ENVIRONMENTAL IMPACT ASSESSMENT AND ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT
FOR
ERGOSAT (PTY) LTD - LEFA COLLIERY: MINING RIGHT

Various portions of the farm Wened 1152, Erfinis 269, Pretorius 1788, Smaldeel 683, Heilbron Groenpunt 880, Groenpunt 724, Driehoek 780, Hoeko 1163, Frisch Gewacht 1162, Goede Hoop 727 and Rus en Vrede 1647.

Metsimaholo Local and Fezile Dabi District Municipality DC20,
Free State Province
DMRE REF: FS 5/1/2/2/10033 MR

July 2020

Submitted as part of an application process for environmental authorisation in terms of the National Environmental Management Act (Act 107 of 1998) [as amended] in respect of listed activities that have been triggered by application in terms of the Mineral and Petroleum Resources Development Act (Act 28 of 2002) [as amended]

DOCUMENT HISTORY

Document Control, Quality Control and Disclaimer

Report	**ENVIRONMENTAL IMPACT ASSESSMENT AND ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT FOR ERGOSAT (PTY) LTD - LEFA COLLIERY: MINING RIGHT, DMRE REF: FS 5/1/2/2/10033 MR**		
Client	Ergosat (Pty) Ltd - Lefa Colliery		
Responsible Person	Contact: Mr. Heinrich Schultz Contact no.: +27 79 529 8873 Email : heinrich@africannickel.com		
Report Number	DEIA/EMPR_Ergosat_Revision	**Report Status**	Revision for PPP
Draft Report	13 July 2020	**Final Report:**	To be confirmed

Report no	Date	Version	Status
DEIA/EMPR_Ergosat_Revision	15 July 2020	0.0	Public Review

DOCUMENT COMPILED AND REVIEWED BY

Responsible person	Date	Position
DuToit Wilken	13 June 2020	EAP – Senior Specialist (Pr.Sci.Nat)
Signature		
Responsible person	**Date**	**Position**
Corlien Lambrechts	13 June 2020	EAP – Senior Specialist (Pr.Sci.Nat) EAPASA: 2020/935
Signature		

mineral resources

Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

ENVIRONMENTAL IMPACT ASSESSMENT REPORT
AND
ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

FOR LISTED ACTIVITIES ASSOCIATED WITH THE MINING RIGHT FOR ERGOSAT (PTY) LTD - LEFA COLLIERY: MINING RIGHT

VARIOUS PORTIONS OF THE FARM WENED 1152, ERFINIS 269, PRETORIUS 1788, SMALDEEL 683, HEILBRON GROENPUNT 880, GROENPUNT 724, DRIEHOEK 780, HOEKO 1163, FRISCH GEWACHT 1162, GOEDE HOOP 727 AND RUS EN VREDE 1647.

SUBMITTED FOR ENVIRONMENTAL AUTHORIZATIONS IN TERMS OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 AND THE NATIONAL ENVIRONMENTAL MANAGEMENT WASTE ACT, 2008 IN RESPECT OF LISTED ACTIVITIES THAT HAVE BEEN TRIGGERED BY APPLICATIONS IN TERMS OF THE MINERAL AND PETROLEUM RESOURCES DEVELOPMENT ACT, 2002 (MPRDA) (AS AMENDED).

Name of Applicant	**Ergosat (Pty) Ltd**
Project	**Lefa Colliery**
Contact person	Contact: Mr. Heinrich Schultz Email : heinrich@africannickel.com
Tel No	+27 79 529 8873
Fax No	None
Postal Address	P.O. Box 98924, Sloane Park, 2052
Physical Address	First Floor, Corner House Office Park, 1 Leslie Avenue East, Fourways, Gauteng
File Reference Numbers	**DMRE REF: FS 5/1/2/2/10033 MR**

IMPORTANT NOTICE

In terms of the Mineral and Petroleum Resources Development Act (Act 28 of 2002 as amended), the Minister must grant a prospecting or mining right if among others the mining "will not result in unacceptable pollution, ecological degradation or damage to the environment".

Unless an Environmental Authorisation can be granted following the evaluation of an Environmental Impact Assessment and an Environmental Management Programme report in terms of the National Environmental Management Act (Act 107 of 1998) (NEMA), it cannot be concluded that the said activities will not result in unacceptable pollution, ecological degradation or damage to the environment.

In terms of section 16(3)(b) of the EIA Regulations, 2014, any report submitted as part of an application must be prepared in a format that may be determined by the Competent Authority and in terms of section 17(1)(c) the competent Authority must check whether the application has taken into account any minimum requirements applicable or instructions or guidance provided by the competent authority to the submission of applications.

It is therefore an instruction that the prescribed reports required in respect of applications for an environmental authorisation for listed activities triggered by an application for a right or a permit are submitted in the exact format of, and provide all the information required in terms of, this template. Furthermore, please be advised that failure to submit the information required in the format provided in this template will be regarded as a failure to meet the requirements of the Regulation and will lead to the Environmental Authorisation being refused.

It is furthermore an instruction that the Environmental Assessment Practitioner must process and interpret his/her research and analysis and use the findings thereof to compile the information required herein. (Unprocessed supporting information may be attached as appendices). The EAP must ensure that the information required is placed correctly in the relevant sections of the Report, in the order, and under the provided headings as set out below, and ensure that the report is not cluttered with un-interpreted information and that it unambiguously represents the interpretation of the applicant.

OBJECTIVE OF THE ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

The objective of the environmental impact assessment process is to, through a consultative process—

(a) Determine the policy and legislative context within which the activity is located and document how the activity complies with and responds to the policy and legislative context;

(b) Describe the need and desirability of the activity, including the need and desirability of the activity in the context of the preferred location;

I Identify the location of the development footprint within the preferred site based on an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment;

(d) Determine the—-

  (i) Nature, significance, consequence, extent, duration and probability of the impacts occurring to inform identified preferred alternatives; and

  (ii) Degree to which these impacts—

    (aa) can be reversed;

    (bb) may cause irreplaceable loss of resources, and

    (cc) can be avoided, managed or mitigated;

(d) Identify the most ideal location for the activity within the preferred site based on the lowest level of environmental sensitivity identified during the assessment;

I Identify, assess, and rank the impacts the activity will impose on the preferred location through the life of the activity;

(f) Identify suitable measures to manage, avoid or mitigate identified impacts; and

(g) Identify residual risks that need to be managed and monitored.

Table of Contents

List of Tables

Page

Table of Figures

Page

List of Appendices

ABBREVIATIONS

Abbreviation	Description
ARC	Agricultural Research Council
BoQ	Bill of Quantities
BPEO	Best Practicable Environmental Option
DAFF	Department of Agriculture, Forestry and Fisheries
DEFF	Department of Environment, Forestry and Fisheries
DEA	Department of Environmental Affairs
DESTEA	Free State Department of Economic, Small Business Development, Tourism and Environmental Affairs
DM	District Municipality
DMRE	Department of Mineral Resources and Energy (previously Department of Mineral Resources - DMR)
DSR	Draft Scoping Report
DHSWS	Department of Housing Services, Water and Sanitation (previously Department of Water and Sanitation – DWS)
EAP	Environmental Assessment Practitioner
ECA	Environmental Conservation Act (Act 73 of 1989)
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EIR	Environmental Impact Assessment Report
EMPR	Environmental Management Programme
ESMS	Environmental and Social Management System
GNR	Government Notice Regulation
I&APs	Interested and Affected Parties
IDP	Integrated Development Programme
IEM	Integrated Environmental Management
IHAS	Invertebrate Habitat Assessment System
IHIA	Intermediate Habitat Integrity Assessment
IWUL	Integrated Water Use License
IWULA	Integrated Water Use License Application
LED	Local Economic Development
LM	Local Municipality
LOM	Life of Mine
MAMSL	Meter Above Mean Sea Level
MPRDA	Mineral and Petroleum Resources Development Act (Act 28 of 2002)
MRA	Mining Right Application
NAEIS	National Atmospheric Emission Inventory System
NEMA	National Environmental Management Act (Act 107 of 1998)
NEMAQA	National Environmental Management: Air Quality Act, 39 of 2004
NEMBA	National Environmental Management: Biodiversity Act (Act 10 of 2004)
NEMWA	National Environmental Management: Waste Act (Act 59 of 2008)
NFA	National Forest Act (Act 84 of 1998)
NHRA	National Heritage Resources Act (Act 25 of 1999)
NWA	National Water Act (Act 36 of 1998)
PAIA	Promotion of Access to Information Act (Act 2 of 2000)
PAJA	Promotion of Administrative Justice Act (Act 3 of 2000)
PES	Present Ecological State
PGMs	Platinum-Group Metals

PM10	Thoracic Particulate Matter
PM2.5	Inhalable Particulate Matter
PPP	Public Participation Process
ROM	Run of Mine
SAHRA	South African Heritage Resources Agency
SANRAL	South African National Roads Agency Limited
SANS	South African National Standard
SASS	South African Scoring System (Currently Version 5 is utilised)
SIA	Social Impact Assessment
SMME	South African Small, Medium and Micro Enterprise
TPA	Tons Per Annum
TSP	Total Suspended Particulates
WUL	Water Use License
WML	Waste Management License

INTRODUCTION

Ergosat (Pty) Ltd. (the Applicant) was issued with an Integrated Environmental Authorisation to commence with an underground coal mining operation on the remaining extent of the farm Wenen 1152, the farm Erfinis 269, the remaining extent of the farm Pretorius 1788, Portion 0 of the farm Smaldeel 683, Portion 5 of the farm Smaldeel 683, Portion 6 of the farm Smaldeel 683, Portion 7 of the farm Smaldeel 683, Portion 1 of the farm Heilbron Groenpunt 880, Portion 2 of the farm Heilbron Groenpunt 880, the remaining extent of the farm Heilbron Groenpunt 880, the remaining extent of the farm Groenpunt 724, the farm Driehoek 780, the farm Hoeko 1163, the farm Frisch Gewacht 1162, the remaining extent of the farm Goede Hoop 727 and the farm Rus en Vrede 1647 near Sasolburg in the Free State Province.

Elemental Sustainability (Pty) Ltd (Elemental-S) was initially appointed by Ergosat (Pty) Ltd to undertake the Water Use License Application (WULA) for the project after all environmental authorisation documents (EIA/EMPR) have been submitted for decision. After the appeal processes and revisions required by the Minister of Environmental, Forestry and Fisheries, Elemental-S was appointed to finalise and revise the environmental authorisation process in terms of the National Environmental Management Act, 1998 (Act 107 of 1998) (as amended) and the National Environmental Management Waste Act, 2008 (Act 59 of 2008) for the proposed Lefa Colliery.

As stated, several appeals were launched against the project and several have been dismissed. However, after the outcome of the appeal launched by SASOL, the Minster made a decision for the project as follows (the full summary was provided within the Comments and Response Report (C&RR)).

In summary, the Minster decision and recommendations for the revised EIA/EMPR, were the following:

- "*Having upheld this ground of appeal, I am of the view that the appropriate remedy is to remit the matter to the DMRE for further consultation and reconsideration. The applicant is afforded an opportunity to properly investigate the presence of Sasol pipelines on the properties affected by the proposed mining operations.*
- *The applicant must thereafter incorporate the findings thereof in the EIAR. Due to significant changes or new information added to the EIAR, the revised report must be subjected to a public participation of at least thirty (30) days as required by regulation 19(1) (b) of the 2014 EIA Regulations.*
- *Any comments received from IAPs, including the second appellant as well as responses thereto by the applicant must be Incorporated into the final EIAR for submission to the DMRE for reconsideration of the application for IEA. In this regard, the timeframes prescribed by the 2014 EIA Regulations in respect of PPP and decision making must be adhere to.*
- *Regarding the contention on the change of EAP, there is no information before me to support this allegation. Hence my finding that this ground of appeal is without merit and therefore dismissed accordingly.*"

PART A: SCOPE OF ASSESSMENT AND ENVIRONMENTAL IMPACT ASSESSMENT REPORT

1 CONTACT PERSON AND CORRESPONDENCE ADDRESS

1.1 DETAILS

1.1.1 Details of the EAP

Table 1-1: Details and Name of the Practitioner

Name of the Practitioner:	DuToit Wilken
Tel No.:	084 588 2322
Fax No.:	None
Email address:	dutoit@elemental-s.co.za
Name of the Practitioner Reviewer	Corlien Lambrechts
Tel No.:	064 618 2646
Fax No.:	None
Email address:	corlien@elemental-s.co.za

1.1.2 Expertise of the EAP

1.1.2.1 The Qualifications of the EAP (With Evidence)

The Initial EAP for the project was Rock Environmental Consulting (Pty) Ltd (REC).

A new EAP has been appointed by the client after the initial EIA/EMPR and final EIA/EMPR were submitted to the DMRE for decision. Initially the EAP has been only appointed to conduct the WULA for the project and notify the I&APs of the decision made when the EA was issued. Elemental-S will also aim to address the outcomes of the appeals and revise the EIA/EMPR report to ensure all aspects are addressed as requested.

Please refer to Section 1.1.2.2 for a summary of the qualification and experience of the EAP. Refer to Appendix 1 and 2 for more details (CV).

Mr DuToit Wilken (Pr.Sci.Nat):

- University of Pretoria, MSc Geography – 2015
- University of Pretoria, BSc Hons Environmental Science – 2010
- University of Pretoria, BSc Environmental Science – 2009

Ms Corlien Lambrechts (Pr.Sci.Nat & EAPASA):

- University of Pretoria, BSc Hons Zoology – 2015
- University of South Africa / North West University, BSc Environmental Management (including Zoology) – 2009

1.1.2.2 Summary of the EAPs Past Experience (In Carrying Out the Environmental Impact Assessment Procedure)

*(Attached the EAP's curriculum vitae as **Appendix 2**)*

Provided here is a summary of the qualification and experience of the EAP. Refer to Appendix 2 for more details (experience).

DuToit Wilken is an Environmental Scientist with more than 10 years of experience in applying the principles of Integrated Environmental Management, and in applying the Environmental Legislation to a number of development projects and initiatives in Southern Africa. He is registered as a Pr.Sci.Nat. (SACNASP), Natural Scientist, Registration number 118911. He has co-ordinated and managed number of diverse projects and programs related to the Environment and Mining within both the public and private sectors and for national, multi-national and international companies. His interpersonal and organisational skills have enabled him to efficiently direct these projects from initiation to implementation.

A significant element of public participation is required throughout the life cycle of an EIA process. DuToit has successfully liaised with interested and affected parties, ensuring that all communication procedures and dialogues are open and transparent, and that capacity building is conducted where necessary. His proficient report-writing skills have been utilised for the compilation of a wide variety of reports, which include but is not limited to Basic Assessment Reports, Scoping and Environmental Impact Assessment Reports, Environmental Management Plans (Planning, Construction, Operation and Closure), Environmental Audit Reports, Opportunities and Constraints Analyses, Waste License Applications, Water-Use Application Reports and Mining Right Applications.

Corlien Lambrechts is an Environmental Scientist with 7 years of applicable experience in the relevant field of Environmental Management and has qualifications in Environmental Management and Zoology. She is a Professional Natural Scientist with the South African Council of Natural Scientific Professions (Pr.Sci.Nat: 009135) and has been registered and accredited by Environmental Assessment Practitioners Association of South Africa (EAPASA), Registration number: 2020/935.

After consulting for a number of years, she enrolled for her Honors degree in Zoology at the University of Pretoria in 2015 where she completed a project in the Cathedral Peak Drakensberg Mountain range studying differences in community structures of invertebrate species between natural grasslands and grasslands subjected to rehabilitation by South African Environmental Observation Network (SAEON) and in association with the University of Pretoria Centre of Invasion Biology (CIB). During her career within the Environmental management field, she has been involved in a wide variety of Ecological and Environmental applications and compilation of reports, which include as relevant to the compilation of this report: Basic Assessment Reports, Scoping and Environmental Impact Assessment Reports and Environmental Management Plans, Environmental Audit Reports, Water-Use Application Reports and Mining Right Applications.

2 DESCRIPTION OF THE PROPERTY

2.1 SITE LOCATION

Table 2-1: Property description and surveyor codes

Name:	Lefa Colliery	
Application area (Ha)	3180 ha	
Magisterial district:	Sasolburg	
Distance and direction from nearest town	10 Km north west from Deneysville 20 Km east from Sasolburg 30 Km north of Vereeniging	
21-digit Surveyor General Code for each farm portion	Remaining extent of the farm Wenen 1152	F01600000000115200000
	The farm Erfinis 269	F01600000000026900000
	Remaining extent of the farm Pretorius 1788	F01600000000178800000
	Portion 0 of the farm Smaldeel 683	F01600000000068300000
	Portion 5 of the farm Smaldeel 683	F01600000000068300005
	Portion 6 of the farm Smaldeel 683	F01600000000068300006
	Portion 7 of the farm Smaldeel 683	F01600000000068300007
	Portion 1 of the farm Heilbron Groenpunt 880	F01600000000088000001
	Portion 2 of the farm Heilbron Groenpunt 880	F01600000000088000002
	Remaining extent of the farm Heilbron Groenpunt 880	F01600000000088000000
	Remaining extent of the farm Groenpunt 724	F01600000000072400000
	The farm Driehoek 780	F01600000000078000000
	The farm Hoeko 1163	F01600000000116300000
	The farm Frisch Gewacht 1162	F01600000000116200000
	Remaining extent of the farm Goede Hoop 727	F01600000000727200000
	The farm Rus en Vrede 1647	F01600000000164700000

2.2 LOCALITY MAP (SHOW NEAREST TOWN, SCALE NOT SMALLER THAN 1:250 000)

(Show nearest town, scale not smaller than 1:250000 attached.

Please refer to Appendix 3 for the Locality Maps for the project area.

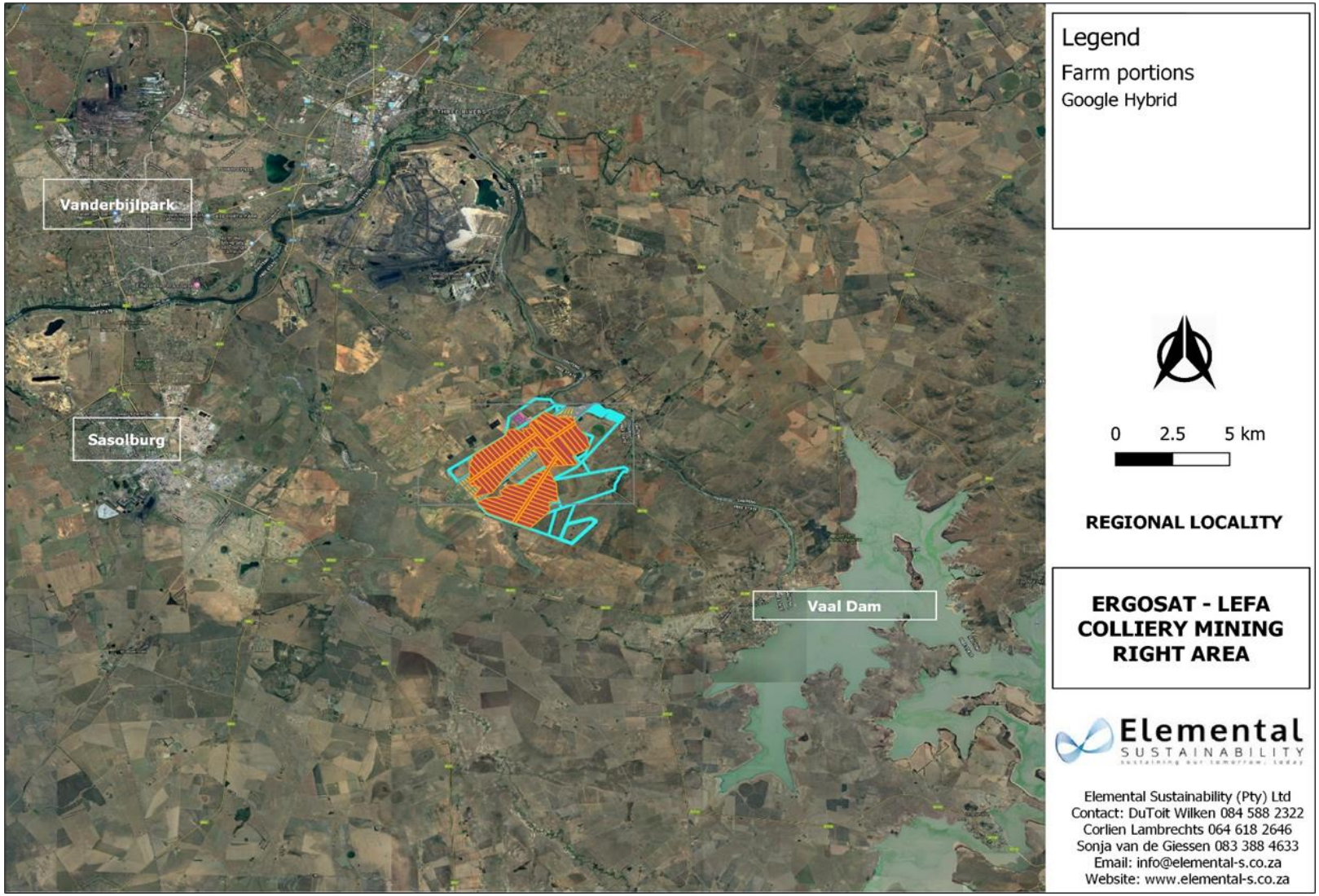


Figure 2-1: Regional Locality of Lefa Colliery within the Free State Province

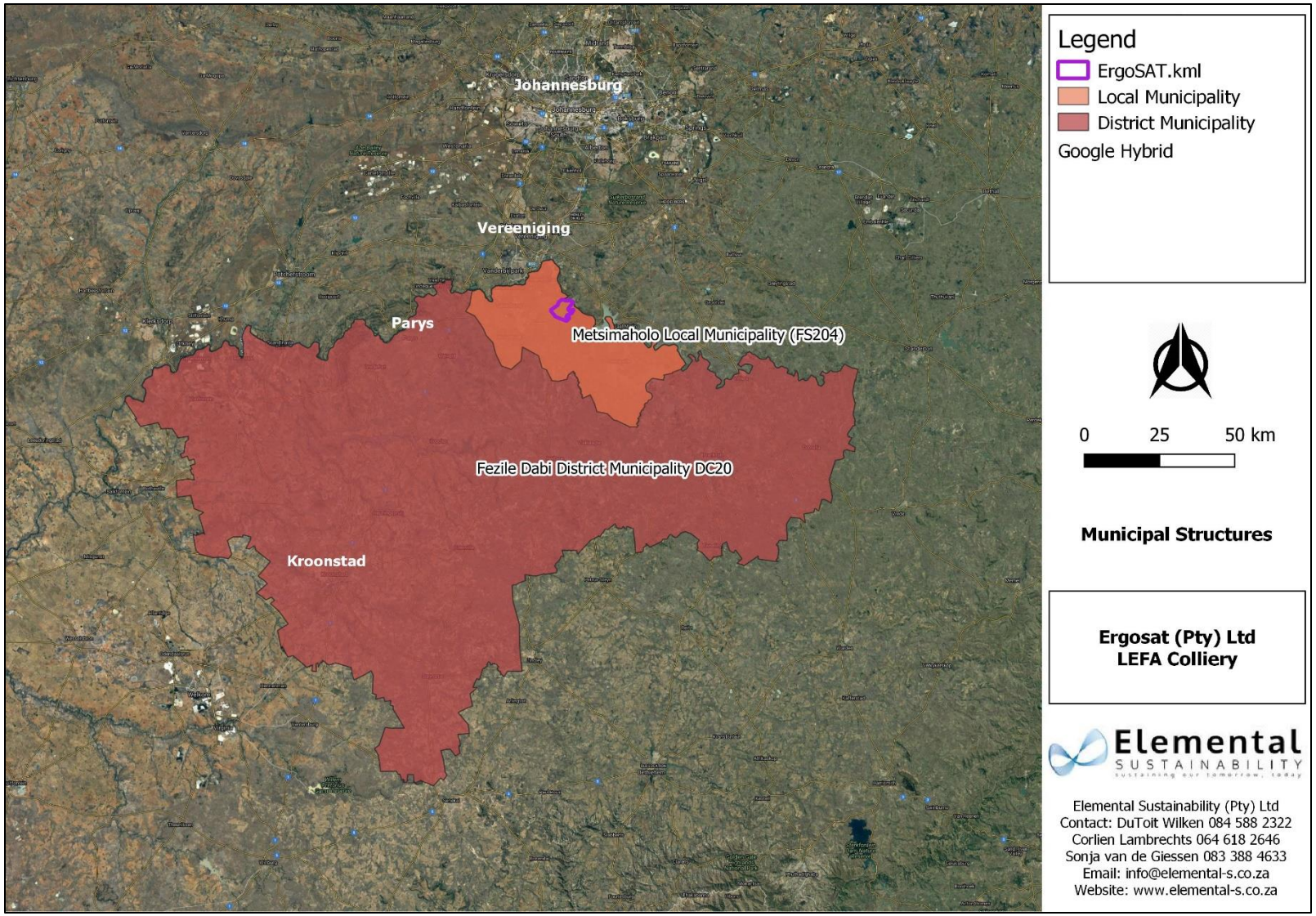


Figure 2-2: Municipal Structures

3 DESCRIPTION OF THE SCOPE OF THE OVERALL ACTIVITY

3.1 LISTED AND SPECIFIED ACTIVITIES

Provide a plan drawn to a scale acceptable to the competent authority but not less than 1: 10 000 that shows the location, and area (hectares) of all the aforesaid main and listed activities, and infrastructure to be placed on site and attach as Appendix.

Refer to Appendix 4.

Table 3-1: Listed and specified activities

NAME OF ACTIVITY	AERIAL EXTENT OF THE ACTIVITY	LISTED ACTIVITY	APPLICABLE LISTING NOTICE	WASTE MANAGEMENT AUHTORISATION
***(E.g. For prospecting to** drill site, site camp, ablution facility, accommodation, equipment storage, sample storage, site office, access route **etc…etc…etc** **E.g. for mining**, to excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc…etc…etc.)*	*Ha or m²*	*Mark with an X where applicable or affected*	*(GNR 327, GNR 325 or GNR 324) of 7 April 2017*	*(Indicate whether an authorisation is required in terms of the Waste Management Act).* ***(Mark with an X)***
Storm water management structures, pipelines, berms and water resources diversions.	Included in the overall extent of the underground mining areas	X	Listing notice 1-(9)	
Access and Haul roads	1 ha	X	Listing notice 1-(24 ii)	
Pipelines	1 ha	X	Listing notice 1-(9) i & ii	
Plant and Other Infrastructure (Overland conveyer removed as alternative)	35 ha	X	Listing Notice 1- (12) xii Listing Notice 3 (14)	
Sewage treatment	0.5 ha	X	Listing notice 1-(10) i &ii	
Bulk hydrocarbon storage facilities/ Filling station	0.5ha	X	Listing Notice 1-(14) Listing Notice 2-(4)	
Shaft development	5 ha	X	Listing Notice 2 (17)	

NAME OF ACTIVITY	AERIAL EXTENT OF THE ACTIVITY	LISTED ACTIVITY	APPLICABLE LISTING NOTICE	WASTE MANAGEMENT AUHTORISATION
Mining of coal by underground mining	1600 ha	X	Listing notice 2-(17)	
Crushing and screening of coal underground	0.5 ha	X	Listing notice 2- (21)	
All infrastructure including External parking, Security and Weigh bridge, Truck Loading area, Internal parking, Silos, stockpiles, sewage treatment plant, scrap yard, offices, crusher and screen plant, medical facility, stores, raw water dam, storage yard and the ventilation shaft.	17.3 ha	X	Listing notice 1-(27) Listing Notice 1- (12) xii	
Sub-station and power line	0.5 ha	X	Listing notice 1-(11)	
Infrastructure area industrial development	35 ha	X	Listing Notice 1 (28) ii	
Residue stockpiles or deposit areas *"Mining, exploration or production operation, resulting in the development of residue stockpiles and residue deposits*" Prospecting, mining, exploration or production operation, resulting in development of residue stockpiles and residue deposits. The management and control of these wastes must take place in accordance with the regulations for management and control of residue deposits and residue stockpiles or an integrated environmental authorization as provided for in terms of NEMA.	Included in the infrastructure area of the mine - 0.5 ha	X		Category B; Listing 7, 9, 10, 11

3.2 DESCRIPTION OF THE ACTIVITIES TO BE UNDERTAKEN

(Describe Methodology or technology to be employed, including the type of commodity to be mined and for a linear activity, a description of the route of the activity)

Refer to Appendix 4 for Master Layout

3.2.1 Background

The proposed Lefa Colliery mining project will be located on various farms as described in Table 2-1 above. Ergosat Pty Ltd is currently the prospecting holder of the area and has decided to apply for a mining right in the same area.

3.2.1.1 Planning phase

Detail designs of the proposed mining operation have been done during the WULA process and various plans updated such as social and labour and mine works programme. The Environmental Impact Assessment process forms part of this phase. A full Scoping and EIA process has been undertaken with the current revision as forming part of this process (NEMA).

3.2.1.2 Construction phase

Establishment of the facilities and infrastructure required for the underground mining activities. This specific mine has very little infrastructure as the mined coal will be hauled to the Lethabo Power station, pending a contract to be reached. It should be noted that the construction activities will also form part of the mining (operational) phase of the project and will include construction of the service and access roads, excavations and construction of water management structures, all structures in the infrastructure area and all shafts including the incline and ventilation shafts.

3.2.1.3 Operational phase

Surface infrastructure will include (but is not limited to) the following:

- Mine access and security control facilities;
- Access road and internal mine roads;
- Box cut portal to decline;
- Conveyor belt from underground;
- Decline Shaft;
- Ventilation Shafts;
- Offices and administration buildings;
- Medical facilities;
- Firefighting facilities and fire water;
- Change house;
- Lamp room;
- Stores and storage yards;
- Weighbridge;
- Workshop;
- Scrap Yard;
- Truck loading area;
- Fuel storage and distribution facilities;
- Power Substation;
- Potable water connection and pump station;
- Raw Water Dam;
- Sewerage storage and treatment facilities;
- Waste rock dump;
- Internal parking area for mine fleet and staff;

- External parking area for visitors;
- Coal stockpiles area; and
- Coal Crushing Plant.

The proposed coal mining will be by box-cut to decline method.

The twin decline shafts will comprise of two parallel shafts, one dedicated to personnel and material movement and one dedicated to coal conveying. Initially these will be the up and down cast ventilation tunnels for the mine, but up-cast raise bore ventilation shafts will be developed once required and then these two declines will both be downcast. Raise Bore ventilation holes will be developed as part of on-going capital as mining progresses.

Bord-and-pillar mining method is proposed for dipping coal seams. This entails the mining of rooms (bords) leaving pillars intact as a primary support to support the immediate roof. Secondary support will be used in the form of roof bolts and any other support means as and when required into the immediate roof of the bords mined. The width of the pillars to be left intact is dictated mainly by the following factors:

- The depth below surface;
- Immediate roof competency (inputs from a geotechnical specialist);
- The mining height; and
- Width of the bord.

To maintain optimal extraction of the resource, pillars left behind could be partially extracted towards the end of a panel being mined or towards the end of the Life of Mine ("LOM") following specialised geotechnical guidelines. Due to the thickness of the parting between the three seams designated to be mined, it is envisaged that the three seams can be super imposed. This implies that the layout of the lower seam is to be as close as practical possible to the layout of the upper seam. This layout will also be dependent on specialised recommendations from a geotechnical engineer with further studies and will mainly rely on the thickness and the competency of the parting in between. Figure 3-1, Figure 3-2 and Figure 3-3 below illustrates a typical bord-and-pillar layout.

Coal will be extracted through a mechanised mining method. This entails a mining cycle of cutting and loading the coal by means of a continuous miner and supporting the roof. Coal will then be conveyed by means of electrical shuttle cars to a feeder breaker from where it will be crushed in order to convey it to the processing plant.

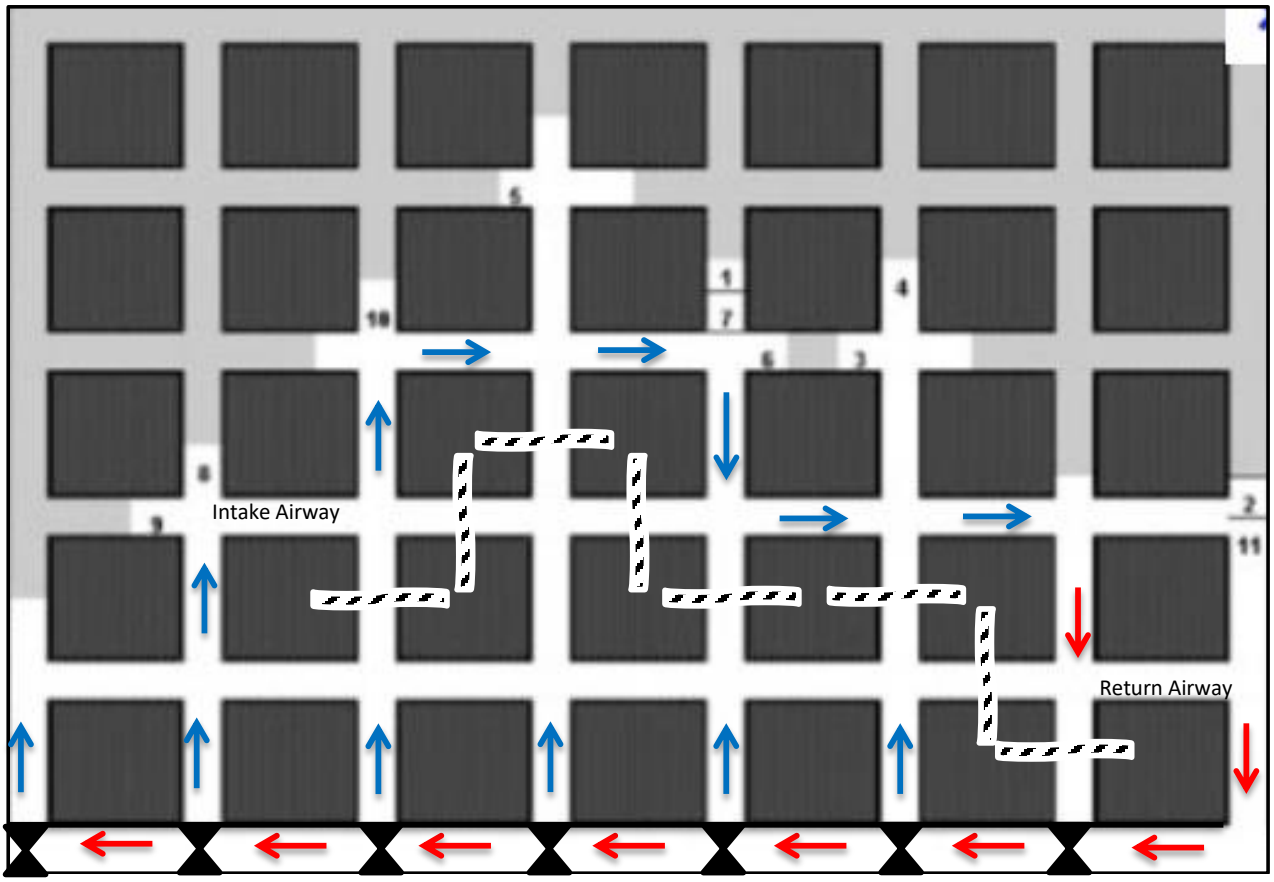


Figure 3-1: Typical Bord-and-Pillar Layout

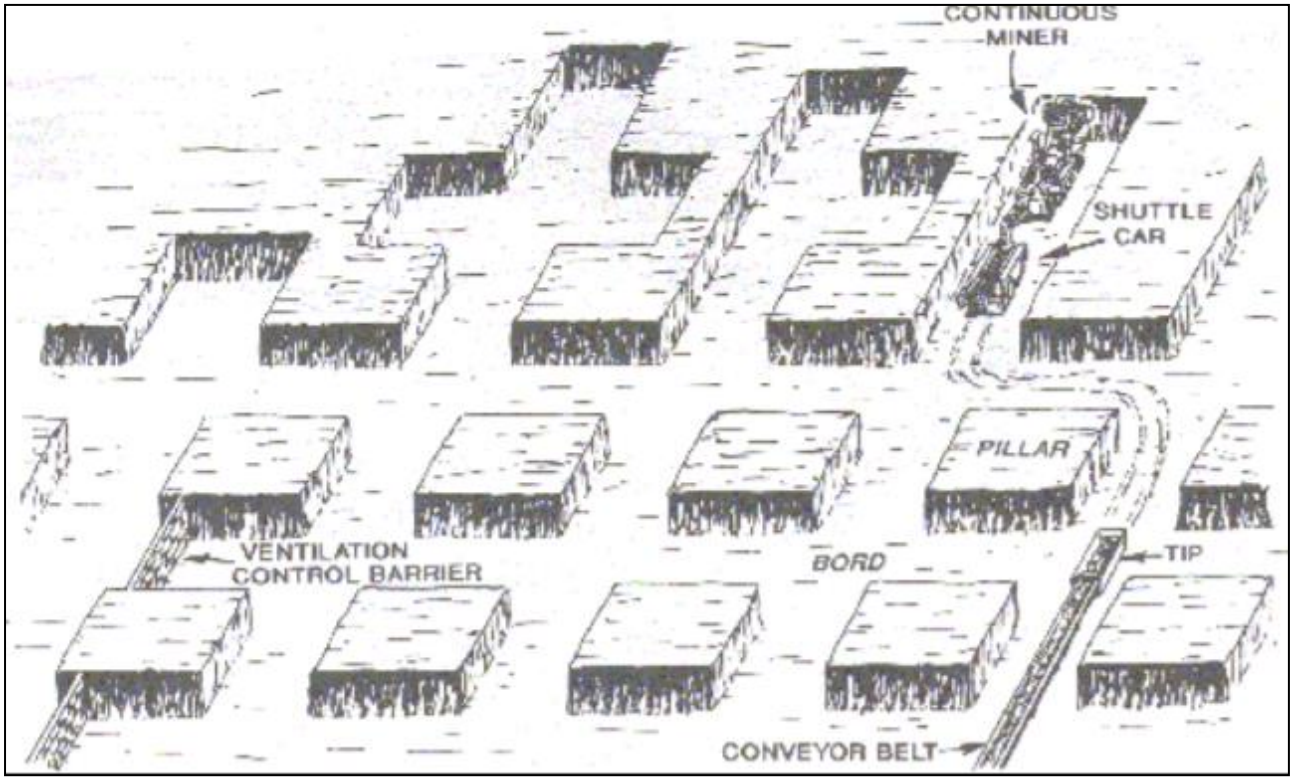


Figure 3-2: Typical Bord-and-Pillar Layout (Wells et al., 1992)

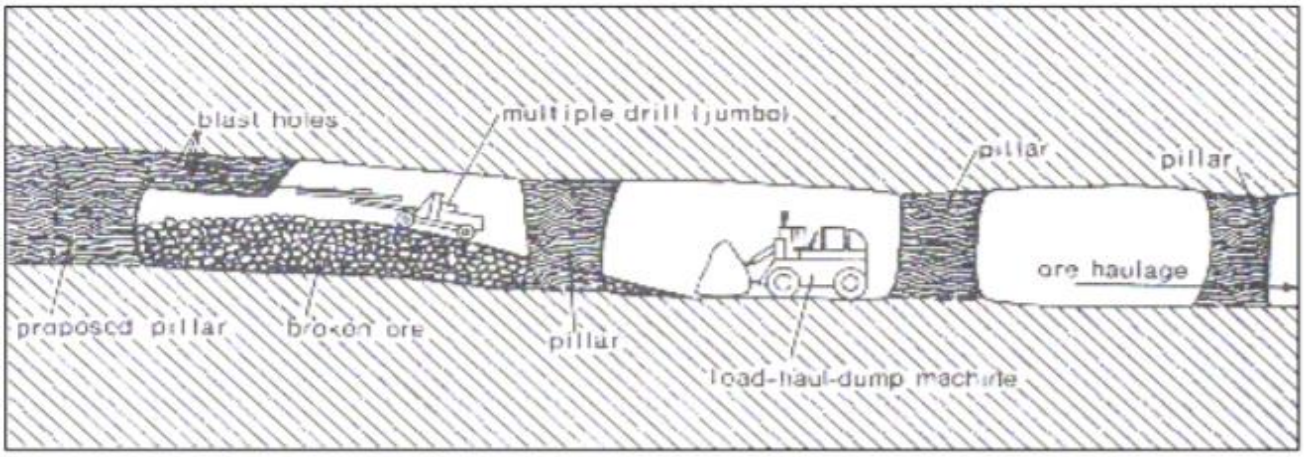


Figure 3-3: Cross section of typical bord-and-pillar layout (Source: Scoble, 1993)

3.2.1.3.1 Mine Design Parameters

According to the available information, a mine design criterion ("MDC") was developed and compiled from first principles. It would be recommended to obtain thorough input parameters from a qualified geotechnical rock engineer with further detail studies.

Safety Factor - Practical design width for three adits is on 70m wide span which incorporates an average of 5.5m height x 6.5m wide bords and pillars width dependent on the depth as illustrated in this document. Factors influencing the panel pillar dimensions and safety factor will be the depth below surface and the mining height. At this stage these dimensions are benchmarked with similar commodity operations as well as applying Solomon's Squad Pillar formula.

3.2.1.3.2 Panel Bord-and-Pillar Dimensions

Based on the principles above, the recommended bord-and-pillar widths at depth below surface are illustrated in Table 3-2 below.

Table 3-2: Panel Bord-and-Pillar Dimensions

Production panels		
Depth below Surface	**Actual pillar width (m)**	**Bord width (m)**
0 - 80	8.5 x 8.5	6.5
80 - 150	11.5 x 11.5	6.5
Main headings		
Depth below Surface	**Actual pillar width (m)**	**Bord width (m)**
0 - 80	8.5 x 38.5	6.5
80 - 150	11.5 x38.5	6.5

With the design, pillars are increased with every 100m increments at depth below surface. The practical dimensions of bords and pillars are illustrated in

Table 3-3 below.

Table 3-3: Depth below surface vs. Extraction Ratio vs. Pillar sizes

	Extraction (within mining production area)	**Extraction including barrier pillars**
Production panels <80m deep	68%	63%
Production panels ≥80m deep	59%	55%

Main Headings <80m deep	52%	40-50%
Main Headings ≥80m deep	45%	

3.2.1.3.3 Equipment needed

Table 3-4 illustrates the basic fleet of equipment recommended for the LEFA Colliery underground project incorporating primary, secondary and tertiary equipment.

Table 3-4: Basic Mining Equipment Fleet

Equipment	Fleet Requirement
Primary Equipment	
Continuous Miner	5
Shuttle Cars	15
Feeder breakers	5
Fletcher Roofbolters	5
Secondary and Tertiary Equipment	
Blower Fan	6
LDV 4x4	12
Underground People Carrier	2
Genies	1
Service Trucks	1
Underground Pump Station	5
Bob-Cat	3
Section Fan	8
Surface Vent Fan	3

3.2.1.3.4 Mine schedule

Xpac imported data was used for production scheduling purposes. The schedule stretches over a period of approximately 15 years at a ROM production rate of 3Mtpa. The following four Figures illustrate the face positions as well as the sequencing in increments of 5 years.

Figure 3-4 illustrates the production scheduled ROM tonnes from the different coal seams.

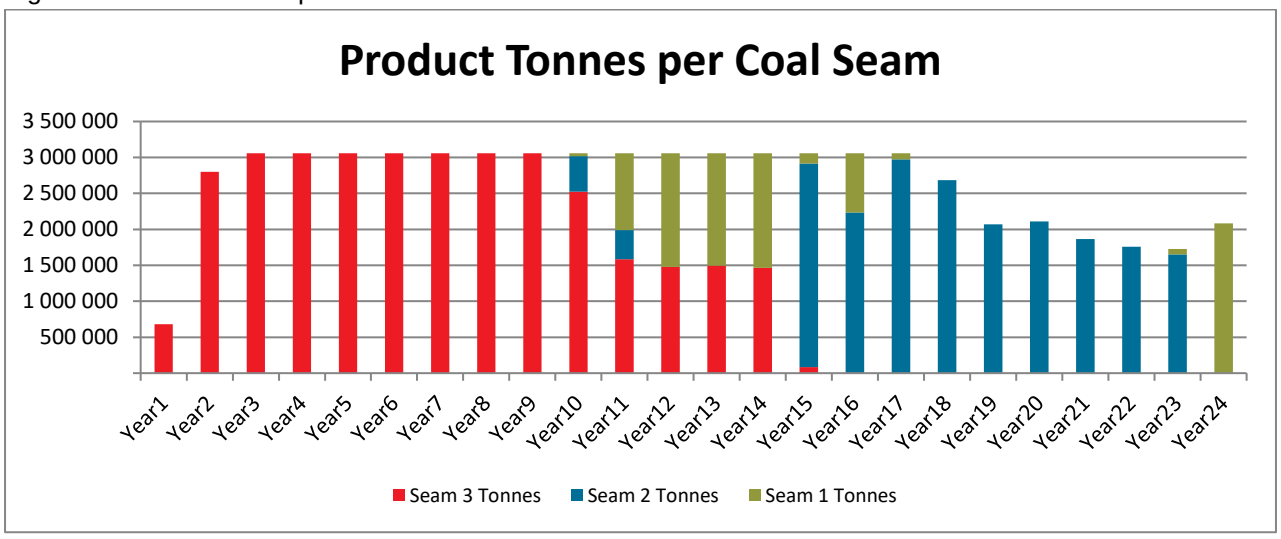


Figure 3-4: Production Results

3.2.1.3.5 Product

A low-quality thermal coal will be produced from the different coal seams that will be mined. The product will have a CV between 15 and 16 MJ/kg. One-hundred present of the material mined will be in this specification range. The coal from the Lefa Colliery will be transported to the Lethabo Power Station.

3.2.1.3.6 Basic plant design

Lethabo Power Station is specifically designed to burn coal from this coal field with a medium Calorific value (15 to 16 MJ/kg) and high Ash (42%) content. The Ergosat coal therefore fulfils these requirements and no washing of coal is required. The top-size of coal from the continuous miner is 350mm. Coal will be supplied to Lethabo Power Station at -50mm. A two-stage underground crushing plant will be installed as shown on the flow diagram below in Figure 3-5.

Coal will be mined at 567 tonnes per hour. Primary crushing of the run of mine coal will take place in the Underground Crushing Station. In this crushing stage, run of mine coal will be crushed from-350mm to -80mm. The second crushing stage will produce -50mm coal product. Please see Figure 3-5 below.

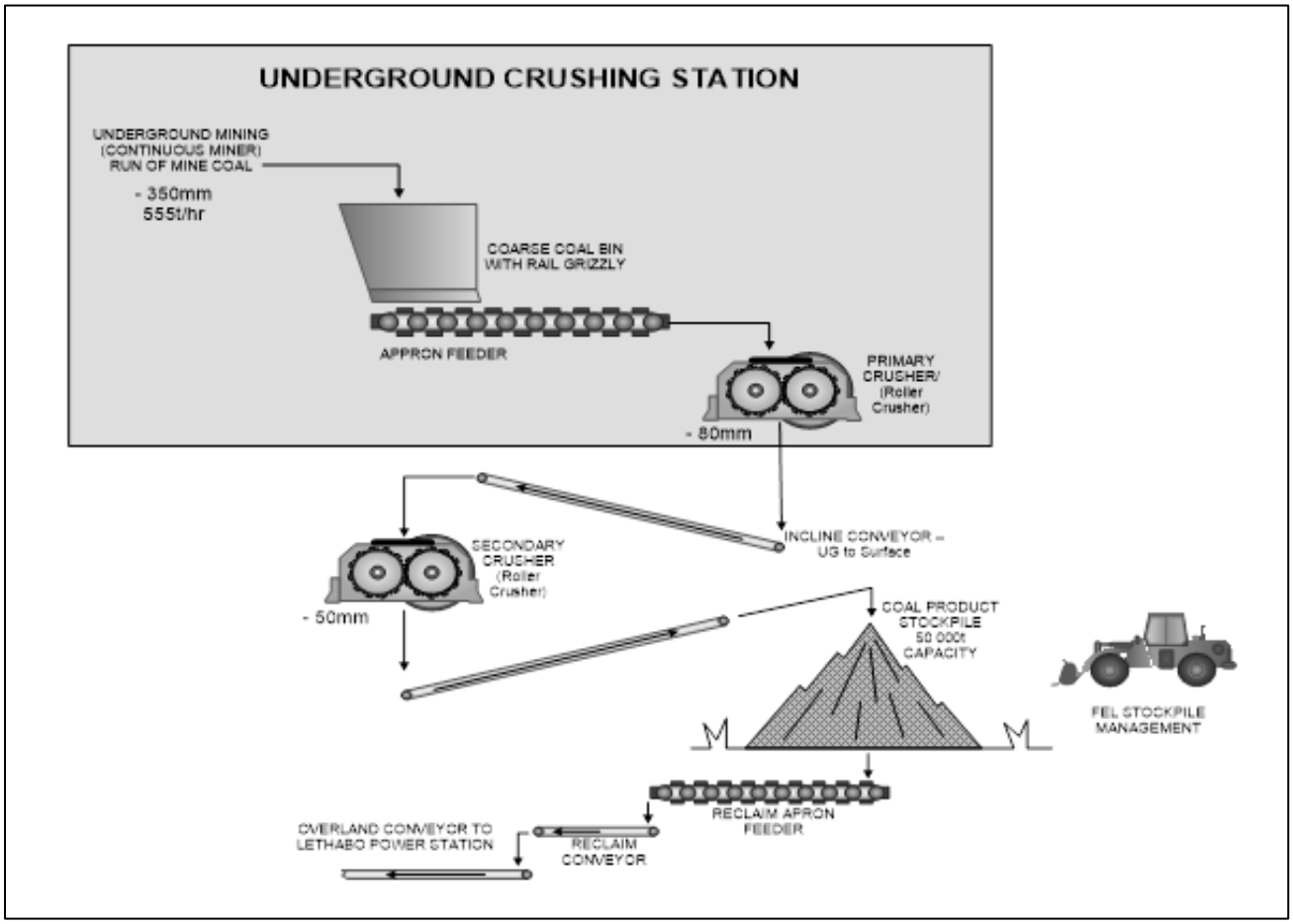


Figure 3-5: Coal Crushing Plant Process Flow Diagram

Figure 3-6 indicates the positioning of the plant infrastructure. No. 9 on the figure is the Plant and no. 5 is the Product Stockpile. No. 18 is the Power Substation and 19 the Portal and Decline.

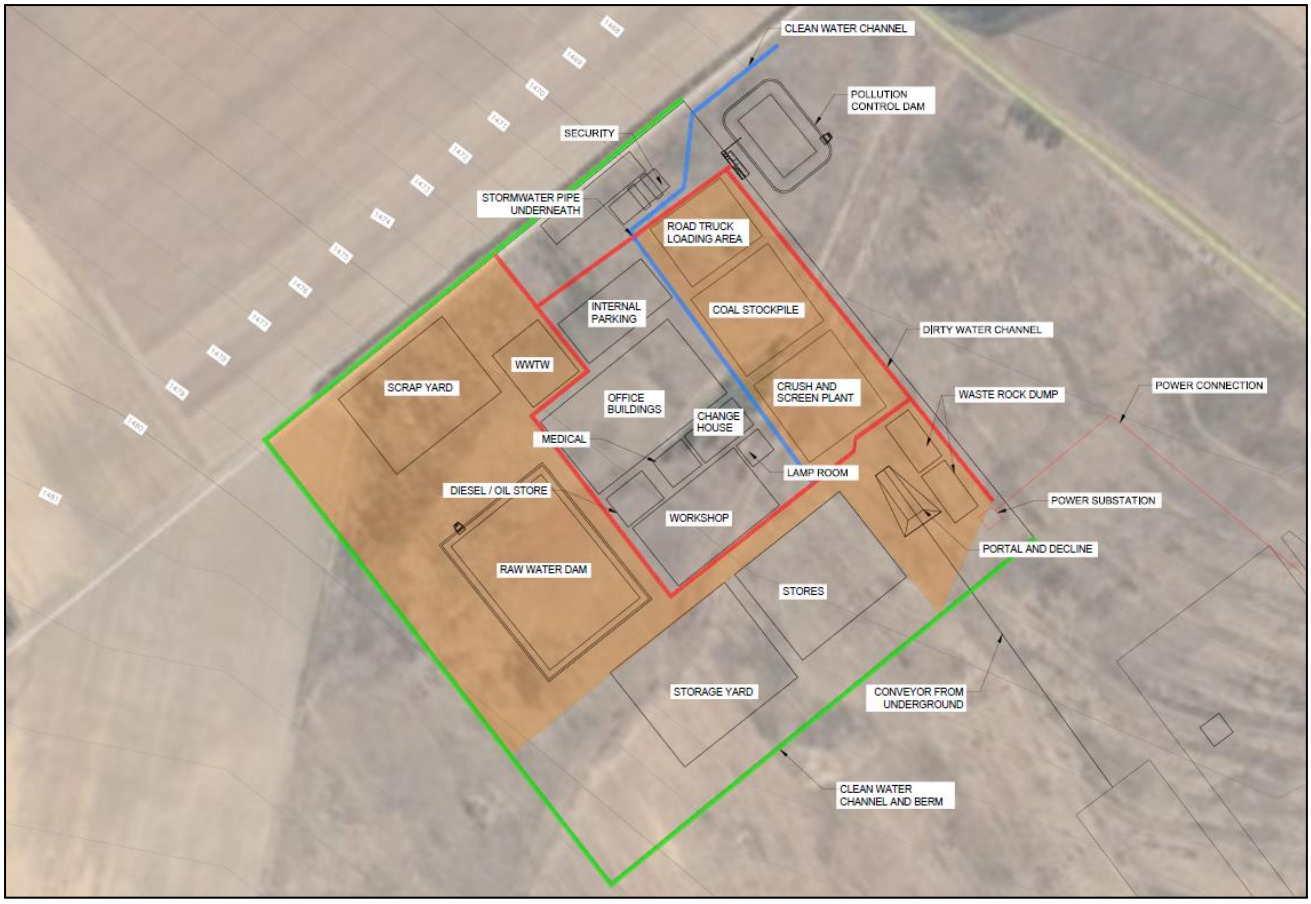


Figure 3-6: Plant infrastructure

The plant infrastructure will consist of:

- Coarse coal bin with rail grizzly;
- Apron feeder;
- Primary crusher;
- Incline conveyor;
- Secondary crusher;
- Stockpile conveyor;
- Product stockpile;
- Reclaim apron feeder.

The plant will use ESKOM power with back-up generators for its electricity requirements. Equipment that will require electricity will be:

- Crushers;
- Apron Feeders;
- Conveyors;
- Offices;
- Medical Facility;
- Potable water pump station; and
- Sewerage pump station.

The conveyer infrastructure initially included has been removed.

3.2.1.3.7 Areas proposed to be mined

Although the mining right extends on a larger area, the actual mining will be undertaken on a smaller area. This mining plan is based on the results of the prospecting that occurred in the area and is based on the availability of coal. Figure 3-7 below illustrates the combination of 1, 2 and 3 seam coal availability and indicates the larger extend of mining operations underground in yellow. Coal will be mined on an average depth of 80m underground. The red lines indicate the extent of the mining right application.

Figure 3-7: Proposed mining area showing underground section

3.2.1.3.8 Waste stockpiles

Waste stockpiles will contain all the waste products from the underground workings. Waste stockpiles are listed in the list of waste activities published in GN. No. R. 632 of 24 July 2015 in accordance with the National Environmental Management: Waste Act 59 of 2008. The area in Figure 3-8 indicated as number 12 is the areas dedicated for waste residue stockpiles.

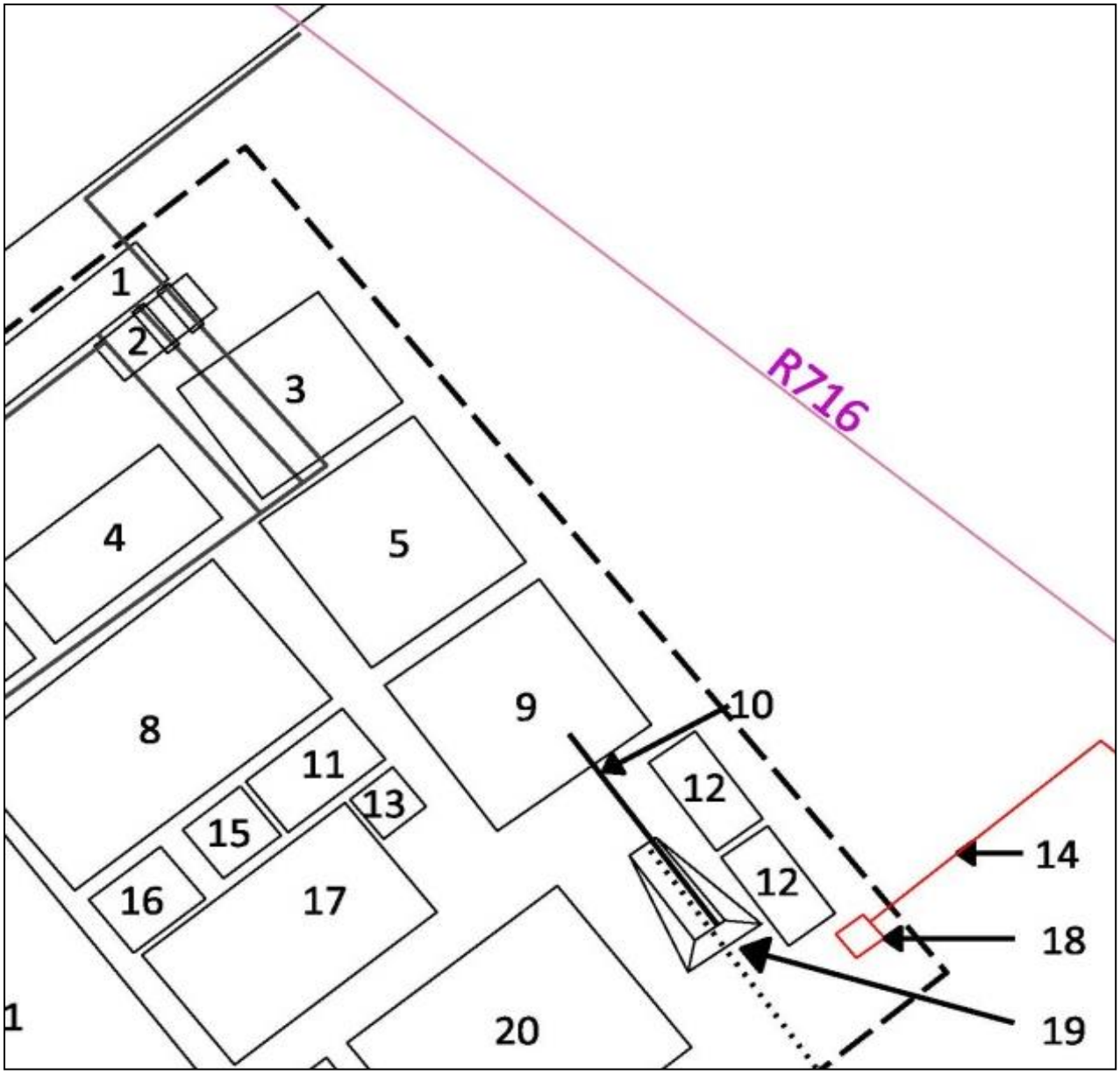


Figure 3-8: Waste stockpile areas shown as number 12

In terms of the new regulations, mine waste residue stockpiles must comply with landfill requirements. Stockpiles must now also comply with the National Norms and Standards for the Assessment of Waste for Landfill Disposal, 2013; and National Norms and Standards for Disposal of Waste to Landfill, 2013. These documents explain the need for waste classification and waste stockpile liner designs.

3.2.1.3.9 Sewage

A modular sewerage treatment plant will be erected for the treatment of sewage. The containerised sewage treatment plant is a fully functional sewage treatment plant, and is easily transported and built into a transportable container.

3.2.1.3.10 Stormwater Management Programme

A Storm Water Management Plan (SMWP) has initially been compiled by IDS Consulting (Pty) Ltd (conceptual designs) and finalised in 2020 by Nurizon (Nurizon Consulting (Pty) Ltd, 2020). A copy of the report has been included in Appendix 24. The main aim of such a system will be to separate clean runoff from dirty runoff which

will be captured in appropriately designed containment facilities. The design of the stormwater management system is based on the requirements of GNR 704.

The following basic principles form an integral part of the development of the stormwater management strategy for the proposed mine:

- Dirty and clean stormwater catchments shall be delineated and separated whereby clean stormwater runoff is diverted around contaminated areas and into/towards natural water courses;
- Impacts on the existing groundwater resources, in terms of quality and quantity shall be minimised through the use of impermeable membranes in the design of dirty stormwater infrastructure, i.e., High-density polyethylene (HDPE) liners for the pollution control and concrete linings for the dirty water drainage channels;
- Prevention of erosion of the existing water courses, particularly at clean stormwater system discharge points;
- Mitigation of flooding to neighbouring properties in the areas due to the proposed mine footprint and mining activities;
- The required capacity of the individual elements comprising the dirty water system considered the following:
    - Projected water balance, with the aim of retaining the contaminated (dirty) water within a closed system;
    - Maximum estimated stormwater peak flow generated by a storm event with a 1 in 50-year recurrence interval;
    - Maximum estimated 24-hour runoff volume with 1 in 50-year recurrence interval.

Stormwater Management Details

The proposed mine's infrastructure area (dirty water) has a surface area of approximately 0.172km^2 and the entire area was classified as dirty stormwater.

The design methodology used for the stormwater management is summarised below:

- The infrastructure area is classified as dirty stormwater as indicated;
- The entire area will be "enclosed" by means of a combination of stormwater channels and cut-off berms. Stormwater from the surrounding areas will therefore be diverted away from the infrastructure area;
- The stormwater run-off for the infrastructure area was calculated using the rational method. Based on the information, a PCD volume of 18,679m^3 (excluding 800mm freeboard) is required.
- Reinforced concrete stormwater channels will be constructed. The purpose of these channels is to collect all the stormwater from the infrastructure area and convey it to the Pollution Control Dam (PCD); and
- The water from the PCD will be re-used (fire water, dust suppression, etc.).

PCD Sizing and Lining

As indicated, PCD volume of approximately 18,679m^3 (excluding 800mm freeboard) is required. The actual size of the PCD (including freeboard) is 25,097.69m^3.

The total area contributing to the dirty stormwater runoff is 0.172km^2. Stormwater runoff upstream of the affected area will be diverted away by means of earth berms and drainage channels. The dirty water runoff from the above catchment will be directed towards a HDPE lined pollution control dam (PCD). The minimum required capacity of the pollution control dam will be >18,679m^3 (excluding freeboard) (25,098m^3 actual size including freeboard).

The PCD design drawings are included as part of Appendix 24. The PCD barrier design was carried out in accordance with regulation 36784. The proposed barrier is a class C barrier that is required for the Type 3 material in terms of Regulation 634 and 635 (refer to Figure 3-9).

The geomembrane will be a 2.0mm HDPE liner. This HDPE liner will have a maintenance free life of 25 years

(overall life of HDPE liner is 25 years). After this period routine inspections and maintenance will need to be undertaken on in order to ensure the performance of the liners.

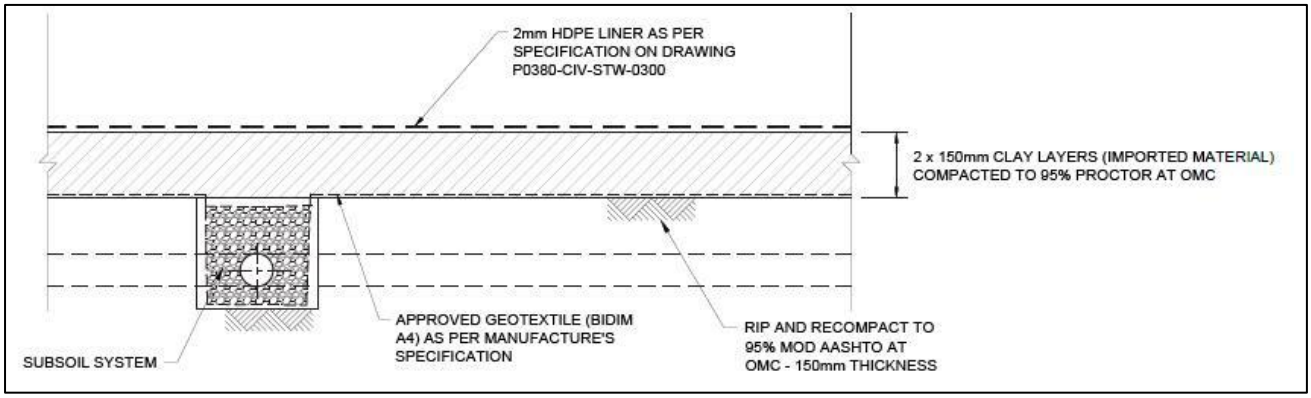


Figure 3-9: PCD Liner Details

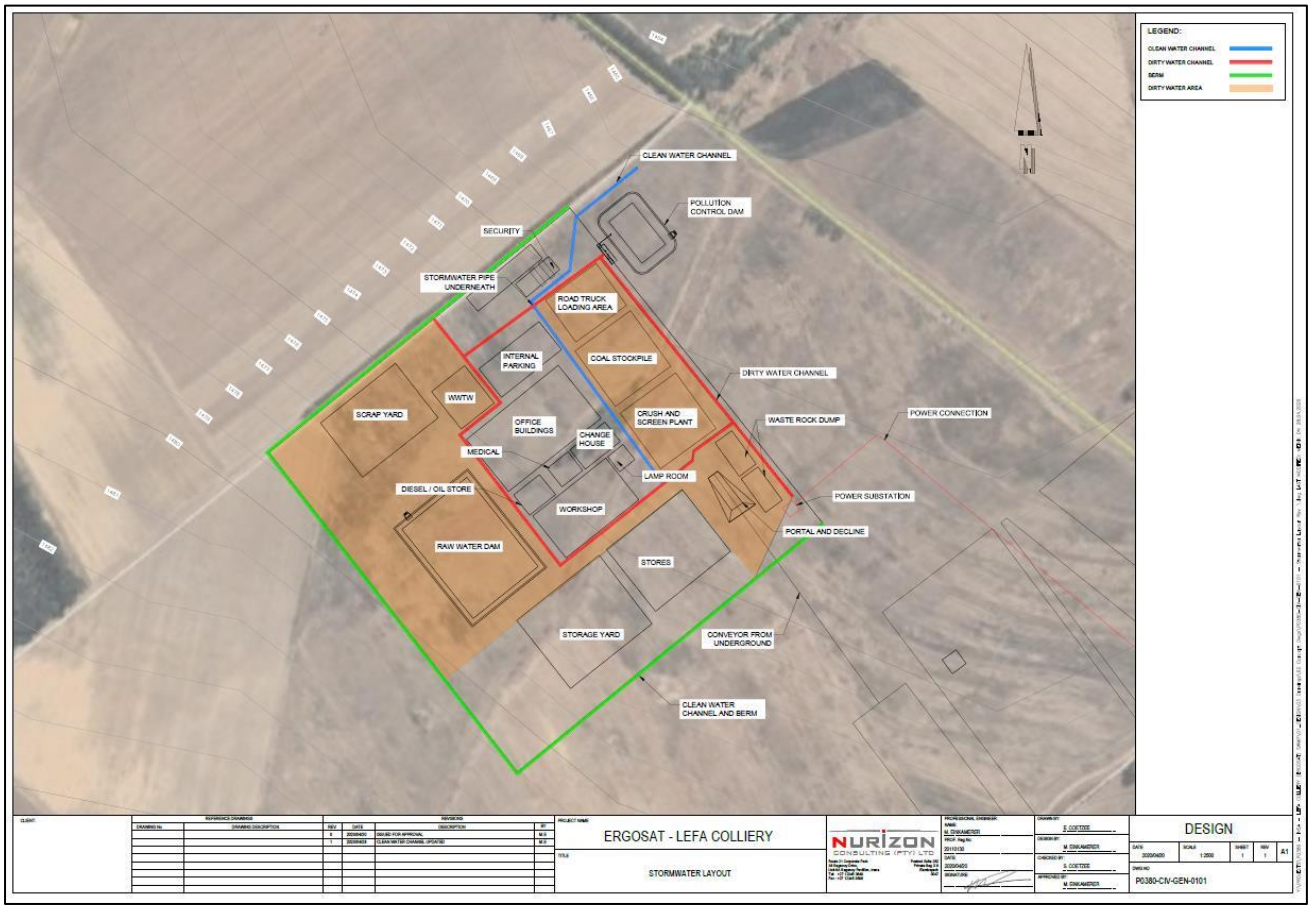


Figure 3-10: Storm water management plan finalised for WUL

Stormwater Conveyance Infrastructure Sizing

The sizing of the stormwater channels was done using Manning's equation, with a roughness coefficient (n) of 0.015 (for concrete lined channels).

The required size of the channel is:

- Shape = Trapezoidal;
- Bottom width = 1.5m;
- Side slopes: 1:2; and

- Depth = 0.8m minimum (including 0.2m freeboard).

The size of the stormwater berm and earth lined channel to divert clean stormwater away from the dirty water area are:

- Earth Lined Channel:
  - Shape = Trapezoidal;
  - Roughness coefficient (n) = 0.03
  - Bottom width = 1.5m;
  - Side slopes: 1:3; and
  - Depth = 0.7m minimum; and
  - Freeboard = 0m (channel overflowing will flow onto berm - not entering site).
- Berm
  - Shape = Trapezoidal;
  - Top width = 3.0m;
  - Side slopes: 1:2; and
  - Height = 1.5m minimum.

3.2.1.4 Decommissioning phase

Simultaneous rehabilitation of the mine has to be undertaken with underground mining with final rehabilitation taking place after the operational phase has come to an end. The decommissioning and closure of the underground mining will occur with the decommissioning of the mine in accordance with an applicable EMPR as part of a closure EIA to be conducted and also in accordance with any other closure plans pertaining to mine infrastructure and facilities. This phase starts at the end of the operational phase of the project. This phase ends when the site obtains a Closure Certificate from the regulatory authorities, but may include a period where there is no activity on the site other than monitoring prior to closure being completed.

The total for rehabilitation to be provided for has been calculated to **R 28 505 548.56.**

3.2.1.5 Post closure phase

Monitoring of aspects such as surface and ground water quality and the indefinite management of decant levels by pumping water out of the underground voids to the MWRP for treatment will be conducted in the post closure phase.

p

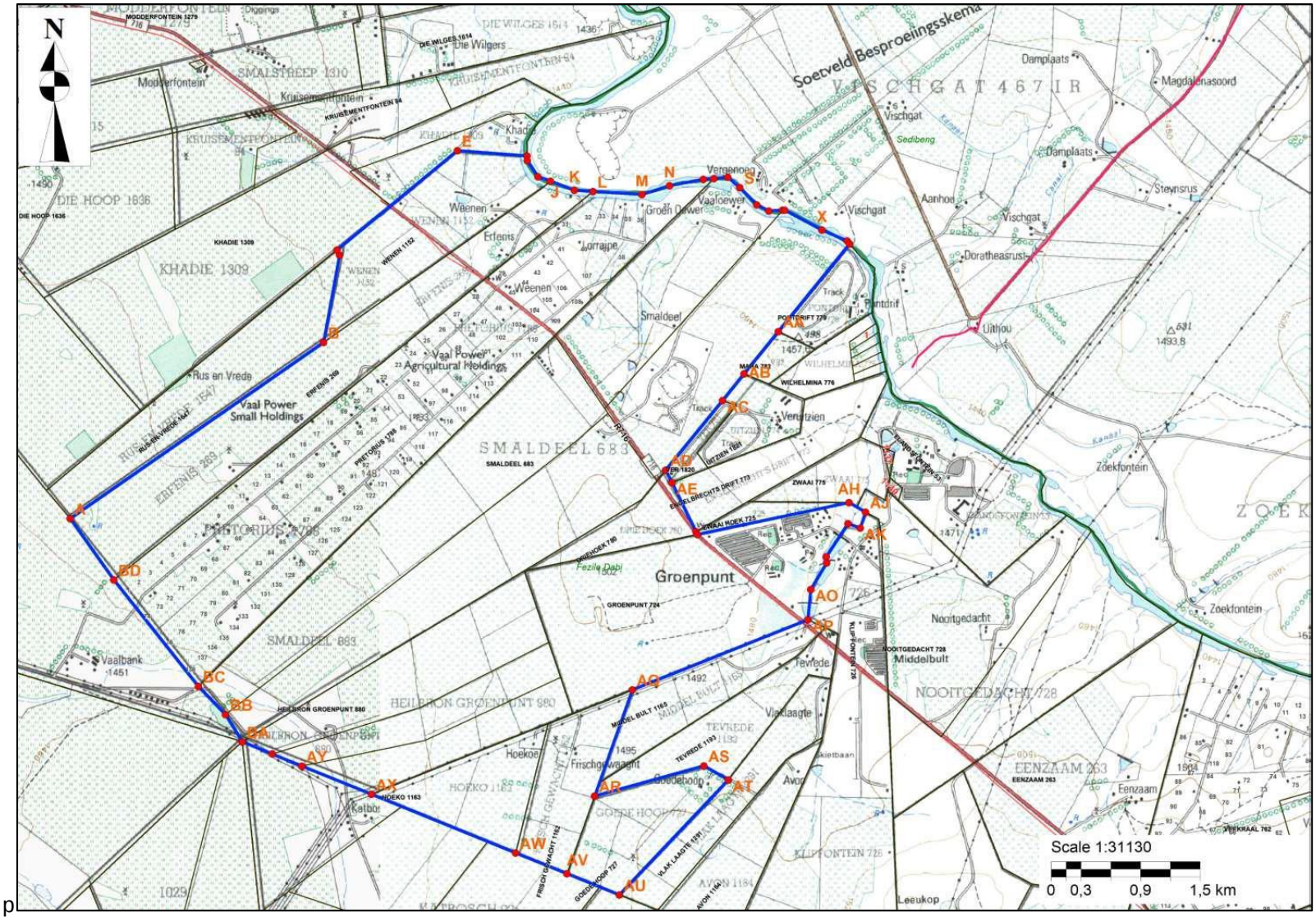


Figure 3-11: Regulation 2(2) Map

3.3 EXISTING AND PROPOSED ACTIVITIES

Ergosat Pty Ltd is currently the prospecting holder over the same area where they are currently applying for a Mining Right (this application). Proposed activities will be those as applied for with this Mining Right application and associated Environmental Authorisation (this document).

4 POLICY AND LEGISLATIVE CONTEXT

Relevant South African legislation requires various authorisations prior to the commencement and future re-opening of the project. Although cognisance of all applicable legislation is being taken, the following table details the relevant environmental authorisations, which are required:

Table 4-1: Policy and Legislative Context

Applicable Legislation and Guidelines Used to Compile the Report	Reference Where Applied
Constitution of South Africa, 1996 (Act No. 108 of 1996) [as amended] • *Section 24* *Environment: Everyone has the right-* • *to an environment that is not harmful to their health or well-being; and* • *to have the environment protected, for the benefit of present and future generations through reasonable legislative and other measures that-* *i) prevent pollution and ecological degradation;* *ii) promote conservation; and* • *Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.*	The proposed development has the potential to harm the environment and poses a risk to the health and wellbeing of people. The development however, also has the potential to secure sustainable development through reusing process products and thereby limiting the use of natural resources. The Applicant has the overall responsibility to ensure that the rights of people in terms of Section 24 of the Constitution is protected in terms of the proposed development activity.
National Environmental Management Act (No. 107 of 1998) [as amended] • *Section 28 (1)* *Duty of Care and responsibilities to minimise and remediate environmental degradation.*	The Applicant is the developer and overall responsibility of the mine rests with him, especially in terms of liabilities associated with the different phases of the development.
EIA Regulations, 2014 (Government Notices 982 -984) [as amended] *The proposed construction, operational and closure activities of the proposed development triggers listed activities that are listed in the EIA regulations for which a Scoping and Environmental Impact Assessment (EIA) process have to be conducted:* Listing Notice 1, 2 & 3 have been triggered as well as GN633 for several waste activities requiring a Waste License as well.	The proposed development requires an application for a mining right. An Integrated NEMA and NEM:WA application has been submitted to the DMRE (this application) based on revisions required as outcome of the SASOL Appeal and to ensure the SASOL pipeline is properly assessed. Other aspects include the formalisation of the Stormwater Management aspects as refined during the WUL process and now also incorporated into the document. Other specialist studies which had been done to inform the WUL process had also been updated and included within the document to ensure it contains all the most relevant information available for the project.

Applicable Legislation and Guidelines Used to Compile the Report	**Reference Where Applied**
EIA Regulations, 2017 (Government Notices 982 -984) *Chapter 6: Regulation 39 to 44: Public Participation;* *Chapter 4: Application for Environmental Authorisation:* *Part 3 Scoping and Environmental Impact Report (S&EIR)* *Appendix 2: Scoping Report* *Appendix 3: Environmental Impact Assessment Report* *Appendix 4: Environmental Management Programme* *Appendix 5: Closure Plan* *Appendix 6: Specialist Reports*	The EIA Regulations, 2014 [as amended in 2017] prescribes *inter alia*: "the manner in which public participation needs to be conducted as well as the requirements of a scoping and environmental impact assessment process and the content of a scoping report, environmental impact assessment report and environmental management programme." The content of specialist reports, closure plans and environmental audit reports are also provided. Since the scope of the document is revised based on the SASOL pipeline to ensure that it is adequately assessed, another round of PPP will be conducted.
Mineral and Petroleum Resources Development Act, 2002 (Act. 28 of 2002) [as amended]:	A Mining Right application is launched by the applicant and this requires the full EIA/EMPr process for Environmental Authorisation as well. Since this is a revised version to address the shortcomings identified during the appeal process, several changes have been made to the document, specifically related to the Sasol pipelines as well as additional studies conducted during the Water Use License Process.
National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) [as amended] • *Section 16* *General duty in respect of waste management;* • *Section 17;* *Reduction, re-use, recycling and recovery of waste;* • *Section 18; and* *Extended producer responsibility; and* • *Section 21* *General requirements for storage of hazardous and general waste.*	The new mining area will produce general and hazardous waste which need to be managed and disposed of according to best practices such as recycling, safe storage, etc. An integrated NEMA and NEM:WA application has been launched with the DMRE (this application).
National Water Act, 1998 (Act No. 36 of 1998) [as amended] • *Section 3* *Regulation of flow and control of all water* • *Section 19* *Prevention of pollution to watercourses* • *Section 21* *The water use activities associated with the proposed development requires compliance with the requirements of the NWA as listed under GN No. 19182. An application for an integrated water use license is lodged in terms of Section 21 of the National Water Act, 1998 (Act 36 of 1998) [as amended] to undertake the following activity:* *Section 21: (g) disposing of waste in a manner which may detrimentally impact on a water resource.*	The mine will have to apply for a Water Use License for the following Section 21 water uses: - Section 21(a): Talking of water from a water resource - Section 21(b): Storage of water - Section 21(c): Impeding or diverting the flow of water in a watercourse - Section 21(g): Disposing of water in a manner which may detrimentally impact on a water resource. - Section 21(i): Altering the bed, banks, course or characteristics of a watercourse. - Section 21(j): Removing, discharging or disposing of water found underground. Water management on the mine to be in line with the requirements of the site specific WUL and GN R704 National Water Act, 1998 (Act No. 36 of 1998). All of these

Applicable Legislation and Guidelines Used to Compile the Report	**Reference Where Applied**
Section 21(j); Removing, discharge or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people	details and water uses are under the authority of the Department of Housing Services, Water and Sanitation (DHSWS) and is subject to any recommendations or additional requestes they might have to make an informed decision regarding the water uses proposed. An active WUL process has been initiated and the Stormwater management features have been finalised. Currently PPP needs to be conducted for the Ergosat WUL.
Regulations Regarding the Procedural Requirements for Water Use Licence Applications and Appeals published in terms of NWA in Government Notice 267 of March 2017. Several General Authorisations have been published in terms of Section 39 of the NWA (various dates).	The Regulations will be taken into consideration during the Water Use Licence Application process and have been utilised by the Wetland specialist to determine the impact of the mine on the wetland areas. The C&I risk assessment have been done in the format as required by the regulations and Section 21(c) & (i) water uses have been included in the WUL application.
Mine Health and Safety Act, 1996 (Act No. 29 of 1996) [as amended] and associated regulations • *Chapter 2, Sections 2 – 4* *Responsibilities of owner* • *Chapter 2, Sections 5 – 13* *Responsibilities of manager;* • *Chapter 2, Sections 14 – 18;* *Documentation requirements;* • *Chapter 2, Section 19 – 20 and 22 to 24* *Employee's rights and duties; and* • *Chapter 2, Section 21* *Manufacturer's and supplier's duty for health and safety*.	The development activities may create an environment that is not safe and healthy for workers on and visitors to the site (if not managed correctly). The act provides for measures to prevent threats to the health and safety of humans in the development area.
National Heritage Resources Act, 1999 (Act No. 25 of 1999) • *Section 44 (1);* *Preservation and protection of heritage resources;* • *Section 3 Types and ranges of heritage resources (i) (i);* *Objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens*.	Protection of indigenous heritage resources on the property. A Heritage assessment was conducted for the project and the documents will again be distributed to SAHRA (uploaded) for comments during the onset of the new PPP Phase. The recommendations from the Heritage specialist report is included within this document and these findings were already uploaded on the SAHRA (SAHRIS) website.
National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004) [as amended] • *Section 32* *Control of dust* • *Section 34* *Control of noise*	Impacts on surrounding landowners need to be managed through dust and noise mitigation measures. An Air Quality Impact Assessment have been completed during the onset of the project and the details are provided within the document and Appendix 12: Air Quality.
List of Activities which Result in Atmospheric Emissions, published in terms of NEM:AQA in Government Notice 893 of 2013 (as amended)	The proposed mining activities will not trigger any of the activities. Although, the mine needs to make sure they comply with any NAEIS and any Carbon Tax regulations applicable to Coal mining.
National Dust Control Regulations, 2013 (Government Notice 827 of 2013)	Dust fall out needs to be monitored in accordance to the standards set out in the monitoring programme with the specified measures due to the Applicant being liable to

Applicable Legislation and Guidelines Used to Compile the Report	**Reference Where Applied**
• *Section 3* *Dust fall standard* • *Section 4* *Dust fall monitoring program* • *Section 6* *Measures for control of dust* • *Section 7* *Ambient air quality monitoring (PM10)* • *Section 8* *Offences* • *Section 9* *Penalties*	offences and penalties associated with non-conformance to dust which may influence employees and surrounding landowners.
National Greenhouse Gas Emission Reporting Regulations, published in terms of NEM:AQA in Government Notice of July 2017	During operational phase the mine will be required to report in the prescribed format.
Veld and Forest Fire Act, 1998 (Act No. 101 of 1998) [as amended] • *Section 12 (1)* *Duty of the landowner to prevent fire from spreading to neighbouring properties.*	Cautionary steps in avoiding the spread of fires to and from neighbouring properties.
National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) [as amended] • *Section 9* *Norms and standards* • *Section 27* *Delegation of power and duties* • *Section 30* *Financial accountability* • *Section 43* *Biodiversity management plans.*	Indigenous vegetation needs to be protected and managed in accordance with management measures set out in the management plans developed for the mine and the Applicant need to ensure he is aware of and covers his liabilities. An Activity for removing and clearing of vegetation has been applied for within this application and no other vegetation clearance will be permitted other than that approved in terms of the EA when/if the Competent Authority makes its decision. The Ergosat mine will be underground, the only clearance required will be that of the ventilation shafts and the plant areas (surface infrastructure).
Alien and Invasive Species Regulations (Government Notice 598 of 2014) and Alien and Invasive Species List, 2014 in terms of NEMBA (Government Notice 599 of 2014) • *Notice 2* *Exempted Alien Species in terms of Section 66 (1)* • *Notice 3* *National Lists of Invasive Species in terms of Section 70(1) – List 1, 3-9 & 11* • *Notice 4* *Prohibited Alien Species in terms of Section 67 (1) – List 1, 3-7, 9-10 & 12*	It is the responsibility of the Applicant to ensure that all prohibited plant and animal species are eradicated as far as possible. Alien and Invasive species need to be managed and prevented throughout the Life of Mine.
Conservation of Agricultural Resources Act (no. 43 of 1983) • *Section 5*	Listed invader/alien plants occurring on site which require management measures to be implemented to strive to maintain the status quo environment, especially through the

Applicable Legislation and Guidelines Used to Compile the Report	**Reference Where Applied**
Prohibition of spreading of weeds • *Section 12* *Maintenance of soil conservation works and maintenance of certain states of affairs* • *Section 16* *Regional Conservation Committees*	guidelines provided by the Regional Conservation Committee.
Mining and Biodiversity Guideline (2013)	The Act, regulation and guideline have informed project planning and will be taken into account in the assessment and mitigation of impacts.
Draft National Biodiversity Offset Policy, 2017	Not applicable for the Ergosat development unless explicitly requested during the WUL process. However, wetland, ecological, geohydrological and hydropedological assessments has been done for the project and incorporated into the WUL and EIA/EMPR. Additional studies could still be requested during the assessment by the DHSWS after Phase 3 submissions. The Applicant will need to abide (if requested).
Hazardous Substances Act, 1973 (Act 15 of 1973) [as amended] • *Section 2* *Declaration of grouped hazardous substances;* • *Section 4* *Licensing;* • *Section 16* *Liability of employer or principle* • *Section 9 (1)* *Storage and handling of hazardous chemical substances* • *Section 18* *Offences*	The Applicant must ensure the safety of people working with hazardous chemicals (specifically fuels), as well as safe storage, use and disposal of containers during the on-site operational phase together with the associated liability should non-compliance be at the order of the day.
Hazardous Chemical Substances Regulations, 1995 (Government Notice 1179 of 1995) • *Section 4* *Duties of persons who may be exposed to hazardous chemical substances* • *Section 9A (1)* *Penalties*	Hazardous substances will be stored and utilised on the site and non-compliance to management measures will result in prosecution of the Applicant in terms of his liabilities to the socio-economic environment.
Waste Classification and Management Regulations and Norms and Standards for the assessment of for landfill disposal and for disposal of waste to landfill, 2013 (Government Notice 634 – 635 of 2013) promulgated in terms of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) [as amended]; and Regulations regarding the planning and management of residue stockpiles and residue deposits from a	The mining area will produce general and hazardous waste which need to be managed and disposed of according to best practices such as recycling, safe storage, etc. Appropriate liners were designed during the formulation of the Stormwater Management Plans and a Waste License is required for the mine for the establishment of Waste/ Residue Stockpiles. These Residue Stockpiles were designed and signed by an Accredited Engineer during the WUL process.

Applicable Legislation and Guidelines Used to Compile the Report	**Reference Where Applied**
prospecting, mining, exploration or production operation (GN R. 632 of 2015).	An integrated NEMA and NEM:WA application has been launched with the DMRE (this application).
National Norms and Standards for the Storage of Waste, published in terms of NEM:WA in Government Notice 926 of 2013.	The purpose of the norms and standards is to – a. Provide a uniform national approach relating to the management of waste storage facilities. b. Ensure best practice in the management of waste storage facilities; and c. Provide minimum standards for the design and operation of ne waste storage facilities. Management of the waste storage facilities will be in line with the requirements.
National Norms and Standards for the Sorting, Shredding, Grinding, Crushing, Screening or Baling of General Waste, published in terms of NEM:WA in Government Notice 1093 of 2017	The purpose of this Norms and Standards is to provide a uniform national approach relating to the management of waste facilities that sort, shred, grind, crush, screen, chip or bale general waste. The waste rock dump is not regulated under this Norms and Standards. No general waste will be processed in terms of these norms and standards on the mining area.
Guideline on the Need and Desirability, Department of Environmental Affairs, 2017	This guideline has been taken into account as part of project planning. The 2017 Guideline has been used within this process.
NEMA: Government Notice. 805 Companion Guideline on the Implantation of the Environmental Impact Assessment Regulations, 2010, October 2012.	The application for Environmental Authorisation is submitted in terms of the EIA Regulations.
NEMA: GN. 807 Public Participation Guideline, October 2012.	Consultation with Interested and Affected Parties and Communities.
Public Participation guideline in terms of NEMA EIA Regulations, Department of Environmental Affairs, 2017	This guideline has informed the public participation process for the project. Another round of PPP due to required Scope change to include the Sasol pipelines and additional consultation required by the Minister. Updated and additional specialist work had also been included in this document to ensure all the relevant information is provided.
Regulations Pertaining to the Financial Provision for Prospecting, Exploration, Mining or Production Operations, 2015 (Notice 1147 of 2015): • *Regulation 5: Scope of financial provision* • *Regulation 6: Method for determining financial provision* • *Regulation 12: Preparation and submission of plans and reports*	An applicant must determine the financial provision through a detailed itemisation of all activities and cost, calculated based on the actual cost of implementation of the measures required.
Regulations on use of Water for Mining and Related Activities Aimed at the Protection of Water Resources, 1999 (Notice 704 of 1999): • *Regulation 4: Restrictions on location of mining activities* • *Regulation 7: Protection of water resources* • *Regulation 12: Technical investigation and monitoring.*	Every person in control of a mine or activity must take measures to manage water in an effective manner as prescribed by the regulation.

Applicable Legislation and Guidelines Used to Compile the Report	**Reference Where Applied**
Noise Control Regulations (The Republic of South Africa, 1992) published in terms of Section 25 of the Environment Conservation Act (Act no. 73 of 1989).	The regulations define the following: • Controlled areas; and • Disturbing noise. Limits are provided for rating levels for outdoor noise. To be utilised by the Noise specialist to determine the impact and mitigation measures. The Ergosat Mine will be an underground mining operation and therefore noise based on blasting etc. will be limited. A Noise Impact Assessment was conducted and impacts will not be changed by the scope change (Appendix 14).
NEM:AQA: GNR 283. National Atmospheric Emissions Reporting Regulations, 2015. *For purposes of these Regulations, emission sources and data providers are classified according to groups A to D listed in Annexure 1 to these Regulations.* Section 5(3): *For purposes of these Regulations, emission sources and data providers are classified according to groups A to D listed in Annexure 1 to these Regulations.*	Applicable to any person, that holds a mining right or permit in terms of the MPRDA. Emissions report must be made in the format required for National Atmospheric Emission Inventory System (NAEIS) to the relevant air quality officer. The Ergosat Mine will be an underground mining operation and therefore air related impacts will be limited. An Air Impact Assessment was conducted originally and impacts will not be changed by the scope change.
National Guideline on minimum information requirements for preparing Environmental Impact Assessments for mining activities that require environmental authorisation, published in terms of NEMA in Government Notice 86 of 2018	This guideline has been taken into account as part of project planning.
Restitution of Land Rights Amendment Act, 2014 (Act 15 of 2014). The act deals with Land claims.	The validity of the amendment Act was challenged in the Constitutional Court. The Constitutional Court found the Amendment Act to be invalid because of the failure of Parliament to facilitate public involvement as required by the Constitution. The Amendment Act ceased to be law on 28 July 2018. The Constitutional Court ordered that the claims that were lodged between 1 July 2014 and 27 July 2016 are validly lodged, but it interdicted the Commission from processing those claims until the Commission has finalised the claims lodged by 31 December 1998 or until Parliament passes a new law providing for the re-opening of lodgement of land claims. It is important to note that the provisions of section 11(7) of the Restitution of land Rights Amendment Act, 1994 do not apply until after the Commission has accepted the claim for investigation and published its details in the Government Gazette. Where section 11(7) of Restitution of land Rights Amendment Act, 1994 applies, the land claim commission will be informed a month before any activity is undertake on the property.
Deeds Registries, 1937 (Act No. 47 of 1937) [as amended]	The Registration of servitudes and deed titles for any project which may require servitude registration.
South African Mining Charter	Focus on sustainable transformation of the mining industry. Ergosat Mine: Lefa Colliery as indicated is compliant with the BEE requirements. Social management and mitigation measures, developed as part of the SIA, will be aligned to the Mining Charter.

Applicable Legislation and Guidelines Used to Compile the Report	**Reference Where Applied**
National Strategy for Sustainable Development and Action Plan 2011 – 2014 (NSSD 1) (2011)	The Strategy for Sustainable Development and Action Plan (NSSD1) is a proactive strategy that regards sustainable development as a long-term commitment, which combines environmental protection, social equity and economic efficiency with the vision and values of the country. It is a milestone in an ongoing process of developing support, and initiating and up-scaling actions to achieve sustainable development in South Africa (DEA, 2011) and has outlined the following strategic objectives: • enhance systems for integrated planning and implementation; • sustain ecosystems and use natural resources efficiently; • move towards a green economy; • build sustainable communities; and • respond effectively to climate change. The Act, development plans, development frameworks and bylaws have informed project planning and the need and desirability of the project, and will be taken into account in the assessment and mitigation of impacts during the EIA phase.
National Spatial Development Perspectives (NSDP)	The Initial NSDP (2006) provides a framework for a focused intervention by the State in equitable and sustainable development. It represents a key instrument in the State's drive towards ensuring greater economic growth, buoyant and sustained job creation and the eradication of poverty. It provides: • a set of principles and mechanisms for guiding infrastructure investment and development decisions; • a description of the spatial manifestations of the main social, economic and environmental trends that should form the basis for a shared understanding of the national space economy; and • an interpretation of the spatial realities and the implications for government intervention. The Act, development plans, development frameworks and bylaws have informed project planning and the need and desirability of the project, and will be taken into account in the assessment and mitigation of impacts during the EIA phase.
National Spatial Development Framework (NSDF)	A Draft NSPF have been released in September 2018 and again April 2019. Latest release in January 2020 with comments invited until 19 March 2020. The National Spatial Development Framework (NSDF), seeks to make a bold and decisive contribution to bringing about the peaceful, prosperous and truly transformed South Africa, as articulated in the Freedom Charter, the Reconstruction and Development Programme and the National Development Plan. It does so in full recognition of:

Applicable Legislation and Guidelines Used to Compile the Report	Reference Where Applied
	• The stranglehold that the unjust national spatial development paradigms, logics and patterns of the past have placed on our many attempts at breaking the back of poverty, unemployment and inequality; • The valuable, and often hard lessons we have learnt over the last twenty-four years in our pursuit of national reconstruction, inclusive economic growth and spatial transformation; and • The necessity for decisive, collaborative and targeted state action in national space, to drive our country towards the shared, inclusive and sustainable future we desire and require. In accordance with this transformative agenda, and guided by the Spatial Planning and Land Use Management Act, Act 16 of 2013 (SPLUMA), the NSDF consists of seven interrelated parts: • Part One provides an overview of the background to, need for and role of the NSDF, locates it within the context of the National Development Plan (NDP), and sets out the NSDF's theory of change to move the country from where we are, to the South Africa we want and need; • Part Two provides an overview of the process that was followed in the compilation of the NSDF, including the data that was gathered and processed, the many work-sessions that were held, and the consultations and engagements that were undertaken; • Part Three provides a high-level overview of a series of significant national spatial development dynamics, challenges and opportunities that impact upon, and shape both (1) the national development landscape, and (2) our ability to realise our national development goals; • Part Four (1) puts forward the national spatial development vision of a shared and just South Africa, (2) sets out the shifts that must be made in the national spatial development logic based on the objectives and directives of the NDP and the SPLUMA principles, to enable a radical, transformative and decisive change in our national spatial development pattern, (3) provides six national spatial development concepts to give spatial expression to the national spatial development vision, and support the shifts that need to be made in accordance with the new national spatial development logic, and (4) provides an indication as to what life would be like in our country by 2050 if the vision is pursued, the necessary shifts are made and the spatial development concepts are appropriately and effectively used; • Part Five puts forward the national spatial development frame, five national spatial outcomes, four national sub-frames, and ten strategic spatial and implementation action areas, to inform, direct and guide all future infrastructure investment and development spending decisions by government and the private sector in line

Applicable Legislation and Guidelines Used to Compile the Report	**Reference Where Applied**
	with our national spatial development vision and logic, to achieve the desired national spatial development pattern for South Africa in 2050, and to, in doing so, realise our core national development objectives, as set out in the NDP; • Part Six deals with the implementation of the NSDF, lists the tasks required in doing so, including championing, communicating, institutionalisation, embedding, and actioning, maps the significance of these tasks over time, and provides an overview of the role-players involved in realising the desired national spatial development pattern; and Part Seven provides a summary of, and conclusion to the NSDF.
National Development Plan 2030 (2010)	The National Development Plan (NSDP 2030) promulgated in March 2019 aims to ensure that all South Africans attain a decent standard of living through the elimination of poverty and reduction of inequality by 2030. The core elements of a decent standard of living identified in the plan are: • housing, water, electricity and sanitation; • safe and reliable public transport; • quality education and skills development; • safety and security; • quality health care; • social protection; • employment; • recreation and leisure; • clean environment; and • adequate nutrition. The Act, development plans, development frameworks and bylaws have informed project planning and the need and desirability of the project, and will be taken into account in the assessment and mitigation of impacts.
New Growth Path (2010) Recent draft placed out for comment – not yet promulgated	South Africa has embarked on a new economic growth path in a bid to create 5 million jobs and reduce unemployment from 25% to 15% over the next ten (10) years. The plan aims to address unemployment, inequality and poverty by unlocking employment opportunities in South Africa's private sector and identifies seven job drivers. These job drivers have the responsibility to create jobs on a large scale. The seven key economic sectors or "job drivers" for job creation are listed below: • infrastructure development and extension: Public works and housing projects; • agricultural development with a focus on rural development and specifically • "Agro-Processing"; • mining value chains; • manufacturing and industrial development (IPAP); • knowledge and green economy; • tourism and services; and

Applicable Legislation and Guidelines Used to Compile the Report	Reference Where Applied
	• informal sector of economy. The Act, development plans, development frameworks and bylaws have informed project planning and the need and desirability of the project, and will be taken into account in the assessment and mitigation of impacts. The Minister of Economic Development presented on the New Growth Path preliminary medium-term review. He stated that prior to the adoption of the NGP employment stood at 13 638 000 jobs, after the NGP the statistics showed 15 545 000 jobs that have been created thus far. Therefore, since the adoption of the NGP the net jobs created were 1.9 million. Of the number of new jobs created the private sector contributed 1 146 000 and government and its utilities contributed just about 749 000 jobs. The NGP focused on channelling growth in various sectors in the economy, infrastructure absorbing a significant amount of funding to secure jobs and create new ones. Through the investment funding of R109.1 billion 200 000 direct jobs in projects monitored by the PICC resulted. In the agricultural sector, R1.2 billion was invested by DRDLR last year to recapitalise 414 land reform farms and support 1 357 poor farmers. Drought relief was provided by government to 53 607 smallholders farmers (R795 million) and 78 863 farmers, Coca-Cola also set up a fund for emerging farmers to procure at least 80% apples, pears and grapes for fruit used to make Appletizer. In Mining, 56% increase in investment was made for the six-year period post the NGP compared to pre-GDP in real terms, therefore, the total jobs in mining increased by 118 000 to 329 000. Steel production fell by 33% between 2008 and 2015 due to the slow global growth rate and strained labour relations. In the manufacturing sector jobs declined by 293 000 between 2008 and 2010 as the result of the 2008 financial crisis, but the sector has been growing slowly linked to the global market recovery. However, the release of the StatsSA's Quarterly Labour Force Survey today revealed that the South African official unemployment rate has increased to 27.6%, and the expanded unemployment rate increased to 38%, translating to 9.9 million unemployed people in South Africa. While the increase is marginal, it is indicative of an economy which is stagnant and shedding jobs at an alarming rate. This is compounded by a National Government that is devoid of a credible, long-term plan for jobs and the economy
National Framework for Sustainable Development (2008)	The purpose of the National Framework on Sustainable Development is to enunciate South Africa's national vision for sustainable development and indicate strategic interventions to re-orientate South Africa's development path in a more sustainable direction. It proposes a national vision, principles and areas for strategic intervention that will enable and guide the development of the national strategy and action plan.

Applicable Legislation and Guidelines Used to Compile the Report	**Reference Where Applied**
Free State Provincial Growth and Development Strategy, November 2007	The framework is a nine-year strategy (i.e. 2005 - 2014), which aims to achieve the objectives of Vision 2014. The FSGDS is the outcome of broad consultation with all role players and research conducted by various experts under the Premier's Advisory Council (PEAC). It addresses the key social, economic, environmental and spatial imperatives in the Province. Underlying the FSGDS are the following imperatives: • The need to effectively use scarce resources within the Province, whilst addressing the real causes of development challenges. • The need to accelerate service delivery based on a common provincial development agenda as the basis for provincial strategic direction. • The need to identify investment opportunities and provide an environment of certainty critical for private-sector investment. • The need to promote intergovernmental coordination between the three spheres of government. • The need to facilitate facilitates the implementation of the People's Contract within the Province. • The need to provide a common vision as the basis for common action amongst all stakeholders, both inside and outside government. • The need to provide a framework for budgets, implementation, performance management and spatial development.
The Free State Provincial Spatial Development Framework (PSDF)	The Free State PSDF is a policy document that promotes a 'developmental state' in accordance with national and provincial legislation and directives. It aligns with the Free State Provincial Growth and Development Strategy which has committed the Free State to 'building a prosperous, sustainable and growing provincial economy which reduces poverty and improves social development'. The PSDF includes comprehensive plans and strategies that collectively indicate which type of land-use should be promoted in the Province, where such land-use should take place, and how it should be implemented and managed. In broad terms, the PSDF: • Indicates the spatial implications of the core development objectives of the Free State Provincial Growth and Development Strategy. • Serves as a spatial plan that facilitates local economic development. • Lays down strategies, proposals and guidelines as it relates to sustainable development. • Facilitates cross-boundary co-operation between municipalities, adjoining provinces, and bordering countries. • Serves as a manual for integration and standardisation of the planning frameworks of all spheres of government in the Province.

Applicable Legislation and Guidelines Used to Compile the Report	**Reference Where Applied**
	The Free State Provincial Growth and Development Strategy states that sustainable economic development is the only effective means by which the most significant challenge of the Free State, namely poverty, can be addressed is. The PSDF gives practical effect to sustainable development, which is defined as development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs. The PSDF is prepared in accordance with bioregional planning principles that were adapted to suit the site-specific requirements of the Free State. It incorporates and complies with the relevant protocols, conventions, agreements, legislation and policy at all applicable levels of planning, ranging from the international to the local. The PSDF builds upon achievements and learns from mistakes of the past, reacts to the challenges of our time, incorporates the traditional knowledge of the people of the Free State, and builds upon international best-practice and technology.
Revised 2018/19 Fezile Dabi District Municipality: Integrated Development Plan	Fezile Dabi District Municipality prides itself by working together with its communities to improve the quality of its people. This plan is a collective plan for the future development course of our Municipality originating from our continued engagements with our stakeholders. Metsimaholo is the only local municipality in which the private sector dominates the economy. The main economic contribution is from the manufacturing sector, dominated by Sasol. Apart from the high-tech industrialized Sasolburg area in the north, the remainder of the area has a strong agricultural base. Cattle and sheep farming provide opportunities for the processing of meat, wool and dairy products. Maize, sunflower seed, sorghum and wheat are cultivated. Extensive areas have rich underground coal deposits. Large quantities are mined in the Sasolburg district by means of conventional and strip-mining methods. Sasolburg, known as the chemical hub of South Africa, has a range of industries related to the oil-from-coal process, including the Chem City project. The rare clay, Bentonite, is mined in the vicinity of Koppies. The re-exploitation of the Lacemyn diamond mine in the vicinity of Kroonstad is currently taking place and gold is mined at the Vaal Reefs Mine, part of the Witwatersrand gold reef, in the Viljoenskroon area. Heilbron has a strong industrial character. The national headquarters of several industries are situated here. Industrial development in Frankfort is agriculture-related and the largest butter production facility in the southern hemisphere is established here (SALGA, 2013). • Fezile Dabi is known to be the grain/maize basket for South Africa.

Applicable Legislation and Guidelines Used to Compile the Report	**Reference Where Applied**
	• Fezile Dabi is contributing 17 -18% of GDP in terms of Agriculture. • There's a need for more agro-processing initiatives to boost agriculture in the district. • Lack of funding for agricultural projects (Koppies Green House Vegetable production Project) Agriculture 12% Mining 1% Manufacturing 13% Electricity 1% Construction 6% Trade 22% Transport 5% Finance 7% Community services 20% Households 13% Revised 2018/19 Fezile Dabi District Municipality: Integrated Development Plan 11 • National Department of Agriculture has conceptualised Agri- Parks, & Ngwathe LM has been identified as one of the areas where Agri- Parks will be established. The district has location advantages in sectors such as agriculture, mining, manufacturing and electricity provision.
All other relevant national, provincial, district and local municipality legislation and guidelines that may be applicable to the application.	

5 NEED AND DESIRABILITY OF THE ACTIVITIES

(Motivate the need and desirability of the proposed development including the need and desirability of the activity in the context of the preferred location).

The main benefits of the proposed Coal mining project are:

- Direct economic benefits will be derived from wages, taxes and profits;
- Indirect economic benefits will be derived from the procurement of goods and services and the spending power of employees;
- Increased job security to employees already skilled in coal mining within the area.
- Implementation of the proposed project will result in skills development associated with and mining;
- It contributes to the economic welfare of the surrounding community by creating working opportunities;
- It contributes to the upliftment of living standards and the health and safety of the local community;
- The project will result in economic mining of a known resource;
- The net benefit to South Africa is a product produced specifically the local commodity market, specifically for electricity generation (Eskom); and
- Reduction in illegal mining and unregulated mining.

The project is aligned with the objectives of the MPRDA (Act 28 of 2002):

- To promote economic growth and mineral development in the Republic;
- To promote employment and advance the social and economic welfare of all South Africans;
- To ensure that the nation's mineral resources are developed in an orderly and ecologically sustainable manner while promoting justifiable social and economic development; and
- To ensure that mining developments contribute towards the social-economic development of the area in which they are operating.

The Department of Environmental Affairs (DEA) published a Guideline on Need and Desirability (2017) in terms of the Environmental Impact Assessment (EIA) Regulations, 2014 (as amended). The key components are listed and discussed below:

- Securing ecological sustainable development and use of natural resources; and
- Promoting justifiable economic and social development.

According to DEA (2017), Guideline on Need and Desirability, Department of Environmental Affairs, to describe the need for a development, it must be determined whether it is the right time for locating the type of land use and/or activity being proposed. To describe the desirability for a development, it must be determined, whether it is the right place for locating the type of land use and/or activity being proposed. Need and desirability can be equated to the concept of wise use of land which can be determined through asking the question: "what is the most sustainable use of land?"

Considering the above, the need and desirability of an application must be addressed separately and in detail answering *inter alia* the following questions:

Table 5-1: Need and desirability considerations

Securing ecological sustainable development and use of natural resources		
1. 1.1	How will this development (and its separate elements/aspects) impact on the ecological integrity of the area? How were the following ecological integrity considerations taken into account? 1.1.1 Threatened Ecosystems, 1.1.2 Sensitive, vulnerable, highly dynamic or stressed ecosystems, such as coastal shores, estuaries, wetlands, and similar systems require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure, 1.1.3 Critical Biodiversity Areas ("CBAs") and Ecological Support Areas ("ESAs"), 1.1.4 Conservation targets, 1.1.5 Ecological drivers of the ecosystem, 1.1.6 Environmental Management Framework, 1.1.7 Spatial Development Framework, and 1.1.8 Global and international responsibilities relating to the environment (e.g. RAMSAR sites, Climate Change, etc.).	In accordance with the Freestate C-Plan, the area falls within the areas mostly identified as "Degraded" and "ESA 2". *The Vegetation report also states: As a large part of the study site has already been transformed and does not resemble any of the indigenous vegetation associated with the Andesite Mountain Bushveld and Central Free State Grassland"* It should be kept in mind that only underground mining will be taking place and surface impacts are only expected as part of the implementation of the plant area and ventilation shafts. The area does not fall within sections listed as Threatened Ecosystems in terms of the National Biodiversity Assessment, 2011. The Andesite Mountain Bushveld is also of Least Concern according to the NBA 2018 (released October 2019). Most of the area included in the Mining Right has been transformed by farming and agricultural activities, which will not be impacted since the mining is proposed underground. Only the section where surface infrastructure is proposed will be impacted.
1.2	How will this development disturb or enhance ecosystems and/or result in the loss or protection of biological diversity? What measures were explored to firstly avoid these negative impacts, and where these negative impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	Impacts predicted for the development have been assessed by a specialist and for the purposes of the WUL application. The wetlands identified as located within 500 m by the specialist investigations have been delineated and these will be licensed with the National Water Act, 1998 (Act No.36 of 1998) (WUL Application) and thereby be regulated by additional rehabilitation and monitoring features to ensure that management will be implemented for these sensitive systems. General impacts, such as dust, noise, etc. have been covered within the Environmental management programme (EMPr) proposed for the Mine

		activities. Several mitigation measures and monitoring features will be included in the EMPr to ensure minimal and managed operation of the footprint area designed for the Mining area.
1.3	How will this development pollute and/or degrade the biophysical environment? 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 (including offsetting) the impacts? What measures were explored to enhance positive impacts?	Mitigation and Management measures prescribed will aid to avoid and lower any possible impacts that may result from the development. Final rehabilitation will restore Land capability and Land use to a pre-mining state where possible and in accordance to the final approved Land use. The Section 21(c) and (i) wetlands to be authorised (within 500m bufferzone) will require a rehabilitation and monitoring programme for the wetlands. These may include Alien and Invasive Monitoring and vegetation establishment along areas requiring rehabilitation. The prevention and repair of eroded site, etc. All of these may have positive impacts on the ecological environment. The Life of Mine is proposed for the period of 24 years, but should include closure and decommissioning. The application will be made for a period of 30 years. This will include active mining, as well as the post-closure monitoring and rehabilitation required to obtain a Closure certificate. As mentioned above, WUL application has been launched and is in process.
1.4	What waste will be generated by this development? What measures were explored to firstly 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?	General waste, Hazardous waste and litter will be generated during the life of the mine and these should be kept in designated areas and disposed of to a licensed landfill facility. Other wastes that may cause soil contamination are from the use of vehicles and loaders during the mining process, which may lead to hydrocarbon spills. Regulations for soil clean-up and management have been prescribed in the EMPr. Portable toilets during construction are recommended for the operation and a contractor will be required for the maintenance and service of these systems. A modular sewerage treatment plant will be erected for the treatment of sewage. The containerised sewage treatment plant is a fully functional sewage treatment plant, is easily transported and built into a transportable container.

		The residue stockpiles, such as the Waste Rock Dump, ROM Stockpiles will be licensed in accordance with the National Waste Act and a Waste license for these activities will be obtained (concurrent with this application under NEMA). All other water uses have been identified and included in the WUL application and in terms of the National Water Act, 1998 (Act 36 of 1998).
1.5	How will this development 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 (including offsetting) the impacts? What measures were explored to enhance positive impacts?	A specialist heritage study was conducted for the project and these findings have been included in the application. All other relevant specialist investigations have been incorporated into the document and the Mining Right Application.
1.6	How will this development 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 (including offsetting) the impacts? What measures were explored to enhance positive impacts?	The operation will remove a known resource (coal resource – limited resource) within the designated area. This cannot be reversed. The study area has already been transformed and the mining will occur underground. Through implementing good practice environmental management measures and mitigation measures, it will ensure that both human and environment are not negatively affected by the development. Coal seams are usually associated with wetland related terrain, as most coal seams are the result of peat and other organic carbon accumulations over the years. Therefore, coal is usually found and may be characterised by sensitive features such as wetlands, pans and grasslands. All of these features have been assessed by specialists and wetlands have been included in the WUL application.
1.7	How will this development use and/or impact on renewable natural resources and the ecosystem of which they are part? Will the use of the resources and/or impact on the ecosystem jeopardise the integrity of the 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	Renewable natural resources may be the use of borehole water to a limited amount on-site. Processing, washing and screening (Primary processing) is proposed, which may require additional water. Water requirements have been described above and all water uses will be licensed in terms of the National Water Act. DHSWS is the Competent Authority (CA) for the WUL process.

	use of the resources? What measures were explored to enhance positive impacts? 1.7.1. Does the proposed development exacerbate the increased dependency on increased use of resources to maintain economic growth or does it reduce resource dependency (i.e. de-materialised growth)? (note: sustainability requires that settlements reduce their ecological footprint by using less material and energy demands and reduce the amount of waste they generate, without compromising their quest to improve their quality of life). 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 (i.e. what are the opportunity costs of using these resources this the proposed development alternative?) 1.7.3. Do the proposed location, type and scale of development promote a reduced dependency on resources?	Stormwater management and the water stemming from the primary processing will be captured in the PCD infrastructure and re-used and recycled into the process and may be used as dust suppression around the dirty footprint areas within the area. This will alleviate the requirement for clean make-up water which will be sourced from groundwater. Water may also be needed to be removed from the underground section during the project and this will also be re-utilised where possible. No discharges into the environment will be applied for or proposed. A conceptual stormwater management plan has been devised during the first application made and during the WUL application, these designs were formalised and finalised by Nurizon Engineers (Nurizon Consulting (Pty) Ltd, 2020). These have been updated and reflected within the EIA/EMPr.
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)? 1.8.2 What is the level of risk associated with the limits of current knowledge? 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?	The Environmental risk assessment for all environmental features has been included within Section 14 and Section 15. An additional Risk assessment was conducted for the SASOL pipelines identified on the Mining Right footprint. Ecological (Fauna, Flora and Avifaunal), Wetland, Groundwater, Hydropedological and Heritage specialist studies (including several other specialist investigations as incorporated within this document) was completed for the project to ensure the impacts of these aspects have been properly assessed and will be catered for within the Environmental Management Programme (EMP). Other specialist investigations were also conducted and these are relevant for the specific project and adherence to these management measures will be mitigated and manage impacts predicted.

