must be concurrent. All voids must be backfilled, and surface infrastructure must be removed from the site when no longer required; and
- Rehabilitation of the area and shaping of the topography must minimise the ingress of water into the mining area. Additionally, measures must also be considered to implement constructed wetlands at likely decant areas, and the planting of trees to reduce groundwater recharge.

H. Impact from soil excavations

Soil excavations during operations from the opencast mining activities and resulting change in the topography and slope in the area will impact upon the wetlands.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Impact from soil excavations	Operation	-21.25	-21.25	-38.96

Proposed Preliminary Mitigation

- Dust suppression must be continuous, and vehicles speeds reduced and minimized to reduce dust precipitation;
- Any possible contamination of topsoil must be avoided. Spill kits must be available and on hand to clean these spills;
- Where applicable, materials must be stored in leak-proof, sealable containers or packaging. Materials must also be stored in bunded areas which can accommodate the required volumes;

- Drip trays or any form of oil absorbent material must be placed underneath mining vehicles / machinery and equipment (in operation and not storage) when not in use;
- Construct cut-off berms downslope of working areas;
- No servicing of equipment on site unless absolutely necessary;
- Leaking equipment shall be repaired immediately or be removed from site to facilitate repair;
- All vehicles and equipment must be well maintained to ensure that there are no oil or fuel leakages;
- All contaminated soil / yard stone shall be removed and be placed in containers;
- A specialist Contractor shall be used for the bio-remediation of contaminated soil where the required remediation material and expertise is not available on site. Alternatively, the mine may undertake or contract the disposal of contaminated soil at a licenced and registered facility if necessary;
- All personnel and contractors to undergo Environmental Awareness Training. A signed register of attendance must be kept for proof. Discussions are required on sensitive environmental receptors within the project area, with particular reference to the wetland systems;
- Demarcate footprint areas to be cleared to avoid unnecessary clearing. Exposed areas which are not going to be utilised in the future must be ripped and vegetated to increase surface roughness;
- Limit the extent (or size) of the void, rehabilitation must be concurrent. All voids must be backfilled, and surface infrastructure must be removed from the site when no longer required; and
- Rehabilitation of the area and shaping of the topography must minimise the ingress of water into the mining area. Additionally, measures must also be considered to implement constructed wetlands at likely decant areas, and the planting of trees to reduce groundwater recharge.

I. Impact from heavy duty vehicle use

Vehicles particularly heavy vehicles on site during operations may lead to spills, leaks and dust precipitation from haulage activities. The movement of such vehicles my also promote the spread of alien vegetation.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Impact from heavy duty vehicle use	Operation	-9.00	-6.00	-7.00

Proposed Preliminary Mitigation

- Dust suppression must be continuous, and vehicles speeds reduced and minimized to reduce dust precipitation;
- Any possible contamination of topsoil must be avoided. Spill kits must be available and on hand to clean these spills;
- Drip trays or any form of oil absorbent material must be placed underneath mining vehicles / machinery and equipment (in operation and not storage) when not in use;
- Construct cut-off berms downslope of working areas;
- No servicing of equipment on site unless absolutely necessary;
- All vehicles and equipment must be well maintained to ensure that there are no oil or fuel leakages;
- All contaminated soil / yard stone shall be removed and be placed in containers;

- A specialist Contractor shall be used for the bio-remediation of contaminated soil where the required remediation material and expertise is not available on site;
- All personnel and contractors to undergo Environmental Awareness Training. A signed register of attendance must be kept for proof. Discussions are required on sensitive environmental receptors within the project area, with particular reference to the wetland systems; and
- An alien invasive plant management plan needs to be compiled and implemented prior to construction and continued through the life of the mine, to control and prevent the spread of invasive aliens. Clean mining vehicles on-site, and prioritise the cleaning of mining vehicles gaining access from surrounding areas.

J. Impact from light vehicles, machine and equipment use

Light vehicles as well as machinery and equipment used on site during operations may result in spills, leaks and dust precipitation which may impact on the surrounding wetlands.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Impact from light vehicles, machine and equipment use	Operation	-9.00	-6.00	-7.00

Proposed Preliminary Mitigation

- Dust suppression must be continuous, and vehicles speeds reduced and minimized to reduce dust precipitation;
- Any possible contamination of topsoil must be avoided. Spill kits must be available and on hand to clean these spills;
- Where applicable, materials must be stored in leak-proof, sealable containers or packaging. Materials must also be stored in bunded areas which can accommodate the required volumes;
- Drip trays or any form of oil absorbent material must be placed underneath mining vehicles / machinery and equipment (in operation and not storage) when not in use;
- Construct cut-off berms downslope of working areas;
- No servicing of equipment on site unless absolutely necessary;
- Leaking equipment shall be repaired immediately or be removed from site to facilitate repair;
- All vehicles and equipment must be well maintained to ensure that there are no oil or fuel leakages;
- All contaminated soil / yard stone shall be removed and be placed in containers;
- A specialist Contractor shall be used for the bio-remediation of contaminated soil where the required remediation material and expertise is not available on site. Alternatively, the mine may undertake or contract the disposal of contaminated soil at a licenced and registered facility if necessary;
- All personnel and contractors to undergo Environmental Awareness Training. A signed register of attendance must be kept for proof. Discussions are required on sensitive environmental receptors within the project area, with particular reference to the wetland systems; and
- An alien invasive plant management plan needs to be compiled and implemented prior to construction and continued through the life of the mine, to control and prevent the spread of invasive aliens. Clean mining vehicles on-site, and prioritise the cleaning of mining vehicles gaining access from surrounding areas.

K. Impact from staff, personnel and contractors

Activities of staff, personnel and contractors during the operational phase of the proposed project particularly in relation to ablutions and waste management are likely to affect the wetlands in the vicinity of the project area.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Impact from staff, personnel and contractors	Operation	-8.25	-5.50	-6.42

Proposed Preliminary Mitigation

- The project layout area pertains to the mining pit and discard stockpiles for hards, softs and topsoil. These areas must be demarcated to ensure the correct footprint area of the areas of disturbance;
- Any possible contamination of topsoil must be avoided. Spill kits must be available and on hand to clean these spills;
- Where applicable, materials must be stored in leak-proof, sealable containers or packaging. Materials must also be stored in bunded areas which can accommodate the required volumes;
- Drip trays or any form of oil absorbent material must be placed underneath mining vehicles / machinery and equipment (in operation and not storage) when not in use;
- Construct cut-off berms downslope of working areas;
- No servicing of equipment on site unless absolutely necessary;
- Leaking equipment shall be repaired immediately or be removed from site to facilitate repair;
- All vehicles and equipment must be well maintained to ensure that there are no oil or fuel leakages;
- All contaminated soil / yard stone shall be removed and be placed in containers;
- A specialist Contractor shall be used for the bio-remediation of contaminated soil where the required remediation material and expertise is not available on site. Alternatively, the mine may undertake or contract the disposal of contaminated soil at a licenced and registered facility if necessary;
- All personnel and contractors to undergo Environmental Awareness Training. A signed register of attendance must be kept for proof. Discussions are required on sensitive environmental receptors within the project area, with particular reference to the wetland systems; and
- An alien invasive plant management plan needs to be compiled and implemented prior to construction and continued through the life of the mine, to control and prevent the spread of invasive aliens. Clean mining vehicles on-site, and prioritise the cleaning of mining vehicles gaining access from surrounding areas.

L. Impact from operation materials

The operation of material during the operational phase of the project may lead to spills and leaks of stored material and solutions, this may subsequently result in untreated run-off.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Impact from operation materials	Operation	-4.50	-4.50	-5.25

Proposed Preliminary Mitigation

- The project layout area pertains to the mining pit and discard stockpiles for hards, softs and topsoil. These areas must be demarcated to ensure the correct footprint area of the areas of disturbance;
- Any possible contamination of topsoil must be avoided. Spill kits must be available and on hand to clean these spills;
- Where applicable, materials must be stored in leak-proof, sealable containers or packaging. Materials must also be stored in bunded areas which can accommodate the required volumes;
- Construct cut-off berms downslope of working areas;
- Leaking equipment shall be repaired immediately or be removed from site to facilitate repair;
- All vehicles and equipment must be well maintained to ensure that there are no oil or fuel leakages;
- All contaminated soil / yard stone shall be removed and be placed in containers;
- A specialist Contractor shall be used for the bio-remediation of contaminated soil where the required remediation material and expertise is not available on site. Alternatively, the mine may undertake or contract the disposal of contaminated soil at a licenced and registered facility if necessary; and
- All personnel and contractors to undergo Environmental Awareness Training. A signed register of attendance must be kept for proof. Discussions are required on sensitive environmental receptors within the project area, with particular reference to the wetland systems.

9.3.6 PRELIMINARY IMPACTS ON SOILS

The following preliminary impacts on the soils within the project area were identified and assessed for the various project phases (planning and design, construction, operation, decommissioning, rehabilitation and closure, as well as post-closure). No impacts on soils have been identified for the Rehabilitation and Closure Phase, and the Post-closure Phase. Below are the preliminary impacts on soil features during the planning and design, construction, operational and decommissioning phases, as well as their impact rating.

A. Loss of land capability

A detailed Project Program, Soil Stripping Guideline and Rehabilitation Plan must be completed before commencement. Poor planning of soil stripping stockpiling and rehabilitation will result in losses of land capability and soil as a valuable and irreplaceable resource. Proper planning prior to construction would reduce the level of impacts from a Medium to a Low impact.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Loss of land capability	Planning and Design	-17.50	-4.00	-6.00

Proposed Preliminary Mitigation

- Proper planning of project sequences must be undertaken particularly in relation to vegetation clearing and the removal and separation of top soil and sub soil;
- Stripping and stockpiling guidelines found in the Guidelines for the Rehabilitation of Mines as well as the Waste Act's Mining Residue Regulations must be taken into consideration; and
- Rehabilitation and monitoring plans regarding the replacement of top soil and re-vegetation of disturbed areas must be prepared to be adhered to during the on-going rehabilitation efforts during operations as well as mining closure at the end of the projects ROM.

B. Loss of land capability

The impacts to consider are those relating to the disturbance of the natural soil state. When soil is stripped the physical properties are changed and this impacts on the soils' health. When the soil is stockpiled, the soils chemical properties will deteriorate unless properly managed. These all lead to the loss of the topsoil layer as a natural resource. Soil is considered a slowly regenerating resource due to the fact that it takes hundreds of years for a soil profile to gain 10cm of additional soil through natural processes. During a single rainfall event on unprotected bare soil, erosion could remove that same amount of soil if not more.

Whilst the construction takes place, vehicles will drive on the soil surface compacting it. This reduces infiltration rates as well as the ability for plant roots to penetrate the compacted soil. This then reduces vegetative cover and increases runoff potential. The increased runoff potential then leads to increased erosion hazards.

If the topsoil and subsoil are stripped and stockpiled as one unit, the topsoil's seed bank and natural fertility balance is diluted. This will affect the regrowth of vegetation on the stockpiles as well as the regrowth of vegetation when the soils have been replaced during the rehabilitation process, therefore soils should be handled with care from the construction phase through to the decommissioning phase.

During the operational phase, similar impact scores are expected regarding the extent of the impacts as those scored for the construction phase. It is of vital importance that the correct procedures be adhered to during this activity and that the different soil horizons be kept separate. During this phase, erosion is a major concern for the topsoil and subsoil stockpiles, especially in cases where proper vegetation has not been established. Erosion within these sections will cause extensive sediment transport and ultimately pollution and degradation of healthy water courses and soil resources nearby.

These designated stockpiles often compact the soil underneath them due to their extremely high masses. Compaction of natural soil resources for extended time periods can cause irreversible degradation. Stockpiles themselves are not the only aspect contributing to compaction. During the operational phase, a large degree of vehicle activity takes place to ensure that extracted minerals as well as additional waste material is transported to its designated storage areas. These heavy machinery vehicles compact the soil between the project site and the mentioned storage areas severely. Additionally, such stockpiles tend to entail very fine sediment that is prone to be carried away by gusts of wind and ultimately contribute to dust pollution.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Loss of land capability	Construction Operation	-20.00	-15.00	-20.00

Proposed Preliminary Mitigation

- Bush clearing of all bushes and trees taller than one meter; ensure proper storm water management designs are in place;

- If any erosion occurs, corrective actions (erosion berms) must be undertaken to minimize any further erosion from taking place;
- If erosion has occurred, topsoil should be sourced and replaced and shaped to reduce the recurrence of erosion;
- Only the designated access routes are to be used in order to reduce any unnecessary compaction;
- Compacted areas are to be ripped to loosen the soil structure;
- The topsoil should be stripped by means of an excavator bucket, and loaded onto dump trucks;
- Topsoil stockpiles are to be kept to a maximum height of 4m;
- Topsoil is to be stripped when the soil is dry, so as to reduce compaction;
- Bush clearing contractors will only clear bushes and trees larger than 1m the remaining vegetation will be stripped with the top 0.3 m of topsoil to conserve as much of the nutrient cycle, organic matter and seed bank as possible;
- The subsoil approximately 0.3m to the designated thickness in the stripping guidelines, will then be stripped and stockpiled separately;
- The handling of the stripped topsoil will be minimized to ensure the soil's structure does not deteriorate significantly;
- Compaction of the removed topsoil must be avoided by prohibiting traffic on stockpiles;
- Stockpiles should only be used for their designated final purposes (i.e. rehabilitation);
- The stockpiles will be vegetated (details contained in rehabilitation plan) in order to reduce the risk of erosion, prevent weed growth and to reinstitute the ecological processes within the soil;
- Place the above cleared vegetation where the topsoil stockpiles are to be placed; and
- Strip the topsoil and the remaining vegetation as per the rehabilitation guideline and place in the allocated locations for the various soil types, on top of the previously cleared bushes and trees.

C. Loss of land capability

During decommissioning, vehicle activity is likely to compact soils even further due to the necessary activities. The infrastructure established during the construction phase is subsequently destroyed to ensure as little as possible is left after the relevant operations.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Loss of land capability	Decommissioning	-20.00	-8.25	-11.00

Proposed Preliminary Mitigation

- Ensure proper storm water management designs are in place;
- Ensure that proper phyto-stabilization takes place on top of the relevant stockpiles;
- Only the designated access routes are to be used to reduce any unnecessary compaction;
- If erosion occurs, corrective actions (erosion berms) must be undertaken to minimize any further erosion from taking place;

- Only the designated access routes are to be used to reduce any unnecessary compaction;
- Implement land rehabilitation measures as defined in rehabilitation report.
- Follow rehabilitation guidelines;
- The topsoil should be moved by means of an excavator bucket, and loaded onto dump trucks;
- Topsoil is to be moved when the soil is dry, as to reduce compaction;
- After the completion of the project, the extension area is to be cleared of all infrastructure;
- The foundations to be removed;
- Topsoil to be replaced for rehabilitation purposes;
- The handling of the stripped topsoil will be minimized to ensure the soil's structure does not deteriorate;
- Stockpiles should only be used for their designated final purposes; and
- Compacted areas are to be ripped to loosen the soil structure and vegetation cover re-instated.

9.3.7 PRELIMINARY IMPACTS ON AIR QUALITY

The following preliminary impacts on the air quality within the project area were identified and assessed for the various project phases (planning and design, construction, operation, decommissioning, rehabilitation and closure, as well as post-closure). No impacts on air quality have been identified that will occur during the Planning and Design Phase, Rehabilitation and Closure Phase, and the Post-closure Phase. Below are the preliminary impacts on air quality for the construction, operation, and decommissioning phases identified during scoping, as well as their impact rating.

A. Decline in air quality – Phase 3 Project

The main pollutant of concern from construction operations is particulate matter, including PM10, PM2.5 and TSP. PM10 and PM2.5 concentrations are associated with potential health impacts due to the size of the particulates being small enough to be inhaled. Nuisance effects are caused by the TSP fraction (20 µm to 75 µm in diameter) resulting in soiling of materials and visibility reductions. This could in effect also have financial implications due to the requirement for more cleaning materials. Since the required surface infrastructure such as offices, stores facility, workshops, and change house already exists at Kangala Colliery and only limited construction activities are required at the site, the impacts due to construction activities are likely to be localised and of low magnitude. This impacts therefore, applies mainly to PM2.5 and PM10 concentrations and dustfall rates.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Decline in air quality – Phase 3 Project	Construction	-6.75	-5.25	-6.13

Proposed Preliminary Mitigation

- Regular water sprays and chemical suppression on unpaved roads to ensure at least 90% control efficiency (CE);
- Monthly physical inspection of road surface, daily visual observation of entrained dust emissions from unpaved road surfaces;

- Controlled blasting techniques to be used to ensure minimal dust generation;
- Blasting only to be conducted on cloudless days, if possible;
- Water sprays on drilling activities;
- Addition of chemical surfactants to water sprays to lower water surface tension and increase binding properties;
- Drilling to be controlled through water sprays or vacuum packs;
- Increase in-pit material moisture content;
- Drop height from excavator into haul trucks to be kept at a minimum for ore and waste rock;
- Tipping onto ROM storage piles to be controlled through water sprays, should significant amounts of dust be generated;
- Keep material handled by dozers and wheeled loaders moist to achieve a control efficiency of 50%, especially during dry periods;
- Regular clean-up at loading areas;
- Water sprays at the crushers to achieve at least 50% CE;
- Water sprays at ROM stockpile can achieve 50% CE. Increase in moisture content provides higher threshold friction velocity and ensures that particulates are not as easily entrained due to high surface winds;
- Reshape all disturbed areas to their natural contours;
- Cover disturbed areas with previously collected topsoil and replant native species;
- Rock cladding with larger pieces of waste rock is recommended to reduce wind erosion emissions from the overburden storage piles;
- Revegetation of overburden stockpile is recommended; and
- Design mitigated activities include: 75% CE on unpaved haul roads, 50% CE on materials handling, 50% CE on crushing and screening, 50% CE on grading activities, 70% CE on covered conveyor tipping points and 65% on windblown dust from conveyor belt with enclosed side and roof.

B. Decline in air quality – Kangala operations (baseline)

The highest impacts are mainly due to unpaved roads (both in-pit and surface roads).

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Decline in air quality – Kangala operations (baseline)	Operation	-14.00	-9.00	-13.50

Proposed Preliminary Mitigation

- Water sprays on haul roads assuming 75% CE due to continuous water sprays (Scenario 1b) and 90% CE on haul roads assuming water sprays and chemical suppression;
- Materials handling (loading and unloading of waste rock, ROM and discard) assuming 50% CE due to water sprays at tip points;

- Control efficiency on covered conveyor tipping points (materials handling) of 70%; and
- Control efficiency on wind erosion due to conveyor belt (enclosed side and roof) of 65%.

C. Decline in air quality – Phase 3 Project (design mitigation)

The main source of impact for design mitigated PM10 due to the proposed Phase 3 Project operations is vehicle entrained dust from unpaved roads, ranging in contribution to total simulated GLCs between 37% and 96%. The secondary source of impact for design mitigated PM10 is in-pit operations, ranging in contribution to total simulated GLCs between 2% and 52%. For design mitigated PM2.5, in-pit operations were the main source of impact at 14 AQSRs, ranging in contribution between 5% and 61%, followed by crushing operations, ranging in contribution between 6% and 42%. Similar to Scenario 1 the main source of impact for design mitigated dust fallout is windblown dust from the discard stockpile and topsoil stockpile, ranging in contribution to total simulated GLCs between 11% and 84%. The secondary source of impact for dust fallout is vehicle entrained dust from unpaved roads, ranging in contribution between 5% and 89%. This impact is, therefore, mainly due to unpaved roads and in-pit activities.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Decline in air quality – Phase 3 Project (design mitigation)	Operation	-15.00	-14.00	-21.00

Proposed Preliminary Mitigation

- Regular water sprays and chemical suppression on unpaved roads to ensure at least 90% control efficiency;
- Monthly physical inspection of road surface, daily visual observation of entrained dust emissions from unpaved road surfaces;
- Controlled blasting techniques to be used to ensure minimal dust generation;
- Blasting only to be conducted on cloudless days, if possible;
- Water sprays on drilling activities;
- Addition of chemical surfactants to water sprays to lower water surface tension and increase binding properties;
- Drilling to be controlled through water sprays or vacuum packs;
- Increase in-pit material moisture content;
- Drop height from excavator into haul trucks to be kept at a minimum for ore and waste rock;
- Tipping onto ROM storage piles to be controlled through water sprays, should significant amounts of dust be generated;
- Keep material handled by dozers and wheeled loaders moist to achieve a control efficiency of 50%, especially during dry periods;
- Regular clean-up at loading areas;
- Water sprays at the crushers to achieve at least 50% control efficiency;

- Water sprays at ROM stockpile can achieve 50% control efficiency. Increase in moisture content provides higher threshold friction velocity and ensures that particulates are not as easily entrained due to high surface winds;
- Reshape all disturbed areas to their natural contours;
- Cover disturbed areas with previously collected topsoil and replant native species;
- Rock cladding with larger pieces of waste rock is recommended to reduce wind erosion emissions from the overburden storage piles;
- Revegetation of overburden stockpile is recommended; and
- Design mitigated activities include: 75% CE on unpaved haul roads, 50% CE on materials handling, 50% CE on crushing and screening, 50% CE on grading activities, 70% CE on covered conveyor tipping points and 65% on windblown dust from conveyor belt with enclosed side and roof.

D. Decline in Air Quality – Phase 3 Project (added mitigation)

The highest impacts are mainly due to unpaved roads (both in-pit and surface roads).

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Decline in air quality – Phase 3 Project (added mitigation)	Operation	-15.00	-9.75	-14.63

Proposed Preliminary Mitigation

- Regular water sprays and chemical suppression on unpaved roads to ensure at least 90% control efficiency;
- Monthly physical inspection of road surface, daily visual observation of entrained dust emissions from unpaved road surfaces;
- Controlled blasting techniques to be used to ensure minimal dust generation;
- Blasting only to be conducted on cloudless days, if possible;
- Water sprays on drilling activities;
- Addition of chemical surfactants to water sprays to lower water surface tension and increase binding properties;
- Drilling to be controlled through water sprays or vacuum packs;
- Increase in-pit material moisture content;
- Drop height from excavator into haul trucks to be kept at a minimum for ore and waste rock;
- Tipping onto ROM storage piles to be controlled through water sprays, should significant amounts of dust be generated;
- Keep material handled by dozers and wheeled loaders moist to achieve a control efficiency of 50%, especially during dry periods;
- Regular clean-up at loading areas;
- Water sprays at the crushers to achieve at least 50% control efficiency;

- Water sprays at ROM stockpile can achieve 50% control efficiency. Increase in moisture content provides higher threshold friction velocity and ensures that particulates are not as easily entrained due to high surface winds;
- Reshape all disturbed areas to their natural contours;
- Cover disturbed areas with previously collected topsoil and replant native species;
- Rock cladding with larger pieces of waste rock is recommended to reduce wind erosion emissions from the overburden storage piles;
- Revegetation of overburden stockpile is recommended; and
- Additional mitigation includes design mitigation and 90% CE on unpaved haul roads.

E. Decline in air quality – Phase 3 Project

It is assumed that all the operations will have ceased by the decommissioning and closure phases of the project. The potential for impacts during this phase will depend on the extent of rehabilitation efforts during decommissioning and closure phases. Aspects and activities associated with the decommissioning and closure phases of the proposed operations include: Generation of PM2.5 and PM10 from stockpiles and the mining pit (dust generated during rehabilitation activities); Generation of PM2.5 and PM10 from the mining infrastructure (demolition of the mining infrastructure); and Gas emissions from vehicles (tailpipe emissions from vehicles utilised during the decommissioning and closure phases). Therefore, this impact applies to PM2.5 and PM10 concentrations and dustfall rates. Likely activities to result in dust impacts during closure are: infrastructure removal/demolition; topsoil recovered from stockpiles for rehabilitation and re-vegetation of surroundings; and vehicle entrainment on unpaved road surfaces during rehabilitation – once that is done, vehicle activity associated with the mining operations should cease.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Decline in air quality – Phase 3 Project	Decommissioning Rehabilitation and Closure	-7.50	-6.00	-7.00

Proposed Preliminary Mitigation

- Demolition of infrastructure to have water sprays where vehicle activity is high; and
- Rehabilitation and vegetation of mined area.

