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MMAKAU COAL (PTY) LTD

SCHURVEKOP MINE

ENVIRONMENTAL IMPACT ASSESSMENT (EIA) AND ENVIRONMENTAL MANAGEMENT PLAN (EMP) REPORT

JANUARY 2022

REFERENCE NO.: MP 30/5/1/2/3/2/1 (10366MR) EM

ISSUED FOR REVIEW AND COMMENT

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DOCUMENT CONTROL

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EXECUTIVE SUMMARY

Mmakau Coal (Pty) Ltd holds a Prospecting Right (1063PR) over Portions 6, 8, RE of 15, 16, 17, 18, 19 and 20 of the farm Schurvekop 227 IS, which is in the Magisterial District of Bethal, Mpumalanga Province.

Mmakau Coal (Pty) Ltd intends to develop the proposed Schurvekop Mine and as such has submitted an application for a Mining Right in terms of the Mineral and Petroleum Resources Development Act, Act No. 28 of 2002 (MPRDA), Reference number MP 30/5/1/2/2/10366MR. An application for integrated environmental authorisation was submitted simultaneously.

The proposed mining operation comprises the underground mining of coal. Coal will be conveyed to surface for processing before being trucked to market. The processing of coal results in the generation of mine residue (slurry and discard) which will be placed on a mine residue facility (MRF), to be constructed onsite. It is understood that a portion of the coal may also be processed at the nearby Forzando operations.

Pertinent Project information is summarised in the table below:

Aspect	**Description**
The Applicant	Mmakau Coal (Pty) Ltd
Project Name	Schurvekop Mine
Reference Number	MP 30/5/1/2/3/2/1 (10366MR) EM
Affected Properties	Portions 6, 8, RE of 15, 16, 17, 18, 19 and 20 of the farm Schurvekop 227 IS
Central Coordinates of Mining Right Area (MRA)	26°16'49.42"S 29°29'31.76"E
Direction & Distance to Nearest Towns	The MRA is situated 20km to the north of Bethal and 20km east of Ga-Nala (Kriel).
Magisterial District	Bethal
Extent of MRA	696.5716 ha
Activity description	Underground mining and processing of coal.
Life of Mine (LoM)	16 years
Competent Authority (CA)	Department of Mineral Resources and Energy (DMRE) Mpumalanga Region

As the application for environmental authorisation relates to activities identified in terms of Listing Notice 1, 2 and 3 of the Environmental Impact Assessment (EIA) Regulations, 2014 (as amended) and Category B of the List of Waste Management Activities, a full Scoping and Environmental Impact Report (S&EIR) is required. Cabanga Environmental has been appointed by Mmakau Coal as the independent Environmental Assessment Practitioners (EAP), responsible for completing the S&EIR for the proposed Project.

The Scoping phase has been completed and this report constitutes the EIA and Environmental Management Plan (EMP) Report. The purpose of the report is to provide information on the

environmental and social consequences of the proposed Project to inform the decision making process.

Potential impacts associated with the Schurvekop Mine were identified by evaluating the activities associated with each project element in the environmental context of the Project area. Impact identification was facilitated through specialist studies, the understanding of the EAP, inputs from the Applicant and inputs from the Public Participation Process (PPP).

Impact Significance was determined by rating the likelihood that an impact would occur, along with the duration (time), extent (spatial scale) and magnitude (effect) of the impact, in the context of the environmental importance or sensitivity of the aspect impacted upon. Impacts were first rated without the consideration of mitigation measures (though some mitigation is inherent in the design of the Project), and again with the consideration of mitigation measures. Impacts of higher significance require more comprehensive mitigation with a higher likelihood of being able to mitigate an impact successfully.

Although some impacts of high significance have been identified, no fatal flaws have been identified. Impacts of moderate-high to high significance (pre-mitigation) are summarised in the table overleaf and include:

- Loss of wetlands, habitat and agricultural lands associated with infrastructure area.
- Permanent alteration of topography.
- Influx of job seekers into the area, and associated social ills.
- Increased risk for injuries, traffic incidences and other accidents.
- Cumulative impacts on the air quality due to dust , PM_{10} & $PM_{2.5}$.
- Alteration of topography and hydrological and geohydrological characteristics through potential subsidence of surface layers; leading to wetland loss.
- Generation of poor surface and groundwater quality water which will:
    - Impair water quality in downstream wetlands and streams;
    - Affect flora and fauna species associated with wetlands and impair eco-services provided by wetlands;
    - Alter the biodiversity of aquatic ecosystems; and
    - Impact downstream water users.

The following privately owned boreholes fall within the groundwater level drawdown in the fractured rock aquifer, and will be impacted on by mine dewatering during the operational phase:

- Bosman BH1
- Community BH
- Community Windmill
- Community Handpump

The maximum drawdown in groundwater level ranges from 37m to 70m. Post-closure the water quality within these boreholes will be impacted by the migrating pollution plume. Once the water quality within these boreholes is impacted Mmakau Coal will have to provide water of similar quality and quantity (Future Flow, 2018)

The surface infrastructure area has been located to avoid all highly sensitive habitat such as rivers, riparian habitats and ridges. However, this is still placed within a wetland flat with

hydrologically active soils which is upslope of a large pan wetland. An offset strategy has been proposed, refer to APPENDIX M. The flora associated with this area is transformed due to agriculture and thus the loss of biodiversity is not significant in this area.

Impact Description	**Aspect**	**Applicable Mine Phase**	**SIGNIFICANCE (pre-mitigation)**	**Mitigation possible?**	**SIGNIFICANCE (post-mitigation)**
Alteration of topography	Topography	Construction, Operation & Decommissioning	70	YES	60
Loss of agricultural land and / or loss of agricultural potential	Soil, Land Use & Land Capability	Construction	64	YES	21
Loss of wetlands	Wetlands & Aquatics	Construction	85	NO	85
Loss of habitat	Flora & Fauna	Construction	80	YES	50
Influx or movement of labour into the area will pose an increased risk for sexually transmitted infections, including HIV/AIDS	Social, Health & Safety	Construction, Operation & Decommissioning	64	YES	42
Soil, water and waste related diseases.	Social, Health & Safety	Construction, Operation, Decommissioning	64	YES	42
Physical injuries at the workplace, road traffic incidences and other accidental injuries. Resultant health system issues (increased pressure on health services and infrastructure).	Social, Traffic & Transport	Construction, Operation & Decommissioning	64	YES	39
Alteration of topography and hydrological and geohydrological characteristics through potential subsidence of surface layers; leading to wetland loss.	Topography, Groundwater, Wetlands & Aquatics, Hydrology	Operation, Decommissioning, Closure, Post Closure	90	YES	36
Impacts on groundwater quality due to poor quality seepage from the mining area.	Groundwater	Operation	65	NO	65
Cumulative dust, PM_{10} & $PM_{2.5}$ generation	Air Quality	Construction, Operation, Decommissioning	70	YES	70

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Impact Description	Aspect	Applicable Mine Phase	SIGNIFICANCE (pre-mitigation)	Mitigation possible?	SIGNIFICANCE (post-mitigation)
MRF will permanently alter the topographical nature of the area.	Topography & Visual aesthetics	Construction, Operation, Decommissioning, Closure, Post Closure	65	YES	39
Environmental pollution due to uncontrolled runoff in to surrounding environment and water resources	Flora & Fauna, Wetlands & Aquatics, Hydrology	Construction, Operation, Decommissioning	85	YES	20
Environmental pollution due to hydrocarbon/chemical contamination into the natural environment	Soils, Flora & Fauna	Construction, Operation, Decommissioning	85	YES	20
Recovery of groundwater level after dewatering stopped	Groundwater	Decommissioning, Rehabilitation and Closure	75	-	75
Impacts on groundwater quality due to poor quality seepage from the mining area once water level has recovered	Groundwater	Decommissioning, Rehabilitation and Closure	80	NO	80
Impacts on surface water quality due to poor quality seepage from the pollution source areas.	Groundwater, surface water, Wetlands & Aquatics	Decommissioning, Rehabilitation and Closure	70	YES	27
Retrenchment/loss of employment and procurement opportunities.	Socio-economic	Decommissioning, Rehabilitation and Closure	75	-	75

It is Cabanga Environmental's reasoned opinion that the activity be authorised on condition that the EMP is fully adhered to, annually audited and amended where necessary based on audit findings.

OPPORTUNITY TO COMMENT:

This report is being made available for public review, for a period of 30 days (**from 09January 2023 until 08 February 2023**) at www.cabangaenvironmental.co.za (under the Public Documents Tab) and in hard copy at the Bethal Public Library (Danie Nortje Street, Bethal).