		A section regarding limitations of the studies have been included in the EIA/EMPr format and will be available for the competent authorities to consider as well.
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? 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?	Noise, dust and visual pollution can increase if not managed correctly. Possibly water pollution, if impacts are not managed effectively, but with the proper mitigation and good practice environmental management measures, it will result in minimal impacts. These impacts have been assessed and detailed prevention and mitigation measures have been recommended (refer to Section 15.2, Section 15.7 and Table 28-1 of this report).
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.)?	Ecological aspects and specialist impact assessments have been included in the document and risk assessments utilised to guide the Environmental Management Program.
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?	The Environmental risk assessment for all environmental features has been assessed and included in the EIA/EMPr. The area has been significantly altered by current land uses and historical actions and is labelled as mostly degraded in the Conservation Plan and verified by the vegetation and faunal investigations.
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?	Ecological (Fauna, Flora and Avifaunal), Wetland, Hydropedological (requested for WUL from DHSWS), Geohydrological and Heritage specialist study have been completed for the project to ensure the impacts of these aspects have been properly assessed and have been catered for within the Environmental Management Programme (EMP). Additional specialist studies have also been conducted and all have assisted with the development of a management plan to secure ecological integrity and a healthy biophysical environment.
1.13	Describe the positive and negative cumulative ecological/biophysical impacts bearing in mind the size, scale,	Cumulative impacts may be the accumulation of all the existing, historic and proposed mining activities which may result in negative impacts. However, if

	scope and nature of the project in relation to its location and existing and other planned developments in the area?	the project implements the mitigation measures and management measures correctly, cumulative negative impacts as a result of the combined coal mining of the area will be managed optimally.
"Promoting justifiable economic and social development"		
2.1	What is the socio-economic context of the area, based on, amongst other considerations, the following considerations? 2.1.1 The IDP (and its sector plans' vision, objectives, strategies, indicators and targets) and any other strategic plans, frameworks of policies applicable to the area, 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.), 2.1.3 Spatial characteristics (e.g. existing land uses, planned land uses, cultural landscapes, etc.), and 2.1.4 Municipal Economic Development Strategy ("LED Strategy").	The project is aligned with the objectives as coal mining is already an ongoing and historic activity within the area and therefore should not compromise the integrity of the surrounding land uses and neighbouring properties. Also, most of the site in question has almost no natural remaining habitat left, as also shown within the Conservation plan, which shows that areas are categorised as "Degraded" and "ESA 2". Revised 2018/19 Fezile Dabi District Municipality: Integrated Development Plan, "*Fezile Dabi District Municipality prides itself by working together with its communities to improve the quality of its people. Metsimaholo is the only local municipality in which the private sector dominates the economy. The main economic contribution is from the manufacturing sector, dominated by Sasol.* *Apart from the high-tech industrialized Sasolburg area in the north, the remainder of the area has a strong agricultural base. Cattle and sheep farming provide opportunities for the processing of meat, wool and dairy products. Maize, sunflower seed, sorghum and wheat are cultivated. Extensive areas have rich underground coal deposits. Large quantities are mined in the Sasolburg district by means of conventional and strip-mining methods. Sasolburg, known as the chemical hub of South Africa, has a range of industries related to the oil-from coal process, including the Chem City project. The rare clay, Bentonite, is mined in the vicinity of Koppies. The re-exploitation of the Lacemyn diamond mine in the vicinity of Kroonstad is currently taking place and gold is mined at the Vaal Reefs Mine, part of the Witwatersrand gold reef, in the Viljoenskroon area. Heilbron has a strong industrial character.* *The district has location advantages in sectors such as agriculture, mining, manufacturing and electricity provision.*"

		This indicates that coal mining within the local area is prevalent and aligned with current developments found within the local vicinity.
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? 2.2.1. Will the development complement the local socio-economic initiatives (such as local economic development (LED) initiatives), or skills development programs?	Also refer to the comments made above. The proposed project will benefit society and the surrounding communities both directly and indirectly by providing job security at the proposed operation and through the extraction of coal reserves within the Free State Province. Direct economic benefits will be derived from wages, taxes and profits. Indirect economic benefits will be derived from the procurement of goods and services and the spending power of employees. The project will make use of local workers and service providers and this must be kept record of to ensure the local economic development (as prescribed in the EMPr).
2.3	How will this development address the specific physical, psychological, developmental, cultural and social needs and interests of the relevant communities?	Refer to comments made above. All aspects and comments received from I&APs during the process will be reasonably addressed and incorporated into the revised final EIA/EMPr submitted to the DMRE. Local economic growth and work opportunities will be main benefits from the project if approved and may address some of the physical, psychological, development, cultural and social needs. Main benefits from the mining, which may possibly address community needs are mentioned below (also refer next comment) and is in-line with the local municipality and national goals and status of development and transformation. The IDP explicitly states: "*Apart from the high-tech industrialized Sasolburg area in the north, the remainder of the area has a strong agricultural base. Cattle and sheep farming provide opportunities for the processing of meat, wool and dairy products. Maize, sunflower seed, sorghum and wheat are cultivated. Extensive areas have rich underground coal deposits. Large quantities are mined in the Sasolburg district by means of conventional and strip-mining methods. Sasolburg, known as the chemical hub of South Africa, has a range of industries related to the oil-from coal process, including the Chem City project. The rare clay, Bentonite, is mined in the vicinity of Koppies.*

		The re-exploitation of the Lacemyn diamond mine in the vicinity of Kroonstad is currently taking place and gold is mined at the Vaal Reefs Mine, part of the Witwatersrand gold reef, in the Viljoenskroon area. Heilbron has a strong industrial character."
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?	The main benefits of the proposed mining operation are: • Direct economic benefits will be derived from wages, taxes and profits. Indirect economic benefits will be derived from the procurement of goods and services and the spending power of employees; • Implementation of the proposed project will result in skills development associated with coal mining; • It contributes to the economic welfare of the surrounding community by creating working opportunities; • It contributes to the upliftment of living standards and the health and safety of the local community; • The project will result in economic mining of a known resource; • The net benefit to South Africa is a product produced for the world and specifically the local commodity market, as it is noted in background information that the coal will be utilised by Eskom (preferably). <u>No definite agreement is in place at the time of the drafting of this document as authorisation has not been finalised.</u> The project is aligned with the objectives of the MPRDA (Act 28 of 2002): • To promote economic growth and mineral development in the Republic; and • To promote employment and advance the social and economic welfare of all South Africans.
2.5	In terms of location, describe how the placement of the proposed development will; 2.5.1. result in the creation of residential and employment opportunities in close proximity to or integrated with each other, 2.5.2. reduce the need for transport of people and goods, 2.5.3. result in access to public transport or enable non-motorised and pedestrian transport (e.g. will the development result in	Alternatives have been assessed during the process and the best suited alternative have been described within this application and depicted in the original EIA/EMPr as well as this revised version which indicated the additional changes that were made. Refer to sections below for all aspects taken into account. The proposed layout is the best suited and feasible alternative, taking into account the already transformed footprint, wetlands within the project area and

	densification and the achievement of thresholds in terms public transport), 2.5.4. compliment other uses in the area, 2.5.5. be in line with the planning for the area, 2.5.6. for urban related development, make use of underutilised land available with the urban edge, 2.5.7. optimise the use of existing resources and infrastructure, 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), 2.5.9. discourage "urban sprawl" and contribute to compaction/densification, 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, 2.5.11. encourage environmentally sustainable land development practices and processes 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.), 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), 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, and 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 known resource occurring within that area. Alternatives have been assessed, the findings of the specialist studies, comments from I&AP's to date and resources studies have been taking into consideration to determine alternatives for the proposed project. All additional comments from I&APs have been taken into consideration in the final report to be submitted to the competent authority for adjudication (this report). The position of Vent Shaft 2 was moved to accommodate the SASOL pipelines identified and to ensure it is more than 100m away ensuring safety and compliance in terms of the MHSA as well as a risk assessment which was conducted for the risk and blasting impacts proposed underground and how this may impact the SASOL pipelines.
2.6	How were 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)?	Gaps and limits in knowledge have been given within the EIA/EMPr document and where appropriate a pre-cautionary approach has been applied. Gaps and limitations have been properly assessed and addressed.

	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? 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?	Limitations as described by the specialists have also been included within Section 13. A civil engineer has been appointed for all designs and the infrastructures, such as the stormwater, the waste management facilities and this process was finalised during the WUL process, therefore the final Phase 3 designs have now also been incorporated into this document to ensure the latest available data is represented in the EMPr. This will ensure the safest design and parameters used to ensure low risk for these aspects included in the application. Only primary processing and underground mining will form part of the application and this will also limit the negative impacts on the environment in certain ways. Applying effective stormwater systems and applying to GN 704 (and a WUL application) will assist in preventing any dirty water entering the environment. The gaps in knowledge related to fine tuning of water requirements and balancing is being addressed as best as possible within the WUL process and therefore the risk may be argued as Medium – Low (with implementation of mitigation measures).
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? 2.7.2. Positive impacts. What measures were taken to enhance positive impacts?	Refer to all other aspects regarding the Socio-Economic environment, benefits and disadvantages. All of the relevant aspects have also been addressed within the EIA/EMPr and may be viewed within the Impact Assessment, Management and Mitigation tables as contained within this document.
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	The area where the mining right is proposed, is currently utilised for agriculture and grazing. The Land Use and Capability has been described within this document. Refer to the baseline environment section (Section 10). Since the

	how the development's socio-economic impacts will result in ecological impacts (e.g. over utilisation of natural resources, etc.)?	mine is an underground mine, almost all surface land uses will/could remain without significant impact.
2.9	What measures were taken to pursue the selection of the "best practicable environmental option" in terms of socio-economic considerations?	Health and Safety considerations will be included in the measures taken to pursue the best practicable environmental options in terms of socio-economic considerations, such as implementation of the mitigation measures such as dust, noise and visual management and mitigation. Formal civil designs for the Waste Management Facilities and Plant also ensures safety and low risk of failure and fatalities. No other socio-economic considerations are relevant, except for work creation for local communities within the area, but these will be same for any footprint chosen on the farms. The environmental features and impacts, known resource and financial restraints associated with mining (specific resource) were the deciding factors concerning the best suited option. Unfortunately, as stated, coal mining and sensitive environmental features such as wetlands rarely exist apart, as the formation of coal is dependent on these environmental features.
2.10	What measures were taken to pursue environmental justice so that adverse environmental impacts shall not be 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?	Refer to comments made above. To extract the known resource optimally within long-term project will benefit the local economy, which is dependent on coal as a provision for electricity. All alternative scenarios have been discussed below. A long-term project without significantly impacting the surface is an ideal manner and a very suitable environmental option.
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?	The main benefits of the proposed mining operation are: • Direct economic benefits will be derived from wages, taxes and profits; • Indirect economic benefits will be derived from the procurement of goods and services and the spending power of employees; • Implementation of the proposed project will result in skills development associated with coal mining; • It contributes to the economic welfare of the surrounding community by creating working opportunities;

		• It contributes to the upliftment of living standards and the health and safety of the local community; • The project will result in economic mining of a known resource; • The net benefit to South Africa is a product produced for the world and specifically the local commodity market, as it is noted in background information that the coal will/could be utilised by Eskom. <u>No definite agreement is in place at the time of the drafting of this document as authorisations has not been finalised.</u> The project is aligned with the objectives of the MPRDA (Act 28 of 2002) • To promote economic growth and mineral development in the Republic; and • To promote employment and advance the social and economic welfare of all South Africans.
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?	Disturbances in terms of Noise, Dust, Waste and Health and Safety have been assessed according to a Risk Matrix and included within this report. Mitigation and Management measures are prescribed for every possible impact which may result from the Mining right being granted. An additional Risk Assessment was conducted based on the outcome of the appeal by SASOL and the recommendations and agreements with SASOL to ensure proper assessment of the pipelines on the surface. The risk assessment showed low risk since the mining will occur underground and not affect surface infrastructure.
2.13	What measures were taken to: 2.13.1. ensure the participation of all interested and affected parties, 2.13.2. provide all people with an opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation, 2.13.3. ensure participation by vulnerable and disadvantaged persons, 2.13.4. promote community wellbeing and empowerment through environmental education, the raising of environmental awareness,	Public Participation has been conducted in accordance with the guidelines and regulations, and the previous authorisation was granted and it was stated that the PPP conducted were found to be sufficient. Since the scope has been changed to include and incorporate the SASOL pipeline and to incorporate other findings as per WUL authorisation process, such as the final designs that will be utilised for Stormwater management and the new placement of Vent Shaft 2, a full round of PPP will be conducted on the new EIA/EMPr draft as per recommendations/requirements of the DMRE.

	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, and 2.13.7. ensure that the vital role of women and youth in environmental management and development were recognised and their full participation therein were promoted?	All details regarding initial process has been included in the PPP section and will contain all the details for the additional round of public consultation.
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 comments made above. Employment from the local surroundings and communities are proposed to ensure that local development is stimulated. The fact that the Ergosat mine is also an underground mining development, means that the current land users will likely not be significantly impacted and this will allow their usual economic activities in the area, reducing the impacts on these current land users as well.
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?	The Mining Right holder will need to draft an Environmental Policy and a Health and Safety Policy, along with Standard Operational Procedures (SOPs) which will regulate activities on the coal mining area. All workers and contractors will need to abide to the policies and framework as specified.
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, 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 (i.e. equitable distribution of costs and benefits), and	Refer to comments made above. As the application is for a Mining Right, it is a long-term project and the appropriate areas will be rehabilitated afterwards to match the pre-mining land use (or alternatively the approved land use). This will only be applicable to the area designated for the plant and the areas where the ventilation shafts are proposed. No other surface impacts are expected to occur since the mine will be that of an underground coal mine.

	2.16.5. the opportunity costs in terms of job creation (e.g. a mine might create 100 jobs, but impact on 1000 agricultural jobs, etc.).	
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, and 2.17.2. that actual or potential conflicts of interest between organs of state were resolved through conflict resolution procedures?	The applicant is in the process of applying for the following aspects across different legislation requirements: • Mining Right (this application – Environmental Authorisation, was initially granted, but then needed to assess the SASOL pipelines and therefore conduct a Risk assessment and need to do another round of PPP as per the Appeal decision); • Waste Management License – included in this application; • WUL (Department of Housing Services, Water and Sanitation – DHSWS – In process on the eWULAAS system). • All legislation which has been incorporated within these processed were discussed within Section regarding Policy and Legislative Content above.
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 comment above as these aspects have already been addressed within previous discussions.
2.19	Are the mitigation measures proposed realistic and what long-term environmental legacy and managed burden will be left?	Yes, for a sensitive environment (which is almost always associated with coal mining) all impacts have been addressed optimally as best possible and designs have been finalised for the completion of the WUL application launched. The mitigation measures were also found to be sufficient for the granting of the EA, but an appeal was granted to allow re-assessment specifically for the SASOL pipeline to ensure the safety and risk of the SASOL pipeline and therefore this application have ensured that all of these aspects have been re-assessed.
2.20	What measures were taken to ensure that he costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects will be paid for by those responsible for harming the environment?	Mitigation and management measures have been described for all environmental aspects identified and is incorporated into the EMPr.

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?	Alternatives and analysis have already been addressed above, refer to comments made. An additional alternative included within this report, is the change of location of Ventilation shaft 2, to ensure that it is further away from the SASOL pipeline.
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 comments made above regarding positive and negative socio-economic impacts. Other projects in relation/adjacent to the application footprint also include coal mining and historic prospecting right on the properties which is also held by the applicant. Cumulative impacts have been discussed where relevant and are not easily accurately quantifiable.

6 PERIOD FOR WHICH THE ENVIRONMENTAL AUTHORISATION IS REQUIRED

It is assumed that first production can be achieved 9 months from the start of site establishment and full production a year thereafter. Full production (steady state) will last for 20 years with a total life of mine of 24 years (including ramp up and ramp down). In order to achieve this aggressive plan, construction of infrastructure and mining must start promptly after an 8 to 9-month feasibility study and the authorisation (environmental and mining) processes; as well as any other approvals required to be in place.

The following is a high-level schedule of requirements to meet the first production timeframe:

- Feasibility and Permitting (Mining and Environmental): 9 Months
- Initial Design & Procurement: 3 Months
- Site establishment, clearing and fencing: 2 Months
- Infrastructure construction, decline shaft sinking, support installation and shaft bottom : 7 Months
- First Continuous Miner introduced and production starts at 50 000 tonne per month, workstation cutting, development to first section, equipping of crushing station and conveyor installation: 4 Months
- Second Continuous Miner introduced to progress to lower development: 2 Months
- Ramp up to full production: 6 Months.

Post monitoring and rehabilitation will make up for the remainder of the Mining Right time period. Any new mining activities (requiring Environmental Authorisation) deviating from those applied for within this document will require a new Environmental Authorisation and New Application to be launched with the Competent Authority. Thereafter, the Mining Right (and EMP) will need to be amended and a new Environmental Authorisation will be required if other areas are to be mined.

The maximum amount of time is therefore requested for this application, which is a period of 30 years.

The LOM mining layout and progress plot is indicated in Figure 6-1.

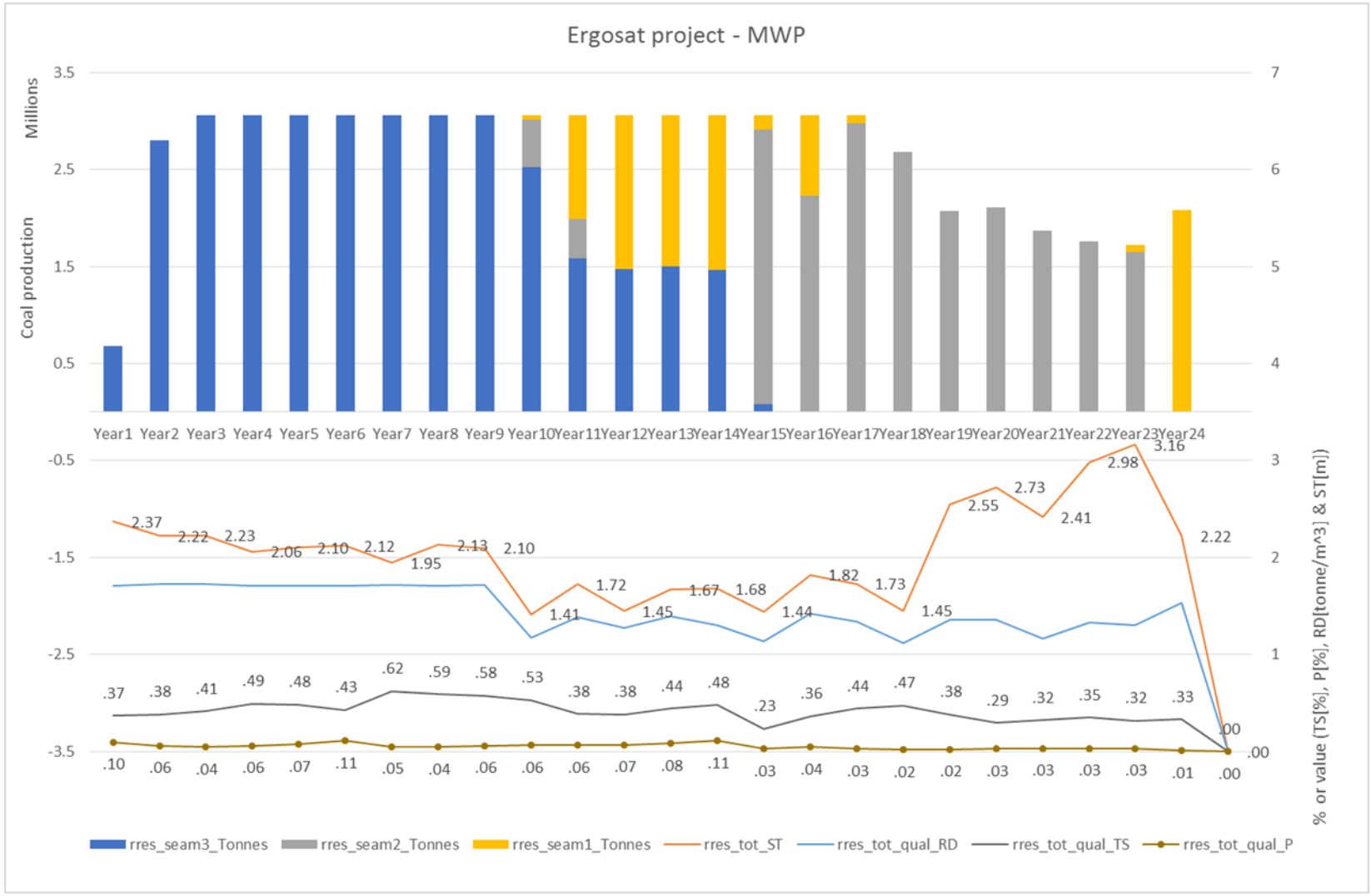


Figure 6-1: Mining Production Forecast for different Coal Seams

7 MOTIVATION FOR THE OVERALL PREFERRED SITE, ACTIVITIES AND TECHNOLOGY ALTERNATIVE

NB!! to This section is about the determination of the specific site layout and the location of infrastructure and activities on site, having taken into consideration the issues raised by interested and affected parties, and the consideration of alternatives to the initially proposed site layout.

7.1 MOTIVATION FOR THE PREFERRED SITE, ACTIVITIES AND ALTERNATIVES

The details of the alternatives considered are described in the sections below. The main motivation for all alternatives is based on the fact that a mining right is applied for on the same areas where the prospecting right was awarded and where minerals have been verified. Underground mining methods were chosen as this will viably mine the available material while restricting the surface impacts.

Changes to the Ventilation shaft positions, re-assessment of the SASOL pipeline as well as the Stormwater Management Plan had been made since the application had been distributed for public consultation and these changes will further mitigate any possible impacts.

7.2 DETAILS OF THE DEVELOPMENT FOOTPRINT ALTERNATIVES CONSIDERED

With reference to the site plan provided as Appendix 4 and the location of the individual activities on site, provide details of the alternatives considered with respect to:

(a) the property on which or location where it is proposed to undertake the activity;
(b) the type of activity to be undertaken;
(c) the design or layout of the activity;
(d) the technology to be used in the activity;
(e) the operational aspects of the activity; and
(f) the option of not implementing the activity.

According to DEA (2017), Guideline on Need and Desirability and Guidelines on Assessment of Alternatives and Impacts, Department of Environmental Affairs, feasible and reasonable alternatives must be identified for a development as required by the NEMA EIA Regulations and applicable to EIA. Each alternative is to be accompanied by a description and comparative assessment of the advantages and disadvantages that such development and activities will pose on the environment and socio-economy. Alternatives form a vital part of the initial assessment process through the consideration of modifications to prevent and/or mitigate environmental impacts associated with a particular development. Alternatives are to be amended when the development's scope of work is amended. It is vital that original as well as amended alternative identification, investigation and assessment together with the generation and consideration of modifications and changes to the development and activities are documented.

Although an array of alternatives could be investigated for each project, such alternatives will not necessarily be applicable to each project and/or project phase. However, there must always be strived to seek alternatives that maximises efficient and sustainable resource utilisation and minimise any negative impacts on the bio-physical and socio-economic environments. The following alternatives were considered as part of the Environmental Authorisation Process for the proposed project:

7.2.1 Site Alternatives

Consideration of alternatives is one of the most critical elements of the environmental assessment process. It has its purpose to provide a framework for sound decision-making based on the principles of sustainable development. The search for alternatives should be well documented and should take into account the views of stakeholders.

According to the criteria for determining alternatives as part of the Integrated Environmental Management Information Series, the key criteria for determining alternatives should be practical, feasible, relevant, reasonable and viable.

No feasible site alternatives for the mining exist since the Mining Right application has been launched on the existing Prospecting Right application area and mining will occur underground. Site alternatives for the Ventilations Shafts (Vent Shaft 2) and the Stormwater Management features were considered and discussed below.

7.2.2 The property on which the location or where it is proposed to undertake the activity

The proposed property is in an area dominated by mining activities and extensive prospecting have indicated the presence of coal on these properties. Minerals can only be mined where identified and verified, therefore, it was not practical to select any other sites. No location or property location was considered. Mineral resources are by nature very difficult to locate as it requires extensive prospecting and calculated determination of stock. Minerals can only be mined where they exist.

7.2.3 The type of activity to be undertaken

The proposed coal mining will be by box-cut to decline method and the use of Bord-and-Pillar methods will be used underground. No long hall methods will be used. All pillars to be thick enough to calculated standards to prevent any subsidence. This is the best alternative and no other alternative is considered. Two options for transport of coal were considered. Truck or above ground conveyor. No major options were identified for the transport of coal from the underground workings to the surface silo. Conventional underground and incline shaft conveyors have been considered for this study with only a few sub-options investigated for underground coal storage and transfer.

Two options for transport of coal were considered. Truck or above ground conveyor. The use of the conveyor belt in the long term from Ergosat to Lethabo was initially chosen for the following reasons:

- Most direct route;
- Low maintenance costs (compared to hauling);
- Minimal impact of dust fallout expected, as the conveyor will be partially enclosed; and
- A lower impact in terms of noise and dust compared to trucking.

This option was reconsidered and deemed to have more negative impacts by impacting more surface area than which is necessary and the conveyer was removed from the layout within this document.

7.2.4 The design or layout of the activity

The design and layout of the mining activity is solemnly dependent on the mining plan to be adopted. Mining design layout needs to be done in such a way as to reduce the amount of times a specific material is handled to reduce any impacts on the environment. Various designs and layouts for the mining operations have been considered and the final layout has been developed based on the availability of coal seam as indicated by the prospecting conducted on site.

7.2.4.1 Finalisation of Stormwater Management Features and additional of PCD

The current available layout seems to be ideal at this stage as the plant is proposed. The layout has been slightly revised to accommodate the final stormwater management features as the initial designs were only conceptual and

finalised during the WUL process. These are now included in the EIA/EMPr. The plant layout has been changed such as the addition of a Pollution Control Dam.

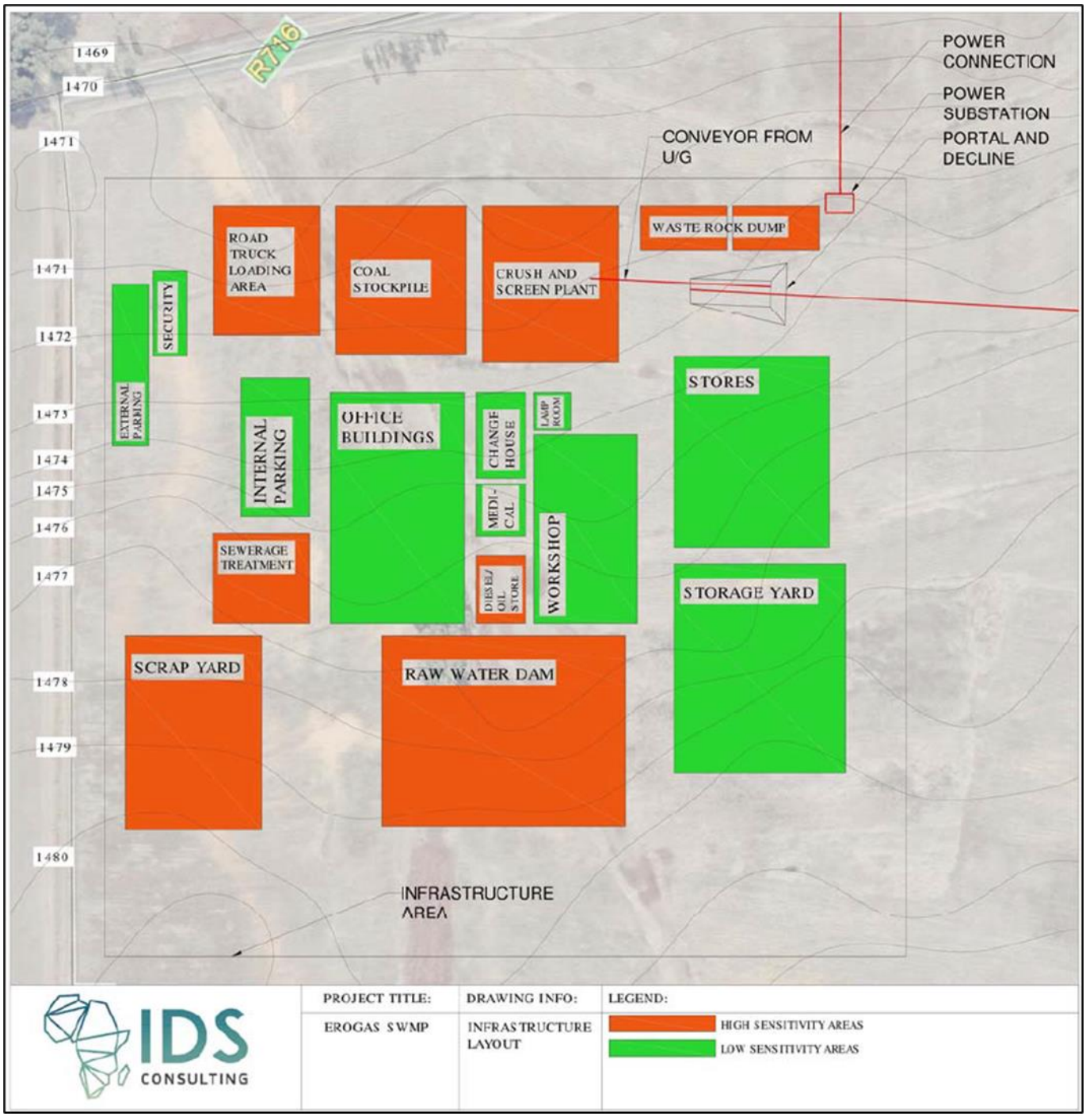


Figure 7-1: Previous layout included (Conceptual Design)

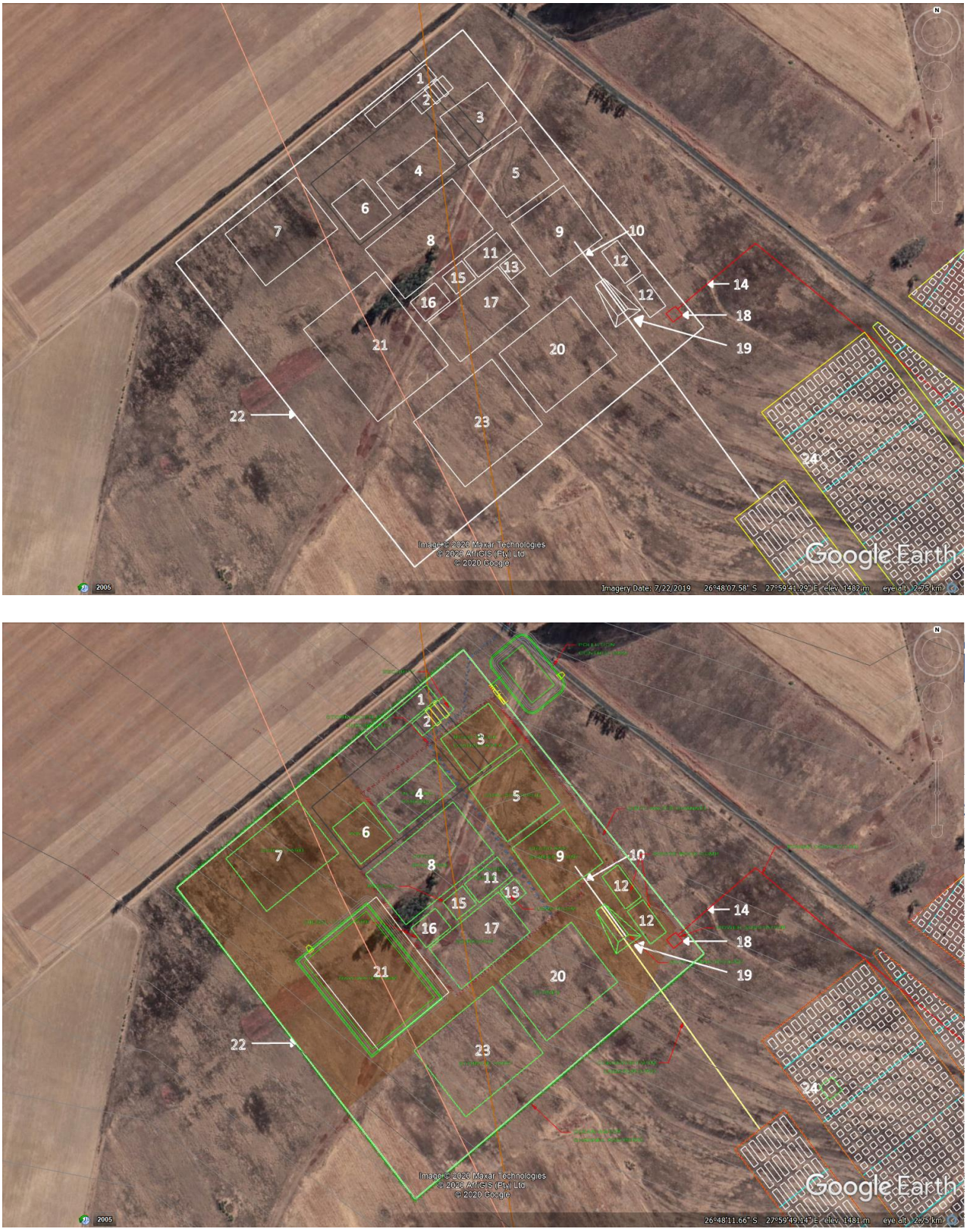


Figure 7-2: Comparison of Conceptual (top) versus Finalised Layout (below)

Figure 7-3: Final formal designed Engineering Layout (Part of Phase 3 Designs for WUL process)

7.2.4.2 Change of position of Ventilation Shaft 2 to accommodate SASOL pipeline infrastructure

The position of Ventilation shaft 2 were changed (moved more to the north) based on the location and re-assessment of the SASOL pipeline and the shaft is now located more than 100m away to ensure that now risk will result to the pipeline and distribution network.

No additional impacts (ecological or other) are expected related to the change of position, except for decreasing the safety risk associated with activities in the vicinity of the SASOL pipelines.

7.2.5 The technology to be used for the activity

The various mining methods that were chosen for investigation are proven mining methods within the industry and are currently being exploited at various collieries around the country. These methods can be summarised as follow:

- Bord and Pillar mining, mechanised mining with continuous miners and shuttle cars;
- Bord and Pillar mining with additional pillar extraction;
- Longwall mining;
- Bord and Pillar mining with the Flexible Train Conveyor; and
- Open cast mining method.

A trade-off between various mining methods (e.g. bord and pillar, bord and pillar stooping, long wall, and open cast) was conducted for the coal resources at the proposed Ergosat project. Combination of bord & pillar and longwall underground mining methods have been selected as the preferred mining method.

7.2.6 The operational aspects of the activity;

In terms of operations on the proposed new mining area, the following is preferred:

- Operational infrastructure to be situated in a concentrated area where the mine shaft will be located. Coal will be mined, crushed underground and transported to the coal ROM stockpiles. From here it will be loaded onto trucks and likely transported to Lethabo Power station.

7.2.7 The option of not implementing the activity

The No Go option would leave the valuable resource in the ground. The no-go option would result in no economic benefit, no job creation and no supply of coal to Eskom and exports. The No-Go option will however impact positively on the existing way of live, especially for farmers and people living on plots.

Table 7-1 below contains the analysis of several alternatives identified and assessed.

Table 7-1: Alternatives Analysis

TYPE OF ALTERNATIVE: Location	**ALTERNATIVE EXPLANATION: Develop on an alternative property Develop on alternative sites on the same property/properties**
The sites for the underground mine were determined based on the prospecting results and those described within the Mining Works Programme (MWP). Minerals can only be mined where identified and verified, therefore it was not practical to select any other sites. The areas used for aboveground infrastructure can be altered to a greater extent in relation to receiving environment sensitivities and as such, there are areas which have been determined to be the “preferred alternatives” and those areas which can be considered “secondary alternatives”. These areas have been determined from a preliminary evaluation of how they are most optimally configured between the footprint and sensitivities, outside of the 1:100 floodlines where possible and away from potentially sensitive areas.	

The current available layout seems to be ideal at this stage as the plant is proposed. The layout has been slightly revised to accommodate the final stormwater management features as the initial designs were only conceptual and finalised during the WUL process. These are now included in the EIA/EMPr. The position of Ventilation shaft 2 was changed based on the location and re-assessment of the SASOL pipeline and the shaft is now located more than 100m away to ensure that now risk will result to the pipeline and distribution network. Minerals can only be mined where the minerals are present. Based on the prospecting work completed a resource of economic value is present on the properties.

TYPE OF ALTERNATIVE:	**ALTERNATIVE EXPLANATION:**
Activity	**Develop an alternative activity e.g. Incineration of waste vs. landfill disposal, abstraction of water vs. re-use/recycling of water.**
No feasible activity alternatives exist, unless stating that farming and agriculture could be an activity alternative. These will not significantly be impacted, because the mining is underground and therefore only the area where the plant is expected will be impacted and changed in terms of land use. No other surface impacts are expected except for the ventilation shafts, of which the position of ventilation shaft 2 were changed based on pre-cautionary principles to ensure that the ventilation shaft is more than 100m away from the Sasol pipelines. This will ensure compliance with the MHSA at all times. Underground mining was considered as an alternative and chosen as it is the best suited option to extract the coal reserves and for the environment.	
TYPE OF ALTERNATIVE:	**ALTERNATIVE EXPLANATION:**
Design	**Adapt architectural and/or engineering designs.**
The placement of the plant area initially reflected in the EA where slightly changed since the final Stormwater management plan had been formalised during the WUL application. This means changes has been made, such as the addition of a Pollution Control Dam, the new layout has been shown above.	
TYPE OF ALTERNATIVE:	**ALTERNATIVE EXPLANATION:**
Layout	**Adapt spatial configurations of an activity on any site e.g. Locate manure dams away from water resources.**
As mentioned above, the operational infrastructure associated with the plant were finalised based on the WUL process and the compilation of Phase 3 technical/final designs. The Pollution Control Dam had been added and is now located in another position when compared with the conceptual layout included in the EIA/EMPr initially.	
TYPE OF ALTERNATIVE:	**ALTERNATIVE EXPLANATION:**
Technological	**Adapt methods or processes that can be implemented to achieve the same goal e.g. Introduction of bacteria rather than chemicals to waste water.**
No method or process alternative have been assessed. The proposed underground mining methods as described within this document (and Mining Works Programme) will be utilised.	
TYPE OF ALTERNATIVE:	**ALTERNATIVE EXPLANATION:**
Demand	**The demand for products and/or services can be met by other means e.g. The demand for paper can be met through deforestation or rather by efficient and viable recycling.**
No alternatives to meet demand were identified or are assessed in this application since the application is about removing coal from an identified reserve and this is the preferred option.	
TYPE OF ALTERNATIVE:	**ALTERNATIVE EXPLANATION:**

Input	**Implement different input materials and/or sources e.g. Utilisation of woodchips for fuelling boilers rather than electricity.**
No input alternatives were identified or are assessed in this application.	
TYPE OF ALTERNATIVE: Routing	**ALTERNATIVE EXPLANATION: Implement alternative routes for linear developments such as power line servitudes, transportation and pipeline routes e.g. Elongate and divert a railway line to exclude a sensitive environment.**
N/A. This is not a linear development.	
TYPE OF ALTERNATIVE: Transport	**ALTERNATIVE EXPLANATION: Method of transportation of product or ore.**
Transport routes should be the shortest possible distances to improve material flow and prevent risk. No changes or revisions are relevant to this application.	
TYPE OF ALTERNATIVE: Scheduling and Timing	**ALTERNATIVE EXPLANATION: Adapt the order and/or scheduling of several measures which plays a part in a program as it will influence the overall effectiveness of the end result.**
No alternative scheduling has been investigated. Scheduling will be based on the mine planning. Other aspects that could be included under Scheduling is the fact that the applicant will not be allowed to initiate mining without a WUL, and the water management/stormwater management features will and should be the first structures to be erected on site. This will ensure stormwater and water management from the onset of the operation and prevent any degradation reaching the outside environment where possible.	
TYPE OF ALTERNATIVE: Scale	**ALTERNATIVE EXPLANATION: Adapt the scale of an activity ex. 15 vs. 35 housing units, 12m^2 vs. 0.5km^2. *P.S. Scale and magnitude is interrelated.***
No changes to the scale are relevant since underground mining will be initiated and therefore, limited surface impacts will occur within the plant footprint area.	
TYPE OF ALTERNATIVE: Magnitude	**ALTERNATIVE EXPLANATION: Adapt the magnitude which is directly related to the extent of an activity. *P.S. Scale and magnitude is interrelated. An activity may be very small scale but can pose an extensive magnitude ex. Destroying an extremely sensitive wetland on a very small scale could result in a magnitude of such as destroying the whole wetland and/or ecological system.***
The magnitude of impacts has already been reduced by the initiation of underground mining which will limit the magnitude of surface impacts.	
TYPE OF ALTERNATIVE: No-Go	**ALTERNATIVE EXPLANATION: The option of not undertaking and implementing the activity at all.**
The no-go option refers to the alternative of the proposed development not going ahead at all. This alternative will avoid potentially positive and negative impacts on the environment and the status quo of the area would remain which is the conditions of the current baseline environment without any deviations or expansions. The current status quo, will not have negative or positive impacts as it will remain unchanged. Agriculture will remain largely unaffected within the Mining Right Area since the underground mining methods will not impact the surface in the same manner as opencast mining would change the land use or capability for example. The surface impacts and land use changes are limited to the area where the plant is proposed and the Ventilation shafts.	

Possible positive impacts related to the No-Go option, may include that the plant area is left undisturbed from its current status and impacts on the neighbours (as reported within their concerns) will not occur. This option was included in the Impact Assessment Section.

8 DETAILS OF THE PUBLIC PARTICIPATION PROCESS FOLLOWED

Describe the process undertaken to consult interested and affected parties including public meetings and one on one consultation. NB the affected parties must be specifically consulted regardless of whether or not they attended public meetings. (Information to be provided to affected parties must include sufficient detail of the intended operation to enable them to assess what impact the activities will have on them or on the use of their land.

This section describes the public participation process (PPP) undertaken to date in line with Chapter 6 of the EIA Regulations (2014)[as amended]. The process is undertaken to ensure compliance with the requirements in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) [as amended] (MPRDA) and the Environmental Impact Assessment Regulations (2014) [as amended]. The intention of the PPP was to inform I&APs, in sufficient detail, of the EIA/EMPR in order that I&APs may contribute meaningfully to the EIA process.

This section describes the PPP undertaken to date in line with Chapter 6 of the EIA Regulations (2014) (as amended). The process is undertaken to ensure compliance with the requirements in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) [as amended] (MPRDA) and the Environmental Impact Assessment Regulations (2014) [as amended]. The intention of the PPP was to inform I&APs, in sufficient detail, of the proposed project in order that I&APs may contribute meaningfully to the EIA process.

The PPP to date has included notification of I&APs through distribution of a Background Information Document (BID), placement of newspaper advertisement and placement of site. A key aspect of public consultation is the notification of landowners, occupier and users within and adjacent to the application area. More detail in this regard to the process followed is provided below.

All proof of public participation undertaken during the scoping phase is included in Appendix 6. The new process PPP is provided (and updated during the process) in Appendix 7.

The following section will be set out according to the Chapter 6 NEMA Regulations (Government Gazette No. 326 of 7 April 2017):

8.1 SECTION 41: PUBLIC PARTICIPATION PROCESS

1) This regulation only applies in instances where adherence to the provisions of this regulation is specifically required.

8.1.1 Section 41, Subregulation 2 (a) – Site Notices

2) The person conducting a public participation process must take into account any relevant guidelines applicable to public participation as contemplated in section 24J of the Act and must give notice to all potential interested and affected parties of an application or proposed application which is subjected to public participation by—

a) fixing a notice board at a place conspicuous to and accessible by the public at the boundary, on the fence or along the corridor of—

i. the site where the activity to which the application or proposed application

ii. relates is or is to be undertaken; and
iii. any alternative site.

For the follow up PPP, site notices were not erected as a repeat of subregulation (2)(a), (b), (c) and (d) is not required as per legislation.

8.1.2 Section 41, Subregulation 2 (b) – Written Notice

b) giving written notice, in any of the manners provided for in section 47D of the Act, to—
i. the occupiers of the site and, if the proponent or applicant is not the owner or person in control of the site on which the activity is to be undertaken, the owner or person in control of the site where the activity is or is to be undertaken and to any alternative site where the activity is to be undertaken;
ii. owners, persons in control of, and occupiers of land adjacent to the site where the activity is or is to be undertaken and to any alternative site where the activity is to be undertaken;
iii. the municipal councillor of the ward in which the site and alternative site is situated and any organisation of ratepayers that represent the community in the area;
iv. the municipality which has jurisdiction in the area;
v. any organ of state having jurisdiction in respect of any aspect of the activity; and
vi. any other party as required by the competent authority;

8.1.2.1 Details of Background Information Document (BID)

A brief introduction document (BID) was compiled and was emailed to the current land owners. Copies of the BID were also given to I&APs via direct consultation or it was emailed to potential Interested and/or affected parties. Copies of the BID documents were delivered by hand to the local communities and also posted via registered mail to government departments and municipalities as presented in Appendix 6.

The BID was made available in English and included details of the project. The BID and distribution of the BID's are presented in Appendix 6.

A brief introduction document (BID) was compiled and was emailed to the current land owners. Copies of the BID were also given to I&APs via direct consultation or it was emailed to potential Interested and/or affected parties. Copies of the BID documents were delivered by hand to the local communities and also posted via registered mail to the following government departments and municipalities:

- Department of Housing Services, Water and Sanitation (DHSWS);
- Department of Economic, small business development, tourism and environmental affairs (DESTEA).
- Department of Land Affairs
- Metsimaholo Local Municipality

No additional BIDs were redistributed as a repeat of subregulation (2)(a), (b), (c) and (d) is not required as per legislation.

8.1.3 Section 41, Subregulation 2 (c), (d) & (e) – Advertisements

c) placing an advertisement in—
i. one local newspaper; or
ii. any official Gazette that is published specifically for the purpose of providing public notice of applications or other submissions made in terms of these Regulations;
d) placing an advertisement in at least one provincial newspaper or national newspaper, if the activity has or

may have an impact that extends beyond the boundaries of the metropolitan or district municipality in which it is or will be undertaken: Provided that this paragraph need not be complied with if an advertisement has been placed in an official Gazette referred to in paragraph (c)(ii); and

e) using reasonable alternative methods, as agreed to by the competent authority, in those instances where a person is desirous of but unable to participate in the process due to—
   i. illiteracy;
   ii. disability; or
   iii. any other disadvantage.

The Advertisement and Site Notices complied with the requirements and specifications as set out in Section 41, Subregulation 3, 4.

8.1.3.1 Details of Advertisements and site notices

During the initiation of the PPP, advertisements were placed in the following newspaper(s):

- Two newspaper advertisements were published,
  - One (1) in the Mooivaal Weekblad on 4 November 2016, and
  - The other in the Volksblad on 4 November 2016,

A copy of the advertisements placed are included in Appendix 6 (Initial).

8.1.4 Section 41, Subregulation 5, 6 & 7

3) Where public participation is conducted in terms of this regulation for an application or proposed application, subregulation (2)(a), (b), (c) and (d) need not be complied with again during the additional public participation process contemplated in regulations 19(1)(b) or 23(1)(b) or the public participation process contemplated in regulation 21(2)(d), on condition that—
   a) such process has been preceded by a public participation process which included compliance with subregulation (2)(a), (b), (c) and (d); and
   b) written notice is given to registered interested and affected parties regarding where the—
      i. revised basic assessment report or, EMPr or closure plan, as contemplated in regulation 19(1)(b);
      ii. revised environmental impact assessment report or EMPr as contemplated in regulation 23(1)(b); or
      iii. environmental impact assessment report and EMPr as contemplated in regulation 21(2)(d);
      may be obtained, the manner in which and the person to whom representations on these reports or plans may be made and the date on which such representations are due.
4) When complying with this regulation, the person conducting the public participation process must ensure that—
   a) information containing all relevant facts in respect of the application or proposed application is made available to potential interested and affected parties; and
   b) participation by potential or registered interested and affected parties is facilitated in such a manner that all potential or registered interested and affected parties are provided with a reasonable opportunity to comment on the application or proposed application.
5) Where an environmental authorisation is required in terms of these Regulations and an authorisation, permit or licence is required in terms of a specific environmental management Act, the public participation process contemplated in this Chapter may be combined with any public participation processes prescribed in terms of a specific environmental management Act, on condition that all relevant authorities agree to such combination of processes.

This section is relevant to the Ergosat application, which will conduct another 30 days of Public Participation, but

not place Site Notices, nor distribute BIDs again.

The existing I&AP Database will be utilised (as updated) and the document redistributed for comment. All comments received will be addressed and included in Appendix 7 as well as below (Table 8-2).

8.2 SECTION 42: REGISTER OF INTERESTED AND AFFECTED PARTIES

8.2.1 Interested and affected party (I&AP) database

As part of the PPP an I&AP database (See Appendix 6) has been developed and has been continuously updated for the project (Appendix 7 will contain the finalised and updated I&AP at the time of final submission).

8.3 SECTION 43: REGISTERED INTERESTED AND AFFECTED PARTIES ENTITLED TO COMMENT ON REPORTS AND PLANS

8.3.1 I&APs and Commenting Authorities

Stakeholders who was captured/registered on the database for the project included:

- The owners or persons in control of the land where the proposed mining is to be undertaken (if different than applicant);
- The occupiers of the property where the development is to be undertaken;
- The owners and occupiers of land adjacent to the mining area;
  - Provincial and local government (relevant local and district municipalities);
  - Organs of state, other than the authorising authority, such as the Department of Agriculture, Forestry and Fisheries (DAFF – now grouped with Environmental Affairs, forming DEFF since 2019) or Department of Roads, having jurisdiction in respect of any aspect of the proposed project;
  - Relevant residents' associations, rates payers' organisations, community-based organisations and NGOs;
  - Environmental and water bodies, forums, groups and associations; and
  - Private sector (business, industries) in the vicinity.

8.3.2 Decision Making Authorities

- Department of Mineral Resources (DMRE); and
- Department of Water and Sanitation (DHSWS) – (Water Use License).

The DMRE had granted the EA, but an appeal from SASOL had been granted and the decision and recommendations were made to update the EIA/EMPR to ensure adequate assessment of the SASOL pipelines and to conduct another round of PPP. Since the Scope of the EIA/EMPr will be changed, the updated Stormwater features as finalised during the WUL process will also be updated and included in the document to ensure relevance during this stage of the process.

I&APs who attended meetings and /or submitted contact details have been registered on the I&AP database (Appendix 6). The database has been updated on an on-going basis throughout the process. The current and updated database is presented in Appendix 7.

8.4 MINING RIGHT APPLICATION

- Scoping Phase:
  1) the Scoping phase was the first step where potential Interested and Affected parties are identified

and registered. After the initial public participation process, the public had an opportunity to review the Scoping report for comments.

2) The Scoping Report was submitted on public view for 30 days and registered Interested and Affected parties notified. The scoping report was made available for review on the REC services website (www.rockeco.co.za) on 23 November 2016 and copies were submitted to the Deneysville Police Station and the Deneysville public library on 24 November 2016.
3) Copies of the Scoping report were submitted to stakeholders and government departments for review. The Scoping report was submitted to DMRE for approval and the acceptance letter was received on 6 April 2017.
4) The Acceptance of the Scoping was also included in Appendix 26.

- Environmental Impact Assessment Phase:
    1) The draft EIAR was compiled and submitted on public view to all stakeholders and registered I&APs on 12 July 2017 for 30 days. A public meeting was held within this time.
    2) After comments received from the DMRE, another submission was made in 2018 to address these comments and specifically an addendum report was compiled to
        - Requirement 1: You are requested to adequately address the concerns raised by Esthe Muller Inc. received by the Department on the 04 October 2017. Kindly note that all concerns, objections or issues with regard to the proposed mining activity must be dealt with in terms of NEMA and the provisions outlined in Chapter 6 of the EIA Regulations, 2014 as amended.
        - Requirement 2: Should an application for an Environmental Authorisation be subjected to any permits or authorisations in terms of the provisions of any Specific Environmental Management Acts (SEMAs), proof of such application must be attached to the revised EIR and EMPr.
        - Requirement 3: A detailed itemised financial provision quantum is required in order for the Department to ascertain latent environmental impacts emanating from the proposed mining activity as required in terms of section 24 (P) of the National Environmental Management Act, 1998 (Act 107 of 1998) as amended.
        - It should be noted that because no significant changes have been made to the EIAR and EMPr, the entire document was not subjected to public view again and as discussed with Shawn Janneker, 6 copies of the report in its entirety was not resubmitted to DMRE.
    5) Environmental Authorisation was issued, however, after the outcome of the application (the DMRE granted the EA), appeals were launched and the appeal by SASOL, which asked more consideration of the SASOL pipelines, were granted and the Minister had given several instructions to be carried out and the documents to be redistributed for PPP in 2020.
        - The EIA/EMPR has been revised, additional studies conducted to investigate the Sasol pipeline and the follow-up public consultation period will be from the 15th of July 2020 to the 14th of August 2020 (30 days). Documents will be distributed on the 14th of July 2020.
        - A link containing all the information available for download will be sent out to all registered I&APs on the 14th of July 2020.
        - Electronic copies (as required during the COVID period) will be distributed or manually delivered at the onset of the PPP to the relevant Departments for comment and proof will be included within Appendix 7 before final submission.

8.5 SECTION 44: COMMENTS OF INTERESTED AND AFFECTED PARTIES TO BE RECORDED IN REPORTS SUBMITTED TO COMPETENT AUTHORITY

8.5.1 Public Meetings and Open days

Initially, consultation meetings were conducted with all surrounding owners and persons leasing land. One Community meeting was held on 10 November 2016. The purpose of the first meeting was solemnly to introduce the project and to get the potential Interested and Affected parties to register. A public open day were held on the 29th of September 2017.

A meeting was held with Sasol as part of the Appeal process on Monday 18 November 2019 at Sasol Satellite Operations (Germiston) during the Appeal phase. No additional public meetings will be held during the review of the EIA/EMPr phase, since all registered I&AP's will receive a copy of the documentation.

All additional information had been pointed out for easy identification and review of the I&APs on the database. Another consideration is based on the restriction of meetings and gatherings during the COVID-19 period and therefore, no public meetings will form part of the additional 30-day phase.

8.5.2 Summary of Issues Raised By I&APs From Public Participation

(Complete the table summarizing comments and issues raised, and reaction to those responses)

Salient points may be summarised (but are not limited) to the following (Initial commenting period):

- **Groundwater:** The question regarding how the mine would affect groundwater were raised again. It was explained that Groundwater monitoring will need to be extended and that the scope of groundwater studies would need to be expanded upon for the WULA application and for when mining commences.
- **SASOL pipelines:** The issue regarding the present SASOL gas pipelines were raised. It was indicated that there are gas pipes present that runs over the property.
- **Timelines:** The comment was raised that the process has been going on for 2 years and there are still no answers in terms of water.
- **Willow Creek:**
    - It was mentioned that Willow Creek has already experienced damages because of the mine as no investors wants to invest. It was indicated that Willow Creek wants an agreement that states that the mine will buy out the development if the mine application is awarded ad goes ahead.
    - It was asked who the shareholders of Ergosat is.
    - REC Services asked if the above-mentioned issues will be contained in a formal communication in terms of the public participation process and it was confirmed.
    - Willow Creek had extensively commented on the application and this is included separately in an Appendix 6 since these aspects had already been considered by the CA. The comments made on the addendum submission in 2018 had been included in the table below as well as summary aspects. Please refer to extensive comments contained within the Appendices.
- **Appeals** launched by several parties after the initial decision was made.

Comments received until the compilation of the Draft EIA report are listed below and have been discussed in this section. Please see ***Appendix 6*** *for a full comments and responses report. A summary of comments received during the public participation process is presented below (Table 8-1).*

New Comments received will be presented in a separate table and included in ***Appendix 7*** *(where all the new PPP details will be filed for ease of reference between the initial and follow-up PPP periods.*

A summary of Salient points may be summarised (but are not limited) to the following (Follow-up PPP period):

- *To be provided here as received (and included within*
-
-
- Table 8-2*).*

Table 8-1: Summary of issues raised by I&APs (Initial and During Appeal)

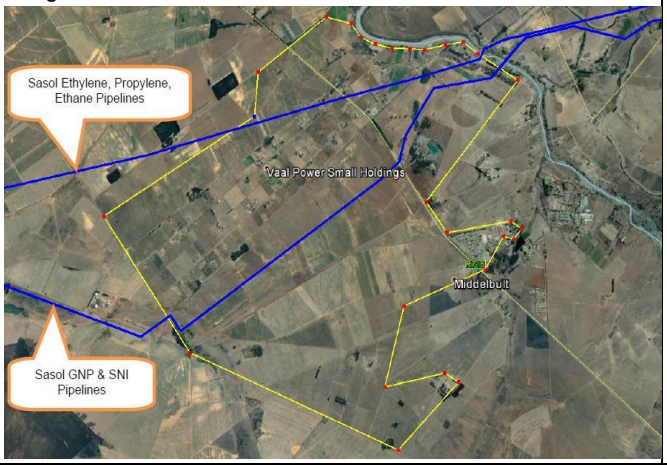
Interested and Affected Parties List the names of persons consulted in this column		Date Comments Received	Issues raised	EAPs response
ORGANS OF STATE				
DMRE- (Free State)	X	28/11/2016	Acknowledgement of receipt of an application for an Environmental Authorisation for Mining Right lodged in terms of Regulation 16 of the Environmental Impact Assessment Regulations, 2014 (herein referred to as the "EIA Regulations") in respect of various properties (See Attached Annexure "A"), situated in the Magisterial District of Sasolburg in the Free State Province. Applicant: Ergosat (Pty) Ltd.	Acknowledgement received.
			1. DMRE indicated that REC could proceed with the EIA phase of the project. DMRE made the following comments: 2. Ensure that all stakeholder comments are submitted to the Department, including PHRA, Provincial Environmental Department, Department of Agriculture, Forestry and Fisheries, Department of Water and Sanitation and the Local Municipality. 3. Include impacts of underground crushing into the EIAR. Also verify that the sewage treatment plant and other named activities does not trigger listed activities in the EIA regulations. 4. Total depth and footprint of the existing quarry.	Noted. These comments were made as part of the initial application. Noted. Reports were submitted to Stakeholders for comments. Included in the Impact Assessment. Included into the EIAR.
DMRE (Free State) Time extension has been requested from DMRE	X	4 September 2018		**Request to submit the amended EIAR and EMPr** Attention: Deputy Director Good day. We have asked DMRE for an extension of time to submit the Final Revised EIAR and EMPr on 5 September 2018 as we were waiting for a meeting to take place between the DMRE, REC Services Pty Ltd and Willow Creek on 24 August 2018 as per the request of the DG. We hereby confirm that the results of the

				meeting held on 24 August 2018 indicated that more work and time will be needed as the following were discussed: 1.Inclusion of a full Design for the conveyor belt and assessment of the impacts associated with it. 2.Suggestions from Esthe Muller in terms with alternatives to be used for road and / or conveyor transport. The final document can therefore not be submitted as requested on 5 September 2018 until the inclusion of these two points presented above have been addressed. The applicant is currently in the process of sourcing information in this regard. We hereby request the department to grant REC Services Pty Ltd extension on or before **8 October 2018** to submit the Final revised EIAr and EMPr inclusive of the above-mentioned information. This information will also provide better clarity to the use of the conveyor belt, and will aid in the objection raised by Willow Creek and Esthe Muller. Your feedback will be much appreciated Could you please also indicate to us who will be the new contact on this project after Shawn moved to KZN. Kind regards
DHSWS - (Gauteng) Vaal River Catchment Management Agency	X		Comments still to be received from the officer in charge of the catchment area. The Scoping report was submitted to their offices for comments. This office will also be handling the Water Use License Application process. A pre-Application meeting will be held on 23 November 2016 with this office.	No comments received to date. The EIAR will also be send for comments.
			WUL process initiated and entering PPP Phase.	The WUL process has been initiated and many of the specialist studies have been redone and done additionally to address the water management features

				and stormwater management features as required for the WUL process. The final Stormwater management features have now also been incorporated in the document to ensure it is as relevant and updated as possible.
Department of Land Affairs	X		No land claims have been identified and therefore the Department of Land Affairs is not necessarily identified as an Interested and Affected party, but a copy of the basic information document will be forwarded to the Department of Land Affairs to ensure that they could register as an interested and affected party if they decide to be involved in this project.	No response
Department of Environmental Affairs	X		The Department of Environmental Affairs received a copy of the Scoping report. They have and will also receive a copy of the EIAR report for comments.	No comments to date
Other competent authorities affected Minister of Environment, Forestry and Fisheries Ms BD Creecy	X		Ms BD Creecy (Minister of Environment, Forestry and Fisheries) made decision on Appeals received and the Appeal outcome and her decision had been included within this table (refer to section labelled Appeal.	The decision is included within this table to allow the applicant to indicate where and how the recommendations have been met and incorporated into the EIA/EMPR.
SASOL Comments included as received	X	4 September 2017	Mr Zwelakhe Mkhasibe (Snr Manager corp Affairs submitted a letter to REC: **Dear Sir** **Lefa Colliery Mining Right** We thank you for the opportunity to comment on the proposed mining activity and believe that the commenting and process will result in an amical solution to this situation. Sasol objected to and are seriously concerned with the proposed mining in the Vaal Power Small Holdings area. Our concerns as an Interested and Affected Party (IAP) has not been indicated in the Environmental reports, nor is there	The letter as initially submitted to the previous consultant during the initial application launched have now been incorporated into the Appendices and within this table for the consideration of the Competent Authority during the re-assessment and decision and as recommended outcome of the appeal. The Sasol pipelines and comments received by Sasol will be adequately addressed and a specialist Independent Risk Assessment have been done which

			any reference or indication on any of the maps/annexures of the Sasol pipelines crossing the area. Our concerns are based on the following reasons: **1. Impact on Environment, Safety and Health** • The detrimental effect that ground movement as a consequence of mining and blasting could have on the integrity on these pipelines were not considered. Note that loss of containment incidents of any of these pipelines will have severe effects on the environment, safety and health of public which could result in a major incident as defined in the OHS Act No. 85 of 1993 resulting in fatalities. • Blasting studies was excluded from your Environmental Impact Assessment and Environmental Management Plan. • The mine is in close proximity to the Vaal River which will impact water quality due to the mining and blasting processes. The Vaal River is a major water supply to public; agriculture and industry and the quality of drinking water will be negatively impacted resulting from the mine process. • Sasol transports hazardous substances through the pipelines and mining processes could result in pipeline failure which in turn will have a disastrous effect on water supply from the Vaal River. Agriculture will also be affected if the pipeline integrity is compromised resulting from the proposed mining activities.	has been included within this report and also as an Appendix Report. The Ergosat mining operation is and underground mine and no blasting will occur on the surface. Blasting impacts on the Sasol pipelines have been included in the Risk Assessment to ensure that no impacts will befall the pipelines and endanger the environment, Sasol transmission and distribution pipelines or result in health and safety impacts to the workers or neighbouring properties. The comments regarding the Vaal river has been already assessed and the recommendations of the Minister will be followed, stating that the impacts on the Vaalriver have been adequately addressed and that adherence to the WUL will ensure the water management aspects are addressed. Regarding impacts on the Vaalriver as a result of pipeline failure, the risk assessment had shown that there is little risk to the Sasol pipelines as a result of the Ergosat development since it will be an underground mining operation. The image has been received and the pipelines have been included in the maps to show the exact location of the lines.

			• The Sasol pipelines affected by the proposed mining, as indicated in Image A below, are as follows: a. Gauteng Network Natural Gas pipeline (GNP) b. Secunda Natref Integration pipeline (SNI) c. Sasol Ethylene Pipeline (SAS14) d. Sasol Propylene Pipeline (SAS 08) e. Sasol Ethane Pipeline (SAS 12) **2. Impact on Economy** The respective pipelines are critical infrastructure for various industries in the Metsimaholo, Emfuleni and Midvaal Municipal areas for production of various products. Gas supply is also a ring feed to the entire gas transmission and distribution network that reaches Randfontein and Tarlton in the west, Rosslyn and Babelegi in the North and Springs to the east. Various private and State-owned companies are using gas in their manufacturing processes which includes: steel, chemical, health, petrochemical, automotive and building Industries. Impacting supply to industry will have a detrimental effect on the economy in Gauteng as well. **3. Sasol Operations** The Sasol Operations is reliant on the effective distribution of product to Sasol plants in and around Sasolburg. The effect of pipeline incidents will result in production losses as well as interruption of services in the local area and also nationally. Access to the pipelines for maintenance and inspection is critical to ensure integrity of the pipelines. Mining Operations will result in access restrictions and will result in deterioration of the respective pipelines and will over time result in a catastrophic failure and detrimental pollution incidents. Please include the concerns raised above into the EIA and Sasol will include DMRE into the liaison due to the high	As indicated and explained above, the risk of the impacts to the Sasol pipelines have been found to be low and the Minister had allowed the re-assessment of this aspects and the update of the EIA/EMPR to ensure that no harm befalls these pipelines since they are critical infrastructure with great importance to many parties. The functioning and safety of these lines should enjoy highest priority during all phases of development and no surface impacts should occur in proximity of these pipelines. If the pipelines are not impacted, no impacts to industry or other sectors as mentioned will occur. Please refer to the all the aspects addressed above regarding the risk assessment done to ensure that the possible impacts to the pipeline have been independently assessed. Access to the pipelines will be ensured and the Lefa Colliery will provide access to Sasol at any time to conduct maintenance or monitoring of the pipelines. This has also been included in the EMPr to ensure compliance. The concerns have been added to this section of the report, as per instruction of the outcome of the appeal, comments received from Sasol have been incorporated into the document and the pipeline have been re-assessed to ensure that no harm befalls these critical structures.

			impact that the proposed activity will have on Sasol as well as the environment. We are willing to discuss the matter to ensure that all factors are adequately considered. Yours sincerely Image attached to letter:  	
		End July/August 2019 (Appellants were notified on 7 August 2019)	**Appeal was launched by Sasol (attached as Appendix containing Response Report)** Name of appellant: Sasol South Africa Limited and Sasol Gas (Pty) Limited Appellant's representative (if applicable): Ms June Wepener (internal legal advisor) Postal address: P O Box 1, Sasolburg, 1947 Email Address: June.wepener@sasol.com Telephone number: 083 326 6336 Fax Number: N/A	Please refer to the applicant's response on all the aspects as per formal Appeal and Response attached as appendix. Appeal has not been included within this table as it is more than 50 pages long. Please refer to Appendix X where a copy is provided.
				Dear All

				Following our meeting last week, please find attached the draft cooperation agreement for comment. As discussed, as soon as we have finalised and signed the agreement, we can begin sharing information / compiling risk assessments and the operations can be handled collaboratively. Could I kindly request that Sasol representatives revert with joint comments on the agreement soonest (i.e. comments in a single document in mark-up) in order to move forward efficiently? Kind regards **The parties entered into a Memorandum of Agreement between Sasol and Ergosat**
		11 May 2020		Follow up email send out to Sasol: Good day Can you please assist with the following? We are looking for the attendance register for the meeting on 18 November 2019. Thank you ***No Response received as of yet.***
APPEAL PROCESS				
Minister of Environment, Forestry and Fisheries (DEFF) Ruling received: Appeal Decision Reference: LSA187872	X	1 April 2020	APPEALS AGAINST THE DECISION TO GRANT AN INTEGRATED ENVIRONMENTAL AUTHORISATON TO ERGOSAT (PTY) LTD FOR THE PROPOSED MINING OF COAL ON VARIOUS PROPERTIES SITUATED WITHIN THE MAGISTERIAL DISTRICT OF SASOLBURG, IN FREE STATE PROVINCE	

			Deneysville Ratepayers Association - First appellant Sasol - Second appellant Groenoewers - Third appellant Mr Miles Parr - Fourth appellant Ergosat (Pty) Ltd - Applicant Department of Mineral Resources - Competent Authority Appeal: These appeals were lodged against the decision of the Regional Manager: Mineral Regulation of the Department of Mineral Resources, Free State Regional office (the DMRE) to grant an Integrated Environmental Authorisation (IEA) to Ergosat (Pty) '' Ltd (the applicant) on 26 July 2019, in respect of a mining right application for coal on various properties (listed in Annexure of the IEA), all situated within the Magisterial District of Sasolburg, in Free State Province.	
			1. BACKGROUND AND APPEAL 1.1 On 7 November 20161 the applicant lodged an application for an IEA with the DMRE in respect of a mining right application to mine coal on various properties situated in the Magisterial District of Sasolburg, in Free State Province. This application was lodged In terms of section 24 of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA), read with regulation 21 and 23 of the Environmental Impact Assessment Regulations 2014 (2014 EIA Regulations as well as the National Environmental Management: Waste Act,· 2008 (Act No. 59 of 2008) (NEMWA). The revised application was thereafter received by the DMRE on 8 October 2018. 1.2 The underground mine method will include the following: 1.2.1 Coal mining by box-cut to decline method; 1.2.2 The twin decline shafts will comprise of two parallel shafts, one for personnel and material movement and one for coal conveying; and	

			1.2.3 Coal will be extracted through a mechanised mining method by cutting and loading the coal by means of a continuous miner and supporting the roof. 1.3 The Scoping Report (SR) and plan of study for the Environmental Impact Assessment (EIA) were accepted by the DMRE on 6 April 20171 followed by the Environmental Impact Assessment Report (EIAR) and the Environmental Management Programme (EMPr) received by the DMRE on 11 September 017. 1.4 The revised EIAR and EMPr were thereafter received by the DMRE on 8 October 2018. 1.5 Upon consideration and evaluation of the EIAR and EMPr, the DMRE was satisfied that the proposed listed activities will not conflict with the objectives of Integrated Environmental Management as set out In Chapter 5 of NEMA, and that any potential detrimental environmental impacts resulting from the listed activities can be mitigated to acceptable levels. As a result, thereof, the DMRE granted an IEA to the applicant on 26 July 2019. 1.6 Registered interested and affected parties (IAPs) were notified of the aforesaid decision of the DMRE on 8 August 2019. Considering the provisions of regulation 4 of the National Appeal Regulations, 2014 (2014 Appeal Regulations), the due date for the submission of the appeal against the aforesaid decision of the DMRE was 28 August 2019. 1.7 Subsequent to the granting of the aforementioned IEA, the Directorate: Appeals and Legal Review within the Department of Environment Forestry and Fisheries (Appeals Directorate} received four appeals from the following appellants:	

			1.7.1 Deneysvllle Ratepayers Association (first appellant) received on 20 August 2019; 1.7.2 Sasol (second appellant) received on 28 August 2019; 1.7.3 Groenoewers (third appellant) received on 28 August 2019, however the appeal was not in the prescribed appeal form. This appeal was submitted in a prescribed appeal form on 12 September 2019; and 1.7.4 Teresa Calmeyer, acting on behalf of Mr Miles Parr, received on 13 September 2019. This appeal was accompanied by the request for condonation for the late filing thereof. 1.8 These appeals were lodged in terms of section 43(1A) of NEMA, read with regulation 4 of the 2014 Appeal Regulations. 1.9 The applicant was provided with a copy of the appeals for responding statement, which statement was received by the Appeals Directorate on 9 September 2019. 1.10 Comments on the grounds of appeals were thereafter received from the DMRE on 8 October 2019. The DMRE also submitted project files to the Appeals Directorate in December 2019. 1.11 Appeal by the third appellant was withdrawn on 24 February 2020 and subsequent thereto, appeal file was accordingly closed on 25 February 2020. 1.12 Before deliberating into the merits of appeals submitted by the first and second appellants, I find it necessary to first deliberate into the late submission of an appeal by the fourth appellant	
			2. Late submission of an appeal fourth appellant	

			2.1 Appeal by the fourth appellant was lodged on 13 September 2019, sixteen (16) days outside the appeal period. This appeal was accompanied by the request for condonation for the late filing thereof. 2.2 Upon receipt of the fourth appellant's appeal together with a request for condonation for the late filing thereof, the applicant Indicated that this appeal was submitted outside the prescribed timeframe, and therefore section 47CB (2) of NEMA finds application. The applicant submits that the Minister may not consider the appeal submitted by the fourth appellant. 2.3 In terms of section 47CB of NEMA. I have the legal authority, subject to explicit limits, to grant an extension or condonation for the submission of an appeal which is out of time. 2.4 Section 47CB (2) of NEMA imposes a limitation on my power to accept an application for condonation to submit an appeal contemplated In section 43 (1A) of NEMA, in that it provides that "The Minister may not accept an application for condonation to submit an appeal contemplated in section 43(1A) after 30 days has lapsed from the date of the decision by the Minister responsible for mineral resources or any person acting under his or her delegated authority'. 2.5 In the case of Fedsure Life Assurance v Greater Johannesburg Transitional Metropolitan Council 1999 (1) SA 374 (CC), the Constitutional Court held that it is •central to the conception of our constitutions/ order that the Legislature and Executive in every sphere are constrained by the principle that they may exercise no power and perform no function beyond that conferred upon them by law'. 2.6 Taking Into consideration that the appeal by the fourth appellant was submitted on 13 September 2019, more	

			than thirty (30} days after the decision of the DMRE to grant the aforementioned IEA to the applicant, I am therefore restricted by section 47CB (2) of NEMA to accept the fourth appellant's request for condonation for the late file of his appeal. 2.7 In light of a foregoing, the appeal submitted by the fourth appellant on 13 September 2019 will not be considered. 2.8 Having ruled against the consideration of an appeal submitted by the fourth appellant, I shall in tum deal with the merits of appeals lodged by the first and second appellants.	
			3 Appeal by the first appellant 3.1 Firstly, the appellant submits that the town of Deneysville was not notified of applicant's intent to apply for a mining right, and the community was not included or consulted as required by the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002} (MPRDA}. 3.2 Secondly, the appellant questions whether the Impact on the Vaal Dam was considered as they never received any information or any proof that an environmental impact study has been done. The appellant submits that pollution has been identified as one of the many pressures affecting freshwater systems and resources in South Africa. It is submitted that mine water is a growing concern in water quality management. The appellant contends that mine water Impacts negatively on the water environment by Increasing the levels of suspended solids, leading to mobilisation of elements such as iron, aluminium, cadmium, cobalt, manganese and zinc and also decreasing pH of the receiving water. The appellant submits that the overall effect of mine water is the deterioration in water quality in many surface	

			water sources that may impact on the domestic, Industrial and agricultural users. 3.3 The appellant submits that Veal Dam has to be protected at all cost, once the water becomes contaminated there will be a depletion of aquatic life including fish, salamanders and frogs, and other aquatic species will begin to diminish in numbers. Contamination of drinking water supply via the toxic heavy metals that remain dissolved in the acidic water from the mine. The appellant submits that toxic heavy metals will be ingested by humans through drinking water supplies1 causing severe health problems. 3.4 The appellant further submits that Informal settlements with associated social pathologies Increased, and an area Impacted by acid mine drainage will have a decline in valued recreational fish species as well as a general decline in outdoor recreation and tourism along with the contamination of groundwater drinking supplies. The appellant submits, furthermore, that acid mine drainage will have severe impacts on aquatic resources and will stunt terrestrial plant growth and harm the wetlands not to mention the many species of birds that breed around the dam. The appellant states that acid mine drainage is recognised as one of the more serious environmental problems in the mining industry and a major problem on coal and gold mines throughout the world. The appellant submits that South Africa is no exception. 3.5 Thirdly, the appellant submits that communities who live close to mines are exposed to the unhealthy effects of mining, such as air, water and land pollution, while their agricultural livelihoods are severely impacted. 3.6 In response to the appeal by the first appellant the applicant states that it is important to note that the appellant does not allege that they were not notified or consulted in	

			respect of the application. The appellant's allegation Is limited solely to consultation undertaken in terms of the MPRDA. In this regard, the applicant submits that the application for IEA is governed by, Inter alia the NEMA read with the 2014 EIA Regulations. The provisions of the MPRDA finds no application in respect of the appeal. 3.7 The applicant submits that regulations 40 - 44 of the 2014 EIA Regulations succinctly detail the public participation process (PPP) to which an EA application must be subjected to in order to be considered compliant. The applicant submits that they fully complied with the requisite requirements for public participation. 3.8 The applicant submits that regulation 40 of the 2014 EIA Regulations directs that the PPP to which a SR and the EIAR and EMP ' was subjected to must give, inter alia, all potential Interested and affected parties IAPs a period of at least 30-days to submit comments on the requisite SR and EIAR. It Is applicant's submission that the appellant was duly provided with such an opportunity. In this regard, the applicant contends that the environmental assessment practitioner (EAP), in compliance with regulation 41(2) of the 2014 EIA Regulations, fully complied with the relevant guidelines applicable to public participation, namely the Department of Environmental Affairs (2010), Public Participation guideline in terms of NEMA EIA Regulations, Department of Environmental Affairs, Pretoria, South Africa, as contemplated in section 24J of NEMA 3.9 The applicant further submits that the EAP, in compliance with regulation 41(2)(a), 41(3) and 41(4) of the 2014 EIA Regulations affixed conspicuous site notice boards surrounding the area. The applicant goes on to submit that the EAP, in compliance with regulation 41(2)(c), advertised the application in two newspapers, one In the Mooivaal	

			Weekblad and one in the Volksblad, published on 4 November 2016. 3.10 Furthermore, the applicant submits that the EAP, in compliance with regulation 42, opened and maintained a list of IAPs. It Is submitted that the draft SR was subjected to the requisite 30-day public review period by registered IAPs and also made available for review and downloaded on the EAP's website, www.rockeco.co.za on 23 November 2016. Copies thereof were submitted to the Deneysville Police Station and the Deneysville public library on 24 November 2016. 3.11 In addition, the applicant submits that the EIAR was also available for download on the abovementioned website. The applicant submits that the EAP, in compliance with regulation 44, compiled a summary comments and response report, and a full comment and response report, as included as Appendix 5-4_1 of the EIAR and in the addendum report version 2 and version 3. All comments received during the PPP are duly addressed in the above-mentioned reports. 3.12 With regards to the appellant's contention in relation to the impact on the Vaal Dam, the applicant submits that the appellant was proper1y consulted in terms of the requisite provisions of the 2014 EIA Regulations. The applicant submits that the appellant's allegations are unsupported by any facts, technical, legal or otherwise and constitute bald allegations against specialist technical reports. The applicant submits that the EIAR, in compliance with the requisite EIA process, adequately investigates, assesses and determines, the flow regime and characterises of ground and surface water. This is achieved through both the applicant's EIAR document as well as, the following specialist studies attached to the Ergosat EIAR:	

			• Geo Pollution Technologies -Gauteng {Ply) Ltd (GPT) (RCERM-17-2047), June 2017 \Groundwater Study") (Appendix 6-5 to the EIAR); and • Integrated Storm Water Management and Pollution Control Dam (PCD) amenities report, completed by IDS Consulting (2017/02/22 - SW0011) (Appendix 6-8_1 to the EIAR). 3.13 The applicant submits that the impact on the Vaal River and Dam is expected to be low as the colliery will be located on average 80 meters below the surface and approximately more than 500 meters away from the Vaal River. All polluted water from the plant area will be contained in the PCD. No water will be discharge into the receiving environment. As such, no significant impacts on surface water resources are expected. As a result of the depth below surface, the possibility of decant from the underground workings taking place is very low. 3.14 The applicant contends that it is also evident that a Fauna, Flora and AviFauna assessment was completed as part of the IEA application for the proposed colliery. As the project is an underground mining located on average 80 meters below the surface, the mining activities will have minimal impact on biodiversity. In this respect the applicant submits that the only impact will be at the shaft and plant area. From the requisite specialist studies, it can be concluded that the habitat on the study site does favour some Red Data avifaunal species although as the mining will be undertaken underground and the mining plant with other infrastructure will be situated on transformed land, currently used for agricultural purposes, there will be very a limited impact on such species. It is the applicant's submission that the mitigation and management measures as proposed by the specialist studies are sufficient to prevent any significant impact. The applicant contends that the Deneysvllie community and the appellant are furthermore located a	

			significant distance from the proposed colliery and the Impact on the appellant will be very low. 3.15 The applicant submits that no washing of coal will take place at the plant area and no tailing storage facility will be constructed. The applicant submits that the proposed mine that will be located, on average, 80 meters below the surface and, approximately, more than 500 meters from the Vaal River. Further that all polluted water will be contained In the PCD as presented in the stormwater management plan ("SWMP") and 3.16 The applicant submits that during the operational phase, it is expected that the main impact on the groundwater environment will be dewatering of the surrounding aquifer. Water entering the mining areas will have to be pumped out to enable mining activities. This will cause a lowering in the groundwater table in and adjacent to the mine. The applicant submits that the flow in the aquifer will be directed towards the mine and very little groundwater pollution is therefore expected. 3.17 The applicant submits that during the decommissioning phase and post mining phase It is expected that dewatering of the proposed mine will cease and it will be allowed to flood. The groundwater regime will return to a state of equilibrium once mining has stopped and the removal of water from the mining void has been discontinued. In this regard, the applicant submits that the rise in the groundwater level is predicted to be relatively slow. The applicant submits that the potential impact before mitigation is expected to be medium and medium to low after mitigation measures have been implemented. The applicant submits that mitigation and management measures are included in Table 11 for the construction phase of the project to mitigate and manage the expected impacts on groundwater.	

			3.18 In response to the appeal by the first appellant, the DMRE submits that according to the information included on the EIAR, a notice of intention to apply for a mining right on the existing prospecting right was advertised in terms of the MPRDA, NEMA and NEMWA. The DMRE submits that the newspaper advert was published on Vaalweekblad for the week of 2-4 November 2016. A public meeting was scheduled to be held at Deneysville Primary School Hall from 18h30 to 20h00 on 10 November 2016, all IAPs were invited to attend. 3.19 Further to the above, the DMRE submits that a ground water study was conducted by Geo Pollution Technologies Gauteng (Pty) Ltd. It is submitted that the report did indicate that the leachate plume emanating from the mine may Impact on the Vaal River and Taaibosspruit as well as privately owned boreholes. The report also gives recommendations on how this impact can be minimised. The report does not indicate that it will be Impossible to manage the potential pollution impact. 3.20 The DMRE further submits that the Department of Water and Sanitation (DWS) was consulted as the regulatory authority of the National Water Act, 1998 (Act No. 36 of 1998) (NWA) regarding this project. DWS comments were received with conditions on how the mine waste should be managed. The decision to grant an IEA was made taking into consideration the conditions contained in the DWS comments. The DMRE submits that DWS did not have any objections in the issuing of and IEA. 3.21 The DMRE submit that the EIAR indicates that applicant will mine coal underground, the crushing and screening will also be done underground, and washing will not be done on the surface and no tailing dams will be established on the surface.	

			3.22 In evaluating the appeal by the appellants and responses thereto by the applicant as well as the DMRE, it is imperative to stress that PPP is an Integral part of the EIA process which afford IAPs an opportunity to participate in the process or to comment on any aspect of the proposed development. In this matter, I have perused the final EIAR and noted the PPP undertaken by the applicant in respect of the application for IEA. In this regard, the information before ne indicates that site notice boards were set up in the area and also that two newspaper advertisements were placed in the Moolvaal Weekblad and Volksblad on 4 November 2016. These notices and adverts invited the public to register as IAPs for the said application. The information before me further indicates that Mr Bill Eardley, who is the chairperson of the appellant, was present at the public consultation. 3.23 In light of the above, I am satisfied that the appellant was consulted and given an opportunity to participate and comment on the reports in respect of the abovementioned application. 3.24 In relation to the contentions relating to the impact on Vaal dam and the impact of acid mine drainage, I have taken note of the groundwater study conducted by Rock Environmental Consulting (Pty) Ltd. I specifically noted the preliminary Groundwater Impacts as set out on page 78 and 79 of the EIAR, which indicates that there will be a lowering of groundwater table which will impact on water supply of groundwater users surrounding the mine and a potential impact on base flow of streams. Further to this I also noted the recommendations by the specialist which Indicates that water quantity and quality data should be collected on a regular, ongoing basis during mining operations, further that geochemical samples should be collected and the hydrocensus and risk assessment should at least be repeated before closure to evaluate any impacts. .	

			3.25 The groundwater study conducted in respect of the abovementioned application is not against the proposed mining activities, provided the mitigation measures are adhered too. 3.26 I have also taken note of the comments from DWS which identifies mitigation measures, and further that condition 13 of the IEA specifically states that "The comments from the Department of Water and Sanitation must be adhered to". 3.27 Further to the above, I have taken note of item 3 of the IEA titled "commencement of the activities" which states that: 3.2 Water from the mining area and related activities must be treated before it is discharged into any natural watercourse or water system. 3.5 Ground water monitoring stations must be Installed around the waste rock dump and the tailings dam to monitor ground water pollution due to leachate and acid mine drainage. 3.8 Mining and related activities must be implemented and managed in a way that pollution and reduction of ground water is prevented. 3.28 In view of the aforegoing, I am satisfied that the potential impacts on Vaal Dam as well as groundwater have been properly investigated, assessed and where necessary appropriately mitigated. I am also satisfied that the DMRE considered all the relevant information available at their disposal, including specialist reports prior to making a decision to grant the aforementioned IEA to the applicant. 3.29 It is against this background that the appeal by the first appellant is accordingly dismissed.	
			4. Appeal by the second appellant	Based on the recommendations made by the Minister of DEFF, the EIA/EMPR has been reworked to ensure the

			4.1 Firstly, the appellant states that the applicant made an application during or about October/November 2016 for an IEA associated with a mining right application in terms of the 2014 EIA Regulations. The applicant simultaneously advertised an application for a water use licence. The appellant contends that notice of these applications was placed in the area's vicinity on 21 October 2016 and also published in the Vaalweekblad between 2 and 4 November 2016. The appellant submits that both notices, despite the differences in dates and which may well have resulted in confusion to IAPs, provided 30 days within which to comment.	adequate assessment of the Sasol pipelines, include it within the maps and conduct the appropriate Risk Assessment as an additional specialist investigation for the application. Another round of PPP will be conducted and all comments included in the new document will be submitted for reconsideration by the DMRE.
			4.2 Secondly, the appellant submits that the applicant appointed Mr Arno van den Berg / Pieter van der Merwe, an EAP of REC Services (Pty) Ltd t/a Rock Environmental Consulting to assist with this application. The appellant submits that at some stage, it appears that the EAP was changed to Elemental Sustainability (Pty) Ltd. In this regard, the appellant submits that they did not receive any communication regarding this change.	Elemental-S have been appointed as noted below to ensure compliance with requirements of regulation 4(2) of the 2014 EIA Regulations.
			4.3 Thirdly, the appellant submits that on 4 September 2017, they advised the EAP of the presence of multiple pipelines in the area including the following pipelines: • Gauteng Network Natural Gas pipeline (GNP); • Secunda Natref integration pipeline (SNI); • Sasol Ethylene Pipeline (SAS14); • Sasol Propylene Pipeline (SAS08); and • Sasol Ethane Pipeline (SAS 12).	All Sasol correspondence were included in this application and the new documents were again provided to Sasol to ensure that they have another opportunity to comment and the comments will be included in the final document which is to be resubmitted.
			4.4 The appellant submits that, although there is no reference to Sasol and their pipelines in the 2017 comments and responses report, the notes of 29 September 2017 public open day refer to the "issue regarding the present SASOL gas pipelines raised". The appellant submits that they indicated the presence of gas pipes that runs over the	The maps have been redone and incorporated to show the exact location and the position of Ventilation shaft 2 had also been moved away further to ensure compliance with the MHSA and that there will be no danger to the Sasol pipelines. No mining or blasting will occur on the

			property. The appellant submits that this is vaguely captured in the EIAR. 4.5 The appellant submits that the existence of these pipelines was drawn to the attention of the EAP, there is however no reference or depiction of the pipelines on the maps included in the reports submitted to the DMRE which would overtly bring the existence and risks associated with the pipelines to the DMRE's attention. The appellant contends that given the significant risks associated with the presence of these pipelines, this was patently relevant information which ought to have been properly presented to and therefore considered by the DMRE prior to granting an IEA to the applicant. 4.6 This appellant submits that the application has a protracted history commencing during or about October 2016, and despite the mandatory time periods included in the 2014 EIA Regulations, a decision was only granted in July/August 2019. 4.7 The appellant submits that, in a SR acceptance letter of 6 March 2017, the DMRE requested the applicant to submit the EIAR by 24 July 2017 and also drew the attention of the applicant to regulation 45 of the 2014 EIA Regulations. The addendum Report is dated November 2017, and although the request for additional information was apparently at the request of the DMRE, there is no indication that permission was granted prior to the 24 July 2017 by the DMRE to extend the time periods as contemplated in regulation 3(7) of the 2014 EIA Regulations. 4.8 Significantly, the appellant submits that the additional information submitted in the addendum Report was also not made available for public comment. The appellant submits that regardless of the above, given the substantial period between the first PPP and the decision to grant an IEA,	surface and the Ergosat mining operation is an underground operation. Low risks have been predicted by the Risk Assessment conducted by the specialist appointed. The revised document will be submitted for comment to all previously identified I&APs to ensure that all parties are awarded an opportunity to comment of another 30 days on all aspects, including the changed and the additional refinement of aspects during the WUL process. Based on the fact as pointed out by the Minister that some of the I&APs could have changed within this period, I&APs included in the register were re-assessed.

			it is submitted that a further round of public participation ought to have been required prior to granting an IEA since IAPs may well have changed in the intervening period. 4.9 The appellant submits that the failure to have properly investigated and delineated the presence of pipelines on the properties affected by the proposed mining operations indicates a likelihood that, as a general proposition, there has been inadequate site- specific impact assessment. This is clear from the fact that none of the maps included in the EIAR indicate the presence of pipelines. 4.10 Further to the above, the appellant submits that on 1 September 2017, their representative sent an email communication to the EAP which stated that: "*Sasol has pipelines within which servitudes that might be affected by the proposed activity. Please send me a map and coordinates of the proposed site to assess if Sasol pipelines are affected"*. In response, the EAP's representative, Mr Arno van den Berg responded that "*you are welcome to send us the servitude information regarding the pipelines. Please fee/ free to talk to Bjorn Goosen in this regard as they will be able to assist in any process regarding the investigation in terms of the pipelines in relation to the mine*". On 4 September 2017, Sasol Satellite Operations directed a letter to the EAP which included a picture showing the location of Sasol pipelines. 4.11 In summary, the letter raises the following concerns: • Sasol's concerns as an IAP had not been indicated in the relevant reports and there is no reference or indication of any of the pipelines crossing the area in any of the maps/annexures;	As stated, the maps have been redone to ensure proper assessment in terms of placement and impacts. Positions of the transmission and distribution network pipelines have been received and as stated, the maps have been revised. These concerns have now been addressed as follows: • Sasol has now been incorporated in terms of their comments and the pipelines. • A separate Risk Assessment has been conducted to ensure independent assessment of the pipelines;

			• There is a potential impact on the environment, safety and health if the integrity of the pipelines Is disturbed by the mining operations; • The pipelines transport hazardous substances and a pipeline failure caused by the mine could have a disastrous effect on water supply from the Vaal River. Agriculture will also be affected if the pipeline integrity is compromised; • The pipelines represent critical infrastructure for multiple industries; and • The Sasol Operations are reliant on the effective distribution of products to the Sasol plants in and around Sasolburg. 4.12 The appellant submits that the letter dated 4 September 2017 specifically requests that the abovementioned concerns ought to be included in the EIAR, however these impacts were not properly considered or addressed. The only indication is contained on page 107 of the EIAR that "*possible encroachment of underground mining operations on the Sasol gas pipeline servitude and on buffer areas required"* and *"the underground mining has been raised as a concern and should be investigated'*. In addition, the appellant submits that the tabulated assessment of ·potential impacts during the operational phase" (page 178) confirms that "*there is an existing gas pipeline and servitude that traverses the proposed mining area and concerns have been raised that the mining activities would encroach the buffers required for the servitude area*". As far as could be established a Sasol representative has been included in the consultation process. The extent of the impact, *if it should occur, has not been established at this stage*" (own emphasis). It is further indicated that the "*impact cannot be rated currently*" and the proposed mitigation measure indicates that applicant will "*keep Sasol informed about the mining schedule and mine plan and ensures that servitudes and buffers are not encroached*'.	additional mitigation measures have also been worked into the EMPr • No impacts will befall the Sasol pipelines since only underground mining is proposed and no activities will take place within 100 m, which also lead to the movement of the location of Ventilation shaft 2. • This will now be done with the revised version of the EIA/EMPr and again submitted for public comment, including resubmission to Sasol and thereby ensuring that their concerns have been adequately addressed. The letter as received from Sasol in 2017 have been included above and initial concerns addressed. Any additional comments received will also be included in the final document submitted.

			4.13 The appellant submits that it is concerning that despite Sasol having written to the EAP and advised of the presence of no less than five pipelines, this statement refers to "*an existing gas pipeline and servitude*". Plainly, the appellant contends that the EAP did not properly consider, investigate and/or address their comments. In this regard, the appellant submits that the purpose of an EIA is to investigate the potential impacts prior to those impacts happening, not at the discretion of the EAP and/or applicant in the future. The appellant submits that the impacts of construction related to blasting and subsidence on the various pipelines which exist in the proposed mining area should have been considered.	A formal notification of change of EAP and another application letter have been submitted to the DMRE and the corrective actions as required by the Minister will be followed and submitted for the reconsideration of the DMRE. The revised EIA/EMPR will and have included all necessary aspects to ensure that the pipelines have been properly assessed to ensure safety to all parties and the environment.
			4.14 The appellant states that they noted from an unrelated question posed in the November 2017 comments and responses report that "*blasting may be necessary but the level of intensity and duration will be determined depending on mining circumstances. In general, only limited blasting will be required due to advanced mining methods*". The appellant submits that, though it appears that blasting may be limited to the construction phase, blasting is considered a significant risk to the integrity of the appellants' pipelines and the overall safety of the surrounding environment and community, and this ought to have been properly assessed and considered by the DMRE.	The risk assessment was conducted specifically taking blasting into account and the associated risks that could occur.
			4.15 Moreover, the appellant contents that there is equally no argument that the socio-economic and other environmental implications of the pipelines potentially being required to be relocated, has been considered. The appellant submits that this represents a material omission In impact assessment which justifies the setting aside of the decision to grant an IEA to the applicant. The appellant further submits that the EAP failed to incorporate Annexure A into the comments and responses report, to submit it separately to the DMRE and/or to include it in the November 2017	No relocation of the Sasol pipelines will occur and was considered during this revision. The revision of the position of Ventilation shaft 2 have been made, which is the best suited option for the situation. All obtained Sasol communication were now incorporated including new comments that may be received from Sasol will be incorporated.

			addendum. This represents an apparent failure in the PPP which once again, leads to a question regarding the adequacy of the process in entirety.	
			4.16 Lastly the appellant submits that the need and desirability as well as feasibility and overall sustainability of the proposed colliery is questionable. The information included in the 2017 EIAR and EMPr purportedly supporting the need and desirability of the proposed activities is outdated for purposes of a decision taken in 2019.	The need and desirability section as well as the feasibility and sustainability of the colliery has been re-assessed and this is shown in Table 5-1 and specifically Section 5.
			4.17 In response to the appeal by the appellant, the applicant submits that regulations 40 - 44 of the 2014 EIA Regulations sufficiently detail the PPP to which an EA application must be subjected in order to be considered compliant. The applicant that they fully complied with the requisite requirements for public participation.	The previous documents complied and fulfilled the PPP requirements and this revised version will also comply with the general requirements and as specified by the Minister, fulfilling requirements of "*public participation of at least thirty (30) days as required by regulation 19 (1) (b) of the 2014 EIA Regulations*".
			4.18 Regarding the change of the EAP, the applicant submits that REC Services Proprietary Limited t/a Rock Environmental Consulting (REC) was appointed to undertake the EA application. According to the applicant, there was not change of the EAP.	As noted, Elemental-S have not been involved in any of the previous application processes, besides notification of I&APs of the decision taken. Therefore, no notification of change of EAP were necessary as the EAP did not change before final submission.
			4.19 The applicant submits that, subsequent to the granting of an IEA, Elemental Sustainability Proprietary Limited (Elemental-S) was appointed to ensure compliance with the requirements of regulation 4(2) of the 2014 EIA Regulations. The applicant submits that Elemental-S, in line with its mandate, duly notified all registered IAPs of the DMRE's decision to grant the aforementioned IEA.	Elemental-S aided the applicant and printed and re-submitted the documents asked for by the DMRE at the end of 2019, after services/contracts with REC had been concluded.
			4.20 The applicant further submits that on 26 August 2019, Ms Vicky Kamango, the appellant's representative, requested a copy of the EIAR / EMPr from Mr D Wilken of Elemental-S. Mr Wilken duly provided a dropbox link to Ms Kamanga which included all requested information. Mr	

			Wilken was then informed by Ms Kamanga that due to security reasons, access was blocked by the Sasol security system to the requested information and therefore unable to access the documents. The requested information was then re-sent as PDF documents to Ms Kamanga via email and receipt thereof was confirmed. No additional information was requested by the appellant. 4.21 Regarding the contentions relating to the presence of the pipelines, the applicant submits that the presence of the pipelines was included into the requisite EIAR / EMPr. It is submitted that Page 113 states that possible encroachment of underground mining operations on the Sasol gas pipeline servitude should be investigated. The applicant further submits that page 182 indicates that one of the impacts identified is the impact the proposed underground mining activities may have on the pipelines and servitude. The impact assessment, as presented on page 182, alludes to the fact that the impact will be determined through a risk assessment in terms of the Mine Health and Safety Act, 1996 (Act No. 29 of 1996) (MHSA) and the regulations published thereunder (MHS Regulations). The applicant submits that MHSA, read with regulation 17.6 and 17.7 of the MHS Regulations prohibits mining operations within 100 meters of structrues1 such as the Sasol pipelines, without first undertaking a rigorous risk assessment or obtaining consent, in terms of regulation 17.8 -17.10 of the MHS Regulations. The applicant submits that they cannot undertake operations near the Sasol pipelines until such time as a rigorous risk assessment has been undertaken to evaluate the Impacts of such operations or consent granted. The EAP correctly indicated that this assessment will be undertaken in future. Mining operations involve a proliferation of laws, which must be viewed holistically by various government departments when gauging compliance.	The Sasol pipelines have been mentioned in the previous application submitted and now it has been re-assessed to ensure that no additional risks befall these structures. A Risk Assessment had been conducted and included within this revision and included within Appendix 21.

			4.22 The applicant further submits that the proposed mining operations will be conducted exclusively underground, and will except in a limited development footprint, not impact on surface rights such as servitudes registered in terms of the Deeds Registries Ac 1937 (Act No. 47 of 1937). The applicant reiterates that no Sasol pipelines will be affected by the limited development footprint taking place above ground and, as detailed above, no mining operations can be undertaken near the Sasol pipelines without first undertaking a comprehensive risk assessment and obtaining consent in terms of the MHSA and MHS Regulations.	All mining will be conducted underground and the plant and ventilation shafts are the only surface infrastructure applicable to the project.
			4.23 The applicant submits, furthermore, that during the public meeting held on 29 September 2017, an IAP stated that a pipeline servitude is registered over the requisite property. The presence of the pipelines was, accordingly, duly included into the EIAR / EMPr. The proposed Ergosat Lefa Colliery will be an underground mining operation with limited surface infrastructure. The proposed underground mining will be located on average 80 meter below the surface. The description of the activities to be undertaken is presented on page 16 - 27 of the EIAR / EMPr. The mining design parameters and the safety factors are presented on page 19 and 20 of the EIAR / EMPr. The safety factors presented are based on industry norms and standards for safe underground mining with very low risk to surface infrastructure, such as the Sasol pipelines.	All additional comments will be incorporated.
			4.24 The applicant submits that the social impact assessment is presented on page 113 of the EIAR / EMPr, and states that the underground mining activities may encroach on the pipelines and the servitudes. The applicant submits that the main location where blasting may take place is in the establishing of the decline shaft, these blasts will consist of very small controlled blasts. The entrance of the proposed decline shaft is more than 650 meters away from the closest pipeline.	Blasting will be controlled as specified and the Risk Assessment conducted also included risks based on blasting. All of the recommended management features given in the Risk assessment were incorporated into the EMPr as revised.

			4.25 The only secondary location/s where blasting may be required is if fault lines are encountered and the continuous mining equipment cannot be utilised to mine through the fault line. These blasts will be very small, controlled and it is highly unlikely to have any effect on surface infrastructure. As presented in the impact assessment section of the EIAR / EMPr, a number of mitigation measures will be implemented to mitigate / manage any impact associated with the limited blasting that may take place. The mitigation measures Identified by the independent external specialist studies and the EAP for all impacts as identified in the impact assessment are included in the mitigation section of the EIAR / EMPr as presented on page 232 - 285. Seismographs will be utilised to monitor vibrations in terms of blasting.	The Risk assessment can be viewed in Appendix 21 and all management aspects and recommendations have been incorporated into the EMPr to ensure compliance and safety during all phases of the development.
			4.26 In response to the appeal by the second appellant, the DMRE submits that the omissions by the EAP are of sufficient gravity in nature and will require further assessment with serious consideration by the EAP on behalf of the applicant.	Noted. The corrective actions will be taken to ensure proper evaluation of impacts and gaps identified.
			4.27 The DMRE submits that according to the EIAR received on 8 October 2018, the document was compiled by Mr Amo Van Der Berg. The DMRE was never notified of any change in EAP as alleged by the appellant.	The final submission and process completion were conducted by REC services. After the EA were issued, the process was thought to be completed, except for the notification of the I&APs. This was done by Elemental-S.
			4.28 The DMRE further submits that it is the responsibility of the EAP to make available all information regarding the EA application to IAPs and to address fully all issues and concerns raised regarding the proposed mining operation and also include the comments in the report to be submitted to the DMRE for consideration. In this regard, the DMRE is of the view that the EAP has omitted this crucial information in the report submitted on 8 October 201B. Pages 113 and 182 does not contain any information about pipelines.	All information available was and will be submitted to the DMRE for reconsideration as available to the EAP.

			4.29 The DMRE submits that further investigation of these pipelines has not been done. It is submitted that the Mine Health and Safety section is the relevant regulator to comment on this issue, but did not comment on the issue as it is not depicted on the report submitted. In conclusion, the DMRE submits that misleading information was submitted to the Competent Authority and the decision to grant an IEA was taken based on the information presented in the reports.	A Risk Assessment has now been conducted based on the MHS Regulations and all infrastructure (such as the Ventilation shaft 2) has been re-assessed to ensure that it is not within 100m of the Sasol pipelines. However, a formal Risk Assessment as required had been conducted.
			4.30 In evaluating the appeal by the second appellant as well as responses thereto by the applicant and the DMRE, I note that the essence of this appeal relates to five Sasol pipelines running through the various properties on which the IEA was granted. In this regard, I have perused the EIAR and EMPr and found that reference is only made to one pipeline on page 182 which states the following: *"Impact on the Sasol gas pipeline and servitude -* *There is an existing gas pipeline and servitude that transverses the proposed mining area and concerns have been raised that the mining activities would encroach the buffers required for the servitude area. As far as could be established a Sasol representative has been included in the consultation process. The extent of the impact, if it should occur has not been established"*	As stated above, the Sasol pipelines have been re-evaluated and will be redistributed for comment of an additional period of 30 days. All comments received will be incorporated. The documents will also be submitted to Sasol for comment to ensure they are satisfied with the findings and the re-assessment of the pipeline.
			4.31 I have also taken note of the comments from the DMRE that the omissions by the EAP are of sufficient gravity in nature and will require further assessment with serious consideration by the EAP representing the applicant. Furthermore, I have taken note of the submission by the DMRE that Mine Health and Safety section is the relevant regulator to comment on the issue of pipelines, but did not do so since this issue is not depicted on the report submitted for decision making. In conclusion, the DMRE submits that misleading information was submitted to the Competent	Refer to comments made above. Further assessment has and will be conducted until resubmission of the documents.

			Authority and the decision to grant an IEA was taken based on the information presented in the reports. 4.32 In light thereof, without the proper identification, assessing and reporting environmental impacts associated with the proposed mining operations with specific reference to the pipelines mentioned in paragraph 4.3 above, I am therefore of view that the DMRE was not placed in a position to assess and consider all relevant information prior to making a decision to grant an IEA to the applicant. For these reasons, the ground of appeal regarding the failure to properly investigate the presence of Sasol pipelines on the properties affected by the proposed mining operations, is accordingly upheld. The decision of the DMRE to grant the aforementioned IEA to the applicant is accordingly set aside. 4.33 Having upheld this ground of appeal, I am of the view that the appropriate remedy is to remit the matter to the DMRE for further consultation and reconsideration. The applicant is afforded an opportunity to properly investigate the presence of Sasol pipelines on the properties affected by the proposed mining operations. 4.34 The applicant must thereafter incorporate the findings thereof in the EIAR. Due to significant changes or new information added to the EIAR, the revised report must be subjected to a public participation of at least thirty (30) days as required by regulation 19 (1) (b) of the 2014 EIA Regulations. 4.35 Any comments received from IAPs, including the second appellant as well as responses thereto by the applicant must be incorporated into the final EIAR for submission to the DMRE for reconsideration of the application for IEA. In this regard, the timeframes prescribed by the 2014 EIA Regulations in respect of PPP and decision making must be adhere to.	The resubmitted documents will contain all relevant information and assessment of the Sasol pipeline. This will be done as instructed and the documents will be resubmitted as required containing all the new information and the comments received after the scope change. 30 days additional commenting period will be completed from 15th of July 2020 to the 14th of August 2020. Documents will be distributed on the 14th of July 2020.

			4.36 Regarding the contention on the change of EAP, there is no information before me to support this allegation. Hence my finding that this ground of appeal is without merit and therefore dismissed accordingly.	
LAND OWNERS AND OCCUPANTS				
Anglo Therman Coal	X		Anglo Thermal Coal was consulted as they are adjacent to the western side of the border of the proposed mining right.	-
Traditional leaders	X		No traditional authorities are present in this area and none were identified in close proximity of the proposed site.	-
MUNICIPALITY				
Ward councillors: Ward 18: Cllr. Luigi Gaigher (DA): 071 417 6184 Ward 19: Cllr. Khomoliileng Alexis Mare (ANC): 083 240 4156	X		The mine will be situated on the border of two municipal wards. It is actually situated within ward 19, but is adjacent to ward 18. Both councillors received a copy of the Scoping report. They will also receive a copy of the EIA report for comments.	No comments to date
Metsimaholo Local Municipality Municipal Manager Mr. Steve Molala Secretary to the MM: Ms. Thakane Nkoli Tel: 016 973 8313 mmsecretary@metsimaholo.gov.za	X		Background information document send to the local municipality. The municipality received a copy of the Scoping report. They will also receive a copy of the EIA report for comments.	No comments to date
Fezile Dabi District Municipality	X		The Fezile District Municipality is automatically identified as an Interested and/ or affected party. They Affairs received a copy of the Scoping report. They receive a copy of the EIA report for comments	Vusi.sibeko@dcs.gov.za. No comments to date.
ADJACENT COMMUNITIES				
Communities adjacent and within Mining Right footprint of the proposed mine (Only main issues listed here).	X	Continuous and on-going	▪ Potential transport of coal on the public roads ▪ How much water will the mine use and will it cause the groundwater supply to deteriorate. ▪ If coal is to be hauled by trucks, it would be dangerous	▪ The coal would have been transported via overland conveyor, but this has been changed and it will be manually transported. ▪ This will be determined by the in depth Geo-hydrological study. Water use will require a water use license application that is also being undertaken. ▪ It is planned that overland conveyors be used.

			for the public as the road has no shoulders and there will be too many trucks.	
			▪ How deep will the mine be and what method of mining will be used and will it cause sink holes.	▪ The mine will be around 80 m deep; will consist of incline shafts and ventilation shafts. Mining method would use Bord-and-Pillar mining. Bord-and-pillar mining design is verified by qualified specialists to ensure the pillars are strong enough to prevent sink holes. No long hall mining will be used.
			▪ Will blasting be used for mining	▪ No, continuous mining will be used.
			▪ Will there be waste dumps and where will it be?	▪ Yes, dolerites and sandstone. Dumps will be situated on the infrastructure area
			▪ Will the coal be stored at the mine and what is the chances that it would start to burn?	▪ Coal will be temporarily stored in the infrastructure area, where it will be loaded for use at the power station, around 8 km away. The risk of them catching fire is low.
			▪ Will there be H2S gasses in the air and the wind will blow from the mine towards Deneysville	▪ H2S gasses are not expected in the air as no combustion of coal will take place or are foreseen.
			▪ Pillar mining will cause the mine to fall and crack the houses. An incline shaft will require a sump that will take away the groundwater.	▪ Comments were noted
			▪ Dust, coal dust, gasses in the atmosphere, trucks on the roads and crime rates	▪ Comments were noted
			▪ Houses property value decline because of the mine.	▪ Comment noted
			▪ Will the people be bought out by Ergosat if their houses are situated in the mining area?	▪ Talks and negotiations will have to be conducted with the mine in future. That is if such buy-outs are regarded by the mine as absolutely necessary.
			▪ Rehabilitation funding is a concern. Will the mine have enough money for rehabilitation purposes?	▪ Rehabilitation financial provisions are enforced by the law and the new financial provision regulations.
			▪ Labour transport, labour accommodation and the possibility of a squatter camp.	▪ It is currently unknown where the labour will be sourced from and where they will stay.
			▪ Who are the directors of the mine and why are there no answers to questions?	▪ The directors of Ergosat is not known to Rock Environmental Consulting. We know it is a

			▪ Does the Guptas or any other African state have a stake in the Mine? ▪ Crime would be a concern. ▪ Stability of the ground. ▪ Pollution. ▪ Fauna and flora.	company called Ergosat. The director's details have been provided. ▪ No, not as far as any of our knowledge stretches. ▪ All of these aspects have been assessed by specialist investigations, crime have been included in the Social impact assessment. ▪ Noted. A Geotechnical Investigation has also been requested and will be done in the WUL process to ensure stability and design of the dams and stockpiles as part of the plan design. ▪ Impacts to the environment have been adequately assessed. ▪ A fauna, flora and avifaunal investigation have been done during the application phase. A separate comment and response report have been included in the appendices, which contains all comments received during the Scoping and EIA/EMPr phase. Refer to Appendix 6. All new comments received during redistribution for 30 days will be included in Appendix 7 to ensure that clarity/distinction between previous matters and new matters are kept and will enable proper address.
Willow Creek development As represented by M van Wyngaard and Ms Esthee Muller (refer below)	X	3 January 2016	Letter dated on 3 January 2016 and also makes reference to another letter dated 15 November 2016. Financial implications due to the mine in respect to property values and disturbance of Sense of Place.	▪ All financial implications noted and all issues given to the applicant. Various issues addressed in the Social Impact Assessment as a result of the comments and response sheet. ▪ Any compensations due to these losses to be analysed further. Future negotiations and discussions will be undertaken but cannot be finalized before it is confirmed if a mining right will be awarded to Ergosat Pty Ltd.
Willow Creek developments comments on Addendum Report submitted as part	X	No date is provided as	▪ Damages suffered because of the proposed mining right	▪ Damages claims to be assessed out of the EIA structure. Impacts on the Social part of Willow

of Final submission made.		original communication could not be found		Creek have already been undertaken in the Social Impact Assessment.
			1. We have now had the opportunity to pursue and discuss with our client the addendum report of REC Services (Pty) Ltd dated November 2017, which was the only new document included in the EIA.	Noted.
			2. It is obvious that the attempt to address the concerns raised by us on behalf of our client in previous correspondence, is without any substance and indicates an unwillingness by the applicant and its agents to take those concerns seriously. We only have to refer to the addendum as corroboration for this and trust that the Department will come to the same conclusion.	All concerns raised during the process were taken seriously and were answered in a legitimate attempt to address the concerns raised. In our view there is no substance in this comment made by the attorney. It is in this regard important to note that the responses and comments/ concerns raised during the EIA process took into consideration: 1. Consultations with I&APs; 2. The specialist studies which were conducted; and 3. The information received from the applicant Furthermore, 1. The concerns raised were adequately addressed with sufficient substance by the EAP; the applicant did take all concerns raised seriously.
			3. However, we intend to yet again refer to the concerns that have not been addressed and, in some instances, seem to be accepted by the applicant. This is done so that there is no uncertainty about our client's continued objection to the application and to highlight the fact that the applicant paid lip-service to addressing the concerns that were raised.	As stated above, all comments received have been included in the EIA process and are up to date. From the comments and response sheet, it should be clear that the concerns have been adequately addressed. All the concerns raised were taken seriously, all were addressed as part of the EIA process.
			4. Our comments to the addendum report are as follows: 4.1 The concern relating to the damages already suffered by our client as a result of the application, as well as the damages to be suffered if the mining licence is granted, is not addressed at all. There seems to be an attempt to extricate the applicant from those consequences by referring to the sales at the estate over the past 10 years, but that is	It is again recorded that the applicant denies that any damages were suffered because of the Ergosat mining right application. In this regard, it is important to take cognizance of the following: 1. At the time when Willow Creek Ext 6 was established, numerous historical prospecting

			irrelevant. In any event, the applicant does not take into account factors such as the state of the road from Lethabo to Willow Creek which resulted in a slowing down of sales and which our client's representatives were instrumental in having repaired;	and/or mining activities for coal had been conducted in the vicinity of Willow Creek; and 2. At the time when the prospective purchaser made an offer to the complainant to purchase all the remaining (60) erven in Willow Creek at a purchase consideration of R 30mill, a mining right application was already submitted on land immediately adjacent to Ergosat's prospecting area and over a portion of land covered by Ergosat's prospecting area due to an overlap between Anglo Coal and Ergosat's rights. The complainant's damages claim is ostensibly based on an offer received by him for the purchase of all the remaining stands in Willow Creek, which offer ostensibly fell through in 2016 when the purchaser learned that a mining right application has been submitted by the applicant. Despite the fact that the applicant has allegedly suffered these ostensible damages as far back as 2016, he has up to now failed to institute legal action for the recovery of the alleged damages against whomever he was advised caused these damages. Further damages were allegedly suffered thereafter when potential individual purchasers failed to submit offers when they were advised of the mining right application. Insofar as the complainant was also advised that he is entitled to also claim damages for these property transactions which did not materialize, he again failed to institute legal action for the recovery of such alleged damages. As the position according to the attorney is that the complainant has already suffered damages, it therefore becomes irrelevant from the applicant's perspective or the DMRE's perspective whether the mining right is actually granted or not as all that remains is for the complaint to issue summons and recover his damages – something he seems hesitant to

				do. The applicant cannot use these ostensible damages claim as leverage to oppose a mining right application which was brought by the legitimate holder of a prospecting right in terms of an Act of Parliament. The application for and subsequent granting of the mining right do not preclude the recovery of any damages, which were allegedly suffered.
			4.2 The EIA still refers to the nearest town to the proposed mine as being 10 kilometers away. This is notwithstanding the fact that we placed on record that the property on which Willow Creek was developed, is a registered township. The reference to the fact that Deneysville is mentioned as the nearest town and our client is an extension of Deneysville, means that the distance to the nearest town in the EIA is not only misleading, but false;	The EIA/EMPr has been updated to address the fact that Deneysville is 10.2km away and that Willow Creek (Deneysville Ext 6) is 2.2 km away from the mining infrastructure.
			4.3 The applicant seems to accept the fact that the EIA does not contain any meaningful mitigation measures in respect of our client, as was set out in previous correspondence. It only relies on the EIA, which is flawed in this respect, but fails to address our client's concerns at all;	This statement is incorrect. The EIA assessed and listed necessary mitigation measures for impacts in relation to Willow Creek. The EIA is the procedural process to address the impacts that the proposed mine will have on the environment. Most impacts in respect to the Willow creek development have been specifically addressed in specialist studies conducted. The contents of this paragraph are denied and all mitigation measures are adequately spelled out. The EIA addressed impacts in the social economic, where Willow creek was identified as a Primary sphere of impact. The EIAr also discussed the potential impact on the “sense of place” on page 171. It was indicated in the mitigation section that communication with the land owner and affected parties need to be upheld to implement mitigation measures. The Social Impact Assessment (SIA) addressed land use impacts in the operational phase of the project and these

				impacts and proposed mitigations were adopted into the EIAr. The Social Impact Assessment (SIA) indicated that the impacts on Willow Creek regarding land use impacts is definite as it would already have manifested. The SIA therefore rated the Significance of the Impact as Medium before and after mitigation. Mitigation measures included communication with the land owners to determine a way forward.
			4.4 The applicant merely notes the issue relating to the lifestyle choice of the owners of stands at Willow Creek and the tranquillity associated therewith, as seen with the complaint that this will be completely destroyed if a mine is established in the immediate vicinity thereof. No attempt is made to address this concern;	The proposed mine and associated infrastructure will be situated far from Willow Creek, and not in line of sight as determined by the Visual Impact Assessment included in Appendix 13 of the EIA/EMPr. The mine will not be seen from Willow Creek and various other mining and industrial facilities/activities are present in the area. Refer to point 4.1 above with regard to historical prospecting and/or mining activities for coal.
			4.5. The issue relating to the categorisation of the impact on Willow Creek as medium, as opposed to high, is not addressed at all. The applicant merely refers back to the EIA in this regard, which made a mockery of such categorisation as set out in our previous letters;	The categorisation referred to were based on the assessment done as part of the Social Impact Assessment, compiled by Integrated Rural & Development Expertise Pty Ltd (Index), as attached in the EIA/EMPr as Appendix 15. The methodology of determination of Significance of impacts were explained and listed in Section 15.3 of the Social Impact Assessment Report. The impact assessment on Willow Creek resulting as a medium significance after mitigation was based on this methodology as implemented in the SIA. To refer back to the EIA would be the logic thing to do as the EIA is the process in which the public participation is being conducted. It should be remembered at this stage that all comments from Willow creek form part of this administrative process of public participation.

				Independent specialist consultants were appointed to conduct the Social Impact Assessment and its resultant report on which the categorisation is based. To label such categorisation by an independent specialist as a 'mockery' is misleading and not supported.
			4.6 The applicant's stance that negotiations with affected parties will only commence once the mining license is granted, is so unreasonable and without substance. There would be no incentive for the applicant to conduct such negotiations once the license is granted. In any event, any negotiations and agreements entered into as a result thereof may be made subject to the granting of the license, which would protect the applicant and would allay the fears and objections raised by such affected parties. There should therefore be no reason for the applicant not to have commenced such negotiations already. In this regard we place on record that we have invited the applicant, on more than one occasion, to meet with representatives of our client in order to address our client's concerns. The applicant has merely paid lip-service to such attempts by stating that they wished to talk to our client, but failing to revert with a time and place therefore;	1. The EIA process is part of the planning stages of a project. It would be unreasonable and premature to expect the applicant to commit to any financial burden or responsibilities without even knowing if the application will be approved. 2. The current position is that following meetings were held between representatives of the applicant and Willow Creek: • 31 January 2017 at the Taung office in Fourways; • 10 March 2017 at Mugg & Bean in the Waterfront, Cape Town; • 6 March 2018 at the site of Willow Creek; and • 14 May 2018 at Mugg & Bean in the Waterfront, Cape Town. Over and above the meetings various emails and phone calls have been exchanged between Willow Creek and Mr. de Bruin from Ergosat. The department was furnished with a summary of these emails and a summary of further emails are attached. As a summary from the meetings held as listed above, it appears that all the complainant is interested in is that the applicant pays him his alleged damages. The applicant does not acknowledge that the complainant has suffered any damages, with the result that these meetings seems to go nowhere.