9.3.8 PRELIMINARY VISUAL IMPACTS

The following preliminary impacts on the visual environment within the project area were identified and assessed for the various project phases (planning and design, construction, operation, decommissioning, rehabilitation and closure, as well as post-closure). No visual impacts have been identified for the Planning and Design Phase, Rehabilitation and Closure Phase, and the Post-closure Phase. Below are the preliminary visual impacts during the construction, operational and decommissioning phases, as well as their impact rating.

A. Change of landscape character

In general terms the proposed mine extension will be visible to the same settlement areas and from a similar distance as the existing mine. The one exception to this is the rural area to the west of the extension area. As current stockpiles associated with the existing mine are located to the east and stockpiles associated with the

proposed extension being located to the west of the proposed mine extension, it is likely that mining operations will become more obvious from this currently largely rural area.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Change in character	Construction	-2.50	-2.50	-2.50

Proposed Preliminary Mitigation

- In a relatively flat landscape, the scale and nature of the stockpiles will be impossible to screen. The only possible mitigation measure is to locate them to the east of the extension area; and
- General mining activities around the mine extension are unlikely to cause a major change in the current level of impact. Good housekeeping measures will all help to ensure that visual impacts are not exacerbated. These include:
    - Minimising the disturbed area (i.e. ensuring mining activities are localised or kept together as far as possible) so as to reduce the amount of areas with potential visual obstructions or impacts,
    - Retention of as much existing vegetation as possible,
    - Dust suppression, and
    - Progressive rehabilitation.

B. Impact on urban edge

In general terms the proposed mine extension will be visible to the same settlement areas and from a similar distance as the existing mine. The one exception to this is Droogfontein which appears to be an area of smallholdings that have been developed with varying uses including large private houses and semi industrial agriculture. The proposed stockpile location associated with the extension is significantly closer to this area than stockpiles associated with the existing mine. They could therefore be more obvious to this area. Whilst it is unlikely that this impact will affect residential or agricultural use of the area, subject to the degree of screening provided by vegetation within and around the settlement, it is possible that this could cause a change in the nature of view that residents could find objectionable.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Impact on urban edge	Construction	-1.00	-1.00	-1.00

Proposed Preliminary Mitigation

- In a relatively flat landscape, the scale and nature of the stockpiles will be impossible to screen. The only possible mitigation measure is to locate them to the east of the extension area as far from Droogfontein as possible; and
- General mining activities around the mine extension are unlikely to cause a major change in the current level of impact. Good housekeeping measures will all help to ensure that visual impacts are not exacerbated. These include:

- Minimising the disturbed area (i.e. ensuring mining activities are localised or kept together as far as possible) so as to reduce the amount of areas with potential visual obstructions or impacts,
- Retention of as much existing vegetation as possible,
- Dust suppression, and
- Progressive rehabilitation.

C. Impact on farmsteads

In general terms the proposed mine extension is likely to be visible to the same farmsteads and from a similar distance as the existing mine. However, there are likely to be the following exceptions:

- There is one farmstead that appears to be located in close proximity to existing mine stockpiles. As these stockpiles are removed for backfilling and rehabilitation, the visual impact on this receptor is likely to reduce significantly;
- There is one farmstead that appears to be within the proposed mine extension area (NW corner). It has to be assumed that this farmstead will be removed if authorisation for the mine extension is granted; and
- One farmstead is within 1km of the stockpile area associated with the proposed extension. There appear to be areas of alien trees around the farmstead that are likely to help to mitigate views of the stockpiles.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Impact on farmsteads	Construction	-1.00	-1.00	-1.00

Proposed Preliminary Mitigation

- In a relatively flat landscape, the scale and nature of the stockpiles will be impossible to screen. The only possible mitigation measure is to locate them to the east of the extension area as far from Droogfontein as possible; and
- General mining activities around the mine extension are unlikely to cause a major change in the current level of impact. Good housekeeping measures will all help to ensure that visual impacts are not exacerbated. These include:
  - Minimising the disturbed area (i.e. ensuring mining activities are localised or kept together as far as possible) so as to reduce the amount of areas with potential visual obstructions or impacts,
  - Retention of as much existing vegetation as possible,
  - Dust suppression, and
  - Progressive rehabilitation.

D. Impact on local roads

In general terms the proposed mine extension is likely to be visible to the same roads and from a similar distance as the existing mine. Visual impacts associated with the proposed mine extension are therefore unlikely to create significant new areas or different types of visual impact.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Impact on local roads	Construction	-1.00	-1.00	-1.00

Proposed Preliminary Mitigation

- In a relatively flat landscape, the scale and nature of the stockpiles will be impossible to screen; and
- General mining activities around the mine extension are unlikely to cause a major change in the current level of impact. Good housekeeping measures will help to ensure that visual impacts are not exacerbated. These include:
    - Minimising the disturbed area (i.e. ensuring mining activities are localised or kept together as far as possible) so as to reduce the amount of areas with potential visual obstructions or impacts,
    - Retention of as much existing vegetation as possible,
    - Dust suppression,
    - Progressive rehabilitation.

E. Change in character

In general terms the proposed mine extension will be visible to the same settlement areas and from a similar distance as the existing mine. The one exception to this is the rural area to the west of the extension area. As current stockpiles associated with the existing mine are located to the east and stockpiles associated with the proposed extension being located to the west of the proposed mine extension, it is likely that mining operations will become more obvious from this currently largely rural area.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Change in character	Operation	-4.00	-6.00	-6.00

Proposed Preliminary Mitigation

- In a relatively flat landscape, the scale and nature of the stockpiles will be impossible to screen. The only possible mitigation measure is to locate them to the east of the extension area; and
- General mining activities around the mine extension are unlikely to cause a major change in the current level of impact. Good housekeeping measures will all help to ensure that visual impacts are not exacerbated. These include:

- Minimising the disturbed area (i.e. ensuring mining activities are localised or kept together as far as possible) so as to reduce the amount of areas with potential visual obstructions or impacts,
- Retention of as much existing vegetation as possible,
- Dust suppression, and
- Progressive rehabilitation.

F. Impact on urban edge

In general terms the proposed mine extension will be visible to the same settlement areas and from a similar distance as the existing mine. The one exception to this is Droogfontein which appears to be an area of smallholdings that have been developed with varying uses including large private houses and semi industrial agriculture. The proposed stockpile location associated with the extension is significantly closer to this area than stockpiles associated with the existing mine. They could therefore be more obvious to this area. Whilst it is unlikely that this impact will affect residential or agricultural use of the area, subject to the degree of screening provided by vegetation within and around the settlement, it is possible that this could cause a change in the nature of view that residents could find objectionable.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Impact on urban edge	Operation	-4.50	-4.50	-5.25

Proposed Preliminary Mitigation

- In a relatively flat landscape, the scale and nature of the stockpiles will be impossible to screen. The only possible mitigation measure is to locate them to the east of the extension area as far from Droogfontein as possible; and
- General mining activities around the mine extension are unlikely to cause a major change in the current level of impact. Good housekeeping measures will all help to ensure that visual impacts are not exacerbated. These include:
  - Minimising the disturbed area,
  - Retention of as much existing vegetation as possible,
  - Dust suppression, and
  - Progressive rehabilitation.

G. Impact on farmsteads

In general terms the proposed mine extension is likely to be visible to the same farmsteads and from a similar distance as the existing mine. However, there are likely to be the following exceptions:

- There is one farmstead that appears to be located in close proximity to existing mine stockpiles. As these stockpiles are removed for backfilling and rehabilitation, the visual impact on this receptor is likely to reduce significantly;
- There is one farmstead that appears to be within the proposed mine extension area (NW corner). It has to be assumed that this farmstead will be removed if authorisation for the mine extension is granted; and

- One farmstead is within 1km of the stockpile area associated with the proposed extension. There appear to be areas of alien trees around the farmstead that are likely to help to mitigate views of the stockpiles.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Impact on farmsteads	Operation	-2.00	-2.00	-2.00

Proposed Preliminary Mitigation

- In a relatively flat landscape, the scale and nature of the stockpiles will be impossible to screen. The only possible mitigation measure is to locate them to the east of the extension area as far from Droogfontein as possible; and
- General mining activities around the mine extension are unlikely to cause a major change in the current level of impact. Good housekeeping measures will all help to ensure that visual impacts are not exacerbated. These include:
    - Minimising the disturbed area,
    - Retention of as much existing vegetation as possible,
    - Dust suppression, and
    - Progressive rehabilitation.

H. Impact on local roads

In general terms the proposed mine extension is likely to be visible to the same roads and from a similar distance as the existing mine. Visual impacts associated with the proposed mine extension are therefore unlikely to create significant new areas or different types of visual impact.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Impact on local roads	Operation	-2.00	-2.00	-2.00

Proposed Preliminary Mitigation

- In a relatively flat landscape, the scale and nature of the stockpiles will be impossible to screen; and
- General mining activities around the mine extension are unlikely to cause a major change in the current level of impact. Good housekeeping measures will help to ensure that visual impacts are not exacerbated. These include:
    - Minimising the disturbed area,
    - Retention of as much existing vegetation as possible,
    - Dust suppression, and
    - Progressive rehabilitation.

I. Change in character

In general terms the proposed mine extension will be visible to the same settlement areas and from a similar distance as the existing mine. The one exception to this is the rural area to the west of the extension area. As current stockpiles associated with the existing mine are located to the east and stockpiles associated with the proposed extension being located to the west of the proposed mine extension, it is likely that mining operations will become more obvious from this currently largely rural area.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Change in character	Decommissioning	+2.00	+2.00	+2.00

Proposed Preliminary Mitigation

- In a relatively flat landscape, the scale and nature of the stockpiles will be impossible to screen. The only possible mitigation measure is to locate them to the east of the extension area; and
- General mining activities around the mine extension are unlikely to cause a major change in the current level of impact. Good housekeeping measures will all help to ensure that visual impacts are not exacerbated. These include:
    - Minimising the disturbed area,
    - Retention of as much existing vegetation as possible,
    - Dust suppression, and
    - Progressive rehabilitation.

J. Impact on urban edge

In general terms the proposed mine extension will be visible to the same settlement areas and from a similar distance as the existing mine. The one exception to this is Droogfontein which appears to be an area of smallholdings that have been developed with varying uses including large private houses and semi industrial agriculture. The proposed stockpile location associated with the extension is significantly closer to this area than stockpiles associated with the existing mine. They could therefore be more obvious to this area. Whilst it is unlikely that this impact will affect residential or agricultural use of the area, subject to the degree of screening provided by vegetation within and around the settlement, it is possible that this could cause a change in the nature of view that residents could find objectionable.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Impact on urban edge	Decommissioning	+2.00	+2.00	+2.00

Proposed Preliminary Mitigation

- In a relatively flat landscape, the scale and nature of the stockpiles will be impossible to screen. The only possible mitigation measure is to locate them to the east of the extension area as far from Droogfontein as possible; and
- General mining activities around the mine extension are unlikely to cause a major change in the current level of impact. Good housekeeping measures will all help to ensure that visual impacts are not exacerbated. These include:
    - Minimising the disturbed area,
    - Retention of as much existing vegetation as possible,
    - Dust suppression, and
    - Progressive rehabilitation.

K. Impact on farmsteads

In general terms the proposed mine extension is likely to be visible to the same farmsteads and from a similar distance as the existing mine. However, there are likely to be the following exceptions:

- There is one farmstead that appears to be located in close proximity to existing mine stockpiles. As these stockpiles are removed for backfilling and rehabilitation, the visual impact on this receptor is likely to reduce significantly;
- There is one farmstead that appears to be within the proposed mine extension area (NW corner). It has to be assumed that this farmstead will be removed if authorisation for the mine extension is granted; and
- One farmstead is within 1km of the stockpile area associated with the proposed extension. There appear to be areas of alien trees around the farmstead that are likely to help to mitigate views of the stockpiles.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Impact on farmsteads	Decommissioning	+2.00	+2.00	+2.00

Proposed Preliminary Mitigation

- In a relatively flat landscape, the scale and nature of the stockpiles will be impossible to screen. The only possible mitigation measure is to locate them to the east of the extension area as far from Droogfontein as possible; and
- General mining activities around the mine extension are unlikely to cause a major change in the current level of impact. Good housekeeping measures will all help to ensure that visual impacts are not exacerbated. These include:
    - Minimising the disturbed area,
    - Retention of as much existing vegetation as possible,
    - Dust suppression, and
    - Progressive rehabilitation.

L. Impact on local roads

In general terms the proposed mine extension is likely to be visible to the same roads and from a similar distance as the existing mine. Visual impacts associated with the proposed mine extension are therefore unlikely to create significant new areas or different types of visual impact.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Impact on local roads	Decommissioning	+1.00	+1.00	+1.00

Proposed Preliminary Mitigation

- In a relatively flat landscape, the scale and nature of the stockpiles will be impossible to screen; and
- General mining activities around the mine extension are unlikely to cause a major change in the current level of impact. Good housekeeping measures will help to ensure that visual impacts are not exacerbated. These include:
    - Minimising the disturbed area,
    - Retention of as much existing vegetation as possible,
    - Dust suppression, and
    - Progressive rehabilitation.

9.3.9 PRELIMINARY BLASTING AND VIBRATION IMPACTS

Blasting operations primary objective is producing rock for crushing to be used in construction. The blasting operation has the potential to yield secondary effects such as ground vibration, air blast, fly rock and fumes. These aspects may have a negative impact on the surrounding areas depending on the levels generated.

The following preliminary impacts from blasting and vibration within the project area were identified and assessed for the various project phases (planning and design, construction, operation, decommissioning, rehabilitation and closure, as well as post-closure). No impacts from blasting and vibration have been identified for the Planning and Design Phase, Construction Phase, Decommissioning Phase, Rehabilitation and Closure Phase, and Post-closure Phase. Below are the preliminary blasting and vibration impacts during the operational phase, as well as their impact rating.

A. Ground vibration impact on houses

Levels greater than recommended limits may be damaging to structures. Different structures will also have different permitted levels. Ground vibration may cause damage if levels exceed the structures safe limit. People may also experience ground vibration as perceptible at very low levels and normally react negatively to the experience of ground vibration.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Ground vibration impact on houses	Operation	-15.00	-13.00	-19.50

Proposed Preliminary Mitigation

- Blast design – Changes in the blast design involve a change in drill diameter or depth of the holes to be drilled whereby a smaller diameter blast hole will use less explosives. A shallower blast hole will also use less explosives. Both reductions will facilitate less explosives. However, this must be read with changes in the initiation system. If the initiation system for the two blast designs (smaller or shallower hoe) are kept the same then it will reduce the explosive charge mass per delay;
- Reduce charge mass per delay – This is linked to the above, whereby specific design decking can be used with alternative charging to reduce the charge in the blast hole. This is achieved by charging the explosives in two separate columns in the blast hole. The two columns of explosives are initiated separately. This results in the reduction of the charge mass per delay. Reduce charge mass per delay is also achieved through the consideration of changes to the blast design as described above;
- Change drilling configuration – This refers to changes in drilling diameter, pattern layout and direction of the blast;
- Alternative blasting – Alternative blasting pertains to the consideration of mechanical means for excavation, not necessarily blasting; and
- Change initiation systems – Changes in the initiation systems refers to using different initiating systems for initiating the blast. It involves the detonating cord, shock tube systems and electronic initiating systems. Generally, the mine would use shock tube systems as the normal product as it is relatively cheap. The use of shock tube systems on the other hand, can have (depending on the timing layout on the blast and delays used) at least 1 to 6 holes detonating simultaneously. This contributes to the ground vibration effects. If electronic initiation is used and the blast is timed to give only one hole firing at a time, then there is more certainty that only one blast hole's explosive is contributing to the ground vibration. However, electronic initiation can also be setup to use the same timing as a shock tube system whereby there can be multiple blast holes firing. The advantage of electronic initiation is that it can be programmed accordingly whereas shock tube systems have fixed delay time periods.

B. Ground vibration impact on roads

Levels greater than recommended limits may be damaging to structures. Different structures will also have different permitted levels. Ground vibration may cause damage if levels exceed the structures safe limit. People may also experience ground vibration as perceptible at very low levels and normally react negatively to the experience of ground vibration.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Ground vibration impact on roads	Operation	-7.50	-6.00	-9.00

Proposed Preliminary Mitigation

- Blast design – Changes in the blast design involve a change in drill diameter or depth of the holes to be drilled whereby a smaller diameter blast hole will use less explosives. A shallower blast hole will also use less explosives. Both reductions will facilitate less explosives. However, this must be read with changes in the initiation system. If the initiation system for the two blast designs (smaller or shallower hoe) are kept the same then it will reduce the explosive charge mass per delay;
- Reduce charge mass per delay – This is linked to the above, whereby specific design decking can be used with alternative charging to reduce the charge in the blast hole. This is achieved by charging the explosives in two separate columns in the blast hole. The two columns of explosives are initiated separately. This results in the reduction of the charge mass per delay. Reduce charge mass per delay is also achieved through the consideration of changes to the blast design as described above;
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- Change initiation systems – Changes in the initiation systems refers to using different initiating systems for initiating the blast. It involves the detonating cord, shock tube systems and electronic initiating systems. Generally, the mine would use shock tube systems as the normal product as it is relatively cheap. The use of shock tube systems on the other hand, can have (depending on the timing layout on the blast and delays used) at least 1 to 6 holes detonating simultaneously. This contributes to the ground vibration effects. If electronic initiation is used and the blast is timed to give only one hole firing at a time, then there is more certainty that only one blast hole's explosive is contributing to the ground vibration. However, electronic initiation can also be setup to use the same timing as a shock tube system whereby there can be multiple blast holes firing. The advantage of electronic initiation is that it can be programmed accordingly whereas shock tube systems have fixed delay time periods.

C. Ground vibration impact on boreholes

Levels greater than recommended limits may be damaging to structures. Different structures will also have different permitted levels. Ground vibration may cause damage if levels exceed the structures safe limit. People may also experience ground vibration as perceptible at very low levels and normally react negatively to the experience of ground vibration.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Ground vibration impact on boreholes	Operation	-18.75	-15.00	-22.50

Proposed Preliminary Mitigation

- Blast design – Changes in the blast design involve a change in drill diameter or depth of the holes to be drilled whereby a smaller diameter blast hole will use less explosives. A shallower blast hole will also use less explosives. Both reductions will facilitate less explosives. However, this must be read with changes in the initiation system. If the initiation system for the two blast designs (smaller or shallower hoe) are kept the same then it will reduce the explosive charge mass per delay;

- Reduce charge mass per delay – This is linked to the above, whereby specific design decking can be used with alternative charging to reduce the charge in the blast hole. This is achieved by charging the explosives in two separate columns in the blast hole. The two columns of explosives are initiated separately. This results in the reduction of the charge mass per delay. Reduce charge mass per delay is also achieved through the consideration of changes to the blast design as described above;
- Change drilling configuration – This refers to changes in drilling diameter, pattern layout and direction of the blast;
- Alternative blasting – Alternative blasting pertains to the consideration of mechanical means for excavation, not necessarily blasting; and
- Change initiation systems – Changes in the initiation systems refers to using different initiating systems for initiating the blast. It involves the detonating cord, shock tube systems and electronic initiating systems. Generally, the mine would use shock tube systems as the normal product as it is relatively cheap. The use of shock tube systems on the other hand, can have (depending on the timing layout on the blast and delays used) at least 1 to 6 holes detonating simultaneously. This contributes to the ground vibration effects. If electronic initiation is used and the blast is timed to give only one hole firing at a time, then there is more certainty that only one blast hole's explosive is contributing to the ground vibration. However, electronic initiation can also be setup to use the same timing as a shock tube system whereby there can be multiple blast holes firing. The advantage of electronic initiation is that it can be programmed accordingly whereas shock tube systems have fixed delay time periods.

D. Ground vibration impact on heritage sites

Levels greater than recommended limits may be damaging to structures. Different structures will also have different permitted levels. Ground vibration may cause damage if levels exceed the structures safe limit. People may also experience ground vibration as perceptible at very low levels and normally react negatively to the experience of ground vibration.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Ground vibration impact on heritage sites	Operation	-18.75	-18.50	-26.25

Proposed Preliminary Mitigation

- Blast design – Changes in the blast design involve a change in drill diameter or depth of the holes to be drilled whereby a smaller diameter blast hole will use less explosives. A shallower blast hole will also use less explosives. Both reductions will facilitate less explosives. However, this must be read with changes in the initiation system. If the initiation system for the two blast designs (smaller or shallower hoe) are kept the same then it will reduce the explosive charge mass per delay;
- Reduce charge mass per delay – This is linked to the above, whereby specific design decking can be used with alternative charging to reduce the charge in the blast hole. This is achieved by charging the explosives in two separate columns in the blast hole. The two columns of explosives are initiated separately. This results in the reduction of the charge mass per delay. Reduce charge mass per delay is also achieved through the consideration of changes to the blast design as described above;
- Change drilling configuration – This refers to changes in drilling diameter, pattern layout and direction of the blast;

- Alternative blasting – Alternative blasting pertains to the consideration of mechanical means for excavation, not necessarily blasting; and
- Change initiation systems – Changes in the initiation systems refers to using different initiating systems for initiating the blast. It involves the detonating cord, shock tube systems and electronic initiating systems. Generally, the mine would use shock tube systems as the normal product as it is relatively cheap. The use of shock tube systems on the other hand, can have (depending on the timing layout on the blast and delays used) at least 1 to 6 holes detonating simultaneously. This contributes to the ground vibration effects. If electronic initiation is used and the blast is timed to give only one hole firing at a time, then there is more certainty that only one blast hole's explosive is contributing to the ground vibration. However, electronic initiation can also be setup to use the same timing as a shock tube system whereby there can be multiple blast holes firing. The advantage of electronic initiation is that it can be programmed accordingly whereas shock tube systems have fixed delay time periods.

E. Ground vibration impact on power lines

Levels greater than recommended limits may be damaging to structures. Different structures will also have different permitted levels. Ground vibration may cause damage if levels exceed the structures safe limit. People may also experience ground vibration as perceptible at very low levels and normally react negatively to the experience of ground vibration.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Ground vibration impact on power lines	Operation	-18.75	-16.25	-24.38

Proposed Preliminary Mitigation

- Blast design – Changes in the blast design involve a change in drill diameter or depth of the holes to be drilled whereby a smaller diameter blast hole will use less explosives. A shallower blast hole will also use less explosives. Both reductions will facilitate less explosives. However, this must be read with changes in the initiation system. If the initiation system for the two blast designs (smaller or shallower hoe) are kept the same then it will reduce the explosive charge mass per delay;
- Reduce charge mass per delay – This is linked to the above, whereby specific design decking can be used with alternative charging to reduce the charge in the blast hole. This is achieved by charging the explosives in two separate columns in the blast hole. The two columns of explosives are initiated separately. This results in the reduction of the charge mass per delay. Reduce charge mass per delay is also achieved through the consideration of changes to the blast design as described above;
- Change drilling configuration – This refers to changes in drilling diameter, pattern layout and direction of the blast;
- Alternative blasting – Alternative blasting pertains to the consideration of mechanical means for excavation, not necessarily blasting; and
- Change initiation systems – Changes in the initiation systems refers to using different initiating systems for initiating the blast. It involves the detonating cord, shock tube systems and electronic initiating systems. Generally, the mine would use shock tube systems as the normal product as it is relatively cheap. The use of shock tube systems on the other hand, can have (depending on the timing layout on the blast and delays used) at least 1 to 6 holes detonating simultaneously. This

contributes to the ground vibration effects. If electronic initiation is used and the blast is timed to give only one hole firing at a time, then there is more certainty that only one blast hole's explosive is contributing to the ground vibration. However, electronic initiation can also be setup to use the same timing as a shock tube system whereby there can be multiple blast holes firing. The advantage of electronic initiation is that it can be programmed accordingly whereas shock tube systems have fixed delay time periods.