Please provide any comments on the Report on or before the 08th February 2023, at the contact details provided below:

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TABLE OF CONTENTS:

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LIST OF TABLES:

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LIST OF PLANS:

LIST OF FIGURES:

LIST OF APPENDICES:

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APPENDIX H: REPORT ON THE MINE RESIDUE FACILITY AND ASSOCIATED DESIGN DRAWINGS (Delta BEC & cPod Consulting, 2022a)
APPENDIX I: CONSTRUCTION QUALITY ASSURANCE PLAN (MRF, DAMS & LINERS) (Delta BEC & CPod Consulting, 2022b)
APPENDIX J: PUBLIC PARTICIPATION REPORT
APPENDIX K: SPECIALIST STUDIES
APPENDIX L: PASSIVE AMD MANAGEMENT PLAN (SAS, 2019)
APPENDIX M: WETLAND OFFSET STRATEGY (TBC, 2019)

SPECIALIST STUDIES (APPENDIX K):

APPENDIX K 1: AGRICULTURAL POTENTIAL ASSESSMENT (TBC, 2022a)
APPENDIX K 2: AQUATIC AND WETLAND ASSESSMENT (TBC, 2022b)
APPENDIX K 3: HYDRO PEDOLOGICAL ASSESSMENT (TBC, 2018)
APPENDIX K 4: GROUNDWATER STUDY (Future Flow, 2018)
APPENDIX K 5: TERRESTRIAL BIODIVERSITY ASSESSMENT (TBC, 2017, updated 2018) AND IT'S ADDENDUM (TBC, 2022c)
APPENDIX K 6: HERITAGE IMPACT ASSESSMENT (Archaetnos, 2022)
APPENDIX K 7: DESKTOP PALAEONTOLOGICAL ASSESSMENT (Bamford, 2017)
APPENDIX K 8: AIR QUALITY IMPACT ASSESSMENT (Rayten, 2016)
APPENDIX K 9: ENVIRONMENTAL NOISE IMPACT ASSESSMENT (E.A.R, 2022)
APPENDIX K 10: VISUAL IMPACT ASSESSMENT (Green Tree Consulting, 2022)
APPENDIX K 11: HEALTH IMPACT ASSESSMENT (Niara, 2022)
APPENDIX K 12: TRANSPORT IMPACT STUDY (Sturgeon Consulting , 2017)
APPENDIX K 13: BLAST AND VIBRATIONS STUDY (BM&C, 2017)

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LIST OF ACRONYMS:

ACRONYM:	DESCRIPTION:
ABA	Acid-Base-Accounting
AEL	Air Emissions License in terms of NEM:AQA
Al	Aluminium
AMD	Acid Mine Drainage
AQIA	Air Quality Impact Assessment
AQMP	Air Quality Management Plan
BBBEE	Broad-Based Black Economic Empowerment
BID	Background Information Documents
Ca	Calcium
CARA	Conservation of Agricultural Resources Act (Act 43 of 1983) as amended
CBA	Critical Biodiversity Areas
Cd	Cadmium
Cl	Chloride
CMA	Catchment Management Agency
CMS	Catchment Management Strategy
Co	Cobalt
CPP	Coal Preparation Plant
CQA	Construction Quality Assurance
Cu	Copper
dBA	Decibels
DEA	Department of Environmental Affairs (now the Department of Forestry, Fisheries and Environment, DFFE)
DMC	Dense medium cyclone
DMRE	Department of Mineral Resources and Energy
DO	Dissolved Oxygen
DWS	Department of Water and Sanitation
EA	Environmental Authorisation in terms of NEMA
EAP	Environmental Assessment Practitioner
EAPASA	Environmental Assessment Practitioners Association of South Africa
EC	Electrical Conductivity
ECA	Environmental Conservation Act, 1989 (Act No 73 of 1989)
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment (process or report)
EIA Regs.	Environmental Impact Assessment Regulations published under NEMA

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ACRONYM:	DESCRIPTION:
EIS	Ecological Importance and Sensitivity
EMP	Environmental Management Plan
ESA	Ecological Support Areas
F	Fluoride
Fe	Iron
FEPA	Freshwater Ecosystem Priority Areas
GMLM	Govan Mbeki Local Municipality
GN	General Notice (issued under an Act, providing notice or instructions in terms of Regulations)
HIA	Heritage Impact Assessment
HIV	Human Immunodeficiency Virus
HGM	hydrogeomorphic
HPA	Highveld Priority Area
I&AP	Interested and Affected Parties
IBA	Important Bird Area
IDP	Integrated Development Plan
IHAS	Integrated Habitat Assessment System
IWUL	Integrated Water Use License
ISEE	International Society of Explosives Engineer
K	Potassium
LC	Leach Concentration
LDV	Light Duty Vehicle
LED	Local Economic Development
LoM	Life of Mine
Mamsl	Metres above mean sea level
MAR	Mean Annual Runoff
mbgl	Metres below ground level
MDEDET	Mpumalanga Department of Economic Development, Environment and Tourism
Mg	Magnesium
MHSA	Mine Health and Safety Act (Act 29 of 1996) as amended
mm	Millimetres
Mn	Manganese
MPRDA	Mineral and Petroleum Resources Development Act (Act 28 of 2002) as amended
MRA	Mining Right Application in terms of the MPRDA
MRF	Mine Residue Facility

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ACRONYM:	DESCRIPTION:
MSDS	Material Data Safety Sheets
MTPA	Mpumalanga Tourism and Parks Agency
Na	Sodium
NAAQS	National Ambient Air Quality Standards
NAEIS	National Atmospheric Emissions Inventory System
NEMAQA	National Environmental Management: Air Quality Act (act 59 of 2008) as amended
NEMBA	National Environmental Management: Biodiversity Act (Act 10 of 2004) as amended
NEMPAA	National Environmental Management: Protected Areas Act (Act 57 of 2003) as amended
NEMWA	National Environmental Management: Waste Act (Act 39 of 2004) as amended
NEMA	National Environmental Management Act (Act 107 of 1998) as amended
NFEPA	National Freshwater Ecology Priority Areas
NGO	Non-governmental Organisation
NHRA	National Heritage Resources Act (Act No. 25 of 1999) as amended
NO_3	Nitrate
NWA	National Water Act (Act 36 of 1998) as amended
O&AM Area	Operations, Administration and Maintenance Area
Pb	Lead
PCD	Pollution Control Dam
PES	Present Ecological State (usually followed by category A-F)
$PM_{10/5/2.5}$	Particulate Matter up to 10/5/2.5 micrometres
PO_4	Phosphates
POI	Points of Interest
PPP	Public Participation Process
RoM	Run of Mine
S&EIR	Scoping and Environmental Impact Report
S&LP	Social and Labour Plan
SAAQIS	South African Air Quality Information System
SACNASP	South African Council for Natural Scientific Professions
SAHRA	South African Heritage Resource Agency
SAHRIS	South African Heritage Resources Information System
SANBI	South African National Biodiversity Institute
SANRAL	South African National Roads Agency Limited
SANS	South African National Standard (followed by standard number)

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ACRONYM:	DESCRIPTION:
SAPAD	South African Protected Areas Database
SASS5	South African Scoring System version 5 (in terms of aquatic invertebrate assessments)
SCC	Species of Conservation Concern
SDF	Spatial Development Framework
SEI	Site Ecological Importance
SO_4	Sulphates
SPCA	Society for the Prevention of Cruelty to Animals
SPLUMA	Spatial Planning and Land Use Management Act (Act No.16 of 2013)
SQR	Sub Quaternary Reach
Stats SA	Statistics South Africa
TB	Tuberculosis
TBC	The Biodiversity Company
TC	Total Concentration
TDS	Total Dissolved Solids
tph	Tons per hour
vph	Vehicles per hour
WMA	Water Management Area
WML	Waste Management Licence in terms of NEMWA
WRC	Water Research Commission
WULA	Water Use License Application
Zn	Zinc

1 INTRODUCTION

Mmakau Coal (Pty) Ltd (hereinafter Mmakau Coal) intends to develop the proposed Schurvekop Mine over Portions 6, 8, RE of 15, 16, 17, 18, 19 and 20 of the farm Schurvekop 227 IS, which is in the Magisterial District of Bethal, Mpumalanga Province.

The proposed mining operation comprises the underground mining of coal. Coal will be conveyed to surface for processing before being trucked to market. The processing of coal results in the generation of mine residue (slurry and discard) which will be placed on a mine residue facility (MRF), to be constructed onsite. It is understood that a portion of the coal may also be processed at the nearby Forzando operations.

Mmakau Coal is required to obtain authorisation in terms of the following mining and environmental legislation prior to commencement of the proposed mining operations:

- Mining Right in terms of the Mineral and Petroleum Resources Development Act, Act No. 28 of 2002 (MPRDA);
- Environmental Authorisation for Listed Activities in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA), and the Environmental Impact Assessment (EIA) Regulations, 2014 (as amended);
- Waste Management License (WML) in terms of the National Environmental Management Waste Act, 2008 (Act No 59 of 2008) (NEMWA) and the Regulations Listing Waste Management Activities that have, or are likely to have, a detrimental effect on the environment (as amended);
- Potential Relocation Permits for Protected Plant Species in terms of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA); and
- An Integrated Water Use License (IWUL) in terms of the National Water Act, 1998 (Act No. 36 of 1998) (NWA) and the Water Use License Application (WULA) and Appeals Regulations, 2017.

1.1 Project Background

Mmakau Coal holds a Prospecting Right (1063PR) over Portions 6, 8, RE of 15, 16, 17, 18, 19 and 20 of the farm Schurvekop 227 IS.

An application for a Mining Right (10160MR) and integrated environmental authorisation was originally submitted in November 2016. Following a negative record of decision on the WML in May 2021, and the outcome of the appeal process in November 2021, the aforementioned Mining Right Application was withdrawn by Mmakau Coal in July 2022 in favour of a new application (Reference number MP 30/5/1/2/2/10366MR). An application for integrated environmental authorisation was submitted simultaneously.

An application for an IWUL was submitted in 2017 for the proposed operations in terms of the NWA, and issued in December 2020 (License No. 06/B11B/GJACIB/6810).

1.2 Scope

This report relates to three interrelated aspects:

- Application for a Mining Right MP 30/5/1/2/2/10366MR for the underground mining of coal;

- Application for Environmental Authorisation for new Listed Activities associated with development of the proposed Mine and associated infrastructure; and
- Application for a WML for the development of the MRF (integrated discard dump) and overburden stockpiles.

As the application relates to activities identified in terms of Listing Notice 1, 2 and 3 of the EIA Regulations, 2014 (as amended) and Category B of the List of Waste Management Activities, a full Scoping and Environmental Impact Report (S&EIR) is required.

Cabanga Environmental has been appointed as the independent Environmental Assessment Practitioner (EAP) responsible for undertaking the S&EIR process.

1.3 Summary of the EIA Process

Mmakau Coal has submitted an application in terms of the MPRDA, the NEMA and NEMWA to the Department of Mineral Resources and Energy (DMRE), who is the competent authority in respect of these applications.

Chapter 4 of the EIA Regulations, 2014 (as amended) sets out the requirements for Applications for Environmental Authorisation in terms of NEMA. Figure 1 illustrates the process undertaken for this Project.

The Application for a Mining Right was accepted by the DMRE on 26 July 2022, Reference Number: MP30/5/1/2/2/10366MR (see APPENDIX A). Following which the Scoping Report was made available for public review and comment from 08 August – 07 September 2022, updated with comments received during the review period, and submitted to the DMRE for consideration on 09 September 2022. The Scoping Report (including the plan of study for EIA) was approved by the DMRE on 06 October 2022 (APPENDIX B).