			4.7 The applicant merely notes our client's objection to the granting of the licence and the allegation that the recommendation that the licence be granted, was unreasonable. We therefore assume that it is in agreement therewith;	No, the applicant definitely does not agree with it. It was stated as such in the comments and response sheet and the attorney's comment does not require any further comment. It is trite that the process of public participation does not aim to achieve agreement between and applicant and I&APs but rather to ensure that comments and concerns are included into the process for consideration by the competent authority. Regulation 44 (1) of the 2014 EIA regulations as amended guide the process of recording and reporting of comments from interested and / or affected parties to the Competent Authority.
			4.8 The applicant alleges that coal transported by road is not preferred and that the traffic study will be revised. This is, with respect, a ludicrous suggestion in light of the answers provided to our questions which clearly indicate that the conveyor belt is a pipe dream that will either never come into being (if a contract with Lethabo is not entered into, for example) or will take some years after the mine has been established to be erected (which means that in the interim road transportation of the coal would be used). This is a crucial aspect to the application, as the traffic impact assessment that was done, and in fact the EIA as a whole, assumed as a starting point that the coal would be transported via conveyor belt. For that reason, no assessment was done on the impact that coal transporting trucks would have on the roads and the environment. For the applicant to now suggest that this will only be done after the license is granted shows its total disregard for the process and the potential impact that this will have on affected persons and the environment. In fact, it is becoming clear that the applicant has realised that this issue may be fatal to its application which is the reason for its present stance.	The planned method of coal transportation will be by conveyor to Lethabo. From the Product Stockpile, coal will be reclaimed and delivered to Lethabo Power Station via a 10km overland conveyor. In the event of conveyor failure, coal will be transported via trucks to Lethabo at a reduced capacity and lowered production for the few days that the conveyor might be down. If production is reached before construction of the conveyor is completed a study and commitment will be made with the relevant authority. Any changes to the above plan of coal transportation will be submitted to the DMRE for consideration and interested and affected parties will be informed.
			5. Our client's objection to the application still stands as none of its concerns has been adequately addressed, or at all.	All concerns received up to date have been recorded and addressed in the comments and response sheet as attached in the EIAR.

			6. We are of the view that the application cannot be granted in its present form. Any decision to the contrary will simply be irrational and subject to be reviewed and set aside.	Irrespective of the attorneys view the competent authority who will take in to consideration will be the DMRE. All comments submitted by the I&Aps will be taken into consideration before such a decision is made. The CA have made a decision and several appeals have been launched on the decision. The Minister of DEFF have granted the Sasol appeal and allowed resubmission of the EIA/EMPr to allow re-assessment of the pipelines.
Esthe Muller (Representing Willow Creek)	X	Commented throughout application till after final submission	Extensively commented on the application and have been included in the comment and response report within the Appendices (Appendix 6). Since these aspects have already been considered and decisions and appeals have already been launched and considered by the minister, these comments will not be repeated here, but is given in Appendix 6 in the Full Comment and Response Report drafted by the previous EAP during the initial application. Any new comments received will be provided within the following section.	The previous EAP had addressed all the comments and is shown in the comments and response report within Appendix 6. All new comments received will be incorporated into Appendix 7 and Table 8-2 below. The Appeal submitted by the Willow Creek development (as represented by Esthe Muller) is also shown in the Appendices and the Responses included
New Public Participation Phase Comments received				
				All comments received will be included within this section as received to enable separation from new and previous addressed comments – Refer below

Official notification of the process with the link to download the documents were send out to all parties to ensure that they have a copy of the documents and the EAP's contact details as well as the blank commenting sheets.

Any comments received during this commenting period will be incorporated into the final document to be resubmitted for consideration.

Table 8-2: Summary of issues raised by I&APs – Additional 30 Days of Comment 2020 – To be completed as comments are received

Interested and Affected Parties List the names of persons consulted in this column		Date Comments Received	Issues raised	EAPs response
ORGANS OF STATE				
				Comments will be given and addressed here as they are received before final submission.
DMRE- (Free State)	X		**From:** Azwihangwisi Mulaudzi <Azwihangwisi.Mulaudzi@dmre.gov.za> **Sent:** Wednesday, 10 June 2020 11:33 **To:** Corlien Lambrechts <corlien@elemental-s.co.za>; Mamokete Mpatane <Mamokete.Mpatane@dmre.gov.za> **Cc:** DuToit Wilken <dutoit@elemental-s.co.za>; Cedrick Fhedzisani <Cedrick.Fhedzisani@dmre.gov.za>; Kalipa Kewuti <Kalipa.Kewuti@dmre.gov.za> **Subject:** RE: FS 30/5/1/2/3/2/1 (10033) EM / FS 30/5/1/2/3/2/1 (10033) MR Morning Corlien, please note that am no longer RM free state now but move to Limpopo. I have copied the RM:FS Kalipa Kewuti and DD:MEM Shadrack Fhedzisani, please contact them on their email they will assist you. Azwi **Azwihangwisi Mulaudzi** Mineral Regulation Tel:015 287 474 Email: Azwihangwisi.Mulaudzi@dmre.gov.za Website : www.dmr.gov.za	Dear Sir/Madam, Hope this finds you well. We are looking for the case officer who attended to the Ergosat Lefa Colliery application. We would like to confirm the following aspects regarding the outcome of the Appeal and the new PPP Phase that is to commence as soon as possible: • Based on the Regulations published on 5 June 2020 (Government Notice No. 43412), do you wish us to send you a Public Participation Plan in terms of Annexure 2 and 3 for your approval before commencement of the additional 30 days for the revisions made and the risk assessment done for the SASOL pipeline? We are planning on only notifying existing I&APs electronically of the availability of the document and another 30 days to comment. We will not be publishing an advertisement, Site Notices or distributing BIDS etc (as all of these have already been done during the process). • Do we need to resubmit the revised documents to the other Departments again for comment, or will the revised copies distributed via electronic link to the public relevant to the development be sufficient?

				• Will electronic copies be sufficient to these departments if we need to redistribute? • We will also need to resubmit the application form for a change in EAP, as Elemental Sustainability have made the revisions to the EIA/EMPr after the outcome of the appeal. To whom and when do we need to do this during the lockdown period? Can we send the electronic copy to the case officer as we start the PPP process or does this need to happen beforehand? Please assist on the questions raised as we have completed the revisions and the additional specialist studies, we would like to start with the additional PPP 30 day commenting period as soon as possible as to not delay the process any further. Forwarded to : 'azwihangwisi.mulaudzi@dmr.gov.za'; 'mamokete.mpatane@dmr.gov.za' Dear Sir/Madam, Apologies for forwarding this message, but correspondence from the recipients' mailboxes below have indicated that "delivery has failed and the recipient's mailbox is full and can't accept messages now. Please try resending this message later, or contact the recipient directly." Any assistance on the matters as given below will be appreciated or alternative contact details to reach these officials will be much appreciated. I have phoned the telephone numbers we have for Ms R Ramaboea (057 391 1318), including the 057 391 1300 landline provided on the web for the Freestate Office and it also has an automatic response indicating that the mailbox is full and not accepting messages at this time.

				We understand that pressure is experienced by the Department currently based on the re-opening of the timeframes on the 5th of June, but any assistance will be of value. Thank you in advance. Kindest Regards,
		Decision on PPP Plan received 10/07/2020	Good day Reference is made to the IEA granted by the Department of Mineral Resources and Energy and the appeal Decision from the Department of Environmental Affairs, Forestry and Fisheries. Please see the attached letter for your consideration. Should you have any query, please feel free to contact the undersigned. Regards, Tuwani Monyai Tuwani Monyai Mineral Regulations Tel: 057 391 1386 Email: Tuwani.Monyai@mre.gov.za **RE: INTEGRATED ENVIRONMENTAL AUTHORISATION (IEA) IN TERMS OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 (ACT 107 OF 1998) (NEMA) AS AMENDED, THE NATIONAL EMVIRONMENTAL MANAGEMENT: WASTE ACT, 2008 (ACT 59 OF 2008) AS AMENDED (NEMWA) AND THE ENVIRONMENTAL**	Received, thank you. Kindest Regards,

			IMPACT ASSESMENT REGULATIONS, 2014 (HEREIN REFERRED TO AS THE "EIA REGULATIONS") FOR COAL MINING ACTIVITIES IN RESPECT OF VARIOUS PROPERTIES LISTED ON THE ATTACHED ANNEXURE "A", ALL SITUATED IN THE MAGISTERIAL DISTRICT OF SASOLBURG, FREE STATE REGION. Reference is made to the Integrated Environmental Authorisation (IEA) granted to Ergosat (Pty) Ltd by the Department of Mineral Resources and Energy (DMRE), the appeal lodged by Sasol (the appellant) and the appeal decision from the Department of Environmental Affairs, Forestry and Fisheries dated 1 April 2020. 1. The appeal decision is binding to all the affected parties and therefore, you are kindly advised to comply with the appeal decision as outlined. The appeal decision is attached to this letter for ease of reference. 2. Considering the above, the Department of Mineral Resources and Energy as the competent authority and in compliance with the appeal decision hereby instruct Ergosat (Pty) Ltd to consider item 4.33 to item 4.35 of the appeal. 3. You are therefore afforded an opportunity to conduct an Environmental Impact Assessment process with regard to the presence of the Sasol pipeline within the properties affected by the proposed coal mining operations and submit the Environmental Impact Assessment Report (EIAR) within 106 days of this letter to the DMRE for consideration. **4.** The Environmental Impact Assessment Process must be undertaken an independent Environmental Assessment Practitioner as outlined on regulation 13 of the 2014 EIA Regulations. **5.** The EIAR must be subjected to the public participation process as outline the 2014 EIA Regulations. The timeframes prescribed in the 2014 EIA Regulation in respect of the public participation process to be undertaken must be adhered to.	

			6. You are also informed that the timeframes prescribed in the 2014 EIA Regulation in respect of the decision making will also be adhered to. 7. You should also note that commencement with a listed activity without an environmental authorisation contravenes the provisions of section 24F (1) of National Environmental Management Act, 1998 (Act 107 of 1998), as amended (NEMA) and constitutes an offence in terms of section 49A (1) (a) of NEMA. 8. Further note that in terms of regulation 45 of the EIA Regulations, your failure to submit the documents or meet any timeframes prescribed in terms of the said Regulations will result in your application deemed to have lapsed. Yours faithfully **REGIONAL MANAGER: MINERAL REGULATION**	
DMRE (Free State) New Application form with Updated details regarding the Change of EAP will be submitted	X			
DHSWS	X		Mbedzi Andrew Azwindini (GAU) MbedziA@dws.gov.za DHSWS Official attending to the WUL process will receive a copy of the documents	Comments will be given and addressed here as they are received before final submission.
				Comments will be given and addressed here as they are received before final submission.
Department of Land Affairs	X		Will receive a copy of the documents for comment.	Comments will be given and addressed here as they are received before final submission.
Department of Environmental Affairs	X		Will receive a copy of the documents for comment.	Comments will be given and addressed here as they are received before final submission.
Other competent authorities affected	X		Will receive a copy of the documents for comment.	Comments will be given and addressed here as they are received before final submission.
SASOL Comments included as received	X		Will receive a copy of the documents for comment.	Comments will be given and addressed here as they are received before final submission.
LAND OWNERS AND OCCUPANTS				

Anglo Therman Coal	X		Will receive a copy of the documents for comment.	Comments will be given and addressed here as they are received before final submission.
Traditional leaders	X		Will receive a copy of the documents for comment.	Comments will be given and addressed here as they are received before final submission.
MUNICIPALITY				
Ward councillors: Ward 18: Cllr. Luigi Gaigher (DA): 071 417 6184 Ward 19: Cllr. Khomoliileng Alexis Mare (ANC): 083 240 4156	X		CLLR R Meyer (Ward 18) – 0834535293 – ruandameyer@gmail.com CLLR Khomolileng Alexis Mare (Ward 19) – N/A CLLR L Fisher (Ward 20) – 079 788 8136 lucasfisher2016@gmail.com CLLR Toti Mokoena (Ward 21) – 0797736621 – N/A	Comments will be given and addressed here as they are received before final submission.
Metsimaholo Local Municipality Municipal Manager Mr. Steve Molala Secretary to the MM: Ms. Thakane Nkoli Tel: 016 973 8313 mmsecretary@metsimaholo.gov.za	X		Refer to I&AP lists for contact details.	Comments will be given and addressed here as they are received before final submission.
Fezile Dabi District Municipality	X		Will receive a copy of the documents for comment.	Vusi.sibeko@dcs.gov.za. Comments will be given and addressed here as they are received before final submission.
ADJACENT COMMUNITIES				

9 THE ENVIRONMENTAL ATTRIBUTES ASSOCIATED WITH THE DEVELOPMENT FOOTPRINT ALTERNATIVES

(The environmental attributed described must include socio- economic, social, heritage, cultural, geographical, physical and biological aspects)

No alternatives changes will influence the general baseline environmental conditions experienced. The baseline environment as described below, are the Environmental attributes as associated for the proposed development.

Changes to the plant area such as the finalisation of the Stormwater Management features refined during the WUL, the change of position of Ventilation Shaft 2 and the re-assessment of the Sasol pipelines to ensure safety and to reduce the overall impact expected as a result of the mining activities.

Several additional specialist studies have been conducted as part of the WUL process and the details of these studies have also now been included in this document since it will ensure that the document stays as relevant as possible for approval:

- Wetland Assessment (Appendix 17);
- Geohydrological Assessment Update (Appendix 18);
- Hydropedological Assessment (Appendix 19);
- Biomonitoring Assessment (Appendix 20);
- Final Technical Designs for Stormwater Management Programme (Appendix 24);
- Closure and Rehabilitation Update (Appendix 22).

A separate Risk Assessment based on the SASOL pipelines (Appendix 21) was also conducted based on the Minister's recommendations on the Ergosat project.

10 THE ENVIRONMENTAL ATTRIBUTES ASSOCIATED WITH THE SITES: BASELINE ENVIRONMENT

(Its current geographical, physical, biological, socio- economic and cultural character)

The information in this section is largely sourced from the available specialist studies undertaken, as well as the new information gathered during the WUL process (specialist studies updated and/or done additionally), as well as the other available information for the specific area.

10.1 GEOLOGY

10.2 REGIONAL GEOLOGY

The regional geology consists of various groups within the Karoo Supergroup as well as dolerite intrusions occurring predominantly as sills. The available information indicates that the Karoo Supergroup was formed when sediments filled an intracratonic, foreland basin on Gondwanaland, during the Carboniferous, Permian, Triassic and early Jurassic ages, 300 to 160 million years ago (Truswell, 1970). Since Gondwanaland drifted from polar to tropical latitudes during this period, the sedimentation occurred under different depositional environments (Tankard et al., 1982). The result is that one can clearly distinguish between different groups of sediments, each with its own physical properties, within the Supergroup today (Botha, et. al., 1998).

The most relevant Karoo Supergroup unit to this study area is the Permian aged Ecca Group. In its continued drift northwards, Gondwanaland entered a more temperate region during the Permian Age (286-248 Ma). The Dwyka ice cap thus began to melt, leaving a deep basin in the south and incised glacial valleys in the north.

The melting of the ice slowly began to erode the exposed bedrock formations to form rivers in the glacial valleys. The more temperate climate caused the flood-plains of these rivers to be covered by mats of swamp vegetation—the sources of the coal-seams often found on top of the coarse, fluvial channel sandstones in the Ecca Group (Tankard et al, 1982). Some of these fluvial systems must have been quite extensive, judging from the width of sandstone bodies (500 m to 30 km), associated with the Ecca Group.

These bodies are especially prominent in Mpumalanga, which is situated on the northern part of the basin. This suggests that the largest fluvial systems occurred along the glacial Dwyka valleys on the northern shore-line of the basin. As the waves eroded the cliffs at the contact of the flood-plains and the basin, the larger fluvial systems began to form deltas along the shallow parts of the basin's shore-line, thereby prograding the strand-plain and shore-line. This gave the rivers the opportunity of building their deposits slowly forward and to create so-called prodeltas (Botha, et. al., 1998).

The physics of sedimentary transport requires that coarser particles in the flow settle first, while finer particles are transported deeper into the basin. The coarse fractions of the sediment load were therefore deposited on the banks of the main channels as levees, while the finer grained sediments were carried out further into the delta front. The fine to very fine-grained sediments were deposited on the prodeltas as silt and clay. This explains why the sediments in the Ecca Group tend to coarsen upwards.

An interesting feature of the Ecca period is the deep trough, with an east-west trend, that developed in the southern parts of the basin. The origin of the trough is not known, but it was possibly caused by down-warping or subsidence.

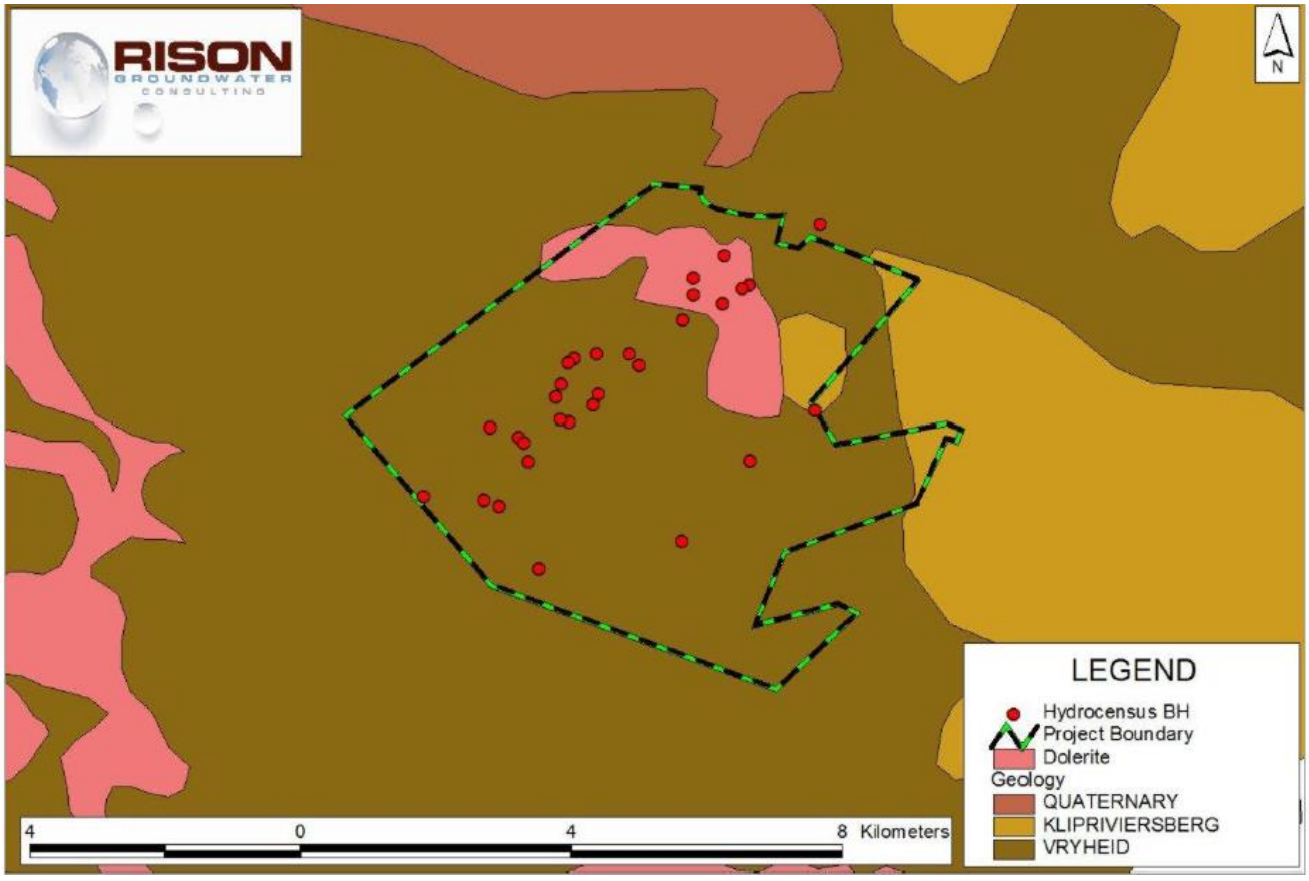


Figure 10-1: Local Geology

The trough, which had a maximum thickness of approximately 2 000 m in the Eastern Cape, was filled with mud and silt that accumulated in the sediment starved basin (Tankard et ah, 1982). The succession in the trough

therefore consists mainly of Ecca shales. Gravity flows, associated with deltas that prograded from the north, south and west near the end of the Ecca period, led to the deposition of turbidite sandstones, in the deeper parts of the basin. These sandstones are usually very dense, and thus unable to transmit large quantities of water. The preceding discussion shows that the Ecca Group was mainly deposited under deep.

10.3 LOCAL GEOLOGY

The LEFA colliery is situated in the Cornelia Basin of the Vereeniging-Sasolburg coal field. The coal field consists of three basins which make up the Vereeniging-Sasolburg coal field: Cornelia, Sigma and Coalbrook basins. The Vereeniging-Sasolburg and South Rand coal fields form part of the same coal province. South Africa's coal deposits form part of the Permian aged Ecca Formation of the Karoo Supergroup which was deposited on the Gondwanaland supercontinent. The Main Karoo basin is underlain by the Kaapvaal Craton in the north and the Namaqua-Natal Metamorphic Belt in the south. The Karoo Supergroup is sub-divided (listed from the base upwards) into the Dwyka Group, Ecca Group, Beaufort Group, Molteno Formation, Elliot Formation, Clarens Formation and the volcanic rocks of the Drakensberg Group. The vast majority of coal beds occur within the Ecca Group, but some coal also occurs in the Beaufort Group and the Molteno Formation (Steyn and Van Der Linde, 1986).

The paleo depositional model for LEFA colliery is envisaged to be representative of fluvio-deltaic complexes prograded in a southerly direction across an epicontinental platform, resulting in the infilling of pre-existing glacial valleys. These glacial valleys controlled the flow of water during deposition as well as the extent and position of the swamps and the resultant coal development. Present-day coal beds are restricted to some of these valleys (Steyn and Van Der Linde, 1986).

Dwyka diamictites overlie Transvaal Sequence dolomites and Ventersdorp lava's and range in thickness from 2 m to 4 m. The diamictite consists of angular to rounded pebbles of dolomite, chert and quartzite in a black to brown argillaceous matrix and is overlain by a mixed sedimentary zone of reworked diamictite and sandstone. In the north of the basin, this mixed sedimentary zone contains a thin coal seam of up to 1.5 m in thickness referred to as the Lower Bottom Seam. Generally, the full coal zone is about 30 m thick and contains three coal units which are referred to as the Bottom, Middle and Top Seams (Steyn and Van der Linde, 1986). The Bottom Seam was deposited directly onto a conglomerate derived from reworked diamictite and averages 4 m in thickness of which 2.5 m is mineable. The Bottom Seam can be correlated with the Number 1 Seam of the Sigma and Coalbrook Basins. The middle unit is separated from the Bottom Seam by a conglomerate and shale unit in which the conglomerate predominates. In the south, thin interlayered coal beds are present in the conglomerate and shale.

The middle unit consists of two coal seams: The Lower Middle and Upper Middle Seams which are separated by a brown shale layer of 0.6 m to 0.9 m in thickness.

The Upper Middle Seam can be correlated with the Number 2B Seam and the Lower Middle Seam with the Number 2A Seam of the Sigma Basin. The Lower Middle Seam is thicker than the Upper Middle Seam and attains its maximum thickness of 7.5 m in the south of the basin. The quality of the Lower Middle Seam is consistent and a mineable thickness of up to 4.5 m has been achieved. A black micaceous shale which grades upwards into a siltstone, separates the top coal unit from the middle unit. The top unit consists of two coal seams referred to as the Top Seam and the Coal Marker Seam (also known as the Number 4 Seam). The Top Seam is equivalent to the Number 3 Seam of the Sigma and Coalbrook basins and reaches a thickness of 10 m with an average mining thickness of 3.2 m.

The parting between the Top Seam and the Coal Marker Seam is predominantly sandstone with a thickness of approximately 0.3 m. The Coal Marker Seam reaches a maximum thickness of 1 m, but is not a mineable as a Coal Resource, due to the very low calorific values ("CVs"). Ergosat's local geology shows the prevalence of coal seams separated intermittently with siliclastic rocks occurring with intercalated shale, mudstones and

siltstones. Siliclastic rocks, are sediments consisting of clastic and silicic components mostly quartz, feldspars and heavy minerals. Most commonly they occur as quartz-sandstone, sandstone consisting of more than 95% quartz grains and below 5% matrix. The seams present at Ergosat includes the Bottom seam unit (Seam 1A, B), the Middle seam unit (Seam 2A, B, the Top seam unit (Seam 3A, B) and the coal seam marker Seam 4 as depicted in the stratigraphic column.

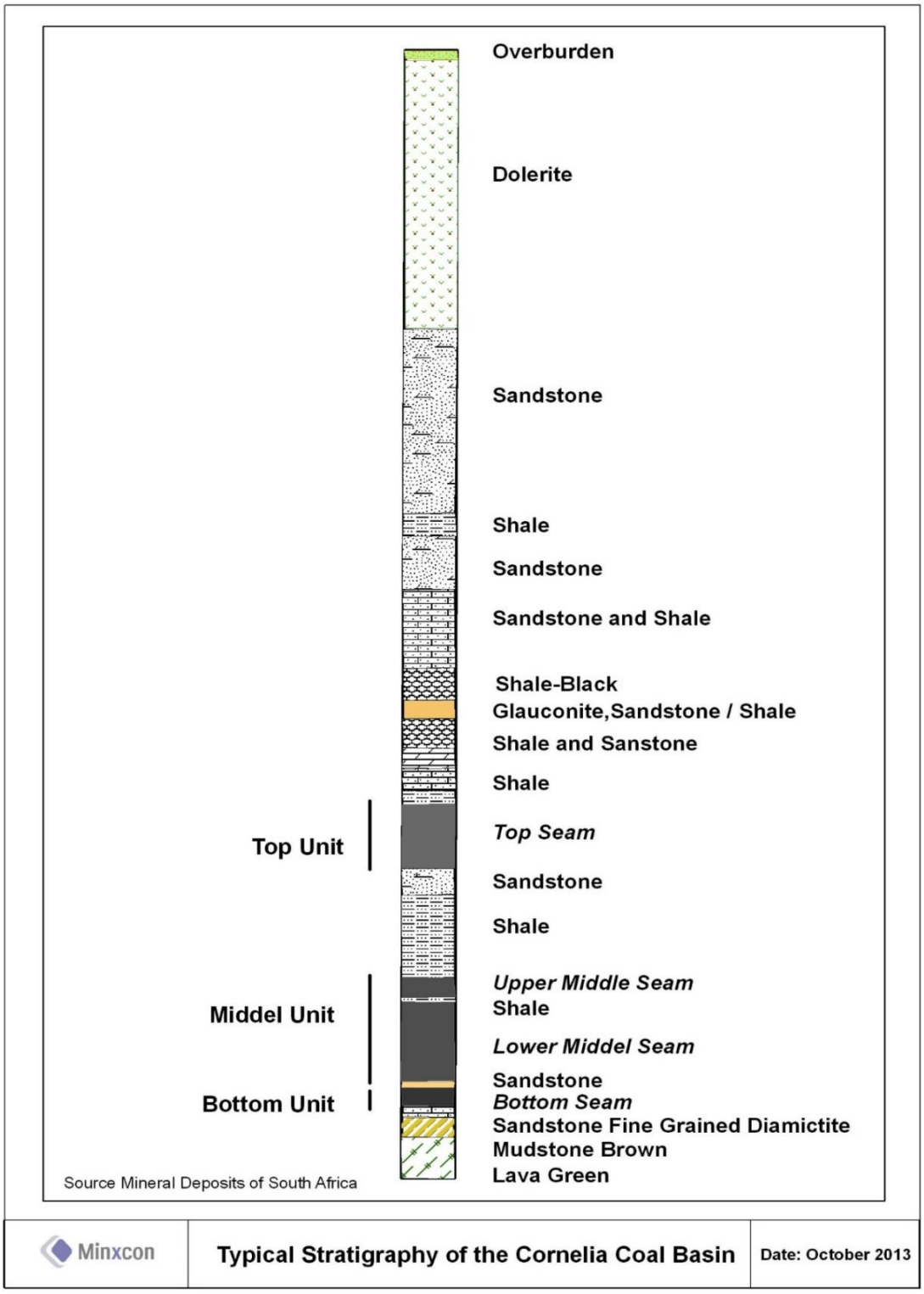


Figure 10-2: Stratigraphy of the Cornelia Coal Basin

10.4 CLIMATE

Based on an evaluation of the meteorological data simulations run from the global NEMS weather model at ~30km resolution from 1985 to current of Sasolburg, 15km to the west. The following deductions can be made as illustrated in Figure 10-3; In the summer months maximum temperatures are expected to be 30°C or higher during the day, dropping to 15°C at night and 9°C minimum on cold nights.

During winter months the maximum day time temperature are in the 18°C to 22°C range while winter night time temperatures are expected to be in the 2°C to 6°C range with cold night dropping down to -4°C. Predominantly the site falls in a summer rain fall area with very little precipitation expected in the winter and 75mm to over 100mm total per month in the summer months.

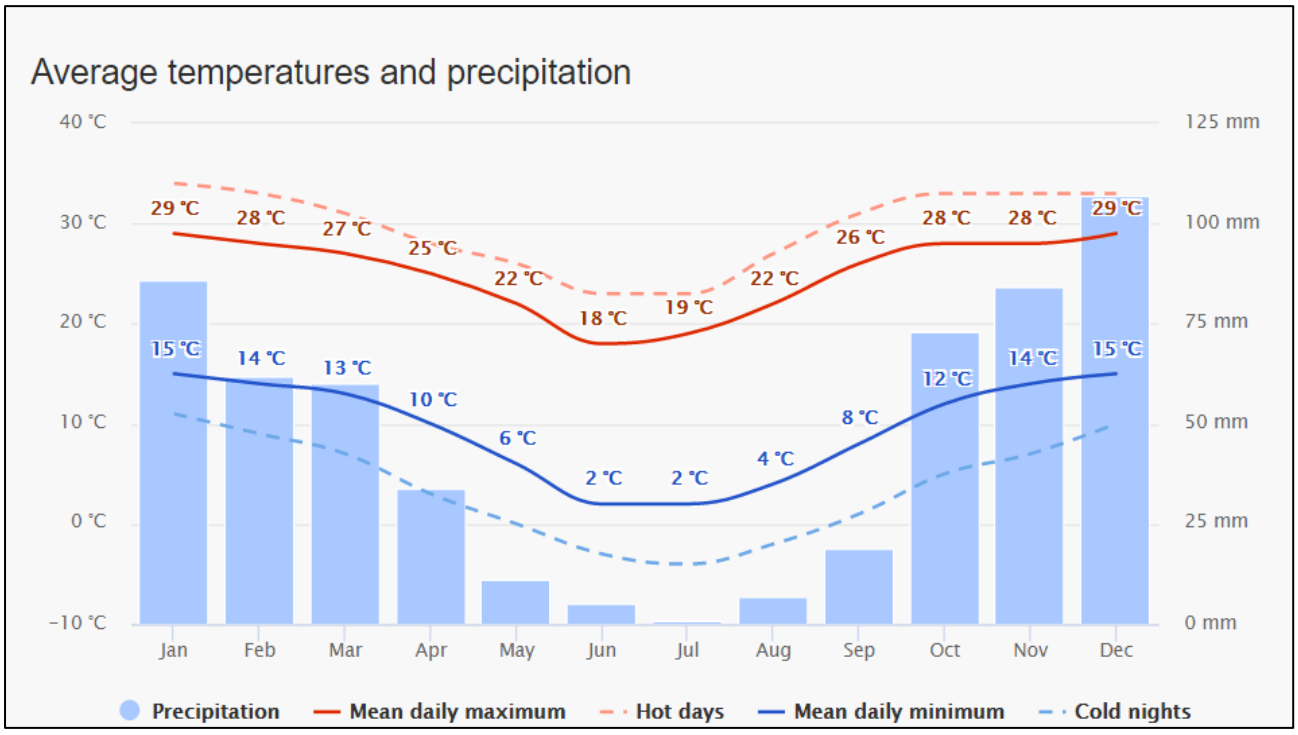


Figure 10-3: Temperature and precipitation simulation results from the NEMS model

The site is located at an altitude ranging from 1,430 m to 1,500 m above mean sea level (“mamsl”) and gently descends to the Vaal River at 1,423 mamsl on the north-eastern boundary. Thick soil covers the landscape which is mostly under cultivation. Crops raised in the area include maize and sorghum.

Based on an evaluation of the meteorological data simulations run from a global NEMS weather model at ~30km resolution from 1985 to current of Sasolburg, 15km to the west. The following deductions regarding the prevailing wind direction and wind frequency can be assessed. Looking at the figure below, the predominant wind direction occurs mainly from the north 1250 hours per year with secondary winds from the west-north-west through east-north-east.

At the site, calm conditions prevail over the area with wind speeds of 12km/h or less. 12-19km/h winds occur less frequently with higher wind speeds of 28km/h occurring very infrequent. The max wind speed of 38km/h only occurs during August to October and very seldom (Figure 10-3).

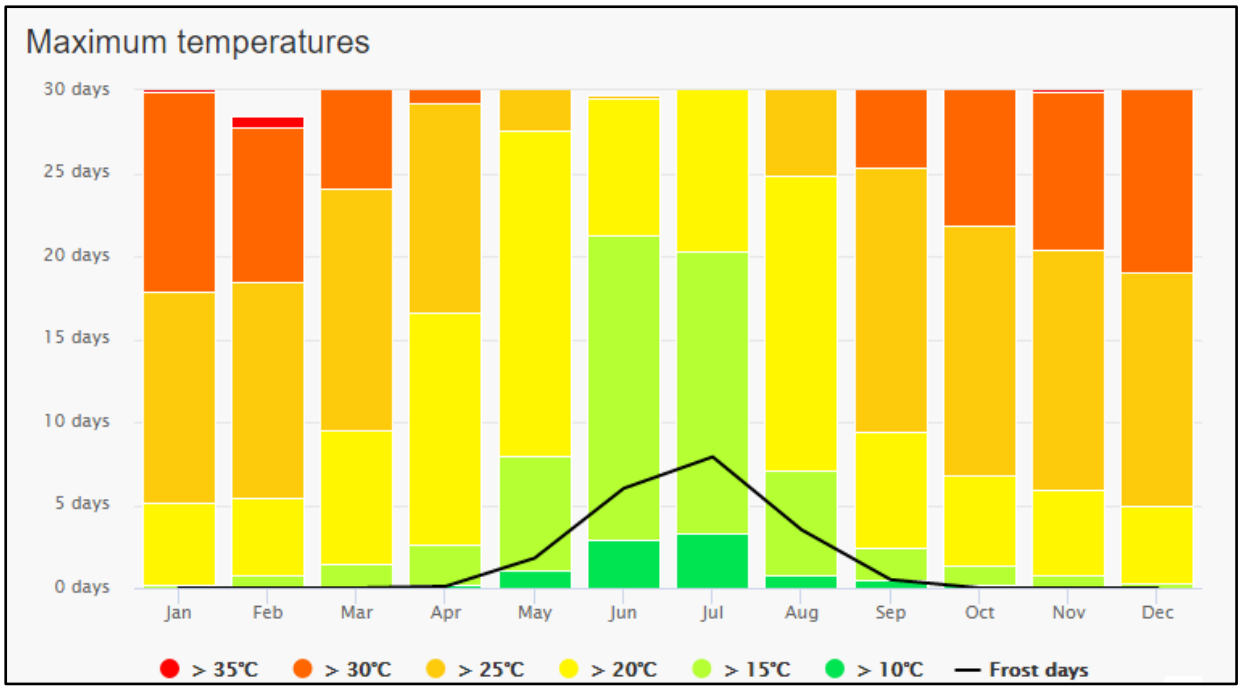


Figure 10-4: Maximum temperatures as simulated from the NEMS 30km model for the Sasolburg

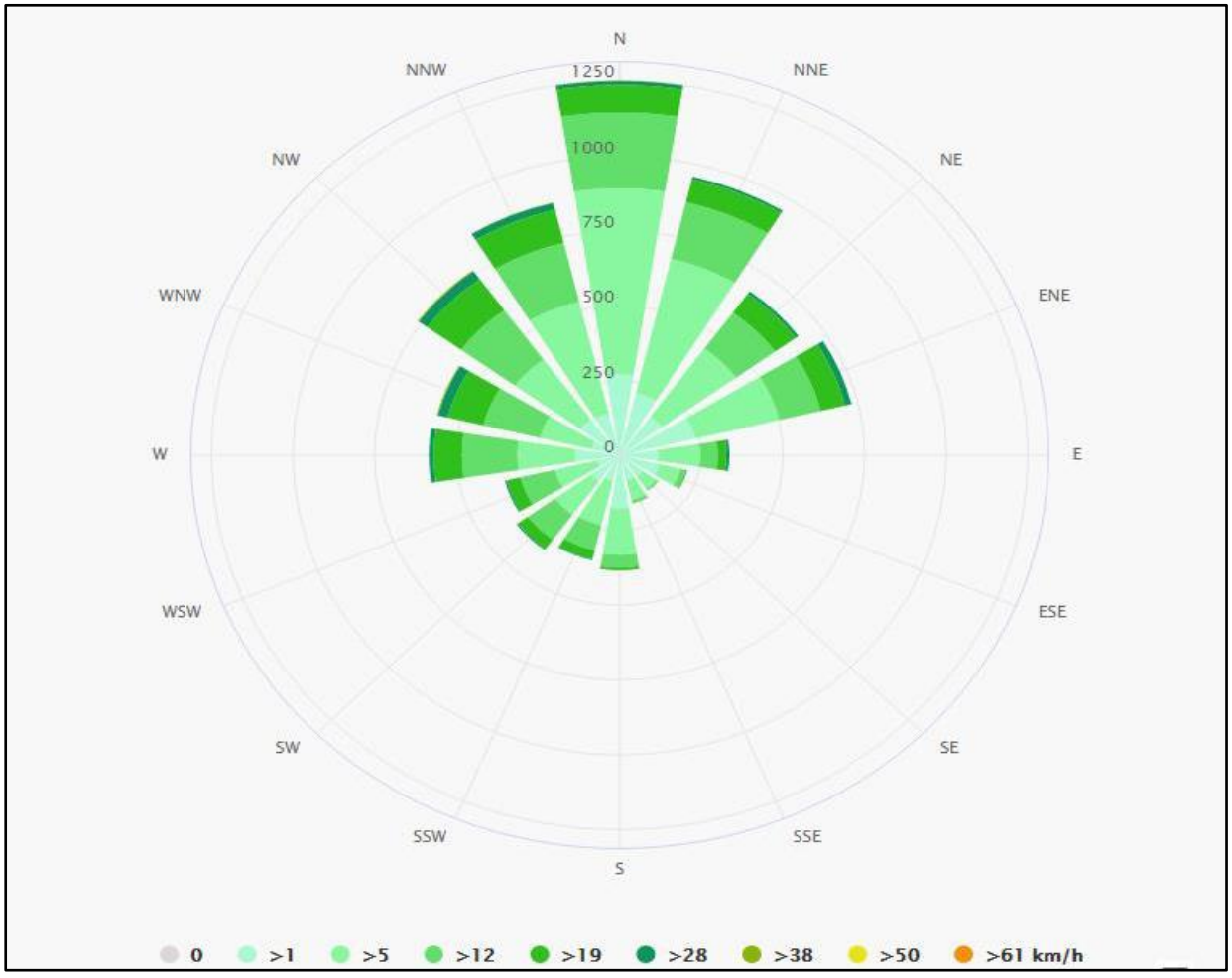


Figure 10-5: NEMS 30km simulation model wind rose for the Sasolburg area

10.5 TOPOGRAPHY

The proposed mining site is situated in a fairly flat area as illustrated in Figure 10-6 . The site is located at an altitude ranging from 1,430 m to 1,500 m above mean sea level ("mamsl") and gently descends to the Vaal River at 1,423 mamsl on the north-eastern boundary. Thick soil covers the landscape which is mostly under cultivation. Crops raised in the area include maize and sorghum.

Figure 10-6: 3D map showing the terrain exaggerated 7x normal heights

10.6 SOILS

Thick soil covers the landscape which is mostly under cultivation. Crops raised in the area include maize and sorghum.

10.6.1 Dominant soil types

Soil types within the proposed infrastructure footprint were mapped based on soil information gathered by means of auger observations at a grid density of 150 x 150 meter. A total of 32 auger observations were made at pre-determined grid points in order to locate and accurately map soil boundaries.

A total of 4 homogeneous soil units, based on dominant soil form, effective soil depth, internal drainage, terrain unit and slope percentage were identified during field observations and were symbolised as Av1, Av2, Lo1 and Lo2. The homogeneous units are referred to as soil types and are shown in Figure 10-7, which contains an abbreviate soil legend. A comprehensive soil legend is provided, which described the soils in terms of the following aspects.

- Dominant soil forms and families and subdominant soil forms;
- The estimated clay content of the A and B or E or G-horizons;
- A broad description of the dominant soil form and terrain in terms of the effective soil depth, internal drainage, soil colour, soil texture class, terrain unit and average slope percentage range;
- A description of the soil horizon sequences;
- The derived erodibility class and dry land crop production potential;

- The land capability and wetland zone classification; and
- The area and percentage comprised by each soil type.

For the infrastructure area where most of the soil disturbances will take place, the following can be noted as indicated in Figure 10-7:

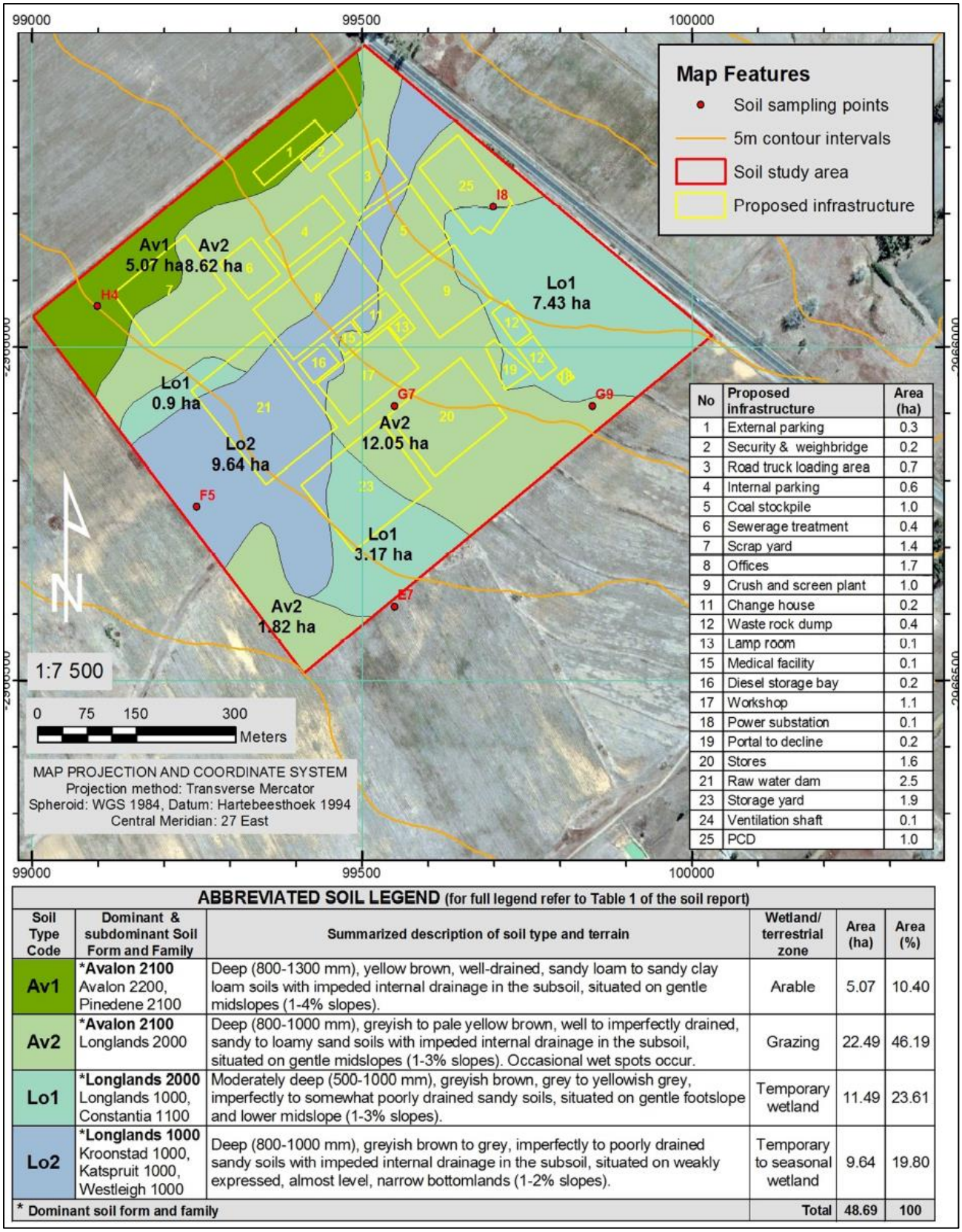
Soil type **Av1**, dominated by the Avalon soil form, covers 5.07 ha and consists of deep (800-1300 mm), yellow brown, well-drained, sandy loam to sandy clay loam soils with impeded internal drainage in the subsoil and is situated on gentle midslopes (1-4% slopes). The land capability was classified as arable land and the dry land crop production potential as moderate to high.

Soil type **Av2**, dominated by the Avalon soil form, covers 22.49 ha and consists of deep (800-1000 mm), greyish to pale yellow brown, well to imperfectly drained, sandy to loamy sand soils with impeded internal drainage in the subsoil and is situated on gentle midslopes (1-3% slopes). The land capability was classified as grazing potential and the dry land crop production potential as moderate to low. Soil type Av2 differs from soil type Av1 in terms of texture, which is much sandier and also more leached which causes pale or more greyish colours. Occasional small wet or saturated patches occur in soil type Av2.

Soil type **Lo1**, dominated by the Longlands 2000 soil form, covers 11.49 ha and consists of moderately deep (500-1000 mm), greyish brown and grey to yellowish grey, imperfectly to somewhat poorly drained sandy soils and is situated on gentle footslopes and lower midslopes (1-3% slopes). The land capability was classified as temporary wetland and the dry land crop production potential as low.

Soil type **Lo2**, dominated by the Longlands soil form, covers 9.64 ha and consists of deep (800-1000 mm), greyish brown to grey, imperfectly to poorly drained sandy soils with impeded internal drainage in the subsoil and is situated on weakly expressed, almost level, narrow bottomlands (0.5-2% slopes). The land capability was classified as temporary to seasonal wetland and the dry land crop production potential as very low.

Soil type **Lo1** differs from soil type **Lo2** in terms of the degree of wetness.



No	Proposed infrastructure	Area (ha)
1	External parking	0.3
2	Security & weighbridge	0.2
3	Road truck loading area	0.7
4	Internal parking	0.6
5	Coal stockpile	1.0
6	Sewerage treatment	0.4
7	Scrap yard	1.4
8	Offices	1.7
9	Crush and screen plant	1.0
11	Change house	0.2
12	Waste rock dump	0.4
13	Lamp room	0.1
15	Medical facility	0.1
16	Diesel storage bay	0.2
17	Workshop	1.1
18	Power substation	0.1
19	Portal to decline	0.2
20	Stores	1.6
21	Raw water dam	2.5
23	Storage yard	1.9
24	Ventilation shaft	0.1
25	PCD	1.0

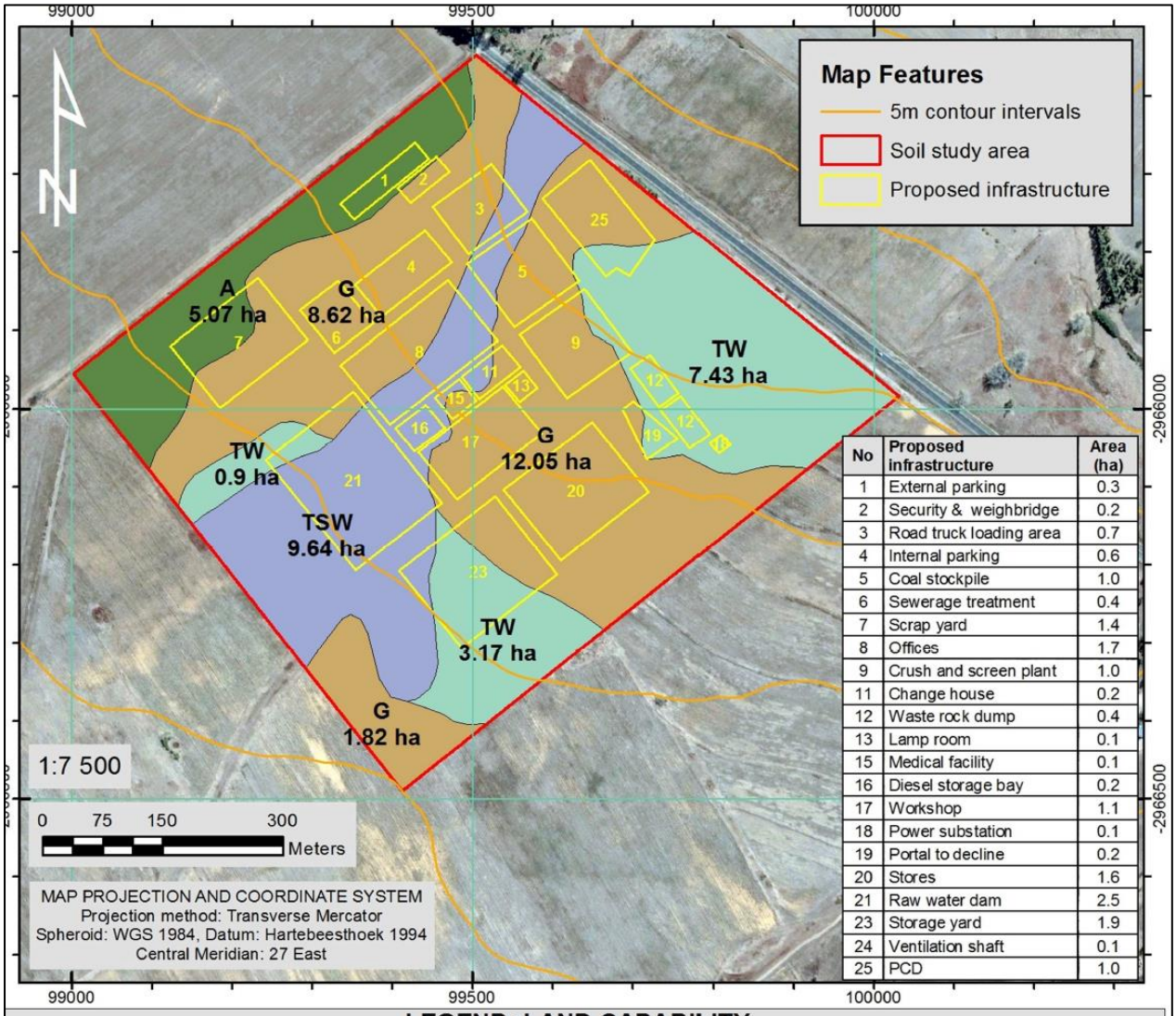
ABBREVIATED SOIL LEGEND (for full legend refer to Table 1 of the soil report)

Soil Type Code	Dominant & subdominant Soil Form and Family	Summarized description of soil type and terrain	Wetland/ terrestrial zone	Area (ha)	Area (%)
Av1	***Avalon 2100** Avalon 2200, Pinedene 2100	Deep (800-1300 mm), yellow brown, well-drained, sandy loam to sandy clay loam soils with impeded internal drainage in the subsoil, situated on gentle midslopes (1-4% slopes).	Arable	5.07	10.40
Av2	***Avalon 2100** Longlands 2000	Deep (800-1000 mm), greyish to pale yellow brown, well to imperfectly drained, sandy to loamy sand soils with impeded internal drainage in the subsoil, situated on gentle midslopes (1-3% slopes). Occasional wet spots occur.	Grazing	22.49	46.19
Lo1	***Longlands 2000** Longlands 1000, Constantia 1100	Moderately deep (500-1000 mm), greyish brown, grey to yellowish grey, imperfectly to somewhat poorly drained sandy soils, situated on gentle footslope and lower midslope (1-3% slopes).	Temporary wetland	11.49	23.61
Lo2	***Longlands 1000** Kroonstad 1000, Katspruit 1000, Westleigh 1000	Deep (800-1000 mm), greyish brown to grey, imperfectly to poorly drained sandy soils with impeded internal drainage in the subsoil, situated on weakly expressed, almost level, narrow bottomlands (1-2% slopes).	Temporary to seasonal wetland	9.64	19.80
* Dominant soil form and family			Total	48.69	100

Figure 10-7: Soil map for the proposed infrastructure area

10.7 PRE-MINING LAND CAPABILITY

The land capability of the proposed infrastructure footprint is presented in Figure 10-8 which shows the soil types grouped into each land capability class, a broad description of the soil group, the number of units per land capability class, and the area and percentage comprised by each land capability class.



No	Proposed infrastructure	Area (ha)
1	External parking	0.3
2	Security & weighbridge	0.2
3	Road truck loading area	0.7
4	Internal parking	0.6
5	Coal stockpile	1.0
6	Sewerage treatment	0.4
7	Scrap yard	1.4
8	Offices	1.7
9	Crush and screen plant	1.0
11	Change house	0.2
12	Waste rock dump	0.4
13	Lamp room	0.1
15	Medical facility	0.1
16	Diesel storage bay	0.2
17	Workshop	1.1
18	Power substation	0.1
19	Portal to decline	0.2
20	Stores	1.6
21	Raw water dam	2.5
23	Storage yard	1.9
24	Ventilation shaft	0.1
25	PCD	1.0

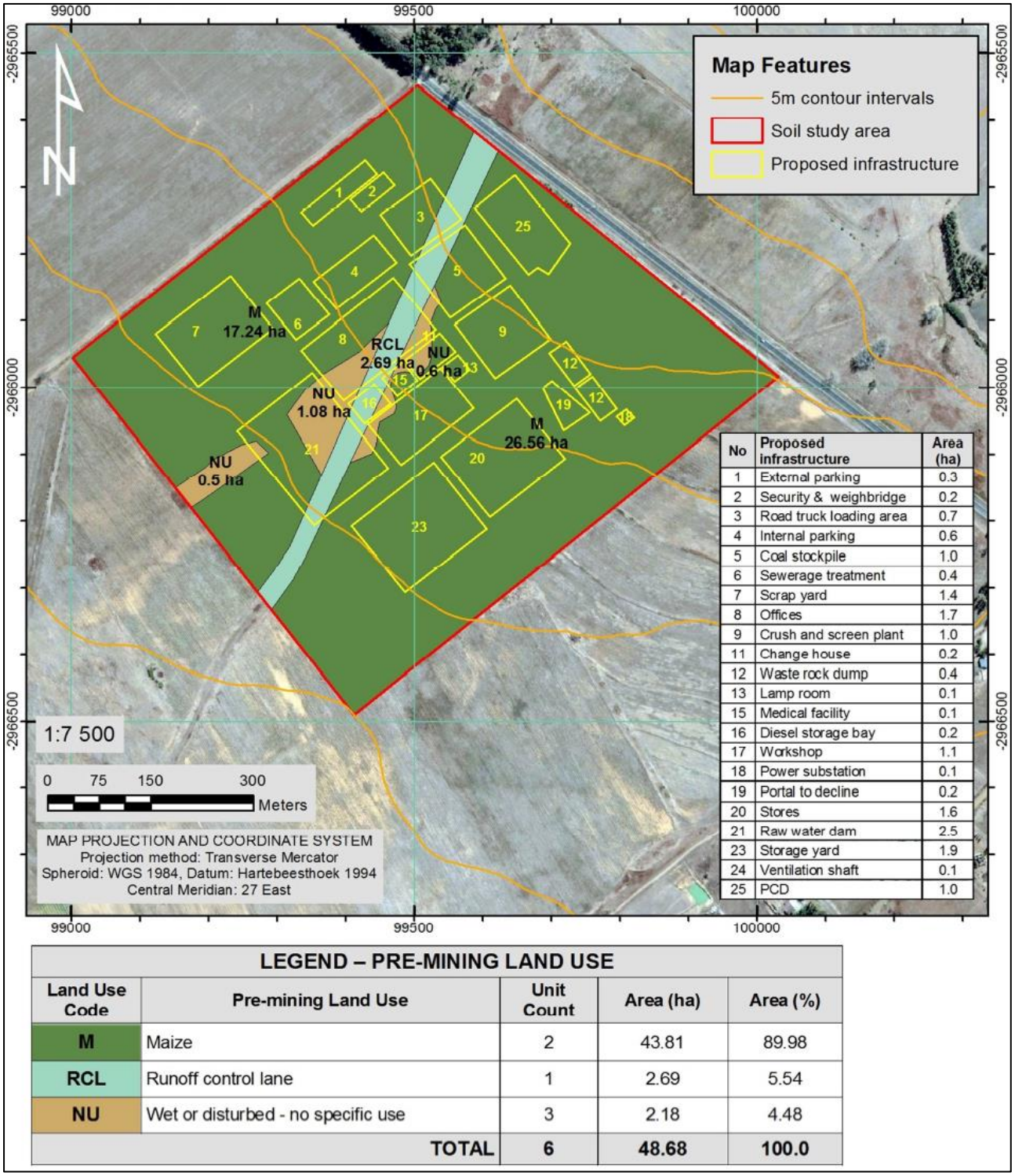
LEGEND: LAND CAPABILITY

Land Capability Code	Land Capability Class	*Soil Types	Broad Soil Description	Unit Count	Area (ha)	Area (%)
A	Arable	Av1	Deep (800-1300 mm), yellow brown, well-drained, sandy loam to sandy clay loam soils with impeded internal drainage in the subsoil, situated on gentle midslopes (1-4% slopes).	1	5.07	10.40
G	Grazing	Av2	Deep (800-1000 mm), greyish to pale yellow brown, well to imperfectly drained, sandy to loamy sand soils with impeded internal drainage in the subsoil, situated on gentle midslopes (1-3% slopes). Occasional wet spots occur.	3	22.49	46.19
TW	Temporary wetland	Lo1	Moderately deep (500-1000 mm), greyish brown, grey to yellowish grey, imperfectly to somewhat poorly drained sandy soils, situated on gentle footslope and lower midslope (1-3% slopes).	3	11.49	23.61
TSW	Temporary to seasonal wetland	Lo2	Deep (800-1000 mm), greyish brown to grey, imperfectly to poorly drained sandy soils with impeded internal drainage in the subsoil, situated on weakly expressed, almost level, narrow bottomlands (1-2% slopes).	1	9.64	19.80
WDN	Wilderness	-	-	0	0	0
See soil map, Figure 3			**Total**	**8**	**48.69**	**100**

Figure 10-8: Soil map for the proposed infrastructure area

10.8 LAND USE

The localities and extents of pre-mining land uses for the proposed infrastructure area are shown in Figure 10-9.



No	Proposed infrastructure	Area (ha)
1	External parking	0.3
2	Security & weighbridge	0.2
3	Road truck loading area	0.7
4	Internal parking	0.6
5	Coal stockpile	1.0
6	Sewerage treatment	0.4
7	Scrap yard	1.4
8	Offices	1.7
9	Crush and screen plant	1.0
11	Change house	0.2
12	Waste rock dump	0.4
13	Lamp room	0.1
15	Medical facility	0.1
16	Diesel storage bay	0.2
17	Workshop	1.1
18	Power substation	0.1
19	Portal to decline	0.2
20	Stores	1.6
21	Raw water dam	2.5
23	Storage yard	1.9
24	Ventilation shaft	0.1
25	PCD	1.0

LEGEND – PRE-MINING LAND USE

Land Use Code	Pre-mining Land Use	Unit Count	Area (ha)	Area (%)
M	Maize	2	43.81	89.98
RCL	Runoff control lane	1	2.69	5.54
NU	Wet or disturbed - no specific use	3	2.18	4.48
	TOTAL	**6**	**48.68**	**100.0**

Figure 10-9: Pre-Mining land use map for the proposed infrastructure area

Please note that the layout of the stormwater management features have been finalized and slightly different as shown in the image. However, Maize is still the dominate land use in the plant area.

10.9 VEGETATION

A vegetation assessment was conducted by EnviFlora (EnviFlora, 2017) and available in Appendix 8.

The natural vegetation in the area has been replaced with cultivated crops. Remaining grassland areas have been overgrazed, so grass cover is thin.

Trees and shrubs occur only along drainage lines and along rocky outcrops. *Acacia karoo*, *Diospyros lycioides* and *Searsia pyroides* are the dominant indigenous shrubs found in low-lying areas along drainage lines and seasonal streams. Due to the intensive cultivation of the land, there are very few areas of natural grassland remaining.

For this purpose, information from Mucina and Rutherford (2006) were used the study area mainly falls in the Andesite Mountain Bushveld (SVcb 11) and a small part in the Central Free State Grassland (Gh 6). The Andesite Mountain Bushveld is mainly found in the North-West, Mpumalanga, Free State and Gauteng Provinces. Several separate occurrences of which the main are: the Bronberg Ridge in eastern Pretoria extending to Welbekend; from Hartebeesthoek in the west along the valley between the two parallel ranges of hills to Atteridgeville; hills in southern Johannesburg; several hills encompassing Nigel, Willemsdal, Coalbrook and Suikerbosrand (in part); and the outer ring of ridges of the Vredefort Dome and some hills to the northwest around Potchefstroom.

The smaller section of Central Free State Grassland occurs mainly in the Free State Province and marginally into the Gauteng Province. The landscape of the area consists of dense, medium-tall thorny bushveld with a well-developed grass layer on hill slopes and some valleys with undulating landscape. The grassland type section consists of undulating plains supporting short grassland, in natural condition dominated by *Themeda triandra* while *Eragrostis curvula* and *E. chloromelas* become dominant in degraded habitats. Dwarf karoo bushes establish in severely degraded clayey bottomlands. Overgrazed and trampled low-lying areas with heavy clayey soils are prone to *Acacia karroo* encroachment. Tree cover elsewhere is variable. Tree and shrub layers are often continuous. Herbaceous layer is dominated by grasses. (Mucina and Rutherford, 2006).

This dominant vegetation type according to Mucina and Rutherford (2006) is classified as Least Threatened and only 7% is statutorily conserved. This is in the Suikerbosrand Nature Reserve and Magaliesberg Nature Area. An additional 1-2% is conserved in other reserves, mainly in the Hartbeesthoek Radio Astronomy Observatory. Some 15% is already transformed, which is mainly cultivated and some urban and built-up areas. Some of this vegetation type fringes on major urban areas. Erosion in this vegetation type is generally very low.

The area to be used for the above ground infrastructure is entirely covered by maize fields. Most of the study area consists of disturbed/transformed vegetation as a result of existing structures/developments, agricultural practices and associated infrastructure. Small patches of the study site do consist of recovered natural vegetation. A small section in the south of the study area does consist of a wetland with surrounding grassland. The area along the Vaal River is taken up by businesses, residential development, farming, recreational facilities and tourist attractions. The primary land use on the site in the past was agricultural (Figure 10-9).

10.9.1 Transformed area

For the analysis of the study area, satellite imagery was used to identify areas clearly visibly transformed. Transformed areas for this study site comprises of areas no longer representing natural species and includes gardens, cultivated lands due to farming, existing infrastructure, residential areas, alien and invasive species, businesses, recreational facilities and tourist attractions. Figure 10-10 below illustrates the transformed areas as seen from Google earth, as well as areas identified as transformed form the site visit.

Figure 10-10: Ergosat land use examples

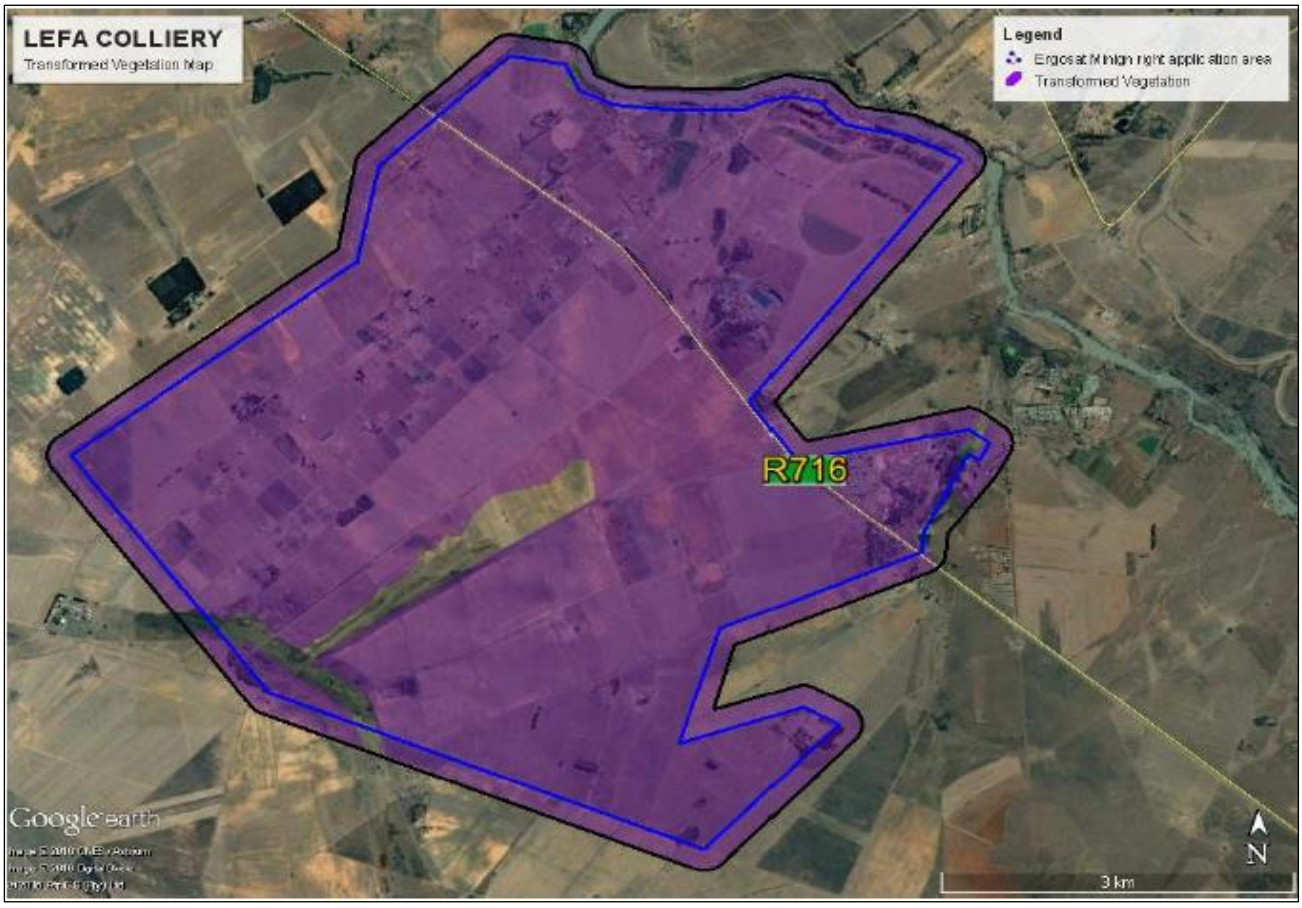


Figure 10-11: Transformed areas in purple

10.9.2 Indigenous and natural vegetation of the study site

Indigenous vegetation associated with wetland areas were encountered on the proposed undermine section of the study area. In some cases, on the study site, areas have been identified that is transformed from the original vegetation type but because of regrowth and other aspects such as the presence of water, these areas show signs of indigenous vegetation. These areas were identified to the north close to the river, and just north of the wetland area where a stream has historically been ploughed and used for agriculture. The sensitivity map was drawn up for the site to determine areas of more sensitivity (Figure 10-12).

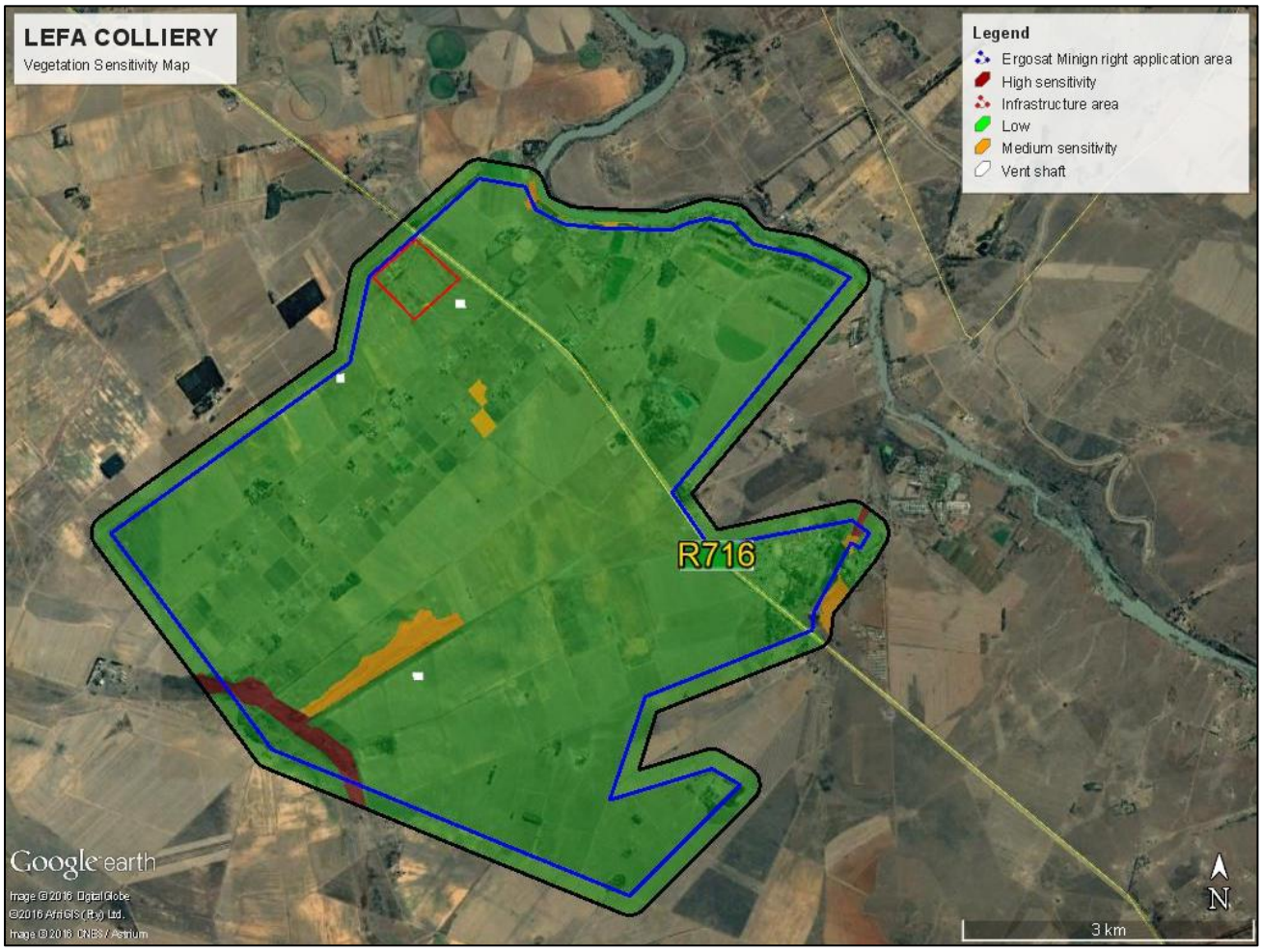


Figure 10-12: Sensitivity map for vegetation

Information obtained from POSA V3 and the new POSA from SANBI indicated that at least 9 orange and red data species have been recorded within the quarter degree cell of the site. For the site visits conducted, no red data species were encountered on the study route and servitude. A **HIGH** sensitivity was awarded for the wetland area, medium for the river and recovered areas and low for the rest of the site. A total of 18 plants were identified on and around the site that is listed in the Alien and Invasive Species. These plants need to be controlled in accordance with an Alien Invasive Plant management plan.

If the study area is taken into consideration, transformation of vegetation within the infrastructure area will not have any effect on the status quo of vegetation associated with the current vegetation unit. Areas to be undermined will not need clearance of vegetation activities.

10.10 FAUNA AND AVI-FAUNA

10.10.1 Fauna

A Faunal assessment was conducted by EnviFlora (EnviFlora, 2017) and available in Appendix 10.

All faunal species will be recorded during the subject property assessment with the use of visual identification, spoor, call and dung and positively identified. It is important to note that due to the nature and habits of fauna it is unlikely that all species will have been recorded during the site assessment. In addition, the levels of anthropogenic activity in the study area and surrounding area may determine whether species will be observed.

The sensitivity assessment determines the status ecological quality of the study area. Areas consisting of natural vegetation of conservation concern, high species diversity, habitat complexity, red list organisms and/or systems vital to sustaining ecological function are considered sensitive. In contrast, areas that are transformed and have little importance for ecological functioning are considered to be of low sensitivity. Fauna sensitivity therefore is closely related to flora sensitivity. Sensitive areas are concentrated within areas containing rivers and wetlands.

The sensitivity map for Fauna is presented in Figure 10-13.

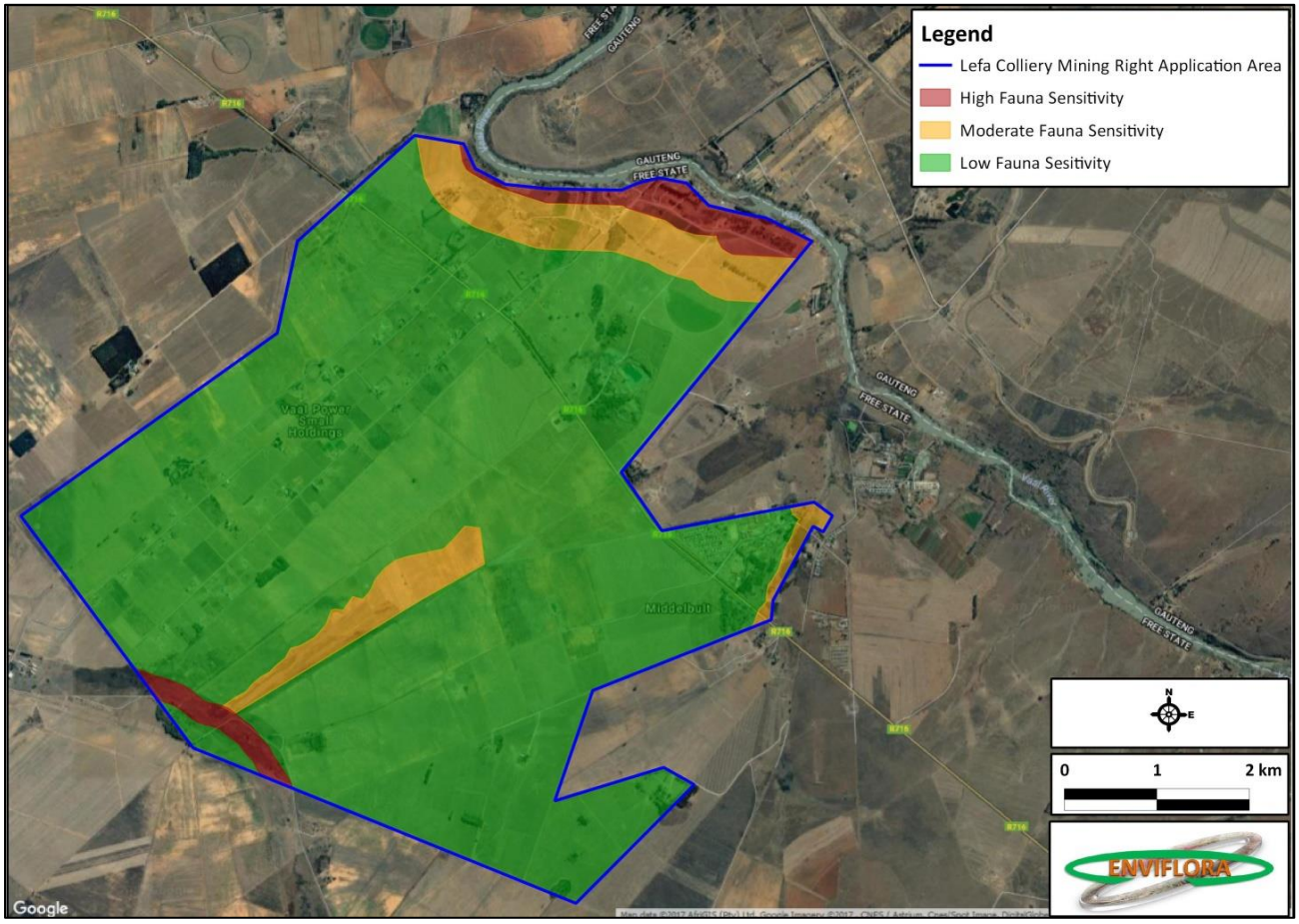


Figure 10-13: Sensitivity map for Fauna

10.10.2 AviFauna

An avifaunal assessment was conducted by EnviFlora (EnviFlora Avifaunal, 2017) and available in Appendix 9.

After the site survey was completed, it was possible to determine which areas in the study site could be classified

as avian sensitive zones. The categorizing of the area into low, moderate and highly sensitive avian habitats is based factors such as the degree of disturbance to the natural habitat, the species richness and the importance (status) of certain bird species that frequent certain areas of the site.

The study area was thus divided into avian sensitive areas (Figure 10-14) as a means of discouraging development in certain areas should this take place.

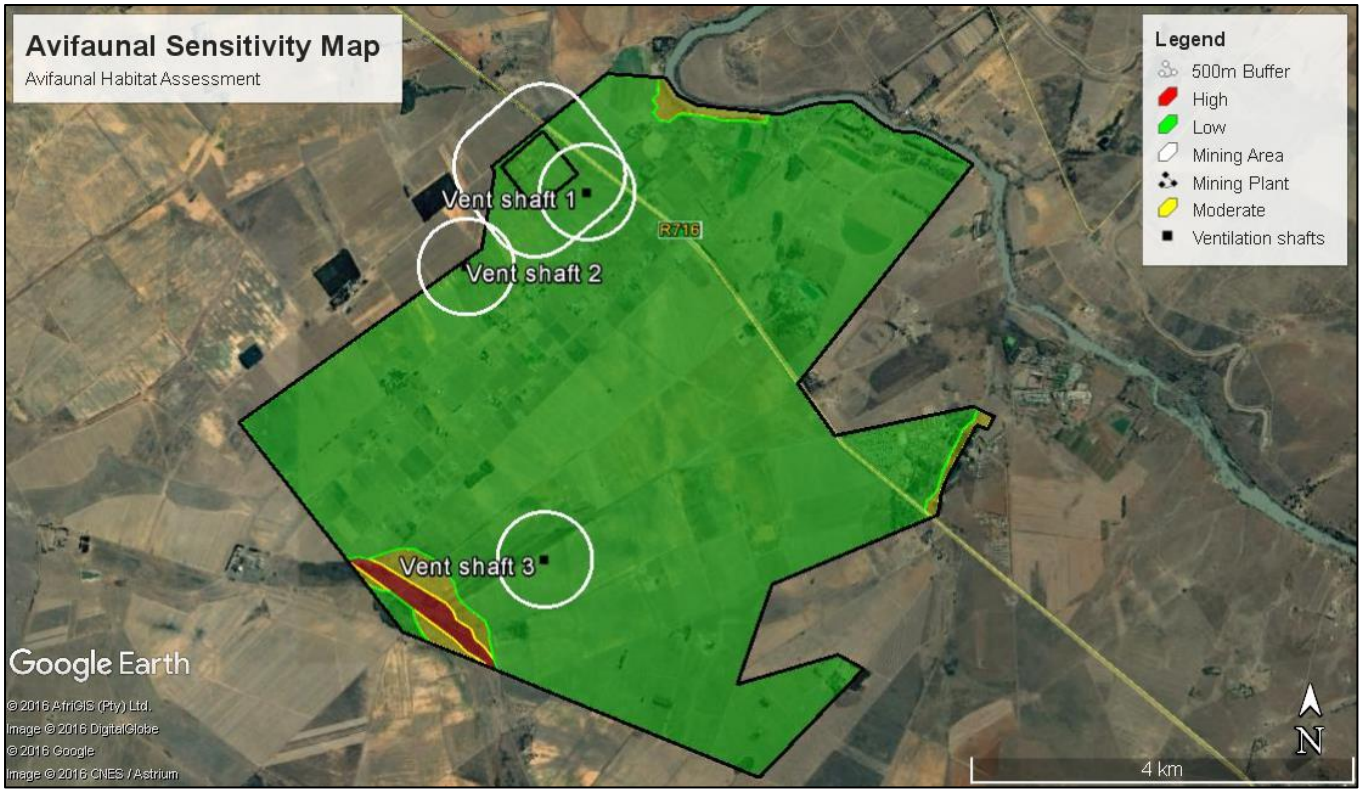


Figure 10-14: Sensitivity map for Avi-Fauna

The habitats on site, where the plant and ventilation shafts occur, does favour three Red Data species in areas surrounding the proposed mining plant and ventilation shaft sites. Avifaunal species observed on, or those that are likely to occur within the study area are the more common species associated with broader grassland habitats and those species that are able to adapt to areas transformed by man.

The habitat on the study site does favour some Red Data avifaunal species (identified), although the mining is done underground and the mining plant with other infrastructure will be situated on transformed land, currently used for agricultural purposes. The disturbed/transformed habitats may in turn suite a variety of typical grassland and bushveld bird species.

Most of the section of the Vaal River in the study area is transformed. Development will result in very little habitat loss for many of these representative species but it is expected that the habitat-specific species will move out of the area into more suitable areas further afield to the site, while the commoner species will remain despite the developments, provided enough natural vegetation remains.

10.11 SURFACE WATER

10.11.1 Water Management Area

The Lefa Colliery falls within the C22F and C22G Quaternary Catchments within the Upper Vaal Water

Management Area (WMA8). The Upper Vaal WMA is a pivotal WMA in the country lying within the eastern interior of South Africa.

The Vaal WMA includes the Upper, Middle and Lower Vaal catchment areas. The water resources of the Vaal River System are an important asset to the country and its people, supporting major Economic activities and a population of about 12 million people. The Vaal River System catchment area stretches from Ermelo in the northeast to Vryburg in the northwest to Douglas in the southwest to Harrismith in the east. The Vaal River is the major water resource within the system with a number of significant tributaries along its length. Rising at Sterkfontein Beacon near Breyten, in Mpumalanga province, the Vaal River flows 1 415 km southwest to its confluence with the Orange River near Douglas.

The Vaal River is probably the most developed and regulated river in Southern Africa – it has some 90 major man-made impoundments situated on the main stem and its tributaries. The Vaal River System has extensive water resource infrastructure and is linked by substantial transfer systems to other water resource systems (Thukela, Usutu, Lesotho). There are also significant transfers out of the Upper Vaal catchment through the distribution system of Rand Water to the Crocodile West and Marico catchments. System supply reaches most of Gauteng, Eskom's power stations and Sasol's plants on the eastern Highveld, the North West and Free State Goldfields, the North West platinum and chrome mines, iron and manganese mines in the Northern Cape, Kimberley, several small towns along the main course of the river, as well as several large irrigation schemes. The water resources within the catchment are largely developed.

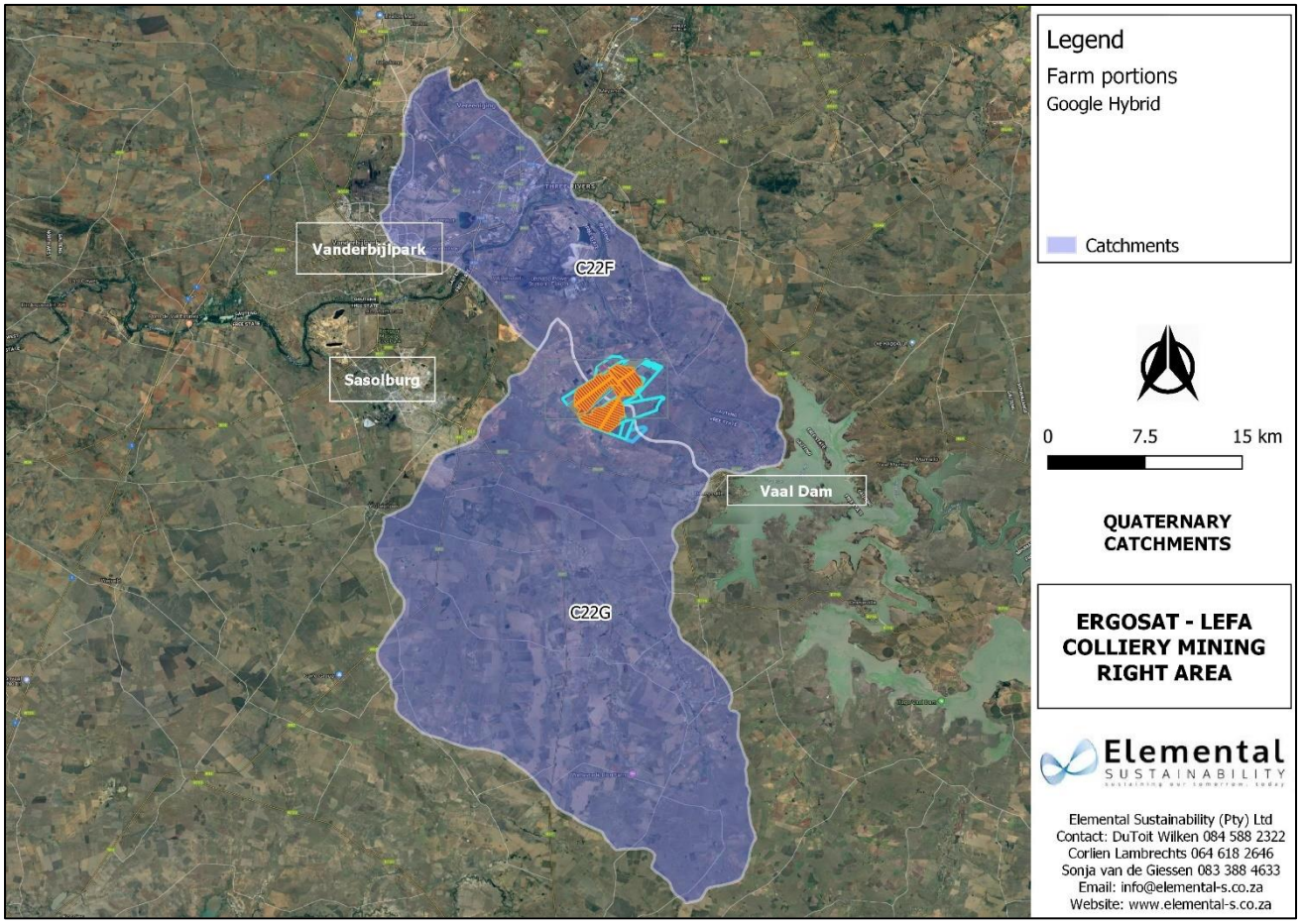


Figure 10-15: Catchments

10.11.2 Hydrology of Project Area

The overall drainage is from the study area to the north-east to the Vaal River on the east and to the west to the Taaibosspruit. The surface water naturally occurring in the WMA has been well developed through the construction of several large dams, and only limited potential for further development remains. The main storage dams are:

- Vaal Dam;
- Grootdraai Dam on the Vaal River upstream of Vaal Dam;
- Sterkfontein and Fika Patso Dams in the Wilge River catchment and Saulspoort on the Liebenbergvlei River, in the Wilge sub-area. Sterkfontein Dam is one of the largest dams in the country and serves as a holding dam for water transferred from the Thukela water management area to the Vaal River System; and
- The Vaal Barrage, as well as Klerkskraal, Boskop and Klipdrif Dams are located in the sub-area downstream of Vaal Dam.

10.11.3 Surface Water Quality

Menco undertook biomonitoring (M2 Environmental Connections cc, 2017) for the proposed Lefa Colliery at four different sites. A copy of the report is available in Appendix 20.

The results of the chemical analysis of the surface water of the four monitoring sites are indicated in Table 10-1. The water quality data indicates that the overall condition of the water is in an acceptable condition to aquatic life.

Table 10-1: Surface Water Quality (Taaibosspruit and Vaal River – Menco 2017)

Analyses in mg/ℓ	**Sample Identification: Ergosat Monitoring**			
	Vaal D/S	**Vaal U/S**	**Taai U/S**	**Taai D/S**
Sample Number	27735	27736	27737	27738
pH – Value at 25°C *	7.8	7.7	7.5	7.3
Electrical Conductivity in mS/m at 25°C	14.1	14.1	13.0	12.8
Total Dissolved Solids at 180°C *	99	94	91	89
Suspended Solids at 105°C *	38	35	52	55
Chloride as Cl	6	6	8	8
Sulphate as SO_4	12	12	11	10
Fluoride as F	0.2	0.2	0.3	0.3
Nitrate as N	0.5	0.4	<0.1	<0.1
Ortho Phosphate as P	0.1	<0.1	<0.1	<0.1
Chemical Oxygen Demand as O_2 (Total)	24	36	56	64
Chemical Oxygen Demand as O_2	16	16	32	36
Dissolved Oxygen as O_2 *	7.0	7.3	5.0	6.1
Faecal Coliform Bacteria / 100 mℓ *	220	120	10	19
E. coli / 100 mℓ	140	110	6	14
Free & Saline Ammonia as N	0.1	0.1	0.4	0.5
Sodium as Na	7	7	8	11
Aluminium as Al	2.1	1.87	2.43	2.33

Based on the results obtained in the biomonitoring report, the overall EcoStatus of the river and catchment is classified as a moderately impaired condition (Class C) and the Ecological Importance and Sensitivity is considered as moderate to high. The Vaal River has the potential to improve to a Health Class B category. As mentioned, it is difficult to obtain a PES for a river or catchment after only one aquatic ecological assessment

and is therefore recommended that bi-annual bio-monitoring continue in order to obtain a comprehensive database.

10.11.4 Resource Class

On 22 April 2016, the Minister of Water and Sanitation, published the Classes and Resource Quality Objectives of water resources for catchments of the Vaal WMA, as GN No. 468 in Government Gazette No. 39943. This notice provides a summary of the water resource classes and ecological categories for Integrated Units of Analyses (IUAs).

IUAs are classified in terms of their extent of permissible utilisation and protection as either Class I: indicating high environmental protection and minimal utilisation; or Class II: indicating moderate protection and moderate utilisation; and Class III: indicating sustainable minimal protection and high utilisation. Table 10-2 below indicates the Resource Class Ecological Category set for the C22F and C22G Quaternary Catchment.

Table 10-2: Water Resource Class and Ecological Category for the C22F and C22G Quaternary Catchment (DHSWS, 2016b)

Catchment	Water Resource Class	Biophysical Node Name	River Name	Present Ecological State	Recommended Ecological Class
C22F	III	EWR4	Vaal	C	B/C
C22G	III	UJ.1	Taaibosspruit (Tributary of the Vaal)	D	D

10.11.5 Receiving Water Quality Objectives and the Reserve

According to DWAF (2004a) (also as specified in the National Water Act, Act No. 36 of 1998) 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 has the responsibility to develop a Catchment Management Strategy (CMS) for the protection, use, development, conservation, management and control of water resources within its WMA.

During 2012 the Department of Housing Services, Water and Sanitation (DHSWS) (previously the Department of Water and Sanitation) proposed to consolidate the original nineteen Water Management Areas (WMAs) into only nine based on the availability and allocation of funding, capacity, skills and expertise for the establishment of Catchment Management Agencies (CMAs). On 16 September 2016 the new nine WMAs were published under Government Notice No. 1056.

The Vaal WMA includes the Upper, Middle and Lower Vaal catchment areas. The water resources of the Vaal River System are an important asset to the country and its people, supporting major Economic activities and a population of about 12 million people. The Vaal River System catchment area stretches from Ermelo in the northeast to Vryburg in the northwest to Douglas in the southwest to Harrismith in the east. The Vaal River is the major water resource within the system with a number of significant tributaries along its length. Rising at Sterkfontein Beacon near Breyten, in Mpumalanga province, the Vaal River flows 1 415 km southwest to its confluence with the Orange River near Douglas.

The Vaal River is probably the most developed and regulated river in Southern Africa – it has some 90 major man-made impoundments situated on the main stem and its tributaries. The Vaal River System has extensive water resource infrastructure and is linked by substantial transfer systems to other water resource systems (Thukela, Usutu, Lesotho). There are also significant transfers out of the Upper Vaal catchment through the distribution system of Rand Water to the Crocodile West and Marico catchments. System supply reaches most

of Gauteng, Eskom's power stations and Sasol's plants on the eastern Highveld, the North West and Free State Goldfields, the North West platinum and chrome mines, iron and manganese mines in the Northern Cape, Kimberley, several small towns along the main course of the river, as well as several large irrigation schemes. The water resources within the catchment are largely developed.

As per the NWRS, 2nd Ed., a management class and associated Reserve and Resource Quality Objectives (RQOs) have been set and approved for every significant water resource in the country. Resource Quality Objectives are regularly monitored for compliance, which informs enforcement and a strategic adaptive management cycle. It is the responsibility of the DHSWS to provide these specific Resource Quality Objectives, if applicable to the study area.
The key strategic objectives for water resource management, as per the NWRS, 2nd Ed., are to:

- Ensure sustainable management of the water resources through resource directed measures and source directed controls;
- Protect and maintain existing freshwater ecosystem priority areas in good condition and well-functioning water resource ecosystems by managing riparian and wetland buffers and critical groundwater recharge areas;
- Carry out rehabilitation of strategic water ecosystems;
- Ensure prevention of water resources from point source and non-point source pollution by managing at source;
- Create awareness among communities, business and decision makers about the value of water and ensure commitment to sustainable water use practices.
- Create an enabling environment for water resource protection through incentive-based approach to water resource management; and
- Monitor the ecological health of our resources through an Integrated Information Management System.

Figure 10-16 provides the water quality ecological specifications for EWR4, which is the closest monitoring site to the C22F and C22G Quaternary Catchment, in which the Lefa Colliery lies.

River: Vaal		**EWR 4: at De Neys**	**Water quality monitoring site/gauge**: C1H012
Inorganic Salts	$MgSO_4$	The 95th percentile of the data must be ≤ 37 mg/L	
	Na_2SO_4	The 95th percentile of the data must be ≤ 33 mg/L	
	$MgCl_2$	The 95th percentile of the data must be ≤ 30 mg/L	
	$CaCl_2$	The 95th percentile of the data must be ≤ 57 mg/L	
	NaCl	The 95th percentile of the data must be ≤ 191 mg/L	
	$CaSO_4$	The 95th percentile of the data must be ≤ 351 mg/L	
Physical variables	EC	The 95th percentile of the data must be ≤ 30 mS/m	
	pH	The 5th percentile of the data must be 6.5 to 8.0 and the 95th percentile 8.0 to 8.8	
	Dissolved oxygen	The 5th percentile of the data must be ≥ 7 mg/L	
Nutrients	Total inorganic Nitrogen (TIN)	The 50th percentile of the data must be ≤ 0.7 mg/L	
	PO_4-P	The 50th percentile of the data must be ≤ 0.125 mg/L	
Response variables	Chl-a phytoplankton	The 50th percentile of the data must be <10 µg/L	
	Chl-a periphyton	The 50th percentile of the data must be ≤ 1.7 mg/m^2	
Toxics	Ammonia	The 95th percentile of the data must be ≤ 0.1 mg/L	
	Fluoride	The 95th percentile of the data must be ≤ 1.5 mg/L	

Figure 10-16: EWR4: Water Quality Ecological Specifications

Table 10-3 provides the proposed Reserve determination and ecological categorisation in terms of section 16(1) of the Act for the rivers of the Vaal catchment area, where the Reserve is expressed as a percentage of the NMAR for the catchment (cumulative).

Table 10-3: Proposed Reserve for the Vaal River at the EWR4 site which include the EWRs to protect the aquatic ecosystem

Quaternary Catchment	Water Resource	PES	EIS	TEC[5]	MAR(MCM)[1]	Reserve (%MAR)[2]	Ecological Reserve[3] (%MAR)	Basic Human Needs Reserve[4] (%MAR)
C22 F	Vaal River EWR 4	C	High	B/C	1977.3[#]	21.550	21.55	0.00015

*1) MAR is the Mean Annual Runoff (# Based on natural flow at the EWR site MAR; * Based on present day flow at the EWR site; Based on observed flow at the EWR site).*
2) The Reserve is the total requirement that accounts for both the Ecological Reserve and the Basic Human Needs Reserve (BHN).
3) Ecological Reserve requirement represents the long-term mean based on the MAR. If the MAR changes, this volume will also change.
4) Represents the BHN requirement as a percentage of the MAR. Basic human needs includes the population directly reliant on rivers, streams and springs for water supply (derived from 2011 Census data)
5) Target Ecological Category (TEC): The ultimate target to achieve a sustainable system both ecologically and economically taking into account the PES and REC.

10.11.6 Surface Water User Survey

The surface water users within the project area include various agricultural uses, industrial uses and other mines located within the region. Urban users are associated with Refengkgotso, Deneysville on the eastern side and Sasolburg and Zamdela on the western side of the study area. The domestic users would be supplied with potable water from the municipality and would not be reliant on the rivers and streams, however it is likely that community members use the rivers, streams and dam for recreational purposes.

10.11.6.1 Surface Water Sensitivity

The surface water sensitive areas are indicated in Figure 10-17 below.

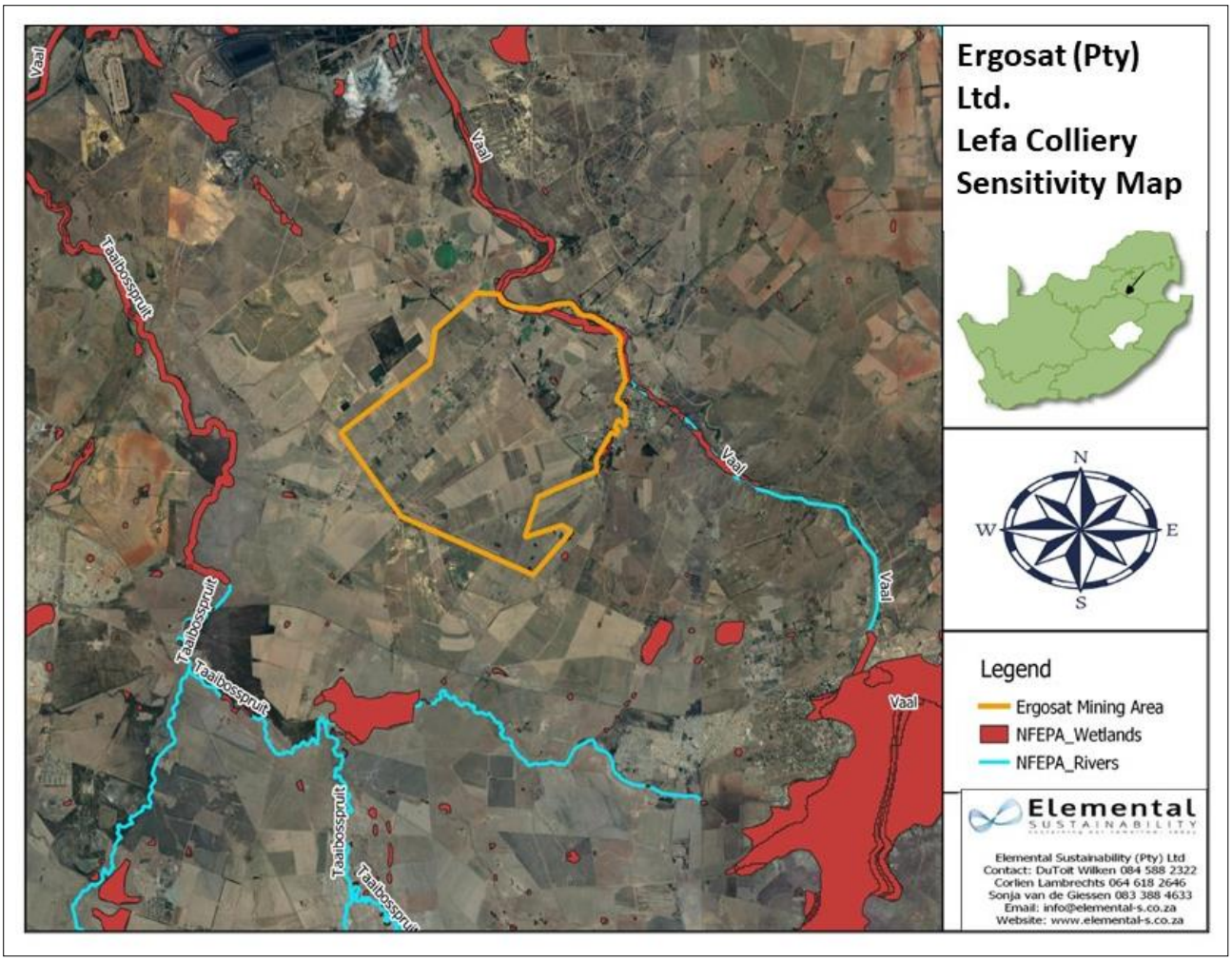


Figure 10-17: Surface water sensitivity map

10.12 WETLANDS

A wetland delineation study was conducted by Limosella Consulting (Pty) Ltd. A copy of the report (Limosella Consulting (Pty) Ltd, 2019) is available in Appendix 17.

Above ground infrastructure is considered in terms of the wetland study, which may potentially affect wetlands on or around the site. The underground mining footprint will be located 80m below the surface and deeper. This component of the development will not affect the surface water or shallow interflow which may affect wetlands. Furthermore, groundwater levels are shown to be below 2.5m below the surface (Eco Elementum, 2019) whereas wetlands are driven by surface water and not by groundwater discharge or shallow interflow (Geo Pollution Technologies, 2019). Underground mine infrastructure is therefore not deemed relevant to the wetland assessment discussed in this report. The effect of underground mining on local and regional water resources should be verified in a hydrogeological assessment.

The study area comprises of 33ha area where the mining infrastructure is proposed to be established. The total area covered by infrastructure will be 16.8ha or 51 % of the study area. The wetlands on the study area accounts for a combined area of 12.87ha of the study area (excluding the 15 m buffer zones), or 39% of the study area. The seepage wetland occupies 1.57 ha and the unchannelled valley bottom wetland occupies 11.3 ha. The infrastructure will consist of the following (Table 10-4 and Figure 10-18).

Table 10-4: Infrastructure of the proposed mine in relation to the wetland areas

No (On Image)	Proposed Infrastructure	Area (Ha)	Relation to Wetlands
1	External Parking	0.3	Outside of wetland and Buffer
2	Security and Weighbridge	0.2	Outside of wetland and Buffer
3	Road Truck Loading Area	0.7	Small section located within Unchannelled valley bottom wetland
4	Internal Parking	0.6	Outside of wetland and Buffer
5	Coal Stockpile	1.0	Small section located within Unchannelled valley bottom wetland
6	Sewerage Treatment	0.4	Outside of wetland and Buffer
7	Scrap Yard	1.4	Outside of wetland and Buffer
8	Offices	1.7	Large section located within Unchannelled valley bottom wetland
9	Crush and Screen Plant	1.0	Small section located within Seepage Wetland
11	Change House	0.2	Large section located within Unchannelled valley bottom wetland
12	Waste Rock Dump	0.4	Entire section located within the Seepage wetland Area
13	Lamp Room	0.1	Outside of wetland and Buffer
15	Medical Facility	0.1	Small section located within Unchannelled valley bottom wetland
16	Diesel Storage Bay	0.2	Entire section located within the Unchannelled Valley Bottom Wetland
17	Workshop	1.1	Very Small section located within Unchannelled valley bottom wetland
18	Power Substation	0.1	Entire section located within the Seepage wetland Area
19	Portal to Decline	0.2	Large section located within Seepage Wetland
20	Stores	1.6	Outside of wetland and Buffer
21	Raw Water Dam	2.5	Large section located within Unchannelled valley bottom wetland
23	Storage Yard	1.9	Large section located within Unchannelled valley bottom wetland
24	Ventilation Shaft	0.1	Outside of wetland and Buffer
25	PCD	1.0	Small section located within Seepage Wetland
Total Ha Infrastructure		16.8	

Figure 10-18: Associated infrastructure of the Proposed Mine and the delineated wetland areas (Green boundary within the site footprint and pink boundaries outside the site footprint)

The area has been used extensively for farming as the land is arable and in close approximation to the Vaal River, which is located 1.3 km north east of the study site, which provided a constant source of water for agriculture. These anthropogenic activities have had several impacts on the study area as well as the wetlands that occur on the study site. Wetness gradient visible on aerial photography, particularly historical imagery, can often be used in conjunction with field samples to effectively delineate a wetland.

However, in this case the wetness gradient cannot be accurately used as the prolonged farming practices have removed these visible signs (Figure 10-18, Figure 10-19). Furthermore, these activities have changed the natural vegetation composition of the study site and specifically the wetlands making a plant-based delineation inaccurate.

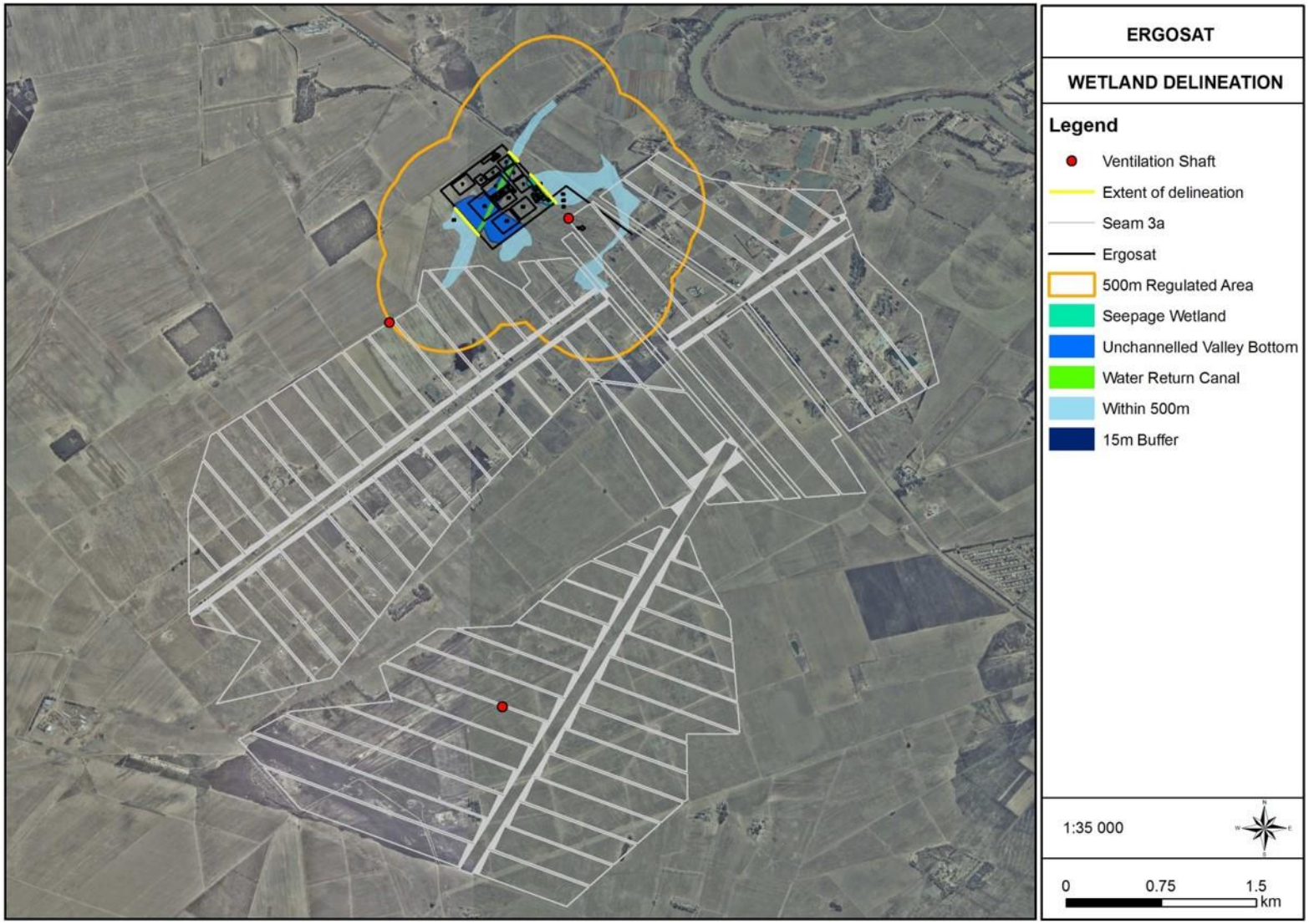


Figure 10-19: Extent of delineated wetlands within the study area and approximate delineation within 500 m including calculated buffer zones

10.12.1 Watercourses

Two wetland areas were identified on the study area during the study conducted by Rehab Green Monitoring Consultants CC (2017) and follow up studies. These wetlands were classified as an unchannelled valley bottom wetland and a seepage wetland. Although the many of the wetland indicators has been removed by anthropogenic activities, the cautionary principle was used and the wetland delineated by the soil indicators recorded in the 2019 field survey. These wetlands were identified as ephemeral wetlands ranging from seasonal wetlands to temporary wetlands. These wetlands are closely associated with the nearby Vaal River and drain directly into the Vaal River via subsurface flow. The majority of the proposed infrastructure is located within or within close proximity to these wetlands.

10.12.2 Soil and Vegetation Indicators

- Soil Indicators

The soil of the unchannelled valley bottom was characterised by loose sandy soils underlain by a grey loam layer with clear mottling. The dominant soil form of these areas is classified as Longlands 2000. and is characterised by deep greyish brown to grey poorly drained sandy soils with impeded internal drainage in the sandy soil, situated on weakly expressed narrow bottomlands (Rehab Green Monitoring Consultants CC , 2017).

Furthermore, the soil associated with the seepage wetland and sections of the unchannelled valley bottom wetland was similar and also characterised by sandy topsoil underlain by grey loam soil with mottling. The dominant soil form of these areas is classified as Longlands 1000 and is characterised by moderately deep, greyish brown, grey to yellowish grey, imperfectly to somewhat poorly drained sandy soils, situated on the footslopes and lower midslopes.

The remainder of the soils on the study area are classified as Avalon soils. Although Avalon soils are described in the literature as a potential seasonal to temporary wetland soil it is unlikely that these areas are wetlands although some wet spots may occur in these areas.

Wetland soil indicators are present as described in the previous assessments as well as recorded during the 2019 field survey. Interflow characteristics appear to reflect subsurface water flow towards the Vaal River. The site visit was undertaken during a dry period. This together with the sandy nature of the soils slightly complicates the interpretation of the depth of water flow since we expect sandy soil to be deposited by wind action and also to be slightly compacted when wet. However, our study concludes that soil wetland indicators represent significant water movement within 50cm (and below) of the soil surface conclusively making the delineated area a wetland as defined in DWAF (2008). However, recent excavation into the soil layer by a road and drain in the wetlands, intercept some interflow which possibly significantly impacts on this remaining function.

- Vegetation Indicators

The vegetation composition has been significantly altered from the theoretical reference state of the associated vegetation biome, Andesite Mountain Bushveld, due to prolonged farming activities from as early as 1941. During the site visit, the area was not used for crops and the majority of the study area was dominated by dense invasive species such as *Tagetes minuta, Datura ferox, Bidens bipinnata, Bidens pilosa* as well as some woody species such as *Eucalyptus grandis.* It is likely that the majority of the study area is used for agriculture for the majority of the time.

The only facultative wetland plants recorded in the study area were *Imperata cylindrica* and *Eragrostis gummiflua.* These plants usually occur in wetlands, but may occur in terrestrial areas. Particularly *Imperata cylindrica* grows well in sandy soil where it may represent terrestrial habitat. These two species could thus not confidently be used for delineation purposes. It should be noted that the site visit occurred before the area received sufficient rain and the area should ideally be revisited after good rains to reassess the vegetation composition. However, the report also draws from a previous vegetation study conducted in the wetter month

of March (Enviflora, 2017). In this report the study area is also described as disturbed/transformed with no natural species. An assumption can therefore be made that a follow up study conducted after rain will not have any significant impacts on the current findings.

10.12.3 Wetland Functional Assessment

The Present Ecological State (PES) score for both Wetlands recorded on the study is recorded as **F: Critically modified**. Modifications have reached a critical level and the ecosystem processes have been modified completely with an almost complete loss of natural habitat and biota and their condition is likely to remain stable over the next 5 years (Macfarlane *et al*, 2007).

It is likely that the wetland no longer provides any ecological function apart from the subsurface movement of water to nearby watercourses (Vaal River) which could potentially be mitigated by effective stormwater and water run-off design (to be confirmed in a dedicated hydropedological or geohydrological assessment). The components of the PES scores are reflected in Table 10-5.

Table 10-5: Summary of hydrology, geomorphology and vegetation health assessment for the components of the wetland system assessed (Macfarlane et al, 2009)

Wetland Unit	Hydrology		Geomorphology		Vegetation		Overall Score	
	Impact Score	Change Score	Impact Score	Change Score	Impact Score	Change Score	Impact Score	Change Score
Wetlands on the study Area	8.2	0	7.4	0	8.3	0	8.0	0
PES Category and Projected Trajectory	**F**	→	**E**	→	**F**	→	**F**	→

Ecological Importance and Sensitivity (EIS)

The wetlands scored low to the majority of the biodiversity and ecological functions and hydrological functions. The wetlands did however score slightly higher for human benefits due to the cultivated foods that are grown on the wetland areas.

The EIS score of **0.7** for the wetlands falls into a category characterised by **Low** ecological importance and sensitivity. Wetlands that are not ecologically important and sensitive at any scale. The biodiversity of these wetlands is ubiquitous and not sensitive to flow and habitat modifications. They play an insignificant role in moderating the quantity and quality of water in major rivers (Table 10-6).

Table 10-6: WIS including EIS scores obtained for the wetlands (DWAF, 1999)

WETLAND IMPORTANCE AND SENSITIVITY	Importance	Confidence
Ecological importance & sensitivity	0.7	3.0
Hydro-functional importance	0.9	2.5
Direct human benefits	0.3	3.0

The ecosystem services provided by the wetlands are summarised in Table 10-7 below. The scores are listed from the lowest scores to the highest. The highest scores obtained for toxicant removal, phosphate trapping and nitrate removal is due to the close proximity to the farming areas and is likely to be lower due to the lack of

wetland vegetation responsible for these functions.

Table 10-7: Results and brief discussion of the Ecosystem Services provided by the wetland complex recorded on site

Function	Score	Significance
Carbon storage	0.0	Low
Cultural significance	0.0	Low
Tourism and recreation	0.0	Low
Opportunities	0.0	Low
Education and research	0.3	Low
Natural resources	0.4	Low
Maintenance of biodiversity	0.6	Low
Water supply for human use	0.9	Low
Flood attenuation	1.3	Moderately Low
Streamflow regulation	1.3	Moderately Low
Erosion control	1.4	Moderately Low
Cultivated foods	1.4	Moderately Low
Sediment trapping	1.8	Moderately Low
Threats	2.0	Moderate
Toxicant removal	2.2	Moderately High
Phosphate trapping	2.4	Moderately High
Nitrate removal	2.6	Moderately High

A summary of the scores are provided in Table 10-8.