F. Ground vibration impact on broilers

Levels greater than recommended limits may be damaging to structures. Different structures will also have different permitted levels. Ground vibration may cause damage if levels exceed the structures safe limit. People may also experience ground vibration as perceptible at very low levels and normally react negatively to the experience of ground vibration.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Ground vibration impact on broilers	Operation	-20.00	-16.50	-24.38

Proposed Preliminary Mitigation

- Blast design – Changes in the blast design involve a change in drill diameter or depth of the holes to be drilled whereby a smaller diameter blast hole will use less explosives. A shallower blast hole will also use less explosives. Both reductions will facilitate less explosives. However, this must be read with changes in the initiation system. If the initiation system for the two blast designs (smaller or shallower hoe) are kept the same then it will reduce the explosive charge mass per delay;
- Reduce charge mass per delay – This is linked to the above, whereby specific design decking can be used with alternative charging to reduce the charge in the blast hole. This is achieved by charging the explosives in two separate columns in the blast hole. The two columns of explosives are initiated separately. This results in the reduction of the charge mass per delay. Reduce charge mass per delay is also achieved through the consideration of changes to the blast design as described above;
- Change drilling configuration – This refers to changes in drilling diameter, pattern layout and direction of the blast;
- Alternative blasting – Alternative blasting pertains to the consideration of mechanical means for excavation, not necessarily blasting; and
- Change initiation systems – Changes in the initiation systems refers to using different initiating systems for initiating the blast. It involves the detonating cord, shock tube systems and electronic initiating systems. Generally, the mine would use shock tube systems as the normal product as it is relatively cheap. The use of shock tube systems on the other hand, can have (depending on the timing layout on the blast and delays used) at least 1 to 6 holes detonating simultaneously. This contributes to the ground vibration effects. If electronic initiation is used and the blast is timed to give only one hole firing at a time, then there is more certainty that only one blast hole's explosive is contributing to the ground vibration. However, electronic initiation can also be setup to use the same timing as a shock tube system whereby there can be multiple blast holes firing. The advantage of electronic initiation is that it can be programmed accordingly whereas shock tube systems have fixed delay time periods.

G. Air blast impact on houses

In most cases the effect of air blast is underestimated. High levels of air blast could cause damage and normally windows are first to be damaged. Levels lower than required to induce damage may rattle windows and large

roof surfaces. These effects are generally mistaken as ground vibration effect and leads to complaints. Rattling of doors and roofs causes concern and lead to upsetting people.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Air blast impact on houses	Operation	-18.75	-16.25	-24.38

Proposed Preliminary Mitigation

- Blast design – Changes in the blast design involve a change in drill diameter or depth of the holes to be drilled whereby a smaller diameter blast hole will use less explosives. A shallower blast hole will also use less explosives. Both reductions will facilitate less explosives. However, this must be read with changes in the initiation system. If the initiation system for the two blast designs (smaller or shallower hoe) are kept the same then it will reduce the explosive charge mass per delay;
- Reduce charge mass per delay – This is linked to the above, whereby specific design decking can be used with alternative charging to reduce the charge in the blast hole. This is achieved by charging the explosives in two separate columns in the blast hole. The two columns of explosives are initiated separately. This results in the reduction of the charge mass per delay. Reduce charge mass per delay is also achieved through the consideration of changes to the blast design as described above;
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H. Air blast impact on roads

In most cases the effect of air blast is underestimated. High levels of air blast could cause damage and normally windows are first to be damaged. Levels lower than required to induce damage may rattle windows and large roof surfaces. These effects are generally mistaken as ground vibration effect and leads to complaints. Rattling of doors and roofs causes concern and lead to upsetting people.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Air blast impact on roads	Operation	-3.75	-3.00	-4.50

Proposed Preliminary Mitigation

- Blast design – Changes in the blast design involve a change in drill diameter or depth of the holes to be drilled whereby a smaller diameter blast hole will use less explosives. A shallower blast hole will also use less explosives. Both reductions will facilitate less explosives. However, this must be read with changes in the initiation system. If the initiation system for the two blast designs (smaller or shallower hoe) are kept the same then it will reduce the explosive charge mass per delay;
- Reduce charge mass per delay – This is linked to the above, whereby specific design decking can be used with alternative charging to reduce the charge in the blast hole. This is achieved by charging the explosives in two separate columns in the blast hole. The two columns of explosives are initiated separately. This results in the reduction of the charge mass per delay. Reduce charge mass per delay is also achieved through the consideration of changes to the blast design as described above;
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I. Air blast impact on boreholes

In most cases the effect of air blast is underestimated. High levels of air blast could cause damage and normally windows are first to be damaged. Levels lower than required to induce damage may rattle windows and large roof surfaces. These effects are generally mistaken as ground vibration effect and leads to complaints. Rattling of doors and roofs causes concern and lead to upsetting people.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Air blast impact on boreholes	Operation	-7.50	-6.00	-9.00

Proposed Preliminary Mitigation

- Blast design – Changes in the blast design involve a change in drill diameter or depth of the holes to be drilled whereby a smaller diameter blast hole will use less explosives. A shallower blast hole will also use less explosives. Both reductions will facilitate less explosives. However, this must be read with changes in the initiation system. If the initiation system for the two blast designs (smaller or shallower hoe) are kept the same then it will reduce the explosive charge mass per delay;
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J. Air blast impact on heritage sites

In most cases the effect of air blast is underestimated. High levels of air blast could cause damage and normally windows are first to be damaged. Levels lower than required to induce damage may rattle windows and large roof surfaces. These effects are generally mistaken as ground vibration effect and leads to complaints. Rattling of doors and roofs causes concern and lead to upsetting people.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Air blast impact on heritage sites	Operation	-11.25	-10.50	-15.75

Proposed Preliminary Mitigation

- Blast design – Changes in the blast design involve a change in drill diameter or depth of the holes to be drilled whereby a smaller diameter blast hole will use less explosives. A shallower blast hole will also use less explosives. Both reductions will facilitate less explosives. However, this must be read with changes in the initiation system. If the initiation system for the two blast designs (smaller or shallower hoe) are kept the same then it will reduce the explosive charge mass per delay;
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separately. This results in the reduction of the charge mass per delay. Reduce charge mass per delay is also achieved through the consideration of changes to the blast design as described above;

- Change drilling configuration – This refers to changes in drilling diameter, pattern layout and direction of the blast;
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K. Air blast impact on power lines

In most cases the effect of air blast is underestimated. High levels of air blast could cause damage and normally windows are first to be damaged. Levels lower than required to induce damage may rattle windows and large roof surfaces. These effects are generally mistaken as ground vibration effect and leads to complaints. Rattling of doors and roofs causes concern and lead to upsetting people.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Air blast impact on power lines	Operation	-7.50	-6.50	-9.75

Proposed Preliminary Mitigation

- Blast design – Changes in the blast design involve a change in drill diameter or depth of the holes to be drilled whereby a smaller diameter blast hole will use less explosives. A shallower blast hole will also use less explosives. Both reductions will facilitate less explosives. However, this must be read with changes in the initiation system. If the initiation system for the two blast designs (smaller or shallower hoe) are kept the same then it will reduce the explosive charge mass per delay;
- Reduce charge mass per delay – This is linked to the above, whereby specific design decking can be used with alternative charging to reduce the charge in the blast hole. This is achieved by charging the explosives in two separate columns in the blast hole. The two columns of explosives are initiated separately. This results in the reduction of the charge mass per delay. Reduce charge mass per delay is also achieved through the consideration of changes to the blast design as described above;
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- Alternative blasting – Alternative blasting pertains to the consideration of mechanical means for excavation, not necessarily blasting; and
- Change initiation systems – Changes in the initiation systems refers to using different initiating systems for initiating the blast. It involves the detonating cord, shock tube systems and electronic initiating systems. Generally, the mine would use shock tube systems as the normal product as it is relatively

cheap. The use of shock tube systems on the other hand, can have (depending on the timing layout on the blast and delays used) at least 1 to 6 holes detonating simultaneously. This contributes to the ground vibration effects. If electronic initiation is used and the blast is timed to give only one hole firing at a time, then there is more certainty that only one blast hole's explosive is contributing to the ground vibration. However, electronic initiation can also be setup to use the same timing as a shock tube system whereby there can be multiple blast holes firing. The advantage of electronic initiation is that it can be programmed accordingly whereas shock tube systems have fixed delay time periods.

L. Air blast impact on broilers

In most cases the effect of air blast is underestimated. High levels of air blast could cause damage and normally windows are first to be damaged. Levels lower than required to induce damage may rattle windows and large roof surfaces. These effects are generally mistaken as ground vibration effect and leads to complaints. Rattling of doors and roofs causes concern and lead to upsetting people.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Air blast impact on broilers	Operation	-20.00	-16.25	-24.38

Proposed Preliminary Mitigation

- Blast design – Changes in the blast design involve a change in drill diameter or depth of the holes to be drilled whereby a smaller diameter blast hole will use less explosives. A shallower blast hole will also use less explosives. Both reductions will facilitate less explosives. However, this must be read with changes in the initiation system. If the initiation system for the two blast designs (smaller or shallower hoe) are kept the same then it will reduce the explosive charge mass per delay;
- Reduce charge mass per delay – This is linked to the above, whereby specific design decking can be used with alternative charging to reduce the charge in the blast hole. This is achieved by charging the explosives in two separate columns in the blast hole. The two columns of explosives are initiated separately. This results in the reduction of the charge mass per delay. Reduce charge mass per delay is also achieved through the consideration of changes to the blast design as described above;
- Change drilling configuration – This refers to changes in drilling diameter, pattern layout and direction of the blast;
- Alternative blasting – Alternative blasting pertains to the consideration of mechanical means for excavation, not necessarily blasting; and
- Change initiation systems – Changes in the initiation systems refers to using different initiating systems for initiating the blast. It involves the detonating cord, shock tube systems and electronic initiating systems. Generally, the mine would use shock tube systems as the normal product as it is relatively cheap. The use of shock tube systems on the other hand, can have (depending on the timing layout on the blast and delays used) at least 1 to 6 holes detonating simultaneously. This contributes to the ground vibration effects. If electronic initiation is used and the blast is timed to give only one hole firing at a time, then there is more certainty that only one blast hole's explosive is contributing to the ground vibration. However, electronic initiation can also be setup to use the same timing as a shock tube system whereby there can be multiple blast holes firing. The advantage of electronic initiation is that it can be programmed accordingly whereas shock tube systems have fixed delay time periods.

M. Fly rock impact on houses

Fly rock can be mitigated but possibility never eliminated. However, it can be managed properly with relative ease. Control on fly rock will also control the effects of air blast. Fly rock is greater concern when pit is located in close proximity of houses or structures or installations. Wild fly rock could cause damage to structures and installations but also be lethal to people and animals.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Fly rock impact on houses	Operation	-7.50	-6.50	-9.75

Proposed Preliminary Mitigation

- Blast design – Changes in the blast design involve a change in drill diameter or depth of the holes to be drilled whereby a smaller diameter blast hole will use less explosives. A shallower blast hole will also use less explosives. Both reductions will facilitate less explosives. However, this must be read with changes in the initiation system. If the initiation system for the two blast designs (smaller or shallower hoe) are kept the same then it will reduce the explosive charge mass per delay;
- Reduce charge mass per delay – This is linked to the above, whereby specific design decking can be used with alternative charging to reduce the charge in the blast hole. This is achieved by charging the explosives in two separate columns in the blast hole. The two columns of explosives are initiated separately. This results in the reduction of the charge mass per delay. Reduce charge mass per delay is also achieved through the consideration of changes to the blast design as described above;
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N. Fly rock impact on roads

Fly rock can be mitigated but possibility never eliminated. However, it can be managed properly with relative ease. Control on fly rock will also control the effects of air blast. Fly rock is greater concern when pit is located in close proximity of houses or structures or installations. Wild fly rock could cause damage to structures and installations but also be lethal to people and animals.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Fly rock impact on roads	Operation	-18.75	-15.00	-22.50

Proposed Preliminary Mitigation

- Blast design – Changes in the blast design involve a change in drill diameter or depth of the holes to be drilled whereby a smaller diameter blast hole will use less explosives. A shallower blast hole will also use less explosives. Both reductions will facilitate less explosives. However, this must be read with changes in the initiation system. If the initiation system for the two blast designs (smaller or shallower hoe) are kept the same then it will reduce the explosive charge mass per delay;
- Reduce charge mass per delay – This is linked to the above, whereby specific design decking can be used with alternative charging to reduce the charge in the blast hole. This is achieved by charging the explosives in two separate columns in the blast hole. The two columns of explosives are initiated separately. This results in the reduction of the charge mass per delay. Reduce charge mass per delay is also achieved through the consideration of changes to the blast design as described above;
- Change drilling configuration – This refers to changes in drilling diameter, pattern layout and direction of the blast;
- Alternative blasting – Alternative blasting pertains to the consideration of mechanical means for excavation, not necessarily blasting; and
- Change initiation systems – Changes in the initiation systems refers to using different initiating systems for initiating the blast. It involves the detonating cord, shock tube systems and electronic initiating systems. Generally, the mine would use shock tube systems as the normal product as it is relatively cheap. The use of shock tube systems on the other hand, can have (depending on the timing layout on the blast and delays used) at least 1 to 6 holes detonating simultaneously. This contributes to the ground vibration effects. If electronic initiation is used and the blast is timed to give only one hole firing at a time, then there is more certainty that only one blast hole's explosive is contributing to the ground vibration. However, electronic initiation can also be setup to use the same timing as a shock tube system whereby there can be multiple blast holes firing. The advantage of electronic initiation is that it can be programmed accordingly whereas shock tube systems have fixed delay time periods.

O. Fly rock impact on boreholes

Fly rock can be mitigated but possibility never eliminated. However, it can be managed properly with relative ease. Control on fly rock will also control the effects of air blast. Fly rock is greater concern when pit is located in close proximity of houses or structures or installations. Wild fly rock could cause damage to structures and installations but also be lethal to people and animals.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Fly rock impact on boreholes	Operation	-18.75	-15.00	-22.50

Proposed Preliminary Mitigation

- Blast design – Changes in the blast design involve a change in drill diameter or depth of the holes to be drilled whereby a smaller diameter blast hole will use less explosives. A shallower blast hole will also use less explosives. Both reductions will facilitate less explosives. However, this must be read with changes in the initiation system. If the initiation system for the two blast designs (smaller or shallower hoe) are kept the same then it will reduce the explosive charge mass per delay;
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- Change drilling configuration – This refers to changes in drilling diameter, pattern layout and direction of the blast;
- Alternative blasting – Alternative blasting pertains to the consideration of mechanical means for excavation, not necessarily blasting; and
- Change initiation systems – Changes in the initiation systems refers to using different initiating systems for initiating the blast. It involves the detonating cord, shock tube systems and electronic initiating systems. Generally, the mine would use shock tube systems as the normal product as it is relatively cheap. The use of shock tube systems on the other hand, can have (depending on the timing layout on the blast and delays used) at least 1 to 6 holes detonating simultaneously. This contributes to the ground vibration effects. If electronic initiation is used and the blast is timed to give only one hole firing at a time, then there is more certainty that only one blast hole's explosive is contributing to the ground vibration. However, electronic initiation can also be setup to use the same timing as a shock tube system whereby there can be multiple blast holes firing. The advantage of electronic initiation is that it can be programmed accordingly whereas shock tube systems have fixed delay time periods.

P. Fly rock impact on heritage sites

Fly rock can be mitigated but possibility never eliminated. However, it can be managed properly with relative ease. Control on fly rock will also control the effects of air blast. Fly rock is greater concern when pit is located in close proximity of houses or structures or installations. Wild fly rock could cause damage to structures and installations but also be lethal to people and animals.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Fly rock impact on heritage sites	Operation	-18.75	-17.50	-26.25

Proposed Preliminary Mitigation

- Blast design – Changes in the blast design involve a change in drill diameter or depth of the holes to be drilled whereby a smaller diameter blast hole will use less explosives. A shallower blast hole will also use less explosives. Both reductions will facilitate less explosives. However, this must be read with changes in the initiation system. If the initiation system for the two blast designs (smaller or shallower hoe) are kept the same then it will reduce the explosive charge mass per delay;
- Reduce charge mass per delay – This is linked to the above, whereby specific design decking can be used with alternative charging to reduce the charge in the blast hole. This is achieved by charging the explosives in two separate columns in the blast hole. The two columns of explosives are initiated

separately. This results in the reduction of the charge mass per delay. Reduce charge mass per delay is also achieved through the consideration of changes to the blast design as described above;

- Change drilling configuration – This refers to changes in drilling diameter, pattern layout and direction of the blast;
- Alternative blasting – Alternative blasting pertains to the consideration of mechanical means for excavation, not necessarily blasting; and
- Change initiation systems – Changes in the initiation systems refers to using different initiating systems for initiating the blast. It involves the detonating cord, shock tube systems and electronic initiating systems. Generally, the mine would use shock tube systems as the normal product as it is relatively cheap. The use of shock tube systems on the other hand, can have (depending on the timing layout on the blast and delays used) at least 1 to 6 holes detonating simultaneously. This contributes to the ground vibration effects. If electronic initiation is used and the blast is timed to give only one hole firing at a time, then there is more certainty that only one blast hole's explosive is contributing to the ground vibration. However, electronic initiation can also be setup to use the same timing as a shock tube system whereby there can be multiple blast holes firing. The advantage of electronic initiation is that it can be programmed accordingly whereas shock tube systems have fixed delay time periods.

Q. Fly rock impact on power lines

Fly rock can be mitigated but possibility never eliminated. However, it can be managed properly with relative ease. Control on fly rock will also control the effects of air blast. Fly rock is greater concern when pit is located in close proximity of houses or structures or installations. Wild fly rock could cause damage to structures and installations but also be lethal to people and animals.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Fly rock impact on power lines	Operation	-18.75	-16.25	-24.38

Proposed Preliminary Mitigation

- Blast design – Changes in the blast design involve a change in drill diameter or depth of the holes to be drilled whereby a smaller diameter blast hole will use less explosives. A shallower blast hole will also use less explosives. Both reductions will facilitate less explosives. However, this must be read with changes in the initiation system. If the initiation system for the two blast designs (smaller or shallower hoe) are kept the same then it will reduce the explosive charge mass per delay;
- Reduce charge mass per delay – This is linked to the above, whereby specific design decking can be used with alternative charging to reduce the charge in the blast hole. This is achieved by charging the explosives in two separate columns in the blast hole. The two columns of explosives are initiated separately. This results in the reduction of the charge mass per delay. Reduce charge mass per delay is also achieved through the consideration of changes to the blast design as described above;
- Change drilling configuration – This refers to changes in drilling diameter, pattern layout and direction of the blast;
- Alternative blasting – Alternative blasting pertains to the consideration of mechanical means for excavation, not necessarily blasting; and
- Change initiation systems – Changes in the initiation systems refers to using different initiating systems for initiating the blast. It involves the detonating cord, shock tube systems and electronic initiating

systems. Generally, the mine would use shock tube systems as the normal product as it is relatively cheap. The use of shock tube systems on the other hand, can have (depending on the timing layout on the blast and delays used) at least 1 to 6 holes detonating simultaneously. This contributes to the ground vibration effects. If electronic initiation is used and the blast is timed to give only one hole firing at a time, then there is more certainty that only one blast hole's explosive is contributing to the ground vibration. However, electronic initiation can also be setup to use the same timing as a shock tube system whereby there can be multiple blast holes firing. The advantage of electronic initiation is that it can be programmed accordingly whereas shock tube systems have fixed delay time periods.

R. Fly rock impact on broilers

Fly rock can be mitigated but possibility never eliminated. However, it can be managed properly with relative ease. Control on fly rock will also control the effects of air blast. Fly rock is greater concern when pit is located in close proximity of houses or structures or installations. Wild fly rock could cause damage to structures and installations but also be lethal to people and animals.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Fly rock impact on broilers	Operation	-12.00	-9.75	-14.63

Proposed Preliminary Mitigation

- Blast design – Changes in the blast design involve a change in drill diameter or depth of the holes to be drilled whereby a smaller diameter blast hole will use less explosives. A shallower blast hole will also use less explosives. Both reductions will facilitate less explosives. However, this must be read with changes in the initiation system. If the initiation system for the two blast designs (smaller or shallower hoe) are kept the same then it will reduce the explosive charge mass per delay;
- Reduce charge mass per delay – This is linked to the above, whereby specific design decking can be used with alternative charging to reduce the charge in the blast hole. This is achieved by charging the explosives in two separate columns in the blast hole. The two columns of explosives are initiated separately. This results in the reduction of the charge mass per delay. Reduce charge mass per delay is also achieved through the consideration of changes to the blast design as described above;
- Change drilling configuration – This refers to changes in drilling diameter, pattern layout and direction of the blast;
- Alternative blasting – Alternative blasting pertains to the consideration of mechanical means for excavation, not necessarily blasting; and
- Change initiation systems – Changes in the initiation systems refers to using different initiating systems for initiating the blast. It involves the detonating cord, shock tube systems and electronic initiating systems. Generally, the mine would use shock tube systems as the normal product as it is relatively cheap. The use of shock tube systems on the other hand, can have (depending on the timing layout on the blast and delays used) at least 1 to 6 holes detonating simultaneously. This contributes to the ground vibration effects. If electronic initiation is used and the blast is timed to give only one hole firing at a time, then there is more certainty that only one blast hole's explosive is contributing to the ground vibration. However, electronic initiation can also be setup to use the same timing as a shock tube system whereby there can be multiple blast holes firing. The advantage of electronic initiation is that it can be programmed accordingly whereas shock tube systems have fixed delay time periods.

9.3.10 PRELIMINARY SOCIAL IMPACTS

The following preliminary impacts on the social environment within the project area were identified and assessed for the various project phases (planning and design, construction, operation, decommissioning, rehabilitation and closure, as well as post-closure). No social impacts have been identified that will occur during the Planning and Design Phase, Decommissioning Phase, Rehabilitation and Closure Phase, and the Post-closure Phase. Below are the construction and operational phase preliminary social impacts identified during scoping, as well as their impact rating.

A. Project induced in-migration

The SLP states that the number of people employed by the mine will increase to approximately 720 with the introduction of the Project, with an additional 50 people employed by the mining contractor during construction. This means an additional 370 people (320 operational and 50 construction staff) that will migrate to the area on a permanent or semi-permanent basis, which equates to a 3.6% rapid population increase. On the other hand, a process of out-migration could also occur with the transformation of land.

Depending on how stable the local social networks are, this could create any of the following:

- In-migration: rapid population growth can place strain on the local area and lead to economic, social and environmental impacts;
- Out-migration: the area affected by the Project becomes less desirable. A decline in the local population can have an effect on the viability and vitality of the area;
- Presence of newcomers: impacts of in-migration can be exacerbated if newcomers are different from (or perceived to be such) from local communities;
- Presence of construction workers: the type and severity of impacts will depend on the number, composition and (dis)similarity of this group to local residents. Due to the temporary nature of their presence, they are unlikely to form place attachment and follow a 'work hard, play hard' mentality, impacting on social cohesion locally; and
- Displacement: local people can lose land or other assets, resulting in physical relocation or loss of income which could cause impoverishment or social disintegration.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Project induced in-migration	Construction	-11.00	-4.50	-6.00

Proposed preliminary Mitigation

- Maximise local employment as much as possible to curb in-migration; and
- Prevent opportunistic influx of job seekers by advertising job requirements in the local area and beyond.