This report constitutes the EIA and EMP Report compiled in terms of the abovementioned applications, and is made available for public review and comment for a period of thirty (30) days, from 09January 2023 until 08 February 2023. Following which the report will be updated and submitted to the DMRE for consideration.

1.4 Deviations from the approved Scoping Report

n/a - No deviation has been made.

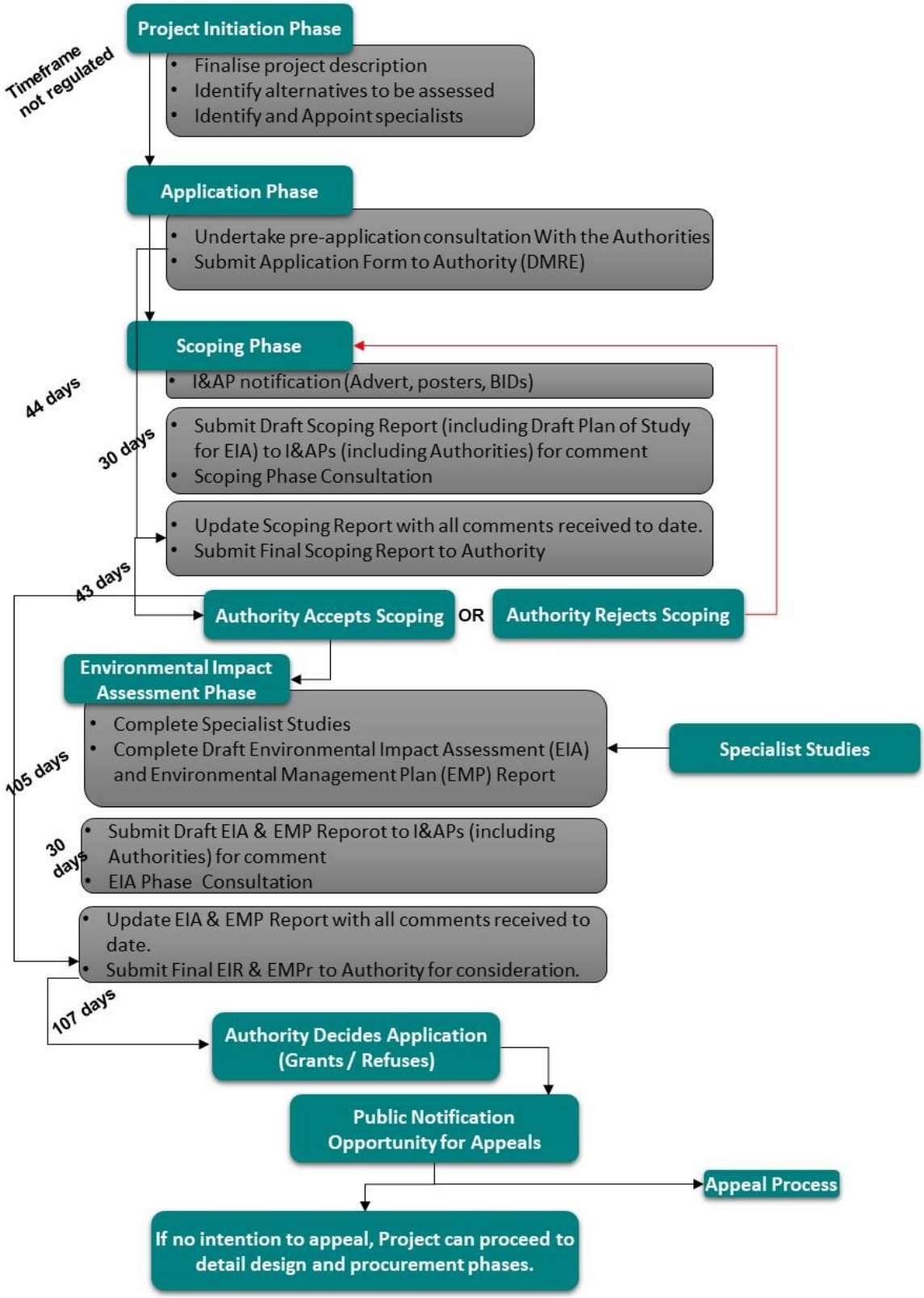


Figure 1: Summary of EIA Process

1.5 Structure of the Report

The required content of an EIA Report is prescribed in Appendix 3 of the EIA Regulations, 2014 (as amended). Table 1 presents these requirements and provides cross-references to the various sections of this report where the requirements are addressed.

Table 1: Required Content of an EIA Report

Requirement, as per EIA Regulations 2014 (as amended)		Section of this report
(1) An environmental impact assessment report must contain the information that is necessary for the competent authority to consider and come to a decision on the application, and must include—		
(a) details of—	(i) the EAP who prepared the report; and	Section 2.2
	(iii) the expertise of the EAP, including a curriculum vitae;	Section 2.3 APPENDIX C
(b) the location of the development footprint of the activity on the approved site as contemplated in the accepted scoping report, including:	(i) the 21-digit Surveyor General code of each cadastral land parcel;	Table 6
	(ii) where available, the physical address and farm name;	
	(iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;	
(c) a plan which locates the proposed activities applied for and the associated structures and infrastructure at an appropriate scale,		Figure 3
(d) a description of the scope of the proposed activity, including—	(i) all listed and specified activities triggered and being applied for;	Section 4.10
	(ii) a description of the associated structures and infrastructure related to the development;	Section 4.1
(e) a description of the policy and legislative context within which the development is located and an explanation of how the proposed development complies with and responds to the legislation and policy context;		Section 5
(f) a motivation for the need and desirability for the proposed development, including the need and desirability of the activity in the context of the preferred development footprint within the approved site as contemplated in the accepted scoping report;		Section 6
(g) a motivation for the preferred development footprint within the approved site as contemplated in the accepted scoping report;		Section 7
(h) a full description of the process followed to reach the proposed development footprint within the approved site as contemplated in the accepted scoping report, including:	(i) details of the development footprint alternatives considered;	Section 7
	(ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;	Section 8 and APPENDIX J
	(iii) a summary of the issues raised by interested and affected parties, and an	

Requirement, as per EIA Regulations 2014 (as amended)		Section of this report
	indication of the manner in which the issues were incorporated, or the reasons for not including them;	
	(iv) the environmental attributes associated with the development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	Section 9
	(v) the impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts— (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated;	Section 11.3
	(vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks;	Section 11.1
	(vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	Section 11.3
	(viii) the possible mitigation measures that could be applied and level of residual risk;	Section 12
	(ix) if no alternative development footprints for the activity were investigated, the motivation for not considering such;	n/a
	(x) a concluding statement indicating the location of the preferred alternative development footprint within the approved site as contemplated in the accepted scoping report;	Section 7.9
a full description of the process undertaken to identify, assess and rank the impacts the activity and associated structures and infrastructure will impose on the preferred development footprint on the approved site as contemplated in the accepted scoping report	(i) a description of all environmental issues and risks that were identified during the environmental impact assessment process; and	Section 11.3
	(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;	Table 55

Requirement, as per EIA Regulations 2014 (as amended)		Section of this report
through the life of the activity, including—		
(j) an assessment of each identified potentially significant impact and risk, including—	(i) cumulative impacts;	Section 11.3 Table 55
	(ii) the nature, significance and consequences of the impact and risk;	
	(iii) the extent and duration of the impact and risk;	
	(iv) the probability of the impact and risk occurring;	
	(v) the degree to which the impact and risk can be reversed;	
	(vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and	
	(vii) the degree to which the impact and risk can be mitigated;	
(k) where applicable, a summary of the findings and recommendations of any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final assessment report;		Section 11.3
(l) an environmental impact statement which contains—	i) a summary of the key findings of the environmental impact assessment:	Section 15.1 Figure 35 Section 15
	(ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred development footprint on the approved site as contemplated in the accepted scoping report indicating any areas that should be avoided, including buffers; and	
	(iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;	
(m) based on the assessment, and where applicable, recommendations from specialist reports, the recording of proposed impact management outcomes for the development for inclusion in the EMP as well as for inclusion as conditions of authorisation;		Section 12.1
(n) the final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment;		Plan 3
(o) any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation;		Section 15.2
(p) a description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed;		Section 14

Requirement, as per EIA Regulations 2014 (as amended)		Section of this report
(q) a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;		Section 15
(r) where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required and the date on which the activity will be concluded and the post construction monitoring requirements finalised;		Section 34
(s) an undertaking under oath or affirmation by the EAP in relation to—	(i) the correctness of the information provided in the reports;	Section 16
	(ii) the inclusion of comments and inputs from stakeholders and I&APs;	
	(iii) the inclusion of inputs and recommendations from the specialist reports where relevant; and	
	(iv) any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties;	
(t) where applicable, details of any financial provision for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts;		Section 13
(u) an indication of any deviation from the approved scoping report, including the plan of study, including—	(i) any deviation from the methodology used in determining the significance of potential environmental impacts and risks; and	Section 1.4
	(ii) a motivation for the deviation;	
(v) any specific information that may be required by the competent authority;		Section 1.6
(w) any other matters required in terms of section 24(4)(a) and (b) of the Act.		

The required content of an Environmental Management Plan (EMP) Report is provided in Appendix 4 of the EIA Regulations, 2014 (as amended), and shown in Table 2 with cross-references to the relevant section(s) of this report.