Table 10-8: Summary of results for each wetland unit discussed

Classification (SANBI, 2013)	PES (Macfarlane *et al*, 2007)	EIS (DWAF, 1999)	Wet Eco Services (3 most prominent scores)	Buffer	REC
				Calculated Buffer (Macfarlane *et al*, 2015).	
Seepage Wetland	8.0 F	0.7 (Low)	Toxicant removal - 2.2 Phosphate trapping - 2.4 Nitrate removal - 2.6	Construction: 15 m Operational: 15 m	D*
Unchannelled Valley Bottom					

* It is unlikely that it would be possible and economically feasible to improve the ecological state of this wetland to the required level due to over 80 years of disturbance.

Table 10-9: Summary of results for each wetland unit discussed

Classification (SANBI, 2013)	PES (Macfarlane *et al*, 2007)	EIS (DWAF, 1999)	Wet Eco Services (3 most prominent scores)	Buffer		REC
				Contour Based Buffer (Catchment)	Calculated Buffer (Macfarlane et al, 2015).	
Endorheic Depressional Pan	4.1 D	1.7 (Moderate)	Carbon storage - 2.3 Erosion	100-210m	Construction: 48 m	C

Classification (SANBI, 2013)	PES (Macfarlane *et al*, 2007)	EIS (DWAF, 1999)	Wet Eco Services (3 most prominent scores)	Buffer		REC
				Contour Based Buffer (Catchment)	Calculated Buffer (Macfarlane et al, 2015).	
Artificial Pan (Directly adjacent to mining area)			control - 2.9 Threats - 4.0		Operational: 28 m	

10.13 HYDROGEOLOGY (UPDATED)

A hydrogeological study was undertaken by Eco Elementum (Eco Elementum Environmental and Engineering, 2019) for the Lefa Colliery (Appendix 18(a)). The results of the study are discussed below.

The Initial Groundwater Assessment (Geo Pollutions Technologies - Gauteng (Pty) Ltd, 2017) are also included in Appendix 18(b)).

10.13.1 Aquifer Classification

According to the hydrogeological assessment conducted, two distinct superimposed groundwater systems are present, namely an unsaturated (shallow, saprolitic aquifer) and a saturated zone (fractured, bedrock aquifer).

10.13.2 Unsaturated Zone – Shallow, saprolite aquifer

The unsaturated zone is the zone between the ground surface and the static water table. In the unsaturated zone the pores between the ground particles are filled with air and water, therefore, below saturation. Static water levels in the region of the Lefa Colliery, as obtained from the 2013 hydrocensus borehole information, range between 2.2 to 25.93 mbs, therefore, also the thickness of the unsaturated zone. The unsaturated zone may consist of soil, weathered bedrock and even solid bedrock from the sandstone and shale of the Ecca Group.

The weathered, unconfined aquifer typically occurs on the transition between soil and weathered bedrock (typically sandstone and shale). The groundwater flow closely mimics the surface topography. Groundwater levels are usually shallow in the low-lying topographical regions and may even daylight on surface which is referred to as springs. The weathered aquifer is more prominent in the wet season because it is located on top of solid bedrock or clayey layers. This aquifer normally has a low yield. Groundwater qualities under natural conditions in this aquifer is generally good due to the dynamic recharge from rainfall. This is also the aquifer mostly impacted on by surface contamination sources including coal stockpiles, pollution control dams, tailings facilities etc.

10.13.3 Saturated Zone - Fractured, bedrock aquifer

The saturated zone is that part of the strata below the regional static water level where all pores and fractures are filled with water at a pressure greater than atmospheric pressure. The depth of the saturated zone in the Lefa Colliery area is, therefore, more than 2.2 to 25.93 mbs. The description on the aquifer is based on experience in previous studies in similar Karoo aquifer environments.

In the deeper, confined aquifer, flow mainly occurs along fractures, bedding planes and other groundwater flow paths. The presence of fractures generally decreases with depth in this aquifer. The secondary aquifer, due to its heterogeneous nature, may be higher yielding than the weathered aquifer. Yields in this aquifer is generally

around 1 l/s, but may be higher in some cases. Groundwater qualities are generally not as good as in the shallow aquifers due to longer residence time in the aquifer and less recharge. The coal seams may have a much higher hydraulic conductivity than that of the remainder of this aquifer.

10.13.4 Groundwater Levels

Groundwater levels in 2013 varied between 2.2 and 25.93 mbs in these boreholes. It should be noted that the majority of these boreholes are in use and therefore in all probability affected by groundwater abstraction. Table 10-10 clearly indicates that the water levels in BH108A and BH93 are significantly deeper than the average of the rest. When correlating the water levels with the surface topography, as in Table 10-10**,** there is a very low correlation of 31%. Typically, the water levels in the Karoo aquifers of South Africa follow the natural topography. That is the case of natural unaffected water levels (no pumping, mining or other effects).

Table 10-10: Summary of water levels in the hydrocensus boreholes (2013)

Borehole	X-coordinate	Y-coordinate	Elevation (mamsl)	Water Level (mbs)
BH62	98376	-2968681	1482	11,3
BH54	99413	-2967469	1484	6,5
BH128	98499	-2969027	1478	5,0
BH85	98448	-2968754	1483	9,9
BH108A	101342	-2966529	1472	15,3
BH109	101081	-2966749	1478	9,0
BH89B	98931	-2968422	1485	8,8
BH114	100445	-2967351	1483	4,0
BH93	99432	-2968054	1486	25,9
BH117	99970	-2967650	1482	4,9
BH133	98109	-2969686	1469	4,1
BH134	97915	-2969593	1469	2,8
BH58	98945	-2967906	1487	10,5
BH59	98874	-2968089	1487	12,6
BH10	98002	-2968526	1481	3,5
BH6	97500	-2968890	1473	2,2
BH98	100078	-2967504	1482	5,1
BH52	99648	-2967315	1482	2,9

By removing the water levels of BH108A and BH93, the correlation already shoots up to 63%, which is higher, but still not ideal for natural unaffected Karoo aquifers. Further consideration of the water levels of the boreholes with similar topographical elevations shows significant differences in some cases. The water levels in BH62, BH117, BH98 and BH52, which are all on the same topographical elevation, varies between 2.6 and 11.3 mbs. Therefore, by further eliminating water levels not correlating with each other the topography and water level correlation increases to 91% as shown in Figure 10-20. The boreholes of the water levels correlating to 91% are presented in Table 10-11.

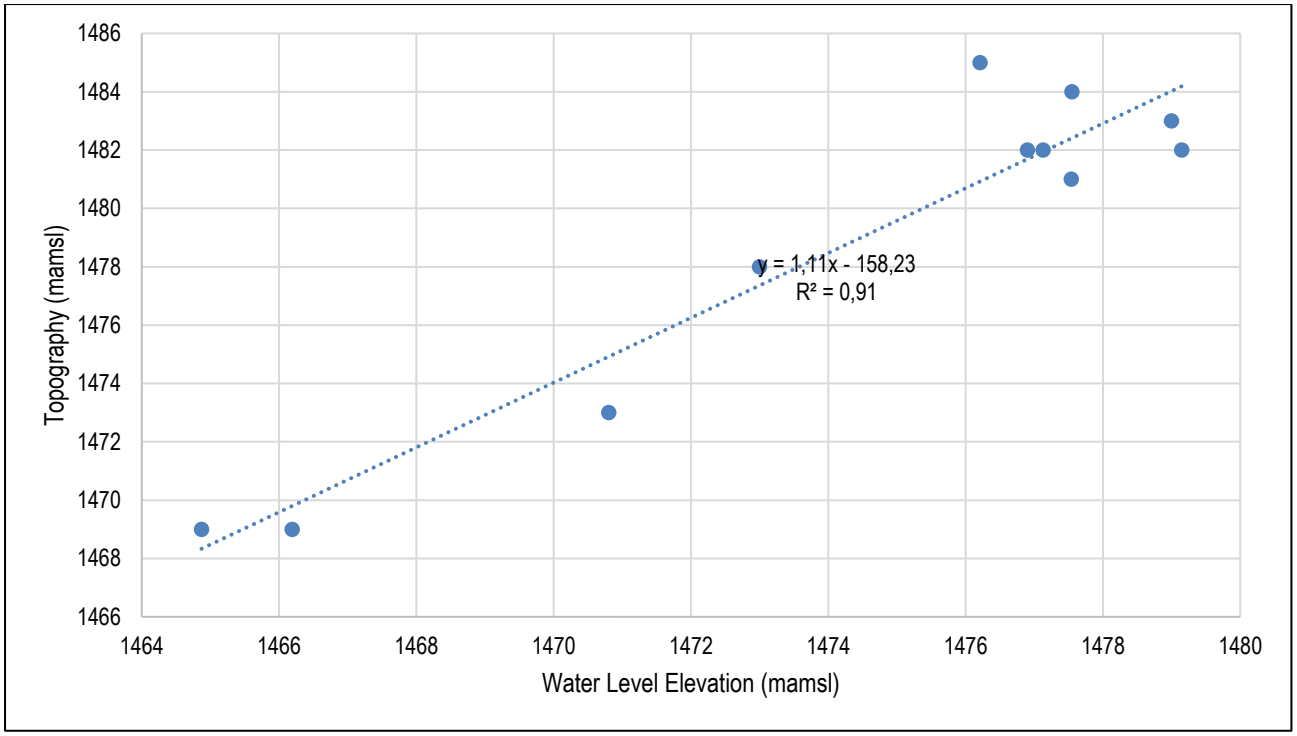


Figure 10-20: Correlation between groundwater level elevations and topography

Table 10-11: Boreholes with water levels that correlates 91% with the surface topography

Borehole	X-coordinate	Y-coordinate	Elevation (mamsl)	Water Level (mbs)
BH133	98109	-2969686	1469	4,1
BH134	97915	-2969593	1469	2,8
BH6	97500	-2968890	1473	2,2
BH128	98499	-2969027	1478	5,0
BH10	98002	-2968526	1481	3,5
BH117	99970	-2967650	1482	4,9
BH98	100078	-2967504	1482	5,1
BH52	99648	-2967315	1482	2,9
BH114	100445	-2967351	1483	4,0
BH54	99413	-2967469	1484	6,5
BH89B	98931	-2968422	1485	8,8

10.13.5 Hydrocensus

Groundwater quality information is available for eight 2019 hydrocensus boreholes in the Lefa mining area. The owners of the boreholes are indicated in Table 10-12. A summary of the water qualities within these boreholes that were sampled is included in Table 10-13.

Table 10-12: Owners of the boreholes

Borehole	Owner
ER-GW-01	S. Bester
ER-GW-02	S. Bester
ER-GW-03	F. Maree
ER-GW-04	F. Maree
ER-GW-05	F. Maree

ER-GW-06	C. Els
ER-GW-07	G. Goosen
ER-GW-08	T. Colby

The following summary from the RGC, 2013 hydrocensus:

- 36 boreholes were located;
- All 36 boreholes are privately owned,
- Uses range from crop/garden irrigation to livestock and domestic use;
- The local community rely solely on groundwater as a water resource; and
- The major use of groundwater is for domestic and agricultural purposes (Figure 10-21).

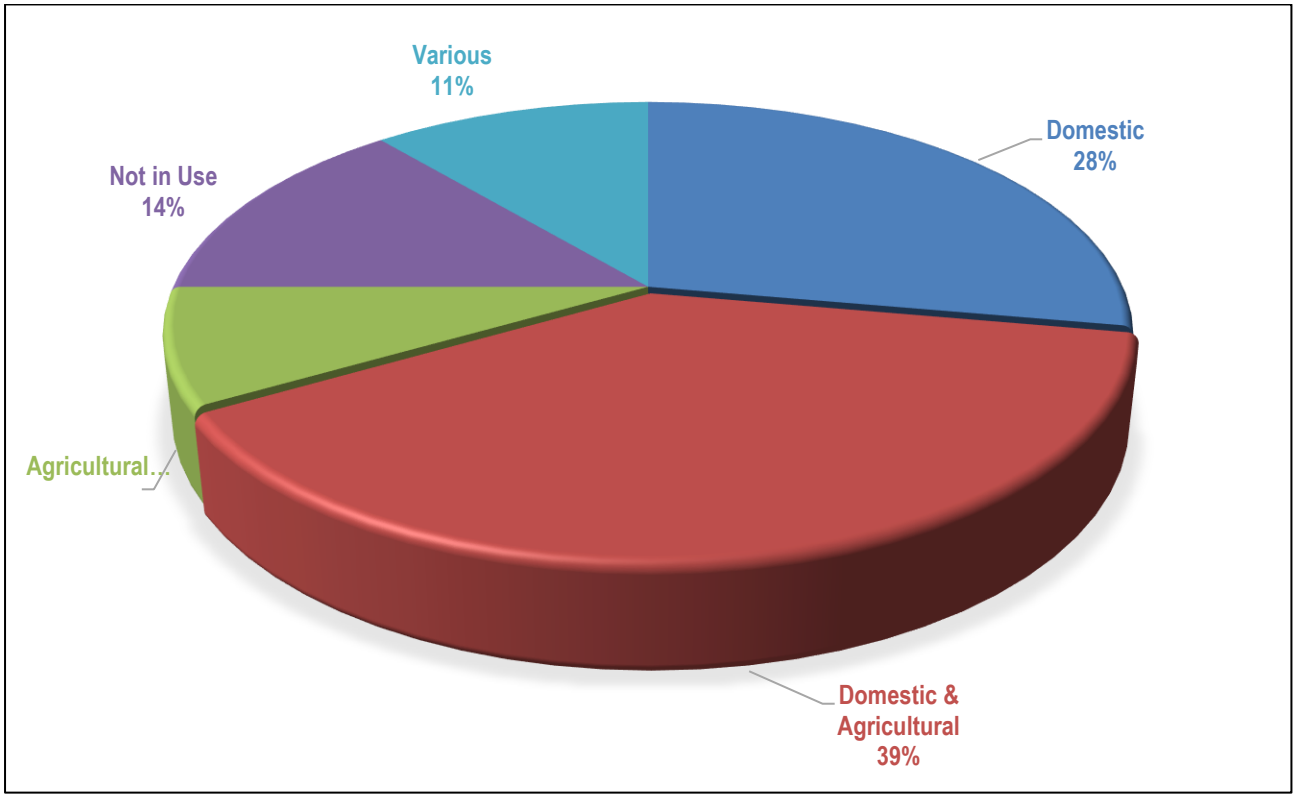


Figure 10-21: Groundwater use recorded during the 2019 hydrocensus

10.13.6 Groundwater Quality

As indicated previously, groundwater quality information is available for eight 2019 hydrocensus boreholes in the Lefa mining area (refer to Table 10-13). All chemical parameters were compared to SANS241:2015 drinking water standards. Concentrations highlighted in red exceeded the specific guideline concentrations.

Table 10-13: Water qualities from 2019 hydrocensus

Borehole ID	pH	EC mS/m	TDS mg/l	Ca mg/l	Mg mg/l	Na mg/l	K mg/l	Cl mg/l	SO_4 mg/l	NO_3-N mg/l	F mg/l	Al mg/l	Fe mg/l	Mn mg/l
SANS241:2015	*≥5 to ≤9,7*	*170*	*1200*	*-*	*-*	*200*	*-*	*300*	*500*	*11*	*1,5*	*0,3*	*2*	*0,4*
ER-GW-01	7,80	36	196	33	11	27	1,30	18	4,00	0,70	0,20	<0,10	0,11	<0,025
ER-GW-02	7,60	37	196	36	13	19	1,30	16	8,00	2,10	<0,20	<0,10	0,09	<0,025
ER-GW-03	7,60	85	494	74	20	71	2,50	82	24	13	0,20	<0,10	0,04	0,17
ER-GW-04	7,90	45	242	32	8	52	1,70	20	8	<0,1	0,40	<0,10	0,06	<0,025
ER-GW-05	7,30	126	775	113	30	93	2,90	153	62	40	0,20	<0,10	0,06	<0,025
ER-GW-06	8,00	31	166	27	6	31	1,60	4,0	<2.0	0,10	0,30	<0,10	0,37	<0,025
ER-GW-07	7,90	29	168	27	12	14	2,50	5,0	15	5,10	<0,20	<0,10	0,06	<0,025
ER-GW-08	7,30	68	391	64	35	19	2,90	38	43	15	<0,20	0,11	0,12	<0,025

The overall quality of the groundwater in the area is generally good with low TDS, sulphate and chloride concentrations. Nitrate is a problem in some boreholes where the concentrations vary between 13 and 40 mg/l, exceeding the SANS guidelines of 11 mg/l. In an area such as the Vaal Power Small Holdings, nitrate could be an effect of fertilisers used in small agricultural activities or sewage systems impacting on the groundwater. The remainder of the measured parameters remained within the permissible limits for drinking water.

10.13.7 Aquifer Characterisation

Due to South Africa's limited water resources it is important to discuss the aquifer sensitivity in terms of the boundaries of the aquifer, its vulnerability, classification and finally protection classification, as this assists in providing a framework in the groundwater management process.

10.13.7.1 Aquifer Vulnerability

Groundwater vulnerability refers to the likelihood for contamination to reach a certain area/receptor after it has been introduced to the surface. For the Lefa Colliery area, the vulnerability was estimated from the Aquifer Vulnerability map (refer to Figure 10-22) of South Africa (DWA, 2013) and by the Groundwater Vulnerability Classification System. According to the Aquifer Vulnerability map, the Lefa Colliery is located in a least to moderate vulnerability rating area. Therefore, an area that is continuously exposed to contamination may be vulnerable to some pollutants.

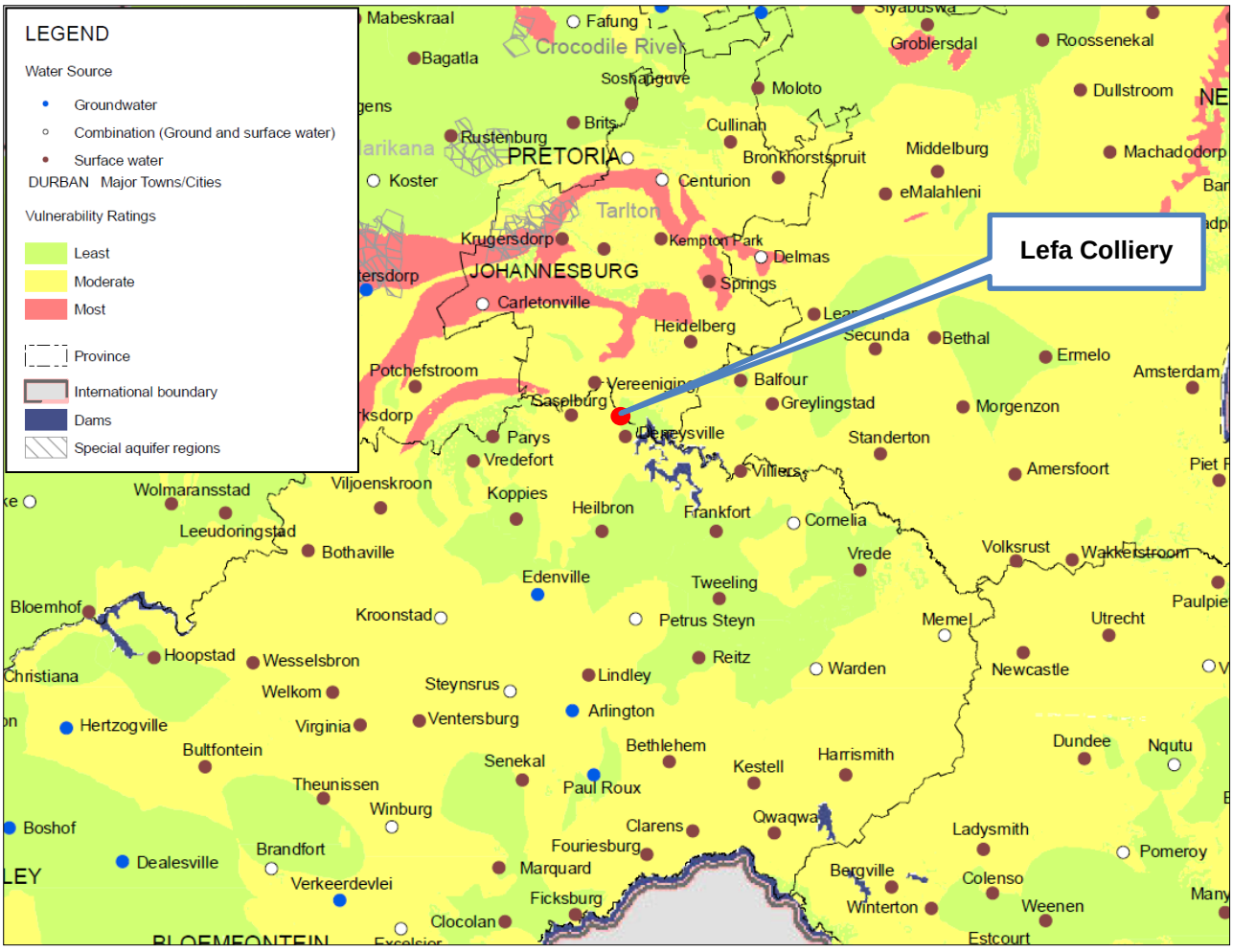


Figure 10-22: Aquifer vulnerability rating for the proposed Lefa Colliery (DWA, 2013)

The Groundwater Vulnerability Classification System incorporates the Parsons Aquifer Classification System (Section 6.2) and the drinking water guidelines from the Department of Water Affairs and Forestry.

Table 10-14: Groundwater Vulnerability Classification System

Rating	Depth to Water Level	Groundwater Quality	Aquifer Type- Parsons
1	> 10 m	Poor (TDS > 2 400 mg/l)	Non-Aquifer System
2	6 – 10 m	Marginal (TDS > 1 000 < 2 400 mg/l)	Minor Aquifer System
3	3 – 6 m	Good (TDS > 450 < 1 000 mg/l)	Major Aquifer System
4	0 – 3 m	Excellent (TDS < 450 mg/l)	Sole Aquifer System

Table 10-15: Groundwater Vulnerability Rating

Rating	Vulnerability
≤ 4	**Low**
> 4 ≤ 8	**Medium**
≥ 9	**High**

According to the Groundwater Vulnerability Classification System, the Lefa Colliery aquifer scored a rating of 9 which is indicative of a high vulnerability (Refer to Table 10-16). This is mainly due to many of the groundwater qualities in terms of TDS concentrations being excellent and the water levels being low.

Table 10-16: Groundwater Vulnerability for Lefa Colliery

Rating	
Depth to water level	3
Groundwater quality	4
Aquifer Type	2
Total Score	**9**

10.13.7.2 Aquifer Classification

According to the Aquifer Classification map (DWA, 2012), the Lefa Colliery is situated in a **minor** aquifer classification area. Aquifer classification is based on the Parsons System (1995) (refer to Table 10-17). Qualities in these aquifers can vary and is typically moderately yielding aquifers.

Table 10-17: Aquifer System Management Classes

Sole Aquifer System	An aquifer that is used to supply 50% or more of domestic water for a given area, and for which there is no reasonably available alternative sources should the aquifer be impacted upon or depleted. Aquifer yields and natural water quality are immaterial.
Major Aquifer System	Highly permeable formation, usually with a known or probable presence of significant fracturing. They may be highly productive and able to support large abstractions for public supply and other purposes. Water quality is generally very good (less than 150 mS/m).
Minor Aquifer System	These can be fractured or potentially fractured rocks that do not have a primary permeability, or other formations of variable permeability. Aquifer extent may be limited and water quality variable. Although these aquifers seldom produce large volumes of water, they are important both for local suppliers and in supplying base flow for rivers.
Non-Aquifer System	These are formations with negligible permeability that are generally regarded as not containing groundwater in exploitable quantities. Water quality may also be such that it renders the aquifer unusable. However, groundwater flow through such rocks, although impermeable, does take place, and needs to be considered when assessing the risk associated with persistent pollutants.
Special Aquifer System	An aquifer designated as such by the Minister of Water Affairs, after due process.

10.13.7.3 Aquifer Protection Classification

As part of policy and regulation development and implementation, the aquifer classification used in Table 16 alone is not sufficient. To minimise misinterpretation, the decision support tool in Table 16 also needs to be incorporated as part of aquifer classification (Parsons, 1995). The combination of the Aquifer System Management Classification and the Aquifer Vulnerability Classification rating is referred to as the Groundwater Quality Management (GQM) classification, which provide a level of aquifer protection.

GQM = Aquifer System Management X Aquifer Vulnerability

Table 10-18: GQM Classification for the Lefa Colliery

Aquifer System Management Classification		Aquifer Vulnerability Classification		GQM		GQM
Class	Points	Class	Points	Index	Level of protection	Lefa Colliery
Sole Source Aquifer System	6	High	3	<1	Limited	
Major Aquifer System	4			1 - 3	Low	
Minor Aquifer System	2	Medium	2	3 - 6	Medium	6
Non-aquifer System	0			6 - 10	High	
Special Aquifer System	0-6	Low	1	>10	Strictly non-degradation	

The level of protection for the Lefa Colliery according to the GQM Index is 6, which is a medium level of protection (refer to Table 10-18). Based on the findings of the geohydrological study it is highly recommended that a proposed monitoring protocol should be in place for the proposed project area.

The DWHS has also compiled a susceptibility map (Figure 10-23**)** for South Africa (2013). This map indicates the qualitative measure of the relative ease with which an aquifer can potentially be contaminated. According to the aquifer susceptibility map, the Lefa Colliery is also classified as low to medium susceptible to contamination.

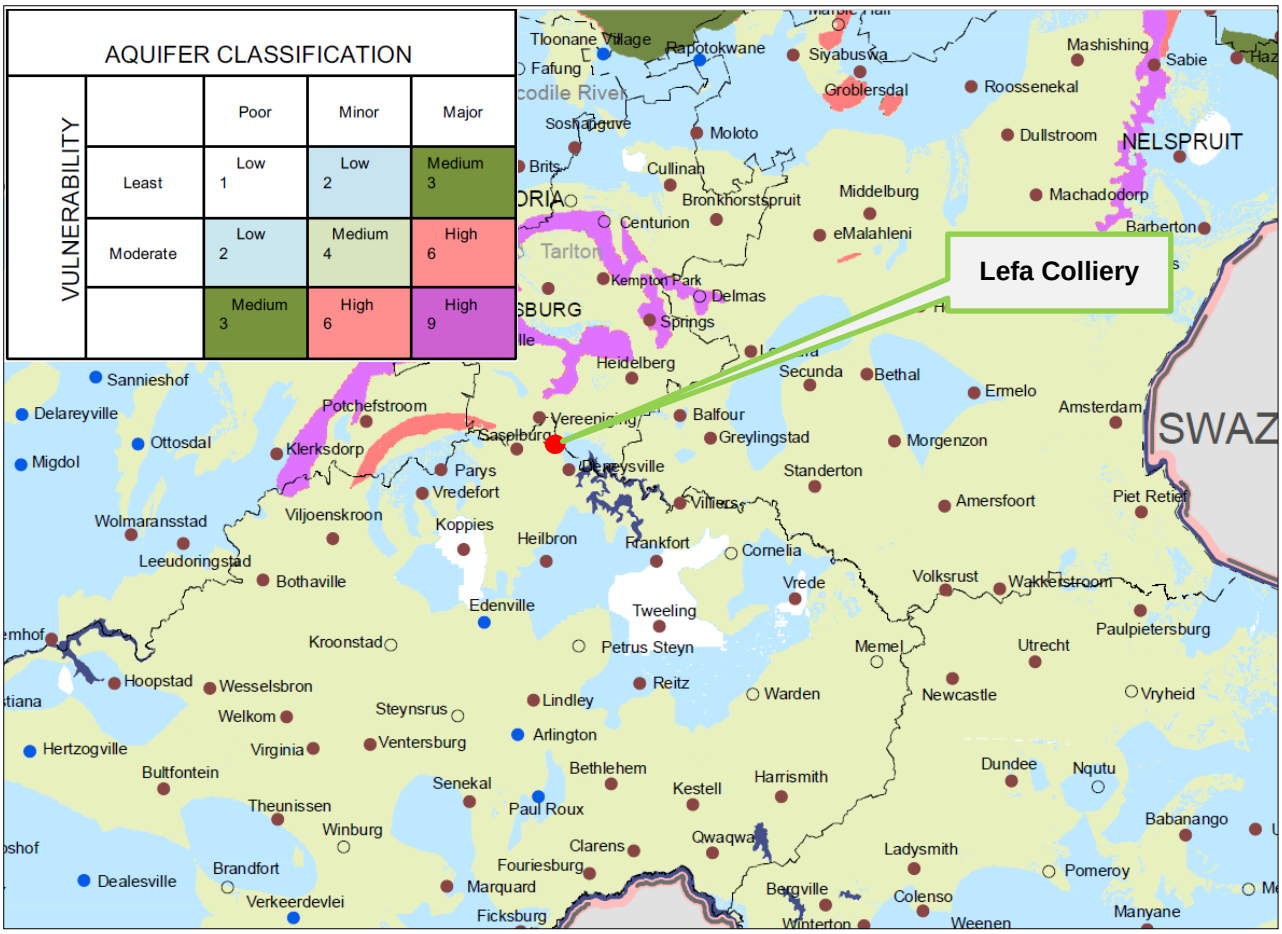


Figure 10-23: Aquifer susceptibility map for the Lefa Colliery area

10.13.8 Potential Pollution Source Identification

Acid generation is a common response to the coal mining environment. Coal and carbonaceous material contain a mineral known as pyrite, an iron-sulphide mineral, which is the main contributor to acid rock drainage (ARD). After being exposed to oxygen and water the sulphide minerals react to form an acid. Bacteria, which increases with the exposure to water and oxygen often accelerates the acidification process. The reaction can however also occur abiotically.

The general equation of pyrite oxidation is as follows:

$2FeS_2 + 7O_2 + 2H_2O \rightarrow 2Fe^{2+} + 4SO_4^{2-} + 4H^+$

Ferrous iron is oxidised to ferric iron:

$4Fe^{2+} + O_2 + 4H^+ \rightarrow 4Fe^{3+} + 2H_2O$

As mentioned previously these two reactions can occur abiotically or with the catalisation by micro-organisms. These organisms arise from the oxidation reactions.

The ferric cations reduce to ferrous ions:

$FeS_2 + 14Fe^{3+} + 8H_2O \rightarrow 15Fe^{2+} + 2SO_4^{2-} + 16H^+$

The release of H+ lowers the pH. At the lower pH the solubility of the ferric ion continuous which increases the acid generation.

10.13.9 Acid Mine Drainage

No site-specific ABA tests were performed, but ABA tests were conducted by Anglo for their Vaalbank Colliery (Golder, 2013), located just north-west of the proposed Lefa Colliery. Tests were conducted for the Vaalbank underground area, which borders with the proposed Lefa Colliery. A summary of the results of the tests will be extracted from the Golder, 2013 report. The results of the ABA tests for Vaalbank are indicated in Table 10-19 and Table 10-20 below. Due to the close proximity to Vaalbank Colliery, similar results can be expected at Lefa Colliery.

Table 10-19: Summary of ABA results for Lifex inter-burden and overburden at Vaalbank (Golder, 2013)

Parameter	Geochemical characteristics, results and classification.
Paste pH	The paste pH is neutral to alkaline (7.7 to 9.6)
Sulphur %	The total sulphur and sulphide sulphur concentrations ranges from <0.01% to 5.2% and <0.01% to 4.6% respectively.
Neutralising potential (NP)	The Modified Sobek NP ranges from 0 to 46 kg CaCO3/t
ARD Classification	Vaalbank overburden/inter-burden predominantly classifies as **potentially acid generating (PAG)**. The PAG units include grit (83%; n=6)**, carbonaceous shale (75%,n=4), shale/siltstone (50%, n= 3), siltstone/sandstone (46%, n=13), sandstone/siltstone (41%, n=17), mudstone (40%, n=9), siltstone (35%, n=17), sandstone (25%, n=17), shale/sandstone (50%, n=4) and overburden composite samples (82%, n= 11).
	Non-Potentially Acid Generating (Non-PAG) units include calcite veins (100%, n=1); dolerite (100%, n=11) and dwyka tillite (100%, n=1). Shale (100%, n=1) classifies as uncertain as well as carbonaceous mudstone (67%, n=3).

Table 10-20: Summary of key ABA parameters and findings for the coal materials (Golder, 2013)

Parameter	Geochemical characteristics, results and classification.
Paste pH	Paste pH is alkaline (8.1 to 8.8).
Sulphur %	The total sulphur and sulphide sulphur concentration ranges from 0.23% to 0.33% and 0.04% to 0.31% respectively.
Neutralising potential (NP)	Total NP ranges from 7.9 to 16 kg CaCO3/t.
ARD Classification	Two (2) of the three (3) Vaalbank coal samples classify as “uncertain” and one is potentially acid generating (PAG).

The inter- and over-burden at Vaalbank which included grit, carbonaceous shale, shale, siltstone, sandstone, mudstone and overburden composite samples indicated a potential to generate acid (Table 10-19). One of the coal samples indicated a potential to generate acid, while the other two was classified as uncertain (Table 10-20). For all purposes of this study, the inter- and over-burden as well as the coal will be seen as acid generating.

10.13.10 Waste Classification

The PCD barrier design was carried out in accordance with regulation 36784. The proposed barrier is a class C barrier that is required for the Type 3 material in terms of Regulation 634 and 635.

10.13.11 Modelling

The Processing Modflow 8 (PMWIN) modelling package was used for the numerical flow and mass transport

simulations. PMWIN is a finite difference modelling package where the domain is broken up into blocks or rectangular cells where the finite difference analogue of the partial differential equation for flow is applied to a node within a cell.

10.13.12 Conceptual Model

A conceptual model involves the construction of a simplified version of the real world. All the geohydrological information gathered by different means, including during the hydrocensus, aquifer tests, chemical analysis etc., are used to construct this simplified model. The conceptual model forms the basis of the numerical model and aids in understanding the geohydrological characteristics of the model area.

The basis of the conceptual model can be summarised as follows:

- The proposed Lefa Colliery is situated in the Upper Vaal Catchment area which is within a summer rainfall region.
- The mean annual precipitation is ± 694.7 mm/annum, while the evaporation is estimated at 1 803 mm/annum.
- The overall drainage is from the study area to the north-east to the Vaal River on the east and to the west to the Taaibosspruit. The general slope in the area is approximately 0.02.
- The proposed Lefa area is underlain by sedimentary rocks from the Karoo Super group's Vryheid Formation.
- Geological structures such as dykes and faults are known to exist in the region of the proposed Lefa Colliery. These structures and the weathered zone are possible pathways of elevated groundwater flow and contamination migration.
- Seam 3a, Seam 2 and Seam 1 will be mined by means of underground board-&-pillar mining with a 70% extraction ratio.
- Two main aquifer systems are found in the proposed Lefa Colliery region. Firstly, the shallow weathered aquifer and secondly, the deeper, secondary aquifer.

Groundwater level information is available for the model area as they were recorded during the 2013 Hydrocensus by RGC. Groundwater levels varied between 2.2 and 25.93 mbs in the boreholes recorded.

In the regions where mining is very deep and no cracking or subsidence occur, the water levels of the shallow weathered aquifer is not expected to decrease significantly, if at all.

With the proposed mining in the deeper aquifer with low flow characteristics, the drawdown cone is not expected to reach more than 1 100 m from the mine boundary.

The overall quality of the groundwater in the area is good with low TDS, sulphate and chloride concentrations. Nitrate concentrations in some boreholes are exceeded above permissible drinking water levels and may be a result of fertilisers or leaking sewage systems.

The ABA concluded by Golder (2013) for Anglo Vaalbank indicated that the inter- and over-burden can be classified as potentially acid generating.

Groundwater Sources:

- Recharge:
  - Natural recharge: in the region of the proposed project the natural recharge is estimated between 1 and 3% of the MAP. Rivers and drainage systems can also be seen as potential recharge sources. Gaining or losing streams play a role here. Losing streams "lose" their water to the aquifer, making it a natural recharge source. The streams in the immediate vicinity of the proposed project have not been identified as losing or gaining streams or even disconnected streams if they are not connected in any way to the groundwater regime.
  - Artificial recharge: Artificial recharge from sources including PCD's, tailings dams, RWD's etc.

are not foreseen since these activities are not proposed for the mining operation.

- Contamination Sources: At the proposed mining operation the potential contamination sources include the underground voids itself, especially post closure and any carbonaceous source which may include ROM stockpiles or overburden stockpiles.

Groundwater pathways:

- Fault zones and dykes surrounding the proposed project area may be potential pathways for groundwater contamination migration. Some site-specific geological structures include fault zones and will be simulated in the numerical model.

Groundwater receptors:

- River Systems: contamination from potential sources may be discharged in terms of baseflow into the receiving river systems in the area.
- Potential groundwater users: In the area of the proposed mining operation's impact zone groundwater users exist. The impact zone may increase should pathways such as geological structures be present. The users from the shallow aquifer is not expected to be impacted on, except where cracking or subsidence occurs which will cause an influx of the shallow aquifer water to the underground mining area. It is strongly recommended that mining occurs in such a manner that cracking or subsidence be minimised or avoided.
- Underground voids: once dewatering of the voids commence, water will flow towards the underground areas and, therefore, act as a groundwater receptor, even though an artificial receptor.

10.13.13 Numerical Model

The numerical groundwater model is used to represent both the flow and contamination/pollution migration of the groundwater regime. The numerical model consists of:

1. Groundwater Flow model,
2. Mass Transport Model.

10.13.14 Groundwater Flow Model

After the steady state calibration have been obtained, the model is set-up for transient state simulations. The boundaries, mesh size, layer type, top and bottom of the layers and aquifer transmissivity of the model remain as defined in the steady state model. The transient state model consists of several stress periods which represents different time frames of the mining activities. The groundwater flow and mass transport conditions remain the same during a stress period. Sources and sinks can change between stress periods but not within a stress period. The groundwater flow model for Lefa Colliery consist of 24 stress periods as indicated in Table 10-21.

Table 10-21: Stress periods and description for the Lefa Colliery

Stress Period	Duration (Years)	Description
1 - 24	1 Year Each	Simulates the proposed underground mining over a period of 24 years.

10.13.15 Mass Transport Model

The mass transport model is used to simulate contamination migration in the aquifer. The main contaminant and a major concern in the coal mining environment is sulphate. Sulphate contamination was simulated for the Lefa Colliery mass transport model. A worst-case source concentration of 3 000 mg/l was used for the underground and potential surface source areas. A general representative source concentration for coal mining activities were applied to the source areas. The parameters used for the mass transport model are indicated in Table 10-22.

Table 10-22: Parameters for the mass transport model

Parameter	Value
Dispersion	5 m
Diffusion	0.00001
Sulphate Source Concentration	3 000 mg/l
Specific Yield	0.08
Storage Coefficient	0.001
Effective Porosity	10%

10.13.16 Results of the Model

10.13.16.1 Pre-facility

Steady state flow model calibration involves the varying of aquifer parameters in the model until the observed water levels correlates well with the measured water levels. The measured water levels must represent the levels prior to any impacts from mining activities. Steady state water levels therefore represent "reality" prior to changes caused by mining activities.

Water level elevations used for steady state model calibration was obtained from hydrocensus information from 2013. The water levels in the boreholes that does not seem to be affected by groundwater abstraction were used in the model calibration.

A good correlation of 92% was obtained. Although the correlation is good in the boreholes used during calibration, very little/no information is available for a large portion of the model area. Due to the heterogeneous characteristics of the aquifer, over or under estimation of the water levels over these areas with little information can be possible. These elevations represent the conditions prior to any impacts from the Lefa Colliery activities.

10.13.16.2 During Facility

The main aim of this geohydrological report is to investigate the expected impacts of the planned activities at Lefa Colliery. The following activities are planned to take place at the Lefa Colliery and were also simulated in the model:

- Seam 1, 2 and 3a underground board-&-pillar mining,
- Surface infrastructure including the Coal stockpiles, Crushing plant, Return Water Dam, Shaft area and Workshop areas.

An investigation into recharge in South African underground collieries, by P.D. Vermeulen and B.H. Usher (2006) concluded that the percentage influx to be expected for the various mining methods is as follows:

- Shallow board and pillar—5–10% of the rainfall
- Deep board and pillar with no subsidence—3–4% of them rainfall
- Stooping—5–12% of the rainfall, or even as high as 20% in some abnormal cases
- Long wall—6–15% of the rainfall
- Rehabilitated underground—14–20% of the rainfall.

Table 10-23 represents the total estimated groundwater inflow to the underground mining voids during mining. A recharge of 3, 4 and 5% was used in the calculations with the most probable recharge at 4% based on the study by Vermeulen & Usher (2006). The total inflows are estimated to vary between 6 and 170 m^3/day during the 24 years of mining. It should be noted that the inflows can increase substantially if geological structures or any other features connect the surface with the underground and especially in areas underlying the alluvial aquifers.

Table 10-23: Estimated groundwater inflows during the operational phase

Year	Area	Groundwater Influx (m^3/day)			Groundwater Influx (m^3/a)		
		Lowest 3%	Most Probable 4%	Highest 5%	Lowest 3%	Most Probable 4%	Highest 5%
Year 1	598930	3	6	9	1105	2210	3315
Year 2	1786240	9	18	27	3296	6591	9887
Year 3	3204670	16	32	49	5913	11825	17738
Year 4	4935250	25	50	75	9106	18211	27317
Year 5	6481510	33	66	98	11958	23917	35875
Year 6	7581240	38	77	115	13987	27975	41962
Year 7	9078950	46	92	138	16751	33501	50252
Year 8	10012530	51	101	152	18473	36946	55419
Year 9	10946110	55	111	166	20196	40391	60587
Year 10	11879690	60	120	180	21918	43836	65754
Year 11	12813270	65	130	194	23640	47281	70921
Year 12	13746850	69	139	208	25363	50726	76089
Year 13	14680430	74	148	223	27085	54171	81256
Year 14	15614010	79	158	237	28808	57616	86424
Year 15	15864200	80	160	241	29269	58539	87808
Year 16	15905600	80	161	241	29346	58692	88037
Year 17	15947000	81	161	242	29422	58844	88267
Year 18	15988400	81	162	242	29499	58997	88496
Year 19	16029800	81	162	243	29575	59150	88725
Year 20	16071200	81	162	244	29651	59303	88954
Year 21	16270760	82	164	247	30020	60039	90059
Year 22	16470320	83	167	250	30388	60775	91163
Year 23	16490910	83	167	250	30426	60851	91277
Year 24	16511500	83	167	250	30464	60927	91391

The simulated maximum drawdown cone in the deep, secondary aquifer as a result of the underground mining activities is presented in Figure 10-24. The maximum extent of the drawdown cone is not expected to exceed 1 100 m from the underground boundaries. The maximum depth of drawdown to the underground is expected to be approximately 155 meters (towards the south-western boundary of the underground underground). Due to the fact that seam contours were not available for the entire underground mining area, drawdown in some areas may be more or less than estimated by the numerical model.

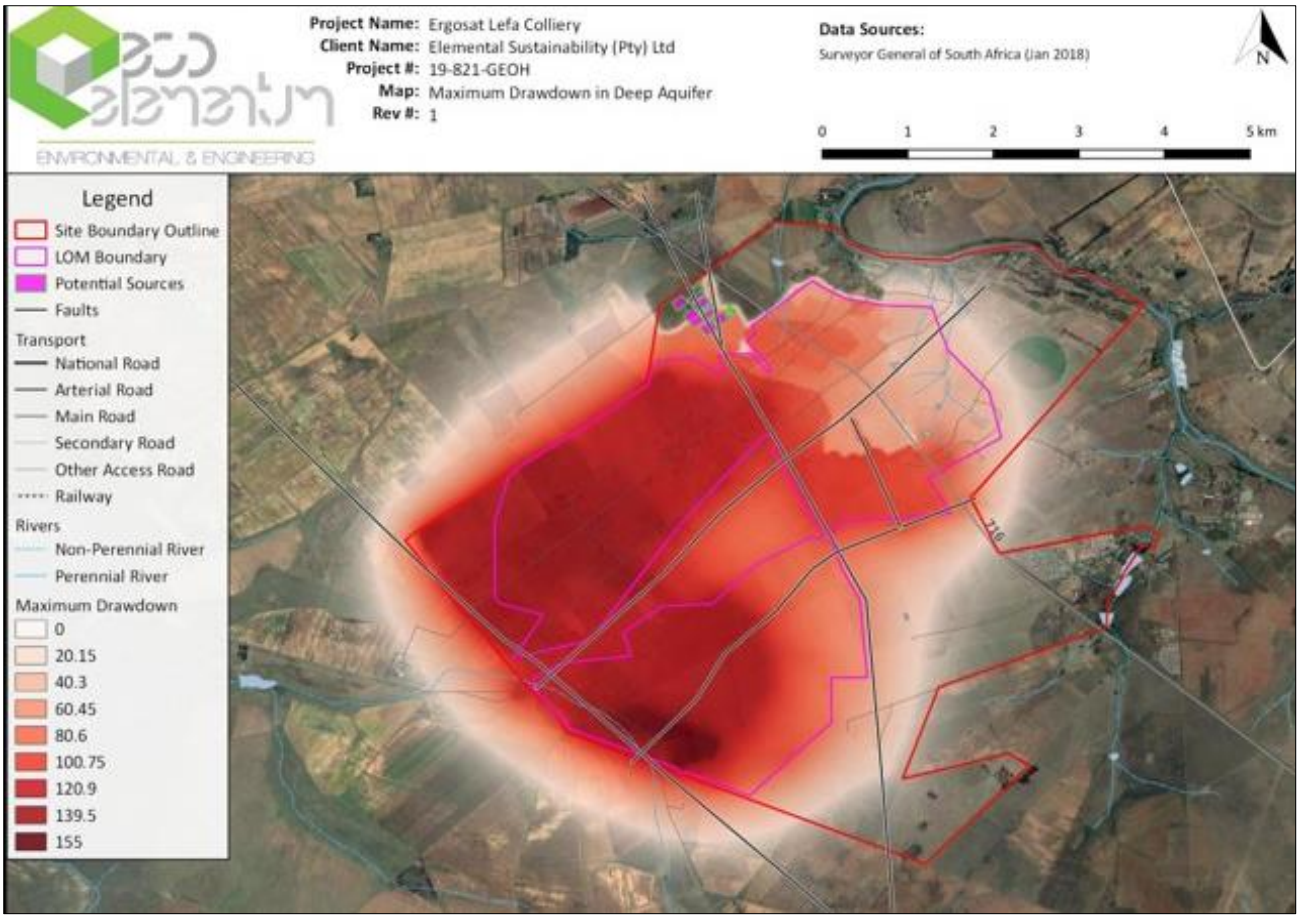


Figure 10-24: The simulated maximum drawdown cone in the deep aquifer for the Lefa Colliery

During the operational phase and for a period after, until the water level has reached equilibrium, a contamination plume will not migrate away from the mining operation in the deep aquifer. This is due to the fact that underground void act as a groundwater sink. Contaminated groundwater, as a result of acid mine drainage will be contained within the underground area. The mass transport simulations for the deep aquifer at the end of the proposed mining operations are presented in Figure 10-25.

The end of mining plume for potential surface sources including the waste stockpiles or spillage from the return water dam are indicated in Figure 10-26. The plume is expected to migrate further along the fault lines as is visible in Figure 10-27. The maximum concentration can reach up to 540 mg/l over the operational phase should continuous contamination exist. The potential source areas will be removed once mining has ceased and the contamination will therefore also stop, and the operational concentrations will start to decrease due to dilution.

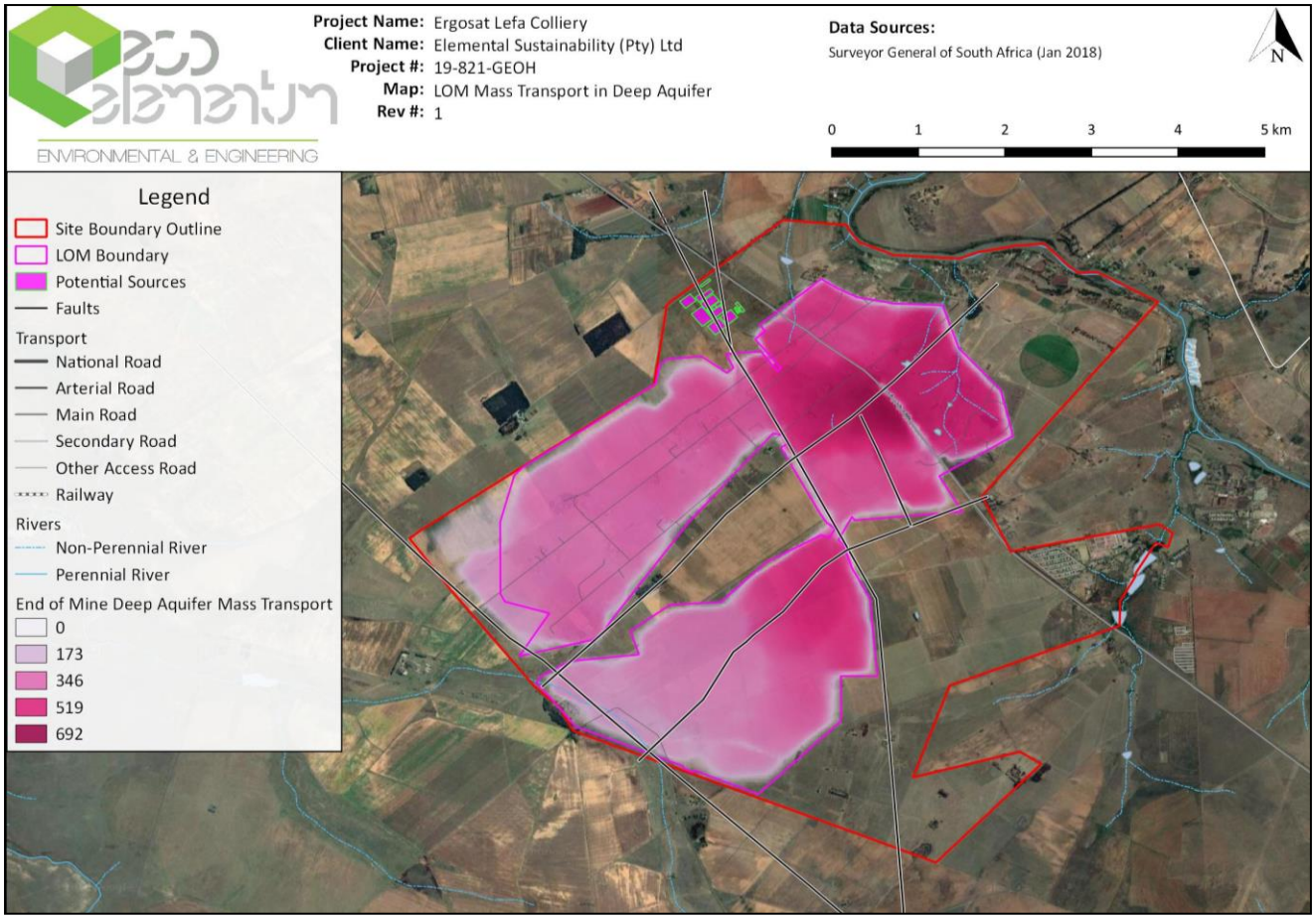


Figure 10-25: The simulated mass transport at the end of the operational phase in the deep aquifer at Lefa Colliery

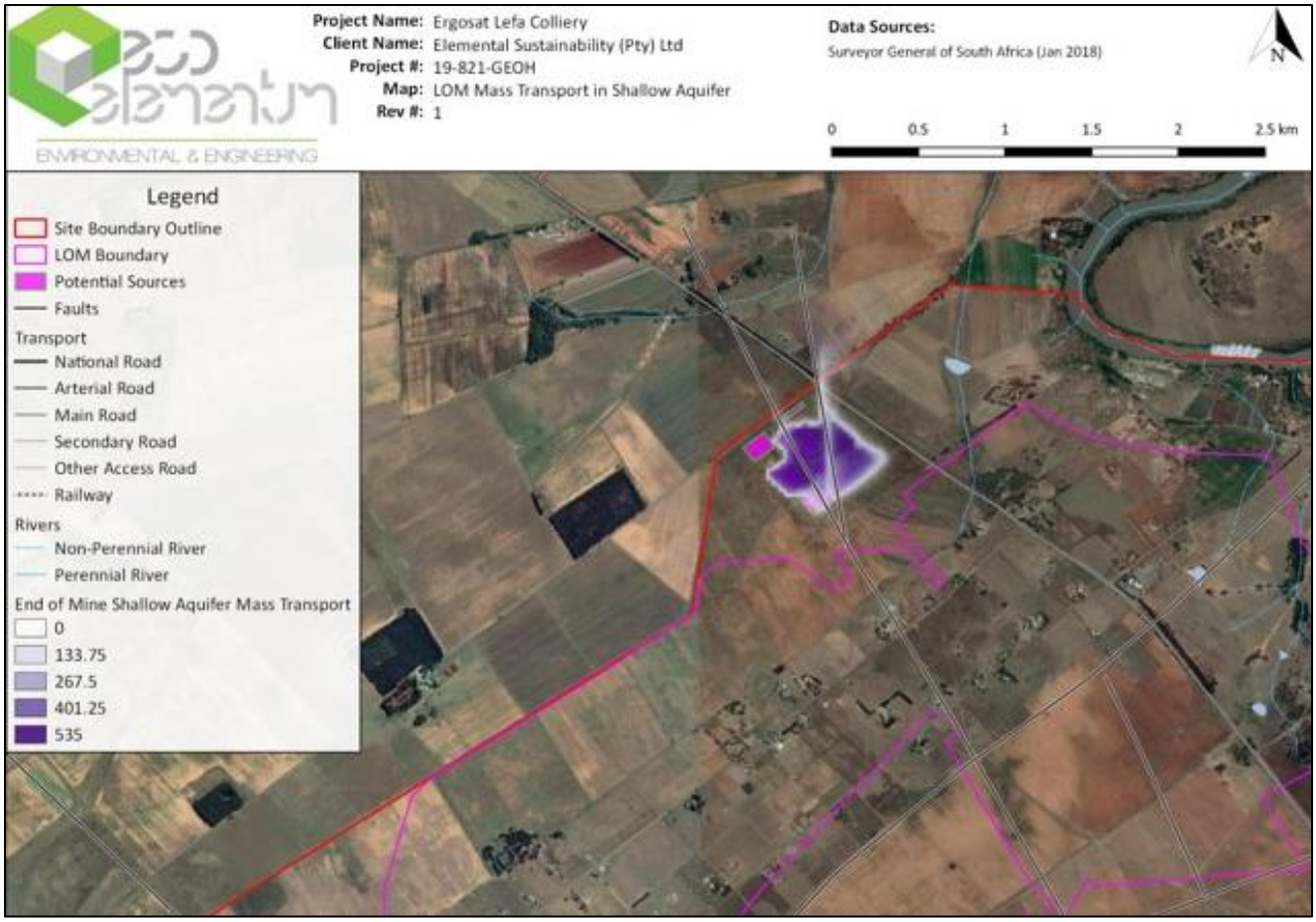


Figure 10-26: The simulated mass transport at the end of the operational phase in the shallow aquifer at Lefa Colliery

4.7.8.5.3 Post-Facility

For the post-facility model simulations, the model was run an additional 100 years for both the flow and mass transport models. The mass transport contours for the deep aquifer are represented in Figure 10-27.

The most common/possible effects of a coal mining operation post-facility are:

- Decanting of the underground into the shallow aquifer and on surface;
- Acid generation and therefore decrease in groundwater qualities in the underground;
- Down-gradient movement of a contamination plume;
- Decant can be expected in the case of one of the following:
- Cracking of the geology as a result of subsidence, connecting the underground mining voids with the surface. In shallow mining areas cracking might occur but the exact location of cracks cannot be pre-determined and therefore should decanting occur from these cracks the position will only be known once cracking is visible or decanting starts;
- Decanting can occur from boreholes drilled into the underground mining voids connecting the surface with the underground void. Decanting will however only occur should the borehole surface elevation be lower than the water levels at any time after the mining voids has started to fill and until the water level reached a new equilibrium post-mining; and
- The lowest topographical point above the proposed underground mining areas is to the north-east boundary of the mining void at 1 438 mamsl. This will for all purposes in this study be seen as the theoretical decant point.

Estimated filling times of the underground mine voids are presented in Table 10-24. It should be noted that the

seam volumes have been estimated by multiplying the area mined with the average seam thickness. The extraction rate was 70% (porosity). Coal seam floor and roof contours were not available for the entire mining area and hence using the average seam thickness in the calculations. It was also assumed that the highest seam roof was below the lowest topographical point above the underground workings at 1 438 mamsl. At a recharge rate of 4% and an abstraction ratio of 70%, it will take the Lefa Underground (Seam1, 2 and 3a) approximately 148 years to fill. Estimated decant rate, if any, for the underground will be approximately 1 2515 m^3/day.

Table 10-24: Estimated fill time of the proposed Lefa underground workings

	Seam 1	**Seam 2**	**Seam 3**
Annual Rainfall (m)	0,6947		
Average Seam Thickness	3,24	3,44	2,28
Mined area for each seam (m^2)	6 708 000	10 554 000	15 614 000
Total void Volume for each seam (m^3)	21 733 920	36 305 760	35 599 920
Combined Mined Area (m^2)	15 976 160		
Combined Mined Volume (m^2)	93 639 600		
Groundwater Influx rate to underground areas (m^3/annum)			
Low recharge 3%	33 2959		
Most Probable recharge 4%	**443 946**		
High recharge 5%	554 932		
Voids (m3):			
70% Abstraction ratio	65 547 720		
Average Time to Fill (Years):	148		

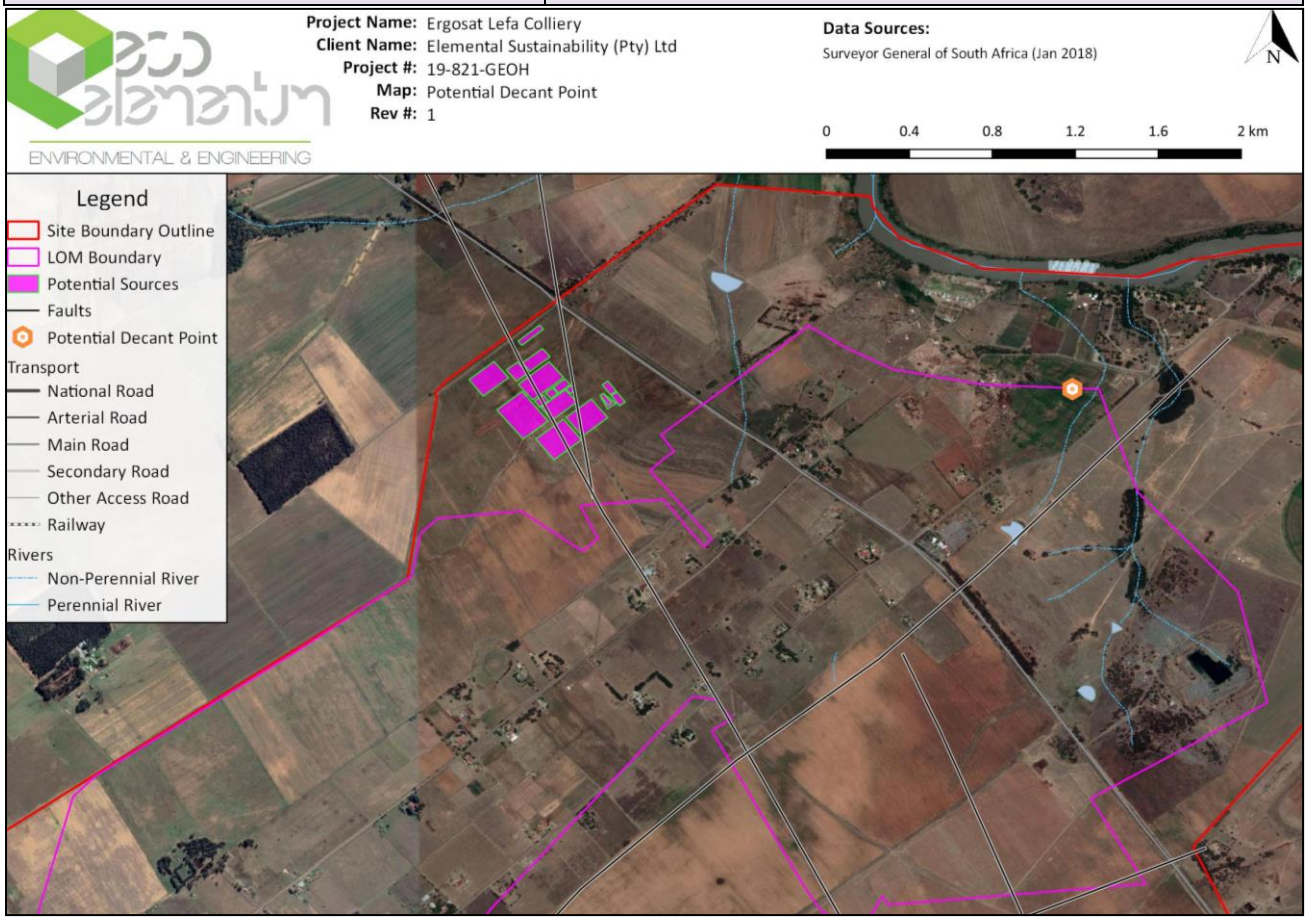


Figure 10-27: The potential theoretical decant point position

The simulated groundwater contamination plume at 100 years post-facility in the deep aquifer is presented in Figure 10-28. The plume will migrate away from the underground area in a north-east and south-west direction similar to the groundwater flow directions. The sulphate concentrations in the underground area increases as a result of acid generation to a concentration over 4 000 mg/l. The contamination plume from the underground is not expected to extent more than 400 m over the period of 100 years post-mining.

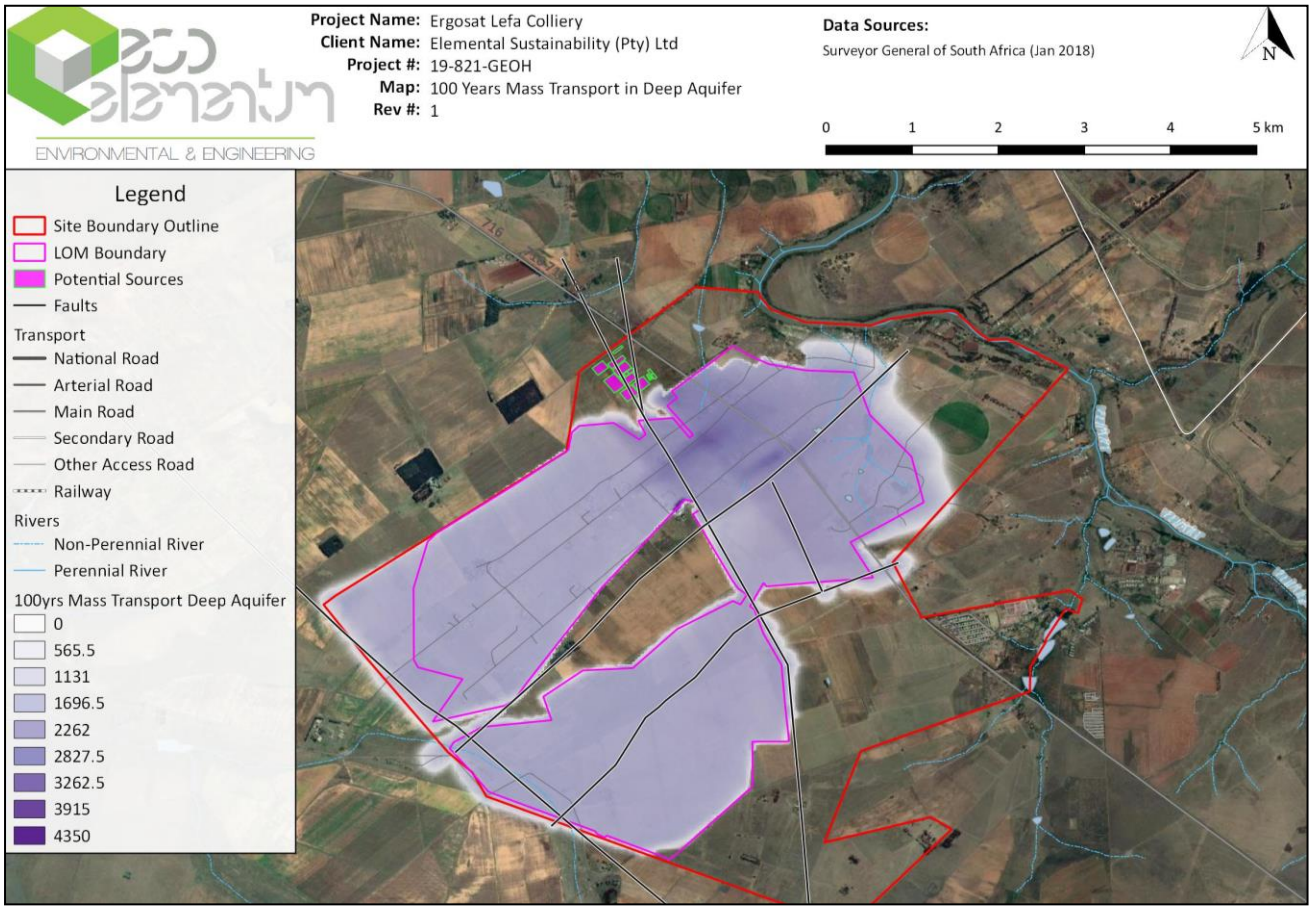


Figure 10-28: Model Simulated groundwater contamination plume in the deep, secondary aquifer at 100 years post facility

10.14 HYDROPEDOLOGY

An additional study has been conducted as part of the WUL process by Geo Pollutions Technologies (Geo Pollutions Technologies - Gauteng (Pty) Ltd, 2019).

10.14.1 Wetland catchment flow reduction

The SANBI Biodiversity Series 22, (2013) Classification System for Wetlands and other Aquatic Ecosystems in South Africa. User Manual: Inland Systems was consulted in determining the estimated flow losses to the specific wetland catchment systems due to mining.

Many wetlands are hydrologically and ecologically linked to adjacent groundwater bodies, but the degree of interaction can vary greatly. Some wetlands may be completely dependent on groundwater discharge under all climatic conditions, whilst others may have very limited dependence such as only under very dry conditions – and some may have no connection with groundwater at all.

Based on the SANBI Biodiversity Series 22, there are two wetland systems:

- **Unchanneled valley bottom** - Water inputs are typically from an upstream channel that becomes dominated by diffuse (surface and subsurface) flow as it enters the wetland and seepage from adjacent slopes. There may also be groundwater input into the wetland. Water characteristically moves through the wetland in the form of diffuse surface or subsurface flow, but the outflow may be in the form of either diffuse or concentrated surface flow
- **Seepage Wetlands** - Water inputs are primarily via subsurface flows from an up-slope direction. Water movement through the seep is mainly in the form of interflow, with diffuse overland flow (known as sheetwash) often being significant during and after rainfall events.

The wetland study found the area has been greatly disturbed by agricultural practices from as early as 1941 and likely earlier. Important to note is that only surface infrastructure and potentially the shaft could impact the two delineated wetlands discussed above. Groundwater or interflow is therefore no considered to be impacted to a significant extent. However, should subsidence occur impacts may result in interflow and groundwater losses.

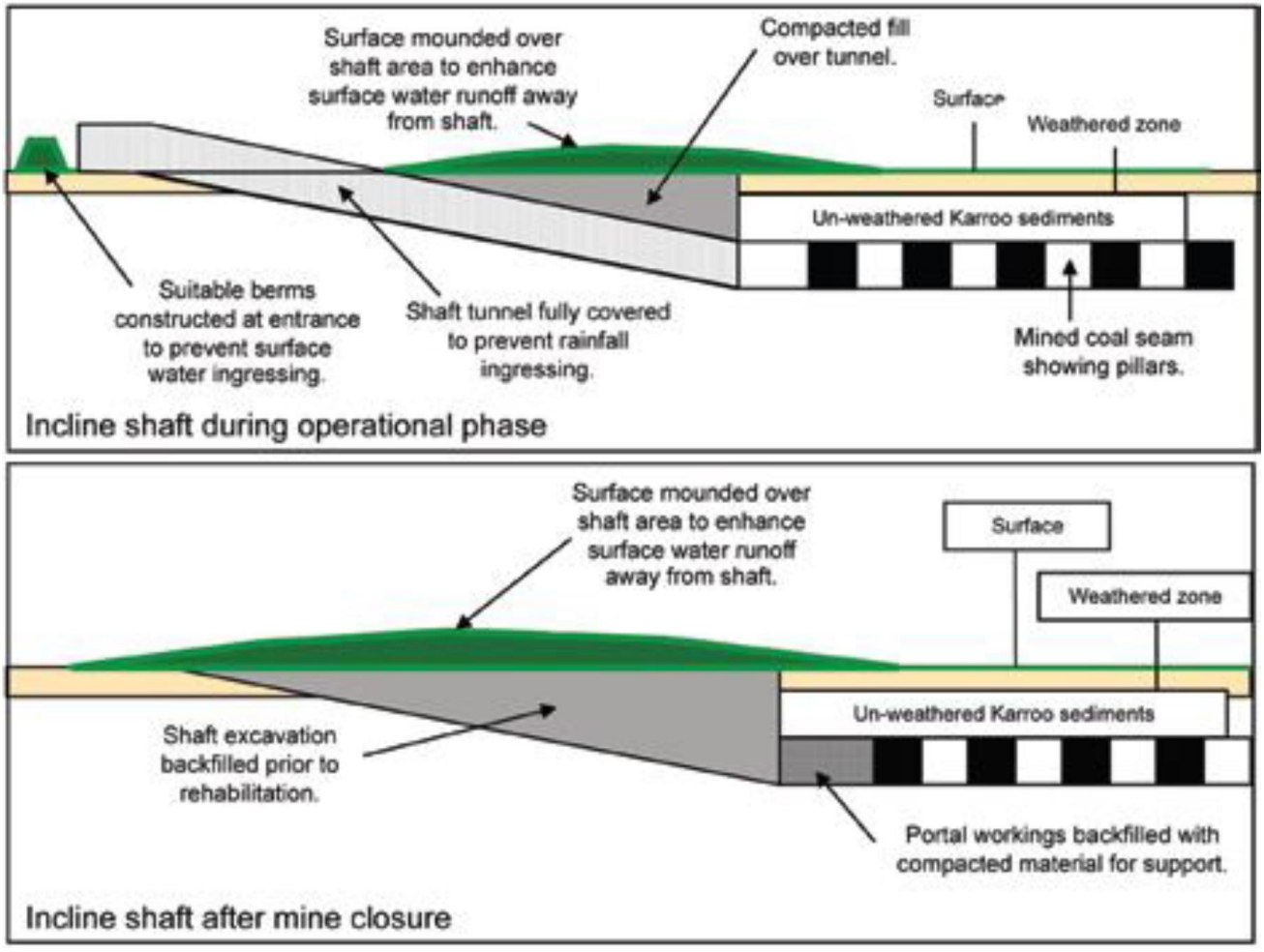


Figure 10-29: Water management of shaft (Best practice guidelines, DWAF 2008)

10.14.2 Impact Expected

The wetlands on site are a reflection of the behaviour of water, predominantly rainfall, and its behaviour following interception and infiltration into the soils. Thus, activities that affect the movement of water as well as its quality in the catchment areas supporting wetlands, translate into changes in the pans to which they are invariably linked.

Expected impacts include:

- Change in hydrology;
- Change in water quality; and
- Loss of wetlands and the biodiversity supported by these wetlands.

Impacts that lead to a change in hydrology include all impacts that influence the quantity (e.g. increased or decreased run-off) and velocity (e.g. concentration of flows) of flows leaving the site.

Increased flows and increased velocity of flows could result in increased erosion within the receiving environment, while decreased flows could result in a decreased pans extent.

Impacts that lead to deteriorating water quality, together with the impacts that change the hydrology, are expected to be the most significant impacts on site. From a wetland perspective, mitigation measures and management plans should focus on these impacts and it will need to be clearly shown in the EIA and EMP how these impacts will be ameliorated to prevent significant deterioration of the quality and quantity of water discharged to downstream areas.

For the shaft and infrastructure scenario the impacts are defined as follows:

- The impacts on the wetlands expected to be on the footprint of the site, the duration of the impact will be medium, the intensity will be low and the impact nearly completely reversible.

Should subsidence occur:

- The impacts on the wetlands expected to be on the footprint of the site, the duration of the impact will be medium, the intensity will be high and the impact irreversible.

It is therefore of critical importance that the mine be designed to prevent any subsidence from occurring.

Table 10-25: Area Information

Area information				
Rainfall	0.680	m/annum	100.0	%
Evaporation	0.408	m/annum	60.0	%
Groundwater Recharge	0.034	m/annum	5.0	%
Mean Annual Runoff	0.068	m/annum	10.0	%
Water in wetland soils	0.170	m/annum	25.0	%

Table 10-26: Wetland flow driver impacts – High extraction subsidence

Wetland system	**Pre development total flows**	**Post development total flow**	**Total loss of flow**	**Loss**
	m^3/a	**m^3/a**	**m^3/a**	**%**
Unchanneled valley bottom	137327.6	102185.2	35142.4	20 -30%
Seepage Wetlands	137327.6	102185.2	35142.4	20 -30%

Table 10-27: Wetland flow driver impacts – No subsidence only shaft and surface infrastructure

Wetland system	**Pre development total flows**	**Post development total flow**	**Total loss of flow**	**Loss**
	m^3/a	**m^3/a**	**m^3/a**	**%**
Unchanneled valley bottom	137327.6	133813.3	3514.2	< 5%
Seepage Wetlands	137327.6	133813.3	3514.2	< 5%

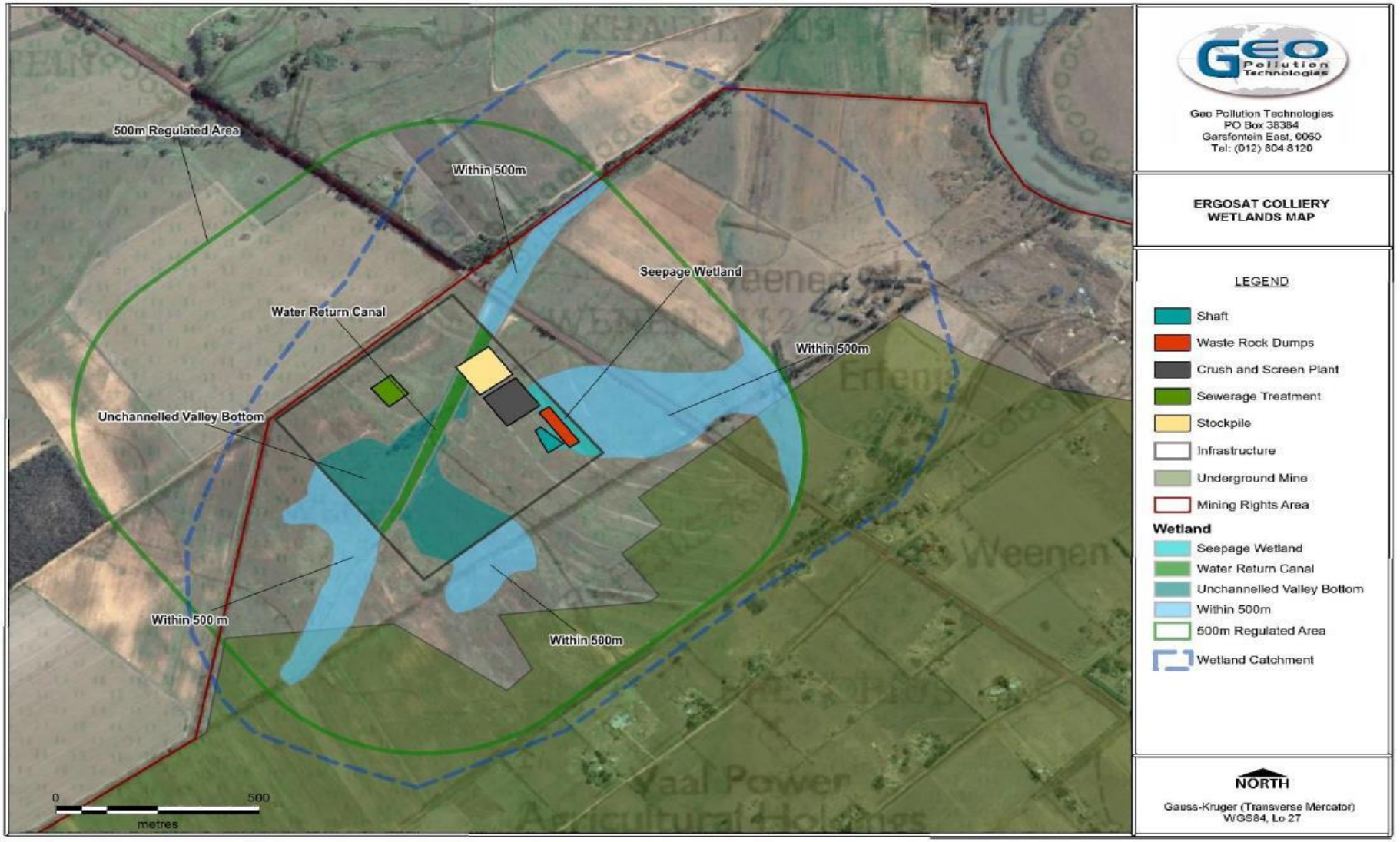


Figure 10-30: Delineated Wetlands with inferred wetland catchment

10.15 AIR QUALITY

An Air Quality Impact assessment was conducted Eco Elementum Environmental & Engineering (Eco Elementum Environmental & Engineering, 2017) and is available in Appendix 12.

For the purpose of the baseline investigation samples has been taken on site for gravimetric dust fallout in $mg/m^2/day$ and particulate matter PM 10 in mg/m^3 converted to ug/m^3 in line with the standard. The samples have been compared to the guidelines and standards while attention has also been given to relevant referencing sites of a similar nature in the vicinity of the proposed project area to determine the impacts that have been experienced before. Passive and active sampling techniques were used for the baseline determination.

10.15.1 Passive Sampling

Site layout for the sampling points has been carried out according to the eight main compass directions; the site layout and equipment placement is done in accordance with the ASTM standard, D 1739 – 2010, thereafter relevant sampling reference numbers were allocated to the receptors accordingly. At each gravimetric dust fallout gauge/receptor point there is a stand built according to specification containing the dust sample collection bucket. Samples are collected after a 1 month running period (+-30days exposure). After sample collection the samples are taken to the relevant SANAS accredited laboratory as required. A visual site investigation is done where after correlations and drawn and findings are identified and reported on.

Dust buckets of a standard size and shape are prepared and set up at locations related to the eight main compass points on the borders of the property so that dust can settle in them for periods of 30+/-2 days. The dust buckets are then sealed and replaced with new empty ones and send away to the SANAS accredited laboratory for analysis. The masses of the water-soluble and –insoluble components of the material collected are then determined and results are reported as $mg/m^2/day$. This methodology is described according to South African National Standards 1929:2004 and the American Society for Testing and Materials (ASTM) Designation: D 1739-98 (2010). The results for this method of testing are obtained by gravimetrical weighing. The apparatus required include open top buckets/containers not less than 150mm in diameter with a height not less than twice its diameter. The buckets must be placed on a stand at a height of 2+/-0.2m above the ground.

10.15.2 Active Sampling

For the Active Sampling the new DUSTTRAK II Dust Monitor that has been used is a battery-operated, data-logging, light-scattering laser photometer that gives you real-time aerosol mass readings. This active sampling machine uses a sheath air system that isolates the aerosol in the optics chamber to keep the optics clean for improved reliability and low maintenance. Samples were taken at the same locations as for the passive sampling as per the sampling layout map in Figure 10-31.

Figure 10-31: Air quality measurement locations during field visit

The sampling layout was established to ensure a regional overview could be obtained for the entire area. Due to the most activities occurring in the infrastructure area, as well as the proximity to the residential homes within the proposed mining licence area, the monitoring was concentrated in this area. Sampling receivers have been established in close proximity to activities which might result in increased dust deposition and atmospheric dust pollution such as open exposed soil surfaces, agricultural fields, gravel and main roads.

10.15.3 Results

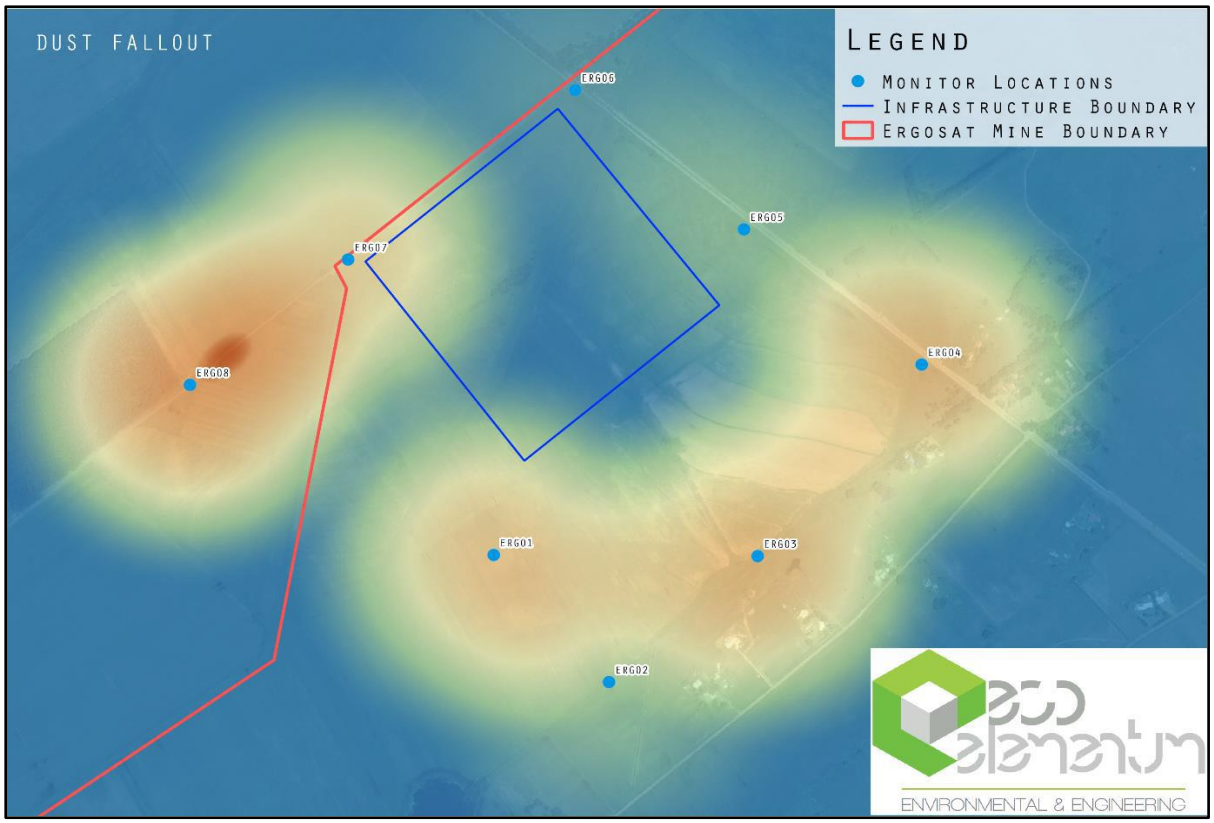


Figure 10-32: Dust Fallout

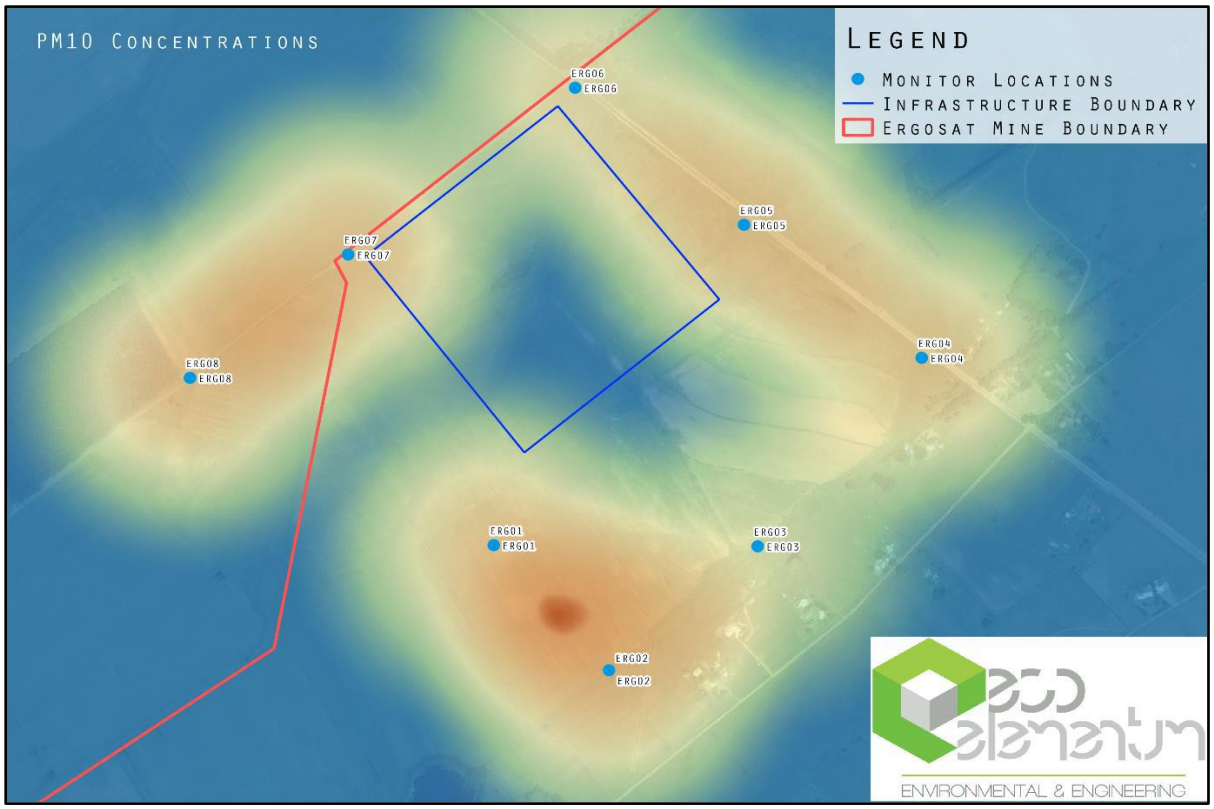


Figure 10-33: Measured Particulate Matter PM10 in ug/m^3 map of site location

Sensitive receptors which have been identified in the immediate vicinity of the study area and proposed project

area have been listed below and is illustrated in Figure 10-34;

- Community homesteads
- Farming homesteads on immediate and surrounding farms
- Agricultural cultivated and grazing lands (not marked on map)
- Surface water bodies (Vaal river, not marked on map, form part of northern boundary)

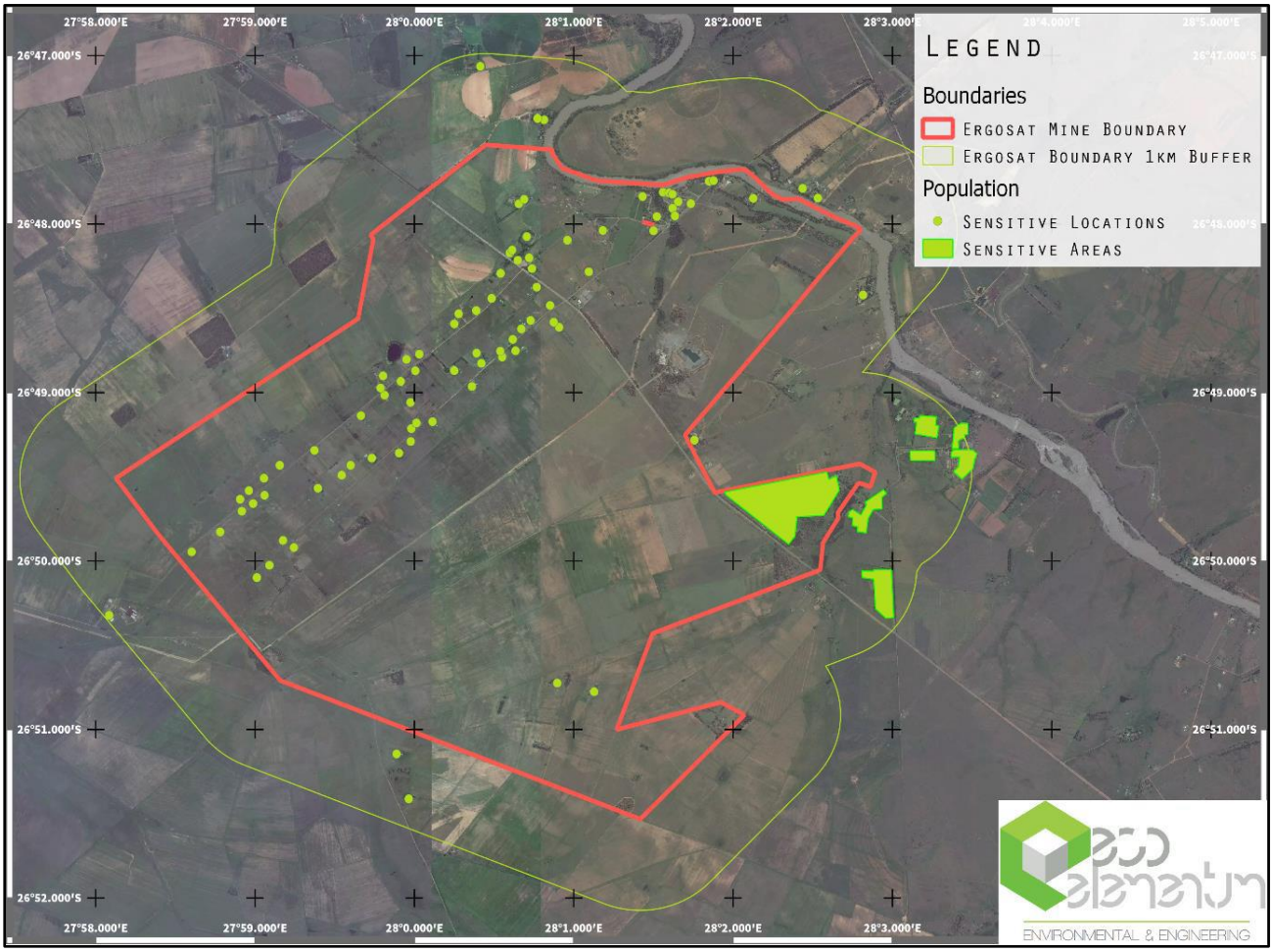


Figure 10-34: Sensitive receptors

Proposed baseline air quality samples for gravimetric dust fallout will be taken for 30day exposure periods which would serve as emission inventory and reference whilst mining commence. It should however be noted that the onsite measurements during the field visit is only applicable to the time period when sampling took place (February 2017) and does not take into account seasonal and other local various that might occur during other months. However, it is still a good general overview of the existing air quality climate.

From the site visits and the desktop study, the following sources been identified as potential pollution causes:

10.15.3.1 Vehicle exhaust gases

Vehicle exhausts contain a number of pollutants including carbon dioxide (CO_2), carbon monoxide (CO), hydrocarbons, oxides of nitrogen (NOx), sulphur and PM_{10}. Tiny amounts of poisonous trace elements such as lead, cadmium and nickel are also present. The quantity of each pollutant emitted depends upon the type and quantity of fuel used, engine size, speed of the vehicle and abatement equipment fitted. Once emitted, the pollutants are diluted and dispersed in the ambient air. Pollutant concentrations in the air can be measured or modelled and then compared with ambient air quality criteria.

10.15.3.2 Veld fires

Veld fires are widespread across the world, occurring in autumn, winter and early spring. In addition to controlled burning for fire-breaks and veld management, many fires are set deliberately for mischievous reasons. Some are accidental, notably those started by motorists throwing cigarettes out of car windows. Emissions from veld fires are similar to those generated by coal and wood combustion. Whilst veld fire smoke primarily impacts visibility and landscape aesthetic quality, it also contributes to the degradation of regional scale air quality. Dry combustible material is consumed first when a fire starts. Surrounding live, green material is dried by the large amount of heat that is released when there are veld fires, sometimes this material can also burn. The major pollutants from veld burning are particulate matter, carbon monoxide, and volatile organics. Nitrogen oxides are emitted at rates from 1 to 4 g/kg burned, depending on combustion temperatures. Emissions of sulphur oxides are negligible (USEPA, 1996).

10.15.3.3 Agricultural activities

Little information is available with respect to the emissions generated due to the growing of crops. The activities responsible for the release of particulates and gasses to atmosphere would however include:

- Particulate emissions generated due to wind erosion from exposed areas;
- Particulate emissions generated due to the mechanical action of equipment used for tilling and harvesting operations;
- Vehicle entrained dust on paved and unpaved road surfaces;

10.15.3.4 Mining activities in the region of the project area

Mining operations like drilling, blasting, hauling, collection, and transportation are the major sources of emissions and air pollution. The use of explosives releases carbon monoxide (CO). Dust and coal particles stirred up during the mining process, as well as soot released during aggregate transport, contributes to emissions and respiratory problems.

10.15.3.5 Trucks passing on the gravel road, loading and offloading raw materials

Dust emissions occur when soil is being crushed by a vehicle, as a result of the soil moisture level being low. Vehicles used on the roads will generate PM_{10} emissions throughout the area and they carry soils onto the paved roads which would increase entrainment PM_{10} emissions. The quantity of dust emissions from unpaved roads varies linearly with the volume of traffic.

10.15.3.6 Wind erosion as a result of ROM material and topsoil stockpiles

The topsoil and waste rock stockpiles generated during the construction phase will be minimal and probably used for construction purposes on site (berm and foundations for buildings), reason being that this will be limited to the mining areas –

10.15.3.7 Material handling (loading, hauling and tipping)

Material handling during loading, hauling and tipping as mining processes has been known to have influence on dust generation in terms of increasing the fugitive dust emissions being generated. With the different kind of materials – topsoil, soft, and hard, tipping will be negligible. The tipping is mostly associated with the ROM at the processing plant vicinity. During these activities factors such as the surrounding wind regime, the material tipping rate, and the moisture content of the material all have an influence on the dust generation at the tipping transfer points.

10.15.3.8 Plant – crushing and screening

There are two basic methods of crushing, either compressive or impact. The main types within these categories are: Compressive; jaw crushers, single and double toggles, gyratory crushers, cone crushers, roll crushers, ball mills and rod mills. Impact; rotary or vertical shaft impactors (e.g. Barmac), hammer mills (fixed or swing hammers). Compressive crushing produces dust but does not in itself produce a great deal of air movement, but rather the material passing through the crusher causes the dust from the process and the processed material to become airborne. Excessive clearance under the crusher can cause a lot of dust generation in the same way

as a high discharge point. Impact-type crushers, for example hammer mills, act as powerful fans and not only produce dust from the impact of hammer on rock, but also blow the dust out.

Screening provides the most difficult dust control problem in mining operations, particularly if dry screening is taking place. Very careful planning of screen layout has to be undertaken to take out the fine cut as early as possible to lessen the dust carried through the screening process, and allow the use of water to both clean chip and allay dust, as water is the cheapest form of dust suppression there is.

In most cases, the crushing and screening process represents a significant source of fugitive dust with high quantities of respirable fractions released to the atmosphere. Dust sources around the plant, apart from crushing and screening, include discharge into hoppers, long open chutes, and from conveyors and transfer points. High discharge heights produce an air pressure blast effect and create turbulence, which carries dust into the air. This also causes particle fracture, and free fall allows the wind to pick up and carry the dust for a long distance from the discharge point.

Current results measured and obtained during the February 2017 sampling period were below the low Residential limit for all but one receptor. ERG08 was on the Residential limit.

The highest gravimetric dust fallout results were obtained at the sampling receiver ERG08 of 608mg/m²/day. The second highest receivers were ERG01, ERG03, ERG04 and ERG07 with fallout concentrations of; 438mg/m²/day, 500 mg/m²/day, 498 mg/m²/day and 389 mg/m²/day respectively. ERG02, ERG05 and ERG06 are well below all limits with a maximum of 141mg/m²/day between the 3 of the receivers.

The area is situated in agriculture land and thus elevated dust levels can be expected because of agricultural related activities. ERG08, with the highest deposition rate, is also situated next to a dirt road contributing to the higher deposition rate. All the samples taken were well below the industrial limit of 1200mg/m²/day and it can be concluded that the air quality regarding dust in the region as it was measured during the sampling period is of good quality.

10.16 NOISE

A Noise Impact assessment was conducted EARES (Enviro Acoustic Research cc, 2017) and is available in Appendix 14.

Receptors include eight (8) different receptors which are residential communities or singular dwellings (also referred to as NSD1 – NSD8). Ambient sound levels were measured at various localities (mainly receptors above) from the 2nd till 7th February 2017.

Based on the measurements the following rating levels were recommended:

- Receptors NSD01 – NSD08: Suburban district daytime rating LReq,d of 50 dBA and night-time rating LReq,n of 40 dBA; and
- It should be noted that this suburban rating is a best-case. Faunal communication, transportation networks etc. were measurable and would raise the ambient sound levels higher than the selected rating level. The closer a receptor is to the R716 the higher the rating level would be. This may include receptors surrounding and including NSD4, NSD5 and NSD7.

A noise impact assessment must be completed for the following reasons:

- if an industry is to be situated within 1 000m of a noise-sensitive development (SANS 10328:2008);
- It is generally required by the local or district authority as part of the environmental authorisation or planning approval in terms of Regulation 2(d) of GN R154 of 1992.

In addition, Appendix 6 of GN R 982 of 2014, issued in terms of the National Environmental Management Act,

No. 107 of 1998, also defines minimum information requirements for specialist reports. In South Africa the document that addresses the issues specifically concerning environmental noise is SANS 10103:2008. It has recently been thoroughly revised and brought in line with the guidelines of the World Health Organisation (WHO). It provides the maximum average ambient noise levels during the day and night to which different types of developments indoors may be exposed.

In addition, SANS 10328:2008 (Edition 3) specifies the methodology to assess the potential noise impacts on the environment due to a proposed activity that might impact on the environment. This standard also stipulates the minimum requirements to be investigated for scoping purposes.

These minimum requirements are:

1. The purpose of the investigation;
2. A brief description of the planned development or the changes that are being considered;
3. A brief description of the existing environment;
4. The identification of the noise sources that may affect the particular development, together with their respective estimated sound pressure levels or sound power levels (or both);
5. The identified noise sources that were not taken into account and the reasons why they were not investigated;
6. The identified noise-sensitive developments and the estimated impact on them;
7. Any assumptions made with regard to the estimated values used;
8. An explanation, either by a brief description or by reference, of the methods that were used to estimate the existing and predicted rating levels;
9. The location of the measurement or calculation points, i.e. a description, sketch or map;
10. Estimation of the environmental noise impact;
11. Alternatives that were considered and the results of those that were investigated;
12. A list of all the interested or affected parties that offered any comments with respect to the environmental noise impact investigation;
13. A detailed summary of all the comments received from interested or affected parties as well as the procedures and discussions followed to deal with them;
14. Conclusions that were reached; and Recommendations, i.e. if there could be a significant impact, or if more information is needed, a recommendation that an environmental noise impact assessment be conducted; and
15. If remedial measures will provide an acceptable solution, which would prevent a significant impact, these remedial measures should be outlined in detail and included in the final authorisation, if the approval is obtained from the relevant authority.

Furthermore, the SANS 10328:2008 and Noise Control Regulations defines a noise-sensitive development to include any of the following:

a) residential districts;
b) non-residential districts;
c) educational, residential, office and health care buildings and their surroundings;
d) churches and their surroundings;
e) auditoriums and concert halls and their surroundings; and
f) recreational areas.

Figure 10-35 below indicates the identified noise receptors:

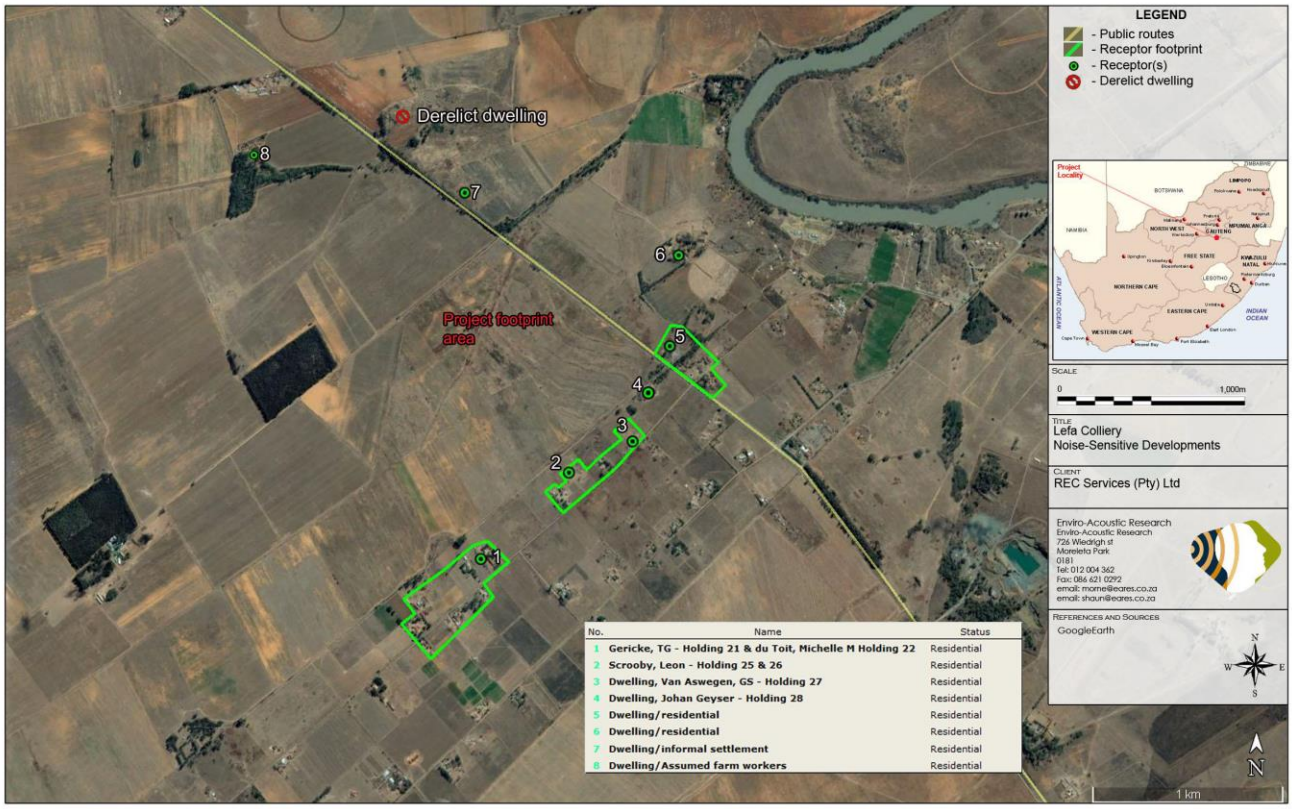


Figure 10-35: Study area & Receptors

The measurement locations were numbered LCLT01 to LCLT03 (long-term measurement locations) and LCST01 - LCST02. Measurement localities are presented in Figure 10-36. Measurement localities were identified initially by means of a desktop analysis but defined by onsite investigations. People that raised concerns regarding noise during the were considered for measurements.

In this measurement section, if the fast-weighted noise level exceeds the IFC noise limit it will be highlighted in **bold red** for better referencing. The SANS 10103:2008 Rating levels will be illustrated using colour coding (developed by EARES). All data will be consolidated to help determine the rating levels or the change of rating levels/IFC criteria for residential areas, and at a stage when the development is in use. It should be noted that measurements were conducted during summertime when faunal communication may be higher than other seasons. This limitation will be considered during data analysis.

Figure 10-36: Localities of ambient sound level measurements

10.16.1 Ambient Sound Levels – Summary

A summary of all LReq based on LAIeq measurements are presented below. The international criteria is also assessed namely the IFC rating level for a residential area.

10.16.2 SANS 10103:2008 typical Rating Levels

Rating Levels:

Longer-term Measurement Point LCLT01: Plot 21 du Toit Homestead –

- Considering the LAIeq daytime data, many of the LR,d measurements indicated rating levels slightly higher than an urban district yet lower than a busy urban district. One day's data indicated industrial rating level (however data influenced by domesticated or faunal communication);
- Considering the LAIeq night-time data, many of the LR, n measurements indicated rating levels slightly higher than an urban district yet lower than a busy urban district;
- During the day dwelling related sounds and domesticated animals was the main baseline contributors.

Longer-term Measurement Point LCLT02: Plot 25 Scrooby Homestead

- Considering the LAIeq daytime data, many of the LR,d measurements indicated rating levels slightly higher than a rural district yet lower than a suburban district;
- Considering the LAIeq night-time data, many of the LR, n measurements indicated rating levels slightly higher than a suburban district yet lower than an urban district;

Longer-term Measurement Point LCLT03: Plot 28 Geyser Homestead –

- Considering the LAIeq daytime data, many of the LR,d measurements indicated rating levels slightly higher

than a suburban district yet lower than an urban or even busy urban district;
- Considering the LAIeq night-time data, many of the LR, n measurements indicated rating levels slightly higher than a business district;
- Domesticated animals were particularly loud at this point.

Shorter-term measurement Points LCST01 - LCST03: Various Locations –
The data indicate that ambient sound levels are similar at NSD5 to NSD7 than the levels measured at the other locations.

ISO/European Union and IFC: General EHS Guidelines
IFC residential areas criteria:
- LCLT01 and LCLT03: Sound levels measured at LCT01 and LCT03 did at times exceed the noise limit of 55 and 45 dBA set out by the World Health Organization, World Bank and International Finance Corporation for a residential area. LC02's data did conform.

The operations of certain industrial operations may occur over a 24-hour cycle (day and night). The most important time of investigations will be during the night-time hours (defined by SANS10103:2008 as 22:00 – 06:00). Five (5) scenarios will be investigated. These would include the planning, construction, operation, closure and decommissioning and post-closure phases. This will allow a comprehensive ENIA during any phase of the project. The most relevant of phases is the operational phase, as the noise capacity that can be generated during this phase can be long-term.

This document briefly discusses blasting and vibration and noise impacts on fauna. However, its methodology and purpose is environmental noise on humans as per 10328:2008. Thus, the most relevant noise to consider is surface infrastructure as underground works will not generate noise at receptors. It should be noted that certain important underground works does extend to surface, with the most important been the mine portal and ventilation shaft.

10.16.3 Phases investigated

10.16.3.1 Potential Noise Sources – Design Phase

There will be no noise generating activities in this phase. However, during this phase certain mitigation options (if required) can be implemented within the design and planning of the project. This includes certain design elements or management decisions which will eliminate or reduce noise generation activities. During the mitigation options section (if mitigation options are required) this phase will be referred to again (planning phase mitigation).

10.16.3.2 Potential Noise Sources – Construction Phase

Construction related scenarios entail the implementation of infrastructure (subsoil, concrete and steel works etc.) and haul routes. It should be noted that only a daytime scenario was considered. Most construction work would likely be conducted during daytimes. At times construction may be conducted during the night due to:
- Concrete work that would be required during one pour (e.g. a concrete slab);
- Working overtime due to schedule constraints that was not met due to bad weather etc.

However, construction works (if applicable) during these hours would likely be kept to a minimum or not have a potential for an impact due to:
- It will be short-term (one or two nights etc.) playing a role in making it "Temporary" on the impact assessment duration criteria. Although the rating level is lower during the night, the night-work (if applicable) may still be a low impact; and
- Working during the night is expensive for contractors (overtime for workers, lighting required etc.) and thus night-work would likely be kept to a minimum;

10.16.3.3 Wash plant

The most relevant noisy activities are briefly discussed below:

- Sub-soil works (compaction of soils, trenching etc.);
- Concrete pouring and vibration (no onsite batching plant was considered); and
- Cranage required moving large components and material.

A "general" noise scenario will be investigated at infrastructure areas (general referring to an accumulation of power tools, trucks etc. used by construction crew).

14.3.2.2 Delivery/Access Routes

Construction or upgrading or existing roads may include the following noise generating activities:

- Deliveries of different road paving aggregate and stockpiling them onsite
- Soil excavations, the removal of soils for foundations by usage of a grader (if required);
- Compaction of soils with a vibrator roller; and
- A road paver and asphalt truck working in conjunction to pave the road if bituminous tar will be used. Roads may likely be unpaved.

A "general" noise scenario will be investigated at infrastructure areas (general referring to an accumulation of power tools, trucks etc. used by construction crew).

10.16.3.4 Blasting

Rock blasting may be required to break down rock to level the ground inside the footprint. However, blasting will not be considered during the Scoping or EIA phase for the following reasons:

- Blasting is highly regulated and control of blasting to protect human health, equipment and infrastructure will ensure that any blasts will use minimum explosives and will occur in a controlled manner; 1
- Blasting is a highly specialised field, and various management options are available to the blasting specialist. Options available to minimise the risk to equipment, people and infrastructure includes:
- The use of different explosives that have a lower detonation speed, which reduces vibration, sound pressure levels as well as air blasts.
- Blasting techniques such as blast direction and/or blast timings (both blasting intervals and sequence).
- Reducing the total size of the blast.
- Damping materials used to cover the explosives.
- People are generally more concerned over ground vibration and air blast levels that might cause building damage than the impact of the noise from the blast. This is normally associated with close proximity mining/quarrying.
- Blasts will be an infrequent occurrence, with a loud but a relative instantaneous character. Potentially affected parties normally receive sufficient notice (siren), and the knowledge that the duration of the siren noise and the blast will be over relatively fast, resulting in a higher acceptance of the noise.

If blasting is required to take place closer than 500m from a receptor's dwelling, it is recommended that the mine consult with a blasting specialist regarding the matter.

10.16.4 Discard/Mineral Residue Deposits Management/Stockpiles or Waste Rock Dumps

Stockpile development usually entails ADT's trucking the aggregate/coal to the stockpile area and loaded by means of a chute (if a ROM stockpile) or dumped by the ADT. Dust suppression trucks are in use in these areas to ensure dust fallout is minimal. Hards, softs, overburden, interburden etc. may likely make use of roller compactors (steel or rubber) to ensure soil and subsoil compaction.

The basic functions of an acoustical nature are briefly discussed below:

- Development and management of the stockpiles (making use of a Front-End Loader - FEL);

- Compaction and management of discard residue top layers (compactor, roller grader, dust suppression by water tanker); and
- Delivery of residue via ADT's (ADT).

A "general" noise scenario will be investigated at infrastructure areas (general referring to an accumulation of power tools, trucks etc. used by construction crew).

10.16.5 Baseline – Cumulative Impact

There exists other noise generating sources within the study area e.g. transportation networks. These sources will not be investigated in the designed modelled scenario as:

- Designed scenarios will be a worst-case investigation. The scenarios investigated/designed is applicable at a time at maximum capacity and should mask any other baseline noise contributors within close proximity to the project; and
- It should be noted that measured and selected Rating Level will represent the baseline noise contributors.

10.16.6 Potential Noise Sources – Operational Phase

Haul Road Design, Specifications & Information

Three separate scenarios will be evaluated based on the tons per month (tpm) that the open cast pits will be delivering ROM. These include 10, 20 and 30 heavy vehicles per hour on long haul routes.

Discard/Mineral Residue Deposits Management

For a designed scenario the ADT will operate on a point as close as feasibly to the receptors, while remaining on the project footprint. The assessed scenario however will consider a direct line-of-sight from the residue deposit in relation to receptors, simulating times when equipment operates at the highest point on the footprint. What should also be noted that berms would likely be implemented on the footprint of the project (e.g. a 2m high berm on project footprint), however noise sources can extend over these berms (e.g. exhaust port above cabin of heavy equipment).

Wash Plants

The following was assumed to take place at the wash plant:

- Material handling/sorting/primary crushing (rotary crusher/grizzly) into manageable lumps;
- Screening of ROM; and
- Weigh-bridge for trucks entering/exiting the development.

No acoustical screening was conducted of individual plant equipment (i.e. brick or building cladding around equipment)

Ventilation Shaft

Ventilation stacks will be used to direct unwanted heat away from the underground mine and to supply air to the underground section. Ventilation fans or shafts have to be placed externally and is sometimes directional facing a receptor.

Potential Noise Sources – Closure and Decommissioning Phase

In general, removal and rehabilitation activities have a significantly lower noise impact than both the construction and operational phases.

The closure phase will be consolidated and considered the same as the construction phase for the following reasons:

- Removal and rehabilitation activities are generally less intense than construction and operational activities;

- Noise levels are lower and will be limited to daylight hours. This reduces the significance of the noise impact; and
- The impact would be similar or less than the construction phase impact.

10.16.7 Potential Noise Sources – Post-Closure Phase

No potential noise impact is envisaged during this stage.

10.16.7.1 Modelling Results

The most important time of investigation would be the night-time hours when the receptors would require a time of rest. Potential operational conceptual road traffic noises are presented in Figure 10-37. Contours were illustrated from 40 dBA onwards. The contours of the roads were assessed separately in a linear fashion, and could be applied to any of the main construction, operational and closure phases. The modelled scenario indicated that haul routes would be a minimal noise source (equivalent value) in relation to other noise sources and at study area receptors.

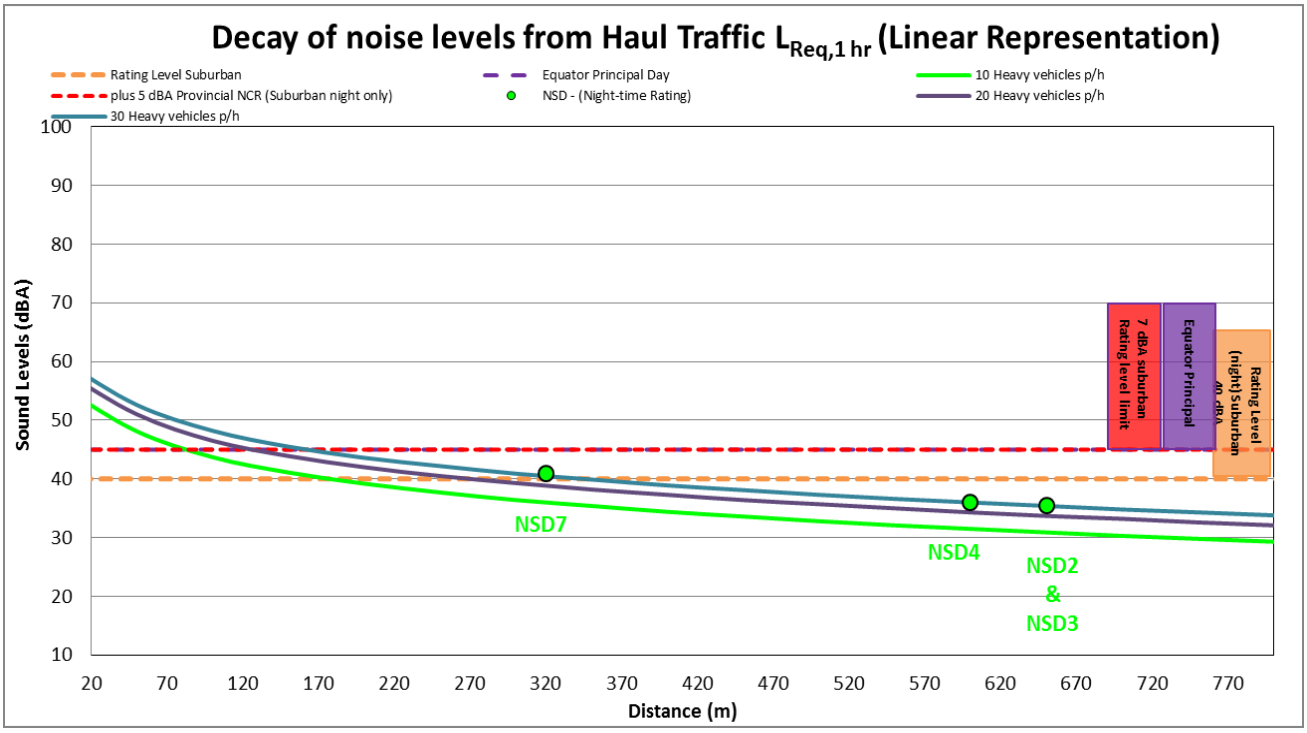


Figure 10-37: Roads assessment – linear representation

Construction

The impact assessment is presented in Figure 10-38 with the linear scenario presented in Figure 10-39. Construction activities are to take place almost over 300m from existing receptors (the closest been NSD2 – NSD5 at app. 280m), is envisaged to only take place during daytime hours and will be short-term in duration. Based on these factors noise projections for the construction phase will comply with the National (GN R154) Noise Control Regulations, SANS 10103:2008 guideline and International Finance Corporation.