B. Labour draw down from other sectors

The Project would expand the Kangala Colliery's life of mine by another 10 years – providing job security for the current workforce and creating job opportunities for a further 320 people. The expansion is also likely to secure more funds for further LED projects in the area for the duration of the Life of Mine. This could lead to the following economic changes and impacts:

- Conversion and diversification of economic activities: The Project could stimulate a process of change from one type of production to another type (e.g. agricultural to mining);

- Impoverishment: certain groups could experience a downward spiral of poverty, usually involving displacement (loss of access to resources) and disempowerment;
- Inflation: can occur at local level through the spending power of increasing numbers of income earners; and
- Concentration of activity in a single industry: this makes the local society vulnerable to the fortunes of a single commodity, which can lead to uneven economic development and, in certain cases, financial dependency on the mine through its LED spend.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Labour draw down from other sectors	Construction	-8.25	-4.50	-6.00

Proposed Preliminary Mitigation

- Do not recruit unskilled labour at wage levels above the wages paid in other sectors.

C. Employment and income creation

Employment opportunities for various levels of labour will arise during construction from the proposed NPhase 3 project which will lead to the creation of income for those employed.

Impact	Project Phase	Pre-Enhancement Score	Post-Enhancement Score	Final Significance
Employment and income creation	Construction	+4.50	+10.00	+13.33

Proposed Preliminary Mitigation

- Prioritise local labour in the recruitment process;
- Upskill unskilled labour where possible; and
- Keep a register of local suppliers.

D. Increased demand for housing and services

It is expected that that the Project would increase the magnitude of impacts described above. It is also expected that the Project would lead to the in-migration of workers and job seekers, who are all in need of housing and access to services. Unemployed job seekers are likely to lack resources to sustain themselves and are therefore likely to settle in informal settlements, causing such settlements to expand and place further strain on the municipality.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Increased demand for housing and services	Construction	-11.00	-6.00	-8.00

Proposed Preliminary Mitigation

- Include local labour requirements in tender BIDs (i.e. percentage of local hire is a condition of contract);
- Accommodate construction teams on site, utilising existing services; and
- Avoid hiring at the gate to curb establishment and expansion of informal settlement.

E. Social disintegration and conflict

Depending on the form that social mobilisation takes, it could lead to work stoppages, violent protests (causing health and safety fears), and appeals against the Project at the competent authority. All of this can cause delays, which could have an economic impact on the developer and its workforce. Changes can occur in the following areas:

- Segregation: creating social difference within the community;
- Social disintegration: the loss of social capital and the abandonment of social and cultural practices;
- Cultural differentiation: an increase in cultural differences (or perceived differences), which enhances the process of 'othering'; and
- Defiant social behaviour (e.g. an increase in prostitution, drug and alcohol use, violent protests, etc.).

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Social disintegration and conflict	Construction	-8.25	-4.50	-7.50

Proposed Preliminary Mitigation

- Develop and implement Stakeholder Engagement Strategy, inclusive of a communication plan, for the project; and
- The Social Entrepreneurship Programme should consider Corporate Social Investment and grievance mechanisms as mechanisms to maintain communication channels with local stakeholders.

F. Defiant social behaviour

There may be incidences of defiant behaviour from local communities or the labour force related to the proposed project. Such defiant behaviour may include incidences of prostitution, drug and alcohol abuse, violent protests, etc. The social mobilisation that mat take place as a result of the defiant social behaviour may lead to work stoppages, violent protests (causing health and safety fears), and appeals against the Project at the competent authority. All of this can cause delays, which could have an economic impact on the developer and its workforce.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Defiant social behaviour	Construction	-9.00	-5.50	-8.25

Proposed preliminary Mitigation

- Contractors should, as part of conditions of tender, be required to develop and implement health and safety policies pertaining to high risk areas (e.g. HIV prevention, alcohol and drug abuse, etc.); and
- Train selected construction workers as peer educators and counsellors.

G. Nuisance factors

Various factors that are perceived to be a nuisance by the communities in the vicinity of the project may arise, and these may include pests from insufficient waste management, dust from the mining activities and vehicle movement, noise from the operation of machinery and other mining equipment, mining activities at unsuitable times for the communities, etc.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Nuisance factors	Construction	-11.00	-6.75	-9.00

Proposed Preliminary Mitigation

- Water down construction site to curb dust;
- Erect notice boards to inform neighbouring properties of construction processes and timeframes – notably to alert them to activities such as blasting; and
- Implement a grievance mechanism.

H. Tax income

The mining operations will incur income tax, a tax levied on income and profit received. The income tax from the project's operations will contributes to the local economy.

Impact	Project Phase	Pre-Enhancement Score	Post-Enhancement Score	Final Significance
Tax income	Operation	+16.25	+16.25	+18.96

Proposed Preliminary Mitigation

- There are no recommended mitigation measures for this impact.

I. Employment and income creation

There will be employment opportunities during operations from the proposed NPhase 3 project which will lead to the creation of income for those employed.

Impact	Project Phase	Pre-Enhancement Score	Post-Enhancement Score	Final Significance
Employment and income creation	Operation	+4.50	+7.50	+10.00

Proposed Preliminary Mitigation

- Prioritise local labour in the recruitment process;
- Upskill unskilled labour where possible; and
- Keep a register of local suppliers.

J. Conversion of land use

It is expected that similar impacts would occur at the Project as those currently occurring at the Kangala colliery. This could include changes such as:

- Conversion and diversification of land use: The Project could give rise to a change in the way in which the surrounding land is utilised; and
- Urbanisation: the establishment of a new mining pit could enhance the rural to urban migration as farm workers leave the area and move to Delmas or Botleng in search of other work.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Conversion of land use	Operation	-15.00	-11.00	-16.50

Proposed Preliminary Mitigation

- Cross check mitigation measures from other specialist studies (e.g. noise, air quality, visual).

K. Social investment in the local community

The project will include a social and labour plan that will identify community upliftment opportunities that in and around the vicinity of the study area.

Impact	Project Phase	Pre-Enhancement Score	Post-Enhancement Score	Final Significance
Social investment in the local community	Operation	+8.25	+13.00	+17.33

Proposed Preliminary Mitigation

- Consult with local stakeholder to determine actual needs in the local area; and
- Consider the development of regional investment initiatives to widen the positive impact of the mine's presence on social development.

9.3.11 PRELIMINARY LAND USE ECONOMICS IMPACTS

The following preliminary land use economics impacts within the study area were identified and assessed for the various project phases (planning and design, construction, operation, decommissioning, rehabilitation and closure, as well as post-closure). No land use economics impacts have been identified that will occur during the Planning and Design Phase and the Post-closure Phase. Below are the construction, operation, decommissioning as well as rehabilitation and closure phases preliminary impacts identified during scoping, as well as their impact rating.

A. Net GGP impact

There will be Gross Geographic Product (GGP) creation in the form of investments made in the duration of the project. However, the economic benefits derived will be for a short period, and for that reason the positive impact ratings will not be high. The reason why the GGP impact is rated as "somewhat positive", as opposed to "significantly" or "absolutely positive", which is more desirable, is because the project extension is economically over a short period. An economic generation is 25 years and this extension has a life of mine of only nine years. The calculations undertaken show that the total GGP added over a 9-year period by the project amounts to R4.4 billion in real terms. The GGP of the project is calculated as the initial investment, the ongoing maintenance investment and the GGP portion of total revenue. Note total revenue is not GGP because all intermediary expenses need to be deducted. GGP is effectively EBITDA (income before interest, tax, depreciation and amortisation) plus salaries and wages, in other words accounting items that are not paid across to other firms.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Net GGP impact	Construction	+6.00	+6.00	+7.00

Proposed Preliminary Mitigation

- The mine should consider establishing a similar farm either in the same municipal area, or in a different area in the district to compensate for the loss of agricultural production. The key issue is food security and although the land lost to agriculture is small in extent, this mitigation measure will neutralise the loss of farm production. Based on the IDP information provided, there are agricultural opportunities in the North-western part of the district. The Southern part of the district, where the mine is located, has the climate and soils for crop and maize farming, and if there is scope to establish or restart a farm in the area, then this is recommended;
- Should the mine be able to rehabilitate its existing open pit earmarked for closure, this would be the most desirable mitigation measure;
- The mine needs to ensure that current employees on the farms need to be placed in either jobs at the mine, or that these employees agree that they do not wish to accept the jobs offered to them;
- The bankable feasibility study and independent competence persons reports are necessary to validate the economic viability of the mine;

- The mine needs to comply with all the new regulation in the mining charter as this is designed to increase local content and BBBEE procurement. This will strengthen both backwards and forward linkages; and
- The mine obviously needs to execute its SLP commitments flawlessly as this execution is aimed at developing the quality of life of the inhabitants of the district.

B. Net employment impacts

The mine will effectively not increase employment. It will maintain / "save" 850 permanent jobs when it closes other parts of its operation and expand its production by developing a new open pit coal mine. In economic terms, however, this can be regarded as creating new 300 jobs, because these jobs would have been lost to the economy. However, these jobs are only created for 9 years, and hence the "full time economic jobs" amount to 9/25*300 = 108 jobs. Often this can be viewed as controversial because it reduces the number of jobs, however, in our view this remains the best method to calculate the benefit.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Net employment impacts	Construction	+7.00	+7.00	+8.17

Proposed Preliminary Mitigation

- The mine should consider establishing a similar farm either in the same municipal area, or in a different area in the district to compensate for the loss of agricultural production. The key issue is food security and although the land lost to agriculture is small in extent, this mitigation measure will neutralise the loss of farm production. Based on the IDP information provided, there are agricultural opportunities in the North-western part of the district. The Southern part of the district, where the mine is located, has the climate and soils for crop and maize farming, and if there is scope to establish or restart a farm in the area, then this is recommended;
- Should the mine be able to rehabilitate its existing open pit earmarked for closure, this would be the most desirable mitigation measure;
- The mine needs to ensure that current employees on the farms need to be placed in either jobs at the mine, or that these employees agree that they do not wish to accept the jobs offered to them;
- The bankable feasibility study and independent competence persons reports are necessary to validate the economic viability of the mine;
- The mine needs to comply with all the new regulation in the mining charter as this is designed to increase local content and BBBEE procurement. This will strengthen both backwards and forward linkages; and
- The mine obviously needs to execute its SLP commitments flawlessly as this execution is aimed at developing the quality of life of the inhabitants of the district.

C. Forex savings

South Africa at present has R700 billion in foreign exchange and the project is not likely to export more than R1 billion per annum, and hence this net benefit is not significant. However, a country's gold reserves and foreign exchange is one of the most important bases for international investor confidence. The higher this amount, the better a country can manage foreign investment and trade, and exchange rate fluctuations. Thus, developments such as this project, relatively small as it may be, have important strategic value.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Forex savings	Construction	-9.00	-9.00	-10.50

Proposed Preliminary Mitigation

- The mine should consider establishing a similar farm either in the same municipal area, or in a different area in the district to compensate for the loss of agricultural production. The key issue is food security and although the land lost to agriculture is small in extent, this mitigation measure will neutralise the loss of farm production. Based on the IDP information provided, there are agricultural opportunities in the North-western part of the district. The Southern part of the district, where the mine is located, has the climate and soils for crop and maize farming, and if there is scope to establish or restart a farm in the area, then this is recommended;
- Should the mine be able to rehabilitate its existing open pit earmarked for closure, this would be the most desirable mitigation measure;
- The mine needs to ensure that current employees on the farms need to be placed in either jobs at the mine, or that these employees agree that they do not wish to accept the jobs offered to them;
- The bankable feasibility study and independent competence persons reports are necessary to validate the economic viability of the mine;
- The mine needs to comply with all the new regulation in the mining charter as this is designed to increase local content and BBBEE procurement. This will strengthen both backwards and forward linkages; and
- The mine obviously needs to execute its SLP commitments flawlessly as this execution is aimed at developing the quality of life of the inhabitants of the district.

D. Fiscal income

Determining the effective tax rate per industry and in particular per enterprise is very difficult. On average, as an economic quantity, and based on internal estimates, both agriculture and mining may well pay tax in the amount of 2% of their total GGP's per industry. The tax to be earned by the project is minute in terms of South African tax base, even should one include PAYE and other indirect taxes. However, it can safely be said that the tax to be paid by the mine, even though only over a 9-year period, will significantly outstrip that of the displaced tax income of farming in the impacted area.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Fiscal income	Construction	+11.00	+11.00	+12.83

Proposed Preliminary Mitigation

- The mine should consider establishing a similar farm either in the same municipal area, or in a different area in the district to compensate for the loss of agricultural production. The key issue is food security and although the land lost to agriculture is small in extent, this mitigation measure will neutralise the loss of farm production. Based on the IDP information provided, there are agricultural opportunities in

the North-western part of the district. The Southern part of the district, where the mine is located, has the climate and soils for crop and maize farming, and if there is scope to establish or restart a farm in the area, then this is recommended;

- Should the mine be able to rehabilitate its existing open pit earmarked for closure, this would be the most desirable mitigation measure;
- The mine needs to ensure that current employees on the farms need to be placed in either jobs at the mine, or that these employees agree that they do not wish to accept the jobs offered to them;
- The bankable feasibility study and independent competence persons reports are necessary to validate the economic viability of the mine;
- The mine needs to comply with all the new regulation in the mining charter as this is designed to increase local content and BBBEE procurement. This will strengthen both backwards and forward linkages; and
- The mine obviously needs to execute its SLP commitments flawlessly as this execution is aimed at developing the quality of life of the inhabitants of the district.

E. Economic development per capita

The actual increase in GGP per capita is relatively small at R331 per capita as a result of the project, relative to an existing R82 645 per capita for Nkangala in 2018. This expansion may assist the poor to a small extent, but not significantly. For this the size of this project and the time duration is too small and short. The dependency ratio (population / formally employed) in 2015 was 3.8 and hence looking at the job creation / maintenance one can argue that the livelihoods of 1 805 are improved / maintained in the district. Although every human life matters this statistic in macro terms is not significant.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Economic development per capita	Construction	+7.00	+7.00	+8.17

Proposed Preliminary Mitigation

- The mine should consider establishing a similar farm either in the same municipal area, or in a different area in the district to compensate for the loss of agricultural production. The key issue is food security and although the land lost to agriculture is small in extent, this mitigation measure will neutralise the loss of farm production. Based on the IDP information provided, there are agricultural opportunities in the North-western part of the district. The Southern part of the district, where the mine is located, has the climate and soils for crop and maize farming, and if there is scope to establish or restart a farm in the area, then this is recommended;
- Should the mine be able to rehabilitate its existing open pit earmarked for closure, this would be the most desirable mitigation measure;
- The mine needs to ensure that current employees on the farms need to be placed in either jobs at the mine, or that these employees agree that they do not wish to accept the jobs offered to them;
- The bankable feasibility study and independent competence persons reports are necessary to validate the economic viability of the mine;

- The mine needs to comply with all the new regulation in the mining charter as this is designed to increase local content and BBBEE procurement. This will strengthen both backwards and forward linkages; and
- The mine obviously needs to execute its SLP commitments flawlessly as this execution is aimed at developing the quality of life of the inhabitants of the district.

F. Country and industry competitiveness

One of South Africa's undoubted competitive advantages has always been stable and inexpensive electricity. Sadly, this does not seem to be the case anymore, and this project expansion undoubtedly will contribute to this competitiveness. A quick calculation indicates that the coal to be provided by the project expansion could result in a contribution of 0.1% of megawatts produced by Eskom. This could potentially mean that R4.6 billion of the national GGP of R4 600 billion (2017) could be supported by this expansion.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Country and industry competitiveness	Construction	+6.75	+6.75	+7.88

Proposed Preliminary Mitigation

- The mine should consider establishing a similar farm either in the same municipal area, or in a different area in the district to compensate for the loss of agricultural production. The key issue is food security and although the land lost to agriculture is small in extent, this mitigation measure will neutralise the loss of farm production. Based on the IDP information provided, there are agricultural opportunities in the North-western part of the district. The Southern part of the district, where the mine is located, has the climate and soils for crop and maize farming, and if there is scope to establish or restart a farm in the area, then this is recommended;
- Should the mine be able to rehabilitate its existing open pit earmarked for closure, this would be the most desirable mitigation measure;
- The mine needs to ensure that current employees on the farms need to be placed in either jobs at the mine, or that these employees agree that they do not wish to accept the jobs offered to them;
- The bankable feasibility study and independent competence persons reports are necessary to validate the economic viability of the mine;
- The mine needs to comply with all the new regulation in the mining charter as this is designed to increase local content and BBBEE procurement. This will strengthen both backwards and forward linkages; and
- The mine obviously needs to execute its SLP commitments flawlessly as this execution is aimed at developing the quality of life of the inhabitants of the district.

G. Alternative land-use

When we look at the alternative land use analysis then we can summarise the findings and state that mining is overwhelmingly more beneficial than agriculture because of the creation of GGP of R4.44 billion over 9 years in real terms relative to the opportunity costs of agricultural GGP of R328 million over 25 years. This is a significant benefit to the local economy.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Alternative land-use	Construction	+13.75	+13.75	+16.04

Proposed Preliminary Mitigation

- The mine should consider establishing a similar farm either in the same municipal area, or in a different area in the district to compensate for the loss of agricultural production. The key issue is food security and although the land lost to agriculture is small in extent, this mitigation measure will neutralise the loss of farm production. Based on the IDP information provided, there are agricultural opportunities in the North-western part of the district. The Southern part of the district, where the mine is located, has the climate and soils for crop and maize farming, and if there is scope to establish or restart a farm in the area, then this is recommended;
- Should the mine be able to rehabilitate its existing open pit earmarked for closure, this would be the most desirable mitigation measure;
- The mine needs to ensure that current employees on the farms need to be placed in either jobs at the mine, or that these employees agree that they do not wish to accept the jobs offered to them;
- The bankable feasibility study and independent competence persons reports are necessary to validate the economic viability of the mine;
- The mine needs to comply with all the new regulation in the mining charter as this is designed to increase local content and BBBEE procurement. This will strengthen both backwards and forward linkages; and
- The mine obviously needs to execute its SLP commitments flawlessly as this execution is aimed at developing the quality of life of the inhabitants of the district.

H. Need and desirability

This expansion's most significant contributor to its need and desirability from an economic perspective, and not an environmental perspective, is that it would add to the sustainable supply of coal to Eskom at a time when it is well known that coal is being transported from outside the region to feed Eskom's power stations. In addition to that, it can be said that this project will support the equivalent of R4.6 billion worth of GGP in South Africa through more reliable electricity generation. At a GGP per capita of R383 000 in 2018, then sustaining a GGP of R4.6 billion implies that 12 000 jobs are potentially supported per annum by this expansion.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Need and desirability	Construction	+9.00	+9.00	+10.50

Proposed Preliminary Mitigation

- The mine should consider establishing a similar farm either in the same municipal area, or in a different area in the district to compensate for the loss of agricultural production. The key issue is food security and although the land lost to agriculture is small in extent, this mitigation measure will neutralise the

loss of farm production. Based on the IDP information provided, there are agricultural opportunities in the North-western part of the district. The Southern part of the district, where the mine is located, has the climate and soils for crop and maize farming, and if there is scope to establish or restart a farm in the area, then this is recommended;

- Should the mine be able to rehabilitate its existing open pit earmarked for closure, this would be the most desirable mitigation measure;
- The mine needs to ensure that current employees on the farms need to be placed in either jobs at the mine, or that these employees agree that they do not wish to accept the jobs offered to them;
- The bankable feasibility study and independent competence persons reports are necessary to validate the economic viability of the mine;
- The mine needs to comply with all the new regulation in the mining charter as this is designed to increase local content and BBBEE procurement. This will strengthen both backwards and forward linkages; and
- The mine obviously needs to execute its SLP commitments flawlessly as this execution is aimed at developing the quality of life of the inhabitants of the district.

I. Net GGP impact

There will be Gross Geographic Product (GGP) creation in the form of investments made in the duration of the project. However, the economic benefits derived will be for a short period, and for that reason the positive impact ratings will not be high. The reason why the GGP impact is rated as "somewhat positive", as opposed to "significantly" or "absolutely positive", which is more desirable, is because the project extension is economically over a short period. An economic generation is 25 years and this extension has a life of mine of only nine years. The calculations undertaken show that the total GGP added over a 9-year period by the project amounts to R4.4 billion in real terms. The GGP of the project is calculated as the initial investment, the ongoing maintenance investment and the GGP portion of total revenue. Note total revenue is not GGP because all intermediary expenses need to be deducted. GGP is effectively EBITDA (income before interest, tax, depreciation and amortisation) plus salaries and wages, in other words accounting items that are not paid across to other firms.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Net GGP impact	Operation	+11.00	+11.00	+12.83

Proposed Preliminary Mitigation

- Same as the construction phase mitigation measures.

J. Net employment impacts

The mine will effectively not increase employment. It will maintain / "save" 300 permanent jobs when it closes other parts of its operation and expand its production by developing a new open pit coal mine. In economic terms, however, this can be regarded as creating new 300 jobs, because these jobs would have been lost to the economy. However, these jobs are only created for 9 years, and hence the "full time economic jobs" amount to 9/25*300 = 108 jobs. Often this can be viewed as controversial because it reduces the number of jobs, however, in our view this remains the best method to calculate the benefit.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Net employment Impacts	Operation	+9.00	+9.00	+10.50

Proposed Preliminary Mitigation

- Same as the construction phase mitigation measures.

K. Forex savings

South Africa at present has R700 billion in foreign exchange and the project is not likely to export more than R1 billion per annum, and hence this net benefit is not significant. However, a country's gold reserves and foreign exchange is one of the most important bases for international investor confidence. The higher this amount, the better a country can manage foreign investment and trade, and exchange rate fluctuations. Thus, developments such as this project, relatively small as it may be, have important strategic value.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Forex savings	Operation	+11.00	+11.00	+12.83

Proposed Preliminary Mitigation

- Same as the construction phase mitigation measures.

L. Fiscal income

Determining the effective tax rate per industry and in particular per enterprise is very difficult. On average, as an economic quantity, and based on internal estimates, both agriculture and mining may well pay tax in the amount of 2% of their total GGP's per industry. The tax to be earned by the project is minute in terms of South African tax base, even should one include PAYE and other indirect taxes. However, it can safely be said that the tax to be paid by the mine, even though only over a 9-year period, will significantly outstrip that of the displaced tax income of farming in the impacted area.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Fiscal income	Operation	+12.00	+12.00	+14.00

Proposed Preliminary Mitigation

- Same as the construction phase mitigation measures.

M. Economic development per capita

The actual increase in GGP per capita is relatively small at R331 per capita as a result of the project, relative to an existing R82 645 per capita for Nkangala in 2018. This expansion may assist the poor to a small extent, but not significantly. For this the size of this project and the time duration is too small and short. The dependency ratio (population / formally employed) in 2015 was 3.8 and hence looking at the job creation / maintenance one can argue that the livelihoods of 1 805 are improved / maintained in the district. Although every human life matters this statistic in macro terms is not significant.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Economic development per capita	Operation	+10.00	+10.00	+11.67

Proposed Preliminary Mitigation

- Same as the construction phase mitigation measures.