Table 2: Required Content of an EMP Report

No	Requirement	Section of this report
1	An EMP must comply with section 24N of the Act and include—	
(a)	details of– (i) the Environmental Assessment Practitioner (EAP) who prepared the EMP ; and (ii) the expertise of that EAP to prepare an EMP , including a curriculum vitae;	Section 2.2 Section 2.3 APPENDIX C

No	Requirement	Section of this report
(b)	a detailed description of the aspects of the activity that are covered by the EMP as identified by the project description;	Section 4
(c)	a map 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 should be avoided, including buffers;	Figure 35
(d)	a description of the impact management outcomes, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including — (i) planning and design; (ii) pre-construction activities; (iii) construction activities; (iv) rehabilitation of the environment after construction and where applicable post closure; and (v) where relevant, operation activities;	Section 12.1
(e)	- (repealed)	-
(f)	a description of proposed impact management actions, identifying the manner in which the impact management outcomes contemplated in paragraph (d) will be achieved, and must, where applicable, include actions to — (i) avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation; (ii) comply with any prescribed environmental management standards or practices; (iii) comply with any applicable provisions of the Act regarding closure, where applicable; and (iv) comply with any provisions of the Act regarding financial provision for rehabilitation, where applicable;	Section 12.2
(g)	the method of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Section 12.3
(h)	the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Section 12.3
(i)	an indication of the persons who will be responsible for the implementation of the impact management actions;	Section 12.3
(j)	the time periods within which the impact management actions contemplated in paragraph (f) must be implemented;	Section 12.2
(k)	the mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);	Section 12.3
(l)	a program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;	Section 12.3
(m)	an environmental awareness plan describing the manner in which—	Section 12.4

No	Requirement	Section of this report
	(i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and (ii) risks must be dealt with in order to avoid pollution or the degradation of the environment; and	
(n)	any specific information that may be required by the competent authority.	None

1.6 Specific Information Required

The EIA / EMP report must also address the matters referred to in section 24(4)(a) and (b) of the NEMA. The provisions of this section, and how these are addressed in this report are shown in Table 3:

Table 3: How the provisions of NEMA Section 24(4)(a) and (b) are addressed in this report

Provision of NEMA	Relevance to this application and report
(4) Procedures for the investigation, assessment and communication of the potential consequences or impacts of activities on the environment – *(a) must ensure, with respect to every application for an environmental authorisation—*	
(i) coordination and cooperation between organs of state in the consideration of assessments where an activity falls under the jurisdiction of more than one organ of state;	The DMRE has been identified as the competent authority in terms of the applications under the MPRDA, NEMA and NEMWA related to the Project. An application has been submitted for an integrated environmental authorisation process (NEMA and NEMWA). Relevant local and provincial authorities are also included in the I&AP database. Refer to APPENDIX J
(ii) that the findings and recommendations flowing from an investigation, the general objectives of integrated environmental management laid down in this Act and the principles of environmental management set out in section 2 are taken into account in any decision made by an organ of state in relation to any proposed policy, programme, process, plan or project;	It is assumed that the decision-making authorities will take the provisions of section 2 of the NEMA into account when evaluating the Project.
(iii) that a description of the environment likely to be significantly affected by the proposed activity is contained in such application;	Please see the baseline description in Section 9 of this report.
(iv) investigation of the potential consequences for or impacts on the environment of the activity and assessment of the significance of those potential consequences or impacts; and	Impact identification and assessment is presented in Table 55 of this report. This will be expanded upon, refined and updated as the project and specialist assessments progress.
(v) public information and participation procedures which provide all interested and affected parties, including all organs of state in all	The PPP is summarised in Section 8 of this report. This report is being made available for a public

Provision of NEMA	Relevance to this application and report
spheres of government that may have jurisdiction over any aspect of the activity, with a reasonable opportunity to participate in those information and participation procedures; and	comment period of 30 days. The full PPP Report is attached as APPENDIX J.
(b) must include, with respect to every application for an environmental authorisation and where applicable—	
(i) investigation of the potential consequences or impacts of the alternatives to the activity on the environment and assessment of the significance of those potential consequences or impacts, including the option of not implementing the activity; *(ii) investigation of mitigation measures to keep adverse consequences or impacts to a minimum;*	Alternatives, including the no-development option, are discussed in Section 7 of this report. Impacts of the proposed project were identified and assessed in Section 11. Management and Mitigation is discussed in Section12.
(iii) investigation, assessment and evaluation of the impact of any proposed listed or specified activity on any national estate referred to in section 3(2) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999), excluding the national estate contemplated in section 3(2)(i)(vi) and (vii) of that Act;	Listed activities relevant to the proposed project are identified in this report. The impact(s) of these activities on palaeontological and heritage resources has been assessed (Section 11.3.7, APPENDIX K 6 and APPENDIX K 7).
(iv) reporting on gaps in knowledge, the adequacy of predictive methods and underlying assumptions, and uncertainties encountered in compiling the required information;	Current assumptions, limitations and gaps are highlighted in this report (Section 14).
(v) Investigation and formulation of arrangements for the monitoring and management of consequences for or impacts on the environment, and the assessment of the effectiveness of such arrangements after their implementation;	Impact Management is discussed in Section 120 while Monitoring requirements are summarised in Section 12.3
(vi) consideration of environmental attributes identified in the compilation of information and maps contemplated in subsection (3); and	The baseline environment is described in this report (Section 9) and relevant maps (Plans) are provided throughout this report and in A3 format as APPENDIX D.
(vii) provision for the adherence to requirements that are prescribed in a specific environmental management Act relevant to the listed or specified activity in question.	Provisions of the Waste Act, Heritage Resources Act, Water Act and other relevant legislation are included in this report (Section5).

2 CONTACT DETAILS

2.1 Details of the Applicant

Mmakau Coal is jointly owned by Mmakau Mining (Pty) Ltd (51%) and Overlooked Colliery (Pty) Ltd (49%). The contact details for the applicant are as follows:

Table 4: Applicant details

Project applicant:	Mmakau Coal (Pty) Ltd		
Registration no (if any):	2000/028613/07		
Trading name (if any):	n/a		
Responsible Person, (e.g. Director, CEO, etc).:	Director		
Contact person:	Rowan Karstel (Director)		
Physical address:	41/43 Glenhove Road, Houghton, Johannesburg		
Postal address:	41/43 Glenhove Road, Houghton, Johannesburg		
Postal code:	2041	Cell:	082 319 1314
Telephone:	011268 6780	Fax:	n/a
E-mail:	rowan@tumelomine.co.za		

2.2 Details of the EAP

Cabanga Environmental has been appointed by Mmakau Coal (Pty) Ltd as the independent Environmental Assessment Practitioner (EAP), responsible for the completing the S&EIR for the proposed Project. The details of the persons who prepared this report are provided in Table 5. Detailed Curriculum Vitae are attached as APPENDIX C.

Table 5: Project Team

Author	**Jane Barrett**
Highest qualification	BSc Environmental Management & Botany
Years' experience	12+years
Professional registration	South African Council for Natural Scientific Professions (SACNASP): Cert Sci. Nat. 130485
Review & EAP	**Lelani Claassen**
Highest qualification	BSc Hons Environmental Management
Years' experience	12+ years
Professional registration	Registered Environmental Assessment Practitioner (EAP) with the Environmental Assessment Practitioner's Association of South Africa (EAPASA). Registration Number 2018/153. SACNASP: Pr. Sci. Nat (Reg. 121645)
Approval	**Ken van Rooyen**
Highest qualification	MSc Geography

Years' experience	30+ years
Professional registration	SACNASP: Pr. Sci. Nat (Reg. 400121/93)

2.3 Summary of Past Experience

Jane Barrett is an experienced environmental and sustainability consultant with a demonstrated history of leading and executing complex projects. She holds a BSc degree in Environmental Management and is currently enrolled for a Diploma in Greenhouse Gas Measurement, Reporting and Verification. She has successfully completed certificated courses in Project Management; Carbon Footprinting; and Environmental, Social and Governance Reporting.

She has a good understanding of Environmental Legislation, and its application to factual scenarios. Her experience includes: Environmental Impact Assessments; Environmental Management Plans; Monitoring and Compliance Reporting; Environmental Auditing; Water Use Licensing; Mineral Right Applications; Pre-feasibility and Feasibility Studies.

Jane is registered with the South African Council for Natural Scientific Professions (SACNASP) (Environmental Science) (Cert. Sci. Nat 130485).

Lelani Claassen started her career as an environmental consultant in 2008. She holds an Honours degree in Environmental Management from UNISA, which she completed whilst working as an environmental consultant following the successful completion of a BSc Degree in Landscape Architecture from the University of Pretoria. She has also successfully completed the SABS Short-course: Environmental Legal Requirements for ISO 14001 compliance.

Her project experience is extensive in scope and covers various aspects of development including residential developments, filling stations and depots, infrastructure and mining projects. Lelani's experience includes environmental authorisation processes, concept (Fatal Flaw), Pre-Feasibility and Feasibility Studies, environmental compliance audits and environmental-legal compliance assessments. She also has experience as an Environmental Control Officer on construction projects.

Lelani is a Registered EAP (Registration Number 2018/153) with the EAPASA, the only Registration Authority for EAPs in South Africa in terms of Section 24H of the NEMA. Lelani is also a Registered Scientist with SACNASP (Environmental Science (Pr. Sci. Nat 121645).

Ken van Rooyen started his career working as an Exploration Geologist in 1987 after which he specialised in Environmental Management, working both within the Mining Industry and then as an Environmental Consultant.

His main areas of interest are:

- the design, management and repair of mine residue facilities;
- rehabilitation planning and modelling;
- risk assessment; and
- quantifying environmental liabilities.

He obtained a Masters degree in Geography based on his final dissertation entitled "*An integrated method of coal discard and slurry disposal to reduce the environmental impact from coal residue*".

Ken's project experience is extensive in scope and covers various developments including agricultural and residential developments, power generation, infrastructure and mining projects. In addition to working on projects throughout South Africa, Ken has worked in Botswana, Mozambique, Zimbabwe, Zambia, Madagascar, Sierra Leone, Rwanda, Mali, Nigeria and the United States of America.

He has presented at numerous local and international forums on issues such as waste management, integrated environmental management and sustainability. As well as represented companies on various committees and advisory groups e.g. the Atmospheric Pollution Prevention Committee, the Water Research Commission (Vaal Barrage), the National Groundwater Quality Management Strategy Advisory Group, the Inkomati-Usuthu Catchment forum and many more.

Ken is registered with SACNASP (Environmental Science) (Pr. Sci. Nat 400121/93).