Mitigation options are none-the-less supplied for the developer to consider ensuring a low-negligible impact.

Receiver no.	Projected operational noise level - $L_{Aeq,1hr}$ (dBA)	Rating Level ($L_{Req,d}$) (dBA)	Magnitude	Duration	Extent	Probability	Significance Without Mitigation (WOM)	Significance With Mitigation (WM)
Daytime								
NSD1	<50	50	2	2	2	2	12	Significance can be reduced if mitigation options implemented
NSD2	<50	50	2	2	2	2	12	
NSD3	<50	50	2	2	2	2	12	
NSD4	<50	50	2	2	2	2	12	
NSD5	<50	50	2	2	2	2	12	
NSD6	<50	50	2	2	2	2	12	
NSD7	<50	50	2	2	2	2	12	
NSD8	<50	50	2	2	2	2	12	
Comments	During the day the potential for an impact is low.							
Probability of impact	Medium.							
Confidence in finding	Moderate-high.							
Mitigation measures	Mitigation is not required but highlighted for consideration.							
Night-time								
NSD1 to NSD8	**No significant construction related noises during night-times.**							
Comments	No night-time noise impact projected (daytime activities only).							
Probability of impact	Low.							
Confidence in finding	Moderate-high.							
Mitigation measures	Mitigation is not required.							

Figure 10-38: Impact Assessment – Construction phase

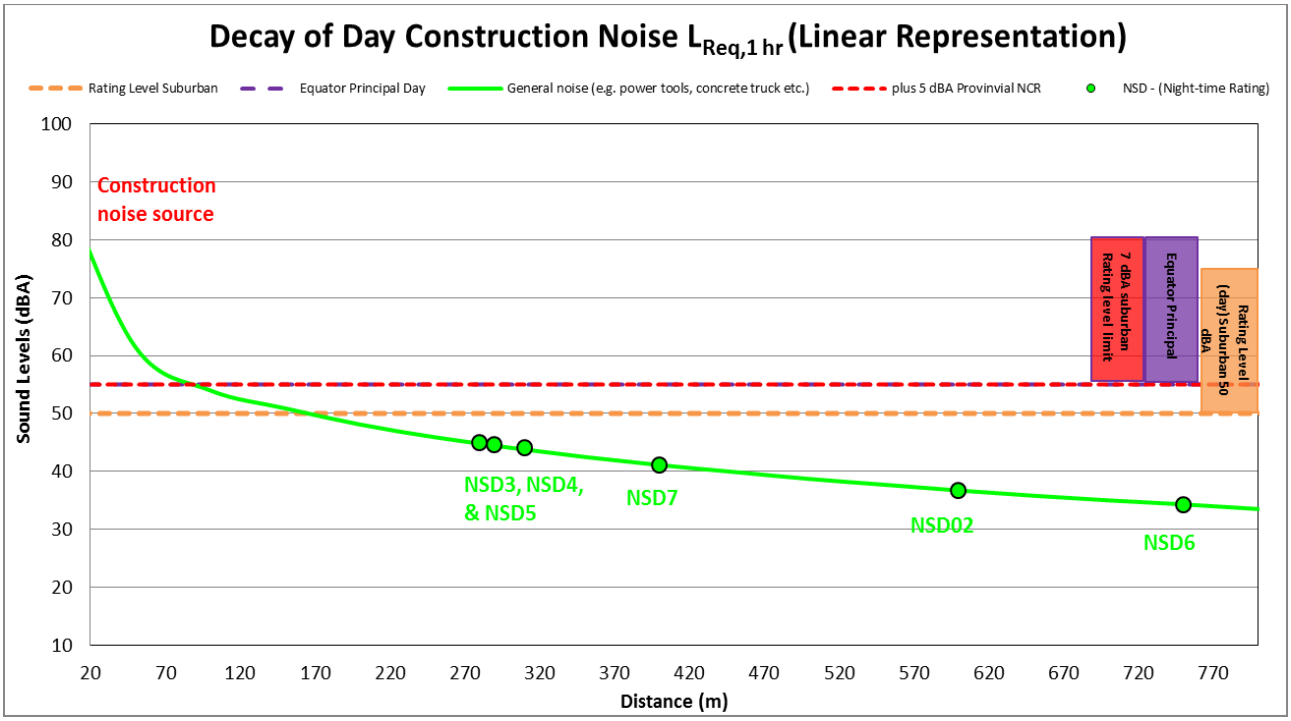


Figure 10-39: Construction assessment – linear representation

Operational

The worst-case scenario for the project is presented in Figure 10-40 illustrating the scenario on a map format and in 3D isopleths. The impact assessment is presented in Figure 10-41.

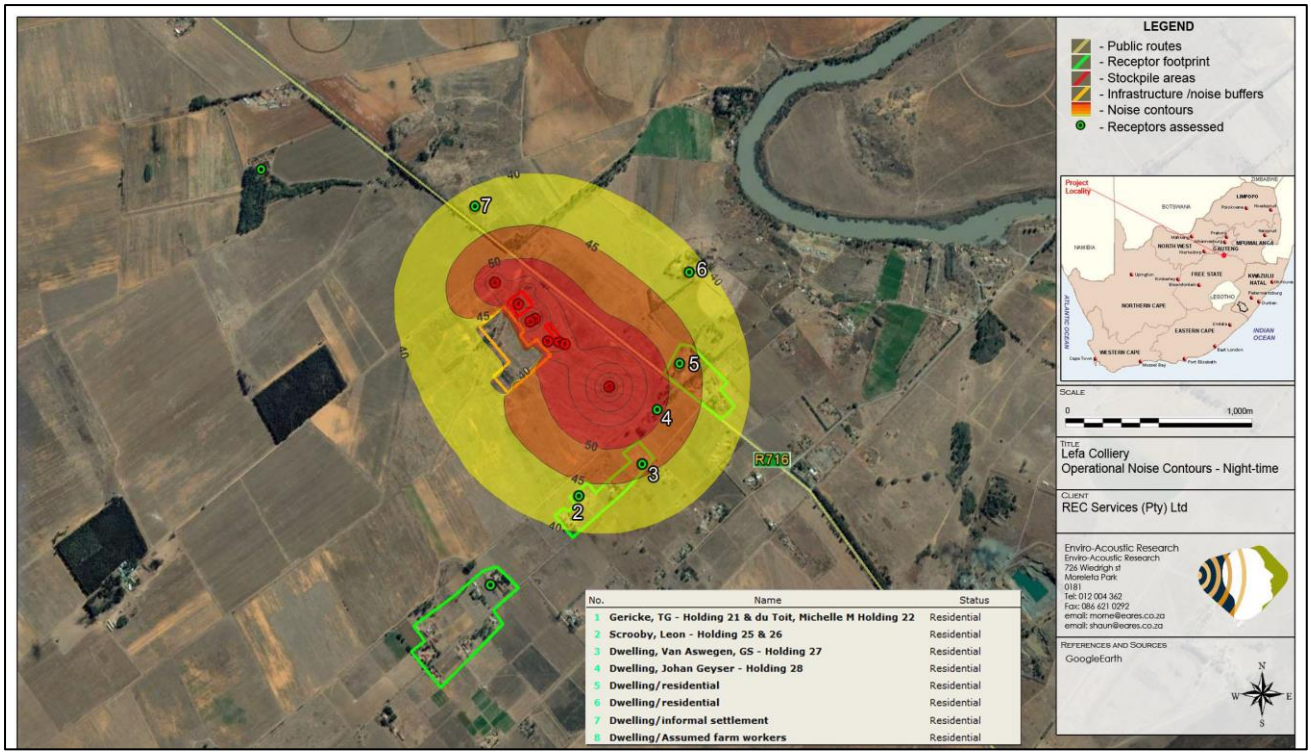


Figure 10-40: Operational phase – Night-time noise rating level contours

The resulting worst-case noise projections indicated that the operations will comply with the National and Provincial Noise Control Regulations, SANS 10103:2008 guideline and International Finance Corporation ***only*** if mitigation options are adhered to.

Receiver no.	Projected operational noise level - $L_{Aeq,1hr}$ (dBA)	Rating Level ($L_{Req,d/n}$) (dBA)	Magnitude	Duration	Extent	Probability	Significance Without Mitigation (WOM)	Significance With Mitigation (WM)
Daytime								
NSD1	<40	50	2	4	2	2	16	Significance can be reduced if mitigation options implemented
NSD2	40 < 45	50	2	4	2	2	16	
NSD3	45 < 50	50	2	4	2	2	16	
NSD4	< 50	50	4	4	2	3	30	
NSD5	45 < 50	50	2	4	2	2	16	
NSD6	45 < 50	50	2	4	2	2	16	
NSD7	40 < 45	50	2	4	2	2	16	
NSD8	<40	50	2	4	2	2	16	
Comments	During the day the potential for an impact is low.							
Probability of impact	Low.							
Confidence in finding	Moderate-high.							
Mitigation measures	Not required for daytime activities.							
Night-time								
NSD1	<40	40	2	4	2	2	16	Significance can be reduced if mitigation options implemented
NSD2	40 < 45	40	4	4	2	3	30	
NSD3	45 < 50	40	8	4	2	4	56	
NSD4	50 < 55	40	10	4	2	4	64	
NSD5	45 < 50	40	8	4	2	4	56	
NSD6	45 < 50	40	8	4	2	4	56	
NSD7	40 < 45	40	4	4	2	3	30	
NSD8	<40	40	2	4	2	2	16	
Comments	Due to the distance of the ventilation shaft in relation to southern receptors and the wash plant in relation to NSD7, mitigation options would be required if the project is to comply with legislation.							
Probability of impact	High.							
Confidence in finding	Moderate-high.							
Mitigation measures	Mitigation required at the ventilation shaft and wash plant (see proceeding section **10**).							

Figure 10-41: Impact Assessment – Operational phase

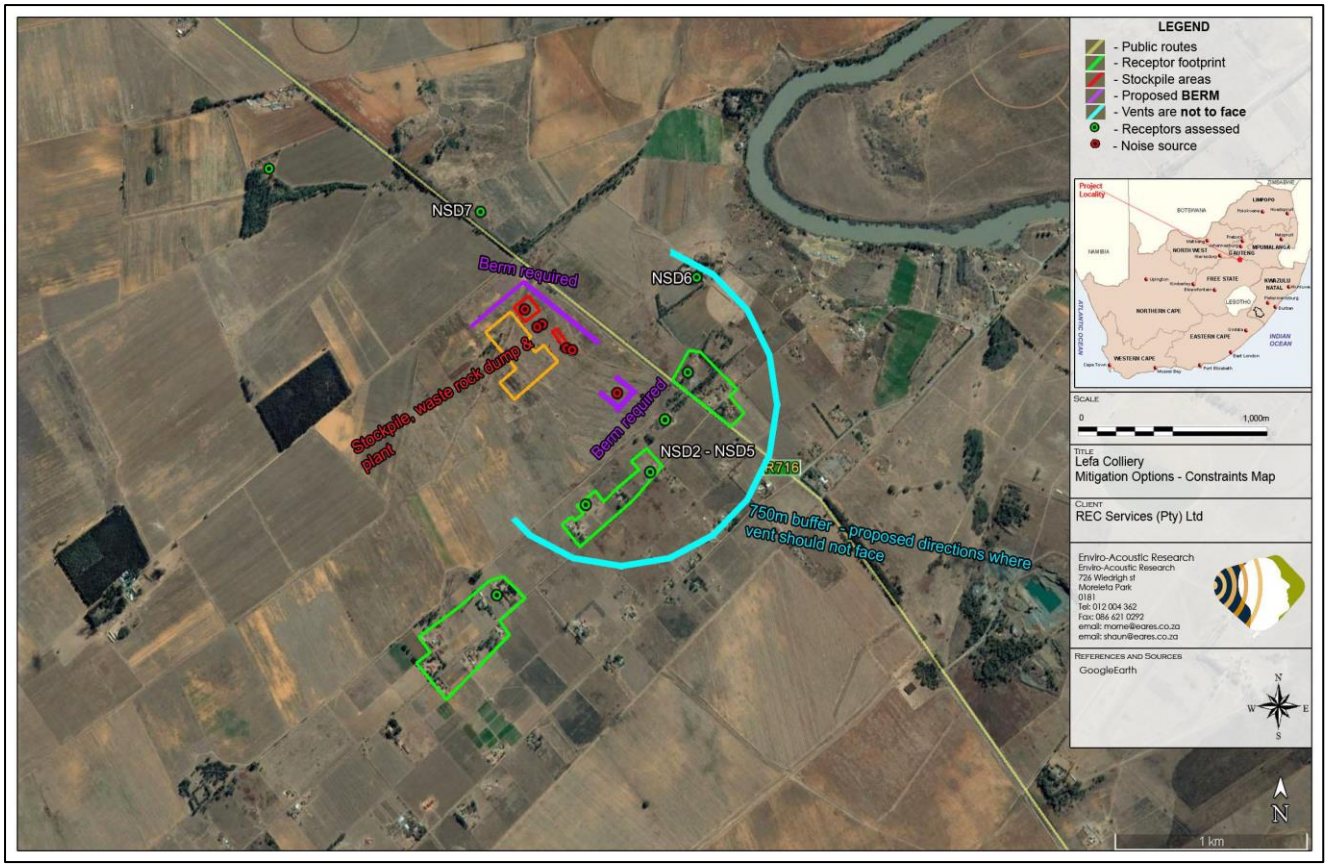


Figure 10-42: All phase important mitigation areas, 750 m buffers and constraints maps

10.16.7.2 Conclusion and recommendation

Assessments done in this document are as recommended by the National/International guidelines and regulations SANS 10103:2008, SANS 0328:2008 and GN R154. The report considers a worst-case scenario, evaluating the potential noise impact during peak hours.

The results of the full ENIA evaluation the significance rating of the noise impacts could be:

- Low (negligible) during Planning phase;
- Low during Construction activities;
- High during the Operational phase (for night-time operations);
- Low during Closure and Decommissioning phase; and
- Low (negligible) during the Post-Closure Phase.

Based on the outcome of the conceptual modelled scenarios a high impact during the operational phase is expected. Mitigation options in the planning and operational phases would be required.

The most important mitigation options recommended include the screening (i.e. masking of the noise by berm/barrier etc.) of the ventilation shaft and wash plant area. The ventilation shaft mentioned above should also not point facing any receptor within 750m from the ventilation fan. The sloping of the stockpile's areas (discards, ROM etc.) should be done facing away from receptors NSD6 and NSD7 (receptors to the east).

A quarterly Acoustical Measurement & Audit Programme is recommended to be implemented and conducted prior to construction phase (to improve the characterisation of the baseline) and during all phases (up till end of closure). Measurements protocol is defined in this document. Noise measurements must be continued as long as there are potential receptors living within 1,000m of the boundaries of the operation, or as long as a valid noise complaint is registered. Feedback regarding noise measurements should be presented to all stakeholders

and other Interested and Affected (I&AP's) parties in the area. The feedback platform and interval periods should be defined by the developer, with an annual feedback period recommended.

It should be noted that this does not suggest that the sound from the project should not be inaudible under all circumstances, this is an unrealistic expectation that is not required (from legislation) or expected from any other agricultural, commercial, industrial or transportation related noise source, but rather that the sound due to the activities from the project should be at a reasonable level in relation to the ambient sound levels as per regulations.

If the layout of the project significantly changes (or assumptions change) as used in this report, that this Environmental Noise Impact Assessment be reviewed with the appropriate information supplied by the developer, including:

- Locality of the noise source;
- Operational time of the noise source; and
- If possible, specifications regarding the noise source.

In terms of acoustics it is recommend that the project be approved, however mitigation options must be adhered to.

10.17 SITES OF ARCHAEOLOGICAL AND CULTURAL INTEREST

A Heritage Impact assessment (Marais-Botes, 2017) was conducted available in Appendix 11.

This project may potentially impact on any types and ranges of heritage resources that are outlined in Section 3 of the National Heritage Resources Act (Act 25 of 1999). Subsequently a Phase 1 Heritage Impact Assessment (HIA) was conducted.

The objective of this Phase 1 Heritage Impact Assessment (HIA) was to gain an overall understanding of the heritage sensitivities of the area and indicate how they may be impacted on through development activities. The site survey took place on 11 February 2017.

In order to establish heritage significance, the following method was followed:

- Investigation of primary resources (archival information);
- Investigation of secondary resources (literature and maps);
- Physical evidence (site investigation); and
- Determining Heritage Significance.

Outside the area identified for the proposed planned infrastructure development graves are situated (co-ordinates: S 26°48‘14.2” E 28°00‘08.3”).

Figure 10-43: Marked grave

The grave has been plotted in relation to the infrastructure area and presented in Figure 10-44 below.

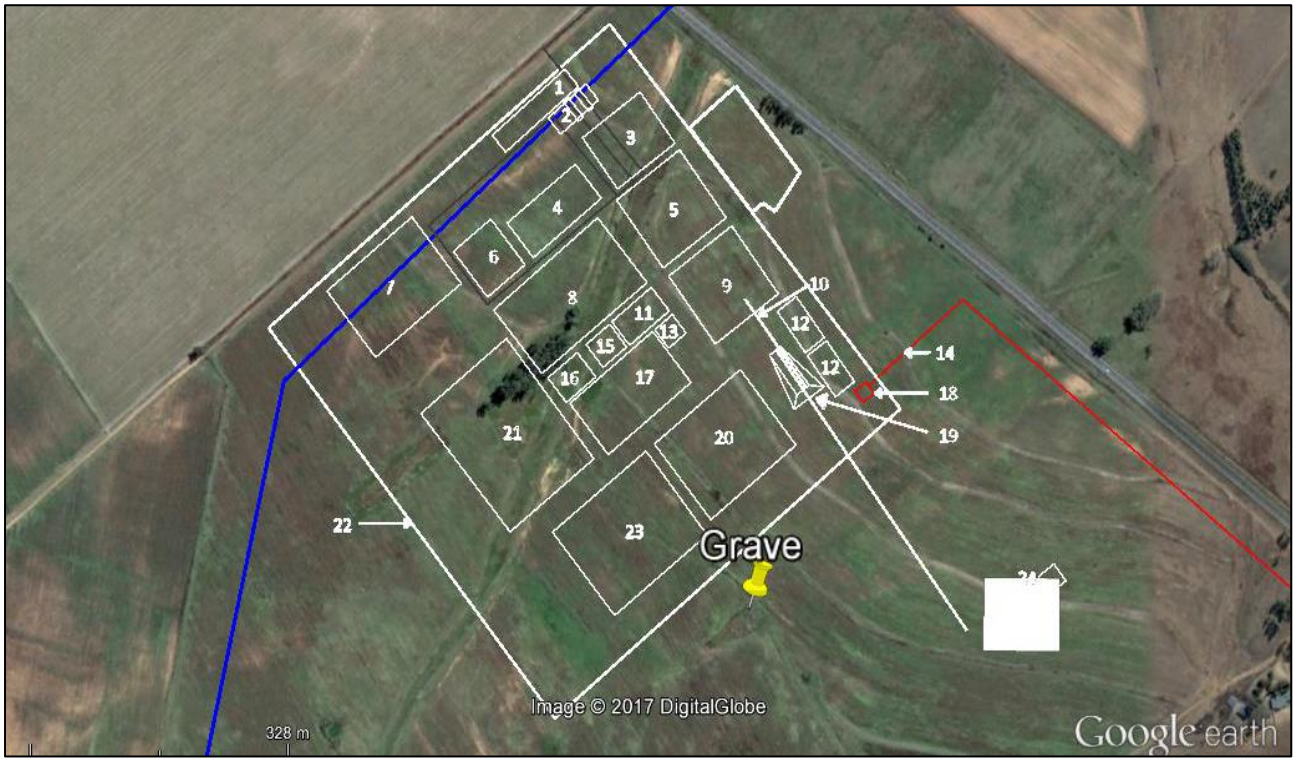


Figure 10-44: Marked grave in relation to the infrastructure area in white

The possibility of graves not visible to the human eye always exists and this should be taken into consideration in the Environmental Management Plan.

It is important to note that all graves and cemeteries are of high significance and are protected by various laws. Legislation with regard to graves includes the National Heritage Resources Act (Act 25 of 1999) whenever graves are 60 years and older. Other legislation with regard to graves includes those when graves are exhumed and relocated, namely the Ordinance on Exhumations (no 12 of 1980) and the Human Tissues Act (Act 65 of 1983 as amended).

If sub-surface graves are discovered work should stop and a professional preferably an archaeologist contacted to assess the age of the grave/graves and to advice on the way forward.

10.17.1 Discussion

- Marked and unmarked graves are situated on the site identified just outside the proposed planned infrastructure. At the time of the site investigation the vegetation was very dense and an accurate count of the graves could not be performed.
- Various structures older than 60 years (protected by Act 25 of 1999 (National Heritage Resources Act)) are situated in the study area, but none on the site earmarked for planned infrastructure.

10.17.2 Recommendations

- Other than the above no other visible restrictions or negative impacts in terms of heritage associated with the study area could be found.
- If any structures older than 60 years are in future earmarked for demolition a Section 34 Application in terms of Act 25 of 1999 (National Heritage Resources Act) must be submitted to the relevant heritage authority.
- It is recommended that the graves situated on the site earmarked for the proposed planned development are conserved in situ. If the proposed outlay for the planned infrastructure cannot be altered the necessary processes and procedures with regard to exhumation and relocation of graves must be followed.
- The discovery of subsurface archaeological and/or historical material as well as graves must be taken into account in the Environmental Management Programme.

10.18 TRAFFIC

A Traffic Impact Assessment was conducted by Engineers (Corli Havenga Transportation Engineers (Pty) Ltd, 2017) and included in Appendix 16.

Access to the mine is anticipated off the R716. The arrow in Figure 10-45 indicates the area where access for the mine is proposed.

Figure 10-45: Proposed access to Road R716

The implementation of access on a provincial or national road is subject to approval from the relevant roads' authority. The mine activities result in significant change in the number of trips that are added to the road, and also turning movements at the access point. In terms of access requirements, there are access spacing requirements and geometric standards for the access that need to be complied with.

The access point on the provincial road also serves other land portions and farms, and access must be maintained. The minimum requirement for access to the mine is normally 100m from the road reserve of the provincial road off the connecting road.

In terms of the COTO, South African Traffic Impact and Site Traffic Assessment Standards and Requirements Manual, TMH 16 Volume 1, August 2012(1), the traffic impact of a change in land uses that coincide with the peak hour on the adjacent road network needs to be evaluated to determine the impact of the additional trips on the road network. The threshold value for a traffic impact assessment is an additional 50 peak hour trips.

To quantify the number of peak hour trips, the COTO TMH 17 Volume 1 South African Trip Data Manual provides trip generation rates for various land uses. Mining is not regarded as a weekday morning and afternoon peak hour trip generator and no peak hour trip generation rates are therefore provided for this land use.

Mines operate with shifts that normally do not coincide with the peak hour on the adjacent road network. Shift change times are normally around the following times:

06:00; 15:00; 22:00. There is also an administrative component with office hours between 07:30 and 16:00. From a traffic impact assessment point of view, we can predict an expected peak hour trip generation for the mine at shift change times and for the admin component. This will be done based on the information obtained from the Mining Works Program.

The staff component is as follows:

Top management	1
Senior management	6
Professional qualified and experienced specialist and mid-management	72
Skilled technical and academically qualified workers, junior management, supervisors, foremen and superintendents	8
Semi-skilled and discretionary decision making	236
Semi-skilled employees	144
TOTAL	**467**

There is also a production side on the mine with consumables coming to the mine and product that leaves the mine to the end users. In this instance the mine will produce coal for delivery to Lethabo Power Station. Figures in regard to transport to Lethabo Power station is as follows:

Production	250 000 tons per month
Production life of mine	11 years
Method of transport	10.7 km overland conveyor

10.18.1 Existing traffic demand

The existing traffic demand was obtained by conducting a traffic count at the intersection of Road R716 and the access road to the Lethabo Power Station during the morning, midday and afternoon peak traffic periods on Thursday, 2 March 2017.

The following periods were surveyed:
Morning period: 06:00-09:00
Midday period: 12:00-14:00
Afternoon period: 15:00-18:00

The normal weekday morning and afternoon peak traffic hours occurred as follows:
Morning (a.m.) peak hour: 07:15 – 08:15
Midday peak hour: 12:00 - 13:00
Afternoon (p.m.) peak hour: 15:45 – 16:45

Based on the traffic counts during the 8-hour period, trucks made up 10% to 11% of the total traffic volume on Road R716.

The traffic impact assessment was done for the two worst-case peak hours that can be expected at the mine. This will coincide with a shift change time. Due to the fact that there are no published trip generation rates for mines, the trip generation was based on employment figures and expected other traffic, production, visitors etc. to and from the mine.

The expected peak hour trip generation at a shift change time is as follows:

Morning shift change (a.m.)	100 trips towards the mine and 72 trips from the mine
Afternoon shift change (p.m.)	72 trips towards the mine and 100 trips from the mine

Product will be moved to the end user at Lethabo Power Station with an overland conveyer approximately 10,7km long.

10.18.2 Conclusion and recommendations

No road upgrades are required for this mine. The access needs to be upgraded to accommodate turning movements.

Access on Road R716

The following is proposed at the new mine access, subject to approval by the Roads Department:

- Access to serve mine on both sides of the R716
- 60m right-turn lanes on the R716
- Taper on the left-turn movements on the R716

Road R716 currently carries relatively low peak hour traffic volumes. With the mine's expected peak hour trip generation added, the expected increase in the traffic flow along Road R716 will be ±93% during the morning peak hour and ±72% during the afternoon peak hour.

The following is recommended for this application:

- Access point on Road R716 must be approved by the relevant roads department;
- The access is upgraded in accordance with the roads department's design standards, conceptual layout in Figure 10-46;
- Access to the surrounding farms that currently obtain access off the existing road must be maintained; and
- Provision is made on the mine to accommodate bus and minibus operators to drop off and pick up staff.

Figure 10-46: Conceptual layout and possible upgrades proposed

10.19 VISUAL

A Visual Impact assessment was conducted Eco Elementum Environmental & Engineering (Eco Elementum Environmental & Engineering, 2017) and is available in Appendix 13.

The proposed mine is an underground mine. The mining method will be mechanised board-and-pillar mining method. Access to the underground mining inventory will be via a box cut, decline shaft and associated infrastructure. Twin decline shafts will comprise of two parallel shafts. One shaft will be dedicated to personnel and material movement and the other to coal conveying. Initially these will be the up and down cast ventilation

tunnels for the mine but up-cast raise bore ventilation shafts will be developed once required leaving the two declines both as downcast. Raise Bore ventilation holes will be developed as part of on-going capital as mining progresses.

The major infrastructure and surface activities will be concentrated in the infrastructure area. Since no information was available for the exact heights, the table below indicate the assumption made regarding surface infrastructure height and represented in Table 10-28.

Table 10-28: Assumptions made regarding surface infrastructure heights

Description	Height	Description	Height
Offices	3	Scrap yard	6
Crush and Screening Plant	10	Sewerage treatment plant	5
Change House	3	Internal parking	2
Medical Facilities	3	External parking	2
Lamp Room	3	Security and Weighbridge	6
Diesel/Oil Storage Bay	5	Truck loading area	8
Workshop	6	Silo- Stockpile	10
Raw Water Dam	3	Overland Conveyor	3
Storage Yard	6	Portal and Decline	6
Stores	6	Power Line	22
Waste Rock Dump	10		
Power Substation	10		
Ventilation Shaft	4		

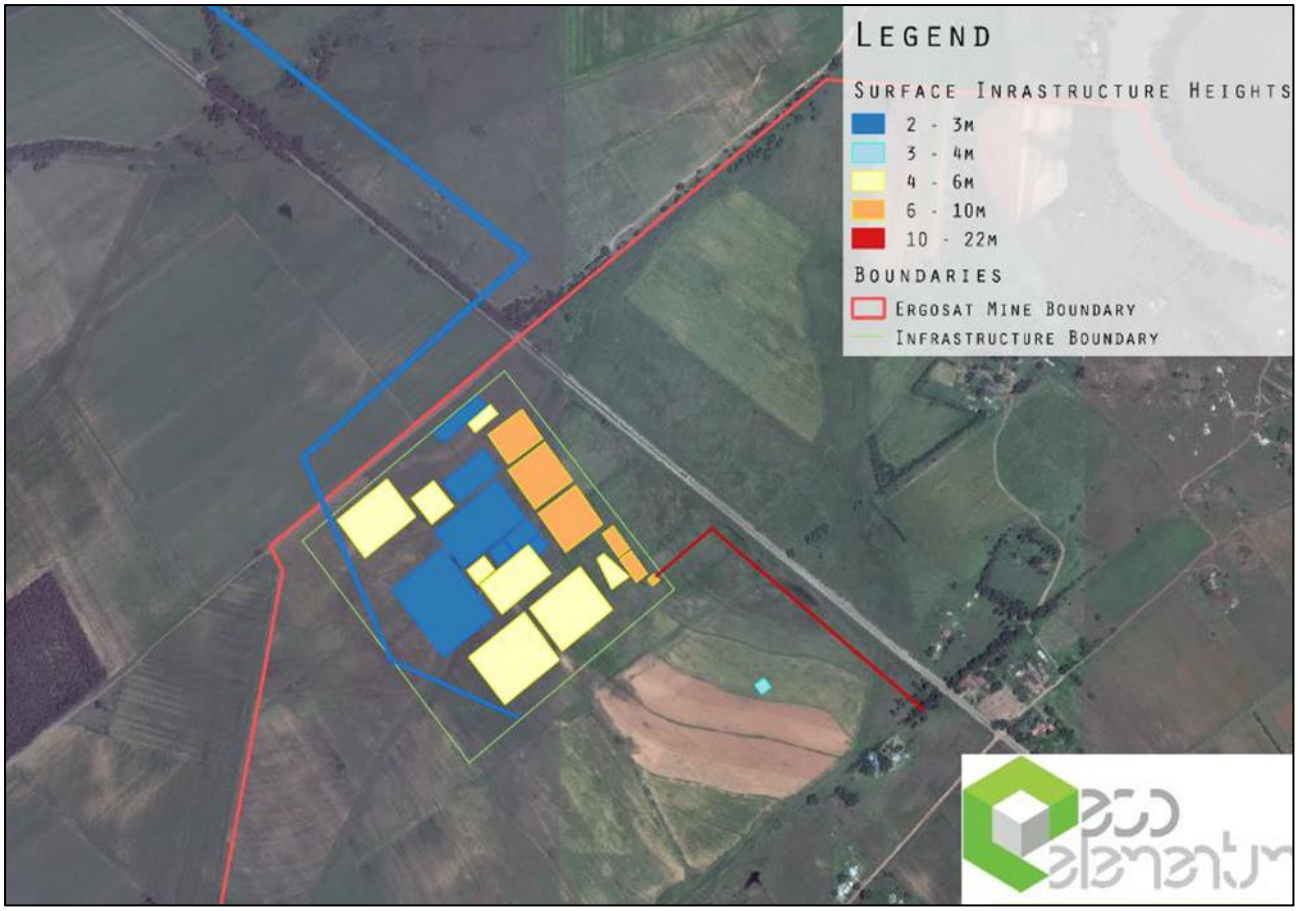


Figure 10-47: Infrastructure surface height ranges

View Points And View Corridors

Viewpoints have been selected based on prominent viewing positions in the area. The selected viewpoints and view corridors are used as a basis for determining potential visual ability and visual impacts of the proposed mine activities. Four main viewpoints were identified based on direction with various others based on sensitivity and visual impact of the area.

Visual Exposure

Visual exposure is based on distance from the project to selected viewpoints. Visual exposure or visual impact tends to diminish exponentially with distance. The visibility or visual exposure of any structure or activity is the point of departure for the visual impact assessment. It stands to reason that if the proposed mine activities and associated infrastructure were not visible, no visual impact would occur. Visual exposure is determined by the view shed or the view catchment being the area within which the proposed development will be visible.

Visual Sensitivity

Visual sensitivity can be determined by a number of factors in combination, such as prominent topographic or other scenic features, including:

- High points, ridges and spurs (visible from a greater distance and determines the horizon effects);
- Steep slopes (tends to be more prominent and visible from a distance);
- Axial vistas

Landscape Integrity

Landscape integrity is visual qualities represented by the following qualities, which enhance the visual and aesthetic experience of the area:

- Intactness of the natural and cultural landscape;
- Lack of visual intrusions or incompatible structures;
- Presence of a 'sense of place '.

Determine the Visual Absorption Capacity (VAC)

The VAC is the capacity of the receiving environment to absorb the potential visual impact of the proposed facility. The VAC is primarily a function of the vegetation, and will be high if the vegetation is tall, dense and continuous. Conversely, low growing, sparse and patchy vegetation will have a low VAC. Topography and built forms have the capacity to 'absorb' visual impact. The digital terrain model utilised in the calculation of the visual exposure of the facility does not incorporate potential visual absorption capacity (VAC). It is therefore necessary to determine the VAC by means of the interpretation of the vegetation cover, topography and structures.

Description of the affected area and environment

The surrounding areas can be described as mostly cultivated agriculture areas. The topography can be described as flat with the Vaal river forming part of the proposed mining right northern border. The proposed mining right area is situated on multiple farms as stipulated earlier in this document. The area subjected to this Visual Impact Assessment is the proposed infrastructure area situated on the remaining extent of farm Wenen 1152.

Sensitive receptors which have been identified in the immediate vicinity of the study area and proposed project area have been listed in
Table 10-29 below.

Table 10-29: Sensitive receptors of the study site

Sensitive Receivers	Locality	Distance from project area
South of Study Area (1)	South of study area	200 m
East of Study Area (3)	East of study area	200 m
North of Study Area (5)	North of study area	On boundary
West of Study Area (4)	West of study area	On boundary
Various Farmsteads (2, 6-12, 16)	Situated around the proposed mining area, predominantly to the south-east	0.5 – 1.5 km
Liquor store (13)	South-east of study area	1.3 km
Day-care centre (14)	South-east of study area	1 km
Small shop (15)	South-east of study area	600 m

Figure 10-48 below indicates the location of sensitive receptors as indicated in
Table 10-29 above.

Figure 10-48: Location of the sensitive receptors as described in the above table

The Sasolburg area is well known for mining activities that take place in the area. The Lethabo Power Station is also situated only 10km to the north-west of the proposed mine. The main land use for the area is agriculture land. The Vaal river that forms part of the northern boundary of the proposed mining right area, flows out of the Vaal dam which is situated ~15km to the south-east.

Due to the flat and agriculture vegetation, the area has a **low to medium visual absorption capacity (VAC).** This means that mining activities can be visually absorbed by the surrounding area. Although the mining activities are long term (i.e. 23)

Sense of place

The concept of "a Sense of Place" does not equate simply to the creation of picturesque landscapes or pretty buildings, but to recognize the importance of a sense of belonging. Embracing uniqueness as opposed to standardization attains quality of place. In terms of the natural environment, it requires the identification, a response to and the emphasis of the distinguishing features and characteristics of landscapes. Different natural landscapes suggest different responses. The sense of place is created by the agriculture and the surrounding Vaal river and dam.

View shed - View Shed Visibility

For the assessment of the visibility of the area, the view shed has been calculated for the amount of surface infrastructure features can be seen from any point on the map (Figure 10-49). It is then further ranked based on distance from the centre of the proposed infrastructure site. The rating of each sensitive receptors is then extracted from the GIS data.

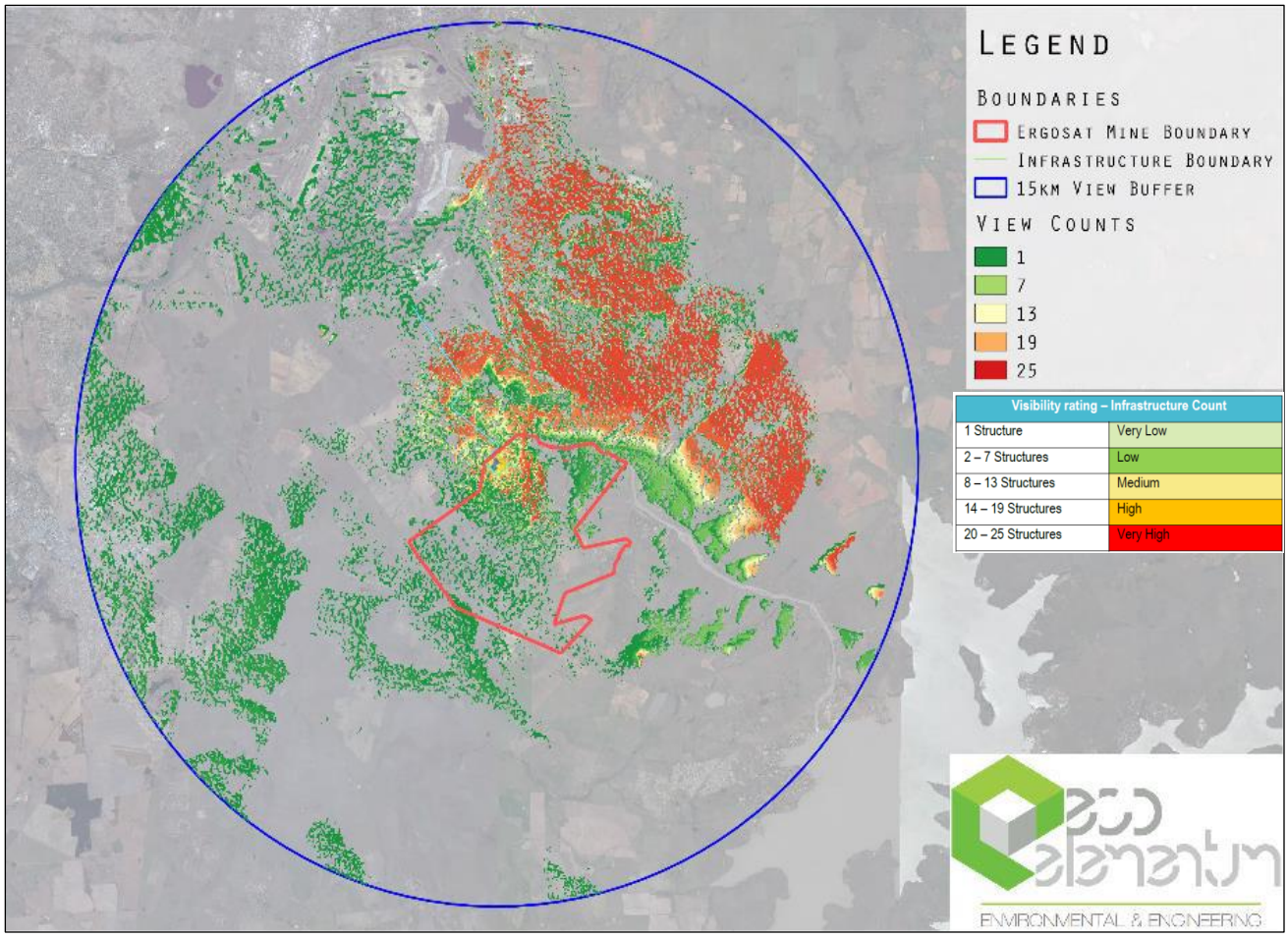


Figure 10-49: View shed of the proposed Ergosat coal project

10.20 SOCIO ECONOMIC CHARACTERISTICS

A Socio-Economic Impact assessment was conducted Index (Integrated Rural 7 Urban Development Expertise (Pty) Ltd, 2017) and is available in Appendix 15.

The study area is located in Ward 19 and borders Ward 18 of the Metsimaholo LM. For purposes of this study the wards demarcations of 2011 were used, as it differs slightly from the proposed 2016 boundaries. Both Wards 18 and 19 are scrutinized in this Report as the combined statistics and characteristics would give a clearer picture of the local area surrounding the site. Unemployment, crime, poor road infrastructure and inadequate health services are some of the challenges facing these wards (Metsimaholo LM IDP 2015/16).

10.20.1 Employment

During the operational phase the mine will employ approximately 530 permanent employees ranging from skilled to semi-skilled and unskilled workers with varying education levels. It is estimated that 100 illiterate workers will be employed to fill unskilled vacancies.

Skilled positions will include top and senior Management, qualified and experienced Specialists, Technical and academically qualified workers, Junior Management, Supervisors, Foremen and Superintendents, and includes:

- Mine manager;
- Environmental Specialist;
- Technical Superintendent;

- Mine Planner;
- Surveyor;
- Production Geologist and Geologist assistant;
- Secretary, Accountant and Office staff;
- Processing plant Manager;
- Boiler makers;
- Electricians; and so forth.

Semi-skilled employment includes positions with discretionary decision-making power, such as:
 Shuttle car operator and vehicle operator;
 Water tanker operator;
 Pump station attendants;
 General crew; etc.

Un-skilled positions are usually positions with defined decision-making and would include the Production miners. According to the Lefa Colliery Social and Labour Plan (SLP) 100 illiterate employees would be employed, with ABET 1, 2, 3, and 4 needs.

Lefa Colliery is responsible for the provision of funds for individual career development and in-service training for employees where the capacity to do so exist. In addition to this the Colliery will provide learnerships, which are registered with the Department of Labour. Internal and external bursaries and internships will be provided in accordance the Mining Charter guidelines.

Management shall accept the responsibility to:
- Develop career development and succession plans;
- Assess the potential of employees and establish a career path for each;
- Ensure the development of each employee;
- Provide a platform for communication of all levels;
- Facilitate communication;
- Ensure an environment openness, honesty and trust;
- Show visible support for leadership development;
- Facilitate career development;
- Give guidance and counselling regarding career development; and
- Provide relevant and updated information.

Employees will be responsible to:
- Assist in career development plan;
- Be motivated and willing to participate in career development;
- Acquire competencies as provided by Lefa Colliery;
- Take charge of own development; and
- Adhere to service obligations.

A ‘Skills, training and development Policy and Plan’ has been drawn up with the purpose to provide guidelines for the implementation and maintenance of comprehensive training and development strategies and procedures.

10.20.2 Employment equity

The number of Historically Disadvantaged South Africans (HDSA) to be employed and developed is reflected in the Lefa Colliery SLP and will annually be evaluated by the Department of Mineral Resources and Energy (DMRE). The purpose of the Lefa Colliery ‘Employment Equity and Policy Plan’ is to regulate, control and guide

on how to ensure effective realization of employment equity strategies which are in line with the SA government's equity policies. Its vision is the employment of a diverse workforce representative of the people of South Africa and thus eliminating all forms of unfair and indiscriminate practices at Lefa Colliery (SLP, Lefa Colliery). It is expected that, in the majority categories, Lefa Colliery will exceed the compliance targets set by DMRE for HDSA employment.

10.20.3 Social Development

As part of a mine's Social and Economic Development responsibility, the mine must get involved with a relevant Local Economic Development Projects as identified in the IDP of a municipality. Lefa Colliery is however not in the position to get involved with the day-to-day running of a LED project, but will make a financial contribution of R1 100 000 annually towards a project of the municipality's choice, over a period of 5 years.

Consultations with the Director of LED at the Local Municipality of Metsimaholo are in progress during which a project will be identified by the said municipality and the necessary stipulations and agreements for the transferring of funds will be made.

The transferral of funds can however only be possible once the mine is in full and successful production and production can only commence on receipt of a mining right (Lefa Colliery SLP, June 2017; Ref. No. 10033).

10.20.4 Decommissioning Activities

The estimated life of mine is 25 years and closure will be approximately 1 year. Concurrent rehabilitation of the mine has to be undertaken with underground mining with final rehabilitation taking place after the operational phase has come to an end. The decommissioning and closure phase of the underground mining will occur with the decommissioning of the mine. This phase ends when the site obtains a Closure Certificate from the regulatory authorities, but may include a period where there is no activity on the site other than monitoring prior to closure being completed.

Primary activities usually associated with Closure and decommissioning are:

- Sealing of underground workings;
- Dismantling/demolishing and removal of the plant, workshops, conveyors and administration and other buildings (where required). Conveyors are usually dismantled and sold as scrap;
- Rehabilitation of the coal stockpile areas;
- Rehabilitation of roads and overland conveyor belt areas. All hardened areas that will not be used after mining are ripped and then covered with topsoil before it is being seeded; and
- Maintenance and monitoring of rehabilitated and surrounding environments.

Retrenchments of workers are likely during this phase.

10.20.5 Retrenchments

Management will, on a continuous basis, introduce indirect measures to lessen the severe impact that retrenchment or closure might have on the workers.

a) **Re-skilling**
   During the skills needs assessment to take place every second year, workers will have the opportunity to stipulate their training needs with regards to re-skilling with portable skills when closure becomes unavoidable. As part of the learnership and Skills Development Programmes, Lefa Colliery will also provide their workers with portable skills.

b) Retrenchment
   Should retrenchment become unavoidable prior to 25 years, Lefa Colliery, will advise workers, their

representatives and union representatives (if available), well in advance to allow time for the necessary counselling and assistance. Counselling is necessary to overcome the shock and distress of being retrenched and assistance is necessary in obtaining other employment and manages retrenchment packages.

Of these workers who will be retrenched, consideration will first be given to those workers closer to retirement and who are not the sole breadwinners of their families.

c) Re-deployment

Those workers who do not qualify for early retirement, will be redeployed in other ventures owned by the owners should they wish to continue their employment with the owners. The owners are involved within varies sectors of the economy where workers with these specific skill sets can easily be redeployed.

d) Establish Future Forum

The establishment of a formally constituted forum will be in place as soon as the mining right has been awarded as per requirement.

10.20.6 Post Closure phase

Post-closure is associated with care and maintenance over areas from which infrastructure had been removed and where rehabilitation took place and lasts 5-years. Monitoring of aspects such as surface and ground water quality and the indefinite management of decant levels by pumping water out of the pit and underground voids to the MWRP for treatment. Further retrenchments during this phase are usually possible if workers are not deployed to other sending areas.

10.20.7 Stakeholders for SIA

Stakeholders within the primary and secondary spheres of influence are identified throughout the public participation and SIA processes. The sphere of influence is determined by the degree of impact that will potentially manifest. Geographic location of the stakeholder can aid the categorisation, but does not necessarily award a higher level of impact to a stakeholder that is located in closer proximity to the project.

Stakeholders that have been identified as relevant include:

i. Primary sphere of impact:

- Private directly affected landowners within the mining right area
- Neighbouring landowners
- Willow Creek Residential Estate and Home Owners Association
- Department of Correctional Services (Groenpunt Prison)
- Local businesses located in the mining right area
- Land claimants (should any land claims exist)

ii. Secondary sphere of impact:

- Deneysville and Refengkgotso communities
- Metsimaholo Local Municipality
- Lethabo Power Station
- Anglo Thermal Coal
- Government Departments (Department of Water & Sanitation; Department of Agriculture; Department of Land Affairs, etc.)
- Environmental and water bodies, forums, groups and associations

iii. Indirect impact spheres:

- Farmers / Agricultural Unions
- Fezile Dabi District Municipality
- South African Police Service
- Viljoensdrift Villages
- Eskom Villages: Bertha Shaft Village

10.20.8 Conclusion and recommendations

The proposed mining right is located in an area characterised by residential, agriculture and small-scale businesses as main land uses. Lethabo Power Station is situated north of the site and Deneysville, located 10 km to the south, currently features some, but limited, tourism-related establishments and activities. Permanent and holiday accommodation are evident towards the banks of the Vaal River.

- The study area is sparsely populated and although crime levels have increased steadily over the last number of years, the local community perceive the area as being relatively crime free.
- Local land owners attach high value to their 'sense of place' and many rely on agriculture as a means of income or practice subsistence farming.
- Negative impacts on property values and land sales have already occurred and due to the uncertainty of the process, will in all likelihood continue up until such time when the mining right is awarded or rejected.
- Negative attitude formation and mobilisation against the proposed Lefa Colliery has already manifested. Transparent communication with stakeholders is essential. If the mining operation is managed sufficiently the significance of the impact could reduce. However, any issues that arise during the course of the process and that are not handled adequately could act as a catalyst that would increase the severity of the impact again.
- It is unclear to I&APs who the applicant is and any attempt by stakeholders to obtain more information with regards to the company has been fruitless. Due to the lack in transparency, issues of distrust have emerged, which heightens negative community mobilisation towards the project.

Construction phase

Positive impacts associated with the construction phase mainly relate to employment and impacts on the local economy. The use of locals in employment as well as local SMMEs, local procurement and so forth will increase the overall significance of the impact.

- The definition of a "local workforce" has to be defined and this, as well as the skills requirements has to be communicated to the local communities. Work with the local Municipality and Councillors to ensure that no unrealistic job expectations are created.
- The formulation of a 'Contractor Social Management Plan' (CSMP) and implementation of its requirements for the duration of the construction period is imperative.
- Negative impacts during this phase (short term) can generally be effectively mitigated.
- Negative health and safety impacts of high significance for workers and locals may occur (death) if the construction process is not managed adequately.

Operational phase

- Many of the identified negative impacts associated with the operational phase can only be mitigated if the supply of clean and adequate water is guaranteed to the landowners. Test boreholes on all affected private properties at regular intervals, make the results known to the property owners and keep record of test results.
- Establish an Environmental Forum represented by land owners, the mine operator and independent specialists and conduct quarterly meetings where issues relating to the environment and possible water pollution issues can be discussed.
- Should boreholes be affected, implement an Action Plan / Emergency plan that will ensure that clean water (on-tap) is available to all the affected land owners without disruptions.
- Possible encroachment of underground mining operations on the Sasol gas pipeline servitude and on buffer areas required between existing housing infrastructure (Vaal Power Smallholdings) and the underground mining has been raised as a concern and should be investigated. The smallholdings are approximately 3,5 to 4,7 hectares in extent and houses located approximately 200 to 300 meters apart.
- The Colliery with its associated environmental impacts, should it manifest, has the potential to impact on the community's 'sense of place' and water resources, which could result in land use changes with far-reaching economic spin-offs for land owners, farmers, their workers and local business.

It is further recommended that:

- More than one EIA and EMP Report be made available for public scrutiny and that CDs be distributed to key stakeholders. Many of the registered I&APs on the database do not have access to the internet and it would thus not be possible for them to review these documents electronically.
- All Mitigation and Management measures as proposed in this SIA report, where applicable, be included in the EIA and EMPR for the proposed Lefa Colliery.

10.21 SASOL PIPELINE RISK ASSESSMENT

An independent Risk Assessment has been conducted by Big Rock Engineering (Big Rock Engineering CC, 2020).

From a geotechnical point of view, the area is located in what is known as the Vaal Basin. A disproportionate number of pillar collapses occurred in the Vaal Basin, mainly at the Coalbrook, Cornelia and Sigma collieries. Van der Merwe (1993) analysed the failures and found that it did not conform to failures from other areas. The Vaal Basin is well known for its weak roof however in the investigation pillar failure was the primary mechanism. The conclusion was that the coal pillars in the Vaal Basin is weaker than in most other areas. Scaling was also found to be progressively quicker in the Vaal Basin than in the Witbank seams. The coal in the Vaal Basin is known to be highly jointed in addition to its weaker properties.

The effect that the proposed underground workings will have on the stability of the overlying surface structures, which include the Sasol Gas line, will be determined by the stability of the underground workings (which may result in subsidence) and to a lesser extent the blasting practices implemented (vibrations).

Subsidence can be defined as the downward movement of the surface lying above an underground excavation such as bord and pillar workings. The extent of subsidence is affected by the mining depth, mining height, panel width, mining method and overburden composition.

Subsidence = 0.39 x mining height x (width to height ratio) ^0.32

10.21.1 Stability Of The Underground Workings

The stability of the underground workings is primarily dependent on the underground pillar design which should ensure long term pillar stability. In shallow mining areas (less than 40m below surface) the pillar stability in collaboration with intersection and bord stability will determine if the resultant subsidence will affect the overlying surface structures. By ensuring pillar and roof stability, subsidence can be prevented and thus the stability of the Sasol Gas Line ensured.

10.21.2 Criteria To Ensure Stability

Since the underground mining area will be conducted in both shallow and deeper lying areas, there are several sets of controls that needs to be implemented to ensure the stability of the overlying surface structures, namely:

- Ensure to develop pillars below surface structures according to primary panel safety factor design criteria (being in excess of 2). Research conducted in 1976 Salamon and Oravecz recommended a safety factor of 2.0 for the design of main development pillars (Van der Merwe 2006). Hill (2005) suggests that pillars designed for long life in excess of 5 years such as primary development pillars should be designed with a margin of 20 percent in addition to the minimum design, the reason being that at some stage it can be assumed that the pillars will be subjected to full tributary area loading. Hill (2005) further recommended that pillars that required for the permanent protection of critical surface features must be designed to have a minimum probability of failure of 1 in a million pillars.

The Pillar Safety Factor (PSF) can be defined as the pillar strength divided by the pillar load. The PSF is a prediction of the probability of a stable geometry used in the pillar design of underground Coal workings.

- The pillars dimensions in the mining area must make use of the pillar safety factor formula that considers the coal to have a lower strength such as the Vaalbasin Coal Pillar Strength Formula (Maddden and Van der Merwe, 2010) in collaboration with the pillar life prediction.

Vaalbasin Coal pillar strength (Van der Merwe 1998)	**Applicable to the Vaalbasin area where coal is considered to have a lower strength (4.5 MPa) than originally used in the Salamon and Munro Formula (7.2 MPa).**
	$SF = 180\frac{w^{2.46}}{\mathrm{HC}^2 h^{0.66}}$

- The pillar width to mining height ratio should be at least 3 below surface structures. After Wagner (1974) investigated coal strength he determined that the modulus of elasticity was a true material property independent of geometry which indicated that post failure behaviour of a pillar is a structure property and not an inherent material property. I.e. larger width to height ratio equals increased stability.

The Pillar width to Mining Height ratio (W:H) is an indication of the strength of a pillar core.

- In shallow mining areas pillar should not be developed beneath surface structures of which the stability must be maintained. Shallow mining areas have an increased probability of surface subsidence resulting from intersection and bord failures.
- Pillar extraction or any form of higher extraction (including bottom and top coaling) must not be attempted or conducted beneath vital surface structures. Any form of higher extraction increases the risk of failure which increases the risk of subsidence which can damage the infrastructure on surface.
- All pillar and support designs must be conducted according to the site-specific conditions and strengths. By incorporating site specific designs, the site-specific conditions can be catered for.

10.21.3 Effect Of Blasting

The effect that blasting conducted in the underground operation may have on the overlying surface structures is dependent on the amount of ground vibrations that will be generated when conducting drill and blast operations (also known as stone works) through dyke and fault areas. The ground vibrations are determined by the Peak Particle Velocity (PPV) that will be generated during a blast. Explosives are used to break rock through the shockwaves and gases yielded from the explosion.

The PPV is the maximum ground motion amplitude experienced by a particle subjected to ground vibration or is defined as the speed at which a particle of ground/soil vibrates as the wave passes through a particular section. PPV is measured in meters per second (m/s) or millimetres per second (mm/s).

Explosives are used to break rock through the shockwaves and gases yielded from the explosion. Ground vibration is a natural result from blasting activities. The far field vibrations are inevitable, but undesirable by products of blasting operations. The shockwave energy that travels beyond the zone of rock breakage is wasted and could cause damage and annoyance. The following factors influences the magnitude of ground vibration (Rangasamy, 2018):

- The charge mass per delay,
- The delay period,
- Distance from the blast,
- Rock mass and

- Geometry of the blast.

The factors influencing ground vibrations can be controlled by a planned design and proper blast preparation (Rangasamy, 2018):

- The larger the charge mass per delay the greater the vibration energy yielded.
- The distance between the blast and the point of interest.
- The geology of the blast medium and surroundings also influences the magnitude of vibrations. High density materials have highs shockwave transferability where low density materials have low transferability of the shockwave.

South African legislation does not dictate the specified maximum allowable ground vibration limits. However, several studies within South Africa has investigated vibration limits. The vibration limits suggested by Rorke (2011) for civil and engineering structures will be used.

Table 10-30: Criteria – Surface Structures (Rorke 2011)

Structure	PPV mm/s limit	Description
Eskom Power Lines	<75 mm/s	Conservative value since the steel structure of pylons and concrete foundation blocks can both withstand significantly higher values.
Public Roads	<150 mm/s	Desegregation of road material will start to appear at vibration amplitudes above 150mm/s
Pipelines (water and transnet)	<50 mm/s	Blasting near pressurized steel pipelines has taken place safely at PPV's of <50 mm/s in South Africa.
Conveyors	< 200mm/s	A steel conveyor structure will withstand very high vibrations and the concrete plinths will remain undamaged by ground vibrations up to 200mm/s.

By adhering to the PPV limits set apart above stability of the surface structure can be ensured. However, since the primary method of mining will not be blasting but rather mechanical methods the effect of blasting will be limited.

It must be noted that sufficient vibrations can be generated on surface by traffic (such as fully loaded trucks) to affect the foundation of the surface structure. This is dependent on the type of soil and the amount of vibrations generated (i.e. location of the structure in relation to the closest roadway).

11 DESCRIPTION OF SPECIFIC ENVIRONMENTAL FEATURES AND INFRASTRUCTURE ON THE SITE

11.1 ENVIRONMENTAL FEATURES

The current land use of the proposed site is:

- Farming practices;
- Residential plots;
- Residential estates;
- Old quarries;
- Prison; and
- Wetlands present on site.

Sensitive features of the proposed site include the Vaal River and river banks to the north of the site, and smaller riparian areas and wetland that crosses the site on various points. Figure 11-1 below indicates the sensitive river and wetland areas.

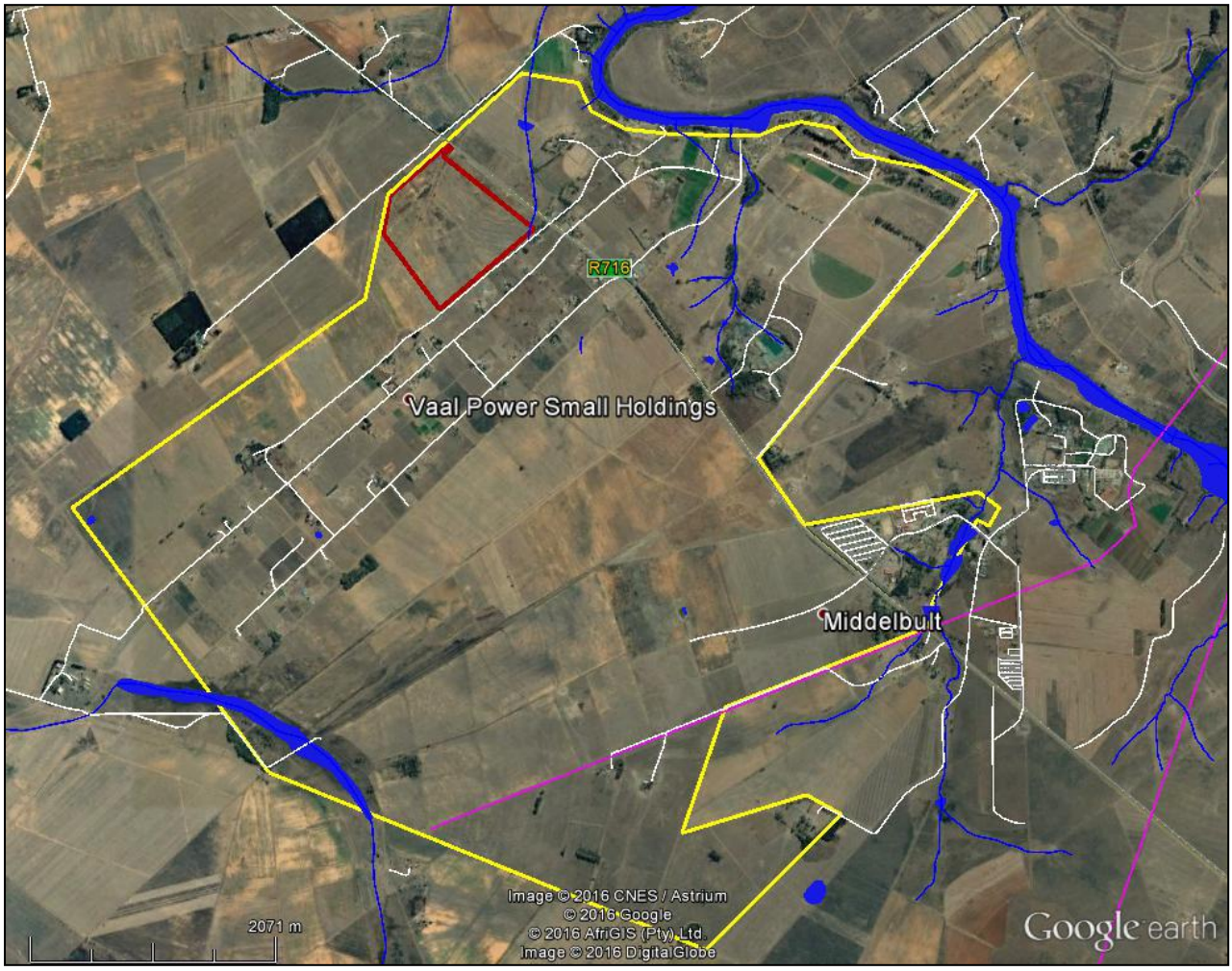


Figure 11-1: River and wetlands indicated in blue

Because the mining planned will be underground mining, very little impact on the sensitivities on site will occur. Specialist studies in terms of sensitivities to be conducted will be done as part of the WULA requirements of the project. Specialist studies identified and conducted are as follows:

- Aquatic assessment that includes the SASS5, FRAI VEGRAI AND IHAS Assessment

- Hydropedological and Geohydrological Update
- Wetlands delineation and Present Ecological State determination
- Finalisation of Stormwater Management Plan and features.

The area indicated in red in Figure 11-1 represents the infrastructure area.

11.2 EXISTING INFRASTRUCTURE ON THE STUDY AREA AND IN CLOSE PROXIMITY

This is a new application and no current infrastructure has been developed which is related to the Mining Right Application. The applicant holds a Prospecting Right on the said properties included within the Mining Right.

11.3 ROADS

The R716, R549, R82 and R59 are all found in close vicinity to the project and no additional roads will need to be developed. Other roads, such as haul and access roads are included in the proposed development layout.

Although no road upgrades are required as per Traffic Impact Assessments, conceptual recommendations for the access road had been made.

11.4 RAILWAY LINE

No railway lines occur in close proximity to the study area.

11.5 POWERLINES AND/OR SERVITUDES I.E THE SASOL PIPELINES

A number of Sasol pipelines are found across the Mining Right and has been included in the documentation and a specialist risk assessment has been done.

11.6 WATER

All water uses will be licensed in terms of the National Water Act, 1998 (Act 36 of 1998). An Application is in process with the DHSWS at present.

11.7 SEWAGE

All sewerage requirements and water use will be licensed in terms of the National Water Act, 1998 (Act 36 of 1998). Chemical toilets and/or conservancy tanks will be utilised where needed and these will be finalised in the WUL application.

12 . DESCRIPTION OF THE CURRENT LAND USES

(Show all environmental and current land use features)

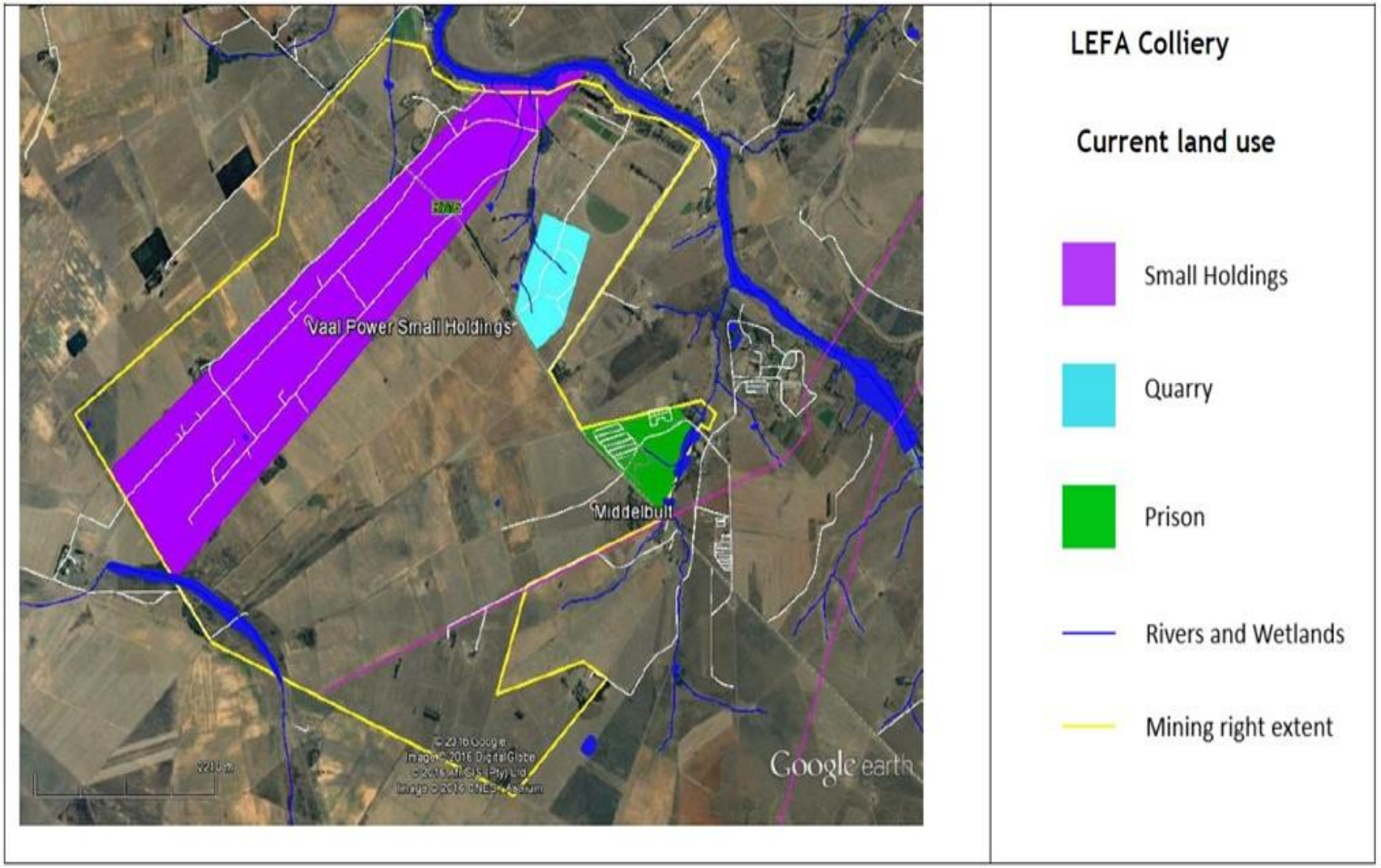


Figure 12-1: Land-use within and surrounding the site (within 200m buffer) – Initial MAP included

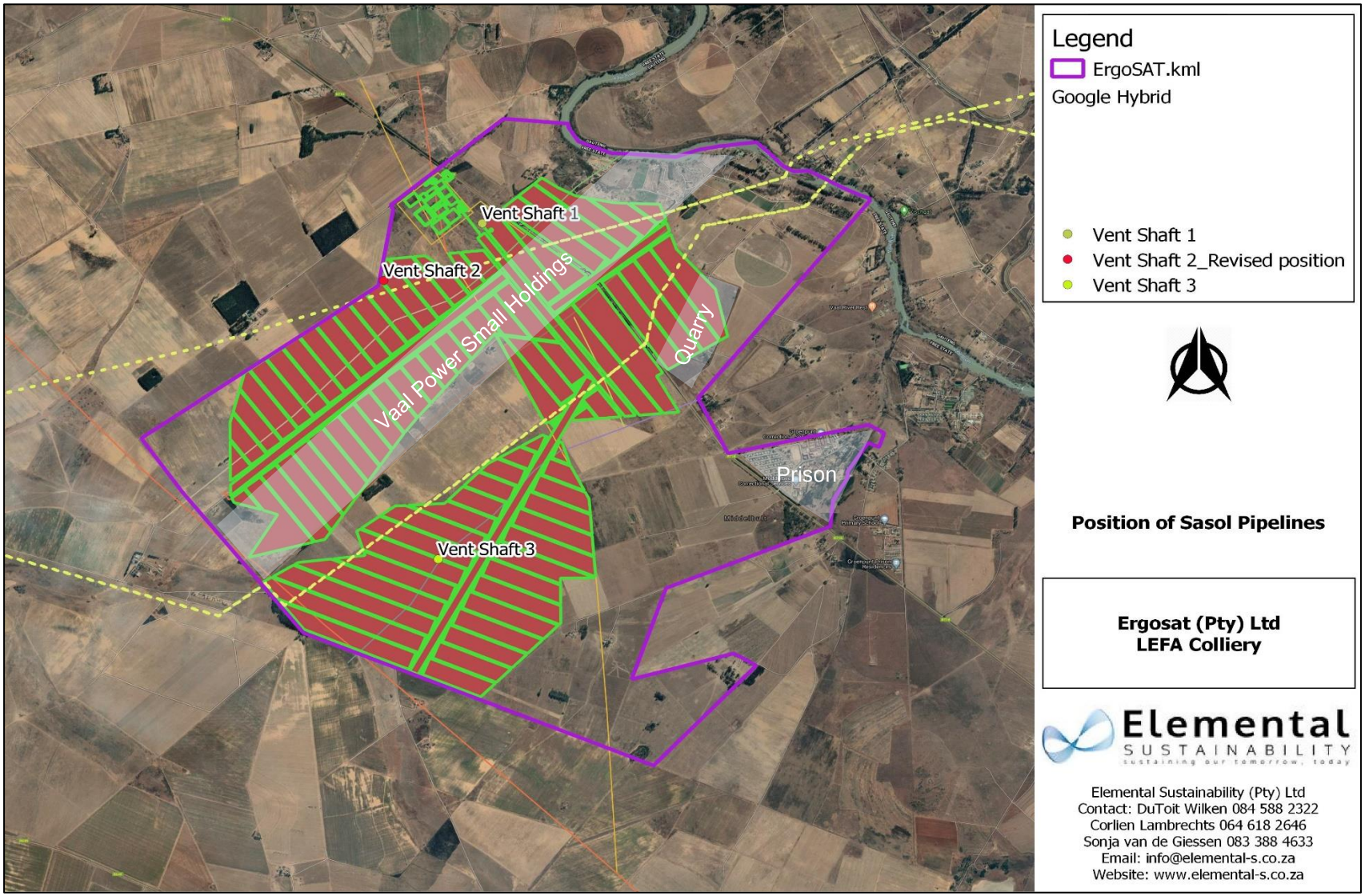


Figure 12-2: Land-use showing SASOL pipelines (Sasol Pipelines in Yellow)

12.1 SENSITIVE LANDSCAPES

The occurrence of possible sensitive landscapes at the project site is outlined in the table below.

Table 12-1: Sensitive Landscapes within the Mining Site

Types of sensitive landscapes	Occurrence at the Mining Site
Nature conservation or ecologically sensitive areas - indigenous plant communities (particularly rare communities and forests), wetlands, rivers, riverbanks, lakes, islands, lagoons, estuaries, reefs, inter-tidal zones, beaches and habitats of rare animal species.	Ecological assessments have been conducted on the Mining Right area. Refer to Section 10.12, 10.13 and 10.14 above for the assessment and baseline findings regarding the wetlands found, hydropedological and hydrogeological updates found and assessed on-site (and within 500 m of the project area).
Sensitive physical environments - such as unstable soils and geo-technically unstable areas.	None known. A Hydropedology assessment has been undertaken as required for the WUL process and this will aim to connect the wetlands found and Hydrogeological assessment and describe the movement between the two water environments. An additional Geotechnical assessment could be requested by DHSWS during the WUL commenting phase, but it will remain the decision of the CA.
Important natural resources - river systems, groundwater systems, high potential agricultural land.	All of these aspects have been assessed by specialists and is described in the baseline environment section (Section 10). The Ergosat project is an underground mine and surface impacts will be minimal expect for the area where the plant is located.
Sites of special scientific interest	None known.
Sites of social significance - including sites of archaeological, historic, cultural, spiritual or religious importance and burial sites.	Marked and unmarked graves are situated on the site identified just outside the proposed planned infrastructure. At the time of the site investigation the vegetation was very dense and an accurate count of the graves could not be performed. Various structures older than 60 years (protected by Act 25 of 1999 (National Heritage Resources Act)) are situated in the study area, but none on the site earmarked for planned infrastructure. The Sasol pipelines are important and critical infrastructure and impacts to these structures will be prevented and a specialist risk assessment was conducted as well as Ventilation shaft 2 was moved to ensure all infrastructure is located more than 100m away.
Sites of outstanding natural beauty, panoramic views and scenic drives	The area has already been impacted by small holdings, agricultural activities, an old quarry and a prison.
Green belts or public open space in municipal areas	Not applicable.

13 LIMITATIONS AND ASSUMPTIONS

Limitations as per specialist study has been provided within each specialist investigation as to comply with Appendix 6 of the Impact Regulations and may be viewed there.

The Sasol pipelines were not specifically included in the previous assessments done, since no surface impacts are foreseen on the Mining Right area, except for the area where the plant is proposed. A separate specialist study has therefore been done to focus on the risks to the pipeline as required by the MHSA and to ensure that the Ergosat development will not endanger these pipelines during any phase of the development.

Re-assessment also lead to the movement of Ventilation shaft 2 to ensure that it is moved further away (more than 100 m). Ventilations shafts will not have constant activity (only during construction and possibly maintenance or repairs) and will only ensure air reaches the underground workings. The specialist Risk Assessment have been included in the Appendices (Appendix 21).

The final Stormwater Management Plan as finalised during the WUL has been incorporated in the EIA/EMPR to ensure the document is as relevant and updated as possible. The closure quantum has also been updated since the guiding principles regarding costing have been updated and this will ensure that the amount that Ergosat Lefa Colliery needs to provide to DMRE for Financial Provision (Rehabilitation) will be sufficient.

Since the document will again be distributed for public comment, all I&APs will be provided a chance to comment on the changes and comply with the NEMA Regulations for PPP.

14 FULL DESCRIPTION OF THE PROCESS UNDERTAKEN TO IDENTIFY, ASSESS AND RANK THE IMPACTS AND RISKS THE ACTIVITY WILL IMPOSE ON THE PREFERRED SITE (IN RESPECT OF THE FINAL SITE LAYOUT PLAN) THROUGH THE LIFE OF THE ACTIVITY

(Including (i) a description of all environmental issues and risks that where identified during the environmental impact assessment process and (ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures.)

14.1 IMPACTS IDENTIFIED FOR THE PROJECT

The following cultural, environmental and socio-economic impacts associated with the project have been assessed in this document.

Associated activities during all phases will be relevant. All aspects have been already assessed by the Competant Authorities and the Minister and the purpose of this document is to ensure that the Sasol pipeline has been properly assessed. It should still be noted that the Ergosat mine is an underground mine and surface impacts will be limited.

Potential impacts that may be caused by the development will be identified using input from the following:

- Views of I&APs;
- Existing information;
- Specialist investigations;
- Site visit with the project team; and
- Legislation.

The following potential major direct, indirect and cumulative impacts were identified:

- Land degradation (where surface impacts are expected);
- Potential to alter the topography (where surface impacts are expected);
- Loss of soil characteristics - erosion and compaction (where surface impacts are expected);
- Potential for alien invasive establishment;
- Reduced flow to downstream water catchment;
- Potential pollution to water resources (surface and groundwater);

- Drawdown cone from dewatering activities (groundwater quantity);
- Increased dust and emissions;
- Increased noise levels;
- Damage to property/infrastructure from blast events (however, blasting will be underground);
- Potential damage to heritage sites (grave and/or archaeological artefacts);
- Influx of job seekers to the area;
- Potential increased traffic – haulage;
- Health and safety impacts;
- Potential injury and loss of health and life of humans;
- Damage and Risk to the Sasol pipeline; and
- Altered Socio-Economic Environment (Positive or negative).

14.2 MOTIVATION WHERE NO ALTERNATIVE SITES WERE CONSIDERED

Minerals can only be mined where identified and verified, therefore it was not practical to select any other sites other than was included in the Prospecting Right. This fact will have guided the proposed positioning as well as utilising the transformed/impacted areas, which will limit surface impacts for the project (refer to Section 7 above).

However, several alternatives and changes have occurred during the finalisation of the project details, water management structures and the re-assessment of the Sasol pipelines and these have all been described in Section 7.

14.3 ISSUES RAISED BY INTERESTED AND AFFECTED PARTIES

An Issues and Response Report was and will again be compiled of all the comments received during the application as part of the Public Participation Process for the project (Comments till date is shown in Table 8-1 above). These comments have already been assessed by the Competant Authority and the Appeal processes have run its course.

All comments will remain included since it forms part of the Ergosat Lefa Colliery, however, the new comments received will be kept separate to ensure these are addressed and re-assessed by the Competant Authority (CA).

14.4 SPECIALIST INVESTIGATIONS

Several updated specialist investigations formed part of the in the EIA Phase of the project.

Table 14-1: Description of aspects assessed by the specialists

Aspect	Specialist Study	Specialist	Terms of Reference
Updated Wetland Assessment	Wetlands	Limosella Consulting	• Delineate the wetland and riparian areas; • Classify the watercourse according to the system proposed in the national wetlands inventory if relevant, • Undertake functional and integrity assessment of wetlands areas within the area assessed as specified in General Notice 267 of 24 March 2017; • Undertake a specialist study with an impact assessment as specified in the NEMA 20014 regulations (as amended),

			• Recommend suitable buffer zones, both generic (as required in GDARD, 2014) and calculated buffer zones as specified in General Notice 267 of 24 March 2017, following Macfarlane et al 2015 ; and • Discuss appropriate mitigation and management procedures relevant to the conserving wetland and riparian areas on the site.
Hydropedological Assessment	Hydropedology	Geo Pollutions Technologies	• To assess the Hydropedological functioning and links between the surface and groundwater within the area. • To assess the Wetland Flow drivers
Geohydrological Assessment	Hydrogeology	Eco Elementum	The main aim of the report is to determine and discuss the main impacts of the proposed mining at Lefa Colliery and include updates required. The report included discussions on: • Geology, • Hydrogeology: o Unsaturated zone, o Saturated zone, o Groundwater recharge, o Hydraulic conductivity, o Groundwater levels, o Potential impacts on groundwater quality and quantity, o Aquifer characteristics. • Numerical Groundwater modelling, • The groundwater monitoring system, • Groundwater Environmental Management Programme, • Post-closure management plan. The information sources for the Lefa Colliery geohydrological study include: • Hydrocensus borehole data, • Mine layouts and schedules obtained from the mine, • Topographical and geological maps as well as satellite imagery for describing the physical site properties; • Geohydrological reports compiled for Ergosat's Lefa Colliery by GPT (2017) and RGC (2013).
Risk Assessment for Sasol Pipeline	Risk Assessment	Big Rock Engineering (Pty) Ltd	• Risk Assessment for Underground Mining in close proximity to the Sasol Gas Line. • This study will include a risk assessment as well as guidelines and recommendations to ensure that a safe distance is kept.
Financial Provision – Closure Cost Assessment and	Financial Provision	Elemental Sustainability (Pty) Ltd	The financial provision and existing rehabilitation plan for the proposed project will only be updated by Elemental Sustainability in accordance with the NEMA Regulations (1147 of 2015) pertaining to the

Plan			financial provision for mining operations. The financial provision and closure plans (Final and Annual) must be updated annually as required.

14.5 THE POSITIVE AND NEGATIVE IMPACTS THAT THE ACTIVITY (IN TERMS OF THE INITIAL SITE LAYOUT) AND ALTERNATIVES WILL HAVE ON THE ENVIRONMENT AND THE COMMUNITY THAT MAY BE AFFECTED

(Provide a discussion in terms of advantages and disadvantages of the initial site layout compared to alternative layout options to accommodate concerns raised by affected parties)

Ergosat (Pty) Ltd applied for mining right on the existing prospecting right area. The site is therefore regarded as the preferred site and alternative sites are not considered. This was taken to I&APs and comments and concerns raised focussed more on water, sinkholes, pollution and impacts such as visual, dust, air quality and noise.

Negative Impacts on communities:

The following impacts are regarded as community impacts as per the current site layout:

- Potential water and soil pollution resulting from hydrocarbon spills and soil erosion;
- Potential of loss of groundwater resources;
- Noise;
- Influx of persons (job seekers) to site as a result of increased activity and the possible resultant increase in opportunistic crime; and Visual Impact;
- Dust pollution;
- Possible contamination of drinking water from ground water resources;
- Visual impact due to shafts;
- Decrease in property values;
- Possible Acid Mine Drainage associated with coal mining.

Positive Impacts on communities:

- The impact will have a positive impact on the local GDP;
- Job opportunities for the local community;
- Possible upliftment of the Deneysville town.

14.5.1 Cumulative Impacts

A cumulative impact may result from an additive impact i.e. where it adds to the impact which is caused by other similar impacts or an interactive impact i.e. where a cumulative impact is caused by different impacts that combine to form a new kind of impact. Interactive impacts may either be countervailing (net adverse cumulative impact is less than the sum of the individual impacts) or synergistic (net adverse cumulative impact is greater than the sum of the individual impacts).

The assessment of cumulative impacts on a study area is complex; especially if many of the impacts occur on a much wider scale than the site being assessed and evaluated. It is often difficult to determine at which point the accumulation of many small impacts reaches the point of an undesired or unintended cumulative impact that should be avoided or mitigated. There are often factors which are uncertain when potential cumulative impacts are identified.

The anticipated impacts resulting from the Mining Right Application could potentially result in cumulative effects such as:

- Increase in impacts to the environment already present from the existing land uses;

- Additional risk of soil, air and water pollution due to all the combined coal mining activities of the region.

Regarding the hydrological environment, cumulative impacts in association with adjacent mines in the region will be mitigated by the implementation of appropriate management measures to ensure sensitive downstream water users are not detrimentally impacted.

14.6 METHODOLOGY USED IN DETERMINING THE SIGNIFICANCE OF ENVIRONMENTAL IMPACTS

The Environmental Impact Assessment (EIA) 2014 Regulations [as amended] promulgated in terms of Sections 24 (5), 24M and 44 of the National Environmental Management Act, 1998 (Act No. 107 of 1998) [as amended] (NEMA), requires that all identified potential impacts associated with the project be assessed in terms of their overall potential significance on the natural, social and economic environments. The criteria identified in the EIA Regulations (2014) include the following:

- Nature of the impact;
- Extent of the impact;
- Duration of the impact
- Probability of the impact occurring;
- Degree to which impact can be reversed;
- Degree to which impact may cause irreplaceable loss of resources;
- Degree to which the impact can be mitigated; and
- Cumulative impacts.

The impact assessment methodology used to determine the significance of impacts prior and after mitigation is presented below.

Extent of the impact

The EXTENT of an impact is the physical extent/area of impact or influence.

Score	Extent	Description
1	Footprint	The impacted area extends only as far as the actual footprint of the activity.
2	Site	The impact will affect the entire or substantial portion of the site/property.
3	Local	The impact could affect the area including neighbouring properties and transport routes.
4	Region	Impact could be widespread with regional implication.
5	National	Impact could have a widespread national level implication.

Duration of the impact

The DURATION of an impact is the expected period of time the impact will have an effect.

Score	Duration	Description
1	Short term	The impact is quickly reversible within a period of less than 2 years, limited to the construction phase, or immediate upon the commencem of floods.
2	Short to medium term	The impact will have a short term lifespan (2–5 years).
3	Medium term	The impact will have a medium term lifespan (6 – 10 years)
4	Long term	The impact will have a medium term lifespan (10 – 25 years)
5	Permanent	The impact will be permanent beyond the lifespan of the development

Intensity of the impact

The INTENSITY of an impact is the expected amplitude of the impact.

Score	Intensity	Description
1	Minor	The activity will only have a minor impact on the affected environment in suc a way that the natural processes or functions are not affected.
2	Low	The activity will have a low impact on the affected environment.
3	Medium	The activity will have a medium impact on the affected environment, bu function and process continue, albeit in a modified way.
4	High	The activity will have a high impact on the affected environment which ma be disturbed to the extent where it temporarily or permanently ceases.
5	Very High	The activity will have a very high impact on the affected environment whic may be disturbed to the extent where it temporarily or permanently ceases

Reversibility of the impact

The REVERSIBILITY of an impact is the severity of the impact on the ecosystem structure

Score	Reversibility	Description
1	Completely reversible	The impact is reversible without any mitigation measures and manageme measures
2	Nearly completely reversible	The impact is reversible without any significant mitigation an management measures. Some time and resources required.
3	Partly reversible	The impact is only reversible with the implantation of mitigation an management measures. Substantial time and resources required.
4	Nearly irreversible	The impact is can only marginally be reversed with the implantation o significant mitigation and management measures. Significant time an resources required to ensure impact is on a controllable level.
5	Irreversible	The impact is irreversible.

Probability of the impact

The PROBABILITY of an impact is the severity of the impact on the ecosystem structure

Score	Probability	Description
1	Improbable	The possibility of the impact occurring is highly improbable (less than 5% of impact occurring).
2	Low	The possibility of the impact occurring is very low, due either to the circumstances, design or experience (5% to 30% of impact occurring).
3	Medium	There is a possibility that the impact will occur to the extent that provision must be made therefore (30% to 60% of impact occurring).
4	High	There is a high possibility that the impact will occur to the extent that provision must be made therefore (60% to 90% of impact occurring).
5	Definite	The impact will definitely take place regardless of any prevention plans, and there can only be relied on migratory actions or contingency plans to contain the effect (90% to 100% of impact occurring).

Calculation of Impacts – Significance Rating of Impact

Significance is determined through a synthesis of the various impact characteristics and represents the combined effect of the Irreplaceability (Magnitude, Extent, Duration, and Intensity) multiplied by the Probability of the impact. The significance of an impact is rated according the scores a presented below:

Equation 1:

Significance = Irreplaceability (Reversibility + Intensity + Duration + Extent) X Probability

Significance Rating

Score	Significance	Colour Code
1 to 20	Very low	
21 to 40	Low	
41 to 60	Medium	
61 to 80	High	
81 to 100	Very high	

Mitigation Efficiency	
Degree to which the impact can be mitigated: *The effect of mitigation measures on the impact and its degree of effectiveness:* *Equation 2:* *Significance Rating = Significance x Mitigation Efficiency*	
High	0,2
Medium to High	0,4
Medium	0,6
Low to Medium	0,8
Low	1,0

Confidence rating: *Level of certainty of the impact occurring*.

- **Certain**
- **Sure**
- **Unsure**

Cumulative impacts: *The effect the combination of past, present and "reasonably foreseeable" future actions have on aspects.*

- Very Low cumulative impact
- Low cumulative impact
- Medium cumulative impact
- High cumulative impact

15 IMPACTS AND RISKS IDENTIFIED INCLUDING THE NATURE, SIGNIFICANCE, CONSEQUENCE, EXTENT, DURATION AND PROBABILITY OF THE IMPACTS, INCLUDING THE DEGREE TO WHICH THESE IMPACTS

(Provide a list of the potential impacts identified of the activities described in the initial site layout that will be undertaken, as informed by both the typical known impacts of such activities, and as informed by the consultations with affected parties together with the significance, probability, and duration of the impacts. Please indicate the extent to which they can be reversed, the extent to which they may cause irreplaceable loss of resources, and can be avoided, managed or mitigated)

15.1 ASSESSMENT OF EACH IDENTIFIED POTENTIALLY SIGNIFICANT IMPACT AND RISK

(This section of the report must consider all the known typical impacts of each of the activities (including those that could or should have been identified by knowledgeable persons) and not only those that were raised by registered interested and affected parties).

Please refer to discussions on identified impacts as well as to Table 15-1 and relevant Management Objectives and Mitigation types for each aspect is provided within Table 15-2. Mitigation measures are prescribed within the Environmental Management Programme (EMPR).

Table 15-1: Impact Assessment Table (Complete with Ratings used to obtain Significance)

The supporting impact assessment conducted by the EAP must be attached as an appendix. **(Considerations used to inform the impact assessment was included in the section above Section 14).**

Activity	Aspects Affected	Potential Impact	Extend		Duration		Intensity		Reversibility		Irreplaceability (Extent + Duration + Intensity + Reversibility)	Probability		Significance without mitigation		Mitigation Efficiently		Significance with mitigation	
No-Go Option																			
No-Go Option	Socio-Economic	Reduced period of development and upliftment of the surrounding communities and infrastructure based on mining development within the region.	Regional	4	Long term	4	High	4	Partly reversible	3	15	Medium	3	Medium	45	N/A	1	Medium	45
No-Go Option	Socio-Economic	Reduced period of development of the economic environment, by job provision and sourcing supplies for and from local residents and businesses.	Regional	4	Long term	4	High	4	Partly reversible	3	15	Medium	3	Medium	45	N/A	1	Medium	45
No-Go Option	Socio-Economic	Positive: No additional negative impacts on I&APs or surrounding land users	Regional	4	Long term	4	High	4	Partly reversible	3	15	Medium	3	POSITIVE Medium	45	N/A	1	POSITIVE Medium	45
No-Go Option	Natural Environment	Positive: No additional negative impacts on the environment	Regional	4	Long term	4	High	4	Partly reversible	3	15	Medium	3	POSITIVE Medium	45	N/A	1	POSITIVE Medium	45
Construction and Operational Phase																			
Storm water management structures, pipelines, berms and water resources diversions, Access and Haul roads, Pipelines, Plant and Other Infrastructure (Overland conveyer removed as alternative), Sewage treatment, Bulk hydrocarbon storage facilities/ Filling station, Shaft development, Mining of coal by underground mining, Crushing and screening of coal underground, All infrastructure including	Soils	Soil compaction by heavy duty vehicles. Soils will be stripped to construct proper roads. This could lead to loss of topsoil. Due to the presence of vehicles and equipment hydro-carbon spills may occur impacting on the quality of the soils. Stripping and stockpiling of topsoil which may lead to deterioration of soil quality.	Site	2	Long term	4	High	4	Partly reversible	3	13	High	4	Medium	52	Medium	0,6	Low	31,2
	Soils	During operation of the Ergosat mine, it is anticipated that carbonaceous material may be spilled which will contaminate soils. Contamination by dirty water run-off and/or spillage of hydrocarbons and/or chemicals is also expected from operations vehicles and	Site	2	Long term	4	High	4	Partly reversible	3	13	High	4	Medium	52	Medium	0,6	Low	31,2

External parking, Security and Weigh bridge, Truck Loading area, Internal parking, Silos, stockpiles, sewage treatment plant, scrap yard, offices, crusher and screen plant, medical facility, stores, raw water dam, storage yard and the ventilation shaft, Sub-station and power line, ,Infrastructure area industrial development, Residue stockpiles or deposit areas		machinery. Contamination of soils through: - Indiscriminate disposal of waste; and - Accidental spillage of chemicals such as hydrocarbon-based fuels and oils or lubricants spilled from vehicles and other chemicals from operational and maintenance activities e.g. paints. Deterioration of topsoil quality due to salt contamination at the coal stockpile and crushing and screening plant footprints																	
Storm water management structures, pipelines, berms and water resources diversions, Access and Haul roads, Pipelines, Plant and Other Infrastructure (Overland conveyer removed as alternative), Sewage treatment, Bulk hydrocarbon storage facilities/ Filling station, Shaft development, Mining of coal by underground mining, Crushing and screening of coal underground, All infrastructure including External parking, Security and Weigh bridge, Truck Loading area, Internal parking, Silos, stockpiles, sewage treatment plant, scrap yard, offices, crusher and screen plant, medical facility, stores, raw water dam, storage yard and the ventilation shaft, Sub-station and power line, ,Infrastructure area industrial development, Residue stockpiles or deposit areas	Land Capability and Land Use	Possibility of mining activities and workers impacting on Mining Right Area	Local	3	Long term	4	Low	2	Partly reversible	3	12	Medium	3	Low	36	Medium	0,6	Low	21,6

Shaft development Mining of coal by underground mining	Blasting	Blasting hazard, specifically - Ground vibration and Other including the SASOL pipeline	Local	3	Long term	4	Low	2	Partly reversible	3	12	Low	2	Low	24	High	0,8	Very Low	19,2
Storm water management structures, pipelines, berms and water resources diversions, Access and Haul roads, Pipelines, Plant and Other Infrastructure (Overland conveyer removed as alternative), Sewage treatment, Bulk hydrocarbon storage facilities/ Filling station, Shaft development, Mining of coal by underground mining, Crushing and screening of coal underground, All infrastructure including External parking, Security and Weigh bridge, Truck Loading area, Internal parking, Silos, stockpiles, sewage treatment plant, scrap yard, offices, crusher and screen plant, medical facility, stores, raw water dam, storage yard and the ventilation shaft, Sub-station and power line, ,Infrastructure area industrial development, Residue stockpiles or deposit areas	Ecological Impacts	Fauna: Disturbance and loss of fauna through noise, light and dust pollution and possible hunting, trapping and killing of fauna. Other impacts on Fauna as identified in specialist assessment	Site	2	Long term	4	Medium	3	Nearly completely	2	11	Definite	5	Medium	55	Medium	0,6	Low	33
	Ecological Impacts	Destruction of Vegetation, loss of integrity of vegetation and Spreading of alien invasive species and bush encroachment of indigenous species. Vegetation will be removed during the construction of the roads where they are not situated within agricultural lands. Note that no red data species were identified within the proposed mining area or at the footprint and stockpiling area.	Site	2	Long term	4	Medium	3	Nearly completely	2	11	Definite	5	Medium	55	Medium	0,6	Low	33
Storm water management structures, pipelines, berms and water resources diversions, Access and Haul roads, Pipelines, Plant and Other Infrastructure (Overland conveyer removed as alternative), Sewage treatment, Bulk hydrocarbon storage facilities/ Filling station,	Hydrological Aspects; Surface water	Stormwater, erosion and siltation impacts due to a lack of implementing measures to manage stormwater run-off quantity and quality during the operational phase.	Local	2	Long term	3	High	4	Partly reversible	2	11	High	4	Medium	44	Medium	0,6	Low	26,4
	Hydrological Aspects; Surface water	Contamination of stormwater runoff and ground water, caused by: - Sediment release; - Chemicals such as hydrocarbon-based fuels and oils or lubricants spilled from construction vehicles;	Regional	4	Long term	4	Medium	3	Partly reversible	3	14	Medium	3	Medium	42	Medium	0,6	Low	25,2

Shaft development, Mining of coal by underground mining, Crushing and screening of coal underground, All infrastructure including External parking, Security and Weigh bridge, Truck Loading area, Internal parking, Silos, stockpiles, sewage treatment plant, scrap yard, offices, crusher and screen plant, stores, raw water dam, storage yard, Infrastructure area industrial development, Residue stockpiles or deposit areas		- Other chemicals from maintenance activities e.g. paints; and - Effluent discharges, due to a lack of stormwater management and system maintenance.																
	Hydrological Aspects; Surface water and Groundwater	Impact of Nitrate based explosives used during mining on groundwater quality. Contamination plume can affect the groundwater resource.	Regional	4	Long term	4	Medium	3	Partly reversible	3	14	High	4	Medium	56	Medium	0,6	Low	33,6
Dewatering during the Operational Phase	Hydrological Aspects; Groundwater	Influx of groundwater into incline shaft void. The void in the incline will lead to an influx of groundwater into the incline shaft. This will potentially result into dewatering of the surrounding underground aquifers. This will manifest as a groundwater cone of depression in the water table with negative consequences of the availability of groundwater for existing borehole users around the proposed incline shafts. The significance is medium due to the duration of the impact throughout the construction and operational phases of the project. Impacts of dewatering on the groundwater aquifer should water be abstracted from ground water during the operational phase.	Regional	4	Long term	4	Medium	3	Partly reversible	3	14	High	4	Medium	56	Low	0,8	Medium	44,8
Dewatering during the Operational Phase	Hydrological Aspects; Groundwater	Underground (Lowering of groundwater levels- baseflow to the Vaal River) The mining operation could potentially lower the baseflow of surrounding water to the Vaal River	Regional	4	Long term	4	Medium	3	Partly reversible	3	14	High	4	Medium	56	Low	0,8	Medium	44,8
Storm water management structures, pipelines,	Hydrological Aspects;	The formation of acid mine drainage (AMD) as a result of ingress water and oxygen into	Regional	5	Long term	5	Medium	3	Partly reversible	3	16	High	4	Medium - High	64	Medium	0,6	Low	28,8

berms and water resources diversions, Access and Haul roads, Pipelines, Plant and Other Infrastructure, Sewage treatment, Bulk hydrocarbon storage facilities/ Filling station, Crushing and screening of coal underground, All infrastructure including External parking, Security and Weigh bridge, Truck Loading area, Internal parking, Silos, stockpiles, sewage treatment plant, scrap yard, offices, crusher and screen plant, medical facility, stores, raw water dam, storage yard and the ventilation shaft, Sub-station and power line, ,Infrastructure area industrial development, Residue stockpiles or deposit areas	Groundwater	the stockpiled overburden The potential impact of seepage water into the shallow weathered aquifer from the overburden stockpile is considered to be moderate. Potential contaminants may seep into the groundwater and could impact on the groundwater usage, which includes domestic and agricultural use. Generally, overburden is considered inert and therefore does not have a great potential for AMD. However, during the removal of the overburden in the construction of the incline shaft, there is the potential to remove some of the coal from the seams. This coal has AMD. The AMD potential of the overburden stockpile is considered moderate in the long term as the overburden will be stockpiled for the LOM. The impact will be limited to the site.																	
	Hydrological Aspects; Surface water and Groundwater	Possible Seepage from waste management activities e.g. waste rock dumps, could cause a contamination plume affecting the underground water resources.	Regional	5	Long term	5	Medium	3	Partly reversible	3	16	High	4	Medium - High	64	Low	0,8	Medium	51,2
	Hydrological Aspects; Surface water, Hydropedological and Groundwater	Wetland Impacts - Artificial wetland created by Agricultural activities	Local	3	Long term	5	Medium	3	Irreversible	5	16	Medium	3	Medium	48	N/A	1.0	Medium	48,4
Access and Haul roads, Plant and Other Infrastructure, Crushing and screening, All infrastructure including External parking, Security and Weigh bridge, Truck Loading area, Internal parking, Silos, stockpiles, sewage treatment plant, scrap yard, offices,	Air Quality	Increased windborne dust (soil and ore fines), vehicle fumes and particulate matter PM10, altering air quality.	Site	2	Long term	4	Low	2	Nearly completely	2	10	Medium	3	Low	30	Medium	0,6	Very Low	18
	Air Quality	Increased dust pollution (soil and ore fines), vehicles on gravel roads and transport of RoM	Site	2	Long term	4	Low	2	Nearly completely	2	10	Medium	3	Low	30	Medium	0,6	Very Low	18
	Air Quality	Emissions by means of crushing and screening In this activity, the use of the primary and secondary crusher	Site	2	Long term	4	Low	2	Nearly completely	2	10	Medium	3	Low	30	Medium	0,6	Very Low	18

crusher and screen plant, medical facility, stores, raw water dam, storage yard and the ventilation shaft, Infrastructure area industrial development, Residue stockpiles or deposit areas		and discard handling are the most likely to have implications on ambient air quality. The crushing process releases fugitive dust, especially if there are no enclosure and water sprays. Dust contained within the RoM ore can be released into the atmosphere during this process i.e. fugitive dust (containing TSP, as well as PM10 and PM2.5). Wind erosion from stockpiles can be a perennial source of dust if not properly managed during and post mining operations. The plant, crushing and screening areas all have the potential to generate dust and therefore specific mitigation measures can be assigned to each of these activities.																	
Access and Haul roads, Plant and Other Infrastructure, Shaft development, Mining of coal by underground mining, Crushing and screening of coal, All infrastructure including External parking, Security and Weigh bridge, Truck Loading area, Internal parking, Silos, stockpiles, sewage treatment plant, scrap yard, offices, crusher and screen plant, medical facility, stores, raw water dam, storage yard and the ventilation shaft, Sub-station and power line, Infrastructure area industrial development.	Noise and Lighting	Nuisance and health risks caused by an increase in the ambient noise level as a result of noise impacts associated with the operation of the mining activities and processing.	Site	2	Long term	4	High	4	Nearly completely	2	12	High	4	Medium	48	Medium	0,6	Low	28,8
	Noise and Lighting	Nuisance and health risks caused to close by receptors as identified in specialist report	Site	2	Long term	4	High	4	Partially reversible	3	13	High	4	Medium	52	Medium	0,6	Low	31,2
	Noise and Lighting	Noise impact that would only manifest in the operational phase but that can be avoided in the construction phase by implementation of measures in construction of ventilation shafts. Impacts of noise need to be controlled by means of berms and shielding structures. The recommendations made by the Noise Impact Assessment are with the assumption that sensitive receptors within 750m of the site will not relocate. If relocation of these receptors would be an option, the recommendations would have to be altered.	Site	2	Long term	4	Low	2	Nearly completely	2	10	High	4	Medium	40	Medium	0,6	Low	24
	Noise and Lighting	Impact of security lighting on surrounding landowners and animals.	Site	2	Long term	4	Low	2	Nearly completely	2	10	Medium	3	Low	30	Low	0,8	Low	24

All activities	Sites of archaeological and cultural interests	Construction activities have the potential to impact the historical structures. A marked grave is located within the infrastructure area.	Site	2	Long term	4	Low	2	Nearly completely	2	10	Medium	3	Low	30	Medium	0,6	Very low	18
All activities	Visual aspects	Potential visual impact on the viewpoints that had a visual exposure rating of 5 or higher. The operational impact on the surrounding agricultural farmers and land users will be more significant, due to the visual intrusion and activities being undertaken. Although the mine activities will not be visible since it will all be underground, the stockpiles, waste rock dumps and related surface infrastructure will be visible for the entire life of mine.	Local	3	Long term	4	Medium	3	Partly reversible	3	13	High	4	Medium	52	Medium	0,6	Low	31,2
Storm water management structures, pipelines, berms and water resources diversions, Access and Haul roads, Pipelines, Plant and Other Infrastructure (Overland conveyer removed as alternative), Sewage treatment, Bulk hydrocarbon storage facilities/ Filling station, Shaft development, Mining of coal by underground mining, Crushing and screening of coal underground, All infrastructure including External parking, Security and Weigh bridge, Truck Loading area, Internal parking, Silos, stockpiles, sewage treatment plant, scrap yard, offices, crusher and screen plant, medical facility, stores, raw water dam, storage yard and the ventilation shaft, Sub-station and power line,	Waste	Generation and disposal of general waste, litter and hazardous material during the construction and operational phase	Local	2	Long term	4	Medium	3	Partly reversible	3	12	High	4	Medium	48	Medium	0,6	Low	28,8

Infrastructure area industrial development, Residue stockpiles or deposit areas																		
Sewage treatment Bulk hydrocarbon storage facilities/ Filling station, sewage treatment plant, Residue stockpiles or deposit areas	Waste (Including Hazardous Waste)	Generation and disposal of additional hazardous operational waste i.e. Residue Stockpiles, etc.	Local	2	Long term	4	High	4	Partly reversible	3	13	High	4	Medium	52	Medium	0,6	Low	31,2
Storm water management structures, pipelines, berms and water resources diversions, Access and Haul roads, Pipelines, Plant and Other Infrastructure (Overland conveyer removed as alternative), Sewage treatment, Bulk hydrocarbon storage facilities/ Filling station, Shaft development, Mining of coal by underground mining, Crushing and screening of coal underground, All infrastructure including External parking, Security and Weigh bridge, Truck Loading area, Internal parking, Silos, stockpiles, sewage treatment plant, scrap yard, offices, crusher and screen plant, medical facility, stores, raw water dam, storage yard and the ventilation shaft, Sub-station and power line, ,Infrastructure area industrial development, Residue stockpiles or deposit areas	Services	Need for services e.g. water, electricity and sewerage systems, causing additional strain on natural resources and service infrastructure.	Regional	3	Long term	4	Low	3	Partly reversible	3	13	Medium	3	Low	39	Low	0,8	Low	31,2
Access and Haul roads, External parking, Security and Weigh bridge, Truck Loading area, Internal parking.	Traffic	The change in the traffic patterns as a result of increased traffic entering and exiting the operations on the surrounding road infrastructure and existing traffic. Impacts on	Regional	3	Long term	4	Low	2	Nearly completely	2	11	High	4	Medium	44	Medium	0,6	Low	26,4

		road infrastructure Structural maintenance work on the R716 was completed recently and an increase in the size and frequency of large construction vehicles and trucks could potentially damage the road surface. Financial impacts could manifest for the local Municipality in terms of road maintenance. Safety and financial impacts are possible for road users should private vehicles be damaged or accidents occur.																
	Traffic	Nuisance, health and safety risks caused by increased traffic on an adjacent to the study area including cars and heavy vehicles.	Regional	3	Long term	4	Low	2	Nearly completely	2	11	High	4	Medium	44	Medium	0,6	Low	26,4
Activities as mentioned above (No activity is found within 100 m of the SASOL pipelines).	Health and Safety - Sasol Pipelines	Possibility of impacts to the Sasol Pipeline and Dangers associated with impacts to these structures	Regional	3	Long term	4	Medium	3	Nearly completely	2	12	Medium	3	Low	36	Medium	0,6	Low	21,6
Storm water management structures, pipelines, berms and water resources diversions, Access and Haul roads, Pipelines, Plant and Other Infrastructure (Overland conveyer removed as alternative), Sewage treatment, Bulk hydrocarbon storage facilities/ Filling station, Shaft development, Mining of coal by underground mining, Crushing and screening of coal underground, All infrastructure including External parking, Security and Weigh bridge, Truck Loading area, Internal parking, Silos, stockpiles, sewage treatment plant, scrap yard, offices, crusher and screen plant, medical facility,	Health and Safety	Increased risk to public health and safety: Dangerous areas including the waste management activities and waste poses health risks and possible loss of life to mine workers and visitors to the site. Health and safety risks for workers Inadequate management of the construction process and general construction related activities could result in health and safety risks for workers, manifesting in the following ways: Construction related accidents due to structural safety of project infrastructure. The excavation of the shaft will result in the formation of topographical voids, which may be a safety risk to the employees, livestock and neighbouring landowners. • Dust generation and air pollution resulting in respiratory diseases. • High ambient noise levels	Site	2	Long term	4	Medium	3	Partly reversible	3	12	Medium	3	Low	36	Medium	0,6	Low	21,6

stores, raw water dam, storage yard and the ventilation shaft, Sub-station and power line, Infrastructure area industrial development, Residue stockpiles or deposit areas		caused by machinery and construction equipment resulting in health issues for workers. • Poor management of the construction process resulting in pollution problems (e.g. insufficient sanitation facilities, littering and refuse), flies rodents and pests and possible contamination of water sources. • Unsafe and insufficient drinking water. • An increase in HIV/AIDS and other STDs due to prostitution activities and temporary sexual relationships with local women, unwanted pregnancies that place further pressure on Basic Health Care Services. • Dehydration and sunburn, as high temperatures could be experienced during summer months.																
	Health and Safety	Increased risk to public and worker health and safety	Site	2	Long term	4	Medium	3	Partly reversible	3	12	Medium	3	Low	36	Medium	0,6	Low	21,6
Storm water management structures, pipelines, berms and water resources diversions, Access and Haul roads, Pipelines, Plant and Other Infrastructure (Overland conveyer removed as alternative), Sewage treatment, Bulk hydrocarbon storage facilities/ Filling station, Shaft development, Mining of coal by underground mining, Crushing and screening of coal underground, All infrastructure including External parking, Security and Weigh bridge, Truck Loading area, Internal parking, Silos, stockpiles, sewage treatment plant, scrap yard, offices,	Socio-Economic	Socio-economic impact on farmers, labourers and surrounding landowners and residents due to negative impacts on groundwater, dust pollution, noise pollution etc.	Regional	4	Long term	4	Low	2	Nearly irreversible	4	14	Medium	3	Medium	42	Medium	0,6	Low	25,2
	Socio-Economic	Socio-economic impact on farmers, labourers and surrounding landowners specifically the close-by receptors, specifically in terms of attitude against the mine	Regional	4	Long term	4	Medium	3	Nearly irreversible	4	15	Definite	5	Medium - High	75	Medium	0,6	Medium	45
	Socio-Economic: **Positive Impacts**	Extended employment provision due to the implementation of the extension of the mining activities, allowing mining activities to continue for additional years.	Regional	4	Long term	4	High	4	Partly reversible	3	15	Medium	3	Medium	45	N/A	1	Medium	45
	Socio-Economic: **Positive Impacts**	Employment at the Colliery The mine will employ and estimated 530 permanent employees, with skills levels that vary from skilled, semi-skilled to unskilled. Approximately 100 of the employees will be unskilled	Regional	4	Long term	4	High	4	Partly reversible	3	15	Medium	3	Medium	45	N/A	1	Medium	45

crusher and screen plant, medical facility, stores, raw water dam, storage yard and the ventilation shaft, Sub-station and power line, ,Infrastructure area industrial development, Residue stockpiles or deposit areas		and illiterate and for all employees individual training and skills development plans will be implemented in alignment with career progression. Skilled employment will include managerial positions, Planners, Environmental and other Specialists, Geologists, administrative and financial personnel, certain Operators, Engineers, Boilermakers and so forth. Semi-skilled positions relate to Foreman positions and Operators such as Diesel Attendants, whereas unskilled positions are usually associated with manual labour (underground miners, gardeners, etc.). It is anticipated that the majority of the positions could be filled by locals from the Municipal area as mining and industrial related skills should be available in the Sasolburg/Vereeniging region. Locals closer to the project site (Deneysville, Refengkgotso, etc.) would in all likelihood expect to be considered especially for unskilled and semi-skilled positions. Tertiary education levels in Ward 19 are much lower than in Ward 18 and in the broader municipal area (Ward 18: 23%; Ward 19: 2%; Metsimaholo: 9%) In addition to permanent positions, temporary employment and contractors could be added. Temporary employment would include: • Cleaning and maintenance of the conveyor belts, the V drains and culverts; • Cutting and clearing of vegetation within the used mine servitudes; • Maintenance of firebreaks; • Maintenance of gravel roads, regular grading and watering to suppress dust;																	

	• Repairing of fences as required; • Repair and maintenance of buried and surface pipelines in the servitudes, various valves, etc.; • Regular cleaning of silt traps drying bed, oil traps and the dirty water dams; etc.																
Socio-Economic: **Positive Impacts**	Impacts on procurement / supporting industries / local SMME's The Mining Charter sets BEE compliance guidelines and as such Lefa Colliery will have to procure all products and/or services from BEE compliant outlets. In order to ensure and promote the procurement of products and/or services from SMMEs who are BEE compliant as well as black owned and/or black empowered, strategies are identified in the Colliery's SLP. It is expected that the majority of goods and services will be available locally from within the Municipal area. Supporting industries, local SMME's and contractors include: • Contractors to transport and dispose of domestic and industrial waste; • Equipment cleaning (trucks, conveyors, belt); • Maintenance and repairs of infrastructure, roads, etc.; • Operation of tuck shops; • Laundry and catering services; • Gardening; • Security; etc.	Regional	4	Long term	4	High	4	Partly reversible	3	15	Medium	3	Medium	45	N/A	1	Medium	45
Socio-Economic	Impacts on current NON-MINING RELATED employment levels of the area The proposed Colliery is an underground operation and current land uses will to a large extent be unaffected. However, should negative impacts usually associated with coal mining (impacts on water resources, air/dust pollution,	Regional	4	Long term	4	High	4	Nearly irreversible	4	16	Medium	3	Medium	48	N/A	1	Medium	48

	crime, etc.) manifest and affect current land uses (farming ventures, local businesses) to such an extent that existing operations cease or are downscaled, then job losses would be inevitable. It was not at this stage possible to determine the existing employment numbers within the study area and the extent of potential job losses, should it occur, is not known.																	
Socio-Economic	Impacts on land values / market values of affected land portions. A variety of factors could impact land values of affected land portions and include: • The availability and quality of ground and/or surface water for domestic and farming purposes; • Intrusion impacts, such as noise and dust, which could have an impact on crops, livestock and infrastructure; • Occurrence of criminal activities (theft, vandalism, etc.); • Occurrence of informal settlements, trespassing on private land, illegal grazing practices; and • Restrictions that are set by the mining company for future infrastructure developments on private properties due to underground mining operations, safety issues, and so forth. Although a mining right has not been awarded yet, the proposed Lefa Colliery has already impacted on sales of properties in the area. Willow Creek Estate is marketed and promoted as a pristine residential estate with access to clean surface and groundwater resources. Large infrastructure investments have been made (R21 million in 2006 for reservoirs, roads,	Regional	4	Long term	4	High	4	Nearly irreversible	4	16	Medium	3	Medium	48	N/A	1	Medium	48

		fencing, engineering services and so forth). The proposed Lefa Colliery (with the associated impacts of a coal mine) has the potential to negatively impact the 'sense of place' as well as natural resources of the area and as a consequence property values and sales at the estate could decline. Uncertainty with regards to the Lefa Colliery development and the timeframes associated with the awarding of a mining right exacerbates this impact. Should the mining right not be awarded, or the mine not be developed, potential impacts on land values would already have manifested. Financial impacts for Willow Creek Estate are also anticipated, as incomes derived through sales and levies have already been affected. It is furthermore possible that impacts on groundwater, if it occurs, will affect farmland as well as the Vaal Power Smallholding's property prices negatively, as they rely on groundwater for domestic and agricultural purposes and would be less marketable without this resource.																
Socio-Economic: **Positive Impacts**	Impacts on tourism activities Existing tourism activities and holiday accommodation towards Deneysville, the Vaal Dam and Vaal River could negatively be impacted if the aesthetic environment and 'sense of place' is affected to such an extent that tourists are discouraged to frequent the area. Since the mine is an underground operation it is not likely that current or future tourism activities will be affected significantly as a direct result of the mine development. However, the possible negative	Regional	4	Long term	4	High	4	Nearly irreversible	4	16	Medium	3	Medium	48	N/A	1	Medium	48

		spin-offs of a coal mine (groundwater pollution, etc.) could affect the sale of properties along the Vaal River, and subsequently impact on leisure activities. Visual impacts of the shaft complex's current locality will manifest for road users on their way to the Dam, but the complex would in all likelihood not be visible from the Dam and its surrounds. Visual impacts are being assessed by a Specialist in this field.																
Socio-Economic: **Positive Impacts**	Skills development, training and skills equity, A 'Skills, training and development Policy and Plan' has been drawn up with the purpose to provide guidelines for the implementation and maintenance of comprehensive training and development strategies and procedures. Annual monitoring is done by the DMRE. Funds for Human Resource Development for individual career development and in-service training are provided. Training includes ABET to illiterate employees, learnerships registered with the Department of Labour, internal and external bursaries and internships to be provided in accordance the Mining Charter guidelines. Management will be responsible to develop career development and succession plans and to assess the potential of employees and establish a career path for each to ensure the development of each employee. Lefa Colliery aims to exceed the compliance targets set by DMRE for HDSA employment and the full staff compliment will reflect as follows by the end of 2021: • Top Management: 50%	Regional	4	Long term	4	High	4	Nearly irreversible	4	16	Medium	3	Medium	48	N/A	1	Medium	48

	White; 50% Black • Senior Management: 40% White; 60% Black • Middle Management: 29% White; 71% Black • Junior Management: 11% White; 89% Black • Women in Core Activities: 12%																
Socio-Economic: **Positive Impacts**	Impacts on the local community / community projects. As part of a mine's Social and Economic Development responsibility, the mine must get involved with a relevant Local Economic Development Projects as identified in the IDP of a municipality. Lefa Colliery is however not in the position to get involved with the day-to-day running of a LED project, but will make a financial contribution of R1 100 000 annually towards a project of the municipality's choice, over a period of 5 year	Regional	4	Long term	4	High	4	Nearly irreversible	4	16	Medium	3	Medium	48	N/A	1	Medium	48
Socio-Economic	Impacts of an 'outside' workforce / migrant labourers The Mining Charter requires that the majority of permanent employees be sourced from the "local" area. Local employees are in turn defined as people that originate/live within a 50 km radius of the project site. In terms of the Lefa Colliery this would also include people from outside the Metsimaholo Local Municipal area and would include people from as far as Vereeniging, Parys and the Gauteng province. This definition of a local workforce could thus be in conflict with the perception of a "local workforce" as seen by people living in close proximity to the Colliery. Locals could thus perceive "outsiders" as stealing employment opportunities that should be reserved for them. Negative impacts that can manifest as a	Regional	4	Long term	4	High	4	Nearly irreversible	4	16	Medium	3	Medium	48	N/A	1	Medium	48

		result of a migrant and/or "outside" workforce include: • Impacts on population changes, as the 'outside' / migrant workforce impacts on the population size, gender, racial and age composition of the local and regional Municipalities; • Additional pressure on local government for housing and associated infrastructure and services if workers are retrenched and unemployed; • A rise in the number and size of informal settlements if workers are retrenched; Impacts on the HIV/AIDS prevalence rate, unwanted pregnancies and the subsequent pressure on health care services, if short-term relations were established with local women and the migrants return to their families in the sending areas; • An increase in unemployment placing pressure on the Local Municipality to provide jobs if the workers are retrenched; and • Safety and security issues for the surrounding communities due to a growth in the number of unemployed people.																	
	Socio-Economic	Impacts associated with blasting. Blasting operations and the associated ground vibrations have the potential to affect structures in the study area, such as dams and houses, resulting in unnecessary reparation costs for private landowners.	Regional	4	Long term	4	High	4	Nearly irreversible	4	16	Medium	3	Medium	48	N/A	1	Medium	48
Activities as mentioned above	SASOL Pipeline Impacts - Independently Assessed (Specialist Risk	Impact on the Sasol gas pipeline and servitude There is an existing gas pipeline and servitude that traverses the proposed mining area and concerns have been raised that the mining activities would encroach the buffers required for the servitude area.	Regional	4	Long term	4	High	4	Nearly irreversible	4	16	Medium	3	Medium	48	Medium	0,6	Low	28,8

	Assessment Conducted)	As far as could be established a Sasol representative has been included in the consultation process. The extent of the impact, if it should occur, has not been established at this stage.																
Closure and Rehabilitation Phase																		
Closure and Rehabilitation	Geology and Soils	Potential for compaction and contamination from heavy vehicles usage and spillage of hydrocarbons, reagents (from infrastructure and machinery), raw materials and dirty water runoff, and the loss of soil due to erosion by wind and or water.	Site	2	Short term	1	Low	2	Nearly completely	2	7	Medium	3	Low	21	High	0,2	Very Low	4,2
Closure and Rehabilitation	Land Capability and Land Use	Rehabilitation of Land uses and Land Capability	Local	3	Short term	1	Low	2	Nearly completely	2	8	Low	2	Very Low	16	High	0,2	Very Low	3,2
Closure and Rehabilitation	Ecological Impacts	Disturbance and loss of fauna through noise, light and dust pollution as well as hunting, trapping and killing of fauna.	Site	2	Short term	1	Medium	3	Nearly completely	2	8	Medium	3	Low	24	Medium	0,6	Very Low	14,4
Closure and Rehabilitation	Ecological Impacts	Spreading of alien invasive species and bush encroachment of indigenous species.	Site	2	Short term	1	Low	2	Nearly completely	2	7	Medium	3	Low	21	Medium	0,6	Very Low	12,6
Closure and Rehabilitation - Implementation and ensuring maintenance and sustainability	Ecological Impacts - **Positive Impact**	Rehabilitation of area with natural vegetation and re-establishment of local biodiversity	Site	2	Long term	4	Low	2	Nearly completely	2	10	Medium	3	Low	30	Medium	0,6	Very Low	18
Closure and Rehabilitation	Ecological Impacts - **Positive Impact**	Rehabilitation of area with natural vegetation and re-establishment of local biodiversity	Site	2	Long term	4	Low	2	Nearly completely	2	10	Medium	3	Low	30	Medium	0,6	Very Low	18
Rehabilitation of site, removal of infrastructure, closure of waste management facilities (including Stormwater)	Hydrological Aspects; Surface water and Groundwater	Stormwater, erosion and siltation impacts due to a lack of implementing measures to manage stormwater run-off quantity and quality during the closure phase.	Regional	4	Short term	1	Medium	3	Partly reversible	3	11	High	4	Medium	44	Medium	0,6	Low	26,4
Rehabilitation of site, removal of infrastructure, closure of waste management facilities (including Stormwater)	Hydrological Aspects; Surface water and Groundwater	Contamination of stormwater runoff and ground water, caused by: - Sediment release; - Chemicals such as hydrocarbon-based fuels and oils or lubricants spilled from heavy duty vehicles; - Effluent discharges, due to a	Regional	4	Short term	1	Medium	3	Partly reversible	3	11	Low	2	Low	22	Medium	0,6	Very Low	13,2

		lack of stormwater management.																	
Closure and Rehabilitation	Hydrological Aspects; Surface water and Groundwater	Impacts of dewatering on the groundwater aquifer should water be abstracted from ground water during the closure phase.	Regional	4	Short term	1	Medium	3	Partly reversible	3	11	Medium	3	Low	33	Medium	0,6	Low	19,8
Rehabilitation of site, removal of infrastructure, closure of waste management facilities (including Stormwater)	Hydrological Aspects; Surface water and Groundwater	Impaction groundwater from the pollution plume associated with the waste storage facilities and possible Decant	Regional	5	Long term	4	Medium	3	Nearly irreversible	4	16	High	4	Medium - High	64	Low	0,8	Medium	51,2
Rehabilitation of site, removal of infrastructure, closure of waste management facilities (including Stormwater)	Hydrological Aspects; Surface water and Groundwater	Impaction groundwater from the pollution and possible Acid Mine Drainage	Regional	5	Long term	4	Medium	3	Nearly irreversible	4	16	High	4	Medium - High	64	Low	0,8	Medium	51,2
Closure and Rehabilitation	Air Quality	Demolition & Removal of all infrastructure (incl. transportation off site) During this activity, there is demolition of buildings and foundation and subsequent removal of rubbles generated. There is cleaning-up of workshops, fuels and reagents, removal of power and water supply, removal of haul and access roads. Potential for impacts during this phase will depend on the extent of demolition and rehabilitation efforts during closure as well as features which will remain. The impacts on the atmospheric environment during the decommissioning phase will be similar to the impacts during the construction phase. The process includes dismantling and demolition of existing infrastructure, transporting and handling of topsoil on unpaved roads in order to bring the site to its initial/rehabilitated state. Demolition and removal of all infrastructures will cause fugitive dust emissions. The impacts will be short-term and localised. Any implication or	Site	2	Long term	4	Low	2	Nearly completely	2	10	Medium	3	Low	30	Medium	0,6	Very Low	18

		implications this phase will have on ambient air quality will seize once the activities are finalised.																
Closure and Rehabilitation	Noise and Lighting	Nuisance and health risks caused by an increase in the ambient noise level as a result of noise impacts associated with the operation of heavy-duty vehicles and equipment.	Site	2	Short term	1	Medium	3	Nearly completely	2	8	Medium	3	Low	24	Low	0,8	Very Low	19,2
Closure and Rehabilitation	Noise and Lighting	Disturbance due to vibrations caused by heavy duty vehicles.	Site	2	Short term	1	Low	2	Nearly completely	2	7	Medium	3	Low	21	Low	0,8	Very Low	16,8
Closure and Rehabilitation	Noise and Lighting	Impact of security lighting on surrounding landowners and animals.	Site	2	Short term	1	Low	2	Nearly completely	2	7	Medium	3	Low	21	Low	0,8	Very Low	16,8
Closure and Rehabilitation	Sites of archaeological and cultural interests	Graves to be protected in-situ or as per recommendations made by specialist	Site	2	Short term	1	Low	2	Nearly completely	2	7	Medium	3	Low	21	Low	0,8	Very Low	16,8
Closure and Rehabilitation	Visual aspects	Visibility from sensitive receptors / visual scarring of the landscape as a result of the closure and rehabilitation activities.	Local	3	Short term	1	Low	2	Nearly completely	2	8	High	4	Low	32	Low	0,8	Low	25,6
Closure and Rehabilitation	Waste (Including Hazardous Waste)	Generation and disposal of general waste, litter and hazardous material created from the decommissioning activities	Local	2	Short term	1	Medium	3	Partly reversible	3	9	High	4	Low	36	Medium	0,6	Low	21,6
Closure and Rehabilitation, Rehabilitation of site, removal of infrastructure, sealing of shafts and closure of waste facilities	Waste (Including Hazardous Waste)	Generation and disposal of additional hazardous waste	Local	2	Short term	1	High	4	Partly reversible	3	10	High	4	Low	40	Medium	0,6	Low	24
Closure and Rehabilitation	Services	Need for additional services i.e. water, electricity and sewerage systems during the closure phase causing additional strain on natural resources and infrastructure.	Regional	3	Short term	1	Medium	3	Nearly completely	2	9	High	4	Low	36	Low	0,8	Low	28,8
Closure and Rehabilitation	Traffic	The change in the traffic patterns as a result of traffic entering and exiting the proposed mine on the surrounding road infrastructure and existing traffic.	Regional	3	Short term	1	Low	2	Nearly completely	2	8	High	4	Low	32	Low	0,8	Low	25,6
Closure and Rehabilitation	Traffic	Nuisance, health and safety risks caused by increased traffic on an adjacent to the study area including cars and heavy vehicles.	Regional	3	Short term	1	Low	2	Nearly completely	2	8	High	4	Low	32	Low	0,8	Low	25,6

Closure and Rehabilitation	Health and Safety	Possibility of closure activities and workers causing veld fires, which can potentially cause injury and or loss of life to workers and surrounding landowners and visitors.	Site	2	Short term	1	Medium	3	Partly reversible	3	9	Medium	3	Low	27	Medium	0,6	Very Low	16,2
Rehabilitation of site, removal of infrastructure, closure of waste management facilities (including Stormwater)	Health and Safety	Increased risk to public health and safety: Dangerous areas including the waste management facilities poses health risks and possible loss of life to mine workers and visitors to the site.	Site	2	Short term	1	Medium	3	Partly reversible	3	9	Medium	3	Low	27	Medium	0,6	Very Low	16,2
Rehabilitation of site, removal of infrastructure, closure of waste management facilities (including Stormwater)	Socio-Economic	Socio-economic impact on farmers, labourers and surrounding landowners and residents due to negative impacts on groundwater, dust pollution, noise pollution etc.	Regional	4	Short term	1	Low	2	Nearly irreversible	4	11	Medium	3	Low	33	Medium	0,6	Very Low	19,8
Closure and Rehabilitation	Socio-Economic	Economic impact should there be an incident of public health and safety.	Regional	4	Long term	4	High	4	Partly reversible	3	15	High	4	Medium-High	60	Low	0,8	Medium	48
Closure and Rehabilitation	Socio-Economic	Sourcing supplies from local residents and businesses boosting the local economy for an extended period of time.	Regional	4	Short term	1	High	4	Nearly irreversible	4	13	High	4	Medium	52	Low	0,8	Medium	41,6
Closure and Rehabilitation	Socio-Economic	Reduced period of providing employment for local residents and skills transfer to unskilled and semi-skilled unemployed individuals.	Regional	4	Short term	1	Medium	3	Nearly completely	2	10	High	4	Medium	40	Medium	0,6	Very Low	24
Closure and Rehabilitation	Sasol Pipelines	Impacts during Closure phase to the Sasol pipelines	Regional	4	Short term	1	Medium	3	Nearly completely	2	10	Medium	3	Low	30	Medium	0,6	Very Low	18

15.2 THE POSSIBLE MITIGATION MEASURES THAT COULD BE APPLIED AND THE LEVEL OF RISK

(With regard to the issues and concerns raised by affected parties provide a list of the issues raised and an assessment/ discussion of the mitigations or site layout alternatives available to accommodate or address their concerns, together with an assessment of the impacts or risks associated with the mitigation or alternatives considered).