N. Country and industry competitiveness

One of South Africa's undoubted competitive advantages has always been stable and inexpensive electricity. Sadly, this does not seem to be the case anymore, and this project expansion undoubtedly will contribute to this competitiveness. A quick calculation indicates that the coal to be provided by the project expansion could result in a contribution of 0.1% of megawatts produced by Eskom. This could potentially mean that R4.6 billion of the national GGP of R4 600 billion (2017) could be supported by this expansion.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Country and industry competitiveness	Operation	+14.00	+14.00	+16.33

Proposed Preliminary Mitigation

- Same as the construction phase mitigation measures.

O. Alternative land-use

When we look at the alternative land use analysis then we can summarise the findings and state that mining is overwhelmingly more beneficial than agriculture because of the creation of GGP of R4.44 billion over 9 years in real terms relative to the opportunity costs of agricultural GGP of R328 million over 25 years. This is a significant benefit to the local economy.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Alternative land-use	Operation	+16.25	+16.25	+18.96

Proposed Preliminary Mitigation

- Same as the construction phase mitigation measures.

P. Need and desirability

This expansion's most significant contributor to its need and desirability from an economic perspective, and not an environmental perspective, is that it would add to the sustainable supply of coal to Eskom at a time when it is well known that coal is being transported from outside the region to feed Eskom's power stations. In addition to that, it can be said that this project will support the equivalent of R4.6 billion worth of GGP in South Africa through more reliable electricity generation. At a GGP per capita of R383 000 in 2018, then sustaining a GGP of R4.6 billion implies that 12 000 jobs are potentially supported per annum by this expansion.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Need and desirability	Operation	+17.50	+17.50	+20.42

Proposed Preliminary Mitigation

- Same as the construction phase mitigation measures.

Q. Net GGP impact

There will be Gross Geographic Product (GGP) creation in the form of investments made in the duration of the project. However, the economic benefits derived will be for a short period, and for that reason the positive impact ratings will not be high. The reason why the GGP impact is rated as "somewhat positive", as opposed to "significantly" or "absolutely positive", which is more desirable, is because the project extension is economically over a short period. An economic generation is 25 years and this extension has a life of mine of only nine years. The calculations undertaken show that the total GGP added over a 9-year period by the project amounts to R4.4 billion in real terms. The GGP of the project is calculated as the initial investment, the ongoing maintenance investment and the GGP portion of total revenue. Note total revenue is not GGP because all intermediary expenses need to be deducted. GGP is effectively EBITDA (income before interest, tax, depreciation and amortisation) plus salaries and wages, in other words accounting items that are not paid across to other firms.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Net GGP impact	Decommissioning	-12.00	-12.00	-14.00

Proposed Preliminary Mitigation

- Same as the construction phase mitigation measures.

R. Net employment impacts

The mine will effectively not increase employment. It will maintain / "save" 300 permanent jobs when it closes other parts of its operation and expand its production by developing a new open pit coal mine. In economic terms, however, this can be regarded as creating new 300 jobs, because these jobs would have been lost to the economy. However, these jobs are only created for 9 years, and hence the "full time economic jobs" amount to 9/25*300 = 108 jobs. Often this can be viewed as controversial because it reduces the number of jobs, however, in our view this remains the best method to calculate the benefit.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Net employment impacts	Decommissioning	-12.00	-12.00	-14.00

Proposed Preliminary Mitigation

- Same as the construction phase mitigation measures.

S. Forex savings

South Africa at present has R700 billion in foreign exchange and the project is not likely to export more than R1 billion per annum, and hence this net benefit is not significant. However, a country's gold reserves and foreign exchange is one of the most important bases for international investor confidence. The higher this amount, the better a country can manage foreign investment and trade, and exchange rate fluctuations. Thus, developments such as this project, relatively small as it may be, have important strategic value.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Forex savings	Decommissioning	-18.75	-18.75	-21.88

Proposed Preliminary Mitigation

- Same as the construction phase mitigation measures.

T. Fiscal income

Determining the effective tax rate per industry and in particular per enterprise is very difficult. On average, as an economic quantity, and based on internal estimates, both agriculture and mining may well pay tax in the amount of 2% of their total GGP's per industry. The tax to be earned by the project is minute in terms of South African tax base, even should one include PAYE and other indirect taxes. However, it can safely be said that the tax to be paid by the mine, even though only over a 9-year period, will significantly outstrip that of the displaced tax income of farming in the impacted area.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Fiscal income	Decommissioning	-18.75	-18.75	-21.88

Proposed Preliminary Mitigation

- Same as the construction phase mitigation measures.

U. Economic development per capita

The actual increase in GGP per capita is relatively small at R331 per capita as a result of the project, relative to an existing R82 645 per capita for Nkangala in 2018. This expansion may assist the poor to a small extent, but not significantly. For this the size of this project and the time duration is too small and short. The dependency ratio (population / formally employed) in 2015 was 3.8 and hence looking at the job creation / maintenance one can argue that the livelihoods of 1 805 are improved / maintained in the district. Although every human life matters this statistic in macro terms is not significant.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Economic development per capita	Decommissioning	-12.00	-12.00	-14.00

Proposed Preliminary Mitigation

- Same as the construction phase mitigation measures.

V. Country and industry competitiveness

One of South Africa's undoubted competitive advantages has always been stable and inexpensive electricity. Sadly, this does not seem to be the case anymore, and this project expansion undoubtedly will contribute to this competitiveness. A quick calculation indicates that the coal to be provided by the project expansion could result in a contribution of 0.1% of megawatts produced by Eskom. This could potentially mean that R4.6 billion of the national GGP of R4 600 billion (2017) could be supported by this expansion.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Country and industry competitiveness	Decommissioning	-15.00	-15.00	-17.50

Proposed Preliminary Mitigation

- Same as the construction phase mitigation measures.

W. Black economic transformation

The project is anticipated to contribute to the local economy through the socio-economic initiatives (e.g. employment opportunities, etc.) that the mine will put in place towards social upliftment, economic benefit and overall participation particularly within previously disadvantaged communities. However, this will only be applicable during the construction and operational phases of the project. Once decommissioning commences, these benefits will be lost in preparation of closure of the mining activities.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Black economic transformation	Decommissioning	-13.00	-13.00	-15.17

Proposed Preliminary Mitigation

- Same as the construction phase mitigation measures.

X. Alternative land-use

When we look at the alternative land use analysis then we can summarise the findings and state that mining is overwhelmingly more beneficial than agriculture because of the creation of GGP of R4.44 billion over 9 years in real terms relative to the opportunity costs of agricultural GGP of R328 million over 25 years. This is a significant benefit to the local economy.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Alternative land-use	Decommissioning	-12.50	-12.50	-14.58

Proposed Preliminary Mitigation

- Same as the construction phase mitigation measures.

Y. Need and desirability

This expansion's most significant contributor to its need and desirability from an economic perspective, and not an environmental perspective, is that it would add to the sustainable supply of coal to Eskom at a time when it is well known that coal is being transported from outside the region to feed Eskom's power stations. In addition to that, it can be said that this project will support the equivalent of R4.6 billion worth of GGP in South Africa through more reliable electricity generation. At a GGP per capita of R383 000 in 2018, then sustaining a GGP of R4.6 billion implies that 12 000 jobs are potentially supported per annum by this expansion.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Need and desirability	Decommissioning	-13.00	-13.00	-15.17

Proposed Preliminary Mitigation

- Same as the construction phase mitigation measures.

Z. GGP impact

There will be Gross Geographic Product (GGP) creation in the form of investments made in the duration of the project. However, the economic benefits derived will be for a short period, and for that reason the positive impact ratings will not be high. The reason why the GGP impact is rated as "somewhat positive", as opposed to "significantly" or "absolutely positive", which is more desirable, is because the project extension is economically over a short period. An economic generation is 25 years and this extension has a life of mine of only nine years. The calculations undertaken show that the total GGP added over a 9-year period by the project amounts to R4.4 billion in real terms. The GGP of the project is calculated as the initial investment, the ongoing maintenance investment and the GGP portion of total revenue. Note total revenue is not GGP because all intermediary expenses need to be deducted. GGP is effectively EBITDA (income before interest, tax, depreciation and amortisation) plus salaries and wages, in other words accounting items that are not paid across to other firms.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
GGP impact	Rehabilitation and Closure	-18.75	-18.75	-21.88

Proposed Preliminary Mitigation

- Same as the construction phase mitigation measures.

AA. Employment impacts

The mine will effectively not increase employment. It will maintain / "save" 300 permanent jobs when it closes other parts of its operation and expand its production by developing a new open pit coal mine. In economic terms, however, this can be regarded as creating new 300 jobs, because these jobs would have been lost to the economy. However, these jobs are only created for 9 years, and hence the "full time economic jobs" amount to 9/25*300 = 108 jobs. Often this can be viewed as controversial because it reduces the number of jobs, however, in our view this remains the best method to calculate the benefit.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Employment impacts	Rehabilitation and Closure	-15.00	-15.00	-17.50

Proposed Preliminary Mitigation

- Same as the construction phase mitigation measures.

BB. Forex savings

South Africa at present has R700 billion in foreign exchange and the project is not likely to export more than R1 billion per annum, and hence this net benefit is not significant. However, a country's gold reserves and foreign exchange is one of the most important bases for international investor confidence. The higher this amount, the better a country can manage foreign investment and trade, and exchange rate fluctuations. Thus, developments such as this project, relatively small as it may be, have important strategic value.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Forex savings	Rehabilitation and Closure	-16.25	-16.25	-18.96

Proposed Preliminary Mitigation

- Same as the construction phase mitigation measures.

CC. Fiscal income

Determining the effective tax rate per industry and in particular per enterprise is very difficult. On average, as an economic quantity, and based on internal estimates, both agriculture and mining may well pay tax in the amount of 2% of their total GGP's per industry. The tax to be earned by the project is minute in terms of South African tax base, even should one include PAYE and other indirect taxes. However, it can safely be said that the tax to be paid by the mine, even though only over a 9-year period, will significantly outstrip that of the displaced tax income of farming in the impacted area.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Fiscal income	Rehabilitation and Closure	-16.25	-16.25	-18.96

Proposed Preliminary Mitigation

- Same as the construction phase mitigation measures.

DD. Economic development per capita

The actual increase in GGP per capita is relatively small at R331 per capita as a result of the project, relative to an existing R82 645 per capita for Nkangala in 2018. This expansion may assist the poor to a small extent, but not significantly. For this the size of this project and the time duration is too small and short. The dependency ratio (population / formally employed) in 2015 was 3.8 and hence looking at the job creation / maintenance one can argue that the livelihoods of 1 805 are improved / maintained in the district. Although every human life matters this statistic in macro terms is not significant.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Economic development per capita	Rehabilitation and Closure	-16.25	-16.25	-18.96

Proposed Preliminary Mitigation

- Same as the construction phase mitigation measures.

EE. Country and industry competitiveness

One of South Africa's undoubted competitive advantages has always been stable and inexpensive electricity. Sadly, this does not seem to be the case anymore, and this project expansion undoubtedly will contribute to this competitiveness. A quick calculation indicates that the coal to be provided by the project expansion could result in a contribution of 0.1% of megawatts produced by Eskom. This could potentially mean that R4.6 billion of the national GGP of R4 600 billion (2017) could be supported by this expansion.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Country and industry competitiveness	Rehabilitation and Closure	-13.00	-13.00	-15.17

Proposed Preliminary Mitigation

- Same as the construction phase mitigation measures.

FF. Alternative land-use

When we look at the alternative land use analysis then we can summarise the findings and state that mining is overwhelmingly more beneficial than agriculture because of the creation of GGP of R4.44 billion over 9 years in real terms relative to the opportunity costs of agricultural GGP of R328 million over 25 years. This is a significant benefit to the local economy.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Alternative land-use	Rehabilitation and Closure	-17.50	-17.50	-20.42

Proposed Preliminary Mitigation

- Same as the construction phase mitigation measures.

GG. Need and desirability

This expansion's most significant contributor to its need and desirability from an economic perspective, and not an environmental perspective, is that it would add to the sustainable supply of coal to Eskom at a time when it

is well known that coal is being transported from outside the region to feed Eskom's power stations. In addition to that, it can be said that this project will support the equivalent of R4.6 billion worth of GGP in South Africa through more reliable electricity generation. At a GGP per capita of R383 000 in 2018, then sustaining a GGP of R4.6 billion implies that 12 000 jobs are potentially supported per annum by this expansion.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Need and desirability	Rehabilitation and Closure	-16.00	-16.00	-18.67

Proposed Preliminary Mitigation

- Same as the construction phase mitigation measures.

9.3.12 PRELIMINARY NOISE IMPACTS

The following preliminary noise impacts within the study area and its surrounding were identified and assessed for the various project phases (planning and design, construction, operation, decommissioning, rehabilitation and closure, as well as post-closure). No noise impacts have been identified that will occur during the Planning and Design Phase, Construction Phase, and the Post-closure Phase. Below are the operation, decommissioning as well as rehabilitation and closure phase preliminary impacts identified during scoping, as well as their impact rating.

A. Increase in noise levels at surrounding receptors due to operational mining activities in the day

Day time noise levels are likely to increase as a result of the operational activities thereby disturbing the surrounding communities.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Increase in noise levels at surrounding receptors due to operational mining activities in the day	Operation	-21.25	-2.75	-3.21

Proposed Preliminary Mitigation

- Relocation of noise-sensitive development 03 (NSD03)[2] which is a farmstead within the boundary of the proposed study area;
- Environmental awareness training for employees / drivers; and
- Use of topsoil and overburden dumps as noise management berms (between proposed activities and NSD).

[2] The mine currently owns the property where the noise-sensitive development NSD03 is located, a farmstead on farm land currently being leased. The lease is anticipated to end prior to the proposed Kangala Extension Project mining operations begin in that area therefore no relocation is anticipated.

B. Increase in noise levels at surrounding receptors due to operational mining activities at night

Night time noise levels are likely to increase as a result of the operational activities thereby disturbing the surrounding communities.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Increase in noise levels at surrounding receptors due to operational mining activities at night	Operation	-21.25	-9.00	-10.50

Proposed Preliminary Mitigation

- Relocation of NSD03;
- Minimize night-time activities when operating within 500 m from NS;
- Minimize the transport of coal between 10PM and 6AM;
- Environmental awareness training for employees/drivers;
- Minimal use of hooters and alarms at night; and
- Use of topsoil and overburden dumps as noise management berms (between proposed activities and NSD).

C. Increase in noise levels at surrounding receptors due to decommissioning activities during the day

Decommissioning activities are likely to result in increased day time noise levels thereby disturbing the surrounding communities.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Increase in noise levels at surrounding receptors due to decommissioning activities during the day	Decommissioning	-6.00	-6.00	-7.00

Proposed Preliminary Mitigation

- Mitigation is not required.

D. Increase in noise levels at surrounding receptors due to closure activities

Increased noise levels are anticipated from the rehabilitation and closure activities which may be a disturbance to the surrounding communities.

Impact	Project Phase	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Increase in noise levels at surrounding receptors due to closure activities	Rehabilitation and Closure	-3.00	-3.00	-3.50

Proposed Preliminary Mitigation

- Mitigation is not required.

9.4 SUMMARY OF PRELIMINARY IMPACTS

A summary of all the identified preliminary impact, their associated phase, as well as their impact calculations and significance are presented in Table 32 below.

Table 32: Summary of the preliminary impacts identified for the Proposed Phase 3 Project and their significance ratings

IMPACT DESCRIPTION			PRE - MITIGATION							POST - MITIGATION								IMPACT PRIORITISATION				
Impact	Alternative	Phase	Nature	Extent	Duration	Magnitude	Reversibility	Probability	Pre-mitigation ER	Nature	Extent	Duration	Magnitude	Reversibility	Probability	Post-mitigation ER	Confidence	Public response	Cumulative Impact	Irreplaceable loss	Priority Factor	Final score
Decline in air quality - Eloff operations	Alternative 1	Construction	-1	3	1	3	2	3	-6,75	-1	2	2	2	2	3	-6	Medium	2	1	1	1,17	-7,00
Decline in air quality - Kangala operations	Alternative 1	Operation	-1	4	4	3	3	4	-14,00	-1	3	4	3	2	3	-9	Medium	2	2	2	1,50	-13,50
Decline in air quality - Eloff operations	Alternative 1	Operation	-1	4	4	4	3	4	-15,00	-1	3	4	4	3	4	-14	Medium	2	2	2	1,50	-21,00
Decline in air quality - Eloff operations (additional mitigations)	Alternative 1	Operation	-1	4	4	4	3	4	-15,00	-1	3	4	3	3	3	-9,75	Medium	2	2	2	1,50	-14,63
Decline in air quality - Eloff operations	Alternative 1	Decommissioning	-1	3	2	2	2	3	-6,75	-1	3	2	2	2	3	-6,75	Medium	2	1	1	1,17	-7,88
Further loss and fragmentation of the vegetation community as well as the destruction of a portion of a Vulnerable vegetation type (NBA, 2012)	Alternative 1	Construction	-1	2	4	4	4	5	-17,50	-1	1	3	2	2	2	-4	High	2	2	3	1,67	-6,67
Displacement, direct mortalities and disturbance of a faunal community (including multiple threatened species) due to habitat loss and disturbance (such as dust and noise)	Alternative 1	Construction	-1	2	5	4	4	5	-18,75	-1	1	3	2	2	2	-4	High	2	2	3	1,67	-6,67
Loss of movement corridor that animals use to migrate between fragmented habitats	Alternative 1	Construction	-1	3	5	5	4	4	-17,00	-1	2	3	2	2	2	-4,5	High	2	2	3	1,67	-7,50
Further loss and fragmentation of the vegetation community as well as the destruction of a portion of a Vulnerable vegetation type (NBA, 2012)	Alternative 1	Operation	-1	2	4	4	4	5	-17,50	-1	1	3	2	2	2	-4	High	2	2	3	1,67	-6,67
Displacement, direct mortalities and disturbance of a faunal community (including multiple threatened species) due to habitat loss and disturbance (such as dust and noise)	Alternative 1	Operation	-1	2	5	4	4	5	-18.75	-1	1	3	2	2	2	-4	High	2	2	3	1,67	-6,67
Loss of movement corridor that animals use to migrate between fragmented habitats	Alternative 1	Operation	-1	3	5	5	4	4	-17,00	-1	2	3	2	2	2	-4,5	High	2	2	3	1,67	-7,50
Further loss and fragmentation of the vegetation community as well as the destruction of a portion of a Vulnerable vegetation type (NBA, 2012)	Alternative 1	Decommissioning	-1	2	4	4	4	5	-17,50	-1	1	3	2	2	2	-4	High	2	2	3	1,67	-6,67
Displacement, direct mortalities and disturbance of a faunal community (including multiple threatened species) due to habitat loss and disturbance (such as dust and noise)	Alternative 1	Decommissioning	-1	2	5	4	4	5	-18,75	-1	1	3	2	2	2	-4	High	2	2	3	1,67	-6,67
Loss of movement corridor that animals use to migrate between fragmented habitats	Alternative 1	Decommissioning	-1	3	5	5	4	4	-17,00	-1	2	3	2	2	2	-4,5	High	2	2	3	1,67	-7,50
Further loss and fragmentation of the vegetation community as well as the destruction of a portion of a Vulnerable vegetation type (NBA, 2012)	Alternative 1	Rehab and closure	-1	2	4	4	4	5	-17,50	-1	1	3	2	2	2	-4	High	2	2	3	1,67	-6,67
Displacement, direct mortalities and disturbance of a faunal community (including multiple threatened species) due to habitat loss and disturbance (such as dust and noise)	Alternative 1	Rehab and closure	-1	2	5	4	4	5	-18,75	-1	1	3	2	2	2	-4	High	2	2	3	1,67	-6,67
Loss of movement corridor that animals use to migrate between fragmented habitats	Alternative 1	Rehab and closure	-1	3	5	5	4	4	-17	-1	2	3	2	2	2	-4,5	High	2	2	3	1,67	-7,50
Ground vibration impact on houses	Alternative 1	Operation	-1	3	4	4	4	4	-15	-1	3	4	3	3	4	-13	High	2	2	2	1,50	-19,50

IMPACT DESCRIPTION			PRE - MITIGATION							POST - MITIGATION								IMPACT PRIORITISATION				
Impact	Alternative	Phase	Nature	Extent	Duration	Magnitude	Reversibility	Probability	Pre-mitigation ER	Nature	Extent	Duration	Magnitude	Reversibility	Probability	Post-mitigation ER	Confidence	Public response	Cumulative Impact	Irreplaceable loss	Priority Factor	Final score
Ground vibration impact on roads	Alternative 1	Operation	-1	3	4	4	4	2	-7,5	-1	3	4	3	2	2	-6	High	2	2	2	1,50	-9,00
Ground vibration impact on boreholes	Alternative 1	Operation	-1	3	4	4	4	5	-18,75	-1	3	4	3	2	5	-15	High	2	2	2	1,50	-22,50
Ground vibration impact on heritage sites	Alternative 1	Operation	-1	3	4	4	4	5	-18,75	-1	3	4	3	4	5	-17,5	High	2	2	2	1,50	-26,25
Ground vibration impact on power lines	Alternative 1	Operation	-1	3	4	4	4	5	-18,75	-1	3	4	3	3	5	-16,25	High	2	2	2	1,50	-24,38
Ground vibration impact on broilers	Alternative 1	Operation	-1	3	4	4	5	5	-20	-1	3	4	3	3	5	-16,25	High	2	2	2	1,50	-24,38
Air blast impact on houses	Alternative 1	Operation	-1	3	4	4	4	5	-18,75	-1	3	4	3	3	5	-16,25	High	2	2	2	1,50	-24,38
Air blast impact on roads	Alternative 1	Operation	-1	3	4	4	4	1	-3,75	-1	3	4	3	2	1	-3	High	2	2	2	1,50	-4,50
Air blast impact on boreholes	Alternative 1	Operation	-1	3	4	4	4	2	-7,5	-1	3	4	3	2	2	-6	High	2	2	2	1,50	-9,00
Air blast impact on heritage sites	Alternative 1	Operation	-1	3	4	4	4	3	-11,25	-1	3	4	3	4	3	-10,5	High	2	2	2	1,50	-15,75
Air blast impact on power lines	Alternative 1	Operation	-1	3	4	4	4	2	-7,5	-1	3	4	3	3	2	-6,5	High	2	2	2	1,50	-9,75
Air blast impact on broilers	Alternative 1	Operation	-1	3	4	4	5	5	-20	-1	3	4	3	3	5	-16,25	High	2	2	2	1,50	-24,38
Fly rock impact on houses	Alternative 1	Operation	-1	3	4	4	4	2	-7,5	-1	3	4	3	3	2	-6,5	High	2	2	2	1,50	-9,75
Fly rock impact on roads	Alternative 1	Operation	-1	3	4	4	4	5	-18,75	-1	3	4	3	2	5	-15	High	2	2	2	1,50	-22,50
Fly rock impact on boreholes	Alternative 1	Operation	-1	3	4	4	4	5	-18,75	-1	3	4	3	2	5	-15	High	2	2	2	1,50	-22,50
Fly rock impact on heritage houses	Alternative 1	Operation	-1	3	4	4	4	5	-18,75	-1	3	4	3	4	5	-17,5	High	2	2	2	1,50	-26,25
Fly rock impact on power lines	Alternative 1	Operation	-1	3	4	4	4	5	-18,75	-1	3	4	3	3	5	-16,25	High	2	2	2	1,50	-24,38
Fly rock impact on broilers	Alternative 1	Operation	-1	3	4	4	5	3	-12	-1	3	4	3	3	3	-9,75	High	2	2	2	1,50	-14,63
Lowering of local groundwater levels (i.e. dewatering of the aquifer)	Alternative 1	Operation	-1	3	4	2	3	5	-15	-1	3	4	2	3	5	-15	High	2	2	2	1,50	-22,50
Leachate from coal and waste material stockpiles - should be of marginal quality	Alternative 1	Operation	-1	2	4	3	3	4	-12	-1	1	4	1	3	2	-4,5	Medium	2	2	2	1,50	-6,75
Migration of residual contamination after rehabilitation	Alternative 1	Rehab and closure	-1	2	4	3	3	4	-12	-1	2	4	2	3	2	-5,5	Medium	2	2	2	1,50	-8,25
Decanting of poor quality water from rehabilitated pit	Alternative 1	Rehab and closure	-1	3	5	4	4	5	-20	-1	1	5	2	3	2	-5,5	Medium	2	2	2	1,50	-8,25
Impact on burial grounds and graves	Alternative 1	Construction	-1	1	5	4	5	5	-18,75	-1	1	5	2	5	1	-3,25	Low	1	1	3	1,33	-4,33
Impact on structures older than 60 years	Alternative 1	Construction	-1	1	5	4	5	5	-18,75	-1	1	5	2	5	1	-3,25	Low	1	1	3	1,33	-4,33
Impact on chance find heritage resources	Alternative 1	Construction	-1	2	5	3	3	2	-6,5	-1	1	4	2	5	2	-6	Low	1	1	2	1,17	-7,00
Damage to infrastructure - flooding of proposed infrastructure	Alternative 1	Construction	-1	2	4	4	2	4	-12	-1	2	4	2	2	3	-7,5	Medium	1	2	2	1,33	-10,00
Decline in water quality - hydrocarbon fuel spillage	Alternative 1	Construction	-1	2	3	3	2	3	-7,5	-1	2	3	2	2	2	-4,5	Medium	1	2	2	1,33	-6,00
Decline in water quality - sedimentation of downstream drainage / watercourse	Alternative 1	Construction	-1	2	3	3	2	3	-7,5	-1	2	3	2	2	2	-4,5	Medium	1	2	2	1,33	-6,00
Altered hydrological regime - reduction of catchment yield	Alternative 1	Construction	-1	2	4	1	2	4	-9	-1	2	4	1	2	4	-9	Medium	1	2	2	1,33	-12,00
Damage to infrastructure - flooding of proposed infrastructure	Alternative 1	Operation	-1	2	4	4	2	4	-12	-1	2	4	2	2	3	-7,5	Medium	1	2	2	1,33	-10,00
Decline in water quality - sedimentation / pollution of downstream drainage / watercourse	Alternative 1	Operation	-1	2	3	3	2	3	-7,5	-1	2	3	2	2	2	-4,5	Medium	1	2	2	1,33	-6,00
Altered hydrological regime - reduction of catchment yield	Alternative 1	Operation	-1	2	4	1	2	4	-9	-1	2	4	1	2	4	-9	Medium	1	2	2	1,33	-12,00
Water quality deterioration - siltation of water resources	Alternative 1	Rehab and closure	-1	2	4	4	2	4	-12	-1	2	4	2	2	3	-7,5	Medium	1	2	2	1,33	-10,00