3 PROJECT LOCATION

3.1 Regional and Local Setting

The project area is situated within the Mpumalanga Province, 20 kilometres to the north of Bethal and 20 kilometres east of the town of Ga-Nala (Kriel). It falls within the Gert Sibande District Municipality (DC30), specifically Ward 15 of the Govan Mbeki Local Municipality (MP307) (Plan 1).

The Viskuile River enters the Mining Right Area (MRA) from the east and confluences with the Joubertsvleispruit which enters from the South, after which the continued Viskuile River flows northwest converging with the Olifants River approximately 3.5km northwest of the property. Surrounding land uses include agriculture and mining (coal). The proposed MRA is contiguous to Katlego Coal's Forzando South operations and Thungela Coal's Elders Colliery.

The site can be reached via the R35 (Bethal – Middelburg) tarred road located to the west of the MRA, the R38 (Bethal – Hendrina) tarred road to the east and the D622 (Bethal-Halfgewonnen) tarred road which passes along the eastern boundary of the MRA. The Usuthu bulk water supply pipeline runs parallel to the D622 road.

3.2 Property Description

The MRA extends over 696.5716 Ha, encompassing Portions 6, 8, RE of 15, 16, 17, 18, 19 and 20 of the farm Schurvekop 227 IS (Plan 2).

The properties are currently zoned for agricultural use and consist of cultivated fields, natural grasslands and wetlands. A small community resides on Portions 17 and 20 of Schurvekop 227 IS. Farmsteads are associated with Portions 6 and 8.

Table 6: Property details

Farm Name:	Schurvekop 227 IS
Application area (Ha)	696.5716 ha
Magisterial district:	Bethal
Distance and direction from nearest town	The project area is situated in Mpumalanga, 20 kilometres to the north of Bethal and 20 kilometres east of the town of Ga-Nala (Kriel).
21 digit Surveyor General Code for each farm portion	T0IS00000000022700006 T0IS00000000022700008 T0IS00000000022700015 T0IS00000000022700016 T0IS00000000022700017 T0IS00000000022700018 T0IS00000000022700019 T0IS00000000022700020

3.3 Surface Right Owners

Table 7 lists the current surface right holders for the MRA. The Regional Land Claims Commission has indicated that a Land Claim has been submitted on Portion 16 and 7[1] of the farm Schurvekop 227 IS.

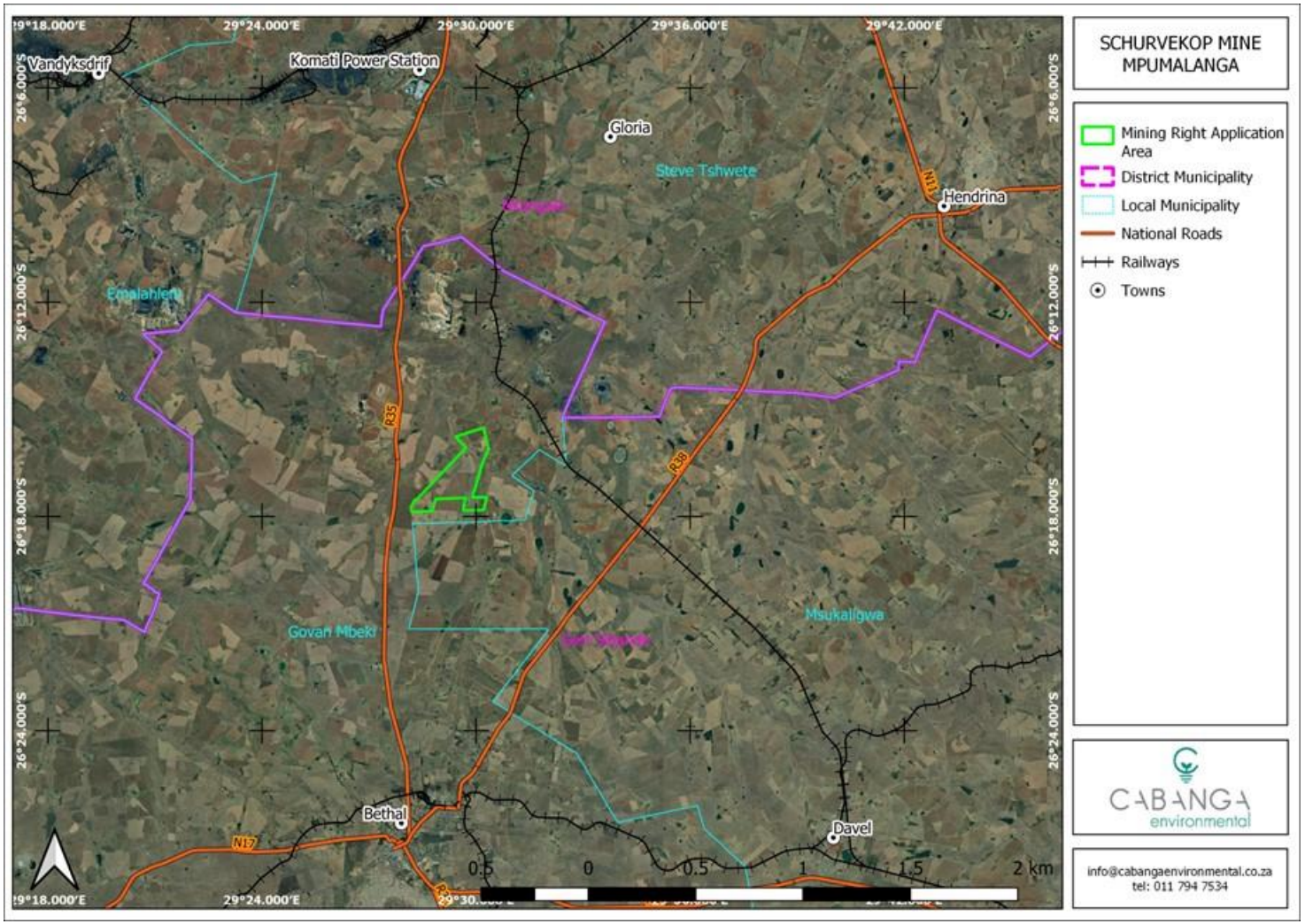
Table 7: Land Tenure

Property	Portion	Deed of Transfer	Extent - Ha	Registered Owner(s)	Share Owned
Schurvekop 227 IS	6	T1633/2010	123.2178	Anglo Operations (Pty) Ltd[2]	100%
Schurvekop 227 IS	8	T4683/2012	190.7068	Mmakau Coal (Pty) Ltd	100%
Schurvekop 227 IS	RE of 15	T4683/2012	61.6075	Mmakau Coal (Pty) Ltd	100%
Schurvekop 227 IS	16	T1633/2010	95.3548	Anglo Operations (Pty) Ltd	100%

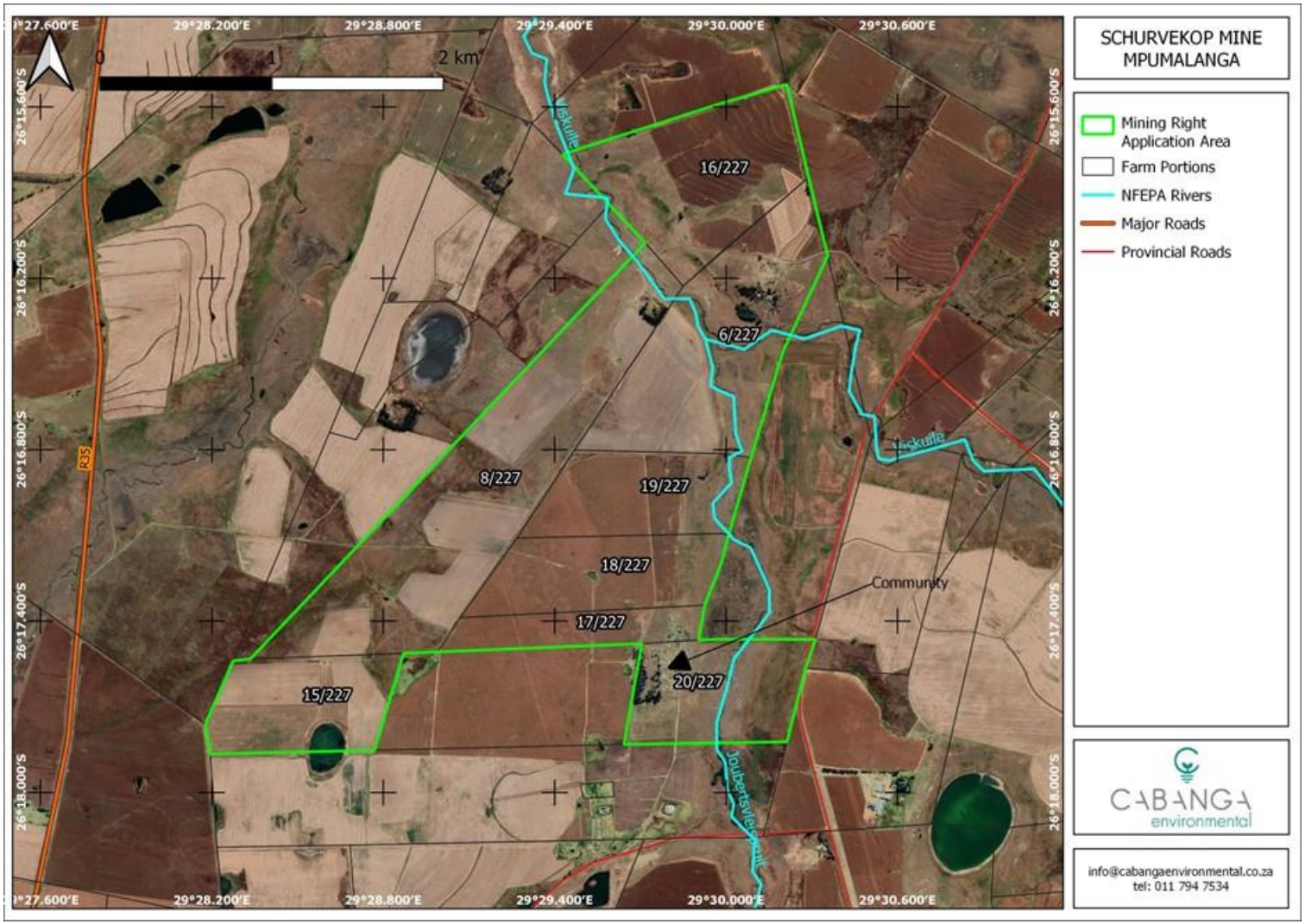
[1] Portion 7 is excluded from the Mining Right Application.