Management Objectives and Mitigation types for each aspect is provided here. Mitigation measures are prescribed within the Environmental Management Programme (EMPR).

Table 15-2: Summary of the key environmental impacts and Management Objectives and Mitigation Type

Activity	Aspects Affected	Potential Impact	Management Objectives	Mitigation Type	Residual Risk	
No-Go Option						
No-Go Option	Socio-Economic	Reduced period of development and upliftment of the surrounding communities and infrastructure based on mining development within the region.	No Additional Management Objectives if Project does not proceed	N/A	Medium	45
No-Go Option	Socio-Economic	Reduced period of development of the economic environment, by job provision and sourcing supplies for and from local residents and businesses.	No Additional Management Objectives if Project does not proceed	N/A	Medium	45
No-Go Option	Socio-Economic	Positive: No additional negative impacts on I&APs or surrounding land users	No Additional Management Objectives if Project does not proceed	N/A	POSITIVE Medium	45
No-Go Option	Natural Environment	Positive: No additional negative impacts on the environment	No Additional Management Objectives if Project does not proceed	N/A	POSITIVE Medium	45
Construction and Operational Phase						
Storm water management structures, pipelines, berms and water resources diversions, Access and Haul roads, Pipelines, Plant and Other Infrastructure (Overland conveyer removed as alternative), Sewage treatment, Bulk hydrocarbon storage facilities/ Filling station, Shaft development, Mining of coal by underground mining, Crushing and screening of coal underground, All infrastructure including External parking, Security and Weigh bridge, Truck Loading area, Internal parking, Silos, stockpiles, sewage treatment plant, scrap yard, offices, crusher and screen plant, medical facility, stores, raw water dam, storage yard and the ventilation shaft, Sub-station and power line, ,Infrastructure area	Soils	Soil compaction by heavy duty vehicles. Soils will be stripped to construct proper roads. This could lead to loss of topsoil. Due to the presence of vehicles and equipment hydro-carbon spills may occur impacting on the quality of the soils. Stripping and stockpiling of topsoil which may lead to deterioration of soil quality.	Early detection of impacts and remediation thereof.	Visual inspection/confirmation that no surface impacts are occurring. Management and Rehabilitation (If required)	Low	31,2
	Soils	During operation of the Ergosat mine, it is anticipated that carbonaceous material may be spilled which will contaminate soils. Contamination by dirty water run-off and/or spillage of hydrocarbons and/or chemicals is also expected from operations vehicles and machinery. Contamination of soils through: - Indiscriminate disposal of waste; and - Accidental spillage of chemicals such as hydrocarbon-based fuels and oils or lubricants spilled from vehicles and other chemicals from operational and maintenance activities e.g. paints.	To prevent contamination of soils.	Remedy through rehabilitation, proper removal and disposal if soils have become contaminated	Low	31,2

industrial development, Residue stockpiles or deposit areas		Deterioration of topsoil quality due to salt contamination at the coal stockpile and crushing and screening plant footprints				
Storm water management structures, pipelines, berms and water resources diversions. Access and Haul roads Pipelines Plant and Other Infrastructure (Overland conveyer removed as alternative) Sewage treatment Bulk hydrocarbon storage facilities/ Filling station Shaft development Mining of coal by underground mining Crushing and screening of coal underground All infrastructure including External parking, Security and Weigh bridge, Truck Loading area, Internal parking, Silos, stockpiles, sewage treatment plant, scrap yard, offices, crusher and screen plant, medical facility, stores, raw water dam, storage yard and the ventilation shaft. Sub-station and power line Infrastructure area industrial development Residue stockpiles or deposit areas	Land Capability and Land Use	Possibility of mining activities and workers impacting on Mining Right Area	Implement concurrent rehabilitation where possible and adhere to Final Closure and Rehabilitation Plan.	Visual inspection/confirmation that no additional surface impacts are occurring. Management and Rehabilitation (If required)	Low	21,6
Shaft development Mining of coal by underground mining	Blasting	Blasting hazard, specifically - Ground vibration and Other including the SASOL pipeline	To prevent impacts on people and animals and to avoid damage to structures.	Control through management (third-party monitoring), blast design and communication	Very Low	19,2
Storm water management structures, pipelines, berms and water resources diversions, Access and Haul roads, Pipelines, Plant and Other Infrastructure (Overland conveyer removed as alternative), Sewage treatment, Bulk hydrocarbon storage facilities/ Filling station, Shaft development, Mining of coal by underground mining, Crushing and screening of coal underground, All infrastructure including External parking, Security and Weigh bridge, Truck Loading area, Internal parking, Silos, stockpiles, sewage treatment plant, scrap yard, offices, crusher and screen plant, medical facility, stores, raw water dam, storage yard and the ventilation shaft, Sub-station and	Ecological Impacts	Fauna: Disturbance and loss of fauna through noise, light and dust pollution and possible hunting, trapping and killing of fauna. Other impacts on Fauna as identified in specialist assessment	Early detection of impacts and remediation thereof.	Visual inspection/confirmation that no additional surface impacts are occurring. Management and Rehabilitation (If required)	Low	33
	Ecological Impacts	Destruction of Vegetation, loss of integrity of vegetation and Spreading of alien invasive species and bush encroachment of indigenous species. Vegetation will be removed during the construction of the roads where they are not situated within agricultural lands. Note that no red data species were identified within the proposed mining area or at the footprint and stockpiling area.	Early detection of impacts and remediation thereof.	Visual inspection/confirmation that no additional surface impacts are occurring. Management and Rehabilitation (If required)	Low	33

power line, ,Infrastructure area industrial development, Residue stockpiles or deposit areas						
Storm water management structures, pipelines, berms and water resources diversions, Access and Haul roads, Pipelines, Plant and Other Infrastructure (Overland conveyer removed as alternative), Sewage treatment, Bulk hydrocarbon storage facilities/ Filling station, Shaft development, Mining of coal by underground mining, Crushing and screening of coal underground, All infrastructure including External parking, Security and Weigh bridge, Truck Loading area, Internal parking, Silos, stockpiles, sewage treatment plant, scrap yard, offices, crusher and screen plant, stores, raw water dam, storage yard, Infrastructure area industrial development, Residue stockpiles or deposit areas	Hydrological Aspects; Surface water	Stormwater, erosion and siltation impacts due to a lack of implementing measures to manage stormwater run-off quantity and quality during the operational phase.	Prevent hydrological impacts and prevent contamination of water resources	Stormwater Management, Monitoring, Infrastructure Design	Low	31,2
	Hydrological Aspects; Surface water	Contamination of stormwater runoff and ground water, caused by: - Sediment release; - Chemicals such as hydrocarbon-based fuels and oils or lubricants spilled from construction vehicles; - Other chemicals from maintenance activities e.g. paints; and - Effluent discharges, due to a lack of stormwater management and system maintenance.	To limit the impact of infiltration of potentially contaminated leachate to the underlying aquifers.	Infrastructure designs; Management; Monitoring	Low	33,6
	Hydrological Aspects; Surface water and Groundwater	Impact of Nitrate based explosives used during mining on groundwater quality. Contamination plume can affect the groundwater resource.	Prevent hydrological impacts and prevent contamination of water resources	Stormwater Management, Monitoring, Infrastructure Design	Low	33,6
Dewatering during the Operational Phase	Hydrological Aspects; Groundwater	Influx of groundwater into incline shaft void The void in the incline will lead to an influx of groundwater into the incline shaft. This will potentially result into dewatering of the surrounding underground aquifers. This will manifest as a groundwater cone of depression in the water table with negative consequences of the availability of groundwater for existing borehole users around the proposed incline shafts. The significance is medium due to the duration of the impact throughout the construction and operational phases of the project. Impacts of dewatering on the groundwater aquifer should water be abstracted from ground water during the operational phase.	Keep record of the dewatering volumes and water levels of the aquifer	Monitoring of water levels and possible impacts on the aquifer	Medium	44,8
Dewatering during the Operational Phase	Hydrological Aspects; Groundwater	Underground (Lowering of groundwater levels- baseflow to the Vaal River) The mining operation could potentially lower the baseflow of surrounding water to the Vaal River	Keep record of the dewatering volumes and water levels of the aquifer	Monitoring of water levels and possible impacts on the aquifer	Medium	44,8
Storm water management structures, pipelines, berms and water resources diversions, Access and Haul roads, Pipelines, Plant and Other Infrastructure (Overland conveyer removed as alternative), Sewage treatment, Bulk	Hydrological Aspects; Groundwater	The formation of acid mine drainage (AMD) as a result of ingress water and oxygen into the stockpiled overburden The potential impact of seepage water into the shallow weathered aquifer from the overburden stockpile is considered to be moderate. Potential contaminants may	Prevent hydrological impacts and prevent contamination of water resources	Stormwater Management, Monitoring, Infrastructure Design	Low	38,4

hydrocarbon storage facilities/ Filling station, Shaft development, Mining of coal by underground mining, Crushing and screening of coal underground, All infrastructure including External parking, Security and Weigh bridge, Truck Loading area, Internal parking, Silos, stockpiles, sewage treatment plant, scrap yard, offices, crusher and screen plant, stores, raw water dam, storage yard, Infrastructure area industrial development, Residue stockpiles or deposit areas		seep into the groundwater and could impact on the groundwater usage, which includes domestic and agricultural use. Generally, overburden is considered inert and therefore does not have a great potential for AMD. However, during the removal of the overburden in the construction of the incline shaft, there is the potential to remove some of the coal from the seams. This coal has AMD. The AMD potential of the overburden stockpile is considered moderate in the long term as the overburden will be stockpiled for the LOM. The impact will be limited to the site.				
	Hydrological Aspects; Surface water and Groundwater	Possible Seepage from waste management activities e.g. waste rock dumps, could cause a contamination plume affecting the underground water resources.	Prevent and monitor seepage	Stormwater Management, Monitoring, Infrastructure Design	Medium	51,2
	Hydrological Aspects; Surface water, Hydropedological and Groundwater	Wetland Impacts - Artificial wetland created by Agricultural activities	Monitor integrity of PCDs and Stockpiles. Keep record of disposal rates and maximum capacity.	Stormwater Management, Monitoring, Infrastructure Design	Medium	48,4
Access and Haul roads, Plant and Other Infrastructure, Crushing and screening, All infrastructure including External parking, Security and Weigh bridge, Truck Loading area, Internal parking, Silos, stockpiles, sewage treatment plant, scrap yard, offices, crusher and screen plant, medical facility, stores, raw water dam, storage yard and the ventilation shaft, Infrastructure area industrial development, Residue stockpiles or deposit areas Activities as mentioned above	Air Quality	Increased windborne dust (soil and ore fines), vehicle fumes and particulate matter PM10, altering air quality.	To limit public exposure to unacceptable health risks.	Adhere to Dust regulations and Monitoring	Very Low	18
	Air Quality	Increased dust pollution (soil and ore fines), vehicles on gravel roads and transport of RoM	To limit public exposure to unacceptable health risks.	Adhere to Dust regulations and Monitoring	Very Low	18
	Air Quality	Emissions by means of crushing and screening In this activity, the use of the primary and secondary crusher and discard handling are the most likely to have implications on ambient air quality. The crushing process releases fugitive dust, especially if there are no enclosure and water sprays. Dust contained within the RoM ore can be released into the atmosphere during this process i.e. fugitive dust (containing TSP, as well as PM10 and PM2.5). Wind erosion from stockpiles can be a perennial source of dust if not properly managed during and post mining operations. The plant, crushing and screening areas all have the potential to generate dust and therefore specific mitigation measures can be assigned to each of these activities.	To limit public exposure to unacceptable health risks.	Adhere to Dust regulations and Monitoring	Very Low	18
Access and Haul roads, Plant and Other Infrastructure, Shaft development, Mining of coal by	Noise and Lighting	Nuisance and health risks caused by an increase in the ambient noise level as a result of noise impacts associated with	Responsible blasting and avoiding unnecessary noise and lighting sources.	Be mindful of additional noise sources. Monitoring of Noise levels	Low	28,8

underground mining, Crushing and screening of coal, All infrastructure including External parking, Security and Weigh bridge, Truck Loading area, Internal parking, Silos, stockpiles, sewage treatment plant, scrap yard, offices, crusher and screen plant, medical facility, stores, raw water dam, storage yard and the ventilation shaft, Sub-station and power line, Infrastructure area industrial development.		the operation of the mining activities and processing.				
	Noise and Lighting	Nuisance and health risks caused to close by receptors as identified in specialist report	Responsible blasting and avoiding unnecessary noise and lighting sources.	Be mindful of additional noise sources. Monitoring of Noise levels	Low	31,2
	Noise and Lighting	Noise impact that would only manifest in the operational phase but that can be avoided in the construction phase by implementation of measures in construction of ventilation shafts. Impacts of noise need to be controlled by means of berms and shielding structures. The recommendations made by the Noise Impact Assessment are with the assumption that sensitive receptors within 750m of the site will not relocate. If relocation of these receptors would be an option, the recommendations would have to be altered.	Responsible blasting and avoiding unnecessary noise and lighting sources.	Be mindful of additional noise sources. Monitoring of Noise levels	Low	24
	Noise and Lighting	Impact of security lighting on surrounding landowners and animals.	Responsible blasting and avoiding unnecessary noise and lighting sources.	Be mindful of additional noise sources. Monitoring of Noise levels	Low	24
All activities.	Sites of archaeological and cultural interests	Construction activities have the potential to impact the historical structures. A marked grave is located within the infrastructure area.	To avoid disturbing sites of archaeological and cultural interest. If any new heritage aspects are discovered, a specialist must be called for evaluation. This must be done in accordance with legal requirements.	Management; Conservation; Permitting	Very low	18
All Activities	Visual aspects	Potential visual impact on the viewpoints that had a visual exposure rating of 5 or higher. The operational impact on the surrounding agricultural farmers and land users will be more significant, due to the visual intrusion and activities being undertaken. Although the mine activities will not be visible since it will all be underground, the stockpiles, waste rock dumps and related surface infrastructure will be visible for the entire life of mine.	Visual surface condition monitoring and design to identify impacts and warning signs of impacts occurring on surface.	Monitoring and Rehabilitation if required	Low	31,2
Storm water management structures, pipelines, berms and water resources diversions, Access and Haul roads, Pipelines, Plant and Other Infrastructure (Overland conveyer removed as alternative), Sewage treatment, Bulk hydrocarbon storage facilities/ Filling station, Shaft development, Mining of coal by underground mining, Crushing and screening of coal underground, All infrastructure including External parking, Security	Waste	Generation and disposal of general waste, litter and hazardous material during the construction and operational phase	Adhere to responsible water management practices	Environmental Awareness, Monitor waste	Low	28,8

and Weigh bridge, Truck Loading area, Internal parking, Silos, stockpiles, sewage treatment plant, scrap yard, offices, crusher and screen plant, medical facility, stores, raw water dam, storage yard and the ventilation shaft, Sub-station and power line, Infrastructure area industrial development, Residue stockpiles or deposit areas						
Sewage treatment Bulk hydrocarbon storage facilities/ Filling station, sewage treatment plant, Residue stockpiles or deposit areas	Waste (Including Hazardous Waste)	Generation and disposal of additional hazardous operational waste i.e. Residue Stockpiles, etc.	Adhere to responsible water management practices	Environmental Awareness. Monitor waste volumes produced and disposed	Low	31,2
Storm water management structures, pipelines, berms and water resources diversions, Access and Haul roads, Pipelines, Plant and Other Infrastructure (Overland conveyer removed as alternative), Sewage treatment, Bulk hydrocarbon storage facilities/ Filling station, Shaft development, Mining of coal by underground mining, Crushing and screening of coal underground, All infrastructure including External parking, Security and Weigh bridge, Truck Loading area, Internal parking, Silos, stockpiles, sewage treatment plant, scrap yard, offices, crusher and screen plant, medical facility, stores, raw water dam, storage yard and the ventilation shaft, Sub-station and power line, ,Infrastructure area industrial development, Residue stockpiles or deposit areas	Services	Need for services e.g. water, electricity and sewerage systems, causing additional strain on natural resources and service infrastructure.	Planning to prevent impacts	Infrastructure designs; Management; Monitoring	Low	31,2
Access and Haul roads External parking, Security and Weigh bridge, Truck Loading area, Internal parking	Traffic	The change in the traffic patterns as a result of increased traffic entering and exiting the operations on the surrounding road infrastructure and existing traffic. Impacts on road infrastructure Structural maintenance work on the R716 was completed recently and an increase in the size and frequency of large construction vehicles and trucks could potentially damage the road surface. Financial impacts could manifest for the local Municipality in terms of road maintenance. Safety and financial impacts are possible for road users should private vehicles be damaged or accidents occur.	Planning to prevent impacts	Infrastructure designs; Management; Monitoring	Low	26,4

	Traffic	Nuisance, health and safety risks caused by increased traffic on an adjacent to the study area including cars and heavy vehicles.	Planning to prevent impacts	Infrastructure designs; Management; Monitoring	Low	26,4
Activities as mentioned above (No activity is found within 100 m of the SASOL pipelines).	Health and Safety - Sasol Pipelines	Possibility of impacts to the Sasol Pipeline and Dangers associated with impacts to these structures	Adhere to Health and Safety Regulations	Environmental Awareness, Reporting structures; Monitoring	Low	21,6
Storm water management structures, pipelines, berms and water resources diversions, Access and Haul roads, Pipelines, Plant and Other Infrastructure (Overland conveyer removed as alternative), Sewage treatment, Bulk hydrocarbon storage facilities/ Filling station, Shaft development, Mining of coal by underground mining, Crushing and screening of coal underground, All infrastructure including External parking, Security and Weigh bridge, Truck Loading area, Internal parking, Silos, stockpiles, sewage treatment plant, scrap yard, offices, crusher and screen plant, medical facility, stores, raw water dam, storage yard and the ventilation shaft, Sub-station and power line, Infrastructure area industrial development, Residue stockpiles or deposit areas	Health and Safety	Increased risk to public health and safety: Dangerous areas including the waste management activities and waste poses health risks and possible loss of life to mine workers and visitors to the site. Health and safety risks for workers Inadequate management of the construction process and general construction related activities could result in health and safety risks for workers, manifesting in the following ways: Construction related accidents due to structural safety of project infrastructure. The excavation of the shaft will result in the formation of topographical voids, which may be a safety risk to the employees, livestock and neighbouring landowners. • Dust generation and air pollution resulting in respiratory diseases. • High ambient noise levels caused by machinery and construction equipment resulting in health issues for workers. • Poor management of the construction process resulting in pollution problems (e.g. insufficient sanitation facilities, littering and refuse), flies rodents and pests and possible contamination of water sources. • Unsafe and insufficient drinking water. • An increase in HIV/AIDS and other STDs due to prostitution activities and temporary sexual relationships with local women, unwanted pregnancies that place further pressure on Basic Health Care Services. • Dehydration and sunburn, as high temperatures could be experienced during summer months.	Adhere to Health and Safety Regulations	Environmental Awareness, Infrastructure designs; Management; Monitoring	Low	21,6
	Health and Safety	Increased risk to public and worker health and safety	Adhere to Health and Safety Regulations	Infrastructure designs; Management; Monitoring	Low	21,6
Storm water management structures, pipelines, berms and water resources diversions, Access and Haul roads, Pipelines, Plant and Other Infrastructure (Overland	Socio-Economic	Socio-economic impact on farmers, labourers and surrounding landowners and residents due to negative impacts on groundwater, dust pollution, noise pollution etc.	To enhance the socio-economic benefits of the project.	Management; Communication; Strategy implementation	Low	25,2

conveyer removed as alternative), Sewage treatment, Bulk hydrocarbon storage facilities/ Filling station, Shaft development, Mining of coal by underground mining, Crushing and screening of coal underground, All infrastructure including External parking, Security and Weigh bridge, Truck Loading area, Internal parking, Silos, stockpiles, sewage treatment plant, scrap yard, offices, crusher and screen plant, medical facility, stores, raw water dam, storage yard and the ventilation shaft, Sub-station and power line, ,Infrastructure area industrial development, Residue stockpiles or deposit areas	Socio-Economic	Socio-economic impact on farmers, labourers and surrounding landowners specifically the close-by receptors, specifically in terms of attitude against the mine	To enhance the socio-economic benefits of the project.	Management; Communication; Strategy implementation	Medium	45
	Socio-Economic: **Positive Impacts**	Extended employment provision due to the implementation of the extension of the mining activities, allowing mining activities to continue for additional years.	Enhance Socio-Economic environment	Management; Communication; Strategy implementation	Medium	45
	Socio-Economic: **Positive Impacts**	Employment at the Colliery The mine will employ and estimated 530 permanent employees, with skills levels that vary from skilled, semi-skilled to unskilled. Approximately 100 of the employees will be unskilled and illiterate and for all employees individual training and skills development plans will be implemented in alignment with career progression. Skilled employment will include managerial positions, Planners, Environmental and other Specialists, Geologists, administrative and financial personnel, certain Operators, Engineers, Boilermakers and so forth. Semi-skilled positions relate to Foreman positions and Operators such as Diesel Attendants, whereas unskilled positions are usually associated with manual labour (underground miners, gardeners, etc.). It is anticipated that the majority of the positions could be filled by locals from the Municipal area as mining and industrial related skills should be available in the Sasolburg/Vereeniging region. Locals closer to the project site (Deneysville, Refengkgotso, etc.) would in all likelihood expect to be considered especially for unskilled and semi-skilled positions. Tertiary education levels in Ward 19 are much lower than in Ward 18 and in the broader municipal area (Ward 18: 23%; Ward 19: 2%; Metsimaholo: 9%) In addition to permanent positions, temporary employment and contractors could be added. Temporary employment would include: • Cleaning and maintenance of the conveyor belts, the V drains and culverts; • Cutting and clearing of vegetation within the used mine servitudes; • Maintenance of firebreaks; • Maintenance of gravel roads, regular grading and watering to suppress dust;	Enhance Socio-Economic environment	Management; Communication; Strategy implementation	Medium	45

		• Repairing of fences as required; • Repair and maintenance of buried and surface pipelines in the servitudes, various valves, etc.; • Regular cleaning of silt traps drying bed, oil traps and the dirty water dams; etc.				
	Socio-Economic: **Positive Impacts**	Impacts on procurement / supporting industries / local SMME's The Mining Charter sets BEE compliance guidelines and as such Lefa Colliery will have to procure all products and/or services from BEE compliant outlets. In order to ensure and promote the procurement of products and/or services from SMMEs who are BEE compliant as well as black owned and/or black empowered, strategies are identified in the Colliery's SLP. It is expected that the majority of goods and services will be available locally from within the Municipal area. Supporting industries, local SMME's and contractors include: • Contractors to transport and dispose of domestic and industrial waste; • Equipment cleaning (trucks, conveyors, belt); • Maintenance and repairs of infrastructure, roads, etc.; • Operation of tuck shops; • Laundry and catering services; • Gardening; • Security; etc.	Enhance Socio-Economic environment	Management; Communication; Strategy implementation	Medium	45
	Socio-Economic	Impacts on current NON-MINING RELATED employment levels of the area The proposed Colliery is an underground operation and current land uses will to a large extent be unaffected. However, should negative impacts usually associated with coal mining (impacts on water resources, air/dust pollution, crime, etc.) manifest and affect current land uses (farming ventures, local businesses) to such an extent that existing operations cease or are downscaled, then job losses would be inevitable. It was not at this stage possible to determine the existing employment numbers within the study area and the extent of potential job losses, should it occur, is not known.	Enhance Socio-Economic environment	Management; Communication; Strategy implementation	Medium	48
	Socio-Economic	Impacts on land values / market values of affected land portions A variety of factors could impact land values of affected land portions and include:	Enhance Socio-Economic environment	Management; Communication; Strategy implementation	Medium	48

		• The availability and quality of ground and/or surface water for domestic and farming purposes; • Intrusion impacts, such as noise and dust, which could have an impact on crops, livestock and infrastructure; • Occurrence of criminal activities (theft, vandalism, etc.); • Occurrence of informal settlements, trespassing on private land, illegal grazing practices; and • Restrictions that are set by the mining company for future infrastructure developments on private properties due to underground mining operations, safety issues, and so forth. Although a mining right has not been awarded yet, the proposed Lefa Colliery has already impacted on sales of properties in the area. Willow Creek Estate is marketed and promoted as a pristine residential estate with access to clean surface and groundwater resources. Large infrastructure investments have been made (R21 million in 2006 for reservoirs, roads, fencing, engineering services and so forth). The proposed Lefa Colliery (with the associated impacts of a coal mine) has the potential to negatively impact the 'sense of place' as well as natural resources of the area and as a consequence property values and sales at the estate could decline. Uncertainty with regards to the Lefa Colliery development and the timeframes associated with the awarding of a mining right exacerbates this impact. Should the mining right not be awarded, or the mine not be developed, potential impacts on land values would already have manifested. Financial impacts for Willow Creek Estate are also anticipated, as incomes derived through sales and levies have already been affected. It is furthermore possible that impacts on groundwater, if it occurs, will affect farmland as well as the Vaal Power Smallholding's property prices negatively, as they rely on groundwater for domestic and agricultural purposes and would be less marketable without this resource.				
	Socio-Economic: **Positive Impacts**	Impacts on tourism activities Existing tourism activities and holiday	Enhance Socio-Economic environment	Management; Communication; Strategy implementation	Medium	48

		accommodation towards Deneysville, the Vaal Dam and Vaal River could negatively be impacted if the aesthetic environment and 'sense of place' is affected to such an extent that tourists are discouraged to frequent the area. Since the mine is an underground operation it is not likely that current or future tourism activities will be affected significantly as a direct result of the mine development. However, the possible negative spin-offs of a coal mine (groundwater pollution, etc.) could affect the sale of properties along the Vaal River, and subsequently impact on leisure activities. Visual impacts of the shaft complex's current locality will manifest for road users on their way to the Dam, but the complex would in all likelihood not be visible from the Dam and its surrounds. Visual impacts are being assessed by a Specialist in this field.				
	Socio-Economic: **Positive Impacts**	Skills development, training and skills equity A 'Skills, training and development Policy and Plan' has been drawn up with the purpose to provide guidelines for the implementation and maintenance of comprehensive training and development strategies and procedures. Annual monitoring is done by the DMRE. Funds for Human Resource Development for individual career development and in-service training are provided. Training includes ABET to illiterate employees, learnerships registered with the Department of Labour, internal and external bursaries and internships to be provided in accordance the Mining Charter guidelines. Management will be responsible to develop career development and succession plans and to assess the potential of employees and establish a career path for each to ensure the development of each employee. Lefa Colliery aims to exceed the compliance targets set by DMRE for HDSA employment and the full staff compliment will reflect as follows by the end of 2021: • Top Management: 50% White; 50% Black • Senior Management: 40% White; 60% Black	Enhance Socio-Economic environment	Management; Communication; Strategy implementation	Medium	48

		• Middle Management: 29% White; 71% Black • Junior Management: 11% White; 89% Black • Women in Core Activities: 12%				
	Socio-Economic: **Positive Impacts**	Impacts on the local community / community projects As part of a mine's Social and Economic Development responsibility, the mine must get involved with a relevant Local Economic Development Projects as identified in the IDP of a municipality. Lefa Colliery is however not in the position to get involved with the day-to-day running of a LED project, but will make a financial contribution of R1 100 000 annually towards a project of the municipality's choice, over a period of 5 year	Enhance Socio-Economic environment	Management; Communication; Strategy implementation	Medium	48
	Socio-Economic	Impacts of an 'outside' workforce / migrant labourers The Mining Charter requires that the majority of permanent employees be sourced from the "local" area. Local employees are in turn defined as people that originate/live within a 50 km radius of the project site. In terms of the Lefa Colliery this would also include people from outside the Metsimaholo Local Municipal area and would include people from as far as Vereeniging, Parys and the Gauteng province. This definition of a local workforce could thus be in conflict with the perception of a "local workforce" as seen by people living in close proximity to the Colliery. Locals could thus perceive "outsiders" as stealing employment opportunities that should be reserved for them. Negative impacts that can manifest as a result of a migrant and/or "outside" workforce include: • Impacts on population changes, as the 'outside' / migrant workforce impacts on the population size, gender, racial and age composition of the local and regional Municipalities; • Additional pressure on local government for housing and associated infrastructure and services if workers are retrenched and unemployed; • A rise in the number and size of informal settlements if workers are retrenched; Impacts on the HIV/AIDS prevalence rate, unwanted pregnancies and the	Enhance Socio-Economic environment	Management; Communication; Strategy implementation	Medium	48

		subsequent pressure on health care services, if short-term relations were established with local women and the migrants return to their families in the sending areas; • An increase in unemployment placing pressure on the Local Municipality to provide jobs if the workers are retrenched; and • Safety and security issues for the surrounding communities due to a growth in the number of unemployed people.				
	Socio-Economic	Impacts associated with blasting Blasting operations and the associated ground vibrations have the potential to affect structures in the study area, such as dams and houses, resulting in unnecessary reparation costs for private landowners.	Enhance Socio-Economic environment	Management; Communication; Strategy implementation	Medium	48
Activities as mentioned above	SASOL Pipeline Impacts - Independently Assessed (Specialist Risk Assessment Conducted)	Impact on the Sasol gas pipeline and servitude There is an existing gas pipeline and servitude that traverses the proposed mining area and concerns have been raised that the mining activities would encroach the buffers required for the servitude area. As far as could be established a Sasol representative has been included in the consultation process. The extent of the impact, if it should occur, has not been established at this stage.	Enhance Socio-Economic environment	Management; Communication; Strategy implementation	Low	28,8
Closure and Rehabilitation Phase						
Closure and Rehabilitation	Geology and Soils	Potential for compaction and contamination from heavy vehicles usage and spillage of hydrocarbons, reagents (from infrastructure and machinery), raw materials and dirty water runoff, and the loss of soil due to erosion by wind and or water.	Early detection of impacts and remediation thereof.	Rehabilitation and Monitoring	Very Low	4,2
Closure and Rehabilitation	Land Capability and Land Use	Rehabilitation of Land uses and Land Capability	Implement Final Land Use / Final Land form at End of Life	Rehabilitation and Monitoring	Very Low	3,2
Closure and Rehabilitation	Ecological Impacts	Disturbance and loss of fauna through noise, light and dust pollution as well as hunting, trapping and killing of fauna.	Restore Land Use and Land Capability	Rehabilitation and Monitoring	Very Low	14,4
Closure and Rehabilitation	Ecological Impacts	Spreading of alien invasive species and bush encroachment of indigenous species.	Restore Land Use and Land Capability	Rehabilitation and Monitoring	Very Low	12,6
Closure and Rehabilitation - Implementation and ensuring maintenance and sustainability	Ecological Impacts - **Positive Impact**	Rehabilitation of area with natural vegetation and re-establishment of local biodiversity	Restore Land Use and Land Capability	Rehabilitation and Monitoring	Very Low	18

Closure and Rehabilitation	Ecological Impacts - **Positive Impact**	Rehabilitation of area with natural vegetation and re-establishment of local biodiversity	Restore Land Use and Land Capability	Rehabilitation and Monitoring	Very Low	18
Rehabilitation of site, removal of infrastructure, closure of waste management facilities (including Stormwater)	Hydrological Aspects; Surface water and Groundwater	Stormwater, erosion and siltation impacts due to a lack of implementing measures to manage stormwater run-off quantity and quality during the closure phase.	Prevent hydrological impacts and prevent contamination of water resources during Closure Phase	Infrastructure designs; Management; Monitoring	Low	26,4
Rehabilitation of site, removal of infrastructure, closure of waste management facilities (including Stormwater)	Hydrological Aspects; Surface water and Groundwater	Contamination of stormwater runoff and ground water, caused by: - Sediment release; - Chemicals such as hydrocarbon-based fuels and oils or lubricants spilled from heavy duty vehicles; - Effluent discharges, due to a lack of stormwater management.	Prevent hydrological impacts and prevent contamination of water resources during Closure Phase	Stormwater Management, Monitoring, Infrastructure Design	Very Low	13,2
Closure and Rehabilitation	Hydrological Aspects; Surface water and Groundwater	Impacts of dewatering on the groundwater aquifer should water be abstracted from ground water during the closure phase.	Keep record of the dewatering volumes and water levels of the aquifer	Monitoring of water levels and possible impacts on the aquifer	Low	19,8
Rehabilitation of site, removal of infrastructure, closure of waste management facilities (including Stormwater)	Hydrological Aspects; Surface water and Groundwater	Impaction groundwater from the pollution plume associated with the waste storage facilities and possible Decant	Prevent hydrological impacts and prevent contamination of water resources. Prevent and monitor seepage/decant and pollution plumes.	Stormwater Management, Monitoring, Infrastructure Design	Medium	51,2
Rehabilitation of site, removal of infrastructure, closure of waste management facilities (including Stormwater)	Hydrological Aspects; Surface water and Groundwater	Impaction groundwater from the pollution and possible Acid Mine Drainage	Prevent hydrological impacts and prevent contamination of water resources. Prevent and monitor seepage/decant and pollution plumes.	Stormwater Management, Monitoring, Infrastructure Design	Medium	51,2
Closure and Rehabilitation	Air Quality	Demolition & Removal of all infrastructure (incl. transportation off site) During this activity, there is demolition of buildings and foundation and subsequent removal of rubbles generated. There is cleaning-up of workshops, fuels and reagents, removal of power and water supply, removal of haul and access roads. Potential for impacts during this phase will depend on the extent of demolition and rehabilitation efforts during closure as well as features which will remain. The impacts on the atmospheric environment during the decommissioning phase will be similar to the impacts during the construction phase. The process includes dismantling and demolition of existing infrastructure, transporting and handling of topsoil on unpaved roads in order to bring the site to its initial/rehabilitated state. Demolition and removal of all infrastructures will cause fugitive dust emissions. The impacts will be short-term and localised. Any implication or implications this phase will have on	To limit public exposure to unacceptable health risks.	Adhere to Dust regulations and monitoring framework established	Very Low	18

		ambient air quality will seize once the activities are finalised.				
Closure and Rehabilitation	Noise and Lighting	Nuisance and health risks caused by an increase in the ambient noise level as a result of noise impacts associated with the operation of heavy-duty vehicles and equipment.	To limit public exposure to unacceptable health risks.	Be mindful of additional noise sources. Monitoring of Noise levels.	Very Low	19,2
Closure and Rehabilitation	Noise and Lighting	Disturbance due to vibrations caused by heavy duty vehicles.	To limit public exposure to unacceptable health risks.	Be mindful of additional noise sources. Monitoring of Noise levels.	Very Low	16,8
Closure and Rehabilitation	Noise and Lighting	Impact of security lighting on surrounding landowners and animals.	Responsible blasting and avoiding unnecessary noise and lighting sources.	Be mindful of additional noise sources. Monitoring of Noise levels.	Very Low	16,8
Closure and Rehabilitation	Sites of archaeological and cultural interests	Graves to be protected in-situ or as per recommendations made by specialist	To avoid disturbing sites of archaeological and cultural interest. If any new heritage aspects are discovered, a specialist must be called for evaluation. This must be done in accordance with legal requirements.	Management; Conservation; Permitting	Very Low	16,8
Closure and Rehabilitation	Visual aspects	Visibility from sensitive receptors / visual scarring of the landscape as a result of the closure and rehabilitation activities.	Rehabilitation and Monitoring	Monitoring and Rehabilitation if required	Low	25,6
Closure and Rehabilitation	Waste (Including Hazardous Waste)	Generation and disposal of general waste, litter and hazardous material created from the decommissioning activities	Rehabilitation and Monitoring. Responsible disposal of waste	Environmental Awareness, Monitoring and Rehabilitation if required	Low	21,6
Closure and Rehabilitation, Rehabilitation of site, removal of infrastructure, sealing of shafts and closure of waste facilities	Waste (Including Hazardous Waste)	Generation and disposal of additional hazardous waste	Rehabilitation and Monitoring. Responsible disposal of waste	Environmental Awareness, Monitoring and Rehabilitation if required	Low	24
Closure and Rehabilitation	Services	Need for additional services i.e. water, electricity and sewerage systems during the closure phase causing additional strain on natural resources and infrastructure.	Planning to prevent impacts	Environmental Awareness, Infrastructure designs; Management; Monitoring	Low	28,8
Closure and Rehabilitation	Traffic	The change in the traffic patterns as a result of traffic entering and exiting the proposed mine on the surrounding road infrastructure and existing traffic.	Planning to prevent impacts	Infrastructure designs; Management; Monitoring	Low	25,6
Closure and Rehabilitation	Traffic	Nuisance, health and safety risks caused by increased traffic on an adjacent to the study area including cars and heavy vehicles.	Planning to prevent impacts	Infrastructure designs; Management; Monitoring	Low	25,6
Closure and Rehabilitation	Health and Safety	Possibility of closure activities and workers causing veld fires, which can potentially cause injury and or loss of life to workers and surrounding landowners and visitors.	Adhere to Health and Safety Regulations	Environmental Awareness, Monitoring	Very Low	16,2
Rehabilitation of site, removal of infrastructure, closure of waste management facilities (including Stormwater)	Health and Safety	Increased risk to public health and safety: Dangerous areas including the waste management facilities poses health risks and possible loss of life to mine workers and visitors to the site.	Adhere to Health and Safety Regulations	Environmental Awareness, Infrastructure designs; Management; Monitoring	Very Low	16,2

Rehabilitation of site, removal of infrastructure, closure of waste management facilities (including Stormwater)	Socio-Economic	Socio-economic impact on farmers, labourers and surrounding landowners and residents due to negative impacts on groundwater, dust pollution, noise pollution etc.	Adhere to Health and Safety Regulations	Infrastructure designs; Management; Monitoring	Very Low	19,8
Closure and Rehabilitation	Socio-Economic	Economic impact should there be an incident of public health and safety.	To enhance the socio-economic benefits of the project. Source Local residents during Closure Phase	Management; Communication; Strategy implementation	Medium	48
Closure and Rehabilitation	Socio-Economic	Sourcing supplies from local residents and businesses boosting the local economy for an extended period of time.	To enhance the socio-economic benefits of the region as long as possible.	Management; Communication; Strategy implementation	Medium	41,6
Closure and Rehabilitation	Socio-Economic	Reduced period of providing employment for local residents and skills transfer to unskilled and semi-skilled unemployed individuals.	To enhance the socio-economic benefits of the project. Focus on skill-transfer.	Management; Communication; Strategy implementation	Very Low	24
Closure and Rehabilitation	Sasol Pipelines	Impacts during Closure phase to the Sasol pipelines	To enhance the socio-economic benefits of the project. Focus on skill-transfer.	Management; Communication; Strategy implementation	Very Low	18

15.3 SUMMARY OF SPECIALIST REPORTS

(This summary must be completed if any specialist reports informed the impact assessment and final site layout process and must be in the following tabular form):

Table 15-3: Specialist Recommendations Summarised

List of Studies Undertaken	Recommendations of Specialist Reports	Specialist Recommendations included in the EIA Report	Reference to Section in Report Included
Hydrogeological Assessment (Updated)	The geohydrological environment at Lefa Colliery can be summarised as follows: • The proposed Lefa Colliery is situated in the Upper Vaal Catchment area which is within a summer rainfall region. • The mean annual precipitation is ± 694.7 mm/annum, while the evaporation is estimated at 1 803 mm/annum. • The overall drainage is from the study area to the north-east to the Vaal River on the east and to the west to the Taaibosspruit. • The general slope in the area is approximately 0.02. • The proposed Lefa area is underlain by sedimentary rocks from the Karoo Super group's Vryheid Formation. • Geological structures such as dykes and faults are known to exist in the region of the proposed Lefa Colliery. These structures and the weathered zone are possible pathways of elevated groundwater flow and contamination migration.	X	Baseline Environment (Section 10.14), Impact Assessment and Management Tables

	• Seam 3a, Seam 2 and Seam 1 will be mined by means of underground bord-&-pillar mining with a 70% extraction ratio.
	• Two main aquifer systems are found in the proposed Lefa Colliery region. Firstly, the shallow weathered aquifer and secondly, the deeper, secondary aquifer.
	• Groundwater level information is available for the model area as they were recorded during the 2013 Hydrocensus by RGC.
	• Groundwater levels varied between 2.2 and 25.93 mbs in the boreholes recorded.
	• In the regions where mining is very deep and no cracking or subsidence occur, the water levels of the shallow weathered aquifer is not expected to decrease significantly, if at all.
	• With the proposed mining in the deeper aquifer with low flow characteristics, the drawdown cone is not expected to reach more than 1 100 m from the mine boundary.
	• The overall quality of the groundwater in the area is good with low TDS, sulphate and chloride concentrations. Nitrate concentrations in some boreholes are exceeded above permissible drinking water levels and may be a result of fertilisers or leaking sewage systems.
	• The ABA concluded by Golder (2013) for Anglo Vaalbank indicated that the inter- and over-burden can be classified as potentially acid generating.
	• Groundwater Sources:
	  ○ Recharge:
	  ▪ Natural recharge: in the region of the proposed project the natural recharge is estimated between 1 and 3% of the MAP. Rivers and drainage systems can also be seen as potential recharge sources. Gaining or losing streams play a role here. Losing streams “lose” their water to the aquifer, making it a natural recharge source. The streams in the immediate vicinity of the proposed project have not been identified as losing or gaining streams or even disconnected streams if they are not connected in any way to the groundwater regime.
	  ▪ Artificial recharge: Artificial recharge from sources including PCD’s, tailings dams, RWD’s etc. are not foreseen since these activities are not proposed for the mining operation.
	  ▪ Contamination Sources: At the proposed mining operation the potential contamination sources include the underground voids itself, especially post closure and any carbonaceous source which may include ROM stockpiles or overburden stockpiles.
	• Groundwater pathways:
	  ○ Fault zones and dykes surrounding the proposed project area may be potential pathways for groundwater contamination migration. Some site-specific geological structures include fault zones and will be simulated in the numerical model.
	• Groundwater receptors:
	  ○ River Systems: contamination from potential sources may be discharged in terms of baseflow into the receiving river systems in the area.
	  ○ Potential groundwater users: In the area of the proposed mining operation’s impact zone groundwater users exist. The impact zone may increase should pathways such as geological structures be present. The users from the shallow aquifer is not expected to be impacted on, except where cracking or subsidence occurs which will cause an influx of the shallow aquifer water to the underground mining area. It is strongly recommended that mining occurs in such a manner that cracking or subsidence be minimised or avoided.		

	○ Underground voids: once dewatering of the voids commence, water will flow towards the underground areas and therefore act as a groundwater receptor, even though an artificial receptor. • The expected impacts as a result of the proposed mining operations are summarised as: ○ Construction phase: ▪ Impacts in terms of groundwater levels are expected during this phase. The dewatering of at the shaft will cause a drawdown in the water levels within the immediate vicinity of the cut. ▪ Fuel spillages from construction vehicles may occur during this phase. ○ Operational phase: ▪ Impacts in terms of groundwater levels are expected during this phase. The dewatering of the underground will cause a drawdown in the water levels within the immediate vicinity of the underground activities. ▪ The maximum drawdown cone extent is not expected to exceed 1 100 m in the deep weathered aquifer. ▪ The maximum drawdown is expected to be in the region of 153 m. ▪ No adverse impacts on the groundwater qualities surrounding the underground are expected during this phase. ▪ Quality impacts from surface infrastructure may be expected during this phase on the shallow aquifer. ○ Post Closure: ▪ The groundwater qualities of the shallow aquifer will start to improve as the potential sources will be removed post closure. ▪ The plume from the underground workings will migrate north-east and south-west from the mine boundary. ▪ The sulphate concentrations in the underground area increases as a result of acid generation to just over 3 000 mg/l. ▪ The contamination plume from the underground mining area is not expected to extent more than 400 m from the boundary at 100 years post-closure. • The proposed mitigation measures for the proposed mining operation are summarised below: ○ Operational phase: ▪ Groundwater levels in the monitoring boreholes should be measured on at least a quarterly interval. ▪ Should the water levels of surrounding users be influenced in terms of groundwater level or quality decline, the users should be compensated. ▪ Monitor groundwater inflow rates on a monthly basis throughout the mining operation. ▪ The groundwater quality in the monitoring boreholes should be analysed on a quarterly basis. ▪ Annual reporting on the groundwater qualities and levels should be conducted and submitted to the DWA. ▪ The numerical model should be updated once more time-series monitoring data (water levels and qualities) are available. • Post-closure phase: ○ Potential sealing of areas that have been mined already to fill with water as soon as possible, may decrease the generation of acid.		

	○ Any areas of subsidence should be identified together with borehole locations that have been drilled into the underground workings. In the case that these occur they should be filled/closed to minimize surface water ingress to the mine. ○ Methods of handling the potential decant should be investigated and may include treatment		
Wetland Driver – Hydropedological Assessment	The following mitigation measures are recommended to mitigate flow losses: • *During operations:* ○ Flow driver impact can be mitigated through replacement/diversion of surface water around infrastructure through diversion berms and drains. ○ The shaft should be sealed through the weathered material to prevent interflow and groundwater ingress. • *Closure:* ○ Subsidence should be prevented at all costs. This could be done through prevention of high extraction and appropriate safety pillar factors. ○ The shaft should be sealed through the weathered material to prevent interflow and groundwater ingress.	X	Baseline Environment (Section 10.9), Impact Assessment and Management Tables
Wetland Assessment Updated	• Two wetland areas were identified on the study area during the study conducted by Rehab Green Monitoring Consultants CC (2017) and follow up studies. These wetlands were classified as an unchannelled valley bottom wetland and a seepage wetland. These wetlands are closely associated with the nearby Vaal River and drain directly into the Vaal River via subsurface flow. The majority of the proposed infrastructure is located within or within close proximity to these wetlands. • It is important to note that the study area has been greatly disturbed by agricultural practices from as early as 1941 and likely earlier. Consequently, the vegetation layer has been transformed making a plant-based delineation inaccurate. • All the ecological functionality of the wetland was transformed with the transformation of vegetation cover. The remaining function is limited to subsurface water flow to the Vaal River, which potentially has a water quality enhancement effect and ensures slow release of water. However, recent impacts including the interception of water flow by a road and a return water canal may limit this functionality. It is therefore possible that the wetland no longer provides hydrological function, or that hydrological function is significantly decreased. • However, wetland conditions remain visible within 50cm of the soil surface and forms the basis of a conservative wetland delineation presented in this report. It is possible that the wetland is no longer functional and that mining impacts can be mitigated through adequate management of surface water flow as well as the intercepted interflow. Analysis of current interflow volumes should be used to confirm or refute continued wetland function and should inform management of water on the site should mining proceed.	X	Baseline Environment (Section 10.12), Impact Assessment and Management Tables
Biodiversity studies: Flora	• A sensitivity map has been developed for the study area, indicating areas considered to be of increased ecological importance. It is recommended that this sensitivity map be considered during all development phases, including closure and decommissioning, to aid in the conservation of floral habitat within the study area. • Areas to be disturbed by construction activity as well as areas for ancillary activities such as stock piles, storage yards or site offices must be clearly demarcated in already disturbed areas or areas where they will cause minimal disturbance. The extent of the areas must be minimised and demarcated by preferably using steel droppers and nylon rope between the markers. • Construction activities and materials must at all times be contained within the demarcated sites. • Vegetation clearance of indigenous vegetation should be limited as far as possible.	X	Baseline Environment (Section 10.9), Impact Assessment and Management Tables

	• Vegetation clearance of the wetland area should be avoided. Any clearances needed in terms of the wetland system will have to be accompanied by a correlating wetland relocation plan, programme and associated water use license application. • Only indigenous plant species, preferably species that are indigenous to the natural vegetation of the area, should be used for landscaping in communal areas. As far as possible, plants naturally growing on the development site, but would otherwise be destroyed during clearing for development purposes, should be incorporated into landscaped areas. • Forage and host plants required by pollinators should also be planted in landscaped areas. • The development and Implementation of the Alien and Invasive plant management plan will be needed in the operational phase of the proposed activity.		
Biodiversity studies: Avifauna	• A sensitivity map has been developed for the study area, indicating areas considered to be of increased ecological importance. It is recommended that this sensitivity map be considered during all development phases, including closure and decommissioning, to aid in the conservation of Avifaunal habitat and foraging areas within the study area. • Where possible, work should be restricted to one area at a time, as this will give the birds a chance to weather the disturbance in an undisturbed zone close to their natural territories. • As much as possible of the natural vegetation that occurs on site should be retained as part of the landscaping. • The contractor must ensure that no fauna is disturbed, trapped, hunted or killed during the construction phase. Conservation-orientated clauses should be built into contracts for construction personnel, complete with penalty clauses for non-compliance. • During the construction phases, noise must be kept to a minimum to reduce the impact of the development on the fauna residing on the site. • Alien and invasive plants must be removed where structures will be erected. • All areas designated as highly sensitive, not in this case, in a sensitivity mapping exercise should be incorporated into the design and planning phase. Development should be located on the areas of lowest sensitivity. • An appropriate management authority (e.g. the owner) that is contractually bound to implement the Environmental Management Program (EMPr) and Environmental Authorisation (EA) during the construction and operational phase of the development should be identified.	X	Baseline Environment (Section 10.10.2), Impact Assessment and Management Tables
Biodiversity studies: Fauna	• The construction area should be well demarcated and construction workers should not enter into adjacent areas. • Only areas targeted for the proposed mining development should be cleared of vegetation, no other areas. • Mixing of concrete and storage of building material must be restricted to the transformed, already disturbed, areas to minimise the potential for pollution. • Oil, diesel, petroleum or any other harmful spillages must be cleaned immediately. Oil trays must be placed under construction vehicles likely to leak substances. • Access to the site must only be through existing roads or temporary roads approved by the engineer and the Environmental Control Officer. • Adequate storm water management should be implemented during construction and operation to prevent any dirty runoff from entering any of the unnamed tributaries transecting the mining right area as well as to prevent increased siltation as result of erosion. • The storm water management plan should be carried through to the Operational Phase of the project. • Continuous rehabilitation and maintenance of the construction site should occur during construction. The Contractor must ensure that the site is kept clean and tidy and free from litter that could attract rodents and other animal species.		Baseline Environment (Section 10.10.1), Impact Assessment and Management Tables

	• Animals may under no circumstances be handled, removed, killed or interfered with by the Contractor, his employees, his Sub-Contractors or his Sub-contractors' employees. This includes foraging, food and wood collecting outside of the construction site. • Conservation orientated clauses should be built into contracts for construction personnel, complete with penalty clauses for non-compliance. • Measures must be taken to ensure that workers are aware of laws and restrictions governing the hunting, capturing or trapping of animals and should be advised on the penalties associated with the needless destruction of wildlife. • The surface infrastructure site should be well demarcated and workers (both Construction and Operational) should not enter into adjacent areas. • No construction activities may take place within any delineated wetland areas. • No burning of material will be allowed on site. • If animals become trapped in trenches and foundation diggings, a specialist must be contacted to adequately and safely remove these and relocate them to the adjacent habitat.		
Geo-Hydro Assessment	• Update of the Geohydrological Report had been done to include the findings of the Wetland and Hydropedological Assessment.	X	Baseline Environment (Section 10.13), Impact Assessment and Management Tables
Air Quality Assessment	• It is recommended that ambient air quality monitoring be undertaken to establish the baseline condition prior to the onset of operations on-site and in order to establish the level at which the proposed operations are noted to impact on the ambient air quality. • Fallout monitoring should be included to assess the level of nuisance dust associated with both mining and process related operations. Sampling of fallout should be undertaken within the neighbouring areas as well as on-site. Dust fallout monitoring should ideally be located on-site, at the crusher and in the vicinity of major material handling points and on next to the residential houses located downwind from the emissions sources. • Indicative PM10 and PM2.5 dust monitoring must also be undertaken at the same sites as mentioned under the previous bullet but also in and around potential fugitive emission sources to determine mitigation measures and focus management efforts.	X	Baseline Environment (Section 10.15), Impact Assessment and Management Tables
Visual Impact Assessment	• Plant some indigenous trees to create a barrier between the neighbours and roads. • Dust from Stockpile areas, roads and other activities must be managed by means of dust suppression to prevent excessive dust. • A wind barrier system that encloses the stockpiles and tailing dumps; • Stockpiles and waste rock dumps should not exceed 20m in height. • Rehabilitation of the area must be done as the mining is completed.	X	Baseline Environment (Section 10.19), Impact Assessment and Management Tables
Soil, land use and land capability Assessment	• The soil fertility status should be determined by soil chemical analysis after levelling (before seeding/re-vegetation). • Soil amelioration should be done according soil analyses as recommended by a soil specialist, in order to correct the pH and nutrition status before revegetation.		Baseline Environment (Section 10.6, 10.8), Impact

	• The footprint should preferably be re-vegetated with a grass seed mixture and the soil stability and erosion should be monitored. • Crop farming can be re-introduced on those areas declared suitable for crop farming by a soil specialist after a post-mining soil and land capability assessment was done. • Re-vegetation should be done as soon as possible and preferably in spring and early summer to stabilize the soil and prevent soil loss during the rainy season. • A short-term fertilizer program should be based on the soil chemical status after the first year in order to maintain the fertility status for 2 to 3 years after rehabilitation until the area can be declared as self-sustaining		Assessment and Management Tables
Noise Impact Assessment	• Based on the outcome of the conceptual modelled scenarios a high impact during the operational phase is expected. Mitigation options in the planning and operational phases would be required. • The most important mitigation options recommended include the screening (i.e. masking of the noise by berm/barrier etc.) of the ventilation shaft and wash plant area. The ventilation shaft mentioned above should also not point facing any receptor within 750m from the ventilation fan. The sloping of the stockpile's areas (discards, ROM etc.) should be done facing away from receptors NSD6 and NSD7 (receptors to the east). • A quarterly Acoustical Measurement & Audit Programme is recommended to be implemented and conducted prior to construction phase (to improve the characterisation of the baseline) and during all phases (up till end of closure). Measurements protocol is defined in this document. Noise measurements must be continued as long as there are potential receptors living within 1,000m of the boundaries of the operation, or as long as a valid noise complaint is registered. Feedback regarding noise measurements should be presented to all stakeholders and other Interested and Affected (I&AP's) parties in the area. The feedback platform and interval periods should be defined by the developer, with an annual feedback period recommended.	X	Baseline Environment (Section 10.16), Impact Assessment and Management Tables
Traffic Impact Assessment	• Access point on Road R716 must be approved by the relevant roads department; • The access is upgraded in accordance with the roads department's design standards, conceptual layout in; • Access to the surrounding farms that currently obtain access off the existing road must be maintained; and • Provision is made on the mine to accommodate bus and minibus operators to drop off and pick up staff.	X	Baseline Environment (Section 10.18), Impact Assessment and Management Tables
Storm Water Management plan	• The Stormwater Management Programme have been finalised during the Water Use License process.		Baseline Environment. Impact Assessment and Management Tables
Heritage Impact Assessment	• Other than the above no other visible restrictions or negative impacts in terms of heritage associated with the study area could be found. • If any structures older than 60 years are in future earmarked for demolition a Section 34 Application in terms of Act 25 of 1999 (National Heritage Resources Act) must be submitted to the relevant heritage authority. • It is recommended that the graves situated on the site earmarked for the proposed planned development are conserved in situ. If the proposed outlay for the planned infrastructure cannot be altered the necessary processes and procedures with regard to exhumation and relocation of graves must be followed.	X	Baseline Environment (Section 10.17), Impact Assessment and Management Tables

	• The discovery of subsurface archaeological and/or historical material as well as graves must be taken into account in the Environmental Management Programme		
Social Impact Assessment	• Positive impacts associated with the construction phase mainly relate to employment and impacts on the local economy. The use of locals in employment as well as local SMMEs, local procurement and so forth will increase the overall significance of the impact. • The definition of a "local workforce" has to be defined and this, as well as the skills requirements has to be communicated to the local communities. Work with the local Municipality and Councillors to ensure that no unrealistic job expectations are created. • The formulation of a 'Contractor Social Management Plan' (CSMP) and implementation of its requirements for the duration of the construction period is imperative. • Negative health and safety impacts of high significance for workers and locals may occur (death) if the construction process is not managed adequately. • Establish an Environmental Forum represented by land owners, the mine operator and independent specialists and conduct quarterly meetings where issues relating to the environment and possible water pollution issues can be discussed. • Should boreholes be affected, implement an Action Plan / Emergency plan that will ensure that clean water (on-tap) is available to all the affected land owners without disruptions. • Possible encroachment of underground mining operations on the Sasol gas pipeline servitude and on buffer areas required between existing housing infrastructure (Vaal Power Smallholdings) and the underground mining has been raised as a concern and should be investigated. The smallholdings are approximately 3,5 to 4,7 hectares in extent and houses located approximately 200 to 300 meters apart. • The Colliery with its associated environmental impacts, should it manifest, has the potential to impact on the community's 'sense of place' and water resources, which could result in land use changes with far-reaching economic spin-offs for land owners, farmers, their workers and local business. • It is further recommended that: • More than one EIA and EMP Report be made available for public scrutiny and that CDs be distributed to key stakeholders. Many of the registered I&APs on the database do not have access to the internet and it would thus not be possible for them to review these documents electronically. • All Mitigation and Management measures as proposed in this SIA report, where applicable, be included in the EIA and EMPR for the proposed Lefa Colliery	X	Baseline Environment (Section 10.20), Impact Assessment and Management Tables

Attach copies of Specialist Reports as appendices.

15.4 ENVIRONMENTAL IMPACT STATEMENT

15.5 SUMMARY OF THE KEY FINDINGS OF THE ENVIRONMENTAL IMPACT ASSESSMENT

The findings of the specialist studies undertaken for this EIA/EMP process provide an assessment of both the benefits and potential negative impacts anticipated as a result of the proposed project. The findings conclude that, provided that the recommended mitigation and management measures are implemented, there are no environmental fatal flaws that should prevent the proposed project from proceeding.

In order to achieve appropriate environmental management standards and ensure that the findings of the environmental studies are implemented through practical measures, the recommendations from this EIA/EMP will form part of the contract with the contractors appointed to construct and maintain the mine and associated infrastructure. The EIA/EMP would be used to ensure compliance with environmental specifications and management measures. The implementation of this EIA/EMP for key cycle phases (i.e. operation and closure/decommissioning) of the project is considered to be fundamental in achieving the appropriate environmental management standards as detailed for this project.

For a detailed impact assessment layout specifying all the ratings used to obtain Significance of impacts with and without mitigation, refer to Table 15-1 above.

For a summary giving only the Significance obtained, refer below. Impacts have been discussed in Section 14.5 and the previous documents submitted for assessment.

The main aim of the rework of the EIA/EMPr is to ensure that the Sasol pipelines are incorporated into all aspects and have properly been assessed.

Table 15-4: Summary of Key findings in terms of Impact Significance

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	Significance without mitigation		Mitigation Efficiently		Significance with mitigation	
No-Go Option								
No-Go Option	Socio-Economic	Reduced period of development and upliftment of the surrounding communities and infrastructure based on mining development within the region.	Medium	45	N/A	1	Medium	45
No-Go Option	Socio-Economic	Reduced period of development of the economic environment, by job provision and sourcing supplies for and from local residents and businesses.	Medium	45	N/A	1	Medium	45
No-Go Option	Socio-Economic	Positive: No additional negative impacts on I&APs or surrounding land users	POSITIVE Medium	45	N/A	1	POSITIVE Medium	45
No-Go Option	Natural Environment	Positive: No additional negative impacts on the environment	POSITIVE Medium	45	N/A	1	POSITIVE Medium	45
Construction and Operational Phase								
Storm water management structures, pipelines, berms and water resources diversions, Access and Haul roads, Pipelines, Plant and Other Infrastructure (Overland conveyer removed as alternative), Sewage treatment, Bulk hydrocarbon storage facilities/ Filling station, Shaft development, Mining of coal by underground mining, Crushing and screening of coal underground, All infrastructure including External parking, Security and Weigh bridge, Truck Loading area, Internal parking, Silos, stockpiles, sewage treatment plant, scrap yard, offices, crusher and screen plant, medical facility, stores, raw water dam, storage yard and the ventilation shaft, Sub-station and power line, ,Infrastructure area industrial development, Residue stockpiles or deposit areas.	Soils	Soil compaction by heavy duty vehicles. Soils will be stripped to construct proper roads. This could lead to loss of topsoil. Due to the presence of vehicles and equipment hydro-carbon spills may occur impacting on the quality of the soils. Stripping and stockpiling of topsoil which may lead to deterioration of soil quality.	Medium	52	Medium	0,6	Low	31,2
	Soils	During operation of the Ergosat mine, it is anticipated that carbonaceous material may be spilled which will contaminate soils. Contamination by dirty water run-off and/or spillage of hydrocarbons and/or chemicals is also expected from operations vehicles and machinery. Contamination of soils through: - Indiscriminate disposal of waste; and - Accidental spillage of chemicals such as hydrocarbon-based fuels and oils or lubricants spilled from vehicles and other chemicals from operational and maintenance activities e.g. paints. Deterioration of topsoil quality due to salt contamination at the coal stockpile and crushing and screening plant footprints	Medium	52	Medium	0,6	Low	31,2
Storm water management structures, pipelines, berms and water resources diversions, Access and Haul roads, Pipelines, Plant and Other Infrastructure (Overland conveyer removed as alternative), Sewage treatment, Bulk hydrocarbon storage facilities/ Filling station, Shaft development, Mining of coal by underground mining, Crushing and screening of coal underground, All infrastructure including External parking, Security and Weigh bridge,	Land Capability and Land Use	Possibility of mining activities and workers impacting on Mining Right Area	Low	36	Medium	0,6	Low	21,6

Truck Loading area, Internal parking, Silos, stockpiles, sewage treatment plant, scrap yard, offices, crusher and screen plant, medical facility, stores, raw water dam, storage yard and the ventilation shaft, Sub-station and power line, ,Infrastructure area industrial development, Residue stockpiles or deposit areas								
Shaft development Mining of coal by underground mining	Blasting	Blasting hazard, specifically - Ground vibration and Other including the SASOL pipeline	Low	24	High	0,8	Very Low	19,2
Storm water management structures, pipelines, berms and water resources diversions, Access and Haul roads, Pipelines, Plant and Other Infrastructure (Overland conveyer removed as alternative), Sewage treatment, Bulk hydrocarbon storage facilities/ Filling station, Shaft development, Mining of coal by underground mining, Crushing and screening of coal underground, All infrastructure including External parking, Security and Weigh bridge, Truck Loading area, Internal parking, Silos, stockpiles, sewage treatment plant, scrap yard, offices, crusher and screen plant, medical facility, stores, raw water dam, storage yard and the ventilation shaft, Sub-station and power line, ,Infrastructure area industrial development, Residue stockpiles or deposit areas.	Ecological Impacts	Fauna: Disturbance and loss of fauna through noise, light and dust pollution and possible hunting, trapping and killing of fauna. Other impacts on Fauna as identified in specialist assessment	Medium	55	Medium	0,6	Low	33
	Ecological Impacts	Destruction of Vegetation, loss of integrity of vegetation and Spreading of alien invasive species and bush encroachment of indigenous species. Vegetation will be removed during the construction of the roads where they are not situated within agricultural lands. Note that no red data species were identified within the proposed mining area or at the footprint and stockpiling area.	Medium	55	Medium	0,6	Low	33
Storm water management structures, pipelines, berms and water resources diversions, Access and Haul roads, Pipelines, Plant and Other Infrastructure (Overland conveyer removed as alternative), Sewage treatment, Bulk hydrocarbon storage facilities/ Filling station, Shaft development, Mining of coal by underground mining, Crushing and screening of coal underground, All infrastructure including External parking, Security and Weigh bridge, Truck Loading area, Internal parking, Silos, stockpiles, sewage treatment plant, scrap yard, offices, crusher and screen plant, stores, raw water dam, storage yard, Infrastructure area industrial development, Residue stockpiles or deposit areas	Hydrological Aspects; Surface water	Stormwater, erosion and siltation impacts due to a lack of implementing measures to manage stormwater run-off quantity and quality during the operational phase.	Medium	52	Medium	0,6	Low	31,2
	Hydrological Aspects; Surface water	Contamination of stormwater runoff and ground water, caused by: - Sediment release; - Chemicals such as hydrocarbon-based fuels and oils or lubricants spilled from construction vehicles; - Other chemicals from maintenance activities e.g. paints; and - Effluent discharges, due to a lack of stormwater management and system maintenance.	Medium	56	Medium	0,6	Low	33,6
	Hydrological Aspects; Surface water and Groundwater	Impact of Nitrate based explosives used during mining on groundwater quality. Contamination plume can affect the groundwater resource.	Medium	56	Medium	0,6	Low	33,6

Dewatering during the Operational Phase	Hydrological Aspects; Groundwater	Influx of groundwater into incline shaft void The void in the incline will lead to an influx of groundwater into the incline shaft. This will potentially result into dewatering of the surrounding underground aquifers. This will manifest as a groundwater cone of depression in the water table with negative consequences of the availability of groundwater for existing borehole users around the proposed incline shafts. The significance is medium due to the duration of the impact throughout the construction and operational phases of the project. Impacts of dewatering on the groundwater aquifer should water be abstracted from ground water during the operational phase.	Medium	56	Low	0,8	Medium	44,8
Dewatering during the Operational Phase	Hydrological Aspects; Groundwater	Underground (Lowering of groundwater levels- baseflow to the Vaal River) The mining operation could potentially lower the baseflow of surrounding water to the Vaal River	Medium	56	Low	0,8	Medium	44,8
Storm water management structures, pipelines, berms and water resources diversions, Access and Haul roads, Pipelines, Plant and Other Infrastructure (Overland conveyer removed as alternative), Sewage treatment, Bulk hydrocarbon storage facilities/ Filling station, Shaft development, Mining of coal by underground mining, Crushing and screening of coal underground, All infrastructure including External parking, Security and Weigh bridge, Truck Loading area, Internal parking, Silos, stockpiles, sewage treatment plant, scrap yard, offices, crusher and screen plant, stores, raw water dam, storage yard, Infrastructure area industrial development, Residue stockpiles or deposit areas	Hydrological Aspects; Groundwater	The formation of acid mine drainage (AMD) as a result of ingress water and oxygen into the stockpiled overburden The potential impact of seepage water into the shallow weathered aquifer from the overburden stockpile is considered to be moderate. Potential contaminants may seep into the groundwater and could impact on the groundwater usage, which includes domestic and agricultural use. Generally, overburden is considered inert and therefore does not have a great potential for AMD. However, during the removal of the overburden in the construction of the incline shaft, there is the potential to remove some of the coal from the seams. This coal has AMD. The AMD potential of the overburden stockpile is considered moderate in the long term as the overburden will be stockpiled for the LOM. The impact will be limited to the site.	Medium - High	64	Medium	0,6	Low	38,4
	Hydrological Aspects; Surface water and Groundwater	Possible Seepage from waste management activities e.g. waste rock dumps, could cause a contamination plume affecting the underground water resources.	Medium - High	64	Low	0,8	Medium	51,2
	Hydrological Aspects; Surface water, Hydropedological and Groundwater	Wetland Impacts - Artificial wetland created by Agricultural activities	Medium	48	Low	0,8	Medium	38,4
Access and Haul roads, Plant and Other Infrastructure, Crushing and screening, All infrastructure including External parking, Security and Weigh bridge, Truck Loading area, Internal	Air Quality	Increased windborne dust (soil and ore fines), vehicle fumes and particulate matter PM10, altering air quality.	Low	30	Medium	0,6	Very Low	18
	Air Quality	Increased dust pollution (soil and ore fines), vehicles on gravel roads and transport of RoM	Low	30	Medium	0,6	Very Low	18

parking, Silos, stockpiles, sewage treatment plant, scrap yard, offices, crusher and screen plant, medical facility, stores, raw water dam, storage yard and the ventilation shaft, Infrastructure area industrial development, Residue stockpiles or deposit areas	Air Quality	Emissions by means of crushing and screening In this activity, the use of the primary and secondary crusher and discard handling are the most likely to have implications on ambient air quality. The crushing process releases fugitive dust, especially if there are no enclosure and water sprays. Dust contained within the RoM ore can be released into the atmosphere during this process i.e. fugitive dust (containing TSP, as well as PM10 and PM2.5). Wind erosion from stockpiles can be a perennial source of dust if not properly managed during and post mining operations. The plant, crushing and screening areas all have the potential to generate dust and therefore specific mitigation measures can be assigned to each of these activities.	Low	30	Medium	0,6	Very Low	18
Access and Haul roads, Plant and Other Infrastructure, Shaft development, Mining of coal by underground mining, Crushing and screening of coal, All infrastructure including External parking, Security and Weigh bridge, Truck Loading area, Internal parking, Silos, stockpiles, sewage treatment plant, scrap yard, offices, crusher and screen plant, medical facility, stores, raw water dam, storage yard and the ventilation shaft, Sub-station and power line, Infrastructure area industrial development.	Noise and Lighting	Nuisance and health risks caused by an increase in the ambient noise level as a result of noise impacts associated with the operation of the mining activities and processing.	Medium	48	Medium	0,6	Low	28,8
	Noise and Lighting	Nuisance and health risks caused to close by receptors as identified in specialist report	Medium	52	Medium	0,6	Low	31,2
	Noise and Lighting	Noise impact that would only manifest in the operational phase but that can be avoided in the construction phase by implementation of measures in construction of ventilation shafts. Impacts of noise need to be controlled by means of berms and shielding structures. The recommendations made by the Noise Impact Assessment are with the assumption that sensitive receptors within 750m of the site will not relocate. If relocation of these receptors would be an option, the recommendations would have to be altered.	Medium	40	Medium	0,6	Low	24
	Noise and Lighting	Impact of security lighting on surrounding landowners and animals.	Low	30	Low	0,8	Low	24
All Activities	Sites of archaeological and cultural interests	Construction activities have the potential to impact the historical structures. A marked grave is located within the infrastructure area.	Low	30	Medium	0,6	Very low	18
All Activities	Visual aspects	Potential visual impact on the viewpoints that had a visual exposure rating of 5 or higher. The operational impact on the surrounding agricultural farmers and land users will be more significant, due to the visual intrusion and activities being undertaken. Although the mine activities will not be visible since it will all be underground, the stockpiles, waste rock dumps and related surface infrastructure will be visible for the entire life of mine.	Medium	52	Medium	0,6	Low	31,2
Storm water management structures, pipelines, berms and water resources diversions, Access and Haul roads,	Waste	Generation and disposal of general waste, litter and hazardous material during the construction and operational phase	Medium	48	Medium	0,6	Low	28,8

Pipelines, Plant and Other Infrastructure (Overland conveyer removed as alternative), Sewage treatment, Bulk hydrocarbon storage facilities/ Filling station, Shaft development, Mining of coal by underground mining, Crushing and screening of coal underground, All infrastructure including External parking, Security and Weigh bridge, Truck Loading area, Internal parking, Silos, stockpiles, sewage treatment plant, scrap yard, offices, crusher and screen plant, medical facility, stores, raw water dam, storage yard and the ventilation shaft, Sub-station and power line, Infrastructure area industrial development, Residue stockpiles or deposit areas								
Sewage treatment Bulk hydrocarbon storage facilities/ Filling station, sewage treatment plant, Residue stockpiles or deposit areas	Waste (Including Hazardous Waste)	Generation and disposal of additional hazardous operational waste i.e. Residue Stockpiles, etc.	Medium	52	Medium	0,6	Low	31,2
Storm water management structures, pipelines, berms and water resources diversions, Access and Haul roads, Pipelines, Plant and Other Infrastructure (Overland conveyer removed as alternative), Sewage treatment, Bulk hydrocarbon storage facilities/ Filling station, Shaft development, Mining of coal by underground mining, Crushing and screening of coal underground, All infrastructure including External parking, Security and Weigh bridge, Truck Loading area, Internal parking, Silos, stockpiles, sewage treatment plant, scrap yard, offices, crusher and screen plant, medical facility, stores, raw water dam, storage yard and the ventilation shaft, Sub-station and power line, ,Infrastructure area industrial development, Residue stockpiles or deposit areas	Services	Need for services e.g. water, electricity and sewerage systems, causing additional strain on natural resources and service infrastructure.	Medium	39	Low	0,8	Low	31,2
Access and Haul roads, External parking, Security and Weigh bridge, Truck Loading area, Internal parking.	Traffic	The change in the traffic patterns as a result of increased traffic entering and exiting the operations on the surrounding road infrastructure and existing traffic. Impacts on road infrastructure Structural maintenance work on the R716 was completed recently and an increase in the size and frequency of large construction	Medium	44	Medium	0,6	Low	26,4

		vehicles and trucks could potentially damage the road surface. Financial impacts could manifest for the local Municipality in terms of road maintenance. Safety and financial impacts are possible for road users should private vehicles be damaged or accidents occur.						
	Traffic	Nuisance, health and safety risks caused by increased traffic on an adjacent to the study area including cars and heavy vehicles.	Medium	44	Medium	0,6	Low	26,4
Activities as mentioned above (No activity is found within 100 m of the SASOL pipelines).	Health and Safety - Sasol Pipelines	Possibility of impacts to the Sasol Pipeline and Dangers associated with impacts to these structures	Low	36	Medium	0,6	Low	21,6
Storm water management structures, pipelines, berms and water resources diversions, Access and Haul roads, Pipelines, Plant and Other Infrastructure (Overland conveyer removed as alternative), Sewage treatment, Bulk hydrocarbon storage facilities/ Filling station, Shaft development, Mining of coal by underground mining, Crushing and screening of coal underground, All infrastructure including External parking, Security and Weigh bridge, Truck Loading area, Internal parking, Silos, stockpiles, sewage treatment plant, scrap yard, offices, crusher and screen plant, medical facility, stores, raw water dam, storage yard and the ventilation shaft, Sub-station and power line, Infrastructure area industrial development, Residue stockpiles or deposit areas	Health and Safety	Increased risk to public health and safety: Dangerous areas including the waste management activities and waste poses health risks and possible loss of life to mine workers and visitors to the site. Health and safety risks for workers Inadequate management of the construction process and general construction related activities could result in health and safety risks for workers, manifesting in the following ways: Construction related accidents due to structural safety of project infrastructure. The excavation of the shaft will result in the formation of topographical voids, which may be a safety risk to the employees, livestock and neighbouring landowners. • Dust generation and air pollution resulting in respiratory diseases. • High ambient noise levels caused by machinery and construction equipment resulting in health issues for workers. • Poor management of the construction process resulting in pollution problems (e.g. insufficient sanitation facilities, littering and refuse), flies rodents and pests and possible contamination of water sources. • Unsafe and insufficient drinking water. • An increase in HIV/AIDS and other STDs due to prostitution activities and temporary sexual relationships with local women, unwanted pregnancies that place further pressure on Basic Health Care Services. • Dehydration and sunburn, as high temperatures could be experienced during summer months.	Low	36	Medium	0,6	Low	21,6
	Health and Safety	Increased risk to public and worker health and safety	Low	36	Medium	0,6	Low	21,6
Storm water management structures, pipelines, berms and water resources	Socio-Economic	Socio-economic impact on farmers, labourers and surrounding landowners and residents	Medium	42	Medium	0,6	Low	25,2

diversions, Access and Haul roads, Pipelines, Plant and Other Infrastructure (Overland conveyer removed as alternative), Sewage treatment, Bulk hydrocarbon storage facilities/ Filling station, Shaft development, Mining of coal by underground mining, Crushing and screening of coal underground, All infrastructure including External parking, Security and Weigh bridge, Truck Loading area, Internal parking, Silos, stockpiles, sewage treatment plant, scrap yard, offices, crusher and screen plant, medical facility, stores, raw water dam, storage yard and the ventilation shaft, Sub-station and power line, ,Infrastructure area industrial development, Residue stockpiles or deposit areas		due to negative impacts on groundwater, dust pollution, noise pollution etc.						
	Socio-Economic	Socio-economic impact on farmers, labourers and surrounding landowners specifically the close-by receptors, specifically in terms of attitude against the mine	Medium-High	75	Medium	0,6	Medium	45
	Socio-Economic: **Positive Impacts**	Extended employment provision due to the implementation of the extension of the mining activities, allowing mining activities to continue for additional years.	Medium	45	N/A	1	Medium	45
	Socio-Economic: **Positive Impacts**	Employment at the Colliery The mine will employ and estimated 530 permanent employees, with skills levels that vary from skilled, semi-skilled to unskilled. Approximately 100 of the employees will be unskilled and illiterate and for all employees individual training and skills development plans will be implemented in alignment with career progression. Skilled employment will include managerial positions, Planners, Environmental and other Specialists, Geologists, administrative and financial personnel, certain Operators, Engineers, Boilermakers and so forth. Semi-skilled positions relate to Foreman positions and Operators such as Diesel Attendants, whereas unskilled positions are usually associated with manual labour (underground miners, gardeners, etc.). It is anticipated that the majority of the positions could be filled by locals from the Municipal area as mining and industrial related skills should be available in the Sasolburg/Vereeniging region. Locals closer to the project site (Deneysville, Refengkgotso, etc.) would in all likelihood expect to be considered especially for unskilled and semi-skilled positions. Tertiary education levels in Ward 19 are much lower than in Ward 18 and in the broader municipal area (Ward 18: 23%; Ward 19: 2%; Metsimaholo: 9%) In addition to permanent positions, temporary employment and contractors could be added. Temporary employment would include: • Cleaning and maintenance of the conveyor belts, the V drains and culverts; • Cutting and clearing of vegetation within the used mine servitudes; • Maintenance of firebreaks; • Maintenance of gravel roads, regular grading and watering to suppress dust; • Repairing of fences as required; • Repair and maintenance of buried and surface pipelines in the servitudes, various	Medium	45	N/A	1	Medium	45

		valves, etc.; • Regular cleaning of silt traps drying bed, oil traps and the dirty water dams; etc.						
	Socio-Economic: **Positive Impacts**	Impacts on procurement / supporting industries / local SMME's The Mining Charter sets BEE compliance guidelines and as such Lefa Colliery will have to procure all products and/or services from BEE compliant outlets. In order to ensure and promote the procurement of products and/or services from SMMEs who are BEE compliant as well as black owned and/or black empowered, strategies are identified in the Colliery's SLP. It is expected that the majority of goods and services will be available locally from within the Municipal area. Supporting industries, local SMME's and contractors include: • Contractors to transport and dispose of domestic and industrial waste; • Equipment cleaning (trucks, conveyors, belt); • Maintenance and repairs of infrastructure, roads, etc.; • Operation of tuck shops; • Laundry and catering services; • Gardening; • Security; etc.	Medium	45	N/A	1	Medium	45
	Socio-Economic	Impacts on current NON-MINING RELATED employment levels of the area The proposed Colliery is an underground operation and current land uses will to a large extent be unaffected. However, should negative impacts usually associated with coal mining (impacts on water resources, air/dust pollution, crime, etc.) manifest and affect current land uses (farming ventures, local businesses) to such an extent that existing operations cease or are downscaled, then job losses would be inevitable. It was not at this stage possible to determine the existing employment numbers within the study area and the extent of potential job losses, should it occur, is not known.	Medium	48	N/A	1	Medium	48
	Socio-Economic	Impacts on land values / market values of affected land portions A variety of factors could impact land values of affected land portions and include: • The availability and quality of ground and/or surface water for domestic and farming purposes; • Intrusion impacts, such as noise and dust, which could have an impact on crops, livestock and infrastructure;	Medium	48	N/A	1	Medium	48

		• Occurrence of criminal activities (theft, vandalism, etc.); • Occurrence of informal settlements, trespassing on private land, illegal grazing practices; and • Restrictions that are set by the mining company for future infrastructure developments on private properties due to underground mining operations, safety issues, and so forth. Although a mining right has not been awarded yet, the proposed Lefa Colliery has already impacted on sales of properties in the area. Willow Creek Estate is marketed and promoted as a pristine residential estate with access to clean surface and groundwater resources. Large infrastructure investments have been made (R21 million in 2006 for reservoirs, roads, fencing, engineering services and so forth). The proposed Lefa Colliery (with the associated impacts of a coal mine) has the potential to negatively impact the 'sense of place' as well as natural resources of the area and as a consequence property values and sales at the estate could decline. Uncertainty with regards to the Lefa Colliery development and the timeframes associated with the awarding of a mining right exacerbates this impact. Should the mining right not be awarded, or the mine not be developed, potential impacts on land values would already have manifested. Financial impacts for Willow Creek Estate are also anticipated, as incomes derived through sales and levies have already been affected. It is furthermore possible that impacts on groundwater, if it occurs, will affect farmland as well as the Vaal Power Smallholding's property prices negatively, as they rely on groundwater for domestic and agricultural purposes and would be less marketable without this resource.						
	Socio-Economic: **Positive Impacts**	Impacts on tourism activities Existing tourism activities and holiday accommodation towards Deneysville, the Vaal Dam and Vaal River could negatively be impacted if the aesthetic environment and 'sense of place' is affected to such an extent that tourists are discouraged to frequent the area. Since the mine is an underground operation it is not likely that current or future tourism activities will be affected significantly as a direct result of the mine development.	Medium	48	N/A	1	Medium	48

		However, the possible negative spin-offs of a coal mine (groundwater pollution, etc.) could affect the sale of properties along the Vaal River, and subsequently impact on leisure activities. Visual impacts of the shaft complex's current locality will manifest for road users on their way to the Dam, but the complex would in all likelihood not be visible from the Dam and its surrounds. Visual impacts are being assessed by a Specialist in this field.						
	Socio-Economic: **Positive Impacts**	Skills development, training and skills equity A 'Skills, training and development Policy and Plan' has been drawn up with the purpose to provide guidelines for the implementation and maintenance of comprehensive training and development strategies and procedures. Annual monitoring is done by the DMRE. Funds for Human Resource Development for individual career development and in-service training are provided. Training includes ABET to illiterate employees, learnerships registered with the Department of Labour, internal and external bursaries and internships to be provided in accordance the Mining Charter guidelines. Management will be responsible to develop career development and succession plans and to assess the potential of employees and establish a career path for each to ensure the development of each employee. Lefa Colliery aims to exceed the compliance targets set by DMRE for HDSA employment and the full staff compliment will reflect as follows by the end of 2021: • Top Management: 50% White; 50% Black • Senior Management: 40% White; 60% Black • Middle Management: 29% White; 71% Black • Junior Management: 11% White; 89% Black • Women in Core Activities: 12%	Medium	48	N/A	1	Medium	48
	Socio-Economic: **Positive Impacts**	Impacts on the local community / community projects As part of a mine's Social and Economic Development responsibility, the mine must get involved with a relevant Local Economic Development Projects as identified in the IDP of a municipality. Lefa Colliery is however not in the position to get involved with the day-to-day running of a LED project, but will make a financial contribution of R1 100 000 annually towards a	Medium	48	N/A	1	Medium	48

		project of the municipality's choice, over a period of 5 year						
	Socio-Economic	Impacts of an 'outside' workforce / migrant labourers The Mining Charter requires that the majority of permanent employees be sourced from the "local" area. Local employees are in turn defined as people that originate/live within a 50 km radius of the project site. In terms of the Lefa Colliery this would also include people from outside the Metsimaholo Local Municipal area and would include people from as far as Vereeniging, Parys and the Gauteng province. This definition of a local workforce could thus be in conflict with the perception of a "local workforce" as seen by people living in close proximity to the Colliery. Locals could thus perceive "outsiders" as stealing employment opportunities that should be reserved for them. Negative impacts that can manifest as a result of a migrant and/or "outside" workforce include: • Impacts on population changes, as the 'outside' / migrant workforce impacts on the population size, gender, racial and age composition of the local and regional Municipalities; • Additional pressure on local government for housing and associated infrastructure and services if workers are retrenched and unemployed; • A rise in the number and size of informal settlements if workers are retrenched; Impacts on the HIV/AIDS prevalence rate, unwanted pregnancies and the subsequent pressure on health care services, if short-term relations were established with local women and the migrants return to their families in the sending areas; • An increase in unemployment placing pressure on the Local Municipality to provide jobs if the workers are retrenched; and • Safety and security issues for the surrounding communities due to a growth in the number of unemployed people.	Medium	48	N/A	1	Medium	48
	Socio-Economic	Impacts associated with blasting. Blasting operations and the associated ground vibrations have the potential to affect structures in the study area, such as dams and houses, resulting in unnecessary reparation costs for private landowners.	Medium	48	N/A	1	Medium	48
Activities as mentioned above	SASOL Pipeline Impacts - Independently Assessed	Impact on the Sasol gas pipeline and servitude	Medium	48	Medium	0,6	Low	28,8

	(Specialist Risk Assessment Conducted)	There is an existing gas pipeline and servitude that traverses the proposed mining area and concerns have been raised that the mining activities would encroach the buffers required for the servitude area. As far as could be established a Sasol representative has been included in the consultation process. The extent of the impact, if it should occur, has not been established at this stage.						
Closure and Rehabilitation Phase								
Closure and Rehabilitation	Geology and Soils	Potential for compaction and contamination from heavy vehicles usage and spillage of hydrocarbons, reagents (from infrastructure and machinery), raw materials and dirty water runoff, and the loss of soil due to erosion by wind and or water.	Low	21	High	0,2	Very Low	4,2
Closure and Rehabilitation	Land Capability and Land Use	Rehabilitation of Land uses and Land Capability	Very Low	16	High	0,2	Very Low	3,2
Closure and Rehabilitation	Ecological Impacts	Disturbance and loss of fauna through noise, light and dust pollution as well as hunting, trapping and killing of fauna.	Low	24	Medium	0,6	Very Low	14,4
Closure and Rehabilitation	Ecological Impacts	Spreading of alien invasive species and bush encroachment of indigenous species.	Low	21	Medium	0,6	Very Low	12,6
Closure and Rehabilitation - Implementation and ensuring maintenance and sustainability	Ecological Impacts - **Positive Impact**	Rehabilitation of area with natural vegetation and re-establishment of local biodiversity	Low	30	Medium	0,6	Very Low	18
Closure and Rehabilitation	Ecological Impacts - **Positive Impact**	Rehabilitation of area with natural vegetation and re-establishment of local biodiversity	Low	30	Medium	0,6	Very Low	18
Rehabilitation of site, removal of infrastructure, closure of waste management facilities (including Stormwater)	Hydrological Aspects; Surface water and Groundwater	Stormwater, erosion and siltation impacts due to a lack of implementing measures to manage stormwater run-off quantity and quality during the closure phase.	Medium	44	Medium	0,6	Low	26,4
Rehabilitation of site, removal of infrastructure, closure of waste management facilities (including Stormwater)	Hydrological Aspects; Surface water and Groundwater	Contamination of stormwater runoff and ground water, caused by: - Sediment release; - Chemicals such as hydrocarbon-based fuels and oils or lubricants spilled from heavy duty vehicles; - Effluent discharges, due to a lack of stormwater management.	Low	22	Medium	0,6	Very Low	13,2
Closure and Rehabilitation	Hydrological Aspects; Surface water and Groundwater	Impacts of dewatering on the groundwater aquifer should water be abstracted from ground water during the closure phase.	Low	33	Medium	0,6	Low	19,8
Rehabilitation of site, removal of infrastructure, closure of waste management facilities (including Stormwater)	Hydrological Aspects; Surface water and Groundwater	Impaction groundwater from the pollution plume associated with the waste storage facilities and possible Decant	Medium-High	64	Low	0,8	Medium	51,2
Rehabilitation of site, removal of infrastructure, closure of waste management facilities (including Stormwater)	Hydrological Aspects; Surface water and Groundwater	Impaction groundwater from the pollution and possible Acid Mine Drainage	Medium-High	64	Low	0,8	Medium	51,2
Closure and Rehabilitation	Air Quality	Demolition & Removal of all infrastructure (incl. transportation off site) During this activity, there is demolition of	Low	30	Medium	0,6	Very Low	18

		buildings and foundation and subsequent removal of rubbles generated. There is cleaning-up of workshops, fuels and reagents, removal of power and water supply, removal of haul and access roads. Potential for impacts during this phase will depend on the extent of demolition and rehabilitation efforts during closure as well as features which will remain. The impacts on the atmospheric environment during the decommissioning phase will be similar to the impacts during the construction phase. The process includes dismantling and demolition of existing infrastructure, transporting and handling of topsoil on unpaved roads in order to bring the site to its initial/rehabilitated state. Demolition and removal of all infrastructures will cause fugitive dust emissions. The impacts will be short-term and localised. Any implication or implications this phase will have on ambient air quality will seize once the activities are finalised.						
Closure and Rehabilitation	Noise and Lighting	Nuisance and health risks caused by an increase in the ambient noise level as a result of noise impacts associated with the operation of heavy-duty vehicles and equipment.	Low	24	Low	0,8	Very Low	19,2
Closure and Rehabilitation	Noise and Lighting	Disturbance due to vibrations caused by heavy duty vehicles.	Low	21	Low	0,8	Very Low	16,8
Closure and Rehabilitation	Noise and Lighting	Impact of security lighting on surrounding landowners and animals.	Low	21	Low	0,8	Very Low	16,8
Closure and Rehabilitation	Sites of archaeological and cultural interests	Graves to be protected in-situ or as per recommendations made by specialist	Low	21	Low	0,8	Very Low	16,8
Closure and Rehabilitation	Visual aspects	Visibility from sensitive receptors / visual scarring of the landscape as a result of the closure and rehabilitation activities.	Low	32	Low	0,8	Low	25,6
Closure and Rehabilitation	Waste (Including Hazardous Waste)	Generation and disposal of general waste, litter and hazardous material created from the decommissioning activities	Low	36	Medium	0,6	Low	21,6
Closure and Rehabilitation, Rehabilitation of site, removal of infrastructure, sealing of shafts and closure of waste facilities	Waste (Including Hazardous Waste)	Generation and disposal of additional hazardous waste	Medium	40	Medium	0,6	Low	24
Closure and Rehabilitation	Services	Need for additional services i.e. water, electricity and sewerage systems during the closure phase causing additional strain on natural resources and infrastructure.	Low	36	Low	0,8	Low	28,8
Closure and Rehabilitation	Traffic	The change in the traffic patterns as a result of traffic entering and exiting the proposed mine on the surrounding road infrastructure and existing traffic.	Low	32	Low	0,8	Low	25,6
Closure and Rehabilitation	Traffic	Nuisance, health and safety risks caused by increased traffic on an adjacent to the study area including cars and heavy vehicles.	Low	32	Low	0,8	Low	25,6

Closure and Rehabilitation	Health and Safety	Possibility of closure activities and workers causing veld fires, which can potentially cause injury and or loss of life to workers and surrounding landowners and visitors.	Low	27	Medium	0,6	Very Low	16,2
Rehabilitation of site, removal of infrastructure, closure of waste management facilities (including Stormwater)	Health and Safety	Increased risk to public health and safety: Dangerous areas including the waste management facilities poses health risks and possible loss of life to mine workers and visitors to the site.	Low	27	Medium	0,6	Very Low	16,2
Rehabilitation of site, removal of infrastructure, closure of waste management facilities (including Stormwater)	Socio-Economic	Socio-economic impact on farmers, labourers and surrounding landowners and residents due to negative impacts on groundwater, dust pollution, noise pollution etc.	Low	33	Medium	0,6	Very Low	19,8
Closure and Rehabilitation	Socio-Economic	Economic impact should there be an incident of public health and safety.	Medium-High	60	Low	0,8	Medium	48
Closure and Rehabilitation	Socio-Economic	Sourcing supplies from local residents and businesses boosting the local economy for an extended period of time.	Medium	52	Low	0,8	Medium	41,6
Closure and Rehabilitation	Socio-Economic	Reduced period of providing employment for local residents and skills transfer to unskilled and semi-skilled unemployed individuals.	Medium	40	Medium	0,6	Very Low	24
Closure and Rehabilitation	Sasol Pipelines	Impacts during Closure phase to the Sasol pipelines	Low	30	Medium	0,6	Very Low	18

15.6 FINAL SITE MAP

Provide a map at an appropriate scale which superimposes the proposed overall activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers. Attach as Appendix.

Please refer to Appendix 4.

15.7 IMPACT MANAGEMENT OBJECTIVES AND THE IMPACT MANAGEMENT OUTCOMES FOR INCLUSION IN THE EMPR

Based on the assessment and where applicable the recommendations from specialist reports, the recording of proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr as well as for inclusion as conditions of authorization.

Specialist recommendations which could be included as conditions have been discussed in Table 15-3. Specialist management measures as well as the significance of the impacts prior and post mitigation are provided in Table 15-1 and contained in the respective studies.

Table 15-5: Impact management objectives and the impact management outcomes for inclusion in the EMPr

Activity	Aspects Affected	Potential Impact	Management Objectives	Management Outcome
No-Go Option				
No-Go Option	Socio-Economic	Reduced period of development and upliftment of the surrounding communities and infrastructure based on mining development within the region.	No Additional Management Objectives if Project does not proceed	No management possible if no development occurs
No-Go Option	Socio-Economic	Reduced period of development of the economic environment, by job provision and sourcing supplies for and from local residents and businesses.	No Additional Management Objectives if Project does not proceed	No management possible if no development occurs
No-Go Option	Socio-Economic	Positive: No additional negative impacts on I&APs or surrounding land users	No Additional Management Objectives if Project does not proceed	No management possible if no development occurs
No-Go Option	Natural Environment	Positive: No additional negative impacts on the environment	No Additional Management Objectives if Project does not proceed	No management possible if no development occurs
Construction and Operational Phase				
Storm water management structures, pipelines, berms and water resources diversions, Access and Haul roads, Pipelines, Plant and Other Infrastructure (Overland conveyer removed as alternative), Sewage treatment, Bulk hydrocarbon storage facilities/ Filling station, Shaft development, Mining of coal by underground mining, Crushing and screening of coal underground, All infrastructure including External parking, Security and Weigh bridge, Truck Loading area, Internal parking, Silos, stockpiles, sewage treatment plant, scrap yard, offices, crusher and screen plant, medical facility, stores, raw water dam, storage yard and the ventilation shaft, Sub-station and power line, ,Infrastructure area industrial development, Residue stockpiles or deposit areas	Soils	Soil compaction by heavy duty vehicles. Soils will be stripped to construct proper roads. This could lead to loss of topsoil. Due to the presence of vehicles and equipment hydro-carbon spills may occur impacting on the quality of the soils. Stripping and stockpiling of topsoil which may lead to deterioration of soil quality.	Early detection of impacts and remediation thereof.	Early detection and prevention of possible impacts.
	Soils	During operation of the Ergosat mine, it is anticipated that carbonaceous material may be spilled which will contaminate soils. Contamination by dirty water run-off and/or spillage of hydrocarbons and/or chemicals is also expected from operations vehicles and machinery. Contamination of soils through: - Indiscriminate disposal of waste; and - Accidental spillage of chemicals such as hydrocarbon-based fuels and oils or lubricants spilled from vehicles and other chemicals from operational and maintenance activities e.g. paints. Deterioration of topsoil quality due to salt contamination at the coal stockpile and crushing and screening plant footprints	To prevent contamination of soils.	Prevention of soil and water pollution.
Storm water management structures, pipelines, berms and water resources diversions, Access and Haul roads, Pipelines, Plant and Other Infrastructure (Overland conveyer removed as alternative), Sewage treatment, Bulk hydrocarbon storage facilities/ Filling station, Shaft development, Mining of coal by underground mining, Crushing and screening of coal underground, All infrastructure including External parking, Security and Weigh bridge, Truck Loading area, Internal parking, Silos, stockpiles, sewage treatment plant, scrap yard, offices, crusher and screen plant, medical facility,	Land Capability and Land Use	Possibility of mining activities and workers impacting on Mining Right Area	Implement concurrent rehabilitation where possible and adhere to Final Closure and Rehabilitation Plan.	Early detection and prevention of possible impacts. Restoration of Landscape function and Capability

stores, raw water dam, storage yard and the ventilation shaft, Sub-station and power line, ,Infrastructure area industrial development, Residue stockpiles or deposit areas				
Shaft development Mining of coal by underground mining	Blasting	Blasting hazard, specifically - Ground vibration and Other including the SASOL pipeline	To prevent impacts on people and animals and to avoid damage to structures.	Safe mining environment. Prevention of blasting related impacts. Adhere to Risk Assessment and specifications for Blasting set out within the report to ensure no harm befalls the SASOL pipeline
Storm water management structures, pipelines, berms and water resources diversions, Access and Haul roads, Pipelines, Plant and Other Infrastructure (Overland conveyer removed as alternative), Sewage treatment, Bulk hydrocarbon storage facilities/ Filling station, Shaft development, Mining of coal by underground mining, Crushing and screening of coal underground, All infrastructure including External parking, Security and Weigh bridge, Truck Loading area, Internal parking, Silos, stockpiles, sewage treatment plant, scrap yard, offices, crusher and screen plant, medical facility, stores, raw water dam, storage yard and the ventilation shaft, Sub-station and power line, ,Infrastructure area industrial development, Residue stockpiles or deposit areas	Ecological Impacts	Fauna: Disturbance and loss of fauna through noise, light and dust pollution and possible hunting, trapping and killing of fauna. Other impacts on Fauna as identified in specialist assessment	Early detection of impacts and remediation thereof.	Prevent and/or remediate ecological impacts
	Ecological Impacts	Destruction of Vegetation, loss of integrity of vegetation and Spreading of alien invasive species and bush encroachment of indigenous species. Vegetation will be removed during the construction of the roads where they are not situated within agricultural lands. Note that no red data species were identified within the proposed mining area or at the footprint and stockpiling area.	Early detection of impacts and remediation thereof.	Prevent and/or remediate ecological impacts
Storm water management structures, pipelines, berms and water resources diversions, Access and Haul roads, Pipelines, Plant and Other Infrastructure (Overland conveyer removed as alternative), Sewage treatment, Bulk hydrocarbon storage facilities/ Filling station, Shaft development, Mining of coal by underground mining, Crushing and screening of coal underground, All infrastructure including External parking, Security and Weigh bridge, Truck Loading area, Internal parking, Silos, stockpiles, sewage treatment plant, scrap yard, offices, crusher and screen plant, stores, raw water dam, storage yard, Infrastructure area industrial development, Residue stockpiles or deposit areas	Hydrological Aspects; Surface water	Stormwater, erosion and siltation impacts due to a lack of implementing measures to manage stormwater run-off quantity and quality during the operational phase.	Prevent hydrological impacts and prevent contamination of water resources	Prevention water pollution and impacts on the natural environment and surrounding water users.
	Hydrological Aspects; Surface water	Contamination of stormwater runoff and ground water, caused by: - Sediment release; - Chemicals such as hydrocarbon-based fuels and oils or lubricants spilled from construction vehicles; - Other chemicals from maintenance activities e.g. paints; and - Effluent discharges, due to a lack of stormwater management and system maintenance.	To limit the impact of infiltration of potentially contaminated leachate to the underlying aquifers.	Prevention water pollution and impacts on the natural environment and surrounding water users.
	Hydrological Aspects; Surface water and Groundwater	Impact of Nitrate based explosives used during mining on groundwater quality. Contamination plume can affect the groundwater resource.	Prevent hydrological impacts and prevent contamination of water resources	Prevention water pollution and impacts on the natural environment and surrounding water users.