IMPACT DESCRIPTION			PRE - MITIGATION							POST - MITIGATION								IMPACT PRIORITISATION				
Impact	Alternative	Phase	Nature	Extent	Duration	Magnitude	Reversibility	Probability	Pre-mitigation ER	Nature	Extent	Duration	Magnitude	Reversibility	Probability	Post-mitigation ER	Confidence	Public response	Cumulative Impact	Irreplaceable loss	Priority Factor	Final score
Increase in noise levels at surrounding receptors due to operational mining activities in the day	Alternative 1	Operation	-1	3	4	5	5	5	-21,25	-1	3	4	2	2	1	-2,75	Medium	1	2	1	1,17	-3,21
Increase in noise levels at surrounding receptors due to operational mining activities at night	Alternative 1	Operation	-1	3	4	5	5	5	-21,25	-1	3	4	3	2	3	-9	Medium	1	2	1	1,17	-10,50
Increase in noise levels at surrounding receptors due to decommissioning activities during the day	Alternative 1	Decommissioning	-1	3	2	5	2	2	-6	-1	3	2	5	2	2	-6	Medium	1	2	1	1,17	-7,00
Increase in noise levels at surrounding receptors due to closure activities	Alternative 1	Rehab and closure	-1	3	2	5	2	1	-3	-1	3	2	5	2	1	-3	Medium	1	2	1	1,17	-3,50
Loss of land capability	Alternative 1	Planning	-1	1	5	5	3	5	-17,5	-1	1	2	3	2	2	-4	High	1	2	3	1,50	-6,00
Loss of land capability - opencast	Alternative 1	Construction	-1	2	5	4	5	5	-20	-1	2	4	5	4	4	-15	Low	1	2	2	1,33	-20,00
Loss of land capability - opencast	Alternative 1	Operation	-1	2	5	4	5	5	-20	-1	2	4	5	4	4	-15	Low	1	2	2	1,33	-20,00
Loss of land capability - opencast	Alternative 1	Decommissioning	-1	2	5	4	5	5	-20	-1	2	3	3	3	3	-8,25	Low	1	2	2	1,33	-11,00
Change of character	Alternative 1	Construction	-1	2	1	1	1	2	-2,5	-1	2	1	1	1	2	-2,5	Medium	1	1	1	1,00	-2,50
Impact on urban edge	Alternative 1	Construction	-1	1	1	1	1	1	-1	-1	1	1	1	1	1	-1	Medium	1	1	1	1,00	-1,00
Impact on farmsteads	Alternative 1	Construction	-1	1	1	1	1	1	-1	-1	1	1	1	1	1	-1	Medium	1	1	1	1,00	-1,00
Impact on local roads	Alternative 1	Construction	-1	1	1	1	1	1	-1	-1	1	1	1	1	1	-1	Medium	1	1	1	1,00	-1,00
Change of character	Alternative 1	Operation	-1	3	3	1	1	2	-4	-1	3	3	1	1	3	-6	Medium	1	1	1	1,00	-6,00
Impact on urban edge	Alternative 1	Operation	-1	3	3	2	1	2	-4,5	-1	3	3	2	1	2	-4,5	Medium	2	1	1	1,17	-5,25
Impact on farmsteads	Alternative 1	Operation	-1	3	3	1	1	1	-2	-1	3	3	1	1	1	-2	Medium	1	1	1	1,00	-2,00
Impact on local roads	Alternative 1	Operation	-1	3	3	1	1	1	-2	-1	3	3	1	1	1	-2	Medium	1	1	1	1,00	-2,00
Change of character	Alternative 1	Decommissioning	1	1	1	1	1	2	2	1	1	1	1	1	2	2	Medium	1	1	1	1,00	2,00
Impact on urban edge	Alternative 1	Decommissioning	1	1	1	1	1	2	2	1	1	1	1	1	2	2	Medium	1	1	1	1,00	2,00
Impact on farmsteads	Alternative 1	Decommissioning	1	1	1	1	1	2	2	1	1	1	1	1	2	2	Medium	1	1	1	1,00	2,00
Impact on local roads	Alternative 1	Decommissioning	1	1	1	1	1	1	1	1	1	1	1	1	1	1	Medium	1	1	1	1,00	1,00
Clearing of vegetation in and around wetlands	Alternative 1	Construction	-1	2	1	2	3	4	-8	-1	2	1	2	3	3	-6	High	1	2	2	1,33	-8,00
Soil excavations in and around wetlands	Alternative 1	Construction	-1	2	2	3	3	4	-10	-1	2	2	3	3	3	-7,5	High	1	2	2	1,33	-10,00
Heavy duty vehicle use in and around wetlands	Alternative 1	Construction	-1	2	2	2	2	4	-8	-1	2	2	2	2	3	-6	High	1	2	1	1,17	-7,00
Light vehicles, machine and equipment use in and around wetlands	Alternative 1	Construction	-1	2	2	2	2	3	-6	-1	2	2	2	2	3	-6	High	1	2	1	1,17	-7,00
Staff, personnel and contractor activity in and around wetlands	Alternative 1	Construction	-1	2	2	3	2	3	-6,75	-1	2	2	3	2	2	-4,5	High	1	2	1	1,17	-5,25
Construction material use in and around wetlands	Alternative 1	Construction	-1	2	2	2	1	2	-3,5	-1	2	2	2	1	2	-3,5	High	1	2	1	1,17	-4,08
Blasting in and around wetlands	Alternative 1	Operation	-1	3	4	4	5	5	-20	-1	3	4	4	5	5	-20	High	2	3	3	1,83	-36,67
Soil excavations in and around wetlands	Alternative 1	Operation	-1	3	4	5	5	5	-21,25	-1	3	4	5	5	5	-21,25	High	2	3	3	1,83	-38,96
Heavy duty vehicle use in and around wetlands	Alternative 1	Operation	-1	2	4	3	3	3	-9	-1	2	4	3	3	2	-6	High	1	2	1	1,17	-7,00
Light vehicles, machine and equipment use in and around wetlands	Alternative 1	Operation	-1	2	4	3	3	3	-9	-1	2	4	3	3	2	-6	High	1	2	1	1,17	-7,00
Staff, personnel and contractor activity in and around wetlands	Alternative 1	Operation	-1	2	4	3	2	3	-8,25	-1	2	4	3	2	2	-5,5	High	1	2	1	1,17	-6,42

IMPACT DESCRIPTION			PRE - MITIGATION							POST - MITIGATION								IMPACT PRIORITISATION				
Impact	Alternative	Phase	Nature	Extent	Duration	Magnitude	Reversibility	Probability	Pre-mitigation ER	Nature	Extent	Duration	Magnitude	Reversibility	Probability	Post-mitigation ER	Confidence	Public response	Cumulative Impact	Irreplaceable loss	Priority Factor	Final score
Operation material use in and around wetlands	Alternative 1	Operation	-1	2	4	2	1	2	-4,5	-1	2	4	2	1	2	-4,5	High	1	2	1	1,17	-5,25
Project induced in-migration	Alternative 1	Construction	-1	3	2	3	4	4	-11	-1	2	2	2	3	2	-4,5	Medium	1	2	2	1,33	-6,00
Labour draw down from other sectors	Alternative 1	Construction	-1	4	2	3	2	3	-8,25	-1	3	2	2	2	2	-4,5	Medium	1	2	2	1,33	-6,00
Employment and income creation	Alternative 1	Construction	1	3	2	2	2	2	4,5	1	3	2	3	2	4	10	Medium	2	2	1	1,33	13,33
Increased demand for housing and services	Alternative 1	Construction	-1	3	2	3	3	4	-11	-1	2	1	2	3	3	-6	Medium	1	2	2	1,33	-8,00
Social disintegration and conflict	Alternative 1	Construction	-1	3	2	3	3	3	-8,25	-1	2	2	2	3	2	-4,5	Medium	2	3	2	1,67	-7,50
Defiant social behaviour	Alternative 1	Construction	-1	3	2	4	3	3	-9	-1	3	2	3	3	2	-5,5	Low	1	3	2	1,50	-8,25
Nuisance factors	Alternative 1	Construction	-1	3	2	3	3	4	-11	-1	2	2	2	3	3	-6,75	Medium	2	2	1	1,33	-9,00
Tax income	Alternative 1	Operation	1	5	4	3	1	5	16,25	1	5	4	3	1	5	16,25	High	1	2	1	1,17	18,95
Employment and income creation	Alternative 1	Operation	1	3	3	2	1	2	4,5	1	3	3	3	1	3	7,5	Medium	2	2	1	1,33	10,00
Conversion of land use	Alternative 1	Operation	-1	3	3	5	4	4	-15	-1	2	3	3	3	4	-11	Medium	1	2	3	1,50	-16,50
Social investment in the local community	Alternative 1	Operation	1	3	3	2	3	3	8,25	1	4	3	3	3	4	13	High	1	2	2	1,33	17,33
Net GGP impact	Alternative 1	Construction	1	1	1	2	2	4	6	1	1	1	2	2	4	6	Medium	2	2	1	1,33	8,00
Net employment impact	Alternative 1	Construction	1	1	1	3	2	4	7	1	1	1	3	2	4	7	Medium	2	2	1	1,33	9,33
Forex savings	Alternative 1	Construction	-1	5	1	1	2	4	-9	-1	5	1	1	2	4	-9	Medium	2	2	1	1,33	-12,00
Fiscal Income	Alternative 1	Construction	1	5	1	3	2	4	11	1	5	1	3	2	4	11	Medium	2	2	1	1,33	14,67
Economic development per capita	Alternative 1	Construction	1	1	1	3	2	4	7	1	1	1	3	2	4	7	Medium	2	2	1	1,33	9,33
Country and industry competitiveness	Alternative 1	Construction	1	1	1	5	2	3	6,75	1	1	1	5	2	3	6,75	Medium	2	2	1	1,33	9,00
Alternative land-use	Alternative 1	Construction	1	3	1	5	2	5	13,75	1	3	1	5	2	5	13,75	Medium	2	2	1	1,33	18,33
Need and desirability	Alternative 1	Construction	1	1	1	5	2	4	9	1	1	1	5	2	4	9	Medium	2	2	1	1,33	12,00
Net GGP impact	Alternative 1	Operation	1	4	3	2	2	4	11	1	4	3	2	2	4	11	Medium	2	2	1	1,33	14,67
Net employment impact	Alternative 1	Operation	1	3	3	1	2	4	9	1	3	3	1	2	4	9	Medium	2	2	1	1,33	12,00
Forex savings	Alternative 1	Operation	1	5	3	1	2	4	11	1	5	3	1	2	4	11	Medium	2	2	1	1,33	14,67
Fiscal Income	Alternative 1	Operation	1	5	3	2	2	4	12	1	5	3	2	2	4	12	Medium	2	2	1	1,33	16,00
Economic development per capita	Alternative 1	Operation	1	4	3	1	2	4	10	1	4	3	1	2	4	10	Medium	2	2	1	1,33	13,33
Country and industry competitiveness	Alternative 1	Operation	1	5	3	4	2	4	14	1	5	3	4	2	4	14	Medium	2	2	1	1,33	18,67
Alternative land-use	Alternative 1	Operation	1	3	3	5	2	5	16,25	1	3	3	5	2	5	16,25	Medium	2	2	1	1,33	21,67
Need and desirability	Alternative 1	Operation	1	4	3	5	2	5	17,5	1	4	3	5	2	5	17,5	Medium	2	2	1	1,33	23,33
Net GGP impact	Alternative 1	Decommissioning	-1	4	2	4	2	4	-12	-1	4	2	4	2	4	-12	Medium	2	2	1	1,33	-16,00
Net employment impact	Alternative 1	Decommissioning	-1	4	2	4	2	4	-12	-1	4	2	4	2	4	-12	Medium	2	2	1	1,33	-16,00
Forex savings	Alternative 1	Decommissioning	-1	4	5	4	2	5	-18,75	-1	4	5	4	2	5	-18,75	Medium	2	2	1	1,33	-25,00
Fiscal Income	Alternative 1	Decommissioning	-1	4	5	4	2	5	-18,75	-1	4	5	4	2	5	-18,75	Medium	2	2	1	1,33	-25,00
Economic development per capita	Alternative 1	Decommissioning	-1	4	2	4	2	4	-12	-1	4	2	4	2	4	-12	Medium	2	2	1	1,33	-16,00
Country and industry competitiveness	Alternative 1	Decommissioning	-1	5	5	3	2	4	-15	-1	5	5	3	2	4	-15	Medium	2	2	1	1,33	-20,00
Black economic transformation	Alternative 1	Decommissioning	-1	3	5	3	2	4	-13	-1	3	5	3	2	4	-13	Medium	2	2	1	1,33	-17,33
Alternative land-use	Alternative 1	Decommissioning	-1	2	2	4	2	5	-12,5	-1	2	2	4	2	5	-12,5	Medium	2	2	1	1,33	-16,67
Need and desirability	Alternative 1	Decommissioning	-1	4	2	5	2	4	-13	-1	4	2	5	2	4	-13	Medium	2	2	1	1,33	-17,33

IMPACT DESCRIPTION			PRE - MITIGATION							POST - MITIGATION								IMPACT PRIORITISATION				
Impact	Alternative	Phase	Nature	Extent	Duration	Magnitude	Reversibility	Probability	Pre-mitigation ER	Nature	Extent	Duration	Magnitude	Reversibility	Probability	Post-mitigation ER	Confidence	Public response	Cumulative Impact	Irreplaceable loss	Priority Factor	Final score
Net GGP impact	Alternative 1	Rehab and closure	-1	4	5	4	2	5	-18,75	-1	4	5	4	2	5	-18,75	Medium	2	2	1	1,33	-25,00
Net employment impact	Alternative 1	Rehab and closure	-1	3	5	2	2	5	-15	-1	3	5	2	2	5	-15	Medium	2	2	1	1,33	-20,00
Forex savings	Alternative 1	Rehab and closure	-1	5	5	1	2	5	-16,25	-1	5	5	1	2	5	-16,25	Medium	2	2	1	1,33	-21,67
Fiscal Income	Alternative 1	Rehab and closure	-1	5	5	1	2	5	-16,25	-1	5	5	1	2	5	-16,25	Medium	2	2	1	1,33	-21,67
Economic development per capita	Alternative 1	Rehab and closure	-1	4	5	2	2	5	-16,25	-1	4	5	2	2	5	-16,25	Medium	2	2	1	1,33	-21,67
Country and industry competitiveness	Alternative 1	Rehab and closure	-1	5	5	1	2	4	-13	-1	5	5	1	2	4	-13	Medium	2	2	1	1,33	-17,33
Alternative land-use	Alternative 1	Rehab and closure	-1	3	5	4	2	5	-17,5	-1	3	5	4	2	5	-17,5	Medium	2	2	1	1,33	-23,33
Need and desirability	Alternative 1	Rehab and closure	-1	4	5	5	2	4	-16	-1	4	5	5	2	4	-16	Medium	2	2	1	1,33	-21,33

10 PLAN OF STUDY FOR THE IMPACT ASSESSMENT

The section below outlines the proposed plan of study which will be conducted for the various environmental aspects during the EIA phase. It is also important to note that the plan of study will also be guided by comment obtained from I&APs and other stakeholders during the Scoping Report public review period.

10.1 DESCRIPTION OF ALTERNATIVES TO BE CONSIDERED

The alternatives considered and discussed in Section 6 of this Scoping Report, which include location, process, technology and activity alternatives, have culminated into the identification of feasible development alternatives to be addressed further in the EIA phase of this EIA process. The feasible development alternatives to be further assessed in the EIA phase are presented below.

10.1.1 LOCATION ALTERNATIVES

No other development location alternative, other than the placement of the new mining pit extension adjacent to the existing Kangala Colliery pit, will considered for the Phase 3 Project due to all the factors discussed in Section 6.2.1. The preliminary environmental impacts associated with this location alternative are discussed in Section 9 of this Scoping Report, and will be further investigated in the EIA phase. With regards to site design and layout, the sensitivity-based approach (Site Layout Alternative S1c) whereby areas of significantly medium to high environmental sensitivity are avoided or buffered, is the alternative to be assessed further during the EIA phase. However, should specialist studies confirm limited sensitivities by the proposed project on the receiving environment during their on-site EIA phase detailed impact assessments, the maximum-mining approach (Site Layout Alternative S2b) may be deemed viable. Furthermore, EIA phase studies may indicate that a balanced combination of Process Alternatives S2b and S2c is preferred in an effort to optimise mineral extraction whilst also ensuring adequate environmental and social protection. It should be noted that should the Process Alternative S2b be viable, it is likely to have mine design and economic viability implications on the Phase 3 Project, this will be evaluated in the EIA phase as part of the land use impact assessment. Overall however, the sensitivity-based approached (Process Alternative S1c) is preferred based on the preliminary Scoping phase findings and will be the alternative guiding further investigations during the EIA phase.

10.1.2 PROCESS ALTERNATIVE

The relevant process alternatives for consideration in the EIA phase, largely pertain to waste location and handling (i.e. discard stockpiles), dewatering options, as well as water supply initiatives for proposed Phase 3 Project, are discussed in this section. The Phase 3 Project pertains to a new opencast mining pit as an extension to the existing pit within Kangala Colliery. Since this project involves extending an existing pit currently being mined utilising the opencast mining method, the same method is recommended as the best option whereby the extension continues utilising the opencast mining method and thus being able to utilise existing infrastructure. This mining method is also best suited for mining a shallow coal resource, such as the target coal reserve. Therefore, no other mining method alternatives other than the proposed opencast mining method will be investigated further in the EIA phase.

The alternatives being carried forward to the EIA phase for further investigation and assessment relate to the waste location and handling, dewatering, and water supply options for the Phase 3 Project, as follows:

- The location and handling of discard stockpiles (hard, soft and topsoil material) includes four options whereby either the hard and soft discard is permanently stored or stockpiled on site (Process Alternative P2a); stockpiles stored at the Kangala Colliery stockpile areas (Process Alternative P2b); stockpiles stored at the rehabilitated Kangala Colliery pit area (Process Alternative P2c); or initial box cut discard used to backfill voids at Kangala Colliery (Process Alternative P2d). The current Kangala Colliery has several stockpiles on site therefore, stockpiling of the discard from the Phase 3 Project would fit with the current surrounding area land use. However, since the impact of cumulative effects is to be considered, and minimising the footprint of the proposed project would be of benefit to the receiving environment, Alternative P2b which is locating the discard at the existing Kangala Colliery

stockpile area has been identified as the most feasible and preferred and will be assessed further in the EIA phase.

- The dewatering of the mining pit area / mine workings will be assessed further in the EIA phase whereby the feasibility of two alternatives will be investigated towards the selection of the preferred option. These process alternatives involve either pumping the groundwater and treating it prior to discharging (Process Alternative P3a); or pumping the groundwater into a void and allowing the water to naturally evaporate over time (Process Alternative P3b).
- Water supply for the project is proposed to be obtained from either the dirty water containment facilities such as the proposed stockpile dumping area sumps and existing Kangala Colliery PCD (Process Alternative P4a); or from existing licensed sources such as boreholes and municipal supply (Process Alternative P4b). Therefore, during the EIA phase it will be determined if there are suitable dirty water containment facilities that can be utilised to supply water to the new pit extension area without introducing additional impacts, or if there is sufficient amounts of ground or surface water within the vicinity of the project area from which water can be extracted without added negative hydrological impacts. It is likely that a combination of these two alternatives may be preferred.

10.1.3 TECHNOLOGY ALTERNATIVES

Regarding the two transport options considered in terms of technology alternatives, the practicality and flexibility of the road transport option (Technology Alternative T1a) due to there being existing road networks in and around the proposed extension site, makes it the most feasible option over the use of a conveyor (Technology Alternative T1b). Therefore, this will be the alternative assessed further in the EIA phase whereas the use of a conveyor to transport the coal from the pit to the CHPP at Kangala Colliery, has been scoped out.

10.1.4 ACTIVITY ALTERNATIVES

The mining option (Activity Alternative A1) will be assessed in more detail during the EIA phase and the option to continue with farming (Activity Alternative A2) has been scoped out based on the project's needs and desirability as discussed in Section 5 of this Scoping Report. The no-go or 'do nothing' option is the same as keeping the current *status quo* of farming, and therefore provides the baseline against which the impacts of other alternatives should be compared.

10.2 DESCRIPTION OF THE ASPECTS TO BE ASSESSED AS PART OF THE ENVIRONMENTAL IMPACT ASSESSMENT PHASE

The following aspects will be assessed further during the EIA phase investigations to be undertaken:

- Heritage;
- Social;
- Biodiversity
- Soils;
- Hydrology (surface water);
- Hydrogeology (ground water);
- Wetlands;
- Blasting and vibrations;
- Land use economics;
- Noise;
- Visual;
- Air quality; and
- Climate change.

10.3 ASPECTS TO BE ASSESSED BY SPECIALISTS

Table 33 below details the various aspects of the project to be addressed in the EIA phase through detailed impact assessment specialist studies. The table also includes a proposed scope of work / terms of reference for each of the impact assessment specialist studies.