[2] Now known as Thungela Coal Resources Ltd.

Property	Portion	Deed of Transfer	Extent - Ha	Registered Owner(s)	Share Owned
Schurvekop 227 IS	17	T14718/2013	32.2970	Zelpy 1100 (Pty) Ltd	100%
Schurvekop 227 IS	18	T14717/2013	65.8901	Zelpy 1100 (Pty) Ltd	100%
Schurvekop 227 IS	19	T14716/2013	61.6075	Zelpy 1100 (Pty) Ltd	100%
Schurvekop 227 IS	20	T14715/2013	65.8901	Zelpy 1100 (Pty) Ltd	100%
Total Extent of Mining Right Application Area			**696.57 Ha**		



Plan 1: Regional Setting



Plan 2: Local Setting

4 DESCRIPTION OF THE OVERALL ACTIVITY

4.1 Infrastructure Requirements

The Adit and associated infrastructure area will comprise approximately 46 Ha, and include the following infrastructure:

- Haul/access roads, parking and trucking waiting area
- Security, fencing and access control
- Operations, Administration and Maintenance (O&AM) Area
- Fuel and oil storage area
- Box cut Adit
- Ventilation shafts
- Soils and spoils stockpiles
- Processing plant
- Product and Run of Mine (RoM) stockpiles
- Mine Residue Facility
- Water Management Facilities
- Salvage yard and waste storage area

Plan 3 illustrates the proposed layout.

4.1.1 Access Roads & Transport

Two access routes have been identified; both are via existing farm roads which will need to be upgraded. The first access route is via the farm road off the R35 whilst the secondary option is via the farm road off the gravel D1476. It is anticipated that both access roads will have their own weighbridge and access control (Delta BEC, 2022d).

Product will be trucked to market.

4.1.2 Security Fencing & Access Control

The mine area will be fenced off and access to site controlled via 2 x gatehouse complexes occupied by 2 on duty security guards (Delta BEC, 2022d).

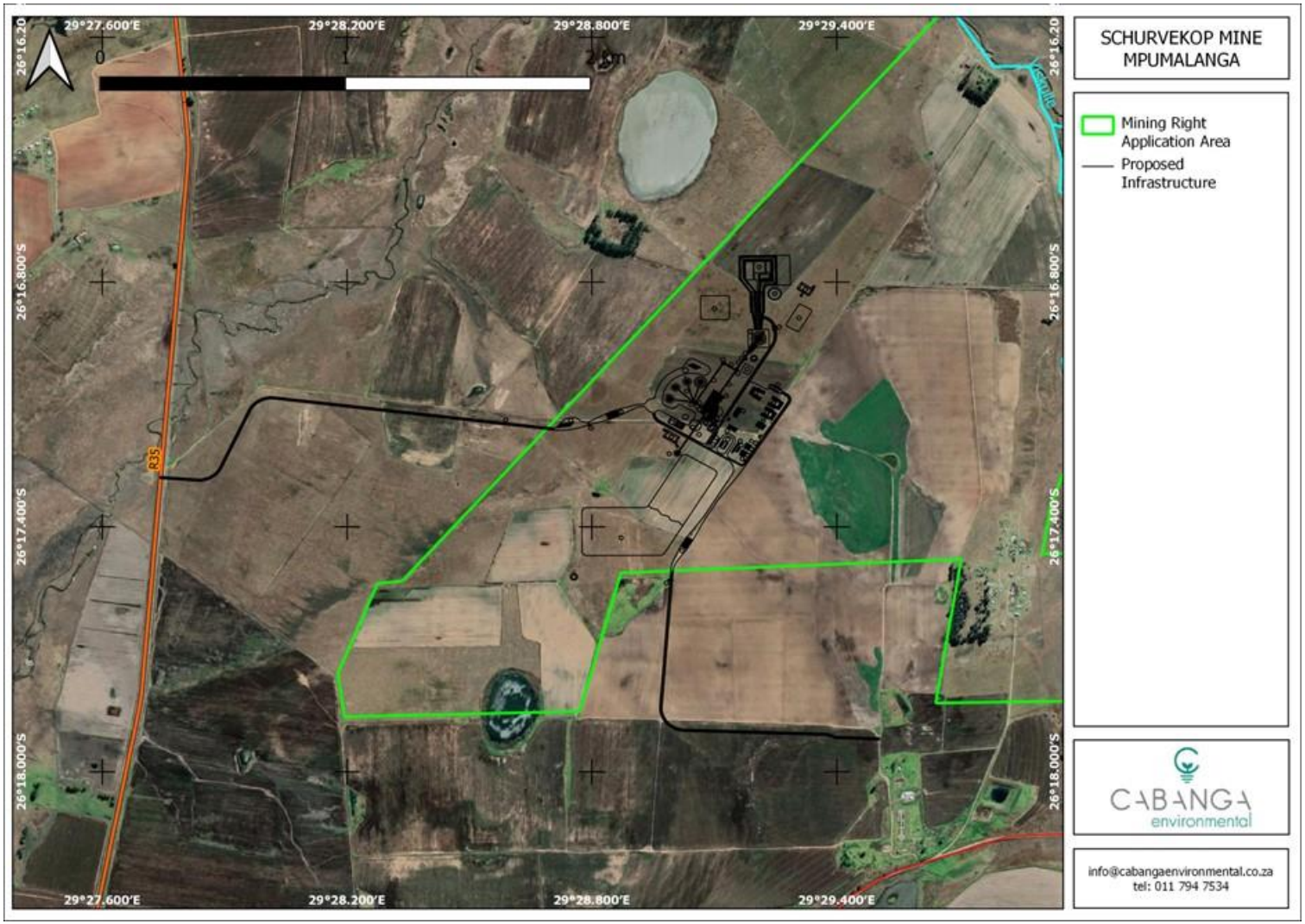
4.1.3 Administration, Workshops & Other Buildings

Supporting infrastructure to be constructed at the O&AM Area includes:

- Change houses and ablution facilities
- Lamp room
- Coal laboratory
- Workshops, stores and wash bay
- Clinic
- Offices, boardroom and training facility
- Plant control room and offices

4.1.4 Storage of Dangerous Goods

Hydrocarbon storage (~80m^3) will be constructed at the workshop area, within a concrete bund.



Plan 3: Proposed Infrastructure Layout

4.2 Mineral Reserve, Life of Mine (LoM) and Mine Plan

There are two seams of economical interest at Schurvekop Mine, namely the No. 4 Lower and No. 2 Lower.

No. 4 Lower Seam:

The depth of the seam varies from 8 to 70m below surface within the MRA, it is shallowest in the northern portions of the MRA. The thickness of the coal that can be mined ranges from 1.65 to 3.84m with an average of 2.6m. The No. 4 Lower Seam is generally overlain by a relatively thick, competent sandstone layer. The depth at which mining is proposed to take place on the No. 4 Lower Seam ranges from 20m to 67m below surface (Delta BEC, 2022a).

No. 2 Lower Seam:

The depth of the No. 2 seam varies from 26.3 to 99m below surface. It is shallowest in the norther portions of the MRA and never exceeds 100m. The coal thickness varies from 1.65m to 5.3m with an average of 2.1m. The No. 2 Seam is generally overlain by a relatively thick, competent sandstone layer. The depth at which mining is proposed to take place at the No. 2 Seam ranges from 35m to 97m below surface (Delta BEC, 2022a).

Figure 3 indicates the extent of the MRA in relation to the seams targeted for underground mining and the proposed infrastructure. Pertinent project information is summarised in the table below:

Table 8: Summary of the details of the mineral deposit

Mineral:	Coal
Geological Formation:	The area is situated in the north eastern extremity of the Highveld Coal field separated by the pre-Karoo Smithfield ridge from the Witbank Coal field to the north.
Mining Method:	Underground bord-and-pillar method using continuous miners
Production Rate:	1 600 000 tons/annum
Plant Design Capacity:	250t/h rated capacity
Estimated LoM:	16 years

The Schurvekop resource will be mined using a mechanised bord-and-pillar method using continuous miners. In mechanised bord-and-pillar mining, extraction is achieved by developing a series of roadways (bords) in the coal seam and connecting them by splits (cut-through) to form pillars. These pillars are left behind as part of a primary roof support system.

Main development panels will be designed to a safety factor of 2.0; whilst production panels will be designed to a safety factor of 1.6 using the Salamon Formulae and designs by a rock Engineer. According to the geotechnical and rock engineering report (Delta BEC, 2022a) a safety factor of 2.5 has been recommended for environmentally sensitive areas (i.e. the water courses and riparian habitats) and under buildings where people congregate (farmsteads and community). A copy of the geotechnical and rock engineering report (Delta BEC, 2022a) is attached as APPENDIX E.

The underground will be accessed via a boxcut adit. The volumes to be extracted from the boxcut adit will be (as defined by SANS 1200) (Delta BEC, 2022d):

- Soft excavation 65,953 m^3;
- Intermediate Excavation 140,042m^3; and
- Hard rock 58,830m^3.

This material will be stockpiled on surface, for use as backfill during the rehabilitation phase.

The high walls and sidewalls of the box-cut will be terraced where necessary in order to limit the possibility of weathering and sloughing. Entries will generally be limited via two or three portals, allowing for conveying and travelling, as well as return airways and escape routes (Mmakau Coal (Pty) Ltd, 2022).

The construction of the mine is planned to commence in 2024 and this phase is scheduled to take 12 months to complete. First production is scheduled for 2025, reaching steady state production in 2027. The steady state run of mine (RoM) production will be ~1 600 000 tons/annum, this will last until 2040. Resources will then be limited and continuous miner sections will be phased out over the last 12 months of the LoM until all coal resources are depleted in 2041 (Mmakau Coal (Pty) Ltd, 2022).