Dewatering during the Operational Phase	Hydrological Aspects; Groundwater	Influx of groundwater into incline shaft void The void in the incline will lead to an influx of groundwater into the incline shaft. This will potentially result into dewatering of the surrounding underground aquifers. This will manifest as a groundwater cone of depression in the water table with negative consequences of the availability of groundwater for existing borehole users around the proposed incline shafts. The significance is medium due to the duration of the impact throughout the construction and operational phases of the project. Impacts of dewatering on the groundwater aquifer should water be abstracted from ground water during the operational phase.	Keep record of the dewatering volumes and water levels of the aquifer	Prevention decreasing water availability and impacts on the natural environment and surrounding water users.
Dewatering during the Operational Phase	Hydrological Aspects; Groundwater	Underground (Lowering of groundwater levels-baseflow to the Vaal River) The mining operation could potentially lower the baseflow of surrounding water to the Vaal River	Keep record of the dewatering volumes and water levels of the aquifer	Prevention decreasing water availability and impacts on the natural environment and surrounding water users.
Storm water management structures, pipelines, berms and water resources diversions, Access and Haul roads, Pipelines, Plant and Other Infrastructure (Overland conveyer removed as alternative), Sewage treatment, Bulk hydrocarbon storage facilities/ Filling station, Shaft development, Mining of coal by underground mining, Crushing and screening of coal underground, All infrastructure including External parking, Security and Weigh bridge, Truck Loading area, Internal parking, Silos, stockpiles, sewage treatment plant, scrap yard, offices, crusher and screen plant, stores, raw water dam, storage yard, Infrastructure area industrial development, Residue stockpiles or deposit areas	Hydrological Aspects; Groundwater	The formation of acid mine drainage (AMD) as a result of ingress water and oxygen into the stockpiled overburden The potential impact of seepage water into the shallow weathered aquifer from the overburden stockpile is considered to be moderate. Potential contaminants may seep into the groundwater and could impact on the groundwater usage, which includes domestic and agricultural use. Generally, overburden is considered inert and therefore does not have a great potential for AMD. However, during the removal of the overburden in the construction of the incline shaft, there is the potential to remove some of the coal from the seams. This coal has AMD. The AMD potential of the overburden stockpile is considered moderate in the long term as the overburden will be stockpiled for the LOM. The impact will be limited to the site.	Prevent hydrological impacts and prevent contamination of water resources	Prevention water pollution and impacts on the natural environment and surrounding water users.
Storm water management structures, pipelines, berms and water resources diversions, Access and Haul roads, Pipelines, Plant and Other Infrastructure (Overland conveyer removed as alternative), Sewage treatment, Bulk hydrocarbon storage facilities/ Filling station, Shaft development, Mining of coal by underground mining, Crushing and screening of coal underground, All infrastructure including External parking, Security and Weigh bridge, Truck Loading area, Internal parking, Silos, stockpiles, sewage treatment plant, scrap yard, offices, crusher	Hydrological Aspects; Surface water and Groundwater	Possible Seepage from waste management activities e.g. waste rock dumps, could cause a contamination plume affecting the underground water resources.	Prevent and monitor seepage	Prevention water pollution and impacts on the natural environment and surrounding water users.

and screen plant, stores, raw water dam, storage yard, Infrastructure area industrial development, Residue stockpiles or deposit areas				
Storm water management structures, pipelines, berms and water resources diversions, Access and Haul roads, Pipelines, Plant and Other Infrastructure (Overland conveyer removed as alternative), Sewage treatment, Bulk hydrocarbon storage facilities/ Filling station, Shaft development, Mining of coal by underground mining, Crushing and screening of coal underground, All infrastructure including External parking, Security and Weigh bridge, Truck Loading area, Internal parking, Silos, stockpiles, sewage treatment plant, scrap yard, offices, crusher and screen plant, stores, raw water dam, storage yard, Infrastructure area industrial development, Residue stockpiles or deposit areas	Hydrological Aspects; Surface water, Hydropedological and Groundwater	Wetland Impacts - Artificial wetland created by Agricultural activities	Monitor integrity of PCDs and Stockpiles. Keep record of disposal rates and maximum capacity.	Prevent Discharge to the environment
Access and Haul roads, Plant and Other Infrastructure, Crushing and screening, All infrastructure including External parking, Security and Weigh bridge, Truck Loading area, Internal parking, Silos, stockpiles, sewage treatment plant, scrap yard, offices, crusher and screen plant, medical facility, stores, raw water dam, storage yard and the ventilation shaft, Infrastructure area industrial development, Residue stockpiles or deposit areas	Air Quality	Increased windborne dust (soil and ore fines), vehicle fumes and particulate matter PM10, altering air quality.	To limit public exposure to unacceptable health risks.	Ensure health and safety of mine workers within the underground sections as well as the surrounding environment. Conservation of the soil resource
	Air Quality	Increased dust pollution (soil and ore fines), vehicles on gravel roads and transport of RoM	To limit public exposure to unacceptable health risks.	Ensure health and safety of mine workers within the underground sections as well as the surrounding environment. Conservation of the soil resource
	Air Quality	Emissions by means of crushing and screening In this activity, the use of the primary and secondary crusher and discard handling are the most likely to have implications on ambient air quality. The crushing process releases fugitive dust, especially if there are no enclosure and water sprays. Dust contained within the RoM ore can be released into the atmosphere during this process i.e. fugitive dust (containing TSP, as well as PM10 and PM2.5). Wind erosion from stockpiles can be a perennial source of dust if not properly managed during and post mining operations. The plant, crushing and screening areas all have the potential to generate dust and therefore specific mitigation measures can be assigned to each of these activities.	To limit public exposure to unacceptable health risks.	Ensure health and safety of mine workers within the underground sections as well as the surrounding environment. Conservation of the soil resource
Access and Haul roads, Plant and Other Infrastructure, Shaft development, Mining of coal by underground mining, Crushing and screening of coal, All infrastructure including External parking, Security and Weigh bridge, Truck Loading	Noise and Lighting	Nuisance and health risks caused by an increase in the ambient noise level as a result of noise impacts associated with the operation of the mining activities and processing.	Responsible blasting and avoiding unnecessary noise and lighting sources.	Reducing disturbing noise/light and vibration to outside boundaries.
	Noise and Lighting	Nuisance and health risks caused to close by receptors as identified in specialist report	Responsible blasting and avoiding unnecessary noise and lighting sources.	Reducing disturbing noise/light and vibration to outside boundaries.

area, Internal parking, Silos, stockpiles, sewage treatment plant, scrap yard, offices, crusher and screen plant, medical facility, stores, raw water dam, storage yard and the ventilation shaft, Sub-station and power line, Infrastructure area industrial development.	Noise and Lighting	Noise impact that would only manifest in the operational phase but that can be avoided in the construction phase by implementation of measures in construction of ventilation shafts. Impacts of noise need to be controlled by means of berms and shielding structures. The recommendations made by the Noise Impact Assessment are with the assumption that sensitive receptors within 750m of the site will not relocate. If relocation of these receptors would be an option, the recommendations would have to be altered.	Responsible blasting and avoiding unnecessary noise and lighting sources.	Reducing disturbing noise/light and vibration to outside boundaries.
	Noise and Lighting	Impact of security lighting on surrounding landowners and animals.	Responsible blasting and avoiding unnecessary noise and lighting sources.	Reducing disturbing noise/light and vibration to outside boundaries.
All Activities	Sites of archaeological and cultural interests	Construction activities have the potential to impact the historical structures. A marked grave is located within the infrastructure area.	To avoid disturbing sites of archaeological and cultural interest. If any new heritage aspects are discovered, a specialist must be called for evaluation. This must be done in accordance with legal requirements.	No sites will be impacted. Consult a specialist if any heritage aspect is uncovered during any stage of the development.
All Activities	Visual aspects	Potential visual impact on the viewpoints that had a visual exposure rating of 5 or higher. The operational impact on the surrounding agricultural farmers and land users will be more significant, due to the visual intrusion and activities being undertaken. Although the mine activities will not be visible since it will all be underground, the stockpiles, waste rock dumps and related surface infrastructure will be visible for the entire life of mine.	Visual surface condition monitoring and design to identify impacts and warning signs of impacts occurring on surface.	Early detection and prevention of possible impacts.
Storm water management structures, pipelines, berms and water resources diversions, Access and Haul roads, Pipelines, Plant and Other Infrastructure (Overland conveyer removed as alternative), Sewage treatment, Bulk hydrocarbon storage facilities/ Filling station, Shaft development, Mining of coal by underground mining, Crushing and screening of coal underground, All infrastructure including External parking, Security and Weigh bridge, Truck Loading area, Internal parking, Silos, stockpiles, sewage treatment plant, scrap yard, offices, crusher and screen plant, medical facility, stores, raw water dam, storage yard and the ventilation shaft, Sub-station and power line, Infrastructure area industrial development, Residue stockpiles or deposit areas	Waste	Generation and disposal of general waste, litter and hazardous material during the construction and operational phase	Adhere to responsible water management practices	Responsible waste management and prevention of pollution.
Sewage treatment Bulk hydrocarbon storage facilities/ Filling station,	Waste (Including Hazardous Waste)	Generation and disposal of additional hazardous operational waste i.e. Residue Stockpiles, etc.	Adhere to responsible water management practices	Responsible waste management and prevention of pollution.

sewage treatment plant, Residue stockpiles or deposit areas				
Storm water management structures, pipelines, berms and water resources diversions, Access and Haul roads, Pipelines, Plant and Other Infrastructure (Overland conveyer removed as alternative), Sewage treatment, Bulk hydrocarbon storage facilities/ Filling station, Shaft development, Mining of coal by underground mining, Crushing and screening of coal underground, All infrastructure including External parking, Security and Weigh bridge, Truck Loading area, Internal parking, Silos, stockpiles, sewage treatment plant, scrap yard, offices, crusher and screen plant, medical facility, stores, raw water dam, storage yard and the ventilation shaft, Sub-station and power line, ,Infrastructure area industrial development, Residue stockpiles or deposit areas	Services	Need for services e.g. water, electricity and sewerage systems, causing additional strain on natural resources and service infrastructure.	Planning to prevent impacts	Minimise and manage service requirements
Access and Haul roads, External parking, Security and Weigh bridge, Truck Loading area, Internal parking.	Traffic	The change in the traffic patterns as a result of increased traffic entering and exiting the operations on the surrounding road infrastructure and existing traffic. Impacts on road infrastructure Structural maintenance work on the R716 was completed recently and an increase in the size and frequency of large construction vehicles and trucks could potentially damage the road surface. Financial impacts could manifest for the local Municipality in terms of road maintenance. Safety and financial impacts are possible for road users should private vehicles be damaged or accidents occur.	Planning to prevent impacts	Traffic Control and prevention of impacts
	Traffic	Nuisance, health and safety risks caused by increased traffic on an adjacent to the study area including cars and heavy vehicles.	Planning to prevent impacts	Traffic Control and prevention of impacts
Activities as mentioned above (No activity is found within 100 m of the SASOL pipelines).	Health and Safety - Sasol Pipelines	Possibility of impacts to the Sasol Pipeline and Dangers associated with impacts to these structures	Adhere to Health and Safety Regulations	Ensure Health and Safety Compliance and Environment
Storm water management structures, pipelines, berms and water resources diversions, Access and Haul roads, Pipelines, Plant and Other Infrastructure (Overland conveyer removed as alternative), Sewage treatment, Bulk hydrocarbon storage facilities/ Filling station, Shaft development, Mining of coal by underground mining, Crushing and screening of coal underground, All infrastructure including External	Health and Safety	Increased risk to public health and safety: Dangerous areas including the waste management activities and waste poses health risks and possible loss of life to mine workers and visitors to the site. Health and safety risks for workers Inadequate management of the construction process and general construction related activities could result in health and safety risks for workers, manifesting in the following ways: Construction related accidents due to structural safety of project infrastructure. The excavation of the shaft will result in the formation of topographical voids,	Adhere to Health and Safety Regulations	Ensure Health and Safety Compliance and Environment

parking, Security and Weigh bridge, Truck Loading area, Internal parking, Silos, stockpiles, sewage treatment plant, scrap yard, offices, crusher and screen plant, medical facility, stores, raw water dam, storage yard and the ventilation shaft, Sub-station and power line, Infrastructure area industrial development, Residue stockpiles or deposit areas		which may be a safety risk to the employees, livestock and neighbouring landowners. • Dust generation and air pollution resulting in respiratory diseases. • High ambient noise levels caused by machinery and construction equipment resulting in health issues for workers. • Poor management of the construction process resulting in pollution problems (e.g. insufficient sanitation facilities, littering and refuse), flies rodents and pests and possible contamination of water sources. • Unsafe and insufficient drinking water. • An increase in HIV/AIDS and other STDs due to prostitution activities and temporary sexual relationships with local women, unwanted pregnancies that place further pressure on Basic Health Care Services. • Dehydration and sunburn, as high temperatures could be experienced during summer months.		
	Health and Safety	Increased risk to public and worker health and safety	Adhere to Health and Safety Regulations	Ensure Health and Safety Compliance and Environment
Storm water management structures, pipelines, berms and water resources diversions, Access and Haul roads, Pipelines, Plant and Other Infrastructure (Overland conveyer removed as alternative), Sewage treatment, Bulk hydrocarbon storage facilities/ Filling station, Shaft development, Mining of coal by underground mining, Crushing and screening of coal underground, All infrastructure including External parking, Security and Weigh bridge, Truck Loading area, Internal parking, Silos, stockpiles, sewage treatment plant, scrap yard, offices, crusher and screen plant, medical facility, stores, raw water dam, storage yard and the ventilation shaft, Sub-station and power line, ,Infrastructure area industrial development, Residue stockpiles or deposit areas	Socio-Economic	Socio-economic impact on farmers, labourers and surrounding landowners and residents due to negative impacts on groundwater, dust pollution, noise pollution etc.	To enhance the socio-economic benefits of the project.	Prevent impacts on farmers labourers and surrounding landowners at all stages of the development.
	Socio-Economic	Socio-economic impact on farmers, labourers and surrounding landowners specifically the close-by receptors, specifically in terms of attitude against the mine	To enhance the socio-economic benefits of the project.	Prevent impacts on farmers labourers and surrounding landowners at all stages of the development.
	Socio-Economic: **Positive Impacts**	Extended employment provision due to the implementation of the extension of the mining activities, allowing mining activities to continue for additional years.	Enhance Socio-Economic environment	• Proceed with the proposed activity. Boost positive impacts to the Socio-Economic Environment
	Socio-Economic: **Positive Impacts**	Employment at the Colliery The mine will employ and estimated 530 permanent employees, with skills levels that vary from skilled, semi-skilled to unskilled. Approximately 100 of the employees will be unskilled and illiterate and for all employees individual training and skills development plans will be implemented in alignment with career progression. Skilled employment will include managerial positions, Planners, Environmental and other Specialists, Geologists, administrative and financial personnel, certain Operators, Engineers, Boilermakers and so forth. Semi-skilled positions relate to Foreman positions and Operators such as Diesel Attendants, whereas unskilled positions are usually associated with manual labour (underground miners, gardeners, etc.). It is anticipated that the majority of the positions could be filled by locals from the Municipal area as mining and industrial related skills should be available in the	Enhance Socio-Economic environment	• Proceed with the proposed activity. Boost positive impacts to the Socio-Economic Environment

		Sasolburg/Vereeniging region. Locals closer to the project site (Deneysville, Refengkgotso, etc.) would in all likelihood expect to be considered especially for unskilled and semi-skilled positions. Tertiary education levels in Ward 19 are much lower than in Ward 18 and in the broader municipal area (Ward 18: 23%; Ward 19: 2%; Metsimaholo: 9%) In addition to permanent positions, temporary employment and contractors could be added. Temporary employment would include: • Cleaning and maintenance of the conveyor belts, the V drains and culverts; • Cutting and clearing of vegetation within the used mine servitudes; • Maintenance of firebreaks; • Maintenance of gravel roads, regular grading and watering to suppress dust; • Repairing of fences as required; • Repair and maintenance of buried and surface pipelines in the servitudes, various valves, etc.; • Regular cleaning of silt traps drying bed, oil traps and the dirty water dams; etc.		
	Socio-Economic: **Positive Impacts**	Impacts on procurement / supporting industries / local SMME's The Mining Charter sets BEE compliance guidelines and as such Lefa Colliery will have to procure all products and/or services from BEE compliant outlets. In order to ensure and promote the procurement of products and/or services from SMMEs who are BEE compliant as well as black owned and/or black empowered, strategies are identified in the Colliery's SLP. It is expected that the majority of goods and services will be available locally from within the Municipal area. Supporting industries, local SMME's and contractors include: • Contractors to transport and dispose of domestic and industrial waste; • Equipment cleaning (trucks, conveyors, belt); • Maintenance and repairs of infrastructure, roads, etc.; • Operation of tuck shops; • Laundry and catering services; • Gardening; • Security; etc.	Enhance environment Socio-Economic	• Proceed with the proposed activity. Boost positive impacts to the Socio-Economic Environment
	Socio-Economic	Impacts on current NON-MINING RELATED employment levels of the area The proposed Colliery is an underground operation and current land uses will to a large extent be unaffected. However, should negative impacts usually associated with coal mining (impacts on water resources, air/dust pollution, crime, etc.) manifest and affect current land uses (farming ventures, local businesses) to such an extent that existing operations cease or are downscaled, then job losses would be	Enhance environment Socio-Economic	Supporting, utilising and building local economy

	inevitable. It was not at this stage possible to determine the existing employment numbers within the study area and the extent of potential job losses, should it occur, is not known.			
Socio-Economic	Impacts on land values / market values of affected land portions A variety of factors could impact land values of affected land portions and include: • The availability and quality of ground and/or surface water for domestic and farming purposes; • Intrusion impacts, such as noise and dust, which could have an impact on crops, livestock and infrastructure; • Occurrence of criminal activities (theft, vandalism, etc.); • Occurrence of informal settlements, trespassing on private land, illegal grazing practices; and • Restrictions that are set by the mining company for future infrastructure developments on private properties due to underground mining operations, safety issues, and so forth. Although a mining right has not been awarded yet, the proposed Lefa Colliery has already impacted on sales of properties in the area. Willow Creek Estate is marketed and promoted as a pristine residential estate with access to clean surface and groundwater resources. Large infrastructure investments have been made (R21 million in 2006 for reservoirs, roads, fencing, engineering services and so forth). The proposed Lefa Colliery (with the associated impacts of a coal mine) has the potential to negatively impact the 'sense of place' as well as natural resources of the area and as a consequence property values and sales at the estate could decline. Uncertainty with regards to the Lefa Colliery development and the timeframes associated with the awarding of a mining right exacerbates this impact. Should the mining right not be awarded, or the mine not be developed, potential impacts on land values would already have manifested. Financial impacts for Willow Creek Estate are also anticipated, as incomes derived through sales and levies have already been affected. It is furthermore possible that impacts on groundwater, if it occurs, will affect farmland as well as the Vaal Power Smallholding's property prices negatively, as they rely on groundwater for domestic and agricultural purposes and would be less marketable without this resource.	Enhance environment	Socio-Economic	Supporting, utilising and building local economy
Socio-Economic: **Positive Impacts**	Impacts on tourism activities Existing tourism activities and holiday accommodation towards Deneysville, the Vaal Dam and Vaal River could negatively be impacted if the aesthetic environment and 'sense of place' is affected to such	Enhance environment	Socio-Economic	Supporting, utilising and building local economy

	an extent that tourists are discouraged to frequent the area. Since the mine is an underground operation it is not likely that current or future tourism activities will be affected significantly as a direct result of the mine development. However, the possible negative spin-offs of a coal mine (groundwater pollution, etc.) could affect the sale of properties along the Vaal River, and subsequently impact on leisure activities. Visual impacts of the shaft complex's current locality will manifest for road users on their way to the Dam, but the complex would in all likelihood not be visible from the Dam and its surrounds. Visual impacts are being assessed by a Specialist in this field.		
Socio-Economic: **Positive Impacts**	Skills development, training and skills equity A 'Skills, training and development Policy and Plan' has been drawn up with the purpose to provide guidelines for the implementation and maintenance of comprehensive training and development strategies and procedures. Annual monitoring is done by the DMRE. Funds for Human Resource Development for individual career development and in-service training are provided. Training includes ABET to illiterate employees, learnerships registered with the Department of Labour, internal and external bursaries and internships to be provided in accordance the Mining Charter guidelines. Management will be responsible to develop career development and succession plans and to assess the potential of employees and establish a career path for each to ensure the development of each employee. Lefa Colliery aims to exceed the compliance targets set by DMRE for HDSA employment and the full staff compliment will reflect as follows by the end of 2021: • Top Management: 50% White; 50% Black • Senior Management: 40% White; 60% Black • Middle Management: 29% White; 71% Black • Junior Management: 11% White; 89% Black • Women in Core Activities: 12%	Enhance environment	Socio-Economic	Supporting, utilising and building local economy
Socio-Economic: **Positive Impacts**	Impacts on the local community / community projects As part of a mine's Social and Economic Development responsibility, the mine must get involved with a relevant Local Economic Development Projects as identified in the IDP of a municipality. Lefa Colliery is however not in the position to get involved with the day-to-day running of a LED project, but will make a financial contribution of R1 100 000 annually towards a project of the municipality's choice, over a period of 5 year	Enhance environment	Socio-Economic	Supporting, utilising and building local economy
Socio-Economic	Impacts of an 'outside' workforce / migrant labourers The Mining Charter requires that the majority of permanent employees be sourced from the "local" area. Local employees are in turn defined as people	Enhance environment	Socio-Economic	Supporting, utilising and building local economy

		that originate/live within a 50 km radius of the project site. In terms of the Lefa Colliery this would also include people from outside the Metsimaholo Local Municipal area and would include people from as far as Vereeniging, Parys and the Gauteng province. This definition of a local workforce could thus be in conflict with the perception of a "local workforce" as seen by people living in close proximity to the Colliery. Locals could thus perceive "outsiders" as stealing employment opportunities that should be reserved for them. Negative impacts that can manifest as a result of a migrant and/or "outside" workforce include: • Impacts on population changes, as the 'outside' / migrant workforce impacts on the population size, gender, racial and age composition of the local and regional Municipalities; • Additional pressure on local government for housing and associated infrastructure and services if workers are retrenched and unemployed; • A rise in the number and size of informal settlements if workers are retrenched; Impacts on the HIV/AIDS prevalence rate, unwanted pregnancies and the subsequent pressure on health care services, if short-term relations were established with local women and the migrants return to their families in the sending areas; • An increase in unemployment placing pressure on the Local Municipality to provide jobs if the workers are retrenched; and • Safety and security issues for the surrounding communities due to a growth in the number of unemployed people.		
	Socio-Economic	Impacts associated with blasting. Blasting operations and the associated ground vibrations have the potential to affect structures in the study area, such as dams and houses, resulting in unnecessary reparation costs for private landowners.	Enhance Socio-Economic environment	Supporting, utilising and building local economy
Activities as mentioned above	SASOL Pipeline Impacts - Independently Assessed (Specialist Risk Assessment Conducted)	Impact on the Sasol gas pipeline and servitude There is an existing gas pipeline and servitude that traverses the proposed mining area and concerns have been raised that the mining activities would encroach the buffers required for the servitude area. As far as could be established a Sasol representative has been included in the consultation process. The extent of the impact, if it should occur, has not been established at this stage.	Enhance Socio-Economic environment	Supporting, utilising and building local economy
Closure and Rehabilitation Phase				
Closure and Rehabilitation	Geology and Soils	Potential for compaction and contamination from heavy vehicles usage and spillage of hydrocarbons, reagents (from infrastructure and machinery), raw materials and dirty water runoff, and the loss of soil due to erosion by wind and or water.	Early detection of impacts and remediation thereof.	Early detection and prevention of possible impacts. Restoration of Landscape function and Capability. Closure phase overlapping with the operational phase, adhere to management

				outcomes/mitigation measures as described for Operational phase.
Closure and Rehabilitation	Land Capability and Land Use	Rehabilitation of Land uses and Land Capability	Implement Final Land Use / Final Land form at End of Life	Early detection and prevention of possible impacts. Restoration of Landscape function and Capability. Closure phase overlapping with the operational phase, adhere to management outcomes/mitigation measures as described for Operational phase.
Closure and Rehabilitation	Ecological Impacts	Disturbance and loss of fauna through noise, light and dust pollution as well as hunting, trapping and killing of fauna.	Restore Land Use and Land Capability	Prevent and/or remediate ecological impacts. Closure phase overlapping with the operational phase, adhere to management outcomes/mitigation measures as described for Operational phase.
Closure and Rehabilitation	Ecological Impacts	Spreading of alien invasive species and bush encroachment of indigenous species.	Restore Land Use and Land Capability	Prevent and/or remediate ecological impacts. Closure phase overlapping with the operational phase, adhere to management outcomes/mitigation measures as described for Operational phase.
Closure and Rehabilitation - Implementation and ensuring maintenance and sustainability	Ecological Impacts - **Positive Impact**	Rehabilitation of area with natural vegetation and re-establishment of local biodiversity	Restore Land Use and Land Capability	Restore the natural environment to approved Post-Closure Land form
Closure and Rehabilitation	Ecological Impacts - **Positive Impact**	Rehabilitation of area with natural vegetation and re-establishment of local biodiversity	Restore Land Use and Land Capability	Restore the natural environment to approved Post-Closure Land form
Rehabilitation of site, removal of infrastructure, closure of waste management facilities (including Stormwater)	Hydrological Aspects; Surface water and Groundwater	Stormwater, erosion and siltation impacts due to a lack of implementing measures to manage stormwater run-off quantity and quality during the closure phase.	Prevent hydrological impacts and prevent contamination of water resources during Closure Phase	Prevention water pollution and impacts on the natural environment and surrounding water users.
Rehabilitation of site, removal of infrastructure, closure of waste management facilities (including Stormwater)	Hydrological Aspects; Surface water and Groundwater	Contamination of stormwater runoff and ground water, caused by: - Sediment release; - Chemicals such as hydrocarbon-based fuels and oils or lubricants spilled from heavy duty vehicles; - Effluent discharges, due to a lack of stormwater management.	Prevent hydrological impacts and prevent contamination of water resources during Closure Phase	Prevention water pollution and impacts on the natural environment and surrounding water users.
Closure and Rehabilitation	Hydrological Aspects; Surface water and Groundwater	Impacts of dewatering on the groundwater aquifer should water be abstracted from ground water during the closure phase.	Keep record of the dewatering volumes and water levels of the aquifer	Prevention decreasing water availability and impacts on the natural environment and surrounding water users. Closure phase overlapping with the operational phase, adhere to management outcomes/mitigation measures as described for Operational phase.
Rehabilitation of site, removal of infrastructure, closure of waste management facilities (including Stormwater)	Hydrological Aspects; Surface water and Groundwater	Impaction groundwater from the pollution plume associated with the waste storage facilities and possible Decant	Prevent hydrological impacts and prevent contamination of water resources. Prevent and monitor seepage/decant and pollution plumes.	Prevention water pollution and impacts on the natural environment and surrounding water users. Monitor for Pollution Plumes
Rehabilitation of site, removal of infrastructure, closure of waste management facilities (including Stormwater)	Hydrological Aspects; Surface water and Groundwater	Impaction groundwater from the pollution and possible Acid Mine Drainage	Prevent hydrological impacts and prevent contamination of water resources. Prevent and monitor seepage/decant and pollution plumes.	Prevention water pollution and impacts on the natural environment and surrounding water users. Monitor for Pollution Plumes
Closure and Rehabilitation	Air Quality	Demolition & Removal of all infrastructure (incl. transportation off site) During this activity, there is demolition of buildings and foundation and subsequent removal of rubbles generated. There is cleaning-up of workshops, fuels and reagents, removal of power and water supply,	To limit public exposure to unacceptable health risks.	Ensure health and safety of mine workers within the underground sections as well as the surrounding environment

		removal of haul and access roads. Potential for impacts during this phase will depend on the extent of demolition and rehabilitation efforts during closure as well as features which will remain. The impacts on the atmospheric environment during the decommissioning phase will be similar to the impacts during the construction phase. The process includes dismantling and demolition of existing infrastructure, transporting and handling of topsoil on unpaved roads in order to bring the site to its initial/rehabilitated state. Demolition and removal of all infrastructures will cause fugitive dust emissions. The impacts will be short-term and localised. Any implication or implications this phase will have on ambient air quality will seize once the activities are finalised.		
Closure and Rehabilitation	Noise and Lighting	Nuisance and health risks caused by an increase in the ambient noise level as a result of noise impacts associated with the operation of heavy-duty vehicles and equipment.	To limit public exposure to unacceptable health risks.	Ensure health and safety of mine workers within the underground sections as well as the surrounding environment
Closure and Rehabilitation	Noise and Lighting	Disturbance due to vibrations caused by heavy duty vehicles.	To limit public exposure to unacceptable health risks.	Reducing disturbing noise/light and vibration to outside boundaries.
Closure and Rehabilitation	Noise and Lighting	Impact of security lighting on surrounding landowners and animals.	Responsible blasting and avoiding unnecessary noise and lighting sources.	Reducing disturbing noise/light and vibration to outside boundaries.
Closure and Rehabilitation	Sites of archaeological and cultural interests	Graves to be protected in-situ or as per recommendations made by specialist	To avoid disturbing sites of archaeological and cultural interest. If any new heritage aspects are discovered, a specialist must be called for evaluation. This must be done in accordance with legal requirements.	Consult a specialist if any heritage aspect is uncovered during any stage of the development.
Closure and Rehabilitation	Visual aspects	Visibility from sensitive receptors / visual scarring of the landscape as a result of the closure and rehabilitation activities.	Rehabilitation and Monitoring	Early detection and prevention of possible impacts.
Closure and Rehabilitation	Waste (Including Hazardous Waste)	Generation and disposal of general waste, litter and hazardous material created from the decommissioning activities	Rehabilitation and Monitoring. Responsible disposal of waste	Responsible waste management and prevention of pollution.
Closure and Rehabilitation, Rehabilitation of site, removal of infrastructure, sealing of shafts and closure of waste facilities	Waste (Including Hazardous Waste)	Generation and disposal of additional hazardous waste	Rehabilitation and Monitoring. Responsible disposal of waste	Responsible waste management and prevention of pollution.
Closure and Rehabilitation	Services	Need for additional services i.e. water, electricity and sewerage systems during the closure phase causing additional strain on natural resources and infrastructure.	Planning to prevent impacts	Minimise and manage service requirements
Closure and Rehabilitation	Traffic	The change in the traffic patterns as a result of traffic entering and exiting the proposed mine on the surrounding road infrastructure and existing traffic.	Planning to prevent impacts	Traffic Control and prevention of impacts
Closure and Rehabilitation	Traffic	Nuisance, health and safety risks caused by increased traffic on an adjacent to the study area including cars and heavy vehicles.	Planning to prevent impacts	Traffic Control and prevention of impacts
Closure and Rehabilitation	Health and Safety	Possibility of closure activities and workers causing veld fires, which can potentially cause injury and or loss of life to workers and surrounding landowners and visitors.	Adhere to Health and Safety Regulations	Ensure Health and Safety Compliance and Environment

Rehabilitation of site, removal of infrastructure, closure of waste management facilities (including Stormwater)	Health and Safety	Increased risk to public health and safety: Dangerous areas including the waste management facilities poses health risks and possible loss of life to mine workers and visitors to the site.	Adhere to Health and Safety Regulations	Ensure Health and Safety Compliance and Environment
Rehabilitation of site, removal of infrastructure, closure of waste management facilities (including Stormwater)	Socio-Economic	Socio-economic impact on farmers, labourers and surrounding landowners and residents due to negative impacts on groundwater, dust pollution, noise pollution etc.	Adhere to Health and Safety Regulations	Prevent impacts on farmers labourers and surrounding landowners at all stages of the development.
Closure and Rehabilitation	Socio-Economic	Economic impact should there be an incident of public health and safety.	To enhance the socio-economic benefits of the project. Source Local residents during Closure Phase	Prevent impacts on farmers labourers and surrounding landowners at all stages of the development.
Closure and Rehabilitation	Socio-Economic	Sourcing supplies from local residents and businesses boosting the local economy for an extended period of time.	To enhance the socio-economic benefits of the region as long as possible.	Increased Employment Opportunities in the Long term
Closure and Rehabilitation	Socio-Economic	Reduced period of providing employment for local residents and skills transfer to unskilled and semi-skilled unemployed individuals.	To enhance the socio-economic benefits of the project. Focus on skill-transfer.	Supporting, utilising and building local economy
Closure and Rehabilitation	Sasol Pipelines	Impacts during Closure phase to the Sasol pipelines	To enhance the socio-economic benefits of the project. Focus on skill-transfer.	Supporting, utilising and building local economy

15.8 FINAL ALTERNATIVES

(Provide an explanation for the final layout of the infrastructure and activities on the overall site as shown on the final site map together with the reasons why they are the final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment)

Alternatives have been described within Section 7. The positioning current mining areas was informed by the position of the mineable resource and ensuring a feasible access point to the mineable resource. Alternatives were assessed and changes were made hence the current layout proposed is the most preferred option.

16 ASPECTS FOR INCLUSION AS CONDITIONS OF AUTHORIZATION

Any aspects which have not formed part of the EMPr that must be made conditions of the Environmental Authorization.

Refer to
Table 15-3 for conditions which could possibly be included in the Environmental Authorisation. The Mitigation measures as specified within the EMP are to be included in the Environmental Authorisation (Table 28-1).

To ensure compliance with, and implementation of the EMPr by:

- Appointing of a suitably qualified individual to oversee implementation of the EMPr during all phases of the project; and
- Appointing a suitably qualified Environmental Control Officer to undertake audits on a regular basis throughout the construction phase

To ensure that all staff, contractors and sub-contractors are aware of and understand the requirements of the EMPr and environmental issues in relation to their individual areas of work by:

- Developing an induction and training program covering the EMPr, environmental awareness, dealing with environmental incidents and waste management; and
- Advising staff commissioned during pre-construction and construction, including sub-contractors, of EMPr requirements through the induction program as well as on notice boards at the contractor's camps during construction and notice boards during operation. These notice boards should cover the EMPr, environmental awareness, dealing with emergencies and waste management.

Submission of a Water Use License Application and the undertaking of all relevant specialist studies for that purpose (WUL in process). A detailed water balance will need to be produced before commencement and need to include all water uses, volumes and rates.

The updating and further develoment of Geohydrological modelling with special reference to Acid Mine Drainage during the different phases of the development should be done. The groundwater model predictions should be verified once time dependant groundwater monitoring data become available. Predicted flow simulation and decant rates for later years of mine development can significantly be improved by observation data from earlier years and subsequent updates of the groundwater model.

Authorization should be subject to the undertaking of a ground water monitoring programme with associated updated hydro census. The monitoring programme should cover pre- and post mining conditions to evaluate and determine the effect of mining on ground water supply, and pollution.

Any negative impacts resulting from the mining of coal on the local community will have to be addressed by the mine. The proposed mine has to be held accountable for any environmental damage caused as a result of their mining process as prescribed by the need for environmental liability financial provision.

Other specific conditions as relevant to the Ergosat development is the safety and risk to the Sasol Pipelines

and these include the conditions as set out within the Risk Assessment and the Tables as referenced above.

These include:

- Keep Sasol informed about the mining schedule and mine plan and ensure that servitudes and buffers are not encroached.
- Pillar Stability:
    - Ensure to design pillars according to the guidelines set apart for South African Coal mines for the protection of surface structures.
    - Pillar safety factor calculations must be conducted according to site specific formulas such as the Vaal Basin Strength Formula.
    - Ensure that pillars below surface structures are designed with increased safety factors which considers the life of the pillar.
    - Adhere to the shallow mining guidelines set apart by the Chamber of Mines Research organization.
    - Ensure to monitor pillar stability underground, if needed reassess the pillar design (re-design).
    - Ensure that rock engineering principles to ensure surface stability are incorporated in the pillar design.
    - Ensure rock engineering involvement throughout the mining process.
    - Do not conduct any form of pillar extraction or higher percentage extraction in areas where the protection of the surface is vital without a written investigation from the rock engineering practitioner which ensures surface stability.
- Roof Stability:
    - Ensure that the bord widths and intersection diagonal distances are designed according to the site-specific strength parameters of the immediate roof strata.
    - Ensure to support in time according to a site-specific support design.
    - Ensure to mine according to the designed maximum allowable parameters.
    - Do not exceed the maximum allowable design parameters. Offline mining must not be tolerated.
    - Ensure to monitor bord and intersection spans and implement remedial measures where the spans have been exceeded.
    - Implement monitoring devices with remedial measures in the case of activation.
    - Ensure rock engineering involvement throughout the mining process.
- Prevent risk of subsidence:
    - Ensure that pillars are designed in accordance with at least the minimum required site-specific shallow mining guidelines.
    - Support design must take into consideration the depth of weathering and shallow mining specific strength parameters for the immediate roof strata as well as long term stability of roof support.
    - Do not open spans beneath surface structures that needs to be protected unless a rock engineering practitioner has assessed the conditions, gives measures to ensure surface stability, etc.
    - Do not open intersections beneath surface structures.
    - Ensure rock engineering involvement throughout the mining process.
    - Monitoring devices must be implemented in every intersection to assist with monitoring roof conditions.
    - Monitor pillar, bord and intersection dimensions to ensure that the designed parameters are followed. Implement remedial measures where required.
- Underground Blasting:
    - Ensure that a proper blast design is compiled for the underground operation.
    - Ensure that the blast design in close proximity to surface structures adheres to the minimum PPVs <50mm/s. (PPV = Peak Particle Velocity)
    - Ensure to monitor blasting PPVs during blasting operations both underground and on surface. If required redesign to ensure adherence to the minimum allowable PPVs.

  - Ensure that a qualified blaster (blast engineer) is appointed to conduct the blast design.
- Pillars or Roof failures:
  - Do not conduct pillar extraction or any form of higher extraction beneath surface structures in especially shallow mining conditions.
  - Do not conduct pillar extraction or any form of higher extraction beneath surface structures in deeper lying areas without a proper investigation by a qualified experienced rock engineering practitioner who must give guidelines as to how ensure surface stability.
  - Do not conduct pillar robbing or barrier mining.
  - Ensure rock engineering involvement throughout the mining process.

17 DESCRIPTION OF ANY ASSUMPTIONS, UNCERTAINTIES AND GAPS IN KNOWLEDGE.

(Which relate to the assessment and mitigation measures proposed?)

Please refer to Section 13 giving a description of all the “Limitations and Assumptions” of the study. No other uncertainties are known at this stage relating to the assessment or the mitigation measures.

18 REASONED OPINION AS TO WHETHER THE ACTIVITY SHOULD OR SHOULD NOT BE AUTHORIZED

18.1 REASONS WHY THE ACTIVITY SHOULD BE AUTHORIZED OR NOT

Please refer to Section 15.4 for the impact statements. The findings conclude that, provided that the recommended mitigation and management measures are implemented, there are no environmental fatal flaws that post the provided mitigation, should prevent the proposed project from proceeding.

The redrafting and revision of the EIA/EMPr had been the result of the Minister’s decision regarding the re-assessment of the Sasol pipeline to ensure that this aspect had been properly assessed, therefore, the document had been revised, the additional risk assessment conducted and the most relevant information included as aligned with the WUL process.

Additional period of PPP will be conducted as requierd by the Appeal Decision, allowing all parties to comment for an additional 30 days and inclusion of these comments within the Final EIA/EMPr for submission.

18.2 CONDITIONS THAT MUST BE INCLUDED IN THE AUTHORIZATION

Please refer to Section 16, which states the conditions which could possibly be included is provided in Table 15-3.

18.2.1 Rehabilitation Requirements: Closure Objectives

Adhere to the Closure and Rehabilitation Plan (Appendix 22).

The Rehabilitation Plan must be auditable and bust be able to identify a post mining land use that is feasible through the following:

- providing the vision, objectives, targets and criteria for final rehabilitation, decommissioning and closure of the project;
- outlining the design principles for closure;
- explaining the risk assessment approach and outcomes and link closure activities to risk rehabilitation;

- detailing the closure actions that clearly indicate the measures that will be taken to mitigate and/or manage identified risks and describes the nature of residual risks that will need to be monitored and managed post closure;
- committing to a schedule, budget, roles and responsibilities for final rehabilitation, decommissioning and closure of each relevant activity or item of infrastructure;
- identifying knowledge gaps and how these will be addressed and filled;
- detailing the full closure costs for the life of project at increasing levels of accuracy as the project develops and approaches closure in line with the final land use proposed; and
- outlining monitoring, auditing and reporting requirements.

Soil stripping

This is a key rehabilitation activity because soil, once lost, takes many years to regenerate. The assumption is made that detailed soil surveys have been made of all areas that will be subjected to major disturbance.
Availability of soil materials is the key to successful rehabilitation. The surface layer that contains the fertility and seed bank should be stripped and stored separately before mining to be available for rehabilitation after mining

Outcome: Initiate a pre-mining soil survey

- The pre-mining soil survey will identify those horizons (normally down to a depth of 1.2 metres, limited by the equipment used to survey) that will support plant growth and those that will be less effective.
- Ensure that there is a detailed soil plan for the areas to be stripped
- Strip a suitable distance ahead of mining at all times, to avoid loss and contamination Demarcate boundaries of different soil types
- Define cut-off horizons in simple terms that the stripping operator can understand Supervise stripping to ensure soils are not mixed
- Strip soils only when moisture content will minimise compaction risk
- Strip and replace in one action wherever possible Use shovel and truck in preference to bowlscraper.

Infrastructure removal

Once mining has been completed, the processing facilities, accommodation and administration, mining, transport and storage facilities are usually surplus to the requirements of the ultimate land user. In some circumstances, certain portions of the existing infrastructure can be gainfully used after closure (for example, offices and workshops) and these structures need to be identified and protected. Great care must be taken in determining which structures should be left for subsequent users as, frequently, the future land users are dazzled by the potential for uses which are not economically viable. Consequently, structures handed over in good faith become moribund, broken down and a hazard to health and safety. Although the handover of such structures may be legally sound, the failure of infrastructure that has been handed over will always be associated reputational with the initial mining company.

After identifying the structures that can be gainfully and sustainably used after closure, the remainder of the structures should be removed so that the land can be converted to its final use. Infrastructure removal is a dangerous occupation and detailed attention must be paid to managing safety risks.

Outcome:

- Identify infrastructure items that may be of use to the future land users.
- In association with those users and the authorities, define what could be left, how it would be used and how sustainable that use would be.
- The remaining infrastructure should be assessed for its suitability for reuse/recycling.
- The re-usable items should be removed from the site.

- Hazardous material locations and deposits require specialised assessment and analysis to determine how these materials should be decontaminated and to ensure that all residual hazardous materials are deposited in officially-sanctioned hazardous waste deposit sites.
- Mining infrastructure must be rendered safe, all shafts sealed according to professionally engineered designs and DMR requirements.
- Remaining structures should be demolished and demolition rubble removed or buried.
- The final landform agreed for the infrastructure areas should be created.
- All infrastructure rubble and residual foundations need to be covered with at least one metre of cover material. Best practice is to cover with 1 metre of inert cover material (which may be "B" or "C" horizon material that can be penetrated by plant roots), which in turn is covered with topsoil material.
- The infrastructure sites can then be formally included in the remainder of the mine site rehabilitation process.

Identify infrastructure items that may be of use to the future land users or is salvageable

In association with the persons who will be the ultimate land users and the authorities, assess all structures and determine which items can be left for their gainful use. This is a difficult activity, particularly when the mine site lies within a farming community, or is adjacent to an urban community, as many buildings can be seen as having value for storage after mine closure, or workshops that will be of value for maintaining farm machinery. In some cases, where significant amounts of accommodation and office space are available, it may be possible to establish an enterprise hub or accommodation centre.

However, South Africa is littered with examples of derelict mine infrastructure, where the controlling company handed the infrastructure over to the succeeding land users in good faith – but the ensuing enterprise was not a success. It is essential, then, that the viability of any project which will require the handover of mine infrastructure is carefully researched before the mining company agrees to the handover to the next land users. This should include adequate and appropriate legal input.

Frequently, retention of services such as roads, electricity supply, water supply, water treatment facilities (sewage plants) is requested. In each case, the probable future requirements of the ultimate land users and their ability to maintain the various infrastructures should be assessed. It is pointless, for instance, to leave a mine haul-road as access to a small farming location as its maintenance cost will far outweigh the benefit. Likewise, sewage plants designed to cope with thousands will be overly expensive to maintain if only catering for a few hundred people. Whatever infrastructure that is handed over to subsequent land users must be correctly sized and financially viable to maintain. The remaining infrastructure should be assessed for its suitability for re-use/recycling. Items such as cladding, roofing, electrical components, equipment, should be removed from the site prior to demolition occurring

Make safe and decontaminate all hazardous material locations

All mine sites will have hazardous materials (pesticides, degreasers, hydraulic fluids, metallic sludges etc) in stores and stockpiles. The nature of these materials depends on the nature of the mining and processing that is being done. Many mines currently undergoing closure started before the present focus on environmental management. Consequently, the older mine sites will have a range of hazardous material dump locations which may or may not have been identified and assessed. For these older mines, a detailed survey of the possible location of hazardous materials, wastes and storage areas should be conducted. Hazardous material locations and deposits require specialised assessment and analysis, to determine how they should be decontaminated. All residual hazardous materials must be deposited in officially sanctioned hazardous waste deposit sites. This may involve the removal of significant volumes of contaminated soil and overburden materials to officially registered hazardous waste sites.

Mining infrastructure must be rendered safe, all shafts sealed according to professionally engineered designs

Removal of all unwanted infrastructure and rendering this safe are basic legal requirements for mine closure.

Outcome:

- Where underground mining has been done, a key issue is the sealing and making safe of mine shafts, adits, ventilation tunnels and any other access routes to the underground workings.
- In all cases, the access routes must be sealed. In the case of access or vertical shafts, the procedure involves the filling of the shaft, as far as possible, with inert rubble from demolition, or other waste materials.
- The shafts must be sealed with concrete seals, designed by a professional engineer and approved by the DMR, and these should be positioned in unweathered rock to ensure their permanency.
- There will be a requirement to install "breather" pipes for gas release, or for water release systems where the ultimate reestablishment of the water table will result in water decant from the shaft position.
- Finally, the seals should be covered with inert overburden material and topsoil, and then revegetated.

Remaining structures should be demolished and demolition rubble removed or buried

The infrastructure remaining after salvage should be demolished. Safety is a key issue in this activity, particularly where high structures are concerned, and care must be taken to push over all tall structures before final demolition occurs.

Outcome:

- In some cases, controlled explosion/implosion will be required.
- Concrete and brick structures are usually demolished using equipment fitted with hydraulic hammers.
- Foundations should similarly be demolished, with the use of hydraulic hammers, and the rubble removed either to an adjacent rock dump, tailings deposit or shaft that has to be filled.
- Care must be taken to isolate any concrete structures with hazardous material contamination. This contamination may take the form of chemical toxicity, or radioactivity.
- Material thus contaminated will have to be deposited in appropriate hazardous waste disposal sites.

The final landform and soil cover agreed for the infrastructure areas should be created

Following removal of the infrastructure, the exposed underlying materials should be reshaped to create a gently-sloping, free-draining topography.

Outcome:

- Sealed shaft complexes should have a gentle whale-back shape to enhance runoff.
- Topsoil materials that were stripped prior to construction can be then be replaced, fertilised and ripped.
- In some cases, where infrastructure was developed and constructed before the need to cater for removal at closure was apparent, foundations may be so massive that removal is impractical.
- In such situations, it is permissible to cover the structures with a minimum of 1 metre of cover material. This should be a combination of soft overburden or "B" horizon material covered with topsoil which, combined, will provide a potential plant rooting depth of at least 1 metre.

Include the infrastructure areas in the remainder of the mine site rehabilitation process

Outcome:

- The infrastructure sites can then be formally included in the remainder of the mine site rehabilitation process. That is, these sites can now be revegetated and included in all post-closure monitoring and maintenance procedures.

Landform recreation – soil shaping

Landform re-creation (spoil shaping) is the process by which the mined overburden materials are placed and moved so as to create the "desired" final topography. De facto, cost considerations frequently prevent the full

replacement of all mined-out materials back in to the original excavation and, in many open-pit operations, the resulting topography consists of an overburden dump and an excavation.

There remains considerable scope for the reshaping of both excavation and overburden pile to provide a final landform that will have improved post-closure usefulness. The key is early planning of the end land form to ensure that overburden materials are placed in the most appropriate location. While the current norm is to ensure that the final land-form is free-draining and has slopes such that erosion risk is minimised, the desired approach is to ensure that the final land form conforms as closely as possible to the agreed final configuration and blends in well with the surrounding landscape.

One of the key uncertainties in final landform prediction is the bulking factor. Soft materials frequently compact by as much as 15%, while hard materials may expand by as much as 25%. As a consequence of these factors, it is difficult to predict the final landform accurately and the standard commitment to landform re-creation should relate to agreed outcomes, such as the maximum slopes to be permitted over specific areas, and a commitment to maximise free surface water drainage.

Outcome:

- A post-mining land form concept should be developed at the planning stage. This should take account of expected bulking factors.
- This plan should allow the pre-mining proportions of land capability classes to be recreated, while also meeting water management requirements.
- Where the mining plan precludes the re-creation of the original topography, boxcut spoils, overburden dumps and final voids will be created. These final land forms must also be designed to maximise land capability and to meet water management objectives.
- Where slope length is excessive, use drainage channels and waterways to reduce erosion risk.
- Monitoring of the deposition of overburden materials and reconciliation of volumes moved in relation to plan should be done regularly – preferably on a monthly basis.
- The survey results should be used to correct bulking factors employed in the original planning exercise.
- All changes in mining plan should be analysed for their effects on final landform. Significant modifications to final landform will require modification to the mine EMP.
- Reshaping, following deposition, should be done taking into account surface water drainage and erosion risk considerations. In addition, water balance issues must be addressed. Adjusting the size of open water bodies can ensure that evaporation matches infiltration into the pit area, thus minimising seepage or decant of polluted water.
- An integrated approach is required to ensure that the optimal balance between conflicting final requirements (for instance, land capability and evaporative surface) is achieved.
- Monitoring of overburden spoils on a continuous basis.
- Assess the effects of changes to the mining work programme on final landform.

Replacement of soil

Once the final land form has been created, soil replacement can begin. The timing of when best to replace soil is a matter for debate, as in many instances, the re-created landform is subject to ongoing settlement for some years after the reshaping has been completed. This resettlement, theoretically, accelerates after final pit closure due to the reestablishment of water-tables, with the resultant wetting of surfaces and consequent repacking and compaction of the deposited materials. This may result in significant surface irregularity in relation to the agreed final land form and may result in impeded drainage and surface soil waterlogging issues. However, on balance, early replacement of soil is the desired option as it should minimise the need to stockpile soil and increase the proportion of soil stripped and replaced directly.

Soil horizons should be replaced in the same sequence in which they are dismantled. Thus, the usable subsoil material is replaced on the reshaped spoil, the underlying topsoil material (stripped from depths of 100 to 400

mm) is replaced next and, finally, the surface 100 mm of soil is replaced to return the seed bank and ensure natural revegetation with the species that were originally in the area. The problem with this concept, though, is that each horizon has to be replaced in sequence and, as a result, each layer will be subject to compaction during the replacement and smoothing processes prior to the placement of the next soil layer – all of which introduces compaction.

Outcome:
- Accordingly, the following list of actions reflects current South African soil replacement best practice:
- Soils, which should have been stripped according to form, should be replaced according to a pre-existing plan.
- A soil reserve should be retained to repair localised surface subsidence areas.
- Compaction should be minimised by use of appropriate equipment and replacing soils to the greatest possible thickness in single lifts.
- Soils should be moved when dry to minimise compaction. If they have to be moved when wet, shovel and truck should be used as bowlscrapers create massive compaction when moving wet soils.
- Where multi-layer soil profiles are re-created, running over the lower layers with heavy equipment should be minimised.
- Minimise compaction during smoothing of replaced soils by using dozers rather than graders.
- Following placement, all soils should be ripped to full rooting depth.
- Where natural revegetation is not possible, the soils should be tilled to produce a seed-bed suitable for the plant species selected for seeding.

Prevention of soil Amelioration

Replaced soils require both physical and chemical amelioration. From the physical perspective, this is because the actions of soil removal, stockpiling and replacement result in high levels of soil compaction. There are 40,000 hectares of rehabilitated land in the Mpumalanga Highveld, where compaction has downgraded the land capability to support crop and pasture growth as a result of severely-reduced rooting depth.

While prevention of compaction is better than cure, current prevention methodologies and equipment choice and replacement methods are ineffective at prevention of compaction. Consequently, there is a need for virtually all reconstituted profiles to be loosened. This is usually achieved by deep ripping, with variable success, and this activity is a current focus for research by the coal mining industry.

From the chemical perspective, the stripping of the surface soil (topsoil) in a single, organic-rich, layer, results in the dilution of the fertility that is concentrated in the surface few millimetres throughout the underlying 300-400 mm of relatively impoverished material. The situation is worsened in those cases where topsoil and subsoil are mixed, or where subsoil alone is replaced. In this case, additional amounts of fertiliser application become necessary.

While prevention of compaction is better than cure, current prevention methodologies and equipment choice and replacement methods are ineffective at prevention of compaction. Consequently, there is a need for virtually all reconstituted profiles to be loosened. This is usually achieved by deep ripping, with variable success, and this activity is a current focus for research by the coal mining industry.

From the chemical perspective, the stripping of the surface soil (topsoil) in a single, organic-rich, layer, results in the dilution of the fertility that is concentrated in the surface few millimetres throughout the underlying 300-400 mm of relatively impoverished material. The situation is worsened in those cases where topsoil and subsoil are mixed, or where subsoil alone is replaced. In this case, additional amounts of fertiliser application become necessary.

Outcome:
- Deposited soils must be ripped to ensure compaction is reduced.

- Correct soil moisture content for maximum disturbance must be established.
- Ripping must penetrate through soil into the underlying overburden materials.
- Acceptable soil bulk density values must be determined and progress monitored against target.

- Surface tillage should produce an acceptable seedbed for the vegetation to be established.
- Soil fertility should be restored.
  - Soils should be analysed for plant nutrient content.
  - Fertiliser should be applied to raise soil nutrient content to the desired levels.
  - Rates of fertiliser to be applied frequently exceed normal agricultural dressings.
- Immobile fertilisers should be incorporated into the plant rooting zone.
  - Maintenance dressings of fertiliser should be applied annually until the soil fertility cycle is restored.

Revegetation and Biodiversity re-establishment

The end land use and, hence, the vegetation requirements, will have been set during the Public Participation Process in association with the end-user communities concerned. For Lefa Colliery, the pre mining land use is agricultural and no vegetation re-establishment will be needed for the infrastructure area, if the land use is to return to the pre-mining land use.

It the end of mine land use for the infrastructure area and associated shaft development areas change to an area that requires vegetation establishment, the following will be needed:

Outcomes:

- Species selected for rehabilitation should meet the biodiversity objectives.
- Rehabilitation species selection must be based on practical considerations.
- Appropriate methods should be used for vegetation establishment.
- Planting should be done when climatic conditions are most likely to ensure success.
- Where specialised biodiversity objectives occur, each situation differs and general guidance is worthless – consult your expert!
- • Development and Implementation of an alien invasive management plan.

Rehabilitation monitoring and maintenance

The objective of monitoring is to ensure that the agreed rehabilitation process remains on track. There is a need both to carefully monitor the progress of the physical aspects of rehabilitation (soil stripping, overburden handling, landform development and soil replacement) during the operational phase and the progress with the re-establishment of the desired final ecosystem.

Outcomes:

The list of items that should be monitored will vary from site to site and is usually based on the closure criteria that have been negotiated for the site. Monitoring of the following is needed:

- Alignment of actual final topography to agreed planned landform.
- Depth of topsoil stripped and replaced.
- Chemical, physical and biological status of replaced soil.
- Erosion.
- Surface water drainage systems and surface water quality.
- Groundwater quality at agreed locations.
- Vegetation basal cover.
- Vegetation species diversity.
- Faunal recolonization.
- Crop growth and yield (on sites rehabilitated to agricultural end uses).
- Proportion of mined land that has been fully rehabilitated.

Management systems during mining

While some mines have a short lifespan, the majority are in existence for 20 years and more. There are many mines with lifespans that exceed 40 years – longer than the full working life of the ordinary man. The key challenge is the loss of corporate memory over such long time-frames when it comes to such things as topsoil stockpiles and planned methods of rehabilitation and closure. It is essential that some system of continual "memory refreshment" is employed and that progress is continually checked.

It is a requirement for granting permission to mine that the mine will have an Environmental Management Plan/Programme (EMP) in place to ensure that key risks are managed effectively and that ongoing monitoring is undertaken. While it is not specified that certification to a formal environmental management system such as ISO 14001 is required, de facto ISO 14001 is the system most commonly used in South Africa. Where mining companies adopt the ISO 14001 standard, maintenance and management and document control for rehabilitation activities are usually under control. This is because rehabilitation failure is one of the key environmental risks facing the operation and, therefore, must be fully addressed in Environmental Risk Register and Environmental Management Plan which are essential components of any ISO 14001 compliant system.

For those mining entities that have not formally adopted the ISO 14001 system, there is a need to develop an in-house risk assessment and risk management system, with systems and protocols in place, maintenance and monitoring systems, and regular review of performance leading to correction of the system to eliminate non-conformances in respect of the rehabilitation risk. Whatever the protocol selected, good environmental management practice is underpinned by having good environmental management procedures in place and monitoring regularly to ensure that these procedures are fully implemented. Government requires regular audits of rehabilitation progress. Regulation 55 does not require annual auditing, but an annual audit is usually advisable. The need to report regularly to government ministries should ensure that appropriate review of rehabilitation performance and maintenance takes place throughout the mining period.

Outcomes:

With respect to ensuring that the rehabilitation process remains on track throughout the life of the mine, the EMS should contain the following:

- A listing of the physical attributes of the mine site.
- A listing of the mine objectives with respect to rehabilitation.
- A listing of all activities that are to be undertaken throughout the life of the mine.
- An assessment of how each activity may impact on the potential for the mine to achieve its rehabilitation objectives.
- An evaluation (rating) of the risk of rehabilitation failure occurring as a result of each action, or failure to act.
- For those risk items rated "high", methods of prevention, mitigation, avoidance – and, if all else fails, treatment – must be identified and operational management procedures developed to manage each key risk.
- Performance in relation to these policies and procedures must be monitored and the efficiency with which the procedures work must be assessed regularly.
- For the system to be certified there is a requirement for continual improvement with time. This can either refer to improvement in performance in managing the key risks identified at each site, or a progressive incorporation of the lower-rank risks into the formal management, prevention and mitigation regime provided by the EMS.
- Finally, regular review of the system and its procedures must be done to ensure that all objectives are being met.

Final closure planning

Although mine closure planning should be done prior to mining beginning, the long lifespan of some mines means that major societal changes may have occurred that will preclude the original planned use. This usually

relates to the issue of urban sprawl. Mines which were totally rural at the beginning of mine life may, some 40 years later, be within the town boundaries. Accordingly, it is essential that the mine closure plans be revised periodically throughout the life of mine, but especially during the last seven years of life.

Outcomes:
Review the mine closure plan at least once every two years during the mine operation period.

- Take into consideration the probable end land use in relation to changing social conditions. As far as possible, ensure that the key objective of rehabilitation, that of minimisation of loss of land capability, is retained. In this way, a larger range of closure use options is retained for closure.
- Recognising that it is difficult to predict future needs, time should be spent evaluating alternative potential uses for the mined-out land as social conditions change. An example of this is the value of mined-out clay pits as landfill sites – a use which was not envisioned during the lifetime of the clay pits.
- Review the mine closure plan annually during the last 7 years of mine life.

Requirement of monitoring latent and residual impacts
Latent risk is the possibility that, at some stage in the future, waters emanating from the rehabilitated land may become acid. It is not certain that the waters will turn acid, but there is a possibility that they could, depending on the relative rates of generation of acid from oxidation of sulphides and of neutralisation from the release of carbonates.

Outcomes:
Continually evaluate closure liability and will adjust estimates as more information becomes available relating to operational impacts requiring mitigation, residual and latent closure risks, closure actions and rates for the implementation of the closure actions.

18.3 PERIOD FOR WHICH THE ENVIRONMENTAL AUTHORISATION IS REQUIRED

Since the Environmental Authorisation Application is required for a Mining Right Application, the maximum timeperiod is requested, which is 30 years.

19 FINANCIAL PROVISION

Environmental management infrastructure that is required at the outset will be financed out of the project capital. On-going environmental management and rehabilitation as identified in this document and as set out in the EMP will be funded from working costs during the life of the project.

19.1 EXPLAIN HOW THE AFORESAID AMOUNT WAS DERIVED

The Financial Provisioning as updated to present the Financial Provisioning for the proposed activities.

This section provides details on the proposed closure cost. The outlined assumptions and limitations also underpin the basis of this closure cost determination. It is important to note that the estimation is based on existing information. The closure cost calculation has been performed in accordance with NEMA GNR 1147 financial provision and MPRDA requirements. If the project is granted by the Department, the financial provision will require updating annually, and as such any future disturbances post Year 1 will be determined and closure provisions made accordingly.

19.1.1 Methodology

The costing methodology applied is summarized as follows:

- Undertook a site visit to key areas and facilities to confirm observations and assumptions;
- Developed an itemised plan indicating an inventory of closure aspects based on the proposed mine

schedule and discussions with mine personnel;

- Defined specific rehabilitation actions for each through reviewing specialist studies, impact assessment outcomes, industry guidelines, conceptual modelling and rehabilitation experience;
- Calculated monitoring and maintenance costs through defining the required monitoring and maintenance, obtaining rates for laboratory analysis, specialists, travelling, accommodation and equipment rates; and
- Compiled a dedicated closure spreadsheet to determine the closure costs of the quantified actions through applicable rates.

It is important to note that Section 41 of the Minerals and Petroleum Resources Development Act of 2002 (Act No. 28 of 2002) has been repealed and replaced with Section 24P of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (as amended). In addition, Section 53 and 54 of the Mineral and Petroleum Resources Development Regulations, 2004 is also repealed due to the promulgation of the Financial Provisioning Regulations, November 2015 (as amended). On 26 October 2016 the transitional period for the review, assessment and adjustment of financial provision in terms of this new regulation has been extended to 20 February 2019. This time period was further extended on the 21 September 2018, published under Government Gazette No. 41921, to 19 February 2020 for holders of rights or permits who applied for such rights prior to November 2015, the date on which the Financial regulations came into effect.

Table 19-1: Scheduled Closure Cost (Updated)

CALCULATION OF THE QUANTUM							
Mine:	Ergosat (Pty) Ltd - LEFA COLLIERY	**Location:**	Freestate				
Evaluators:	Elemental Sustainability	**Date:**	02-Jun-20				
No.:	**Description:**	**Unit:**	**A Quantity**	**B Master rate**	**C Multiplication Factor**	**D Weighting Factor 1**	**E=A*B*C*D Amount (Rands)**
1,0	Dismantling of processing plant and related structures (including overland conveyors and power lines)	m3	8500	R16,55	1	1	R140 675,00
2(a)	Demolition of steel buildings and structures	m2	12500	R230,71	1	1	R2 883 875,00
2 (B)	Demolition of reinforced concrete buildings & structures	m^2	9000	R339,98	1	1	R3 059 820,00
3	Rehabilitation of access roads	m^2	1800	R41,29	1	1	R74 322,00
4(A)	Demolition and rehabilitation of electrified railway lines	m	0	R399,49	1	1	R0,00
4(B)	Demolition and rehabilitation of non-electrified railway lines	m	0	R217,90	1	1	R0,00
5	Demolition of housing &/or administration facilities	m^2	13000	R461,39	1	1	R5 998 070,00
6	Opencast rehabilitation including final voids & ramps	ha	0	R241 875,68	1	1	R0,00
7	Sealing of shafts, adits and inclines	m3	10000	R128,55	1	1	R1 285 500,00
8 (A)	Rehabilitation of overburden & spoils	ha	3	R161 250,45	1	1	R483 751,35
8 (B)	Rehabilitation of processing waste deposits and evaporation ponds (basic salt-producing waste)	ha	2	R281 144,00	1	1	R562 288,00
8 (C)	Rehabilitation of processing waste deposits & evaporation ponds (acidic, metal-rich waste)	ha	3	R583 318,67	1	1	R1 749 956,01
9,0	Rehabilitation of subsided areas	ha	1	R135 022,96	1	1	R135 022,96
10	General surface rehabilitation	ha	20	R127 737,55	1	1	R2 554 751,00
11,0	River diversions	ha	0	R127 737,55	1	1	R0,00
12	Fencing	m	2400	R145,71	1	1	R349 704,00
13	Water management	ha	15	R46 656,49	1	1	R699 847,35
14	2 to 3 years of maintenance & aftercare	ha	20	R16 999,29	1	1	R339 985,80
15 (A)	Specialist study	SUM	5%				
			Subtotal 1 (Sum of 1-15 above)				

Escalated Sum of 1-15 above		R 20 317 568,47
Weighting factor 2	1.00	R 20 317 568,47
Preliminary and General	12%	R 2 438 108,22
Contingencies	10%	R 2 031 756,85
Sub Total 2 (Subtotal 1 plus P&G and contingencies)		**R 24 787 433,53**
VAT (15%)		R 3 718 115,03
GRAND TOTAL		**R 28 505 548,56**

19.2 DESCRIBE THE CLOSURE OBJECTIVES AND THE EXTENT TO WHICH THEY HAVE BEEN ALIGNED TO THE BASELINE ENVIRONMENT DESCRIBED UNDER REGULATION 22 (2) (D) AS DESCRIBED IN 2.4 HEREIN

Adhere to the Closure and Rehabilitation Plan compiled for the specific project (Appendix 22) and refer to Objectives provided per item in Section 18.2.1. above.

19.3 CONFIRM SPECIFICALLY THAT THE ENVIRONMENTAL OBJECTIVES IN RELATION TO CLOSURE HAVE BEEN CONSULTED WITH LANDOWNER AND INTERESTED AND AFFECTED PARTIES

The environmental objective in relation to closure have been made available to all registered I&APs for comment. All comments received and the relevant meeting minutes will be appended to this report.

19.4 PROVIDE A REHABILITATION PLAN THAT DESCRIBES AND SHOWS THE SCALE AND AERIAL EXTENT OF THE MAIN MINING ACTIVITIES, INCLUDING THE ANTICIPATED MINING AREA AT THE TIME OF CLOSURE

Refer to Section 18.2.1 above. All infrastructure established will be removed and rehabilitated in accordance with the approved Closure Plan and Final Land use.

19.5 EXPLAIN WHY IT CAN BE CONFIRMED THAT THE REHABILITATION PLAN IS COMPATIBLE WITH THE CLOSURE OBJECTIVES

The rehabilitation plan will be compiled in accordance with the objectives and goals according to the Mine and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) as amended and GNR 1147 of the National Environmental Management Act, 1988 (Act No. 107 of 1998). Refer to Section 19.2. A preliminary Closure Plan has been drafted and is included in Appendix 22.

19.6 CALCULATE AND STATE THE QUANTUM OF THE FINANCIAL PROVISION REQUIRED TO MANAGE AND REHABILITATE THE ENVIRONMENT IN ACCORDANCE WITH THE APPLICABLE GUIDELINE

The Closure Quantum was conducted and updated in 2020 to ensure compliance with annual update required since the initial submission was made. Refer to Table 19-1.

19.7 CONFIRM THAT THE FINANCIAL PROVISION WILL BE PROVIDED AS DETERMINED

The Ergosat (Pty) Ltd: Lefa Colliery Mine will provide the amount/financial guarantee as specified to the DMRE. These guarantees are audited on a yearly basis and is to be updated on a yearly basis.

20 DEVIATIONS FROM THE APPROVED SCOPING REPORT AND PLAN OF STUDY

20.1 DEVIATIONS FROM THE METHODOLOGY USED IN DETERMINING THE SIGNIFICANCE OF POTENTIAL ENVIRONMENTAL IMPACTS AND RISKS

(Provide a list of activities in respect of which the approved scoping report was deviated from, the reference in this report identifying where the deviation was made, and a brief description of the extent of the deviation).

Several changes have been made since the original EIA/EMPr submitted and discussed in the Alternatives

assessed for more details (Section 7). This revision is based on recommendations from the Minister and to ensure the Sasol pipeline is re-assessed to ensure that no harm will befall the pipelines. Ergosat is an underground mining operation and Ventilation Shaft 2 (which will provide air to the underground workings) have been moved to ensure further safety and distance from the pipeline.

20.2 MOTIVATION FOR THE DEVIATION

Deviations from the initial scoping report include some specialist studies that were not undertaken but were indicated in the Scoping Report. The wetland delineation, waste classification and aquatic studies were excluded in the EIA phase because of the requirement of these studies in the WULA process and these have since been done and finalised.

The revisions made to the previous submitted EIA/EMPR have been to improve and ensure saftey in terms of the Mine Health and Safety Act (MHSA) and to include the most relevant information available for the project (such as the finalised Stormwater Management features).

21 OTHER INFORMATION REQUIRED BY THE COMPETENT AUTHORITY

21.1 COMPLIANCE WITH THE PROVISIONS OF SECTIONS 24(4)(A) AND (B) READ WITH SECTION 24 (3) (A) AND (7) OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 (ACT NO. 107 OF 1998) THE EIA REPORT MUST INCLUDE THE FOLLOWING:

21.1.1 Impact on the Socio-Economic Conditions of Any Directly Affected Person

(Provide the results of Investigation, assessment, and evaluation of the impact of the mining, bulk sampling or alluvial *diamond prospecting on any directly affected person including the landowner, lawful occupier, or, where applicable, potential beneficiaries of any land restitution claim, attach the investigation report as Appendix*.

A Socio-Economic report was undertaken for the proposed project and Socio-Economic aspects have been adequetly assessed and addressed within this document. Various farming activities and plots are situated on the surface of where the underground mine will be situated.

Several appeals habe been launched against the applicant and decision of the Minister have been included in the document, and the recommendations based on the outcome have been incorporated into the revised EIA/EMPr.

21.1.1.1 Crime, Health and HIV

Usually, an influx of foreigners and job seekers occurs when a new mining area is started and thereby an increase in disposable income for local people may create negative social impacts such as crime, alcoholism and prostitution in and around the project area. This will also result in new work opportunities that become available. A medium to low or low negative impact is expected, with several positive impacts as well.

21.1.1.2 Land Tenure, Use and Capability

The land tenure and land capability will not be impacted to such an agree based on the fact that Ergosat is an underground mining operation with limited surface impacts. Surface impacts and changes in land capability and land use is mostly expected on the area where the stockpiles and surface infrastructure will be.

21.1.1.3 Noise

The impact of noise from various aspects and equipment of the mining operation will be of medium to low negative significance taking cognizance that blasting and drilling will occur, but all will be largely underground.

Recommendations have been made for mitigation measures to ensure that impacts will be low, managed and monitored (
Table 15-3 above).

21.1.1.4 Air Pollution

The impact is considered low to insignificant negative significance. The dust generated during associated activities and operational phase may reduce the air quality of the localised air. Occupational Health monitoring as part of the management should be initiated, as well as monthly dust monitoring. Monitoring is to be performed in accordance with the requirements as set out in GNR 827, ASTM D1739 and SANS 1929.

21.1.1.5 Light and Visual Aspects

Light and visual impacts will be of low significance overall. Visual impacts, like any other will affect sensitive receptors identified close by more than those on a local scale. That does not mean that the impact should be rated higher, since the impacts rated are based on methodology to ensure objectivity and standard.

21.1.1.6 Economic Opportunities, Infrastructure Development and Employment

The impact will be positive to the local and regional economy and those who will get jobs as a result of the possible construction and opening.

The number of actual jobs and contracts that will be created renders the mining operation to be of medium/high positive significance. This will further be enhanced by the possible secondary economic activities that may arise within the Local Municipality.

Increase in disposable income may create negative social impacts such as crime, alcoholism and prostitution in and around the project area. The significance of this is also thought to be of low consequence, because the area has already been subjected to mining industries, large scale farming activities and many informal settlements already established over a long period of time and no sudden “boom of activities” is expected.

21.1.2 Impact on Any National Estate Referred To In Section 3(2) of the National Heritage Resources Act

(Provide the results of Investigation, assessment, and evaluation of the impact of the mining, bulk sampling or alluvial diamond prospecting on any national estate referred to in section 3(2) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) with the exception of the national estate contemplated in section 3(2)(i)(vi) and (vii) of that Act, attach the investigation report as Appendix 2.19.2 and confirm that the applicable mitigation is reflected in 2.5.3; 2.11.6.and 2.12.herein).

The heritage assessment for the Lefa Colliery project was undertaken by Leonie Marais-Botes. Mitigation measures were recorded into the EIAR and the specialist HIA study is included in the Impact Management tables and EMPr.

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

(the EAP managing the application must provide the competent authority with detailed, written proof of an investigation as required by section 24(4)(b)(i) of the Act and motivation if no reasonable or feasible alternatives, as contemplated in sub-regulation 22(2)(h), exist.).

Please refer to Sections 7 where alternatives have been discussed in detail.

22 UNDERTAKING

Confirm that the undertaking required to meet the requirements of this section is provided at the end of the EMPr and is

applicable to both the Environmental Impact Assessment Report and the Environmental Management Programme report.

The signed undertaking is included in Section 32 of Part B and is valid for both the Environmental Impacts Assessment (Part A) and the Environmental Management Programme (Part B).

PART B ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

DRAFT ENVIRONMENTAL MANAGEMENT PROGRAMME

23 DETAILS OF THE EAP

(Confirm that the requirement for the provision of the details and expertise of the EAP are already included in PART A, section 1(a) herein as required).

The information can be found in Section 1.1. Also refer to Appendix 1 and Appendix 2.

24 DESCRIPTION OF THE ASPECTS OF THE ACTIVITY

(Confirm that the requirement to describe the aspects of the activity that are covered by the draft environmental management programme is already included in PART A, section (1)(h) herein as required).

Please refer to Section 3 above.

24.1 COMPOSITE MAP

(Provide a map (Attached as an Appendix) at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that any areas that should be avoided, including buffers)

Refer to Appendix 4.

24.2 DETERMINATION OF CLOSURE OBJECTIVES

(ensure that the closure objectives are informed by the type of environment described in 2.4 herein)

Rehabilitation will be as per closure objectives. These have been assessed in the Closure and Financial Report as drafted and all objectives have been provided within Section 18.2.1.

The closure objectives are in line with reaching a post rehabilitation environment similar to a pre-mining environmental condition.

For the mining operations, the following closure objectives and goals are proposed:

- To rehabilitate all disturbed land to a state that is suitable for its post closure use;
- To ensure that affected areas are safe and secure for both human and animal activities;
- To rehabilitate all disturbed land to a state where limited or preferably no post closure management is required;
- To rehabilitate all disturbed land to a state that facilitates compliance with current environmental quality objectives
- Rehabilitate as per DMRE Guideline; and
- To limit the impact on personnel whose positions may become redundant on decommissioning of the mine.

24.3 THE PROCESS FOR MANAGING ANY ENVIRONMENTAL DAMAGE, POLLUTION, PUMPING AND TREATMENT OF EXTRANEOUS WATER OR ECOLOGICAL DEGRADATION AS A RESULT OF UNDERTAKING A LISTED ACTIVITY

Refer to Table 28-1 for the mitigation measures.

Any activity that results in damage or pollution to the environment will be rated and signed a value to determine the risk. An environmental emergency is defined as an unplanned situation or event resulting in potential pollution of the environment. A pollution incident means an incident or set of circumstances during or as a consequence of which there is or is likely to be a leak, spill or other escape or deposit of a substance, as a result of which pollution has occurred, is occurring or is likely to occur.

24.3.1 Roles and Responsibilities

The Environmental Manager must ensure that regular internal operational inspections and/or are conducted across the Ergosat (Pty) Ltd: Lefa Colliery so that environmental non-compliances and incidents are identified and addressed.

All employees and its contractors working for the mine are responsible for reporting any accident/emergency to their supervisor immediately, and if required notifying the emergency response teams. Personnel must be nominated as response team members and must receive appropriate training to manage emergencies. All other personnel must be made aware of potential emergencies and trained in emergency response. Management must be aware of their responsibilities in case of emergency.

24.3.2 Response to Environmental Emergencies

24.3.2.1 Emergency Plan

An emergency plan must be developed for each potential environmental emergency situation. The emergency plan must give information on:

- Description of the emergency;
- Reference to relevant material safety data sheets;
- Responsibilities for management of emergencies;
- Contact telephone numbers (on-site & off-site);
- Equipment required (including locations); and
- Site plan where applicable.

24.3.2.2 Classification of Emergencies

The following incidents will be classified as an emergency:

- Natural Disasters;
- Damage to radiological/nuclear sources equipment;
- Strikes, protest or unrest;
- Information Management System Failure (plc systems);
- Health and Disease Outbreaks;
- Serous Incident or Fatality;
- High Potential Risk Incidents (Fatality, serious environmental pollution); and
- Other emergencies.

24.3.2.3 Reporting Emergencies

Ergosat (Pty) Ltd: Lefa Colliery will establish standard operating procedures (SOPs). These procedures will aim to identify the potential for, and response to, incidents and emergency situations and for preventing and mitigating the illness, injury or environmental hazard that may be associated with them. It will review its

emergency preparedness and response plans and procedures, in particular, after the occurrence of incidents or emergency situations. The mine shall also periodically test such procedures where and when practicable.

In the event of a serious incident or fatality occurring it is of the utmost importance to not only ensure the Health and Safety of every person involved but also to ensure that certain evidence is protected and gathered for use, with the aim of the prevention of a similar incident/accident occurring in the future.

A "No Blame Fixing" approach to incident investigation will be implemented and it must be stressed that the gathering of information must be seen as preventative action and not as blame fixing. In light of the above, and in addition to the emergency procedure that is relevant to the specific area where the incident/accident occurred, and in relation to the notifying of person and first aid treatment/safety of any person involved, the following steps must be taken immediately after an incident/accident classified above has occurred.

In the event of a reportable/major environmental incident that could lead to danger to the public or the environment (death or sustaining impact on the environment) the appointee of that specific section, in consultation with SHEQ Manager, is responsible for communicating with and drafting an external report (in terms of Section 30 of National Environmental Management Act, 1998 (Act No. 108 of 1998) and Sections 19 and 20 of the National Water Act, 1998 (Act No. 36 of 1998) to the national and provincial department and the municipality containing the:

- Nature of the incident;
- Substances and quantities and accurate effect on persons and environment;
- Initial measures to minimise impacts;
- Causes of the incident;
- Accordance measures;
- When an environmental incident occurs, the following should be adhered to:
    - Report incident as per Incident Reporting Flow Diagram;
    - Measures to clean up any spillage/pollution must be taken as per Emergency Procedure.
    - It is important to ensure that no secondary pollution is caused by incorrect handling of an environmental incident, e.g. incorrect disposal of absorbent material use to clean up a spill; and
- For high potential risk incident (HPRI) / reportable environmental incidents, the SHEQ Manager will conduct a closeout investigation prior to closure of the incident. This will be done one month after all actions has been completed to verify the effectiveness of the actions.

24.3.2.4 Formalise Policies

The following layout is recommended:

Objectives

To formalise and sign off on company policies.
To include all proposed infrastructure as presented within this document into policies. Make sure the policies are updated on an ongoing basis to ensure validity.

Actions

Compile Health and Safety Policy; and
Compile Environmental Policy.

When

Before construction/operational phase starts for the Lefa Colliery area.

The notification process has six main steps in managing an emergency, from the identification of the situation to final close off. These are as follows:

- Find and identify;

- Ensure human safety;
- Reporting;
- Containment and clean-up;
- Corrective action; and
- Monitoring.

24.3.2.5 Environmental Emergency Incidents

The SHEQ Manager must, within 14 days of the incident, report information on the incident to enable initial evaluation to the following:

- Director-General of Environmental Affairs;
- Provincial Head of Department (DMRE);
- Provincial Head of Department (DHSWS); and
- Local Municipality.

The report must include:

- Nature of the incident;
- Substance involved and an estimation of quantity released and their possible acute effects on persons and the environment;
- Initial measures taken to minimise impacts;
- Cause of incident, whether direct or indirect; and
- Measures taken to avoid recurrence of such incident.

24.3.2.6 Water Pollution Emergency Incident

Water Pollution Emergency Incident is any accident /incident in which a substance pollutes or has the potential to pollute a water resource or a substance that has or is likely to have a detrimental effect on a water resource.

The responsible person who was in control of the substance involved in the incident at the time or responsible for the section the incident occurred will immediately inform the superior of the area where the incident occurred.

The information with regard to the incident is communicated to the Business Manager, SHEQ Manager and Security Personnel immediately by the superior of the area. The SHEQ Manager and the General Manager must, as soon as reasonably practicable after obtaining the knowledge of the incident, (i.e. within 14 days) report to:

- DHSWS (Regional Manager);
- South African Police Services or relevant fire department;
- The Catchment Management Agency; and
- The SHEQ Manager and crisis management team must:
    - Take all reasonable measures to contain and minimise the effects of the incident;
    - Undertake clean-up procedures;
    - Remedy the effects of the incidents; and
    - Sample the water together with the responsible person of the area.

24.3.2.7 Air Pollution Emergency Incidents (If relevant at any stage)

- Record of any non-compliance is kept;
- The non-compliance with conditions will be reported telephonically, by fax or by email to the Chief Air Pollution Control Officer as soon as possible but not later than 24 hours after violation will start to occur. The particulars of such violation, including details of measure is put in place to prevent it happening in the future, will be included respective or in the weekly or monthly report;
- If the utilization and/or efficiency of air pollution control fail to meet requirements as specified in the certificate then the process is managed under emergency procedures until such time as it will be possible to operate in compliance with the conditions of this certificate; and

- Record is kept of periods of upset and abnormal emissions, e.g. off-gas vented directly to the atmosphere or excess thereof due to the faults or limited capacity of air pollution control equipment or limits for process parameters being exceeded, etc. and the Chief Air Pollution Control Officer is notified immediately should it occur.

24.3.2.8 Environmental Impact Register

All non-conformances pertaining to safety, health, environmental, quality of project activities and employees shall be documented as identified by according to documented procedures. The mine will make provision for recording and reviewing the nature and extent of any non-conformance that may be encountered during the Project Execution phase.

24.3.2.9 Records

Records must be kept of all environmental emergencies and non-conformances.

25 WASTE CLASSIFICATION

Section 7 of the National Norms and Standards for the Assessment of Waste for Landfill Disposal Regulations (Government Notice 635 as listed in Government Gazette No 36784), lists the conditions to which the results must be compared to determine the type of waste to ultimately determine the barrier requirements for landfill disposal, for the specific waste type.

Regulation 636 of the National Norms and Standards for the Assessment of Waste for Landfill Disposal contains the standard containment barriers for the various waste types, namely Types 1 to 4.

Based on the above and the prescriptions for containment barriers contained in Article 636 of Regulation 36784, the specified barrier for Waste Type 3 waste is a Class C Liner.

Type 3 waste may only be disposed of at a Class C landfill designed in accordance with Section 3(1) and (2) of these Norms and Standards, or, subject to section 3(4) of these Norms and Standards, may be disposed of at a landfill site designed in accordance with the requirements for a GLB+ landfill as specified in the Minimum Requirements for Waste Disposal by Landfill (2nd Ed., DWAF, 1998).

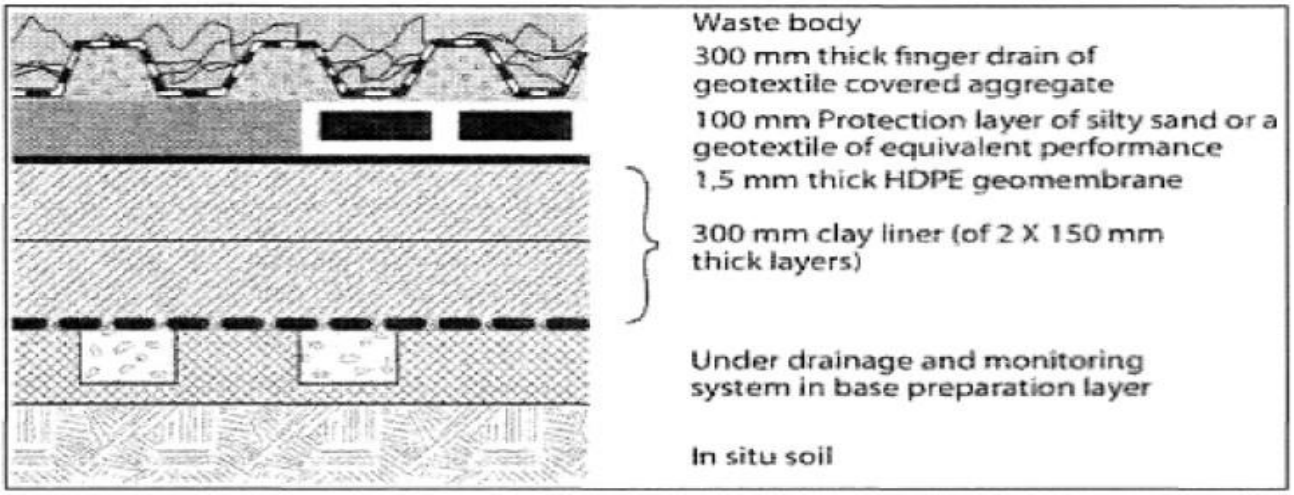


Figure 25-1: Class C landfill (GNR 636)

26 ACID MINE DRAINAGE

(Indicate whether or not the mining can result in acid mine drainage)

26.1 POTENTIAL RISK OF ACID MINE DRAINAGE

As it is a coal mine there is potential for AMD from pyrite coal being exposed to oxygen and water. The potential contaminants that may emanate from the mining activities are Ca, Mg, Cl and SO_4. There may be a possibility of acid generation. This can be confirmed or disproved by performing geochemical sampling and analysis as well as constructing a geochemical model.

26.1.1 Steps Taken to Investigate, Assess, and Evaluate the Impact of Acid Mine Drainage

As it is a coal mine there is potential for AMD from pyrite coal being exposed to oxygen and water. The potential contaminants that may emanate from the mining activities are Ca, Mg, Cl and SO_4. There may be a possibility of acid generation. This can be confirmed or disproved by performing geochemical sampling and analysis as well as constructing a geochemical model.

A model needs to be constructed to quantify potential impacts on receptors such as groundwater users and rivers. Lefa Colliery has been advised to undertake a study closer to the development of the mine. This model will as an important step be undertaken once sufficient chemical information is available on the coal. Once this is available the applicant will undertake the necessary specialist inputs to address the problem.

26.1.2 Engineering Or Mine Design Solutions To Be Implemented To Avoid Or Remedy Acid Mine Drainage

Acid Mine Drainage should be monitored for. Since this is a standard Coal Mining operation, standard methods will be utilised to manage, prevent and detect AMD from the onset of the operation and well after closure.

Both active and passive measures will be devised if and when AMD presents itself. A groundwater model should be developed and updated to ensure monitoring and management of acid mine drainage begins with the onset of the project.

The following has been suggested as an aspect for inclusion in the conditions of the EA (Section 16 and Section 18.2):

"The updating and further development of Geohydrological modelling with special reference to Acid Mine Drainage during the different phases of the development should be done. The groundwater model predictions should be verified once time dependant groundwater monitoring data become available. Predicted flow simulation and decant rates for later years of mine development can significantly be improved by observation data from earlier years and subsequent updates of the groundwater model."

26.1.3 Measures That Will Be Put In Place to Remedy Any Residual or Cumulative Impact That May Result From Acid Mine Drainage

If AMD occurs in the future, the responsibility will be with the Ergosat (Pty) Ltd: Lefa Colliery to implement management measures.

- Water quantity and quality data should be collected on a regular, ongoing basis during mine operations. These data will be used to recalibrate and update the mine water management model, to prepare monitoring and audit reports, to report to the regulatory authorities against the requirements of the IWWMP;
- Areas that may have subsided or areas of depressions and/or sinkholes should be filled to create free draining surfaces. Where leachate is generated, it must be contained separately from water which is only slightly polluted through contact with the waste.
- Surface and groundwater quality and quality monitoring should be continued until a steady state is reached. If required, A pollution control dam could be used to intercept polluted seepage water stemming from the activities. An interception trench is an additional option to treat the contaminated discharge.

- Implement as many closure measures during the operational phase, while conducting appropriate monitoring programmes to demonstrate actual performance of the various management actions during the life of mine.
- Mining should remove as much as possible of the coal reserve and separate acid forming and non-acid forming material.

The hydrogeological report and model should be updated regularly to ensure that the best preformance is envisaged. If Acid Mine Drainage becomes evident based on the current mining operation's activities, the applicant should draft and implement an Action Plan in consultation with the DHSWS to rectify the situation and which may include actively treating the affected water.

27 WATER

27.1 VOLUMES AND RATE OF WATER USE REQUIRED FOR THE MINING, TRENCHING OR BULK SAMPLING OPERATION

The water uses listed in terms of section 21(a), (b), (c), (f), (g), (i) and (j) of the National Water Act, 36 of 1998, as amended ("NWA") will be applied for. A WULA is underway and initiated on the eWULAAS system. All the specialist reports have been conducted to suppliement and finalise the WUL process.

27.2 HAS A WATER USE LICENCE HAS BEEN APPLIED FOR?

Refer to Section 27.1 above. A Water Use License is in process of initiation, the IWWMP is in process.

28 IMPACTS TO BE MITIGATED IN THEIR RESPECTIVE PHASES

Measures to rehabilitate the environment affected by the undertaking of any listed activity

Table 28-1: Mitigation measures to rehabilitate and manage the environment

Activity	Aspects Affected	Potential Impact	Management and Mitigation Measures	Compliance with Standards	Time Period for Implementation
No-Go Option					
No-Go Option	Socio-Economic	Reduced period of development and upliftment of the surrounding communities and infrastructure based on mining development within the region.	N/A	N/A	N/A
No-Go Option	Socio-Economic	Reduced period of development of the economic environment, by job provision and sourcing supplies for and from local residents and businesses.	N/A	N/A	N/A
No-Go Option	Socio-Economic	Positive: No additional negative impacts on I&APs or surrounding land users	N/A	N/A	N/A
No-Go Option	Natural Environment	Positive: No additional negative impacts on the environment	N/A	N/A	N/A
Construction and Operational Phase					
Storm water management structures, pipelines, berms and water resources diversions, Access and Haul roads, Pipelines, Plant and Other Infrastructure (Overland conveyer removed as alternative), Sewage treatment, Bulk hydrocarbon storage facilities/ Filling station, Shaft development, Mining of coal by underground mining, Crushing and screening of coal underground, All infrastructure including External parking, Security and Weigh bridge, Truck Loading area, Internal parking, Silos, stockpiles, sewage treatment plant, scrap yard, offices, crusher and screen plant, medical facility, stores, raw water dam, storage yard and the ventilation shaft, Sub-station and power line, ,Infrastructure area industrial development, Residue stockpiles or deposit areas	Soils	Soil compaction by heavy duty vehicles. Soils will be stripped to construct proper roads. This could lead to loss of topsoil. Due to the presence of vehicles and equipment hydro-carbon spills may occur impacting on the quality of the soils. Stripping and stockpiling of topsoil which may lead to deterioration of soil quality.	• Monitor general condition of surface, rehabilitate if any surface impact occurs. The approved stormwater management plan must be implemented; • Where required the compacted soils should be disked to an adequate depth and re-vegetated with indigenous plants; • Soils compacted, should be deeply ripped at least to a depth of 300mm to loosen compacted layers and re-graded to even running levels; • Roads will be constructed with clean rock material not containing any carbonaceous rock; • Spill kits to be stored on site, and staff trained to act when spills occur; • Contaminated soil to be removed and transported to a facility for remediation; • Drip trays to be used for vehicles that stand overnight.	N/A	As needed
	Soils	During operation of the Ergosat mine, it is anticipated that carbonaceous material may be spilled which will contaminate soils. Contamination by dirty water run-off and/or spillage of hydrocarbons and/or chemicals is also expected from operations vehicles and machinery. Contamination of soils through: - Indiscriminate disposal of waste; and - Accidental spillage of chemicals such as hydrocarbon-based fuels and oils or lubricants spilled from vehicles and other chemicals from operational and maintenance activities e.g. paints. Deterioration of topsoil quality due to salt contamination at the coal stockpile and crushing and screening plant footprints	• All vehicles and machinery will be regularly serviced to ensure they are in proper working condition and to reduce risk of leaks; • All leaks will be cleaned up immediately using an absorbent material and spill kits, in the prescribed manner; • The approved Integrated Water and Waste Management Plan to be implemented. Hydrocarbons and hazardous waste: • All hazardous waste generated shall be kept separate and shall not be mixed with general waste; and • All hazardous waste shall be stored within a sealed drum on an impermeable surfaced area within the central waste storage and transition area.	N/A	Continuous
Storm water management structures, pipelines, berms and water resources diversions, Access and	Land Capability and Land Use	Possibility of mining activities and workers impacting on Mining Right Area	Monitor general condition of surface, rehabilitate if any surface impact occurs. Adhere to final landform plan. • All workers will be sensitised to the risk of fire; • The Applicant shall ensure that the basic fire-fighting	Mine Closure and Rehabilitation Plan	As needed

Haul roads, Pipelines, Plant and Other Infrastructure (Overland conveyer removed as alternative), Sewage treatment, Bulk hydrocarbon storage facilities/ Filling station, Shaft development, Mining of coal by underground mining, Crushing and screening of coal underground, All infrastructure including External parking, Security and Weigh bridge, Truck Loading area, Internal parking, Silos, stockpiles, sewage treatment plant, scrap yard, offices, crusher and screen plant, medical facility, stores, raw water dam, storage yard and the ventilation shaft, Sub-station and power line, ,Infrastructure area industrial development, Residue stockpiles or deposit areas			equipment is available on the site; • Extinguishers should be located outside hazardous materials and chemicals storage containers. Fire response and evacuation • An Emergency Plan (including Fire Protection, Response and Evacuation Plan) is to be prepared by the Applicant and conveyed to all staff on the site; • Identify major risks to minimise the environmental impacts e.g. air pollution and contaminated effluent runoff; • Land capability to be restored as far as possible in the rehabilitation stage to arable land; • Land use currently mining and agricultural orientated. Land use to be determined after mining and rehabilitation has been concluded; • Limit the area of the PCD and STP vegetation clearance to a minimum; • Rehabilitate area back to arable land.		
Shaft development Mining of coal by underground mining	Blasting	Blasting hazard, specifically - Ground vibration and Other including the SASOL pipeline	• Adhere to blasting guidelines given in terms of the SASOL Pipelines as provided within this table. • Specific blast design to be done, shorter blast holes, smaller diameter blast hole, using electronic initiation instead of shock tube systems to obtain single hole firing. • Blast in accordance to strict regulations as set out in the MHSA and MPRDA. • Appoint a Blasting specialist or suitably competent person to design blasting programme if and when blasting is planned. • Monitor blasting levels - Place seismographs in specific surrounding areas to monitor vibrations in terms of blasting.	Blasting Regulations of the Explosives Act, 1956 (Act 26 of 1956). Vibration Management Plan	Continuous
Storm water management structures, pipelines, berms and water resources diversions, Access and Haul roads, Pipelines, Plant and Other Infrastructure (Overland conveyer removed as alternative), Sewage treatment, Bulk hydrocarbon storage facilities/ Filling station, Shaft development, Mining of coal by underground mining, Crushing and	Ecological Impacts	Fauna: Disturbance and loss of fauna through noise, light and dust pollution and possible hunting, trapping and killing of fauna. Other impacts on Fauna as identified in specialist assessment	• No clearance of vegetation where the mining will only affect the underground; • No clearance of indigenous vegetation in the 200m buffer zone will be allowed within the high and medium sensitive areas; • The unnecessary clearance of indigenous vegetation should be avoided as far as possible; • Maintenance should not extend beyond the proposed study site; • Declared alien species should be prevented from occurring on site, as disturbance in natural habitat and compaction of soil usually leads to the establishment of alien plant species; • Construction activities should be restricted to the immediate area of development;	National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) [as amended]	Continuous

screening of coal underground, All infrastructure including External parking, Security and Weigh bridge, Truck Loading area, Internal parking, Silos, stockpiles, sewage treatment plant, scrap yard, offices, crusher and screen plant, medical facility, stores, raw water dam, storage yard and the ventilation shaft, Sub-station and power line, ,Infrastructure area industrial development, Residue stockpiles or deposit areas			• The recommendations of the ecological and botanical specialist studies must be strictly implemented; • Sensitive areas such as obvious wetlands and drainage lines need to be avoided where possible; • Minimising the destruction of or disturbance to vegetation within the proposed area of activity, as well as in the surrounding areas; • Preventing the unnecessary destruction of any natural habitat and animal life within the boundaries of the proposed area of development and adjacent areas; • Avoiding initial construction activity during spring/summer as most birds reproduce and disperse or migrate during this period; • Animals may under no circumstances be handled, removed, killed or interfered with by the Contractor, his employees, his Sub-Contractors or his Sub-contractors' employees. This includes foraging, food and wood collecting outside of the construction site; • Conservation orientated clauses should be built into contracts for construction personnel, complete with penalty clauses for non-compliance; • Measures must be taken to ensure that workers are aware of laws and restrictions governing the hunting, capturing or trapping of animals and should be advised on the penalties associated with the needless destruction of wildlife.		
	Ecological Impacts	Destruction of Vegetation, loss of integrity of vegetation and Spreading of alien invasive species and bush encroachment of indigenous species. Vegetation will be removed during the construction of the roads where they are not situated within agricultural lands. Note that no red data species were identified within the proposed mining area or at the footprint and stockpiling area.	• No clearance of vegetation where the mining will only affect the underground. • No clearance of indigenous vegetation in the 200m buffer zone will be allowed within the high and medium sensitive areas. • The unnecessary clearance of indigenous vegetation should be avoided as far as possible • Maintenance should not extend beyond the proposed study site. • Declared alien species should be prevented from occurring on site, as disturbance in natural habitat and compaction of soil usually leads to the establishment of alien plant species. • Construction activities should be restricted to the immediate area of development; • The recommendations of the ecological and botanical specialist studies must be strictly implemented; • Sensitive areas such as obvious wetlands and drainage lines need to be avoided where possible; • Minimising the destruction of or disturbance to vegetation within the proposed area of activity, as well as in the surrounding areas; • Preventing the unnecessary destruction of any natural habitat and animal life within the boundaries of the proposed area of development and adjacent areas; • Avoiding initial construction activity during spring/summer as most birds reproduce and disperse or migrate during this period; • Animals may under no circumstances be handled, removed, killed or interfered with by the Contractor, his employees, his Sub-Contractors or his Sub-contractors' employees. This includes foraging, food and wood collecting outside of the	• Alien and Invasive Species Management Plan • Rehabilitation Objectives and Standards • Alien and Invasive Species Regulations (Government Notice 598 of 2014) and Alien and Invasive Species List, 2014 in terms of NEMBA (Government Notice 599 of 2014) • Notice 2 • Exempted Alien Species in terms of Section 66 (1) Notice 3 National Lists of Invasive Species in terms of Section 70(1) – List 1, 3-9 & 11 • Notice 4 Prohibited Alien Species in terms of Section 67 (1) – List 1, 3-7, 9-10 & 12	Continuous

			construction site; • Conservation orientated clauses should be built into contracts for construction personnel, complete with penalty clauses for non-compliance; • Measures must be taken to ensure that workers are aware of laws and restrictions governing the hunting, capturing or trapping of animals and should be advised on the penalties associated with the needless destruction of wildlife.		
Storm water management structures, pipelines, berms and water resources diversions, Access and Haul roads, Pipelines, Plant and Other Infrastructure (Overland conveyer removed as alternative), Sewage treatment, Bulk hydrocarbon storage facilities/ Filling station, Shaft development, Mining of coal by underground mining, Crushing and screening of coal underground, All infrastructure including External parking, Security and Weigh bridge, Truck Loading area, Internal parking, Silos, stockpiles, sewage treatment plant, scrap yard, offices, crusher and screen plant, stores, raw water dam, storage yard, Infrastructure area industrial development, Residue stockpiles or deposit areas	Hydrological Aspects; Surface water	Stormwater, erosion and siltation impacts due to a lack of implementing measures to manage stormwater run-off quantity and quality during the operational phase.	• Adhere to WUL issued and approved IWWMP • All openings to the mine need to be sealed or have adequate berms surrounding the openings to prevent surface water entering; In accordance with Government Notice 704 (GN 704), the onsite management should: • Keep clean and dirty water separated; • Contain any dirty water within a system; and • Prevent the contamination of clean water. In order to achieve these objectives, the following stormwater management measures must be implemented on the site to ensure that that potential stormwater impacts are kept to a minimum: • Clean and dirty stormwater needs to be separated. Dirty stormwater may not be released into the environment and should be contained and treated on site; • The operation and maintenance of the stormwater and waste water containment facilities shall be done in accordance with the requirements of the Integrated Water Use License and Integrated Water and Waste Management Plan (IWWMP); • All temporary storm water infrastructure (if any) on-site shall be maintained and kept clean throughout the construction period; • Immediate reporting of any polluting or potentially polluting incidents so that appropriate measures can be implemented; • Fuel and oil spills shall be treated immediately by appropriate mop-up products. Several hydrocarbon absorption/remediation products (i.e. Spill kits) must be placed throughout the site; • Use of bunds or traps to ensure full containment of hydrocarbon and other hazardous materials are mandatory; • Any contaminated material is disposed of in an appropriate manner and the potential risks associated with such spills are limited; • Stormwater leaving the site must in no way be contaminated by any substance, whether such substance is a solid, liquid, vapour or gas or a combination thereof which is produced, used, stored, dumped or spilled on the premises; • All hazardous substances should be stored on impervious surfaces that allow for the containment of spills and leakages (e.g. bunded areas). Should spills occur, these should be reported to the Site Manager. • Liquid hazardous waste shall be contained and stored according to the prescribed measures; • Increased runoff should be managed using berms and other suitable structures as required to ensure flow velocities are	• GNR 704 • Water Use Licence • Groundwater monitoring program	Continuous

			reduced; and • Removal of spills, rainwater and waste produced during clean-up of the bunds – shall be done in accordance to relevant specifications		
	Hydrological Aspects; Surface water	Contamination of stormwater runoff and ground water, caused by: - Sediment release; - Chemicals such as hydrocarbon-based fuels and oils or lubricants spilled from construction vehicles; - Other chemicals from maintenance activities e.g. paints; and - Effluent discharges, due to a lack of stormwater management and system maintenance.	• Ensure that all the dirty water emanating from the dirty water areas be collected via silt traps before entering the PCD for re-use within the mine, to prevent unnecessary discharge into the environment; • The dirty water collection trenches should be cleaned regularly to reduce the build-up of washed off coal fines and ensure they are able to accommodate and convey the 1:50 year peak flows. This material should be disposed to an appropriate licenced facility; • Stockpiling should be monitored so that the side slopes do not encourage erosion of the slopes resulting in silt transported into the trenches from the stockpiles, allowing some silt to settle on the dirty water site rather than in the channels; • In addition to the control of storm water, water quality monitoring should form part of the system where water in the PCD's are monitored for quality. This ensures that pollution sources are monitored during the mining operational process and in the unlikely event of any spillages the downstream impacts can be estimated. Monitor as set out in the WUL and IWWMP; • Dirty water containment facilities should be appropriately lined as per the recommendations of the Waste Classification Study; • The quality of the water discharged from the pit dewatering to the wetland system must be treated prior to discharge to ensure that the quality conforms to the requirements of the catchment RQO.	• GNR 704 • Water Use Licence • Groundwater monitoring program	Continuous
	Hydrological Aspects; Surface water and Groundwater	Impact of Nitrate based explosives used during mining on groundwater quality. Contamination plume can affect the groundwater resource.	• Adhere to all hydrological mitigation measures as prescribed above; • Groundwater levels in the monitoring boreholes should be measured on at least a quarterly interval; • Should the water levels of surrounding users be influenced in terms of groundwater level or quality decline, the users should be compensated; • Monitor groundwater inflow rates on a monthly basis throughout the mining operation; • The groundwater quality in the monitoring boreholes should be analysed on a quarterly basis; • Annual reporting on the groundwater qualities and levels should be conducted and submitted to the DHSWS; • The numerical model should be updated once more time-series monitoring data (water levels and qualities) are available.	• GNR 704 • Water Use Licence • Groundwater monitoring program	Continuous and as needed
Dewatering during the Operational Phase	Hydrological Aspects; Groundwater	Influx of groundwater into incline shaft void The void in the incline will lead to an influx of groundwater into the incline shaft. This will potentially result into dewatering of the surrounding underground aquifers. This will manifest as a groundwater cone of depression in the water table with negative	• Water should be recycled to avoid unnecessary groundwater abstraction; • No mitigation is possible for dewatering as the mine must be kept dry in accordance to safety regulations. Maintenance of water and waste management procedures to avoid contaminant seepage to groundwater; • Install flow meters to monitor the amount of water extracted from underground; • Monitor of groundwater levels quarterly	• GNR 704 • Water Use Licence • Groundwater monitoring program	Continuous and as needed

		consequences of the availability of groundwater for existing borehole users around the proposed incline shafts. The significance is medium due to the duration of the impact throughout the construction and operational phases of the project. Impacts of dewatering on the groundwater aquifer should water be abstracted from ground water during the operational phase.	• Mining should aim to remove as much of the coal seam (acid generating material) as possible; • Should boreholes decrease in yield as a result of the dewatering cone, the mine should supply the owners with a volume of water as agreed upon between the parties involved; • The capacity to rapidly pump water out into storage dams should be maintained. This will assist in minimising water quality deterioration due to long-term retention of storm water in contact with materials that may cause water quality deterioration; • Separate acid generating material and non-acid generating material, as characterised by geochemical sampling and analyses, should be separated during mining; • Concurrent rehabilitation should take place during the operational phase, where applicable, to: • Meet the post-mining topography requirements. • Minimise the post-closure water management requirements, by maximising free-draining areas and minimising contamination of clean water; • The above water management principles should play a key and decisive role when evaluating and deciding on rehabilitation and closure strategies; • Water quantity and quality data should be collected on a regular, ongoing basis during mine operations. These data will be used to recalibrate and update the mine water management model, to prepare monitoring and audit reports, to report to the regulatory authorities against the requirements of the IWWMP and other authorisations and as feedback to stakeholders in the catchment, perhaps via the CMA; • If excessive groundwater recharge and rainfall is encountered other than the predicted volumes the water could be managed as follows: • Manage seepage and rainfall through a collection and storage system. Water stored should be utilised locally for dust suppression, as far as possible. Excess water should be pumped to surface to be incorporated into the mine water balance, • Adhere to the WUL on abstraction volumes authorised and monitoring of these volumes.		
Dewatering during the Operational Phase	Hydrological Aspects; Groundwater	Underground (Lowering of groundwater levels- baseflow to the Vaal River) The mining operation could potentially lower the baseflow of surrounding water to the Vaal River	• Adhere to WUL and allowed abstraction volumes as well as monitoring of water levels and volumes utilised. Monitor as per WUL and IWWMP. • Groundwater monitoring boreholes should be installed to comply with the minimum requirements as set by governmental guidelines; • Monitor static groundwater levels on a quarterly basis in all boreholes within a zone of one kilometre surrounding the mines to ensure that any deviation of the groundwater flow from the idealised predictions is detected in time and can be reacted on appropriately; • If it is proven that dewatering of the mines is impacting on baseflow, various options should be investigated such as if clean discharge is available to be pumped back into the	• GNR 704 • Water Use Licence • Groundwater monitoring program	Continuous and as needed

			surrounding streams/rivers/wetlands. A surface water specialist should be consulted in this regard.		
Storm water management structures, pipelines, berms and water resources diversions, Access and Haul roads, Pipelines, Plant and Other Infrastructure, Sewage treatment, Bulk hydrocarbon storage facilities/ Filling station, Crushing and screening of coal underground, All infrastructure including External parking, Security and Weigh bridge, Truck Loading area, Internal parking, Silos, stockpiles, sewage treatment plant, scrap yard, offices, crusher and screen plant, medical facility, stores, raw water dam, storage yard and the ventilation shaft, Sub-station and power line, ,Infrastructure area industrial development, Residue stockpiles or deposit areas	Hydrological Aspects; Groundwater	The formation of acid mine drainage (AMD) as a result of ingress water and oxygen into the stockpiled overburden The potential impact of seepage water into the shallow weathered aquifer from the overburden stockpile is considered to be moderate. Potential contaminants may seep into the groundwater and could impact on the groundwater usage, which includes domestic and agricultural use. Generally, overburden is considered inert and therefore does not have a great potential for AMD. However, during the removal of the overburden in the construction of the incline shaft, there is the potential to remove some of the coal from the seams. This coal has AMD. The AMD potential of the overburden stockpile is considered moderate in the long term as the overburden will be stockpiled for the LOM. The impact will be limited to the site.	• Optimise storage of mine water make in mined out underground section to minimise exposure to oxygen. • Develop a groundwater monitoring programme in order to assess the groundwater quality. Frequency of monitoring to take place as per the groundwater monitoring plan; • Should pollution be identified within the groundwater resources; the source of the pollutants will be identified and the applicable remediation measures will be implemented; • Potential sealing of areas that have been mined already to fill with water as soon as possible, may decrease the generation of acid. • Any areas of subsidence should be identified together with borehole locations that have been drilled into the underground workings. In the case that these occur they should be filled/closed to minimize surface water ingress to the mine; • Methods of handling the potential decant should be investigated and may include treatment of polluted water; • The groundwater quality in the monitoring boreholes should continue to be analysed on a quarterly interval basis.	• GNR 704 • Water Use Licence • Groundwater monitoring program	Continuous
	Hydrological Aspects; Surface water and Groundwater	Possible Seepage from waste management activities e.g. waste rock dumps, could cause a contamination plume affecting the underground water resources.	• Flow driver impact can be mitigated through replacement/diversion of surface water around infrastructure through diversion berms and drains; • The shaft should be sealed through the weathered material to prevent interflow and groundwater ingress • Adhere to all hydrological mitigation measures as prescribed above; • Storage and classification of hazardous waste to be in accordance with the waste classification and management regulations GNR 634-635; • The appropriate structures (existing structures) be lined with a liner as determined by waste classification; and • Groundwater should be monitored on a quarterly basis to be able to detect any possible pollution caused by the waste management facilities. Should water quality deteriorate, mitigation measures as specified by a specialist shall be implemented; • If it can be proven that the mine is indeed affecting the quantity or quality of groundwater available to certain users, the affected parties should be compensated. This may be done through the installation of additional boreholes for water supply purposes, or an alternative water supply.	• GNR 704 • Water Use Licence • Groundwater monitoring program • Approved IWWMP • Monitoring programme • Spill procedure	Continuous
	Hydrological Aspects; Surface water, Hydropedological and Groundwater	Wetland Impacts - Artificial wetland created by Agricultural activities	• A temporary fence or demarcation must be erected around No-Go Areas outside the proposed works area prior to any construction taking place as part of the contractor planning phase when compiling work method statements to prevent access to the adjacent portions of the watercourse; • Effective stormwater management should be a priority during both construction and operational phase. This should be monitored as part of the EMP;	• GNR 704 • Water Use Licence • Groundwater monitoring program • Approved IWWMP • Monitoring programme • Spill procedure	Continuous

			• High energy stormwater input into the downstream watercourses should be prevented at all cost. Changes to natural flow of water (surface water as well as water flowing within the soil profile) should be taken into account during the design phase and mitigated effectively; • Underground mining will be on average 80 m below surface and the industry norms will be applied for safety factors on pillars to minimize subsidence; • Consider the various methods and equipment available and select whichever method(s) that will have the least impact on watercourses; • Water may seep into trenching and earthworks. It is likely that water will be contaminated within these earthworks and should thus be cleaned or dissipated into a structure that allows for additional sediment input and slows down the velocity of the water thus reducing the risk of erosion. Effective sediment traps should be installed; • Construction in and around watercourses must be restricted to the dryer winter months where possible; • Retain vegetation and soil in position for as long as possible, removing it immediately ahead of construction / earthworks in that area (DWAF, 2005); • Remove only the vegetation where essential for construction and do not allow any disturbance to the adjoining natural vegetation cover; • Rehabilitation plans must be submitted and approved for rehabilitation of damage during construction and that plan must be implemented immediately upon completion of construction; • Cordon off areas that are under rehabilitation as no-go areas using danger tape and steel droppers; • During the construction phase measures must be put in place to control the flow of excess water so that it does not impact on the surface vegetation; • Protect all areas susceptible to erosion and ensure that there is no undue soil erosion resultant from activities within and adjacent to the construction camp and work areas; • Runoff from the construction area must be managed to avoid erosion and pollution problems; • Implementation of best management practices • Monitoring should be done to ensure that sediment pollution is timeously dressed; • Retain vegetation and soil in position for as long as possible, removing it immediately ahead of construction / earthworks in that area and returning it where possible afterwards; • Monitor the establishment of alien invasive species within the areas affected by the construction and maintenance and take immediate corrective action where invasive species are observed to establish; • Rehabilitate or revegetate disturbed areas; • Confirm the persistence of wetland function and revise impact scores if appropriate; • Where construction occurs in the demarcated watercourse and buffer, extra precautions should be implemented to so as to minimise watercourse loss and impacts to downstream wetland		

			areas; • Other than approved and authorized structures, no other development or maintenance infrastructure is allowed within the delineated watercourse or associated buffer zones; • Monitor the establishment of alien invasive species within the areas affected by the construction and take immediate corrective action where invasive species are observed to establish; • Provision of adequate sanitation facilities located outside of the watercourse or its associated buffer zone during the construction phase; • Implementation of appropriate stormwater management around the excavation to prevent the ingress of run-off into the excavation and to prevent contaminated runoff into the watercourse; • The development footprint must be fenced off from the watercourses and no related impacts may be allowed into the watercourse e.g. water runoff from cleaning of equipment, vehicle access etc.; • Manage the dispersal of coal dust to ensure that surrounding watercourses are not negatively affected; • After construction, the land must be cleared of rubbish, surplus materials, and equipment, and all parts of the land shall be left in a condition as close as possible to that prior to use; • Maintenance of construction vehicles / equipment should not take place within the watercourse or watercourse buffer; • Control of waste discharges and do not allow dirty water from operational activities to enter the watercourse; • Regular independent water quality monitoring should form part of operational procedures in order to identify pollution; • Treatment of pollution identified should be prioritized accordingly.		
Access and Haul roads, Plant and Other Infrastructure, Crushing and screening, All infrastructure including External parking, Security and Weigh bridge, Truck Loading area, Internal parking, Silos, stockpiles, sewage treatment plant, scrap yard, offices, crusher and screen plant, medical facility, stores, raw water dam, storage yard and the ventilation shaft, Infrastructure area industrial development, Residue stockpiles or deposit areas	Air Quality	Increased windborne dust (soil and ore fines), vehicle fumes and particulate matter PM10, altering air quality.	Adhere to previous dust mitigation measures as prescribed.	Refer above	Continuous
	Air Quality	Increased dust pollution (soil and ore fines), vehicles on gravel roads and transport of RoM	• Implement a primary underground screening and crushing plant; • Dust can be reduced by providing a controlled fine water spray system that directs water onto the input material before it enters the crusher (be careful not to over water as this can cause further problems down the production process) Adhere to dust mitigation measures as prescribed. It is recommended that ambient air quality monitoring be established to get a baseline condition prior to the onset of the operations and in order to establish the level at which the proposed operations are noted to impact on the ambient air quality; - Fallout monitoring should be continued for the life of mine to better assess the level of nuisance dust associated with both mining and process related operations. Sampling of fallout should be undertaken within the neighbouring areas as well as on-site. Dust fallout monitoring is recommended at the locations as shown in the monitoring framework:	Refer above	Continuous

			- PM10 and PM2.5 dust monitoring must also be undertaken at the same sites as mentioned under the previous bullet but also in and around potential fugitive emission sources to determine mitigation measures and focus management efforts. - Further mitigation measures that should be applied, if it is found that dust and PM10 levels are measured to be exceeding the limits are: - The impacts from dust fallout and Particulate matter can be reduced by implementing dust control measures.		
	Air Quality	Emissions by means of crushing and screening In this activity, the use of the primary and secondary crusher and discard handling are the most likely to have implications on ambient air quality. The crushing process releases fugitive dust, especially if there are no enclosure and water sprays. Dust contained within the RoM ore can be released into the atmosphere during this process i.e. fugitive dust (containing TSP, as well as PM10 and PM2.5). Wind erosion from stockpiles can be a perennial source of dust if not properly managed during and post mining operations. The plant, crushing and screening areas all have the potential to generate dust and therefore specific mitigation measures can be assigned to each of these activities.	• Implement a primary underground screening and crushing plant • Dust can be reduced by providing a controlled fine water spray system that directs water onto the input material before it enters the crusher (be careful not to over water as this can cause further problems down the production process) • Adhere to dust mitigation measures as prescribed. It is recommended that ambient air quality monitoring be established to get a baseline condition prior to the onset of the operations and in order to establish the level at which the proposed operations are noted to impact on the ambient air quality.	Refer above	Continuous
Access and Haul roads, Plant and Other Infrastructure, Shaft development, Mining of coal by underground mining, Crushing and screening of coal, All infrastructure including External parking, Security and Weigh bridge, Truck Loading area, Internal parking, Silos, stockpiles, sewage treatment plant, scrap yard, offices, crusher and screen plant, medical facility, stores, raw water dam, storage yard and the ventilation shaft, Sub-station and power line, Infrastructure area industrial development.	Noise and Lighting	Nuisance and health risks caused by an increase in the ambient noise level as a result of noise impacts associated with the operation of the mining activities and processing.	• Pre-planning phase mitigation as discussed in the operational phase impact assessment options are adhered to; • Communication between the receptors and the developer need to be implemented and maintained; • Ensuring that equipment is well maintained and fitted with the correct and appropriate noise abatement measures. Acoustical mufflers (or silencers) should be considered on equipment exhausts. A noise absorption braid could be mounted on the front of heavy equipment radiators (ADT's, FEL's etc.) to prevent excess mechanical fan noise into the surrounding environment. Engine bay covers over heavy equipment could be pre-fitted with sound absorbing material. Heavy equipment that fully encloses the engine bay should be considered, ensuring that the seam gap between the hood and vehicle body is minimised.	• Blasting Regulations • Vibration management plan as well as Noise Management and Monitoring Programme	Continuous
	Noise and Lighting	Nuisance and health risks caused to close by receptors as identified in specialist report	• The underground ventilation must not face any receptors that are within 750m. The buffer of 750m; • It is highly recommended that the shaft is not facing upwards (skywards). Certain metrological conditions (particularly during night-times) can see refraction of noise over the wall due to the various temperature inversion layers. This means that noise levels from the source may propagate back down to the ground at a receptors' dwelling due to the curvature of sound in the warmer upper night-time atmosphere. Placing the ventilation shaft upwards may allow for this propagation;	• Blasting Regulations • Vibration management plan as well as Noise Management and Monitoring Programme	Continuous

			• A stack silencer should be implemented (e.g. a stack silencer liner inside the stack); • A berm/acoustical barrier need to be implemented around the ventilation stack (areas facing southern receptors NSD02, NSD03, NSD04, NSD05, NSD06) and the wash plant (areas facing NSD06 and NSD07). The following must be considered to ensure the wall acts as an affective acoustical screen: • Walls/berms/barriers to be built as close as feasibly possible to the stack; • The height of the barrier is at least 2 - 3 m higher than the line of sight to the top of the stack and in relation to receptors NSD02 – NSD05, although the higher the berm/barrier the better acoustical screen tool it will be37. Barriers must also be sufficiently dense (at least 10 kg/m2) 38 and sufficient in thickness. A brick wall provides a surface density of 244 kg/m2 at thickness of 150 mm39 and is considered as a typically good acoustical barrier; • The wall should be sufficiently long to block the line of sight from receptors to the sides of the stack; and • No apertures (gaps, entrances) should be implemented at walls; • A quarterly Acoustical Measurement & Audit Programme is recommended to be implemented and conducted prior to construction phase (to improve the characterisation of the baseline) and during all phases (up till end of closure); • The wash plant would require being in an enclosure (building, housing unit). The housing unit should not have any openings (windows or doorways) facing NSD06 and NSD07. Any ventilation exhaust fans etc. on the outside façade of this unit wash unit should face away from NSD06 and NSD07; • Berms on the edge of the stockpiles should be implemented (ensuring the height is higher than the highest noise source on the stockpile).		
	Noise and Lighting	Noise impact that would only manifest in the operational phase but that can be avoided in the construction phase by implementation of measures in construction of ventilation shafts. Impacts of noise need to be controlled by means of berms and shielding structures. The recommendations made by the Noise Impact Assessment are with the assumption that sensitive receptors within 750m of the site will not relocate. If relocation of these receptors would be an option, the recommendations would have to be altered.	• All vehicles should be regularly serviced and maintained and kept in a good running condition; and • Adequate planning practices should be implemented to avoid any unnecessary trips made by heavy vehicles.	Refer above	Continuous
	Noise and Lighting	Impact of security lighting on surrounding landowners and animals.	• Unnecessary lights should be switched off during the day and / or night to avoid light pollution; • If lighting is required, the lighting will be located in such a place and such a manner so as to minimise any impact on the surround community; and	Refer above	Continuous