Table 33: Details of specialists appointed for the EIA Phase

Aspect	Component	Company Responsible	Scope of Work for EIA
Biodiversity	Biodiversity (Fauna and Flora) Scoping Report	The Biodiversity Company	The following will be undertaken in more detail during the EIA phase as part of the biodiversity impact assessment studies : • Geographic Information Systems (GIS) Mapping • Botanical Assessment • Literature study • Wet Season Fieldwork o Floristic Analysis – The wet season fieldwork and sample sites are placed within targeted areas (i.e. target sites) perceived as ecologically sensitive based on the preliminary interpretation of satellite imagery (Google Corporation) and GIS analysis (which included the latest applicable biodiversity datasets) available prior to the fieldwork. The focus of the fieldwork will therefore be to maximise coverage and navigate to each target site in the field in order to perform a rapid vegetation and ecological assessment at each sample site. Emphasis will be placed on sensitive habitats, especially those overlapping with proposed infrastructure development areas. Homogenous vegetation units will be subjectively identified using satellite imagery and existing land cover maps. The floristic diversity and search for flora SCC will be conducted through timed meanders within representative habitat units delineated during the scoping fieldwork. Emphasis will be placed mostly on sensitive habitats overlapping with the proposed infrastructure or mining areas.

Aspect	Component	Company Responsible	Scope of Work for EIA
			The timed random meander method is a highly efficient method for conducting floristic analysis, specifically in detecting flora SCC and maximising floristic coverage. In addition, the method is time and cost effective and highly suited for compiling flora species lists and therefore gives a rapid indication of flora diversity. The timed meander search was performed based on the original technique described by Goff et al. (1982). Suitable habitat for SCC were identified according to Raimondo et al. (2009) and targeted as part of the timed meanders. At each sample site notes will be made regarding current impacts (e.g. livestock grazing, erosion etc.), subjective recording of dominant vegetation species and any sensitive features (e.g. wetlands, outcrops etc.). In addition, opportunistic observations will be made while navigating through the project area. Effort will be made to cover all the different habitat types within the limits of time and access. ○ Faunal Assessment (Mammals & Avifauna) – The field survey component of the study will utilise a variety of sampling techniques including, but not limited to, the following: ▪ Camera trapping; ▪ Visual observations; ▪ Small mammal trapping (Sherman Traps); ▪ Identification of tracks and signs; and ▪ Utilisation of local knowledge. Site selection for trapping will focus on the representative habitats within the project area. Sites will be selected on the basis of GIS mapping and Google Earth imagery and then final selection shall be confirmed through ground truthing during the

Aspect	Component	Company Responsible	Scope of Work for EIA
			surveys. Habitat types sampled may include pristine, disturbed and semi-disturbed zones, drainage lines, wetlands and rocky ridges. ○ Herpetology (Reptiles & Amphibians) – A herpetofauna assessment of the project area will be conducted, including in-depth, site-specific research and focused searching. Ideally, surveys for herpetofauna should be conducted at those times when the target species or communities are known to be active because these periods of activity are more likely to lead to capture success (for most species). In South Africa, this is during the summer months and ideally after or during periods when rainfall is most likely or has recently occurred. Surveys will be conducted in each habitat or vegetation type within the project area, as identified from the desktop study, with a focus on those areas which will be most impacted by the proposed development (i.e. any infrastructure development or mining areas). The herpetological field survey will comprise the following techniques: ▪ Diurnal hand searches - are used for reptile species that shelter in or under particular microhabitats (typically rocks, exfoliating rock outcrops, fallen timber, leaf litter, bark etc.); ▪ Visual searches - typically undertaken for species whose behaviour involves surface activity or for species that are difficult to detect by hand-searches or pitfall trapping. may include walking transects or using binoculars to view species from a distance without them being disturbed; ▪ Amphibians – many of the survey techniques listed above will be able to detect species of amphibians. Over and above these techniques, vocalisation

Aspect	Component	Company Responsible	Scope of Work for EIA
			sampling techniques are often the best to detect the presence of amphibians as each species has a distinct call; and ▪ Opportunistic sampling - Reptiles, especially snakes, are incredibly illusive and difficult to observe. Consequently, all possible opportunities to observe reptiles are taken, in order to augment the standard sampling procedures described above. This will include talking to local people and staff at the site and reviewing photographs of reptiles and amphibians that the other biodiversity specialists may come across while on site.
Hydrology (surface water)	Surface Water Report	GCS Water and Environment (Pty) Ltd	A Hydrological Study (surface water assessment) has been undertaken and the findings thereof included in this Scoping Report. The findings of the hydrological study will also be utilised towards the completion of the EIA Report during the EIA phase.
Hydrogeology (groundwater)	Groundwater Report Waste Classification	Groundwater Square	A Hydrogeological Study (groundwater assessment) has been undertaken and the findings thereof included in this Scoping Report. The findings of the hydrogeological study will further be utilised towards the completion of the EIA Report during the EIA phase.
Wetlands	Wetlands Scoping Report	The Biodiversity Company	A Wetland Study has been undertaken and the findings thereof included in this Scoping Report. The findings of the wetland study will further be utilised towards the completion of the EIA Report during the EIA phase.
Heritage	Heritage Scoping Report	PGS Heritage	The Heritage Impact Assessment (HIA) report to be compiled by PGS Heritage (PGS) for the proposed Kangal Expansion Project will assess the heritage resources found on site. This report will contain the applicable maps, tables and figures as stipulated in the NHRA (no 25 of 1999), the

Aspect	Component	Company Responsible	Scope of Work for EIA

			National Environmental Management Act (NEMA) (no 107 of 1998) and the Minerals and Petroleum Resources Development Act (MPRDA) (28 of 2002). The HIA process consists of three steps:
			• Step I – Literature Review: The background information to the field survey leans greatly on the Heritage Scoping Report completed by PGS for this site;
			• Step II – Physical Survey: A physical survey was conducted on foot and by vehicle through the proposed project area by heritage specialists, aimed at locating and documenting sites falling within and adjacent to the proposed development footprint. – Completed during the Scoping Phase; and
			• Step III – The final step involves the assessment of resources in terms of the heritage impact assessment criteria and report writing, as well as mapping and constructive recommendations.
			The significance of heritage sites was based on four main criteria:
			• Site integrity (i.e. primary vs. secondary context);
			• Amount of deposit, range of features (e.g., stonewalling, stone tools and enclosures);
			  ○ Density of scatter (dispersed scatter),
			  ○ Low - <10/50m2,
			  ○ Medium - 10-50/50m2, and
			  ○ High - >50/50m2;
			• Uniqueness; and
			• Potential to answer present research questions.

Aspect	Component	Company Responsible	Scope of Work for EIA
			Management actions and recommended mitigation, which will result in a reduction in the impact on the sites, will be expressed as follows: A – No further action necessary; B - Mapping of the site and controlled sampling required; C - No-go or relocate pylon position D - Preserve site, or extensive data collection and mapping of the site; and E - Preserve site Site Significance – Site significance classification standards prescribed by the South African Heritage Resources Agency (2006) and approved by the Association for Southern African Professional Archaeologists (ASAPA) for the Southern African Development Community (SADC) region, were used for the purpose of this report.
Soils	Soils Scoping Report	The Biodiversity Company	Field Verification Methodology: • A soil auger will be used to determine the soil form / family and depth. • The soil will be hand augured to the first restricting layer or 1.5 m. • Soil survey positions will be recorded as waypoints using a handheld GPS. • Soils will be identified to their soil family level as per the "Soil Classification: A Taxonomic System for South Africa" (Soil Classification Working Group, 1991). • Landscape features such as existing open trenches will also be helpful in determining soil types and depth.

Aspect	Component	Company Responsible	Scope of Work for EIA
			Land Potential Assessment: Land capability and agricultural potential is determined by a combination of soil, terrain and climate features. Land capability is defined by the most intensive long-term sustainable use of land under rain-fed conditions. At the same time an indication is given about the permanent limitations associated with the different land use classes (Smith, 2006) Land capability is divided into eight classes and these may be divided into three capability groups. The land classes and groups are arranged in order of decreasing capability and ranges of use. The risk of use increases from class I to class VIII (Smith, 2006). The land potential classes are determined by combining the land capability results and the climate capability of a region.
Visual	Visual Scoping Report	Environmental Planning and Design	As indicated in the Visual Scoping Report, a site visit is required in order to investigate and finalise the issues and impacts highlighted by the initial scoping exercise. The following methodology will be used in preparation of the Visual Impact Assessment Report: • Identification of issues raised in scoping phase, and site visit – Likely issues have already been identified in this scoping analysis. These issues will be verified from a site visit as well as response from stakeholders to the Scoping Report. • Description of the receiving environment and the proposed project – The receiving environment has been described and categorised. This will be verified from a site visit. • Establishment of view catchment area, view corridors, viewpoints and receptors – Zones of theoretical visibility and visual receptors have been established from GIS analysis. These will be verified from a site visit. Existing mining operations should help to provide a useful guide as to likely visibility of the proposed development.

Aspect	Component	Company Responsible	Scope of Work for EIA
			Viewpoints will be identified from a site visit to represent views of visual receptors. • Indication of potential visual impacts using established criteria – Areas of likely visual impacts have been identified and described from this scoping exercise. These impacts will be verified from a site visit. It is possible that additional impacts might be identified form the site visit and from comments by stakeholders. Impacts will be assessed using a numerical assessment system that has been adopted by Environmental Impact Management Services for the overall assessment. This methodology is tried and tested and its use will ensure that the Visual Impact Assessment can be easily incorporated into the Environmental Impact Assessment. • Inclusion of potential lighting impacts at night – The impact of lighting at night will be included in the assessment using the above criteria. • Description of alternatives, mitigation measures and monitoring programmes – The alternatives that have been identified for this project as well as the "no-go" alternative will be considered in the assessment. Mitigation and monitoring measures will be developed during the preparation of the VIA report. • Review by independent, experienced visual specialist (if required) – Confirmation of this requirement is needed.
Noise	Noise Scoping Report	Enviro-Acoustic Research (EAR)	The following is the Plan of Study (PoS) for the EIA with regards to Noise Impact Assessment: • Site visit to confirm the status of the identified NSD. • Site visit to measure the ambient sound levels.

Aspect	Component	Company Responsible	Scope of Work for EIA
			• Data (location of equipment/activities, type of equipment/noise-generation activities, number of equipment or activities that simultaneously could generate noise) as received from the developer will be used to model the potential noise impact. • The potential impact will be evaluated (where possible) in terms of the nature (description of what causes the effect, what/who might be affected and how it / they might be affected) as well as the extent of the impact. • The potential significance of the identified issues will be calculated based on the evaluation of the issues / impacts. • The development of an Environmental Management Plan and a proposal of potential mitigation measures (if required). • Recommendations.
Blasting and vibration	Blasting and vibration Scoping Report	Blast Management & Consulting	In order to complete impact assessment, the following is required to be done: • Conduct a site visit for determining location of structures and structure profile – determine typical structures and installations that are found in within the influence radius form the operation. • Obtain all relevant data and information on proposed blasting methods and methodology. • The process then consists of modelling the expected impact based on planned drilling and blasting information for the operation. Various accepted mathematical equations are applied to determine the attenuation of ground vibration, air blast and fly rock. These values are then calculated over distance from site and shown as amplitude level contours. Overlay of these contours with the location of the various receptors then give

Aspect	Component	Company Responsible	Scope of Work for EIA
			indication of the possible impact and expected result of potential impact. Evaluation of each receptor according to the predicted levels will indicate level of possible influence and required mitigation if necessary. The possible environmental or social impacts are then addressed in the detailed EIA phase investigation. • Prepare a report that provides the discussion and outcomes of all evaluations. • Present the outcomes to interested and affected parties if required.
Air quality	Air quality Scoping Report	Airshed	The following is planned for the EIA phase: • The establishment of the future mining operations' emissions inventory. • Atmospheric dispersion simulations for the future mine area. • A human health risk and nuisance impact screening assessment based on dispersion simulation results. • An Air Quality Impact Assessment (AQIA) as part of the Environmental Impact Assessment (EIA) process in the prescribed specialist report format in accordance with Appendix 6 of the EIA Regulations (2014, as amended).
Land use economics	Land use economics Scoping Report	Strategy for Good	Workplan to calculate alternative land-use analysis and economic impacts during the EIA phase including information needed / process to follow, is presented below. • Interviews with farmers, the mine and other key stakeholders to obtain the information required below – *Individual meetings and attendances of public participation hearings*. • The project's GGP will be calculated using the MWP. GGP is the sum of EBITDA and salaries and wages and these numbers are therefore available based on its submitted MWP – *Obtain latest copy of MWP*.

Aspect	Component	Company Responsible	Scope of Work for EIA
			• The GGP lost will be calculated based on the best agricultural yields per hectare, as opposed to the actual yields in the project area. The reason for this is that the farms belong to the applicant and is being leased out to existing farmers. Therefore, one would expect that the farms may not be as well utilised as is expected – *Obtain latest economic yields per hectare in local area. Compare to actual yields on piece of land*. • Most of the other economic quantities, for example foreign exchange benefits or losses, fiscal numbers, and others are a function of GGP and these will be modelled using known economic quantitative formulae – *Undertake economic modelling.* • The multiplier effect used will be based on national and regional published multipliers. Multipliers for a project area is notoriously inaccurate because of project specific leakages, but given that multipliers are simply a subset of the direct impacts, the latter is the most instructive and these quantities have a high degree of correctness – *Analyse the mine's current procurement data. Obtain national data*. • The competitiveness rating will be done based on literature research and interviews with the mine – *Literature search*. • The employment quantities are well-known – *Confirm this information*. • Potential Agricultural hectares directly displaced is available – *None*. • Precautionary approach (radius of 1 km around mine) – *None*. • Total Potential agricultural land lost – *Sum of above*. • Estimated market value for agricultural land ph (R'000) – *Desktop literature search to determine value of farms*. • Potential Agricultural Land Value Lost – *Product of the above*.

Aspect	Component	Company Responsible	Scope of Work for EIA
			• Life of mine / economic generation (years) – *Given*. • Initial construction employment (FTEE) – *Calculated*. • Adjust for 2 years construction – *Calculate*. • Employees per 100 hectare in agriculture – *Research and interview with farmers*. • Add new employment/jobs retained vs opportunity losses – *Given*. • Employment based on FTEE – *Calculated*. • FTEE Jobs Created / Retained / (Lost) *inc constrc'n – Given*. • GDP per employee (R'000) – *Calculated*. • GDP added/lost per annum (Rm) – *Calculated*. • Discount Rate – *Calculated*. • Period of Discount – *Given*. • Present Value of EVA (GDP) (Rm) – *Calculated*. • Total Investment/(Property Value Lost) – *Calculated*. • Total Present Value of EVA + Property value(Rm) – *Calculated*. • Potential Agricultural hectares directly displaced – *Calculated*.
Social	Social Scoping report	NLN Consulting (Pty) Ltd	The activities that will form part of the impact assessment phase are guided by the information requirements and EIA studies as summarised below: <u>Qualitative Data Collection</u> This will be done by means of key informant interviews (either individual or group discussions). A maximum of five (5) such engagement sessions will be conducted, involving representatives of

Aspect	Component	Company Responsible	Scope of Work for EIA
			local government, local community leadership, potentially-affected landowners and land users, local business operators and the like. The main aims of such consultation will be to: • Assess stakeholders' perceptions, concerns and expectations regarding the Project and its cumulative effects; • Verify baseline socio-economic information; • Identify potential impacts that the Project could have on people's lives and livelihoods; and • Help identify possible mitigation measures to avoid or reduce negative impacts and enhance any positive impact. <u>Economic Modelling</u> Input-output (I/O) modelling will be used to assess the Project's potential impact on employment and economic output. The I/O analyses is based on: • Direct impacts (income and employment created due to employment by the project); • Indirect impacts (backward linkages to local suppliers); and • Induced impacts due to the overall increase in income levels and increased spending on goods and services which could lead to a further increase in production and employment in the local area. <u>Impact Identification and Assessment</u> Potential socio-economic impacts will be identified through information obtained from interviews with key informants, specialist opinion and experience from other similar projects. The following

Aspect	Component	Company Responsible	Scope of Work for EIA
			impact rating system (provided by EIMS) will be applied to determine the severity and significance of identified socio-economic impacts. <u>Mitigation / Enhancement Measures and Recommendations</u> Mitigation measures will be prescribed with the aim of avoiding or ameliorating negative socio-economic impacts and enhancing potential positive impacts. The rating exercise described above will be repeated to assess the severity and significance of any residual impacts remaining after mitigation measures have been implemented. <u>Reporting</u> The results of the study will be presented in the form of a specialist SIA report that can be incorporated into the final EIA report. The SIA report will include: • An executive summary; • Overview of the project; • The socio-economic baseline profile; • Sensitivity map(s); • Summary of consultations and key discussion points; • A description of the key project influences on the socio-economic baseline profile; • Impact assessment tables reflecting the nature, geographical extent, probability, reversibility, loss of resources, duration, cumulative effect, and resultant significance of the impact; • Mitigation / enhancement measures; and • Recommendations.

Aspect	Component	Company Responsible	Scope of Work for EIA
			Preliminary findings of other specialist studies forming part of the separate EIA process will also be considered. The findings of specifically the following specialist studies are deemed relevant – where available: • Heritage; • Visual; • Air quality; • Noise; • Soils and Agriculture Potential; and • Waste Classification. The relevance of such findings stems from the fact that impacts on, for example, the visual qualities of landscapes may also affect the lives and well-being of people living in the area.

10.4 PROPOSED METHOD OF ASSESSING ENVIRONMENTAL ASPECTS

The same method of assessing impact significance as was used during the Scoping phase will be applied during the EIA phase. This methodology is described in detail in Section 9.1 of this Scoping Report.

10.5 PROPOSED METHOD FOR ASSESSING DURATION SIGNIFICANCE

The significance of environmental impacts will be rated before and after the implementation of mitigation measures. These mitigation measures may be existing measures or additional measures that may arise from the impact assessment and specialist input. The impact rating system considers the confidence level that can be placed on the successful implementation of the mitigation. The proposed method for the assessment of environmental issues is set out in the Section 9.1. This assessment methodology enables the assessment of environmental issues including: the severity of impacts (including the nature of impacts and the degree to which impacts may cause irreplaceable loss of resources), the extent of the impacts, the duration and reversibility of impacts, the probability of the impact occurring, and the degree to which the impacts can be mitigated.

The specialist studies will recommend practicable mitigation measures or management actions that effectively minimise or eliminate negative impacts, enhance beneficial impacts, and assist project design. If appropriate, the studies will differentiate between essential mitigation measures, which must be implemented and optional mitigation measures, which are recommended ("nice-to-haves").

10.6 STAGES AT WHICH COMPETENT AUTHORITIES WILL BE CONSULTED

Competent authorities were consulted during the initial notification period, the scoping phase, and will further be consulted during the EIA phase. A pre-application meeting was held with the DMR on 30th September 2018. No additional authority meetings are scheduled during the scoping phase. However, if and / or when an authority requires a meeting, one will be arranged. Should a meeting be required, the date, time, and venue of the meeting will be scheduled post dissemination of the project notification documents. The purpose of the authority meeting would be to explain the project in detail to authorities and clarify the process going forward.

10.7 PROPOSED METHOD OF PUBLIC PARTICIPATION

An overview of the proposed public participation process to be followed for the EIA phase is provided below. The commenting periods that will be provided to the I&APs (and the competent authorities) will be thirty (30) days long. Two commenting periods are provided for during this EIA process, these will be during the review period of the:

- Scoping Report; and
- EIA Report and associated EMPr.

All comments received during the initial notification and call to register have been included in this Scoping Report, and comments received during the Scoping Report comment period will be included in the finalised Scoping Report for submission to the competent authority. The details pertaining to the review of the EIA Report and EMPr, the venue where the report will be placed for review, as well as the duration of the comment period, will be determined at a later date and communicated to all registered I&APs.

10.7.1 STEPS TO BE TAKEN TO NOTIFY INTERESTED AND AFFECTED PARTIES

I&APs were notified of the proposed application via registered letters, emails and facsimiles. The Public Participation Process has been and will continue to be undertaken in accordance with the NEMA EIA Regulations (2014, as amended). A minimum of 30 days was provided to the public to register as I&APs and provide initial comments on the project, a further 30 days was provided for to comment on the Scoping Report. The information submitted by I&APs will be utilised during the Impact Assessment and compilation of the EIA Report and associated EMPr. Upon acceptance of the Scoping Report by the competent authority, the EIA phase will commence. An EIA Report will be compiled presenting the findings of the EIA phase, this report will be made available for public review and comment for a further 30 days.

Feedback from I&APs has been and will be solicited through the following means:

- Advertisements;
- Site notices and posters;
- Registered letters;
- Facsimile and e-mails; and
- Any other communication with EIMS, which includes SMS's.

10.7.2 DETAILS OF ENGAGEMENT PROCESS TO BE FOLLOWED

I&APs will be afforded the following opportunities to participate in the project:

- I&APs have been requested via written notifications distributed to provide their views, queries and / or comments on the project;
- The EIA Report and EMPr will be available for comment for a period of 30 days at the same public places in the project area that the Scoping Report was made available. Furthermore, copies of the said report sent to stakeholders who request a copy, and placed on the EIMS website: www.eims.co.za; and
- A public meeting will be held during the review periods of both the Scoping and EIA Reports. Focus group meetings will also be held with key stakeholders, where applicable.

All comments and issues raised during the Scoping Report 30-day public comment period will be incorporated into the final Scoping Report, and the comments from the EIA Report and EMPr review period will be included in the finalised EIA Report and EMPr to be submitted to the competent authority for decision-making.

10.7.3 DESCRIPTION OF INFORMATION TO BE PROVIDED

The following information will be provided during the EIA phase PPP:

- The site layout plan;
- List of activities to be authorised;
- Scale and extent of activities to be authorised;
- Typical impacts of activities to be authorised (e.g. surface disturbance, dust, noise, drainage, fly rock etc.);
- The duration of the activity;
- Sufficient detail of the intended operation to enable communities to assess what impact the activities will have on them or on the use of their land);
- The purpose of the proposed project;
- The proposed mining method;
- Details of the affected properties (including parent farm and portion);
- Details of the MPRDA and NEMA Regulations that must be adhered to;
- The mineral being mined;
- Date by which comment, concerns and objections must be forwarded through to both EIMS and / or the DMR respectively; and
- Contact details of the Environmental Assessment Practitioner (EAP).

10.8 DESCRIPTION OF TASKS THAT WILL BE UNDERTAKEN DURING THE EIA PROCESS

The plan of study in terms of certain aspects or specialist fields is detailed in the above sections, and is summarised below. The following tasks will be undertaken as part of the EIA phase of the project:

- Detailed specialist studies;
- Public consultation:
    - Notification of the availability of the EIA Report for review and comment to all registered I&APs;
    - Informing registered I&APs of the project progress; and
    - Public and focus group meetings, if required.
- Authority consultation:
    - Consultation with DMR and the commenting authorities; and
    - Other relevant / commenting authorities' consultation (including meetings where necessary) to provide authorities with project related information and obtain their feedback.
- Document compilation:
    - The EIA Report and associated EMPr will be compiled in line with the requirements of Appendix 3 and 4 of the NEMA EIA Regulations (2014, as amended);
    - The EIA Report and EMPr will be made available for public comment for a period of 30 days; and
    - The EIA Report and EMPr will be finalised and submitted to the DMR.