Figure 2 illustrates the RoM production for the LoM.

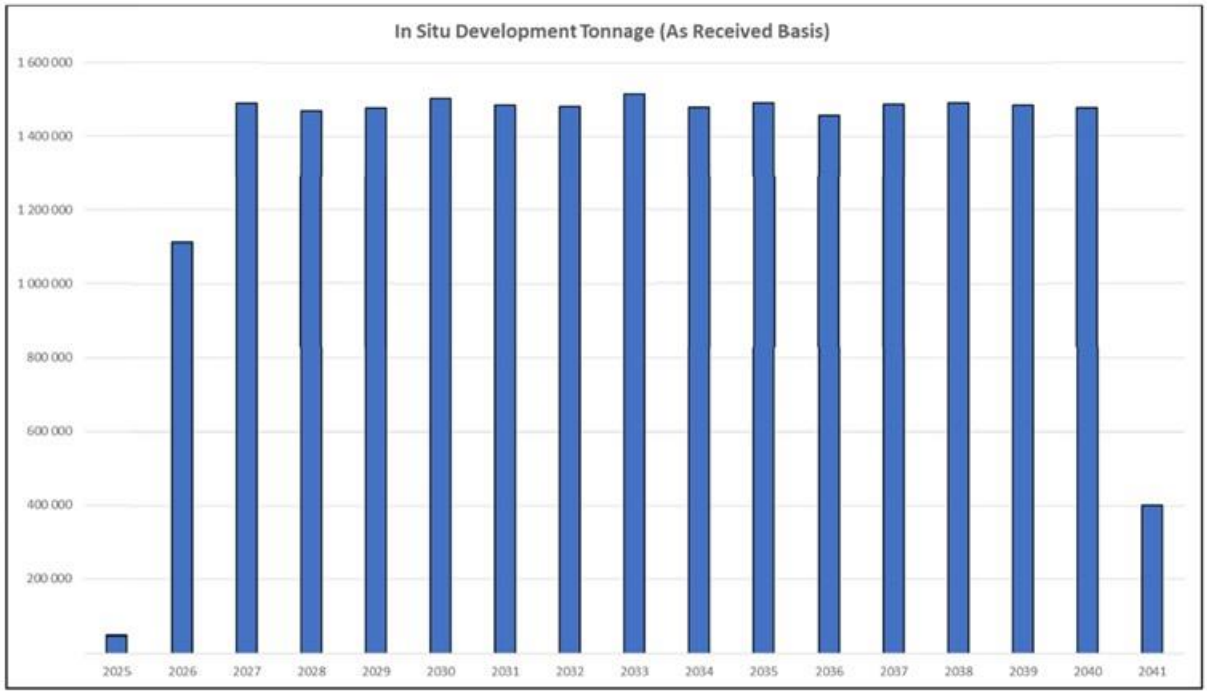


Figure 2: LoM Production Profile (Mmakau Coal (Pty) Ltd, 2022a)

Figure 3: Mine Block Plan (Mmakau Coal (Pty) Ltd, 2022a)

4.3 Coal Handling & Processing

Coal will be transferred from the underground to surface by means of a conveyor belt, whereby it will be sent to the plant area for processing. It is understood that a portion of the coal may also be processed at the nearby Forzando operations.

The section below details the proposed beneficiation process as provided by Mmakau Coal (Mmakau Coal (Pty) Ltd, 2022b):

Crushing & Screening:

Raw underground coal will be conveyed to a RoM conical stockpile. The -300mm raw coal will be extracted via vibrating feeders at a constant rate of 250 tph and conveyed to the primary sizing station. The raw coal will be screened at 150mm with the undersize reporting to the secondary sizing station feed conveyor. The screen oversize will be screened at 150mm and report to the secondary sizing station feed conveyor. The -150mm raw coal will be conveyed to the secondary sizing station and screened at 50mm. The 150x50mm raw coal reports to a crusher and will be sized to -50mm. The -50mm is conveyed to the secondary sizing station feed conveyor to ensure a closed loop crushing system

Before entering the plant, the material will be sampled by a cross-belt sampler fitted on the bin feed conveyor.

Plant Feed:

The coal preparation plant will consist of a single module of 250t/h rated capacity. The coal preparation plant (CPP) feed conveyor will discharge into the raw coal distribution box where the coal will be slurried with water prior to feeding onto a deslime fixed sieve.

Desliming Screen Circuit:

The deslime fixed sieve will be equipped with 1.0 x 12 mm aperture polywedge panels (slot with flow). The nominal -50 + 1.0 mm raw coal will report to a single multi-slope desliming screen fitted with 1.0 mm (w/w) aperture deck panels. Overflow of the desliming screen will report to a chute in which the -50 +1.0 (w/w) coal will be sluiced with dense medium to the dense medium cyclone (DMC) wing tank.

Underflow of the fixed sieve and desliming screens will drain to a desliming Cyclone Feed Sump.

Primary Dense Medium Circuit (DMC):

The -50 + 1.0 mm raw coal overflow from the desliming screens will be flushed with medium in a chute to the DMC wing tank. The wing tank will be designed with a constant sump level maintained through overflow of excess medium to the primary correct medium sump. In this way, the suction head above the coarse DMC feed pump remains constant regardless of fluctuations in the solids feed rate.

Slurry consisting of dense medium and coarse coal will be pumped into a single high-capacity dense medium cyclone located on the top floor of the plant. Due to the need for accurate control of the partition density, the DMC feed pump will have a variable speed drive which will regulate the speed of the pump to maintain a constant feed pressure to the respective DMC.

Product coal and dense medium will collect in the DMC overflow box and, in turn, will discharge onto a fixed sieve where the majority of the medium will be removed. Product coal and adhering medium will then discharge onto a multi-slope product drain and rinse screens.

Medium drained through the drain and rinse screen will be returned directly to the primary correct medium sump from where it will be re-circulated by means of the primary correct medium pump. Any adhering medium after the drain portion of the screen will be rinsed from the coal by water sprays as the coal travels across the rinse portion of the screen and transferred to the common dilute medium sump.

The product drain and rinse screen will be equipped with a scalping section to screen out -25 + 1.0mm material, which report to a coarse coal vibrating basket centrifuge prior to the product conveyor. The centrifuge effluent will drain to the common dilute medium sump. The +25mm material bypasses the centrifuge and is collected onto the product conveyor.

Discards and dense medium from the underflow of the DMC will collect in an underflow box prior to discharging onto a fixed sieve. Discard and adhering medium will then discharge onto a multi-slope discards drain and rinse screen.

Medium drained through the drain and rinse screen will be returned directly to the primary correct medium sump from where it will be re-circulated by means of the primary correct medium pump. Any adhering medium after the drain portion of the screen will be rinsed from the discards and report to the common dilute medium sump.

The drained solids from the discards screen will be sent to the discard conveyor.

Magnetite Recovery:

The medium draining from the drain sections of the product and discards drain and rinse screens will report to the correct medium sump located directly below the screens. Correct Medium will be pumped from sump to a distribution box.

Correct medium will be provided from the distribution box to sluice coal to the DMC wing tank. The distribution box will also provide correct medium to the seal leg of the wing tank.

A portion of the medium will provide the bleed of medium via the correct medium bleed splitter box to the dilute medium sump. The bleed is necessary to purge excess water and non-magnetic contaminants, principally -1.0mm (w/w) material, from the correct medium circuit.

During commissioning, the distribution box will be established with a fixed level to maintain constant flow to the sluicing launder and the seal leg on the wing tank. The constant level requires a small excess of correct medium to be pumped to the distribution box with the excess medium being re-circulated to the correct medium sump.

The rinse sections of the drain and rinse screens will drain directly to the dilute medium sump. Rinsed medium from the screens will be combined with the bleed from the drain section of the product drain and rinse screen and pumped up to the primary magnetic separator. Concentrate from the separators will gravitate to correct medium sump. Effluent from the spigot discharge of the separators will be collected and will report to the Raw Coal Distribution box to assist in slurrying of the raw coal prior to desliming. In this way, any fine coal within the DMC circuit is recovered for processing within the fines circuit.

Density Control:

The density control for the DMC circuits operates on the basis of maintaining the medium in the correct medium sump as a rising density which is generally higher than the desired DMC cut-point. The density of the correct medium in the discharge leg of the correct medium pump will be monitored by means of a fixed nucleonic density gauge.

Any positive offset between the measured process variable and the chosen set-point will be corrected by means of water injection into the correct medium sump.

In the event that the actual medium specific gravity is less than set-point (a negative off-set) in the DMC circuit, the water injection will cease and the inherent rising density of the correct medium circuit will over time increase the specific gravity of the correct medium to that of the set-point. In these situations it is almost inevitable that raw magnetite will need to be added to the respective correct medium circuit as the level in the correct medium sump will drop as water is bled from the correct medium circuit to increase the specific gravity of the circulating medium.

To maintain an over dense medium in the correct medium sump, the water adhering to the coal entering the DMC circuit will be removed by the controlled bleed to the dilute medium sump. From the dilute medium sump, the excess water will be pumped to the magnetic separators and lost as effluent to the desliming screens whilst the recovered magnetite is returned to the correct medium sump as a magnetite concentrate thereby ensuring a rising density.

Magnetite Addition:

When the level in the correct medium sump drops to a pre-set level, magnetite will be added to the sump until the sump level returns to normal.

Magnetite losses will be made up from the bulk magnetite storage pit. The bulk magnetite will be slurried in the pit and pumped by the raw magnetite pump to the correct medium sump.

Spiral Section:

The fine coal, -1.0mm reports as desliming screen underflow into the desliming cyclone feed sump and will be pumped to the desliming cyclone cluster.

The desliming cyclones will classify feed at nominal 0.15mm. The desliming cyclone underflow, will gravitate to MX 7 spiral concentrators. The desliming cyclone overflow will report to the tailings (slurry) thickener.