			• Security lighting should be designed in such a way as to minimise emissions onto undisturbed areas on site and neighbouring properties. Light fittings should face downwards.		
All Activities	Sites of archaeological and cultural interests	Construction activities have the potential to impact the historical structures. A marked grave is located within the infrastructure area.	• Other than the above no other visible restrictions or negative impacts in terms of heritage associated with the study area could be found; • If any structures older than 60 years are in future earmarked for demolition a Section 34 Application in terms of Act 25 of 1999 (National Heritage Resources Act) must be submitted to the relevant heritage authority; • It is recommended that the graves situated on the site earmarked for the proposed planned development are conserved in situ. If the proposed outlay for the planned infrastructure cannot be altered the necessary processes and procedures with regard to exhumation and relocation of graves must be followed; • The discovery of subsurface archaeological and/or historical material as well as graves must be taken into account in the Environmental Management Programme.	National Heritage Resources Act, 1999 (Act No. 25 of 1999)	Continuous
All Activities	Visual aspects	Potential visual impact on the viewpoints that had a visual exposure rating of 5 or higher. The operational impact on the surrounding agricultural farmers and land users will be more significant, due to the visual intrusion and activities being undertaken. Although the mine activities will not be visible since it will all be underground, the stockpiles, waste rock dumps and related surface infrastructure will be visible for the entire life of mine.	• The visual impact can be minimized by the creation of a visual barrier. The area will be rehabilitated after mining is concluded and thus the visual impact will be removed and the area will be restored. In addition the following measures are recommended: - Plant some indigenous trees to create a barrier between the neighbours and roads; - Dust from Stockpile areas, roads and other activities must be managed by means of dust suppression to prevent excessive dust; - A wind barrier system that encloses the stockpiles; - Rehabilitation of the area must be done once mining is completed.	Final Land form and Mine Rehabilitation Plans as approved.	Continuous
Storm water management structures, pipelines, berms and water resources diversions, Access and Haul roads, Pipelines, Plant and Other Infrastructure (Overland conveyer removed as alternative), Sewage treatment, Bulk hydrocarbon storage facilities/ Filling station, Shaft development, Mining of coal by underground mining, Crushing and screening of coal underground, All infrastructure including External parking, Security and Weigh bridge, Truck Loading area, Internal parking, Silos, stockpiles, sewage treatment plant, scrap yard, offices, crusher	Waste	Generation and disposal of general waste, litter and hazardous material during the construction and operational phase	• Adhere to rehabilitation and Closure plans. After the plans are approved by the competent authority, they will be implemented. Monitoring and modelling of the groundwater will continue until a closure certificate is issued; Ensure that a WML is applied for based on the relevant activities requiring a Waste Management License; Appoint a suitable waste contractor, which will remove waste timeously and properly dispose of the waste; • The closure strategy will be re-assessed to determine containment, treatment and/or re-use options through the monitoring and calibration of the groundwater model during the operational phase.	Waste Regulations (NEM:WA) National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) [as amended]	Continuous

and screen plant, medical facility, stores, raw water dam, storage yard and the ventilation shaft, Sub-station and power line, Infrastructure area industrial development, Residue stockpiles or deposit areas					
Sewage treatment Bulk hydrocarbon storage facilities/ Filling station, sewage treatment plant, Residue stockpiles or deposit areas	Waste (Including Hazardous Waste)	Generation and disposal of additional hazardous operational waste i.e. Residue Stockpiles, etc.	• Access to the mining area and waste management facilities to be restricted; • Professional engineers will undertake monitoring of the stability of the mine residue deposits; Adhere to Waste Management License, specifically conditions specified; Record disposal amounts, Keep Material Data Sheets; Adhere to the National Environmental Management: Waste Act (NEM:WA). Adhere to all measures prescribed to prevent Decant and Acid Mine Drainage).	Waste Regulations (NEM:WA); WUL, IWWMP	Continuous
Storm water management structures, pipelines, berms and water resources diversions, Access and Haul roads, Pipelines, Plant and Other Infrastructure (Overland conveyer removed as alternative), Sewage treatment, Bulk hydrocarbon storage facilities/ Filling station, Shaft development, Mining of coal by underground mining, Crushing and screening of coal underground, All infrastructure including External parking, Security and Weigh bridge, Truck Loading area, Internal parking, Silos, stockpiles, sewage treatment plant, scrap yard, offices, crusher and screen plant, medical facility, stores, raw water dam, storage yard and the ventilation shaft, Sub-station and power line, ,Infrastructure area industrial development, Residue stockpiles or deposit areas	Services	Need for services e.g. water, electricity and sewerage systems, causing additional strain on natural resources and service infrastructure.	• Energy savings measures to be implemented at the mine, e.g.: No lights to be switched on unnecessarily. Only security lights to be switched on at night; • Energy saving bulbs to be installed; and • Water should be recycled as far as possible to avoid any additional water usage. Sewerage system should be managed in accordance with WUL/WML and services regularly by a suitably qualified Contractor.	N/A. Municipal regulations if required	As needed
Access and Haul roads, External parking, Security and Weigh bridge, Truck Loading area, Internal parking.	Traffic	The change in the traffic patterns as a result of increased traffic entering and exiting the operations on the surrounding road infrastructure and existing traffic. Impacts on road infrastructure	• Where feasible heavy vehicles should not operate on public roads during peak hours; • Heavy vehicles should adhere to the speed limit of the road; • Communicate with the local Municipality with regards to potholes and possible repairs to the road surfaces that might be	Traffic Management Plan	Continuous

		Structural maintenance work on the R716 was completed recently and an increase in the size and frequency of large construction vehicles and trucks could potentially damage the road surface. Financial impacts could manifest for the local Municipality in terms of road maintenance. Safety and financial impacts are possible for road users should private vehicles be damaged or accidents occur.	required; • Compile a Traffic Management Plan when Construction is implemented to ensure safety and proper management of traffic associated with the Colliery		
	Traffic	Nuisance, health and safety risks caused by increased traffic on an adjacent to the study area including cars and heavy vehicles.	• Drivers will be enforced to keep to set speed limits. • Trucks will be in a road-worthy condition. • Roads and intersections will be signposted clearly. • Only main roads should be used; • Where feasible vehicles should not operate on public roads during peak hours; • Vehicles should adhere to the speed limit of the road; • Heavy vehicles should always travel with their head lights switched on; • Heavy vehicles should not stop on the road to pick up hitchhikers No stopping on the road approaching the mine will be allowed; • Single directional traffic shall be controlled through a stop-go system or any other appropriate traffic control method; • The mine shall be responsible for ensuring that suitable access is maintained for public traffic to all relevant businesses and properties; and • All traffic accommodation measures are to conform to the latest edition of the South African Road Signs Manual.	Refer above	Continuous
Activities as mentioned above (No activity is found within 100 m of the SASOL pipelines).	Health and Safety - Sasol Pipelines	Possibility of impacts to the Sasol Pipeline and Dangers associated with impacts to these structures	• Monitor general condition of surface, rehabilitate. Provide SASOL access to their pipelines at all times during the development to ensure proper maintenance and monitoring. Prevent all impacts during all stages of the development; • Extinguishers should be located outside hazardous materials and chemicals storage containers; Fire response and evacuation: • An Emergency Plan (including Fire Protection, Response and Evacuation Plan) is to be prepared by the Applicant and conveyed to all staff on the site; and • Identify major risks to minimise the environmental impacts e.g. air pollution and contaminated effluent runoff. Adhere to all measures as specified in the Risk Assessment to ensure no harm befalls on the pipeline, refer to Section 10,20 of this Report.	Health and Safety Regulations as described in the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) [as amended], MHSA for the SASOL pipeline specifically.	Continuous
Storm water management structures, pipelines, berms and water resources diversions, Access and Haul roads, Pipelines, Plant and Other Infrastructure (Overland conveyer removed as alternative),	Health and Safety	Increased risk to public health and safety: Dangerous areas including the waste management activities and waste poses health risks and possible loss of life to mine workers and visitors to the site. Health and safety risks for workers Inadequate management of the construction process and general	• A health and safety plan in terms of the Mine Health and Safety Act (Act 29 of 1996) should be drawn up and implemented to ensure worker safety; • A health and safety control officer should monitor the implementation of the health and safety plan for the operational phase; • Regular health and safety audits should be conducted and documented; and a record of health and safety incidents should	Refer above	Continuous

Sewage treatment, Bulk hydrocarbon storage facilities/ Filling station, Shaft development, Mining of coal by underground mining, Crushing and screening of coal underground, All infrastructure including External parking, Security and Weigh bridge, Truck Loading area, Internal parking, Silos, stockpiles, sewage treatment plant, scrap yard, offices, crusher and screen plant, medical facility, stores, raw water dam, storage yard and the ventilation shaft, Sub-station and power line, Infrastructure area industrial development, Residue stockpiles or deposit areas		construction related activities could result in health and safety risks for workers, manifesting in the following ways: Construction related accidents due to structural safety of project infrastructure. The excavation of the shaft will result in the formation of topographical voids, which may be a safety risk to the employees, livestock and neighbouring landowners. • Dust generation and air pollution resulting in respiratory diseases. • High ambient noise levels caused by machinery and construction equipment resulting in health issues for workers. • Poor management of the construction process resulting in pollution problems (e.g. insufficient sanitation facilities, littering and refuse), flies rodents and pests and possible contamination of water sources. • Unsafe and insufficient drinking water. • An increase in HIV/AIDS and other STDs due to prostitution activities and temporary sexual relationships with local women, unwanted pregnancies that place further pressure on Basic Health Care Services. • Dehydration and sunburn, as high temperatures could be experienced during summer months.	be kept on site and made available for inspection; • Any health and safety incidents should be reported to the Site Manager (SM) immediately; • First aid facilities should be available on site at all times; • Workers have the right to refuse work in unsafe conditions; • Material stockpiles or stacks should be stable and well secured to avoid collapse and possible injury to site workers; • Implement measures to suppress dust - spraying of gravel roads, surfaces and stock piles with water on a regular basis; • Construction workers to wear protective clothing (e.g. masks that minimize dust inhalation and clothing that protects against sunburn); • Enforce the use of earplugs where relevant; • Lock away dangerous plant, equipment and material when not supervised or in use; • Dispose of the various types of waste generated in the appropriate manner at licensed waste fill sites at regular intervals; • Provide safe and clean drinking water and instil regular water breaks to keep workers hydrated; • Provide sufficient ablution facilities (chemical/portable toilets, etc.) at strategic locations that are cleaned regularly; • Keep the local police and ambulance services informed of construction times and progress; • Ensure that the Colliery has an ambulance that remains on stand-by for the duration of the project. • Store any materials away from sensitive locations in fenced-off areas; • Accommodation and facilities of security guards and any other personnel that may stay on site should comply with health and safety standards; • Inform the Municipality and emergency services if harmful substances are spilled; • Erect a safety fence around the shaft complex and construct relevant reinforcements to ensure slope stability; • Utilise and increase existing mine security and procedures and 24-hour security in and around the mining area; • Fence off the construction site where possible to avoid illegal trespassing. Close off any excavation areas to prevent access.		
	Health and Safety	Increased risk to public and worker health and safety	• Adhere to mitigation measures as prescribed for Health and Safety Impacts above. • Prevent security risk by having open communication with the local neighbourhood watch and the extensive security network; • Adhere to Safety measures for the SASOL pipeline to ensure no harm befalls the pipeline.	Refer above	Continuous
Storm water management structures, pipelines, berms and water resources diversions, Access and Haul roads, Pipelines, Plant and Other Infrastructure (Overland conveyer removed as alternative), Sewage treatment, Bulk	Socio-Economic	Socio-economic impact on farmers, labourers and surrounding landowners and residents due to negative impacts on groundwater, dust pollution, noise pollution etc.	Refer to the above-mentioned mitigation measures for noise, dust and other environmental impacts.	N/A	Continuous
	Socio-Economic	Socio-economic impact on farmers, labourers and surrounding landowners specifically the close-by receptors,	Refer to the above-mentioned mitigation measures for noise, dust and other environmental impacts. Many Appeals were received, but the Minister have already made a decision regarding the aspects submitted for consideration. Ergosat	N/A	Continuous

hydrocarbon storage facilities/ Filling station, Shaft development, Mining of coal by underground mining, Crushing and screening of coal underground, All infrastructure including External parking, Security and Weigh bridge, Truck Loading area, Internal parking, Silos, stockpiles, sewage treatment plant, scrap yard, offices, crusher and screen plant, medical facility, stores, raw water dam, storage yard and the ventilation shaft, Sub-station and power line, ,Infrastructure area industrial development, Residue stockpiles or deposit areas		specifically in terms of attitude against the mine	should prevent any impacts as far as possible and where reasonably possible to the surrounding land owners and the environment during all phases of the development.		
	Socio-Economic: **Positive Impacts**	Extended employment provision due to the implementation of the extension of the mining activities, allowing mining activities to continue for additional years.	• Increased Employment Opportunities in the Long term, Increased employment for the surrounding communities mostly employed by farming activities. • Implementation of the Social and Labour Plan • Implement Social and Labour Plan with the specific objectives: • To ensure effective transformation as envisaged in the Minerals and Petroleum Resources Development Act (28/2002) the Regulations, and the Mining Charter • To promote fair and equitable employment practices as prescribed in the Employment Equity Act (55/1998) • The social and economic advancement of the community influenced and affected by Ergosat (Pty) Ltd • The positively strive towards equitable practices in accordance with the procurement plan.	N/A	Continuous
	Socio-Economic: **Positive Impacts**	Employment at the Colliery The mine will employ and estimated 530 permanent employees, with skills levels that vary from skilled, semi-skilled to unskilled. Approximately 100 of the employees will be unskilled and illiterate and for all employees individual training and skills development plans will be implemented in alignment with career progression. Skilled employment will include managerial positions, Planners, Environmental and other Specialists, Geologists, administrative and financial personnel, certain Operators, Engineers, Boilermakers and so forth. Semi-skilled positions relate to Foreman positions and Operators such as Diesel Attendants, whereas unskilled positions are usually associated with manual labour (underground miners, gardeners, etc.). It is anticipated that the majority of the positions could be filled by locals from the Municipal area as mining and industrial related skills should be available in the Sasolburg/Vereeniging region. Locals closer to the project site (Deneysville, Refengkgotso, etc.) would in all likelihood expect to be considered especially for unskilled and semi-skilled positions. Tertiary education levels in Ward 19 are much lower than in Ward 18 and in the broader municipal area (Ward 18: 23%; Ward 19: 2%; Metsimaholo: 9%) In addition to permanent positions, temporary employment and contractors could be added. Temporary employment	• Targets for the mining operation for BEE spend are set by the Department of Mineral Resources (DMRE) in the Mining Charter. Implementation of the SCMP will ensure that local economic benefits are maximised and the social performance of Contractors (local employment, local procurement targets, skills development, etc.) are managed through the CSMP; • Should Contractors not comply with the social management plan that was submitted or the KPIs (breach of contract), the contract may be terminated. • Local employment is once again emphasised and workers that reside closest to the mining area should first be considered for employment; • Establish a labour desk in collaboration with the Ward Councillor and local Municipality to determine the skills that are available locally before considering “outsiders”.	N/A	Continuous

		would include: • Cleaning and maintenance of the conveyor belts, the V drains and culverts; • Cutting and clearing of vegetation within the used mine servitudes; • Maintenance of firebreaks; • Maintenance of gravel roads, regular grading and watering to suppress dust; • Repairing of fences as required; • Repair and maintenance of buried and surface pipelines in the servitudes, various valves, etc.; • Regular cleaning of silt traps drying bed, oil traps and the dirty water dams; etc.			
	Socio-Economic: **Positive Impacts**	Impacts on procurement / supporting industries / local SMME's The Mining Charter sets BEE compliance guidelines and as such Lefa Colliery will have to procure all products and/or services from BEE compliant outlets. In order to ensure and promote the procurement of products and/or services from SMMEs who are BEE compliant as well as black owned and/or black empowered, strategies are identified in the Colliery's SLP. It is expected that the majority of goods and services will be available locally from within the Municipal area. Supporting industries, local SMME's and contractors include: • Contractors to transport and dispose of domestic and industrial waste; • Equipment cleaning (trucks, conveyors, belt); • Maintenance and repairs of infrastructure, roads, etc.; • Operation of tuck shops; • Laundry and catering services; • Gardening; • Security; etc.	• Establish a labour desk in collaboration with the Ward Councillor and local Municipality to determine the skills that are available locally before considering "outsiders".	N/A	Continuous
	Socio-Economic	Impacts on current NON-MINING RELATED employment levels of the area The proposed Colliery is an underground operation and current land uses will to a large extent be unaffected. However, should negative impacts usually associated with coal mining (impacts on water resources, air/dust pollution, crime, etc.) manifest and affect current land uses (farming ventures, local businesses) to such an extent that existing operations cease or are downscaled, then job losses would be inevitable. It was not at this	• Implement the 'Groundwater Management Strategy' and any recommendation made as part of the Geohydrological Report. • Test boreholes on all affected private properties at regular intervals, make the results known to the property owners and keep record of test results. • Establish an Environmental Forum represented by land owners, the mine operator and independent specialists and conduct quarterly meetings where issues relating to the environment and water pollution can be discussed.	N/A	Continuous

		stage possible to determine the existing employment numbers within the study area and the extent of potential job losses, should it occur, is not known.			
	Socio-Economic	Impacts on land values / market values of affected land portions A variety of factors could impact land values of affected land portions and include: • The availability and quality of ground and/or surface water for domestic and farming purposes; • Intrusion impacts, such as noise and dust, which could have an impact on crops, livestock and infrastructure; • Occurrence of criminal activities (theft, vandalism, etc.); • Occurrence of informal settlements, trespassing on private land, illegal grazing practices; and • Restrictions that are set by the mining company for future infrastructure developments on private properties due to underground mining operations, safety issues, and so forth. Although a mining right has not been awarded yet, the proposed Lefa Colliery has already impacted on sales of properties in the area. Willow Creek Estate is marketed and promoted as a pristine residential estate with access to clean surface and groundwater resources. Large infrastructure investments have been made (R21 million in 2006 for reservoirs, roads, fencing, engineering services and so forth). The proposed Lefa Colliery (with the associated impacts of a coal mine) has the potential to negatively impact the 'sense of place' as well as natural resources of the area and as a consequence property values and sales at the estate could decline. Uncertainty with regards to the Lefa Colliery development and the timeframes associated with the awarding of a mining right exacerbates this impact. Should the mining right not be awarded, or the mine not be developed, potential impacts on land values would already have manifested. Financial impacts for Willow Creek Estate are also anticipated, as incomes derived through sales and levies have already been affected.	• Should boreholes be affected, implementing an Action Plan that will ensure that clean water (on-tap) is available to all the affected land owners without disruptions; • Ensure that all affected landowners are familiar with the procedure to lodge complaints and attend to the issues at hand expediently. Update affected landowners of new developments and attempt to communicate with them directly by minimising the use of Consultants for this purpose; • Monitoring programmes for groundwater need to be implemented and if ground water quality or quantity is affected, water will need to be supplies by the mine for use by users affected; • Communication and further consultation to be initiated with surrounding landowners regarding the way forward. No commitments for indirect impacts can be made that is not already included in the mitigation strategies of environmental specialist reports such as visual, noise, air quality and ground water, and as adopted into the EMPr; • Communication with the landowner and affected parties of Willow Creek to ensure a process where issues can be discussed in terms of impacts that the proposed mine will have on Willow Creek.	N/A	Continuous

		It is furthermore possible that impacts on groundwater, if it occurs, will affect farmland as well as the Vaal Power Smallholding's property prices negatively, as they rely on groundwater for domestic and agricultural purposes and would be less marketable without this resource.			
	Socio-Economic: **Positive Impacts**	Impacts on tourism activities Existing tourism activities and holiday accommodation towards Deneysville, the Vaal Dam and Vaal River could negatively be impacted if the aesthetic environment and 'sense of place' is affected to such an extent that tourists are discouraged to frequent the area. Since the mine is an underground operation it is not likely that current or future tourism activities will be affected significantly as a direct result of the mine development. However, the possible negative spin-offs of a coal mine (groundwater pollution, etc.) could affect the sale of properties along the Vaal River, and subsequently impact on leisure activities. Visual impacts of the shaft complex's current locality will manifest for road users on their way to the Dam, but the complex would in all likelihood not be visible from the Dam and its surrounds. Visual impacts are being assessed by a Specialist in this field.	• Implement measures (planting of trees, covering of stockpiles, etc.) to reduce visual impacts from the R716 for road users and tourists.	N/A	Continuous
	Socio-Economic: **Positive Impacts**	Skills development, training and skills equity A 'Skills, training and development Policy and Plan' has been drawn up with the purpose to provide guidelines for the implementation and maintenance of comprehensive training and development strategies and procedures. Annual monitoring is done by the DMRE. Funds for Human Resource Development for individual career development and in-service training are provided. Training includes ABET to illiterate employees, learnerships registered with the Department of Labour, internal and external bursaries and internships to be provided in accordance the Mining Charter guidelines. Management will be responsible to develop career development and succession plans and to assess the potential of employees and establish a career path for each to ensure	• Do a skills analysis of the local community members in collaboration with the local Municipality and Ward Councillor to ensure that locals are considered for employment and training; • Take locals from Deneysville, Refengkgotso and settlements close to the project site into consideration for all potential training opportunities. • Engage continuously with all stakeholders on employment and training opportunities should they arise. This will also form part of the overall Lefa Colliery 'Stakeholder Engagement Plan', SLP and the 'Socio-economic Assessment Tool', which will be managed by Lefa Colliery; • Legislation stipulates that specific levels of training and skills are required to work for a mine. Only if skills are not available locally (nearby settlements and local Municipal area) will personnel be sourced elsewhere.	N/A	Continuous

		the development of each employee. Lefa Colliery aims to exceed the compliance targets set by DMRE for HDSA employment and the full staff compliment will reflect as follows by the end of 2021: • Top Management: 50% White; 50% Black • Senior Management: 40% White; 60% Black • Middle Management: 29% White; 71% Black • Junior Management: 11% White; 89% Black • Women in Core Activities: 12%			
	Socio-Economic: **Positive Impacts**	Impacts on the local community / community projects As part of a mine's Social and Economic Development responsibility, the mine must get involved with a relevant Local Economic Development Projects as identified in the IDP of a municipality. Lefa Colliery is however not in the position to get involved with the day-to-day running of a LED project, but will make a financial contribution of R1 100 000 annually towards a project of the municipality's choice, over a period of 5 year	• Set aside a Corporate Social Investment (CSI) budget for smaller ad-hoc community requested projects should individual community members require funding/loans to start-up small businesses, etc.; • In order to address the housing shortages, Lefa Colliery has committed itself to pay a housing subsidy of R2400 per month to each bona fide worker. This subsidy will be payed to each worker over and above his/her salary. The workers can decide upon their own housing needs and preferences. This subsidy will be allocated to each worker without any discriminatory conditions (Lefa Colliery SLP, June 2017; Ref. No. 10033).	N/A	Continuous
	Socio-Economic	Impacts of an 'outside' workforce / migrant labourers The Mining Charter requires that the majority of permanent employees be sourced from the "local" area. Local employees are in turn defined as people that originate/live within a 50 km radius of the project site. In terms of the Lefa Colliery this would also include people from outside the Metsimaholo Local Municipal area and would include people from as far as Vereeniging, Parys and the Gauteng province. This definition of a local workforce could thus be in conflict with the perception of a "local workforce" as seen by people living in close proximity to the Colliery. Locals could thus perceive "outsiders" as stealing employment opportunities that should be reserved for them. Negative impacts that can manifest as a result of a migrant and/or "outside" workforce include: • Impacts on population changes, as the 'outside' / migrant workforce impacts on the population size, gender, racial and	• Lefa Colliery must commit to work with the Ward Councillors and Local Municipality to establish the skills database and to set up a labour desk to source local workers as far as possible; • Only if skills are not available locally should outsiders be considered; • Define the definition of a "local workforce" and communicate this and the skills requirements to the local communities. Work with the local Municipality and Councillors to ensure that no unrealistic job expectations are created.	N/A	Continuous

		age composition of the local and regional Municipalities; • Additional pressure on local government for housing and associated infrastructure and services if workers are retrenched and unemployed; • A rise in the number and size of informal settlements if workers are retrenched; Impacts on the HIV/AIDS prevalence rate, unwanted pregnancies and the subsequent pressure on health care services, if short-term relations were established with local women and the migrants return to their families in the sending areas; • An increase in unemployment placing pressure on the Local Municipality to provide jobs if the workers are retrenched; and • Safety and security issues for the surrounding communities due to a growth in the number of unemployed people.			
	Socio-Economic	Impacts associated with blasting Blasting operations and the associated ground vibrations have the potential to affect structures in the study area, such as dams and houses, resulting in unnecessary reparation costs for private landowners.	• The potential impact of blasting activities on community infrastructure is rated as insignificant as it is unlikely to occur; • Should blasting take place, inform landowners of the blasting schedule and limit blasting to daytime hours. Undertake a full risk assessment in order to address the aspects and to put proper controls in place.	N/A	Continuous
Activities as mentioned above	SASOL Pipeline Impacts - Independently Assessed (Specialist Risk Assessment Conducted)	Impact on the Sasol gas pipeline and servitude There is an existing gas pipeline and servitude that traverses the proposed mining area and concerns have been raised that the mining activities would encroach the buffers required for the servitude area. As far as could be established a Sasol representative has been included in the consultation process. The extent of the impact, if it should occur, has not been established at this stage.	• Keep Sasol informed about the mining schedule and mine plan and ensure that servitudes and buffers are not encroached. <u>Pillar Stability:</u> • Ensure to design pillars according to the guidelines set apart for South African Coal mines for the protection of surface structures. • Pillar safety factor calculations must be conducted according to site specific formulas such as the Vaal Basin Strength Formula. • Ensure that pillars below surface structures are designed with increased safety factors which considers the life of the pillar. • Adhere to the shallow mining guidelines set apart by the Chamber of Mines Research organization. • Ensure to monitor pillar stability underground, if needed reassess the pillar design (re-design). • Ensure that rock engineering principles to ensure surface stability are incorporated in the pillar design. • Ensure rock engineering involvement throughout the mining process. • Do not conduct any form of pillar extraction or higher percentage extraction in areas where the protection of the surface is vital without a written investigation from the rock	N/A	Continuous

			engineering practitioner which ensures surface stability. <u>Roof Stability:</u> • Ensure that the bord widths and intersection diagonal distances are designed according to the site-specific strength parameters of the immediate roof strata. • Ensure to support in time according to a site-specific support design. • Ensure to mine according to the designed maximum allowable parameters. • Do not exceed the maximum allowable design parameters. Offline mining must not be tolerated. • Ensure to monitor bord and intersection spans and implement remedial measures where the spans have been exceeded. • Implement monitoring devices with remedial measures in the case of activation. • Ensure rock engineering involvement throughout the mining process. <u>Prevent risk of subsidence:</u> • Ensure that pillars are designed in accordance with at least the minimum required site specific shallow mining guidelines. • Support design must take into consideration the depth of weathering and shallow mining specific strength parameters for the immediate roof strata as well as long term stability of roof support. • Do not open spans beneath surface structures that needs to be protected unless a rock engineering practitioner has assessed the conditions, gives measures to ensure surface stability, etc. • Do not open intersections beneath surface structures. • Ensure rock engineering involvement throughout the mining process. • Monitoring devices must be implemented in every intersection to assist with monitoring roof conditions. • Monitor pillar, bord and intersection dimensions to ensure that the designed parameters are followed. Implement remedial measures where required. <u>Underground Blasting:</u> • Ensure that a proper blast design is compiled for the underground operation. • Ensure that the blast design in close proximity to surface structures adheres to the minimum PPVs <50mm/s. (PPV = Peak Particle Velocity) • Ensure to monitor blasting PPVs during blasting operations both underground and on surface. If required redesign to ensure adherence to the minimum allowable PPVs. • Ensure that a qualified blaster (blast engineer) is appointed to conduct the blast design. • Pillars or Roof failures: • Do not conduct pillar extraction or any form of higher extraction beneath surface structures in especially shallow mining conditions.		

			• Do not conduct pillar extraction or any form of higher extraction beneath surface structures in deeper lying areas without a proper investigation by a qualified experienced rock engineering practitioner who must give guidelines as to how ensure surface stability. • Do not conduct pillar robbing or barrier mining. • Ensure rock engineering involvement throughout the mining process.		
Closure and Rehabilitation Phase					
Closure and Rehabilitation	Geology and Soils	Potential for compaction and contamination from heavy vehicles usage and spillage of hydrocarbons, reagents (from infrastructure and machinery), raw materials and dirty water runoff, and the loss of soil due to erosion by wind and or water.	Monitor general condition of surface, rehabilitate if any surface impact occurs. Adhere to soil compaction mitigation measures as prescribed within Operational phase.	N/A	As needed
Closure and Rehabilitation	Land Capability and Land Use	Rehabilitation of Land uses and Land Capability	Monitor general condition of surface, rehabilitate if any surface impact occurs. Adhere to mitigation measures as prescribed within Operational phase.	Mine Closure and Rehabilitation Plan	Continuous
Closure and Rehabilitation	Ecological Impacts	Disturbance and loss of fauna through noise, light and dust pollution as well as hunting, trapping and killing of fauna.	Monitor general condition of surface, rehabilitate if any surface impact occurs. Adhere to mitigation measures as prescribed within Operational phase when applicable. Monitor whether rehabilitation practices have been successful and sustainable.	National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)	Continuous
Closure and Rehabilitation	Ecological Impacts	Spreading of alien invasive species and bush encroachment of indigenous species.	Monitor general condition of surface, rehabilitate if any surface impact occurs. Adhere to mitigation measures as prescribed within Operational phase when applicable. Monitor whether rehabilitation practices have been successful and sustainable.	• Alien and Invasive Species Management Plan • Rehabilitation Objectives and Standards • Alien and Invasive Species Regulations (Government Notice 598 of 2014) and Alien and Invasive Species List, 2014 in terms of NEMBA (Government Notice 599 of 2014) • Notice 2 • Exempted Alien Species in terms of Section 66 (1) Notice 3 National Lists of Invasive Species in terms of Section 70(1) – List 1, 3-9 & 11 • Notice 4 Prohibited Alien Species in terms of Section 67 (1) – List 1, 3-7, 9-10 & 12	Continuous
Closure and Rehabilitation - Implementation and ensuring maintenance and sustainability	Ecological Impacts - **Positive Impact**	Rehabilitation of area with natural vegetation and re-establishment of local biodiversity	Monitor general condition of surface, rehabilitate if any surface impact occurs. Adhere to mitigation measures as prescribed within Operational phase when applicable. Monitor whether rehabilitation practices have been successful and sustainable.	• GNR 704 • Water Use Licence • Groundwater monitoring program	Continuous
Closure and Rehabilitation	Ecological Impacts - **Positive Impact**	Rehabilitation of area with natural vegetation and re-establishment of local biodiversity	Monitor general condition of surface, rehabilitate if any surface impact occurs. Adhere to mitigation measures as prescribed within Operational phase. Monitor whether rehabilitation practices have been successful	• GNR 704 • Water Use Licence • Groundwater monitoring program	Continuous
Rehabilitation of site, removal of infrastructure, closure of waste	Hydrological Aspects; Surface water and Groundwater	Stormwater, erosion and siltation impacts due to a lack of implementing measures	• Monitor as per WUL and rehabilitate/remediate if any impact occurs. Adhere to mitigation measures as prescribed within Operational phase.	• GNR 704 • Water Use Licence	Continuous

management facilities (including Stormwater)		to manage stormwater run-off quantity and quality during the closure phase.	• Leaving the storm water management structures in place during the decommissioning and post closure phase until the rehabilitation process is completed. This will ensure that sediment generated during this phase is captured. • Storm water management structures should be inspected after large storm events to ensure that there are no blockages or breaches. Should blockages or breaches occur, then immediate action should be undertaken to remove debris or to repair breached areas. • Soils compacted by heavy machinery can be ripped to allow infiltration. • Rehabilitation processes such as restoring the topography to a pre-mining state, and re-vegetation of disturbed areas will assist in returning natural surface water drainage patterns. • Implement free draining rehabilitation • AMD and ABA modelling to understand calibration model. Closure Planning based on isolation of seep zones with clay material and compaction.	• Groundwater monitoring program	
Rehabilitation of site, removal of infrastructure, closure of waste management facilities (including Stormwater)	Hydrological Aspects; Surface water and Groundwater	Contamination of stormwater runoff and ground water, caused by: - Sediment release; - Chemicals such as hydrocarbon-based fuels and oils or lubricants spilled from heavy duty vehicles; - Effluent discharges, due to a lack of stormwater management.	Monitor as per WUL and rehabilitate/remediate if any impact occurs. Adhere to mitigation measures as prescribed within Operational phase.	• GNR 704 • Water Use Licence • Groundwater monitoring program	Continuous and as needed
Closure and Rehabilitation	Hydrological Aspects; Surface water and Groundwater	Impacts of dewatering on the groundwater aquifer should water be abstracted from ground water during the closure phase.	Monitor as per WUL and rehabilitate/remediate if any impact occurs. Adhere to mitigation measures as prescribed within Operational phase where applicable.	• GNR 704 • Water Use Licence • Groundwater monitoring program	Continuous and as needed
Rehabilitation of site, removal of infrastructure, closure of waste management facilities (including Stormwater)	Hydrological Aspects; Surface water and Groundwater	Impaction groundwater from the pollution plume associated with the waste storage facilities and possible Decant	• Storage and classification of hazardous waste to be in accordance with the waste classification and management regulations GNR 634-635; • The footprint to be lined with a liner as determined by waste classification; • Adhere to Acid Mine Drainage prevention and decant management as prescribed by the Geohydrological assessment, which may include continuous active and passive treatment and the remaining of structures for Water Management on-site after Closure; • A pollution control dam could be used to intercept polluted seepage water. This should be considered if it is found that the Vaal River or the tributary of the Taaibosspruit are indeed negatively affected by pollution. Regular sampling of the streams/rivers/wetlands is essential to decide on this option if needed; • Implement as many closure measures during the operational phase, while conducting appropriate monitoring programmes to demonstrate actual performance of the various management actions during the life of mine; • All mined areas should be flooded as soon as possible to minimise oxygen from reacting with the remaining pyrite; • Mining should remove as much coal as possible from the underground and separate acid forming and non-acid forming	• GNR 704 • Water Use Licence • Groundwater monitoring program • Approved IWWMP • Monitoring programme • Spill procedure	Continuous

			material; • Quarterly groundwater sampling must be conducted to establish a database of groundwater quality to assess plume movement trends; • Audit the monitoring network annually; • Geochemical testing of the ROM should be conducted to aid in the prediction of contaminant release and potential geochemical changes induced in the subsurface, by means of geochemical modelling; • Clean and dirty water systems should be separated as planned; • Waste rock dumps and stockpiles can be lined with available compacted clay from the area to minimise infiltration of contamination; • Treatment of the decant may be viable, however all passive methods should be investigated first during the operational phase of the mine; • Major fractures encountered while mining must be sealed by grouting, both on inflow and outflow areas • A detailed decant management plan will be developed at mine closure. Ultimately water treatment solutions, either passive or active, will be implemented; • Monitoring of the water table rebound will continue post-closure and the modelling updated to quantify the long-term impacts. If necessary, the management measures should be revised based on the modelling results; • Treated water will be discharged to the river system.		
Rehabilitation of site, removal of infrastructure, closure of waste management facilities (including Stormwater)	Hydrological Aspects; Surface water and Groundwater	Impaction groundwater from the pollution and possible Acid Mine Drainage	• An in-depth and detailed geochemical assessment and modelling exercise should be conducted to determine the post closure quality of mine water associated with the both the underground and incline shafts. This will also benefit the Water Use Licence Application still to be undertaken; • Optimise storage of mine water in mined-out underground sections; • Install high pressure seal in the incline underground development to the mined out workings; • The shafts will be sealed, backfilled and made free draining; • The underground workings will be left to fill with water to a pre-determined environmental safe level (below decant level) before active water level management is implemented through pumping; • Monitoring of water levels and water quality; • The rise of water will be closely monitored to ensure that the environmental safe level is not exceeded and that appropriate extraction works and treatment facilities are constructed in time to treat the surplus water once the environmental safe level is reached. The water will then be actively maintained at or below the environmentally safe level; • A detailed decant management plan will be developed at mine closure. Ultimately water treatment solutions, either passive or active, will be implemented; • Monitoring of the water table rebound will continue post-closure and the modelling updated to quantify the long-term impacts. If necessary, the management measures should be	• GNR 704 • Water Use Licence • Groundwater monitoring program • Approved IWWMP • Monitoring programme • Spill procedure	Continuous

			revised based on the modelling results; • Treated water will be discharged to the river system.		
Closure and Rehabilitation	Air Quality	Demolition & Removal of all infrastructure (incl. transportation off site) During this activity, there is demolition of buildings and foundation and subsequent removal of rubbles generated. There is cleaning-up of workshops, fuels and reagents, removal of power and water supply, removal of haul and access roads. Potential for impacts during this phase will depend on the extent of demolition and rehabilitation efforts during closure as well as features which will remain. The impacts on the atmospheric environment during the decommissioning phase will be similar to the impacts during the construction phase. The process includes dismantling and demolition of existing infrastructure, transporting and handling of topsoil on unpaved roads in order to bring the site to its initial/rehabilitated state. Demolition and removal of all infrastructures will cause fugitive dust emissions. The impacts will be short-term and localised. Any implication or implications this phase will have on ambient air quality will seize once the activities are finalised.	Monitor and adhere to mitigation measures as prescribed within Operational phase where relevant.	• South Africa National Standard 1929:2005: Ambient Air Quality: Limits for common pollution • Meet the requirements of the National Dust Control regulations, 2013, as published in the Government Gazette (No. 36974) of 1 November 2013 (GNR 827 of 1 November 2013), in terms of the National Environmental Management: Air Quality Act 39 of 2004 • Dust fall monitoring programme should be implemented	Continuous
Closure and Rehabilitation	Noise and Lighting	Nuisance and health risks caused by an increase in the ambient noise level as a result of noise impacts associated with the operation of heavy-duty vehicles and equipment.	Monitor and adhere to mitigation measures as prescribed within Operational phase where relevant.	• Blasting Regulations • Vibration management plan. Noise Management and Monitoring Programme	Continuous
Closure and Rehabilitation	Noise and Lighting	Disturbance due to vibrations caused by heavy duty vehicles.	Monitor and adhere to mitigation measures as prescribed within Operational phase where relevant.	Refer above	Continuous
Closure and Rehabilitation	Noise and Lighting	Impact of security lighting on surrounding landowners and animals.	Monitor and adhere to mitigation measures as prescribed within Operational phase where relevant.	Refer above	Continuous
Closure and Rehabilitation	Sites of archaeological and cultural interests	Graves to be protected in-situ or as per recommendations made by specialist	As per construction and operational phase. No impacts should reach the heritage resources identified.	National Heritage Resources Act, 1999 (Act No. 25 of 1999)	Continuous
Closure and Rehabilitation	Visual aspects	Visibility from sensitive receptors / visual scarring of the landscape as a result of the closure and rehabilitation activities.	Monitor and adhere to mitigation measures for the visual environment as prescribed within Operational phase where relevant. Ensure rehabilitation and re-vegetation is done as soon as possible after the activities are decommissioned and is successful.	Final Land form and Mine Rehabilitation Plans as approved.	Continuous
Closure and Rehabilitation	Waste (Including Hazardous Waste)	Generation and disposal of general waste, litter and hazardous material created from the decommissioning activities	Monitor and adhere to mitigation measures as prescribed within Operational phase where relevant. Adhere to final land form and rehabilitation plan.	Waste Regulations (NEM:WA) National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) [as amended]	Continuous
Closure and Rehabilitation, Rehabilitation of site, removal of infrastructure,	Waste (Including Hazardous Waste)	Generation and disposal of additional hazardous waste	Monitor and adhere to mitigation measures as prescribed within Operational phase where relevant. Ensure compliance with Waste Management License and Conditions	Waste Regulations (NEM:WA); WUL, IWWMP	Continuous

sealing of shafts and closure of waste facilities					
Closure and Rehabilitation	Services	Need for additional services i.e. water, electricity and sewerage systems during the closure phase causing additional strain on natural resources and infrastructure.	No additional pressure on services are expected or to be mitigated. Adhere to WUL for septic tank decommissioning and contact a suitably qualified contractor to aid in the decommissioning and rehabilitation of the septic tank. Appoint a contractor to decommission the electrical substation.	N/A. Municipal regulations if required	As needed
Closure and Rehabilitation	Traffic	The change in the traffic patterns as a result of traffic entering and exiting the proposed mine on the surrounding road infrastructure and existing traffic.	Adhere to Traffic Management Plan (as drafted and maintained during Construction and Operational Phase)for the Closure and Rehabilitation phase.	Traffic Management Plan as drafted before project implementation	Continuous
Closure and Rehabilitation	Traffic	Nuisance, health and safety risks caused by increased traffic on an adjacent to the study area including cars and heavy vehicles.	Adhere to Traffic Management Plan (as drafted and maintained during Construction and Operational Phase)for the Closure and Rehabilitation phase.	Traffic Management Plan as drafted before project implementation	Continuous
Closure and Rehabilitation	Health and Safety	Possibility of closure activities and workers causing veld fires, which can potentially cause injury and or loss of life to workers and surrounding landowners and visitors.	Monitor general condition of surface, rehabilitate if any impact occurs. Adhere to mitigation measures as prescribed within Operational phase where relevant.	Health and Safety Regulations as described in the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) [as amended]	Continuous
Rehabilitation of site, removal of infrastructure, closure of waste management facilities (including Stormwater)	Health and Safety	Increased risk to public health and safety: Dangerous areas including the waste management facilities poses health risks and possible loss of life to mine workers and visitors to the site.	Monitor general condition of surface, rehabilitate if any impact occurs. Adhere to mitigation measures as prescribed within Operational phase where relevant.	Refer above	Continuous
Rehabilitation of site, removal of infrastructure, closure of waste management facilities (including Stormwater)	Socio-Economic	Socio-economic impact on farmers, labourers and surrounding landowners and residents due to negative impacts on groundwater, dust pollution, noise pollution etc.	Monitor general condition of surface, rehabilitate if any impact occurs. Adhere to mitigation measures as prescribed within Operational phase where relevant.	Social and Labour Plan	Continuous
Closure and Rehabilitation	Socio-Economic	Economic impact should there be an incident of public health and safety.	Monitor general condition of surface, rehabilitate if any impact occurs. Adhere to mitigation measures as prescribed within Operational phase where relevant.	Social and Labour Plan	Continuous
Closure and Rehabilitation	Socio-Economic	Sourcing supplies from local residents and businesses boosting the local economy for an extended period of time.	Source services utilised in the Decommissioning phase from the local area and businesses.	Social and Labour Plan	Continuous
Closure and Rehabilitation	Socio-Economic	Reduced period of providing employment for local residents and skills transfer to unskilled and semi-skilled unemployed individuals.	Aim to rehire (or place) workers utilised at Ergosat (Pty) Ltd in other sections associated with the applicant (or Mining Right Holder). This will aim to lessen the impact of unemployment to the workers who were employed during the LoM.	Social and Labour Plan	Continuous
Closure and Rehabilitation	Sasol Pipelines	Impacts during Closure phase to the Sasol pipelines	Adhere to Risk Assessment guidelines and prevent impacts to the Sasol pipelines during all phases of the developments.	Social and Labour Plan	Continuous

29 IMPACT MANAGEMENT OUTCOMES

Impact Management outcomes have been provided within Table 15-2 above.

30 FINANCIAL PROVISION

30.1 DETERMINATION OF THE AMOUNT OF FINANCIAL PROVISION

Refer to comments made within Section 19.

30.1.1 Describe the Closure Objectives and the Extent to Which They Have Been Aligned To the Baseline Environment Described Under Regulation 22 (2) (D) As Described In 2.4 Herein

Refer to comments made within Section 19.

30.1.2 Confirm Specifically That the Environmental Objectives In Relation To Closure Have Been Consulted With Landowner and Interested and Affected Parties

Refer to comments made within Section 19.3.

30.1.3 Provide A Rehabilitation Plan That Describes And Shows The Scale And Aerial Extent Of The Main Mining Activities, Including The Anticipated Mining Area At The Time Of Closure

Refer to comments made within Section 19.4.

30.1.3.1 Explain Why It Can Be Confirmed That The Rehabilitation Plan Is Compatible With The Closure Objectives.

Please refer to comments made within Section 19.5.

30.2 CONFIRM THAT THIS AMOUNT CAN BE PROVIDED FOR FROM OPERATING EXPENDITURE

(Confirm that the amount, is anticipated to be an operating cost and is provided for as such in the Mining work programme, Financial and Technical Competence Report or Prospecting Work Programme as the case may be).

Annual financial provisioning reports will be updated and submitted to the DMRE. Ergosat (Pty) Ltd: Lefa Colliery will make the said amount available to the DMRE as required.

31 MECHANISMS FOR MONITORING COMPLIANCE WITH AND PERFORMANCE ASSESSMENT AGAINST THE ENVIRONMENTAL MANAGEMENT PROGRAMME AND REPORTING THEREON

Including:
a) Monitoring of Impact Management Actions
b) Monitoring and reporting frequency
c) Responsible persons
d) Time period for implementing impact management action
e) Mechanisms for monitoring compliance

Table 31-1: Mechanisms for monitoring (Including Time period, Functional requirements, Roles and responsibilities and Frequency)

Activity	Aspects Affected	Potential Impact	Compliance with Standards	Standard to be Achieved	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency	Time Period for Implementation Impact Management Options
No-Go Option								
No-Go Option	Socio-Economic	Reduced period of development and upliftment of the surrounding communities and infrastructure based on mining development within the region.	N/A	N/A	N/A	N/A	N/A	N/A
No-Go Option	Socio-Economic	Reduced period of development of the economic environment, by job provision and sourcing supplies for and from local residents and businesses.	N/A	N/A	N/A	N/A	N/A	N/A
No-Go Option	Socio-Economic	Positive: No additional negative impacts on I&APs or surrounding land users	N/A	N/A	N/A	N/A	N/A	N/A
No-Go Option	Natural Environment	Positive: No additional negative impacts on the environment	N/A	N/A	N/A	N/A	N/A	N/A
Construction and Operational Phase								
Storm water management structures, pipelines, berms and water resources diversions, Access and Haul roads, Pipelines, Plant and Other Infrastructure (Overland conveyer removed as alternative), Sewage treatment, Bulk hydrocarbon storage facilities/ Filling station, Shaft development, Mining of coal by underground mining, Crushing and screening of coal underground, All infrastructure including External parking,	Soils	Soil compaction by heavy duty vehicles. Soils will be stripped to construct proper roads. This could lead to loss of topsoil. Due to the presence of vehicles and equipment hydro-carbon spills may occur impacting on the quality of the soils. Stripping and stockpiling of topsoil which may lead to deterioration of soil quality.	N/A	Pre-mining conditions after Closure - Or final Approved Landform	Monitoring of the condition of the surface areas and where activities are taking place - Visual inspection	SHEQ	Monthly, Visual	Areas which are concurrently rehabilitated
	Soils	During operation of the Ergosat mine, it is anticipated that carbonaceous material may be spilled which will contaminate soils. Contamination by dirty water run-off and/or spillage of hydrocarbons and/or chemicals is also expected from operations vehicles	N/A	Pre-mining conditions after Closure - Or final Approved Landform	Set up service plan and record services of vehicles. Monitor areas for spills that needs to be cleaned. Ensure spills have	Workshop / Plant manager	As needed	Continuous

Security and Weigh bridge, Truck Loading area, Internal parking, Silos, stockpiles, sewage treatment plant, scrap yard, offices, crusher and screen plant, medical facility, stores, raw water dam, storage yard and the ventilation shaft, Sub-station and power line, ,Infrastructure area industrial development, Residue stockpiles or deposit areas		and machinery. Contamination of soils through: - Indiscriminate disposal of waste; and - Accidental spillage of chemicals such as hydrocarbon-based fuels and oils or lubricants spilled from vehicles and other chemicals from operational and maintenance activities e.g. paints. Deterioration of topsoil quality due to salt contamination at the coal stockpile and crushing and screening plant footprints			been cleaned properly and disposed suitably			
Storm water management structures, pipelines, berms and water resources diversions, Access and Haul roads, Pipelines, Plant and Other Infrastructure (Overland conveyer removed as alternative), Sewage treatment, Bulk hydrocarbon storage facilities/ Filling station, Shaft development, Mining of coal by underground mining, Crushing and screening of coal underground, All infrastructure including External parking, Security and Weigh bridge, Truck Loading area, Internal parking, Silos, stockpiles, sewage treatment plant, scrap yard, offices, crusher and screen plant, medical facility, stores, raw water dam, storage yard and the ventilation shaft, Sub-station and power line, ,Infrastructure area industrial development, Residue stockpiles or deposit areas	Land Capability and Land Use	Possibility of mining activities and workers impacting on Mining Right Area	Mine Closure and Rehabilitation Plan	Pre-mining conditions after Closure - Or final Approved Landform	Monitoring of the condition of other portions in the MR (which should not suffer any surface impacts)	SHEQ	Monthly	Continuous
Shaft development Mining of coal by underground mining	Blasting	Blasting hazard, specifically - Ground vibration and Other including the SASOL pipeline	Blasting Regulations of the Explosives Act, 1956 (Act 26 of 1956). Vibration Management Plan	As per Blasting Regulations of the Explosives Act, 1956 (Act 26 of 1956). Risk Assessment conducted for SASOL pipeline.	Consult blast specialist as construction begins, blast in accordance with Blast Management Plan and specifications	SHEQ, Mine Manager	As needed	Continuous
Storm water management structures, pipelines, berms and water resources diversions, Access and Haul roads, Pipelines, Plant and	Ecological Impacts	Fauna: Disturbance and loss of fauna through noise, light and dust pollution and possible hunting, trapping and killing of fauna. Other impacts on Fauna as identified in specialist assessment	National Environmental Management: Biodiversity Act, 2004 (Act No. 10	Pre-mining conditions after Closure - Or final Approved Landform	Ecological Monitoring and Compliance	SHEQ	Annually	Continuous

Other Infrastructure (Overland conveyer removed as alternative), Sewage treatment, Bulk hydrocarbon storage facilities/ Filling station, Shaft development, Mining of coal by underground mining, Crushing and screening of coal underground, All infrastructure including External parking, Security and Weigh bridge, Truck Loading area, Internal parking, Silos, stockpiles, sewage treatment plant, scrap yard, offices, crusher and screen plant, medical facility, stores, raw water dam, storage yard and the ventilation shaft, Sub-station and power line, ,Infrastructure area industrial development, Residue stockpiles or deposit areas			of 2004) [as amended]					
	Ecological Impacts	Destruction of Vegetation, loss of integrity of vegetation and Spreading of alien invasive species and bush encroachment of indigenous species. Vegetation will be removed during the construction of the roads where they are not situated within agricultural lands. Note that no red data species were identified within the proposed mining area or at the footprint and stockpiling area.	• Alien and Invasive Species Management Plan • Rehabilitation Objectives and Standards • Alien and Invasive Species Regulations (Government Notice 598 of 2014) and Alien and Invasive Species List, 2014 in terms of NEMBA (Government Notice 599 of 2014) • Notice 2 • Exempted Alien Species in terms of Section 66 (1) Notice 3 National Lists of Invasive Species in terms of Section 70(1) – List 1, 3-9 & 11 • Notice 4 Prohibited Alien Species in terms of Section 67 (1) – List 1, 3-7, 9-10 & 12	Pre-mining conditions after Closure - Or final Approved Landform	Ecological Monitoring, Alien and Invasive Management and Monitoring Programme	SHEQ	Annually or as prescribed by Alien Invasive specialist	Continuous
Storm water management structures, pipelines, berms and water resources diversions, Access and Haul roads, Pipelines, Plant and Other Infrastructure (Overland conveyer removed as alternative), Sewage treatment, Bulk hydrocarbon storage facilities/ Filling station, Shaft development, Mining of coal by underground mining, Crushing and screening of coal underground, All infrastructure including External parking, Security and Weigh bridge, Truck Loading area, Internal	Hydrological Aspects; Surface water	Stormwater, erosion and siltation impacts due to a lack of implementing measures to manage stormwater run-off quantity and quality during the operational phase.	• GNR 704 • Water Use Licence • Groundwater monitoring program	Water Quality: In line with the specific Integrated Unit of Analysis RQS (Resource Quality Standards) for Environmental water resources and Water Quality as specified in WUL	Implement IWWMP Monitoring prescribed	SHEQ, Contractor	Monthly for Surface water quality, Bi-annually for Aquatic Ecology and Quarterly for Groundwater quality and quantity (or as per WUL specifications)	Continuous
	Hydrological Aspects; Surface water	Contamination of stormwater runoff and ground water, caused by: - Sediment release; - Chemicals such as hydrocarbon-based fuels and oils or lubricants spilled from construction vehicles;	• GNR 704 • Water Use Licence • Groundwater monitoring program	Water Quality: In line with the specific Integrated Unit of Analysis RQS (Resource Quality Standards) for Environmental water	Implement IWWMP Monitoring prescribed	SHEQ, Contractor / specialist	Monthly for Surface water quality, Bi-annually for Aquatic Ecology and Quarterly for	Continuous

parking, Silos, stockpiles, sewage treatment plant, scrap yard, offices, crusher and screen plant, stores, raw water dam, storage yard, Infrastructure area industrial development, Residue stockpiles or deposit areas		- Other chemicals from maintenance activities e.g. paints; and - Effluent discharges, due to a lack of stormwater management and system maintenance.		resources and Water Quality as specified in WUL			Groundwater quality and quantity (or as per WUL specifications)	
	Hydrological Aspects; Surface water and Groundwater	Impact of Nitrate based explosives used during mining on groundwater quality. Contamination plume can affect the groundwater resource.	• GNR 704 • Water Use Licence • Groundwater monitoring program	Water Quality: In line with the specific Integrated Unit of Analysis RQS (Resource Quality Standards) for Environmental water resources and Water Quality as specified in WUL	Implement IWWMP Monitoring prescribed	SHEQ, Contractor / specialist	Monthly for Surface water quality, Bi-annually for Aquatic Ecology and Quarterly for Groundwater quality and quantity (or as per WUL specifications)	Continuous
Dewatering during the Operational Phase	Hydrological Aspects; Groundwater	Influx of groundwater into incline shaft void The void in the incline will lead to an influx of groundwater into the incline shaft. This will potentially result into dewatering of the surrounding underground aquifers. This will manifest as a groundwater cone of depression in the water table with negative consequences of the availability of groundwater for existing borehole users around the proposed incline shafts. The significance is medium due to the duration of the impact throughout the construction and operational phases of the project. Impacts of dewatering on the groundwater aquifer should water be abstracted from ground water during the operational phase.	• GNR 704 • Water Use Licence • Groundwater monitoring program	Keeping the water table levels constant and not forming an unrecoverable drawdown cone, thereby impacting on water availability of other water users	Implement IWWMP Monitoring prescribed , water levels	SHEQ, Contractor / specialist	Monthly for Surface water quality, Bi-annually for Aquatic Ecology and Quarterly for Groundwater quality and quantity (or as per WUL specifications)	Continuous
Dewatering during the Operational Phase	Hydrological Aspects; Groundwater	Underground (Lowering of groundwater levels- baseflow to the Vaal River) The mining operation could potentially lower the baseflow of surrounding water to the Vaal River	• GNR 704 • Water Use Licence • Groundwater monitoring program	Keeping the water table levels constant and not forming an unrecoverable drawdown cone, thereby impacting on water availability of other water users	Implement IWWMP Monitoring prescribed , water levels	SHEQ, Contractor / specialist	Monthly for Surface water quality, Bi-annually for Aquatic Ecology and Quarterly for Groundwater quality and quantity (or as per WUL specifications)	Continuous
Storm water management structures, pipelines, berms and water resources diversions, Access and Haul roads, Pipelines, Plant and Other Infrastructure, Sewage treatment, Bulk hydrocarbon storage facilities/ Filling station, Crushing and screening of coal underground, All infrastructure including External parking,	Hydrological Aspects; Groundwater	The formation of acid mine drainage (AMD) as a result of ingress water and oxygen into the stockpiled overburden The potential impact of seepage water into the shallow weathered aquifer from the overburden stockpile is considered to be moderate. Potential contaminants may seep into the groundwater and could impact on the groundwater usage, which includes domestic and agricultural use. Generally, overburden is considered inert	• GNR 704 • Water Use Licence • Groundwater monitoring program	Water Quality as specified in WUL for process related water. GN 704: Capturing and containing dirty water	Implement IWWMP Monitoring prescribed	SHEQ, Contractor / specialist	Monthly for Surface water quality, Bi-annually for Aquatic Ecology and Quarterly for Groundwater quality and quantity (or as per WUL specifications)	Continuous

Security and Weigh bridge, Truck Loading area, Internal parking, Silos, stockpiles, sewage treatment plant, scrap yard, offices, crusher and screen plant, medical facility, stores, raw water dam, storage yard and the ventilation shaft, Sub-station and power line, ,Infrastructure area industrial development, Residue stockpiles or deposit areas		and therefore does not have a great potential for AMD. However, during the removal of the overburden in the construction of the incline shaft, there is the potential to remove some of the coal from the seams. This coal has AMD. The AMD potential of the overburden stockpile is considered moderate in the long term as the overburden will be stockpiled for the LOM. The impact will be limited to the site.						
	Hydrological Aspects; Surface water and Groundwater	Possible Seepage from waste management activities e.g. waste rock dumps, could cause a contamination plume affecting the underground water resources.	• GNR 704 • Water Use Licence • Groundwater monitoring program • Approved IWWMP • Monitoring programme • Spill procedure	Water Quality: In line with the specific Integrated Unit of Analysis RQS (Resource Quality Standards) for Environmental water resources and Water Quality as specified in WUL	Implement IWWMP Monitoring prescribed	SHEQ, Contractor / specialist	Monthly for Surface water quality, Bi-annually for Aquatic Ecology and Quarterly for Groundwater quality and quantity (or as per WUL specifications)	Continuous
	Hydrological Aspects; Surface water, Hydropedological and Groundwater	Wetland Impacts - Artificial wetland created by Agricultural activities	• GNR 704 • Water Use Licence • Groundwater monitoring program • Approved IWWMP • Monitoring programme • Spill procedure	Water Quality as specified in WUL for process related water. GN 704: Capturing and containing dirty water	Implement IWWMP Monitoring prescribed	SHEQ, Contractor / specialist	Monthly for Surface water quality, Bi-annually for Aquatic Ecology and Quarterly for Groundwater quality and quantity (or as per WUL specifications)	
Access and Haul roads, Plant and Other Infrastructure, Crushing and screening, All infrastructure including External parking, Security and Weigh bridge, Truck Loading area, Internal parking, Silos, stockpiles, sewage treatment plant, scrap yard, offices, crusher and screen plant, medical facility, stores, raw water dam, storage yard and the ventilation shaft, Infrastructure area industrial development, Residue stockpiles or deposit areas	Air Quality	Increased windborne dust (soil and ore fines), vehicle fumes and particulate matter PM10, altering air quality.	Refer above	Health and Safety Standards. A Safe and Low Risk Environment. Air Quality Standards	Conduct Air quality monitoring - Dust buckets.	SHEQ	Monthly	Continuous
	Air Quality	Increased dust pollution (soil and ore fines), vehicles on gravel roads and transport of RoM	Refer above	Health and Safety Standards. A Safe and Low Risk Environment. Air Quality Standards	Conduct Air quality monitoring - Dust buckets.	SHEQ, Contractor	Monthly	Continuous
	Air Quality	Emissions by means of crushing and screening In this activity, the use of the primary and secondary crusher and discard handling are the most likely to have implications on ambient air quality. The crushing process releases fugitive dust, especially if there are no enclosure and water sprays. Dust contained within the RoM ore can be released into the atmosphere during this process i.e. fugitive dust (containing TSP, as well as PM10 and PM2.5). Wind erosion from stockpiles can be a perennial source of dust if not properly managed during and	Refer above	Health and Safety Standards. A Safe and Low Risk Environment. Air Quality Standards	Conduct Air quality monitoring - Dust buckets.	SHEQ, Contractor	Monthly	Continuous

		post mining operations. The plant, crushing and screening areas all have the potential to generate dust and therefore specific mitigation measures can be assigned to each of these activities.						
Access and Haul roads, Plant and Other Infrastructure, Shaft development, Mining of coal by underground mining, Crushing and screening of coal, All infrastructure including External parking, Security and Weigh bridge, Truck Loading area, Internal parking, Silos, stockpiles, sewage treatment plant, scrap yard, offices, crusher and screen plant, medical facility, stores, raw water dam, storage yard and the ventilation shaft, Sub-station and power line, Infrastructure area industrial development.	Noise and Lighting	Nuisance and health risks caused by an increase in the ambient noise level as a result of noise impacts associated with the operation of the mining activities and processing.	• Blasting Regulations • Vibration management plan as well as Noise Management and Monitoring Programme	Health and Safety Standards. A Safe and Low Risk Environment. Noise Regulations	Conduct noise monitoring and to include any other noise sources not previously assessed as part of current Noise management programme	SHEQ, Contractor	Quarterly noise measurements are recommended at sensitive receptors during construction and the first year of operation. If any of these receptors are relocated the measurement locations should be replaced with a similar location. If there are no potential noise-sensitive receptors living within 1,000m (maximum distance where noise may be problematic, SANS 10328) from any noise sources (associated with the mine) no noise measurements is required. In addition, noise measurements must be conducted at the location of the person that registered a valid and reasonable noise complaint. The measurement location should consider the direct surroundings to ensure that other	Continuous

							sound sources cannot influence the reading. A second instrument must be deployed at the mine infrastructure area (close to the source of noise) during the measurement.	
	Noise and Lighting	Nuisance and health risks caused to close by receptors as identified in specialist report	• Blasting Regulations • Vibration management plan as well as Noise Management and Monitoring Programme	Health and Safety Standards. A Safe and Low Risk Environment. Noise Regulations	Conduct noise monitoring and to include any other noise sources not previously assessed as part of current Noise management programme	SHEQ, Contractor	Quarterly, refer to details above.	Continuous
	Noise and Lighting	Noise impact that would only manifest in the operational phase but that can be avoided in the construction phase by implementation of measures in construction of ventilation shafts. Impacts of noise need to be controlled by means of berms and shielding structures. The recommendations made by the Noise Impact Assessment are with the assumption that sensitive receptors within 750m of the site will not relocate. If relocation of these receptors would be an option, the recommendations would have to be altered.	Refer above	Health and Safety Standards. A Safe and Low Risk Environment. Noise Regulations	Conduct noise monitoring and to include any other noise sources not previously assessed as part of current Noise management programme	SHEQ, Contractor	Quarterly, refer to details above.	Continuous
	Noise and Lighting	Impact of security lighting on surrounding landowners and animals.	Refer above	Health and Safety Standards. A Safe and Low Risk Environment. Noise Regulations	Investigate complaints when received and mitigate	SHEQ	No light monitoring is required.	Continuous
All Activities	Sites of archaeological and cultural interests	Construction activities have the potential to impact the historical structures. A marked grave is located within the infrastructure area.	National Heritage Resources Act, 1999 (Act No. 25 of 1999)	No impacts on Heritage Resources	Record occurrences of sites and artefacts if found, contact a specialist immediately.	SHEQ	Ensure no impacts are occurring	Continuous
All Activities	Visual aspects	Potential visual impact on the viewpoints that had a visual exposure rating of 5 or higher. The operational impact on the surrounding agricultural farmers and land users will be more significant, due to the visual intrusion and activities being undertaken. Although the mine activities will not be visible since it will all be underground, the stockpiles, waste rock dumps and related surface infrastructure will be visible for the entire life of mine.	Final Land form and Mine Rehabilitation Plans as approved.	Sense of Place. Pre-mining conditions after Closure	Monitor general condition and Implement good housekeeping	SHEQ, Mine Manager	Monitor good housekeeping monthly, visual improvements and rehabilitation success possible quarterly.	Continuous

Storm water management structures, pipelines, berms and water resources diversions, Access and Haul roads, Pipelines, Plant and Other Infrastructure (Overland conveyer removed as alternative), Sewage treatment, Bulk hydrocarbon storage facilities/ Filling station, Shaft development, Mining of coal by underground mining, Crushing and screening of coal underground, All infrastructure including External parking, Security and Weigh bridge, Truck Loading area, Internal parking, Silos, stockpiles, sewage treatment plant, scrap yard, offices, crusher and screen plant, medical facility, stores, raw water dam, storage yard and the ventilation shaft, Sub-station and power line, Infrastructure area industrial development, Residue stockpiles or deposit areas	Waste	Generation and disposal of general waste, litter and hazardous material during the construction and operational phase	Waste Regulations (NEM:WA) National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) [as amended]	Waste Regulations (NEM:WA); WUL, IWWMP	Monitor volumes of waste disposed/ generated and volumes removed by Contractors	SHEQ, Mine Manager	Monthly Disposal and Quantities disposed	Continuous
Sewage treatment Bulk hydrocarbon storage facilities/ Filling station, sewage treatment plant, Residue stockpiles or deposit areas	Waste (Including Hazardous Waste)	Generation and disposal of additional hazardous operational waste i.e. Residue Stockpiles, etc.	Waste Regulations (NEM:WA); WUL, IWWMP	Waste Regulations (NEM:WA); WUL, IWWMP	Monitor volumes of waste disposed/ generated and volumes removed by Contractors	SHEQ, Mine Manager	Monthly Disposal and Quantities disposed	Continuous
Storm water management structures, pipelines, berms and water resources diversions, Access and Haul roads, Pipelines, Plant and Other Infrastructure (Overland conveyer removed as alternative), Sewage treatment, Bulk hydrocarbon storage facilities/ Filling station, Shaft development, Mining of coal by underground mining, Crushing and screening of coal underground, All infrastructure including External parking, Security and Weigh bridge, Truck Loading area, Internal parking, Silos, stockpiles, sewage treatment plant, scrap yard, offices, crusher and screen plant, medical facility,	Services	Need for services e.g. water, electricity and sewerage systems, causing additional strain on natural resources and service infrastructure.	N/A. Municipal regulations if required	Service Provider Agreements	Energy and water saving initiatives	SHEQ, Mine Manager	Continuous	Continuous

stores, raw water dam, storage yard and the ventilation shaft, Sub-station and power line, ,Infrastructure area industrial development, Residue stockpiles or deposit areas								
Access and Haul roads, External parking, Security and Weigh bridge, Truck Loading area, Internal parking.	Traffic	The change in the traffic patterns as a result of increased traffic entering and exiting the operations on the surrounding road infrastructure and existing traffic. Impacts on road infrastructure Structural maintenance work on the R716 was completed recently and an increase in the size and frequency of large construction vehicles and trucks could potentially damage the road surface. Financial impacts could manifest for the local Municipality in terms of road maintenance. Safety and financial impacts are possible for road users should private vehicles be damaged or accidents occur.	Traffic Management Plan	As per Traffic Management Plan to be drafted during project implementation	As per Traffic Management Plan	SHEQ, Mine Manager	As per Traffic Management Plan	Continuous
	Traffic	Nuisance, health and safety risks caused by increased traffic on an adjacent to the study area including cars and heavy vehicles.	Refer above	As per Traffic Management Plan to be drafted during project implementation	As per Traffic Management Plan	SHEQ, Mine Manager	As per Traffic Management Plan	Continuous
Activities as mentioned above (No activity is found within 100 m of the SASOL pipelines).	Health and Safety - Sasol Pipelines	Possibility of impacts to the Sasol Pipeline and Dangers associated with impacts to these structures	Health and Safety Regulations as described in the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) [as amended], MHSA for the SASOL pipeline specifically.	Health and Safety Regulations. A safe and low risk environment Specifications as set out in Risk Assessment.	Monitor Emergency Preparedness	SHEQ, Mine Manager	Continuous	Continuous
Storm water management structures, pipelines, berms and water resources diversions, Access and Haul roads, Pipelines, Plant and Other Infrastructure (Overland conveyer removed as alternative), Sewage treatment, Bulk hydrocarbon storage facilities/ Filling station, Shaft development, Mining of coal by underground mining, Crushing and screening of coal underground, All infrastructure including External parking, Security and Weigh bridge,	Health and Safety	Increased risk to public health and safety: Dangerous areas including the waste management activities and waste poses health risks and possible loss of life to mine workers and visitors to the site. Health and safety risks for workers Inadequate management of the construction process and general construction related activities could result in health and safety risks for workers, manifesting in the following ways: Construction related accidents due to structural safety of project infrastructure. The excavation of the shaft will result in the formation of topographical voids, which may be a safety risk to the employees, livestock	Refer above	Health and Safety Regulations. A safe and low risk environment	Health and Safety Occupational Monitoring,	SHEQ, Mine Manager	Continuous	Continuous

Truck Loading area, Internal parking, Silos, stockpiles, sewage treatment plant, scrap yard, offices, crusher and screen plant, medical facility, stores, raw water dam, storage yard and the ventilation shaft, Sub-station and power line, Infrastructure area industrial development, Residue stockpiles or deposit areas		and neighbouring landowners. • Dust generation and air pollution resulting in respiratory diseases. • High ambient noise levels caused by machinery and construction equipment resulting in health issues for workers. • Poor management of the construction process resulting in pollution problems (e.g. insufficient sanitation facilities, littering and refuse), flies rodents and pests and possible contamination of water sources. • Unsafe and insufficient drinking water. • An increase in HIV/AIDS and other STDs due to prostitution activities and temporary sexual relationships with local women, unwanted pregnancies that place further pressure on Basic Health Care Services. • Dehydration and sunburn, as high temperatures could be experienced during summer months.						
	Health and Safety	Increased risk to public and worker health and safety	Refer above	Health and Safety Regulations. A safe and low risk environment	Health and Safety Occupational Monitoring,	SHEQ, Mine Manager	Continuous	Continuous
Storm water management structures, pipelines, berms and water resources diversions, Access and Haul roads, Pipelines, Plant and Other Infrastructure (Overland conveyer removed as alternative), Sewage treatment, Bulk hydrocarbon storage facilities/ Filling station, Shaft development, Mining of coal by underground mining, Crushing and screening of coal underground, All infrastructure including External parking, Security and Weigh bridge, Truck Loading area, Internal parking, Silos, stockpiles, sewage treatment plant, scrap yard, offices, crusher and screen plant, medical facility, stores, raw water dam, storage yard and the ventilation shaft, Sub-station and power line, ,Infrastructure area industrial development, Residue stockpiles or deposit areas	Socio-Economic	Socio-economic impact on farmers, labourers and surrounding landowners and residents due to negative impacts on groundwater, dust pollution, noise pollution etc.	N/A	Prevent impacts on farmers labourers and surrounding landowners at all stages of the development.	Complaints should be investigated (if any)	SHEQ	Annually	Continuous
	Socio-Economic	Socio-economic impact on farmers, labourers and surrounding landowners specifically the close-by receptors, specifically in terms of attitude against the mine	N/A	Prevent impacts on farmers labourers and surrounding landowners at all stages of the development.	Complaints should be investigated (if any)	SHEQ	Annually	Continuous
	Socio-Economic: **Positive Impacts**	Extended employment provision due to the implementation of the extension of the mining activities, allowing mining activities to continue for additional years.	N/A	Increased Employment Opportunities in the Long term	Compliance with programme principles / vision	Human Resources	Annually	Continuous
	Socio-Economic: **Positive Impacts**	Employment at the Colliery The mine will employ and estimated 530 permanent employees, with skills levels that vary from skilled, semi-skilled to unskilled. Approximately 100 of the employees will be unskilled and illiterate and for all employees individual training and skills development plans will be implemented in alignment with career progression. Skilled employment will include managerial positions, Planners, Environmental and other Specialists, Geologists, administrative and financial personnel, certain Operators, Engineers, Boilermakers and so forth. Semi-skilled positions relate to Foreman positions and Operators such as Diesel Attendants, whereas unskilled positions are	N/A	Increased Employment Opportunities in the Long term	Compliance with programme principles / vision	Human Resources	Annually	Continuous

		usually associated with manual labour (underground miners, gardeners, etc.). It is anticipated that the majority of the positions could be filled by locals from the Municipal area as mining and industrial related skills should be available in the Sasolburg/Vereeniging region. Locals closer to the project site (Deneysville, Refengkgotso, etc.) would in all likelihood expect to be considered especially for unskilled and semi-skilled positions. Tertiary education levels in Ward 19 are much lower than in Ward 18 and in the broader municipal area (Ward 18: 23%; Ward 19: 2%; Metsimaholo: 9%) In addition to permanent positions, temporary employment and contractors could be added. Temporary employment would include: • Cleaning and maintenance of the conveyor belts, the V drains and culverts; • Cutting and clearing of vegetation within the used mine servitudes; • Maintenance of firebreaks; • Maintenance of gravel roads, regular grading and watering to suppress dust; • Repairing of fences as required; • Repair and maintenance of buried and surface pipelines in the servitudes, various valves, etc.; • Regular cleaning of silt traps drying bed, oil traps and the dirty water dams; etc.						
	Socio-Economic: **Positive Impacts**	Impacts on procurement / supporting industries / local SMME's The Mining Charter sets BEE compliance guidelines and as such Lefa Colliery will have to procure all products and/or services from BEE compliant outlets. In order to ensure and promote the procurement of products and/or services from SMMEs who are BEE compliant as well as black owned and/or black empowered, strategies are identified in the Colliery's SLP. It is expected that the majority of goods and services will be available locally from within the Municipal area. Supporting industries, local SMME's and contractors include: • Contractors to transport and dispose of domestic and industrial waste; • Equipment cleaning (trucks, conveyors, belt); • Maintenance and repairs of infrastructure, roads, etc.; • Operation of tuck shops;	N/A	Increased Employment Opportunities in the Long term	Compliance with programme principles / vision	Human Resources	Annually	Continuous

	• Laundry and catering services; • Gardening; • Security; etc.						
Socio-Economic	Impacts on current NON-MINING RELATED employment levels of the area The proposed Colliery is an underground operation and current land uses will to a large extent be unaffected. However, should negative impacts usually associated with coal mining (impacts on water resources, air/dust pollution, crime, etc.) manifest and affect current land uses (farming ventures, local businesses) to such an extent that existing operations cease or are downscaled, then job losses would be inevitable. It was not at this stage possible to determine the existing employment numbers within the study area and the extent of potential job losses, should it occur, is not known.	N/A	Supporting, utilising and building local economy	Keep records of service providers and where they are from	Human Resources/ Procurement	Annually	Continuous
Socio-Economic	Impacts on land values / market values of affected land portions A variety of factors could impact land values of affected land portions and include: • The availability and quality of ground and/or surface water for domestic and farming purposes; • Intrusion impacts, such as noise and dust, which could have an impact on crops, livestock and infrastructure; • Occurrence of criminal activities (theft, vandalism, etc.); • Occurrence of informal settlements, trespassing on private land, illegal grazing practices; and • Restrictions that are set by the mining company for future infrastructure developments on private properties due to underground mining operations, safety issues, and so forth. Although a mining right has not been awarded yet, the proposed Lefa Colliery has already impacted on sales of properties in the area. Willow Creek Estate is marketed and promoted as a pristine residential estate with access to clean surface and groundwater resources. Large infrastructure investments have been made (R21 million in 2006 for reservoirs, roads, fencing, engineering services and so forth). The proposed Lefa Colliery (with the associated impacts of a coal mine) has the potential to negatively impact the 'sense of place' as	N/A	Supporting, utilising and building local economy	Keep records of service providers and where they are from	Human Resources/ Procurement	Annually	Continuous

	well as natural resources of the area and as a consequence property values and sales at the estate could decline. Uncertainty with regards to the Lefa Colliery development and the timeframes associated with the awarding of a mining right exacerbates this impact. Should the mining right not be awarded, or the mine not be developed, potential impacts on land values would already have manifested. Financial impacts for Willow Creek Estate are also anticipated, as incomes derived through sales and levies have already been affected. It is furthermore possible that impacts on groundwater, if it occurs, will affect farmland as well as the Vaal Power Smallholding's property prices negatively, as they rely on groundwater for domestic and agricultural purposes and would be less marketable without this resource.						
Socio-Economic: **Positive Impacts**	Impacts on tourism activities Existing tourism activities and holiday accommodation towards Deneysville, the Vaal Dam and Vaal River could negatively be impacted if the aesthetic environment and 'sense of place' is affected to such an extent that tourists are discouraged to frequent the area. Since the mine is an underground operation it is not likely that current or future tourism activities will be affected significantly as a direct result of the mine development. However, the possible negative spin-offs of a coal mine (groundwater pollution, etc.) could affect the sale of properties along the Vaal River, and subsequently impact on leisure activities. Visual impacts of the shaft complex's current locality will manifest for road users on their way to the Dam, but the complex would in all likelihood not be visible from the Dam and its surrounds. Visual impacts are being assessed by a Specialist in this field.	N/A	Supporting, utilising and building local economy	Keep records of service providers and where they are from	Human Resources/ Procurement	Annually	Continuous
Socio-Economic: **Positive Impacts**	Skills development, training and skills equity A 'Skills, training and development Policy and Plan' has been drawn up with the purpose to provide guidelines for the implementation and maintenance of comprehensive training and development strategies and procedures. Annual monitoring is done by the DMRE. Funds for Human Resource Development for individual career development and in-	N/A	Supporting, utilising and building local economy	Keep records of service providers and where they are from	Human Resources/ Procurement	Annually	Continuous

	service training are provided. Training includes ABET to illiterate employees, learnerships registered with the Department of Labour, internal and external bursaries and internships to be provided in accordance the Mining Charter guidelines. Management will be responsible to develop career development and succession plans and to assess the potential of employees and establish a career path for each to ensure the development of each employee. Lefa Colliery aims to exceed the compliance targets set by DMRE for HDSA employment and the full staff compliment will reflect as follows by the end of 2021: • Top Management: 50% White; 50% Black • Senior Management: 40% White; 60% Black • Middle Management: 29% White; 71% Black • Junior Management: 11% White; 89% Black • Women in Core Activities: 12%						
Socio-Economic: **Positive Impacts**	Impacts on the local community / community projects As part of a mine's Social and Economic Development responsibility, the mine must get involved with a relevant Local Economic Development Projects as identified in the IDP of a municipality. Lefa Colliery is however not in the position to get involved with the day-to-day running of a LED project, but will make a financial contribution of R1 100 000 annually towards a project of the municipality's choice, over a period of 5 year	N/A	Supporting, utilising and building local economy	Keep records of service providers and where they are from	Human Resources/ Procurement	Annually	Continuous
Socio-Economic	Impacts of an 'outside' workforce / migrant labourers The Mining Charter requires that the majority of permanent employees be sourced from the "local" area. Local employees are in turn defined as people that originate/live within a 50 km radius of the project site. In terms of the Lefa Colliery this would also include people from outside the Metsimaholo Local Municipal area and would include people from as far as Vereeniging, Parys and the Gauteng province. This definition of a local workforce could thus be in conflict with the perception of a "local workforce" as seen by people living in close proximity to the Colliery. Locals could thus perceive "outsiders" as stealing employment opportunities that	N/A	Supporting, utilising and building local economy	Keep records of service providers and where they are from	Human Resources/ Procurement	Annually	Continuous

		should be reserved for them. Negative impacts that can manifest as a result of a migrant and/or "outside" workforce include: • Impacts on population changes, as the 'outside' / migrant workforce impacts on the population size, gender, racial and age composition of the local and regional Municipalities; • Additional pressure on local government for housing and associated infrastructure and services if workers are retrenched and unemployed; • A rise in the number and size of informal settlements if workers are retrenched; Impacts on the HIV/AIDS prevalence rate, unwanted pregnancies and the subsequent pressure on health care services, if short-term relations were established with local women and the migrants return to their families in the sending areas; • An increase in unemployment placing pressure on the Local Municipality to provide jobs if the workers are retrenched; and • Safety and security issues for the surrounding communities due to a growth in the number of unemployed people.						
	Socio-Economic	Impacts associated with blasting Blasting operations and the associated ground vibrations have the potential to affect structures in the study area, such as dams and houses, resulting in unnecessary reparation costs for private landowners.	N/A	Supporting, utilising and building local economy	Keep records of service providers and where they are from	Human Resources/ Procurement	Annually	Continuous
Activities as mentioned above	SASOL Pipeline Impacts - Independently Assessed (Specialist Risk Assessment Conducted)	Impact on the Sasol gas pipeline and servitude There is an existing gas pipeline and servitude that traverses the proposed mining area and concerns have been raised that the mining activities would encroach the buffers required for the servitude area. As far as could be established a Sasol representative has been included in the consultation process. The extent of the impact, if it should occur, has not been established at this stage.	N/A	Supporting, utilising and building local economy	Keep records of service providers and where they are from	Human Resources/ Procurement	Annually	Continuous
Closure and Rehabilitation Phase								
Closure and Rehabilitation	Geology and Soils	Potential for compaction and contamination from heavy vehicles usage and spillage of hydrocarbons, reagents (from infrastructure and machinery), raw materials and dirty water runoff, and the loss of soil due to erosion by wind and or water.	N/A	Pre-mining conditions after Closure or as per Approved Rehabilitation Plan	Monitoring of the condition of the surface areas and where current existing activities are taking place - Visual inspection	SHEQ	Monthly, Visual	Areas which are concurrently rehabilitated

Closure and Rehabilitation	Land Capability and Land Use	Rehabilitation of Land uses and Land Capability	Mine Closure and Rehabilitation Plan	Pre-mining conditions after Closure or as per Approved Rehabilitation Plan	Monitoring of the condition of the newly included portions in the MR	SHEQ	As per operational phase until Closure certificate is issued or alternatively as revised by specialist	Continuous
Closure and Rehabilitation	Ecological Impacts	Disturbance and loss of fauna through noise, light and dust pollution as well as hunting, trapping and killing of fauna.	National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)	Pre-mining conditions after Closure or as per Approved Rehabilitation Plan	Ecological Monitoring	SHEQ	As per operational phase until Closure certificate is issued or alternatively as revised by specialist	Continuous
Closure and Rehabilitation	Ecological Impacts	Spreading of alien invasive species and bush encroachment of indigenous species.	• Alien and Invasive Species Management Plan • Rehabilitation Objectives and Standards • Alien and Invasive Species Regulations (Government Notice 598 of 2014) and Alien and Invasive Species List, 2014 in terms of NEMBA (Government Notice 599 of 2014) • Notice 2 • Exempted Alien Species in terms of Section 66 (1) Notice 3 National Lists of Invasive Species in terms of Section 70(1) – List 1, 3-9 & 11 • Notice 4 Prohibited Alien Species in terms of Section 67 (1) – List 1, 3-7, 9-10 & 12	Pre-mining conditions after Closure or as per Approved Rehabilitation Plan	Ecological Monitoring, Alien and Invasive Management and Monitoring Programme	SHEQ	As per operational phase until Closure certificate is issued or alternatively as revised by specialist	Continuous
Closure and Rehabilitation - Implementation and ensuring maintenance and sustainability	Ecological Impacts - **Positive Impact**	Rehabilitation of area with natural vegetation and re-establishment of local biodiversity	• GNR 704 • Water Use Licence	Pre-mining conditions after Closure or as per	Implement IWWMP Monitoring prescribed	SHEQ, Contractor	As per operational phase until Closure	Continuous

			• Groundwater monitoring program	Approved Rehabilitation Plan			certificate is issued or alternatively as revised by specialist	
Closure and Rehabilitation	Ecological Impacts - **Positive Impact**	Rehabilitation of area with natural vegetation and re-establishment of local biodiversity	• GNR 704 • Water Use Licence • Groundwater monitoring program	Pre-mining conditions after Closure or as per Approved Rehabilitation Plan	Implement IWWMP Monitoring prescribed	SHEQ, Contractor	As per operational phase until Closure certificate is issued or alternatively as revised by specialist	Continuous
Rehabilitation of site, removal of infrastructure, closure of waste management facilities (including Stormwater)	Hydrological Aspects; Surface water and Groundwater	Stormwater, erosion and siltation impacts due to a lack of implementing measures to manage stormwater run-off quantity and quality during the closure phase.	• GNR 704 • Water Use Licence • Groundwater monitoring program	Water Quality: In line with the specific Integrated Unit of Analysis RQS (Resource Quality Standards) for Environmental water resources and Water Quality as specified in WUL	Implement IWWMP Monitoring prescribed	SHEQ, Contractor / specialist	Monthly for Surface water quality, Quarterly for Groundwater quality, including 2/3 years post closure monitoring	Continuous
Rehabilitation of site, removal of infrastructure, closure of waste management facilities (including Stormwater)	Hydrological Aspects; Surface water and Groundwater	Contamination of stormwater runoff and ground water, caused by: - Sediment release; - Chemicals such as hydrocarbon-based fuels and oils or lubricants spilled from heavy duty vehicles; - Effluent discharges, due to a lack of stormwater management.	• GNR 704 • Water Use Licence • Groundwater monitoring program	Water Quality: In line with the specific Integrated Unit of Analysis RQS (Resource Quality Standards) for Environmental water resources and Water Quality as specified in WUL	Implement IWWMP Monitoring prescribed	SHEQ, Contractor / specialist	Monthly for Surface water quality, Bi-annually for Aquatic Ecology and Quarterly for Groundwater quality and quantity - or as additionally specified in WUL & WML	Continuous
Closure and Rehabilitation	Hydrological Aspects; Surface water and Groundwater	Impacts of dewatering on the groundwater aquifer should water be abstracted from ground water during the closure phase.	• GNR 704 • Water Use Licence • Groundwater monitoring program	Keeping the water table levels constant and not forming an unrecoverable drawdown cone, thereby impacting on water availability of other water users	Implement IWWMP Monitoring prescribed , water levels	SHEQ, Contractor / specialist	Monthly for Surface water quality, Quarterly for Groundwater quality, including 2/3 years post closure monitoring	Continuous
Rehabilitation of site, removal of infrastructure, closure of waste management facilities (including Stormwater)	Hydrological Aspects; Surface water and Groundwater	Impaction groundwater from the pollution plume associated with the waste storage facilities and possible Decant	• GNR 704 • Water Use Licence • Groundwater monitoring program • Approved IWWMP • Monitoring programme • Spill procedure	Water Quality as specified in WUL for process related water. GN 704: Capturing and containing dirty water	Implement IWWMP Monitoring prescribed	SHEQ, Contractor / specialist	Monthly for Surface water quality, Quarterly for Groundwater quality, including 2/3 years post closure monitoring	Continuous

Rehabilitation of site, removal of infrastructure, closure of waste management facilities (including Stormwater)	Hydrological Aspects; Surface water and Groundwater	Impaction groundwater from the pollution and possible Acid Mine Drainage	• GNR 704 • Water Use Licence • Groundwater monitoring program • Approved IWWMP • Monitoring programme • Spill procedure	Water Quality as specified in WUL for process related water. GN 704: Capturing and containing dirty water	Implement IWWMP Monitoring prescribed	SHEQ, Contractor / specialist	Monthly for Surface water quality, Quarterly for Groundwater quality, including 2/3 years post closure monitoring	Continuous
Closure and Rehabilitation	Air Quality	Demolition & Removal of all infrastructure (incl. transportation off site) During this activity, there is demolition of buildings and foundation and subsequent removal of rubbles generated. There is cleaning-up of workshops, fuels and reagents, removal of power and water supply, removal of haul and access roads. Potential for impacts during this phase will depend on the extent of demolition and rehabilitation efforts during closure as well as features which will remain. The impacts on the atmospheric environment during the decommissioning phase will be similar to the impacts during the construction phase. The process includes dismantling and demolition of existing infrastructure, transporting and handling of topsoil on unpaved roads in order to bring the site to its initial/rehabilitated state. Demolition and removal of all infrastructures will cause fugitive dust emissions. The impacts will be short-term and localised. Any implication or implications this phase will have on ambient air quality will seize once the activities are finalised.	• South Africa National Standard 1929:2005: Ambient Air Quality: Limits for common pollution • Meet the requirements of the National Dust Control regulations, 2013, as published in the Government Gazette (No. 36974) of 1 November 2013 (GNR 827 of 1 November 2013), in terms of the National Environmental Management: Air Quality Act 39 of 2004 • Dust fall monitoring programme should be implemented	Health and Safety Standards. A Safe and Low Risk Environment. Air Quality Standards	Conduct air quality monitoring/ Dust buckets.	SHEQ	Monthly until Closure Certificate is issued or no more surface impacts are occurring as part of the Ergosat LEFA Colliery project	Continuous
Closure and Rehabilitation	Noise and Lighting	Nuisance and health risks caused by an increase in the ambient noise level as a result of noise impacts associated with the operation of heavy-duty vehicles and equipment.	• Blasting Regulations • Vibration management plan. Noise Management and Monitoring Programme	Health and Safety Standards. A Safe and Low Risk Environment. Noise Regulations	Conduct noise monitoring and to include any other noise sources not previously assessed as part of current Noise management programme	SHEQ, Contractor	As prescribed during Operational Phase or until revised by specialist	Continuous
Closure and Rehabilitation	Noise and Lighting	Disturbance due to vibrations caused by heavy duty vehicles.	Refer above	Health and Safety Standards. A Safe and Low Risk Environment. Noise Regulations	Conduct noise monitoring and to include any other noise sources not previously assessed as part of current	SHEQ, Contractor	As prescribed during Operational Phase or until revised by specialist	

					Noise management programme			
Closure and Rehabilitation	Noise and Lighting	Impact of security lighting on surrounding landowners and animals.	Refer above	Health and Safety Standards. A Safe and Low Risk Environment. Noise Regulations	Investigate complaints when received and mitigate	SHEQ	As prescribed during Operational Phase or until revised by specialist	
Closure and Rehabilitation	Sites of archaeological and cultural interests	Graves to be protected in-situ or as per recommendations made by specialist	National Heritage Resources Act, 1999 (Act No. 25 of 1999)	No impacts on Heritage Resources	Record occurrences of sites and artefacts if found, contact a specialist immediately.	SHEQ	As prescribed for Operational Phase	Continuous
Closure and Rehabilitation	Visual aspects	Visibility from sensitive receptors / visual scarring of the landscape as a result of the closure and rehabilitation activities.	Final Land form and Mine Rehabilitation Plans as approved.	Sense of Place. Pre-mining conditions after Closure	Monitor general condition and Implement good housekeeping	SHEQ, Mine Manager	As prescribed for Operational Phase	
Closure and Rehabilitation	Waste (Including Hazardous Waste)	Generation and disposal of general waste, litter and hazardous material created from the decommissioning activities	Waste Regulations (NEM:WA) National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) [as amended]	Waste Regulations (NEM:WA); WUL, IWWMP	Monitor volumes of waste disposed/ generated and volumes removed by Contractors	SHEQ, Mine Manager	Monthly generation and disposal	Continuous
Closure and Rehabilitation, Rehabilitation of site, removal of infrastructure, sealing of shafts and closure of waste facilities	Waste (Including Hazardous Waste)	Generation and disposal of additional hazardous waste	Waste Regulations (NEM:WA); WUL, IWWMP	Waste Regulations (NEM:WA); WUL, IWWMP	Monitor volumes of waste disposed/ generated and volumes removed by Contractors	SHEQ, Mine Manager	Monthly	Continuous
Closure and Rehabilitation	Services	Need for additional services i.e. water, electricity and sewerage systems during the closure phase causing additional strain on natural resources and infrastructure.	N/A. Municipal regulations if required	Service Provided Agreements	Energy and water saving initiatives	SHEQ, Mine Manager	Continuous	Continuous
Closure and Rehabilitation	Traffic	The change in the traffic patterns as a result of traffic entering and exiting the proposed mine on the surrounding road infrastructure and existing traffic.	Traffic Management Plan as drafted before project implementation	As per Traffic Management Plan	As per Traffic Management Plan	SHEQ, Mine Manager	As per Traffic Management Plan	Continuous
Closure and Rehabilitation	Traffic	Nuisance, health and safety risks caused by increased traffic on an adjacent to the study area including cars and heavy vehicles.	Traffic Management Plan as drafted before project implementation	As per Traffic Management Plan	As per Traffic Management Plan	SHEQ, Mine Manager	As per Traffic Management Plan	Continuous
Closure and Rehabilitation	Health and Safety	Possibility of closure activities and workers causing veld fires, which can potentially cause injury and or loss of life to workers and surrounding landowners and visitors.	Health and Safety Regulations as described in the Mineral and Petroleum Resources Development Act,	Health and Safety Regulations. A safe and low risk environment	Monitor Emergency Preparedness	SHEQ, Mine Manager	Continuous	Continuous

			2002 (Act No. 28 of 2002) [as amended]					
Rehabilitation of site, removal of infrastructure, closure of waste management facilities (including Stormwater)	Health and Safety	Increased risk to public health and safety: Dangerous areas including the waste management facilities poses health risks and possible loss of life to mine workers and visitors to the site.	Refer above	Health and Safety Regulations. A safe and low risk environment	Health and Safety Occupational Monitoring,	SHEQ, Mine Manager	Continuous	Continuous
Rehabilitation of site, removal of infrastructure, closure of waste management facilities (including Stormwater)	Socio-Economic	Socio-economic impact on farmers, labourers and surrounding landowners and residents due to negative impacts on groundwater, dust pollution, noise pollution etc.	Social and Labour Plan	Health and Safety Regulations. A safe and low risk environment	Health and Safety Occupational Monitoring,	SHEQ, Mine Manager	Annually	Continuous
Closure and Rehabilitation	Socio-Economic	Economic impact should there be an incident of public health and safety.	Social and Labour Plan	Health and Safety Regulations. A safe and low risk environment	Complaints should be investigated (if any)	SHEQ	Annually	Continuous
Closure and Rehabilitation	Socio-Economic	Sourcing supplies from local residents and businesses boosting the local economy for an extended period of time.	Social and Labour Plan	Supporting, utilising and building local economy	Keep records of service providers and where they are from	Human Resources	Annually	Continuous
Closure and Rehabilitation	Socio-Economic	Reduced period of providing employment for local residents and skills transfer to unskilled and semi-skilled unemployed individuals.	Social and Labour Plan	Increased Employment Opportunities in the Long term	Compliance with programme principles / vision	Human Resources/ Procurement	Annually	Continuous
Closure and Rehabilitation	Sasol Pipelines	Impacts during Closure phase to the Sasol pipelines	Social and Labour Plan	Increased Employment Opportunities in the Long term	Compliance with programme principles / vision	Human Resources/ Procurement	Annually	Continuous

31.1 DETAILED MONITORING PROGRAMMES AS DESCRIBED FOR ACTIVITIES

31.1.1 Geology, Soil and Erosion Monitoring Programme

Soil monitoring will involve the inspection of soil which has been disturbed, compacted, contaminated or eroded. Soil monitoring will assist in determining where soils have not been sufficiently rehabilitated. Where soils have been contaminated by the spillage of hydrocarbon, monitoring must take place on a weekly basis for at least four (4) weeks or until the soil is considered sufficiently rehabilitated. Soils samples should be taken and submitted to a laboratory to test for contaminant content if it is considered necessary.

Soil monitoring should be undertaken:

- Areas which have been rehabilitated;
- After remediation soils which have been contaminated by spillages during the operational phase; and
- Closure and decommissioning phase.

All watercourses or riparian areas requiring re-vegetation should be monitored for signs of erosion. In addition, all of the following areas should also be monitored:

- All stormwater discharge points (if any);
- All clean water diversion discharge points; and
- All roads and crossings.

Monitoring activities should consist of fixed-point photography, as well as a walk-through survey to observe for signs of erosion in the field. Monitoring should be done as specified and at the end of the rainy season. Any erosion damage observed should be repaired immediately.

31.1.2 Surface and Ground Water Monitoring Programme

31.1.2.1 Surface water monitoring

Surface water monitoring must not only adhere to the EMPR requirements, but those specified as per WUL and compliance with the WUL will ensure effective surface water monitoring.

31.1.2.2 Groundwater Monitoring

Groundwater monitoring must not only adhere to the EMPR requirements, but those specified as per WUL and compliance with the WUL will ensure effective groundwater monitoring.

31.1.2.3 Ecological and Vegetation Establishment

31.1.2.3.1 Vegetation re-establishment

Areas re-vegetated following impacting activities, decommissioning activities or any activities leading to vegetation removal and disturbance should be monitored following seeding to ensure successful establishment of vegetation. The following broad guidelines should apply, though the site-specific details should be determined by a suitably qualified expert:

- Monthly monitoring for the first six (6) months, then annual monitoring during the growing season;
- Monitoring for the first six (6) months should focus on cover;
- 70% cover should be achieved after 3 months;
- Annual monitoring (representative sample of re-vegetated sites only) should be undertaken until the appointed independent specialist is satisfied that a sustainable vegetation cover has been established.

31.1.2.3.2 Alien vegetation

An ongoing alien vegetation removal programme should be implemented during all phases of the development.

31.1.3 Noise Monitoring Program

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

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

Active environmental noise monitoring is recommended as per Table 31-1 above (Quarterly).

A quarterly Acoustical Measurement & Audit Programme report is recommended. The measurement report frequency should be reviewed after the first two or three quarterly reports are conducted. The frequency of the reports can be adjusted according to the level of mitigation options implemented by the developer onsite and based on the recommendations of the acoustical consultant.

While this section recommends a noise monitoring programme, it should be used as a guideline as site specific conditions may require that the monitoring locations, frequency or procedure be adapted.

It is recommended that the measurements are conducted during all phases with prior baseline measurements conducted a few times (during all season) before the construction phase. This will enable the improvement of the baseline characterisation.

Quarterly measurements are recommended NSD02 – NSD05, NSD6 and NSD7 as shown in Figure 10-35.

31.1.4 Heritage Monitoring Program

If the graves will be conserved in situ, monitoring of compliance needs to be undertaken throughout the lifespan of the project. No other specific heritage monitoring program was described. However, should any heritage remains be discovered during any phase of the development, a specialist should be consulted.

31.1.5 Air/Dust Monitoring Program

It is highly recommended that a dust monitoring campaign be conducted prior to the commencement of the proposed mining operations and that this then continues for the life of mine in order to establish historical repository of data needed to fully understand/address fugitive and airborne dust emissions from the construction, operation and closure activities. Managing dust fallout effectively will result in the reduction of respiratory diseases that are as a result of air pollution, reduced risk of damage to property, improved visibility, and fewer disturbances to existing flora and fauna habitats.

31.1.5.1 Gravimetrical Dust Fallout – (Milligram/Square Meter/Day) Or (mg/m^2/Day) (Monthly 8 Samples)

Site layout for sampling points must be carried out according to the eight main compass directions; the site layout and equipment placement must be done in accordance with the ASTM standard, D 1739 – 2010, thereafter relevant sampling reference numbers will be allocated to the receptors accordingly. At each gravimetric dust fallout gauge/receptor point there is a stand built according to specification containing the dust sample collection bucket. Samples will be collected after a 1 month running period (+-30 day's exposure). After sample collection, the samples are taken to a SANAS accredited laboratory as required. A visual site investigation is done where after correlations are drawn and findings are identified and reported on.

Dust buckets of a standard size and shape are prepared and set up at locations related to the eight main compass points on the borders of the property so that dust can settle in them for periods of 30+/-2 days. The dust buckets are then sealed and replaced with new empty ones and send away to the SANAS accredited laboratory for analysis. The masses of the water-soluble and –insoluble components of the material collected are then determined and results are reported as mg/m²/day. This methodology is described according to South African National Standards 1929:2004 and the American Society for Testing and Materials (ASTM) Designation: D 1739-98 (2010). The results for this method of testing are obtained by gravimetrical weighing. The apparatus required include open top buckets/containers not less than 150 mm in diameter with a height not less than twice its diameter. The buckets must be placed on a stand at a height of 2+/-0.2 m above the ground.

Taken into account the above site layout, predominant wind direction and modelling results, the site layout as shown in the Figure 10-34 are recommended.

31.1.5.2 Particulate Matter PM10 (Monthly 8 Samples)

As reported previously, the Ergosat Coal Project conducted PM10 monitoring during February 2017. The client should re-establish a fine particulate monitoring programme, which should include one particulate instrument to monitor PM10 and preferably PM2.5 from the mine operation. PM10 instrument that could be used can be similar to the one used during this investigation. The handheld sampling instrument not only allows for sampling in the 8 main wind directions, but also on-site sampling down-wind of potential dust sources to quantify and determine impacts that need to be managed. It is advised to conduct this sampling on a monthly basis but also when the need arise during periods of elevated dust concentrations being emanated from the site.

31.1.6 Waste Monitoring

The following wastes needs to be monitored for the project:

- The volumes of waste deposited (All Residue Stockpiles);
- The volume of water removed and disposed of (WUL); and
- As may be prescribed by the Waste Management License.

31.2 ENVIRONMENTAL MONITORING AND AUDITING

The Department of Environmental Affairs defines environmental auditing as “a process whereby an organisation’s environmental performance is tested against its environmental policies and objectives” Monitoring and auditing is an essential environmental management tool which is used to assess, evaluate and manage environmental and sustainability issues:

In order to ensure that the objectives of sustainable development and integrated environmental management are met and in order to obtain data which can inform continuous improvement of environmental practices at the site (adaptive management), monitoring and reporting will be an essential component of the operations.

Monitoring and management actions associated with the project are contained in Section 31.2 of this report as well as in the various specialist reports associated with this project. This section provides a summary of the critical monitoring aspects per specific environmental field.

31.3 GENERAL MONITORING AND MANAGEMENT

The appointment of a suitably qualified on-site Environmental Control Officer (ECO) is essential to the successful implementation and management of this project, although this role can be fulfilled by the SHE Representative. The ECO will be responsible for the implementation of the EMP, applicable environmental legislation and any stipulations/conditions set by the relevant competent authorities (including but not limited to the DMRE and DHSWS). The Environmental officer will conduct formal monthly site inspections and conduct an internal annual audit during the phases of the development.

An external Environmental Auditor should also be appointed to conduct annual audits for the duration of the project. The auditor should monitor the success and effective implementation of the environmental management measures stipulated by applicable legislation, the EIA/EMP, and any conditions set by the competent authorities. Following each site visit, the auditor should submit a report to the DMRE documenting the success/failure of the implementation of the management measures at the operations.

31.3.1 Specific Monitoring Requirements

Monitoring of the development (both on site and where appropriate in the surrounding environments) should be

considered a high priority and should be conducted in accordance with the relevant specialist recommendations as summarized below:

31.3.2 Monitoring Protocol

It is essential that during the implementation and operational phase of the development that the monitoring of certain elements are carried out to ensure compliance with regulatory bodies. A monitoring protocol will be required. The monitoring only includes those activities identified in the EMP and excludes any monitoring that should take place according to the water use license and compliance in terms of the WUL and WML is essential.

31.3.3 Monitoring Requirements and Record Keeping

To ensure that the procedures outlined throughout the EMP are implemented effectively, it will be necessary to monitor the implementation of the EMP and evaluate the success of achieving the objectives listed in the EMP. To ensure that all personnel on site are aware of their obligation to protect the environment, induction training will also include environmental awareness.

The audit procedure will include a Compliance audit, conducted by the Environmental Control Officer. Where the objectives of the EMP are not being met the reasons will be determined and remedial action or variation to the tasks will be recommended. Major residual effects shall be documented in a Non-Conformance Report, during the remaining phases of the project. Follow-up audits will be conducted as per the audit protocol in the EMP.

31.3.3.1 Implementation Phase

The following monitoring needs to be conducted:

- The onset of monitoring (and those recorded within the Baseline assessment) will provide enough baseline data for comparison against future monitoring of the activities if re-opening occurs, especially since no significant change in monitoring is prescribed.
- All monitoring should commence at full scale as soon as re-opening is envisaged to ensure recent data for comparison against the operational phase.

31.3.3.2 Operational Phase

The following monitoring must be conducted: Please refer to Section 31 and also Table 28-1 regarding mitigation outcomes and
Table 31-1 for mechanisms for monitoring. Adherance to all conditions and monitoring frameworks as prescribed by the mine WUL and WML.

31.3.3.3 Audit Protocol

It is essential that during the current and future phases of the development, the monitoring and auditing of certain elements are carried out to ensure compliance with regulatory bodies. An Audit Protocol for all phases will be required. The auditing only includes those activities identified in the EIA/EMP and excludes any auditing that should take place according to the water use license or any other legislative authorization process if and when they will be authorized.

31.3.3.3.1 Construction, Operational and Decommisioning Phase

The following audits must be completed:

- EMP compliance (Continuously): to be checked by an on-site ECO, SHE representative or Environmental manager (EM).
- External environmental compliance audits (EIA/EMP annually during operations).

31.3.3.4 Environmental Incidents

An environmental incident is defined as any unplanned event that results in actual or potential damage to the environment, whether of a serious or non-serious nature. An incident may involve non-conformance with environmental legal requirements, the requirements of the EMP, or contravention of written or verbal orders given by the ECO or relevant authority.

All details regarding Environmental Incidents and procedures have been described within Section 24.3.2 above and should be handled accordingly.

31.3.3.5 Penalties and Fines for Non-Compliance or Misconduct

This EMP forms part of the contract agreement between the Client and the Principal contractor. As such, non-compliance with conditions of the EMP will amount to a breach of contract. Penalties will be issued directly to the contractor by the applicant in the event of non-compliance to the EMP specifications. The issuing of a penalty will be preceded by a verbal warning by the applicant, as well as strict instruction in at least one monthly ECO report to rectify the situation. The ECO and applicant will communicate with regards to realistic timeframes for possible rectification of the contravention, and possible consequences of continued non-compliance to the EMP.

Penalties incurred do not preclude prosecution under any other law. Cost of rehabilitation and/or repair of environmental resources that were harmed by the actions of the contractor if such actions were in contravention of the specifications of the EMP will be borne by the contractor himself. Penalties may be issued over and above such costs. The repair or rehabilitation of any environmental damage caused by non-compliance with the EMP cannot be claimed in the Contract Bill, nor can any extension of time be claimed for such works. Penalty amounts shall be deducted from Certificate payments made to the Contractor.

The following categories of non-compliance are an indication of the severity of the contravention, and the fine or penalty amounts may be adjusted depending on the seriousness of the infringement:

- Category One: Acts of non-compliance that are unsightly, a nuisance or disruptive to adjacent landowners, existing communities, tourists or persons passing through the area.
- Category Two: Acts of non-compliance that cause minor environmental impact or localized disturbance.
- Category Three: Acts of non-compliance that affect significant environmental impact extending beyond point source.
- Category Four: Acts of non-compliance that result in major environmental impact affecting large areas, site character, protected species or conservation areas.

31.3.4 Environmental Awareness Plan

Environmental awareness training is critical for two primary reasons:

a) The workforce must understand how they can play a role in achieving the objectives specified in the EMP; and
b) The workforce must understand their obligations in terms of the implementation of the EMP and adherence to environmental-legislative requirements.

This environmental awareness plan is aimed at ensuring that employees, contractors, subcontractors and other relevant parties are aware of and able to meet their environmental commitments. This plan is to be updated on a yearly basis during the phases of the project in light of operational changes, learning experiences and identified training needs.

All full-time staff and contractors are required to attend an induction session when they start, which session should include environmental aspects.

It is therefore recommended that the ECO/Environmental Manager be involved in induction training. Since the induction and entry will be located on the existing premises, the induction sessions may be modified/adapted

based on the audience attending the specific session, but it should ensure that all employees gain a suitable understanding of:

- Environmental requirements of the project, and how these will be implemented and monitored;
- Including each employee's responsibilities with respect to environmental issues;
- Contents and commitments of the EMP, including no-go areas, employee conduct, pollution prevention (prohibitions against littering, unauthorized fires, loud music, entry to adjacent properties, road conduct etc.);
- Environmentally sensitive areas on and around the development sites, including why these are deemed important and how these are to be managed. Employees will also be made aware of protected species found on the existing and surrounding site and how these are to be conserved, as well as alien invasive species potentially found on the site and how these should be managed; and
- Incident identification, remediation and reporting requirements: what constitutes an environmental incident (spillages, fire, etc.) and how to react when such an incident occurs.

Environmental training will not be restricted to induction training sessions alone, but will be conducted on an on-going basis throughout the lifecycle of the project as and when required. Records are to be kept of the type of training given (matters discussed and by whom), date on which training was given and the attendees of each training session.

31.3.4.1 Responsible Persons

Compliance with the emergency response plan and ensuring individual safety will be responsibility of all employees and contractors on the mine. Record keeping, investigation and management of emergencies will be the responsibility of the following persons:

- Mine Manager;
- Environmental Management Representative- this includes the Safety, Health and Environmental (SHE) managers and officers;
- Mining Engineer; and
- Site Manager(s).

31.3.4.2 Defining an Environmental Response Plan

Environmental emergencies occur over the short term and require an immediate response. A mine, as part of its management tools, especially if it is ISO 9000 and ISO 14001 compliant, should have an Environmental Emergency Response Plan. The plan should be disseminated to all employees and contractors and in the event of an emergency, it should be consulted.

This Environmental Emergency Response Plan should be used together with the Emergency Preparedness Plan placed on the mine where it will be easily viewed. The Emergency Response Plan should contain a list of procedures, evacuation routes and a list of emergency contact numbers.

If the environmental emergency has the potential to affect surrounding communities, they should be alerted via alarm signals or contacted in person. The surrounding community will be informed, prior to mining taking place, of the potential dangers and emergencies that exist, and the actions to be taken in such emergencies.

Communication is vital in an emergency and thus communication devices, such as mobile phones, two-way radios, pagers or telephones, must be placed on the mine. A checklist of emergency response units must be consulted and the relevant units notified.

The checklist includes:

- Fire department;
- Police;
- Emergency health services such as ambulances, paramedic teams, poisons centres;
- Hospitals, both local and further afield, for specialist care;

- Public health authorities;
- Environmental agencies, especially those responsible for air, water and waste issues;
- Other industrial facilities in the vicinity with emergency response facilities;
- Public works and highways departments, port and airport authorities; and
- Public information authorities and media organisations.

31.3.4.3 Process for Identifying Environmental Emergency Procedures

The process that will be used to identify emergency situations at the mining operations will be conducted in terms of the Aspects Registers and may include the following emergencies:

- Safety risks and subsidence;
- Dam Overflow;
- Dam Breach (on-site);
- Residue Stockpile Failures and Risks;
- Berm Breach/Drain Overflow;
- Hydrocarbon Spill (diesel, oil, grease, etc.); and
- Veld Fires.

The necessary actions required, as well as the responsible person for ensuring that the actions are followed through and the reporting requirements are adhered to, to ensure effective and efficient response to each of the environmental emergency situations listed above are set out in this procedure.

31.3.4.4 Most likely Potential Environmental Emergencies

The following define the most likely potential environmental emergencies:

- Accidents;
- Fires;
- A major hydrocarbon spill or leak;
- A major spill or leak of process water;
- Flooding;
- Subsidence; and
- Explosions.

31.3.4.5 Accidents

In the case of a medical accident or problem, refer to the Emergency Preparedness Plan.

31.3.5 Indicate the Frequency of the Submission of the Performance Assessment Report

Yearly performance assessment reports are recommended. Refer to details on Auditing procedures (Section 31.3.3.3).

31.3.6 Manner In Which Risks Will Be Dealt With In Order To Avoid Pollution Or The Degradation of The Environment

Refer to Table 28-1 for the recommended mitigation measures to limit environmental impacts. A suitable risk matix may be used to evaluate operational risks during any stage of the development. Ensure compilation and compliance with all Standard Operational Procedures (SOPs) and that they be updated annually/bi-annually to ensure validity.

Also create a system or platform for I&APs to submit any grievances to the mine and communication with internal and external stakeholder i.e an Environmental and Social Management System (ESMS) system.

31.4 SPECIFIC INFORMATION REQUIRED BY THE COMPETENT AUTHORITY

(among others, confirm that the financial provision will be reviewed annually).

The Immediate Closure Provision as calculated will be updated yearly as part of the annual liability assessment required by the MPRDA and GNR 1147 in terms of the NEMA, once operations commence. The Final Rehabilitation plan will need to be developed as required.

32 UNDERTAKINGS

The EAP, ……..Elemental Sustainability (Pty) Ltd ……., herewith confirms
a) The correctness of the information provided in the reports;
b) The inclusion of comments and inputs from stakeholders and I&APs;
c) The inclusion of inputs and recommendations from the specialist reports where relevant; and
d) The acceptability of the project in relation to the finding of the assessment and level of mitigation proposed;
Signed at.....on this..... day.....
Signature of applicant .....
Designation.....

COMMITMENT/UNDERTAKING BY THE APPLICANT

I, ……Heinrich Schultz……, the undersigned and duly authorised thereto by the Ergosat (Pty) Ltd: Lefa Colliery undertake to adhere to the requirements and to the conditions as set out in the EMPR submitted to the Director: Mineral Development and approved on .....
.....
Signed at.....on this..... day.....
Signature of applicant .....
Designation.....

-END-

33 REFERENCES

Big Rock Engineering CC. (2020). *Risk Assessment for Underground Mining in close proximity to the Sasol Gas Line, dated April 2020.*

Corli Havenga Transportation Engineers (Pty) Ltd. (2017). *Traffic Impact Assessment for the LEFA Colliery (Ergosat), dated 13 March 2017.*

Eco Elementum Environmental & Engineering. (2017). *Egosat (Pty) Ltd - Visual Impact Assessment (VIA), dated March 2017.*

Eco Elementum Environmental & Engineering. (2017). *Ergosat (Pty) Ltd Mining Right Application - Baseline Air Quality Impact Assessment (AQIA), Ref: 16-194-AIA-REP, dated March 2017.*

Eco Elementum Environmental and Engineering. (2019). *Geohydrological Report for the Inputs to the WULA for the LEFA Colliery, dated 2019/10/21.*

EnviFlora. (2017). *A Faunal Habitat Assessment on the proposed LEFA Colliery Mining Right Area, near Deneysville, Free State Province, dated March 2017.*

EnviFlora. (2017). *Proposed LEFA Colliery Mining Area report by Enviflora.*

EnviFlora Avifaunal. (2017). *Avifaunal Impact Assessment on the proposed LEFA Colliery Mining Area near Deneysville, February 2017.*

Enviro Acoustic Research cc. (2017). *Noise study for Environmental Impact Assessment, developed for the LEFA Colliery, Free State Province.*

Geo Pollutions Technologies - Gauteng (Pty) Ltd. (2017). *Groundwater Study for the LEFA Colliery, Free State.*

Geo Pollutions Technologies - Gauteng (Pty) Ltd. (2019). *Wetland Flow Driver Assessment for Ergosat (LEFA) Colliery, dated November 2019.*

Integrated Rural 7 Urban Development Expertise (Pty) Ltd. (2017). *Socio-Economic Impact Assessment Report for the proposed Mining Right for LEFA Colliery, dated April 2017.*

Limosella Consulting (Pty) Ltd. (2019). *Ergosat (Pty) Ltd Mining Application, Vaal Power Small Holdings, Free State Province. Wetland/Riparian Delineation and Functional Assessment, dated September 2019.*

M2 Environmental Connections cc. (2017). *Ergosat - Vaal River and Taaibosspruit: Aquatic Ecological Assessment.*

Marais-Botes, L. (2017). *Phase 1 Heritage Impact Assessment (HIA) for the Environmental Impact Assessment (EIa) and WUL for a MR on an existing Prospecting Right Ref. FS30/5/1/1/2/10158 PR to be known as LEFA Colliery.*

Nurizon Consulting (Pty) Ltd. (2020). *Ergosat - Lefa Colliery: Stormwater Management Plan, P0380/RPRT/001, dated 2020/04/06.*

Rehab Green Monitoring Consultants CC . (2017). *Environmental and Rehabilitation Monitoring Consultant cc (2017). Soil, land capability and land use assessment of Ergosat (Pty) Ltd's proposed mining infrastructure area, situated on the farm Wenen 1152 near Vereni.*

34 APPENDICES

Appendix 1: Qualifications and Resume of EAP
Appendix 2: Experience of the EAP
Appendix 3: Locality Plans (A3)
Appendix 4: Master layout plan / Site Layout information (A3 Drawings)
Appendix 5: Land Use Map (A3)
Appendix 6: Public Participation Documents (Initial Process and Appeal Details)
Appendix 7: Public Participation Documents (After Ministerial decision – Current PPP to be undertaken)
Appendix 8: Specialist report – Vegetation Assessment
Appendix 9: Specialist report – AviFaunal Assessment
Appendix 10: Specialist report – Fauna Impact Assessment
Appendix 11: Specialist report – Heritage Impact Assessment
Appendix 12: Specialist report – Air Quality Impact Assessment
Appendix 13: Specialist report – Visual Impact Assessment
Appendix 14: Specialist report – Noise Impact Assessment
Appendix 15: Specialist report – Social Impact Assessment
Appendix 16: Specialist report – Traffic Impact Assessment
Appendix 17: Specialist report – Wetland Impact Assessment – *Additional Study done*
Appendix 18: Specialist report – Hydrogeological Assessment – *Additional Study done*
Appendix 19: Specialist report – Hydropedological Assessment – *Additional Study done*
Appendix 20: Specialist report – Biomonitoring Assessment – *Additional Study done*
Appendix 21: Specialist report – Risk Assessment for SASOL pipeline– *Additional Study done*
Appendix 22: Specialist report – Rehabilitation and Closure Assessment
Appendix 23: Specialist report – Soil and Land Capability Report
Appendix 24: Nurizon Stormwater Management Plan Report Finalised – *Additional Study done*
Appendix 25: Mining Works Programme
Appendix 26: Social and Labour Plan
Appendix 27: Acceptance of Scoping Report