10.9 MEASURES TO AVOID, REVERSE, MITIGATE, OR MANAGE IMPACTS

All comments received by I&APs will be taken into consideration and will inform the high-level mitigation measures. Detailed mitigation measures will be further developed as part of the EIA phase. The potential impacts identified during the Scoping phase will further be assessed in terms of the mitigation potential, taking into consideration the following:

- Reversibility of impact:
    - Reversible;
    - Partially reversible.; and
    - Irreversible.
- Irreplaceable loss of resources:
    - Replaceable;
    - Partially replaceable; and
    - Irreplaceable.
- Potential of impacts to be mitigated:
    - High;
    - Medium; and
    - Low.

The assessment findings for each identified impact taking the above into consideration will be provided in the EIA Report and associated EMPr.

11 SENSITIVITY MAPPING

Environmental sensitivity mapping provides a strategic overview of the environmental, cultural and social assets in a region. The sensitivity mapping technique integrates numerous datasets (base maps and shapefiles) into a single consolidated layer making use of Geographic Information System (GIS) software and analysis tools. Environmental sensitivity mapping is a rapid and objective method applied to identify areas which may be particularly sensitive to development based on environmental, cultural and social sensitivity weightings – which is determined by specialists' input within each respective field based on aerial or ground-surveys. Therefore, the sensitivity mapping exercise assists in the identification of low, medium and highly sensitive areas within the Phase 3 Project area, towards selecting the preferred location, design and layout, and process or technology alternatives for the proposed activities and infrastructure.

This sensitivity mapping approach allows for the proposed Phase 3 Project activities to be undertaken whilst protecting identified sensitive environmental areas / features. Furthermore, environmental sensitivity is used to aid in decision-making during consultation processes, forming a strategic part of Environmental Assessment processes. Table 34 below provides a breakdown of the sensitivity rating and weightings applied to determine the sensitivity score of each aspect, and Figure 41below presents how the sensitivity mapping technique integrates numerous datasets into a single consolidated sensitivity layer, and Figure 42 presents the preliminary combined sensitivity map according to heritage, biodiversity, wetlands, social, soil land types, blasting and vibrations, noise and air quality sensitivities in and around the proposed Phase 3 Project area.

The preliminary combined sensitivity map includes individual sensitivities according to heritage, social, blasting and vibration, noise, wetlands, air quality and soil land type features in and around the project area (refer to Appendix B for the individual sensitivity maps). The sensitivities related to hydrogeology (groundwater), visual, land use economics and climate change were excluded as their effects cannot be directly or accurately measured to ascertain sensitivity. Climate change effects occur over time and at a very broad scale influencing several features and thus, it is not possible to assign sensitivity at project area level. Groundwater features are continuous in nature and their sensitivity or vulnerability dependant on various entities (e.g. water travel time, contamination migration, plume stability, soil, etc.) making it difficult to directly and accurately measure or assign sensitivity at project area level. Furthermore, land use economics pertain to the economic value of different land uses in an area which cannot be allocated sensitivity criteria due to their variability. Lastly, the exclusion of visual sensitivity as part of the combined sensitivity map does not mean that there will be no visual sensitivities, but indicates that the entire site and its surroundings is already visually impacted upon by similar activities as the proposed development (i.e. as the Kangala Colliery pit activities decrease including their visual impacts, they will be replaced by the similar activities with similar visual impacts at the proposed new extension site), and thus the project area and its immediate surroundings cannot be assigned different levels of sensitivity.

The identified preliminary sensitivities (heritage, social, blasting and vibration, noise, wetlands, air quality and soil land type features) will be further assessed during the EIA phase, and a final combined sensitivity map produced which will inform the selection of the preferred location and layout alternatives for the proposed Phase 3 Project new mining pit and associated stockpiles, as well as some secondary access roads where required.

Table 34: Sensitivity rating and weighting

Sensitivity Rating	Description	Weighting
Least concern	The inherent feature status and sensitivity is already degraded or contain no inherent sensitivities. The proposed development will not affect the current status and/or may result in a positive impact. These features would be the preferred alternative for mining or infrastructure placement.	-1
Low/Poor	The proposed development will not have a significant effect on the inherent feature status and sensitivity.	0
High	The proposed development will moderately negatively influence the current status of the feature.	1
Very high	The proposed development will have a significantly negative influence on the current status of the feature.	2

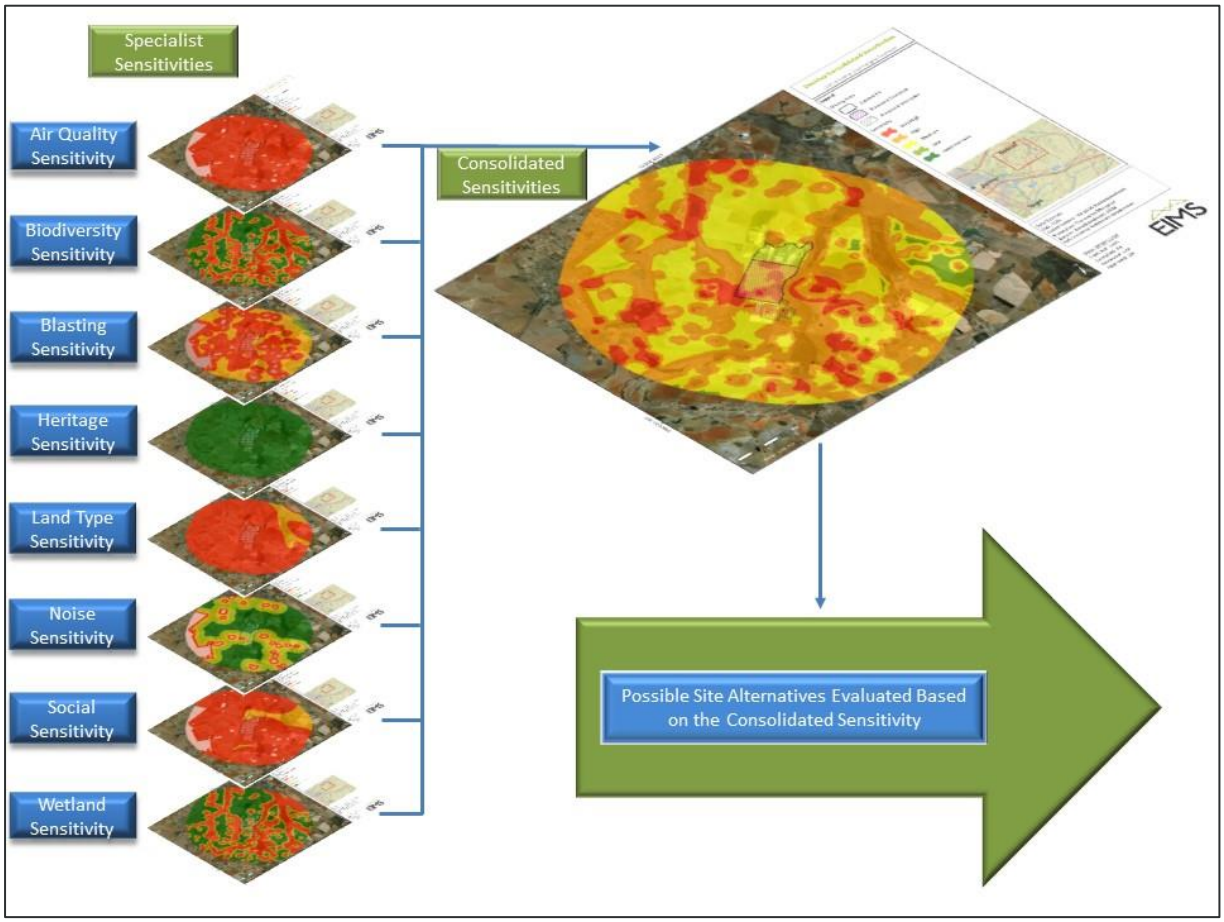

Figure 41: Sensitivity mapping approach

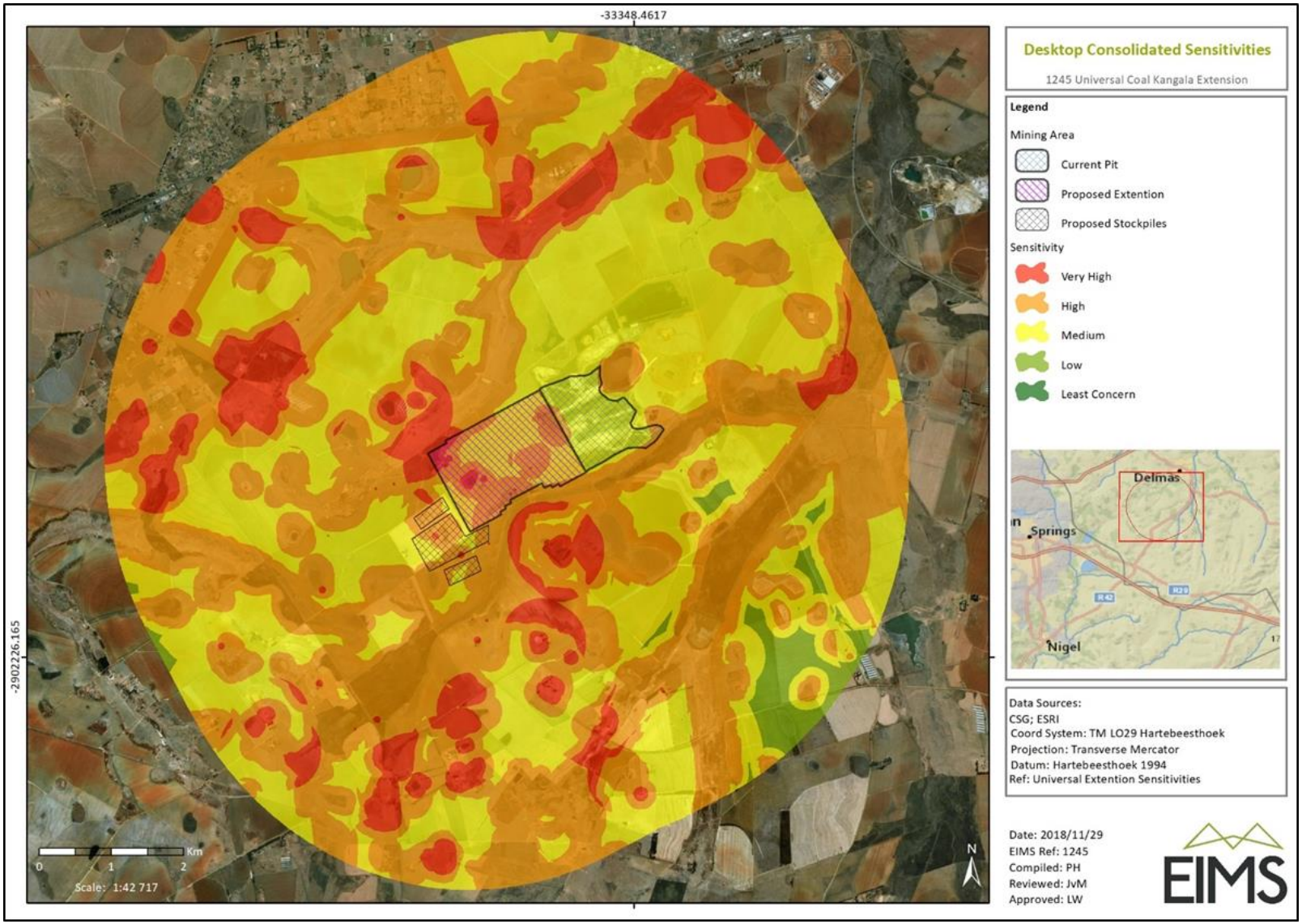

Figure 42: Preliminary sensitivity map

12 ASSUMPTIONS, LIMITATIONS AND UNCERTAINTIES

Certain assumptions, limitations, and uncertainties are associated with the Scoping Phase. This report is based on information that is currently available and, as a result, the following limitations and assumptions are applicable:

- The Scoping Report is based on project information provided by the client;
- The Scoping Report is based on a project description taken from drawings and design specifications for the proposed mine extension that have not yet been finalised, and which are likely to undergo a number of iterations and refinements before they can be regarded as definitive. A project description based on the final design will be provided in the EIA phase;
- The description of the baseline environment has been obtained from specialist studies; and
- The levels of confidence for the impact assessment section (Chapter 9) are considered low until detailed specialist input is obtained in the EIA phase.

Furthermore, certain assumptions, limitations, and uncertainties are associated with the Scoping phase specialist studies and these are detailed for each aspect below.

12.1 BIODIVERSITY

The assessment represents the Scoping phase of the project only. After further field surveys a final biodiversity baseline and impact assessment report will be submitted.

12.2 HERITAGE

Not detracting in any way from the comprehensiveness of the fieldwork undertaken, it is necessary to realise that the heritage resources located during the fieldwork do not necessarily represent all the possible heritage resources present within the area. Various factors account for this, including the subterranean nature of some archaeological sites and the current dense vegetation cover. As such, should any heritage features and/or objects not included in the present inventory be located or observed, a heritage specialist must immediately be contacted.

Such observed or located heritage features and / or objects may not be disturbed or removed in any way until such time that the heritage specialist has been able to make an assessment as to the significance of the site (or material) in question. This applies to graves and cemeteries as well. In the event that any graves or burial places are located during the development, the procedures and requirements pertaining to graves and burials will apply as set out in the Heritage Report.

12.3 SOIL

The scoping level soil assessment was conducted as a desktop study exercise only, no site inspections have been completed. The scoping study has therefore assumed that all information provided for the project is correct.

12.4 SOCIAL

Although every reasonable effort was made to provide an updated and representative picture of the socio-economic setting, this report is still subject to the following assumptions and limitations:

- The report is only intended as a scoping report and is therefore solely based on secondary data. The sources consulted during the compilation of the report are not exhaustive but deemed sufficient to meet the Scope of Work for the current Scoping phase. No relevant information was deliberately excluded from this report; and
- It was assumed that the motivation for, and the ensuing planning and feasibility studies of the Phase 3 Project were done with integrity, and that the information provided to date by the independent EAP was accurate.

12.5 LAND USE ECONOMICS

With respect to this scoping study, the following assumptions and limitations have been made:

- That the mine will be economically viable;
- That the farmland that is being replaced is producing farm produce at an optimum level;
- Although this is a rule of thumb, that an economic generation is 25 years, and hence the 9-year life of mine is compared to the agricultural production of 25 years;
- The both Agriculture and Mining are important economic sectors for the project area;
- That detailed stakeholder consultations will follow and this will inform the final report;
- That no environmental fatal flaw impact exists that will make the economic benefits scoped in this report invalid; and
- That at the writing of this report detailed multiplier effects had not been interrogated.

12.6 WETLANDS

The following are applicable to the wetland study:

- Access to some areas adjacent to the project area (within the required 500m project area radius) was restricted. As much of the area was ground-truthed as possible, but extrapolations have been made for these adjacent areas; and
- The GPS used for wetland delineations is accurate to within five meters. Therefore, the wetland delineation plotted digitally may be offset by at least five meters to either side.

12.7 HYDROLOGY (SURFACE WATER)

The water balance assumes the following:

- Rainfall related inflows and evaporation related losses for the wet and dry season scenarios were estimated based on: i) average values during the three driest months of the year; and ii) average values during the three wettest months of the year;
- Runoff coefficients for each surface were fixed and not influenced by antecedent moisture conditions;
- Catchment and surface areas for the wet and dry periods are constant;
- The summary of areas and runoff factors are listed below:
    - Open pit area - 2 213 900 m2 (year 10 strip mining area), runoff factor of 0.5,
    - Waste Rock Dump (WRD) surface area - 638 000 m2, runoff factor of 0.25,
    - Sump surface area – 110 695 m2 (5 % of open pit area); and
- The Open Pit assumes a total groundwater ingress rate of 280 m3/day when developing the water balance based on the 8th year total water influx into the Open Pit.

12.8 HYDROGEOLOGY (GROUNDWATER)

The conceptual model forms the basis for the numerical groundwater flow and contaminant transport models that were used to assess the potential impacts associated with the proposed new mining and related activities on both groundwater quality and water levels. Although the geohydrological investigation was entirely a desktop study, we are of opinion that the groundwater and related information used in the formation of the conceptual model and subsequent construction and calibration of the numerical groundwater models are more than sufficient to allow for an acceptable assessment.

Some data gaps were however encountered during the investigation and a few assumptions consequently had to be made:

- The Bayesian interpolation technique was used to estimate groundwater elevations in areas where no water level information is available. Local over- and / or underestimations of the actual water levels are bound to occur as a result of groundwater abstraction, artificial aquifer recharge and the highly heterogeneous nature of the fractured rock aquifer underlying the project area; and
- No form of geochemical testing was performed for the Phase 3 Project investigation. Numerous geochemical investigations were however performed for the Kangala Colliery, providing a good understanding of the geochemistry of the underlying geology. Nonetheless, the Delmas Coalfield (especially the targeted Bottom Seam) is complex and difficult to correlate with the Witbank Coalfield that hosts the Kangala Colliery coal reserves. The possibility therefore exists that the geochemistry of coal and waste material from the Phase 3 Project may differ from that of Kangala and a dedicated site-specific geochemical investigation is consequently recommended.

12.9 BLASTING AND VIBRATION

The following assumptions have been made:

- The anticipated areas of influence estimated in this report are based on the authors experienced from general blasting operations in the opencast coal environment;
- Accepted international and local standards with regulations are applied to guide the determination of expected influence areas;
- The assumption is made that the predicted influence areas are a good estimate. These will have to be confirmed with prediction models based on blast information data;
- Blast Management & Consulting was not involved in the mine or planned blast designs to be used; and
- The work done is based on the author's knowledge and information provided by the project applicant.

12.10 NOISE

Limitations relating this the Noise Study for Scoping are:

- Ambient sound levels are the cumulative effects of innumerable sounds generated at various instances both far and near. High measurements may not necessarily mean that noise levels in the area are high. Similarly, a low sound level measurement will not necessarily mean that the area is always quiet, as sound levels will vary over seasons, time of the day, faunal characteristics, vegetation in the area and meteorological conditions (especially wind). This is excluding the potential effect of sounds from anthropogenic origin. It is impossible to quantify and identify the numerous sources that influenced one 10-minute measurement using the reading result at the end of the measurement. Therefore, trying to define ambient sound levels using the result of one 10-minute measurement will be very inaccurate (very low confidence level in the results) for the reasons mentioned above. The more measurements that can be collected at a location the higher the confidence levels in the ambient sound level determined. The more complex the sound environment, the longer the required measurement (especially when at a community or house. This study did collect measurements at one location for approximately 2 full night-time periods in 10-minute bins. It is assumed that the measurement location represents other residential dwellings in the area (similar environment), yet, in practice this can be highly erroneous as there are numerous factors that can impact on ambient sound levels, including:
    - The distance to closest trees, number and type of trees as well as the height of trees,
    - Available habitat and food for birds and other animals,
    - Distance to residential dwelling, type of equipment used at dwelling (compressors, aircons),
    - General maintenance condition of house (especially during windy conditions), and

- Number and type of animals kept in the vicinity of the measurement locations;

- Determination of existing road traffic and other noise sources of significance are important (traffic counts etc.). Traffic however is highly dependent on the time of day as well as seasonal differences. Traffic is a major noise source in locations close to main roads;
- Measurements over wind speeds of 3 m/s could provide data influenced by wind-induced noises. While the windshields used limits the effect of fluctuating pressure across the microphone diaphragm, the effect of wind-induced noises in the trees in the vicinity of the microphone did impact on the ambient sound levels. The site visit unfortunately coincided with a relatively windy period;
- Ambient sound levels are dependant not only on time of day and meteorological conditions, but also change due to seasonal differences. Ambient sound levels are generally higher in summer months when faunal activity is higher and lower during the winter due to reduced faunal activity. Winter months unfortunately also coincide with lower temperatures and very stable atmospheric conditions, ideal conditions for propagation of noise; and
- Ambient sound levels recorded near rivers, streams, wetlands, trees and bushy areas can be high. This is due to faunal activity which can dominate the sound levels around the measurement location.

12.11 VISUAL

The following limitations and assumptions should be noted:

- The main limitation is that the scoping phase document is a desk top assessment. Whilst this is appropriate for the scoping stage as it is intended to identify key issues that need to be addressed in detail as the assessment stage. It is therefore possible that additional issues may be identified during the site visit. It is also possible that impacts identified at the scoping stage could have greater or lesser significance than highlighted in this document;
- In the assessment tables, Prioritisation Factors have been applied to the Environmental Risk score based on the assumption that relevant suggested management/mitigation impacts are implemented;
- In the assessment tables the subjective judgement as to whether an impact is negative or positive is based on the assumption that the majority of people are likely to prefer to view a natural or a rural landscape than a mine or industrial landscape; and
- In undertaking the assessment, it has been assumed that the stockpiles associated with the mine extension will be similar in height to the stockpiles associated with the existing mine.

12.12 AIR QUALITY

The following important assumptions, exclusions and limitations to the specialist study should be noted:

- No provision was made for:
    - Emission estimation, dispersion modelling and impacts assessment for the nearby Leeuwpan Colliery and Stuart Colliery, but impact prioritisation taking cumulative impacts into account was done to determine the final impact significance ratings associated with each phase of the project,
    - Ambient air quality sampling/monitoring,
    - Dust fallout sampling,
    - Meteorological monitoring.
- The health risk assessment was limited to the screening of ambient air concentrations against NAAQS and applicable international legal guidelines and limits (WHO, IFC and US EPA). The scope of the study was confined to the quantification of impacts due to exposures via the inhalation pathway only;

- The impact of the operational phase was determined quantitatively through emissions calculation and dispersion simulation. Due to their temporary nature, the assessment of impacts from the construction and closure phases is mainly of a qualitative nature. A general estimation of emissions due to the construction phase was provided. No impacts are expected post-closure provided the rehabilitation of final land forms is successful;
- Meteorology:
    - In the absence of on-site meteorological data (that is required for atmospheric dispersion modelling), use was made of MM5 modelled meteorological data for the study site for the period 2014-2016,
    - The National Code of Practice for Air Dispersion Modelling prescribes the use of a minimum of one year on-site data or at least three years of appropriate off-site data for use in Level 2 assessments. It also states that the meteorological data must be for a period no older than five years to the year of assessment. The data set applied in this study complies with the requirements of the code of practice; and
- Emissions:
    - The impact assessment was limited to airborne particulates (including TSP, PM10 and PM2.5). These pollutants are either regulated under NAAQS or considered a key pollutant released by this operation,
    - **T**he quantification of sources of emission was restricted to the proposed Project. Although other existing sources of emission within the area were identified, such sources were not quantified as part of the emissions inventory and simulations. Their impact would be considered by ambient air quality monitoring in the region,
    - In the absence of detailed construction and decommissioning plans, fugitive dust emissions for these phases were discussed qualitatively. The confidence rating of these emissions is therefore low.

12.13 CLIMATE CHANGE

No provision was made for the following:

- GHG emission estimation and impact assessment
- Meteorological monitoring;
- GHG sampling / monitoring;
- Site visits; and
- Meetings.

13 UNDERTAKINGS

13.1 UNDERTAKING REGARDING CORRECTNESS OF INFORMATION

I __**John von Mayer**__ herewith undertake that the information provided in the foregoing report is correct, and that the comments and inputs from stakeholders and Interested and Affected Parties has been correctly recorded in the report.

Signature of the EAP

Date: __08 March 2019____

13.2 UNDERTAKING REGARDING LEVEL OF AGREEMENT

I ___**John von Mayer**___ herewith undertake that the information provided in the foregoing report is correct, and that the level of agreement with Interested and Affected Parties and stakeholders has been correctly recorded and reported herein.

Signature of the EAP

Date: __08 March 2019___

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15 APPENDICES

Appendix A: Environmental Assessment Practitioner (EAP) Curriculum Vitae

Appendix B: Maps

Appendix C: Public Participation

Appendix D: Specialist Reports