Spiral product will report to the spiral product sump. Product is then pumped to a product dewatering cyclone cluster. Overflow from the cyclone cluster reports to a tailings thickener. Underflow from the cyclone cluster reports to high frequency dewatering screen.

Overflow from the dewatering screen reports to a fine coal centrifuge before it discharges onto the product conveyor. Dewatering screen underflow and fine coal centrifuge effluent gravitates to the spiral product sump upstream from the centrifuges so that the effluent can be used as sump make-up water but also to ensure that any misplaced solids are recycled.

Spiral discards drains to a high-frequency discards dewatering screen. Oversize from the discards screen is transferred directly onto the discards conveyor and the underflow gravitates to the spiral discard tank from where it is pumped to the tailings thickener.

Water Clarification and Thickening Section:

The desliming cyclone overflow and spiral product dewatering cyclone overflow will flow to the tailings thickener.

A smaller volumetric load will also come from the effluent draining from the high-frequency fines discards screen.

Thickener underflow will be pumped to an emergency slurry pond or a belt press for dewatering. Thickener underflow will be monitored by a density gauge to facilitate pumping slurry of an acceptable pulp density to conserve water. The thickener underflow pump will be fitted with a variable speed drive. The tailings line will also employ a flow meter to allow the mass flow of solids to be estimated.

Dewatered fines product from the belt press will be discharged onto the floor and loaded with a front end loader for placement onto the coarse discard stockpile. Effluent from the belt press will gravitate to a floor sump and pumped to the thickener launder.

Clarified water will overflow the tailings thickener to the clarified water tank and will be re-circulated through the plant as process water.

A fully automated flocculant mixing/dosing system will be provided to serve the tailings thickener.

The system has been designed to accept a powdered flocculent supply which will be manually charged into the flocculant bin regularly to ensure availability at all times.

Flocculant will be withdrawn from the feed bin via screw feeder and mixed with potable water under high pressure prior to entering the flocculant mixing tank. The flocculant make up tank will be equipped with a low shear mixer to ensure proper hydration of the flocculant.

Upon expiry of the hydration timer, the mixed flocculant will be available for transfer to the flocculent dosing tank. A variable speed dosing pump will transfer flocculant from the dosing pump to the thickener feed launder.

Raw water will be supplied to maintain level in the clarified water tank. All process water will be supplied from the clarified water tank which will collect the clarified thickener overflow.

A ring main will be provided to supply the screen sprays, the water for control of the density in the DMC circuits, flushing water for the tailings line, make-up water used for level control within the sumps and slurrying water in head boxes. The ring main will be supplied by a dedicated clarified water pump.

Product Handling:

Product from the plant will be directed onto the product conveyor which will supply product coal to 4 x 5,000t product stockpiles. Before discharging onto the stockpile, the material will be sampled by a cross-belt sampler fitted on the product conveyor. A six idler electro-mechanical scale will be installed to weigh the product coal. This scale will be used for accounting purposes.

Product coal will be sized and stockpiled in designated areas for pre-qualification before being trucked to market.

All the coal stockpile areas will be compacted and made as impermeable as possible; and slightly sloped to drain water into the pollution control dams (PCDs).

Discards Handling:

Spiral discards and coarse discards will discharge from their respective discards screens onto the discards conveyor which in turn will transfer to a 5,000t discards stockpile before being disposed of onto the MRF.

4.4 Mine Residue Facility (MRF)

Mine residue from the processing plant will be disposed of onto an integrated discard dump/MRF, with a storage capacity of 2.85 Mt. The general layout of the MRF is illustrated in Figure 4, whilst the design criteria is summarised in Table 9.

Based on the available geotechnical information it is not expected that there are any geotechnical issues that would adversely impact the development of the facility on the proposed site.

The geochemical characterisation of the coal and waste material was undertaken by Future Flow GPMS (refer to APPENDIX K 4) by collection and testing of six (6) representative samples from the MRA. The results of which conclude that the mine residue can be classed as Type 3 waste and therefore requires disposal to a facility with a Class C containment barrier system or equivalent. The barrier system proposed for Schurvekop is illustrated in Figure 5, refer to APPENDIX H for copies of the relevant engineering report and design drawings, and APPENDIX I for the Construction Quality Assurance (CQA) Plan.

The safety classification of the proposed MRF was conducted according to the requirements of the South African National Standards (SANS) code of practice for Mine Residue Deposits (SANS 10286), see APPENDIX H. The SANS 10286 safety classification system serves to provide a consistent means of differentiating between high, medium and low hazard deposits on the basis of their potential to cause harm to life or property. The hazard classification of the proposed dump is determined by evaluating the potential to cause harm to life or property (Delta BEC & cPod Consulting, 2022a).

The approximate area that may be affected by a flow slide originating from a residue deposit is usually determined based on the guideline values from the Code of Practice and the topography of the area. Based on the nature of the residues however it is not expected that the facility would ever be subject to a flow slide and the associated release of residue. The zone of influence is therefore defined as twice the design height of 40m, therefore a zone of 80m parallel to the dump perimeter toe (Delta BEC & cPod Consulting, 2022a).

Based on the zone of influence and undermining as defined and the criteria specified in the code, the proposed dump has been classified as a high hazard facility.

Table 9: Mine Residue Design Criteria (Delta BEC & cPod Consulting, 2022a).

Description	Value
Residue Type	Coarse and fine coal residue

Description	Value
Deposition Rate	352 000 tpa
Total Capacity Required	2.82 Mt (min)
Life of Facility	8 Years (min)
In-situ Dry Density	Coarse Discard 1.3 t/m^3 (minimum expected) Fine Slurry 0.9t/m^3 Combined Slurry & Discard at 1:10 Ratio 1.4t/m^3 (minimum expected)
Deposition Method	Load, haul, place, spread and compact
Design Storm	1 in 50-year, 24hr event – 118mm
Embankment Design	Individual slopes between benches = 1:2.2 (V:H) Overall slope = 1:2.5 (V:H) Benches width = 3m
Footprint Area	12 ha
Final Elevation of MRF	1645.6mamsl
Height of MRF above lowest point	40m
Minimum Stability Factor of Safety	Operational = 1.5 Closure = 1.5
Waste Type	Type 3
Barrier System	Class C
MRF Decant System	None

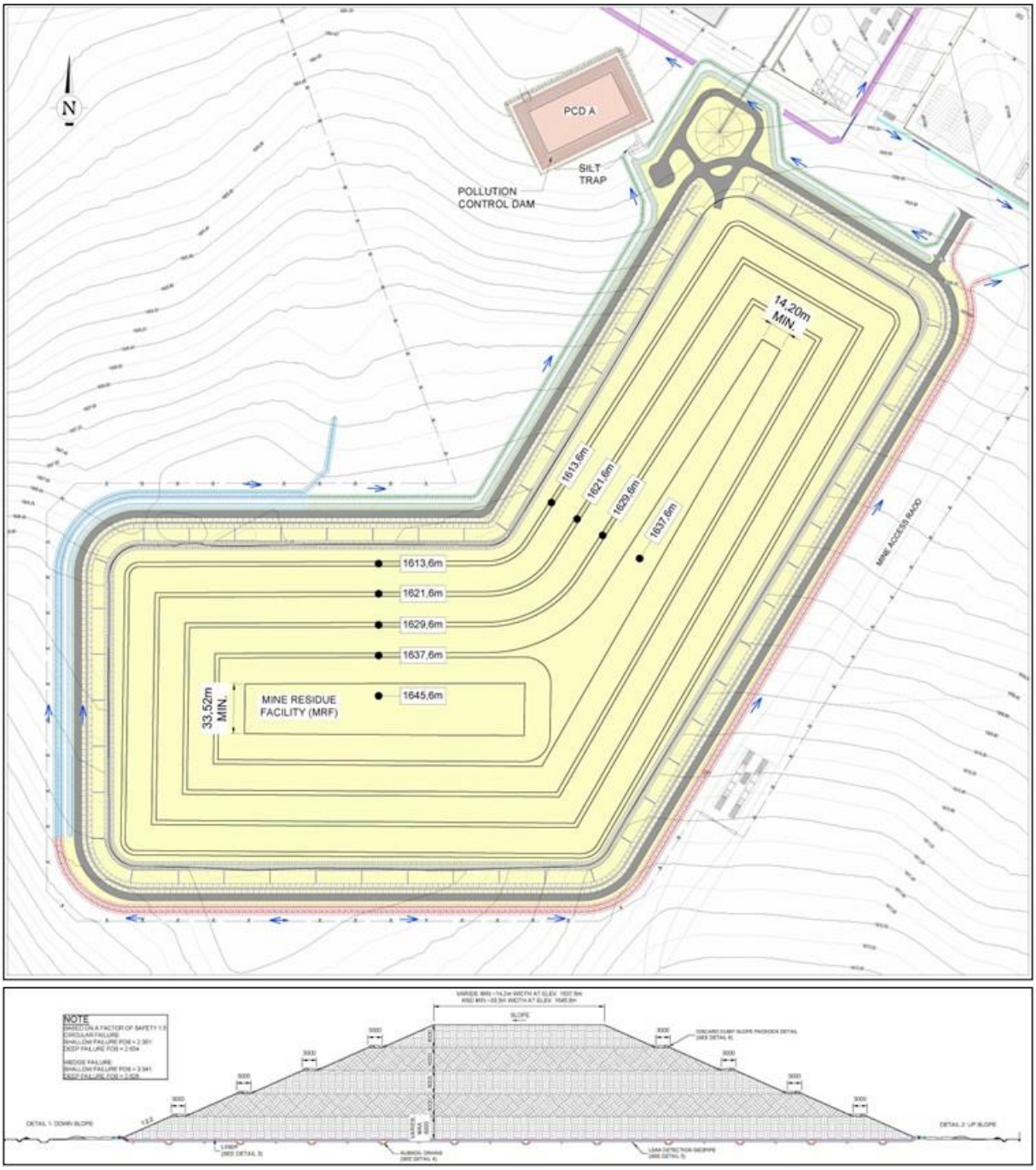


Figure 4: General Layout & Cross Section of the MRF (Delta BEC & cPod Consulting, 2022a)

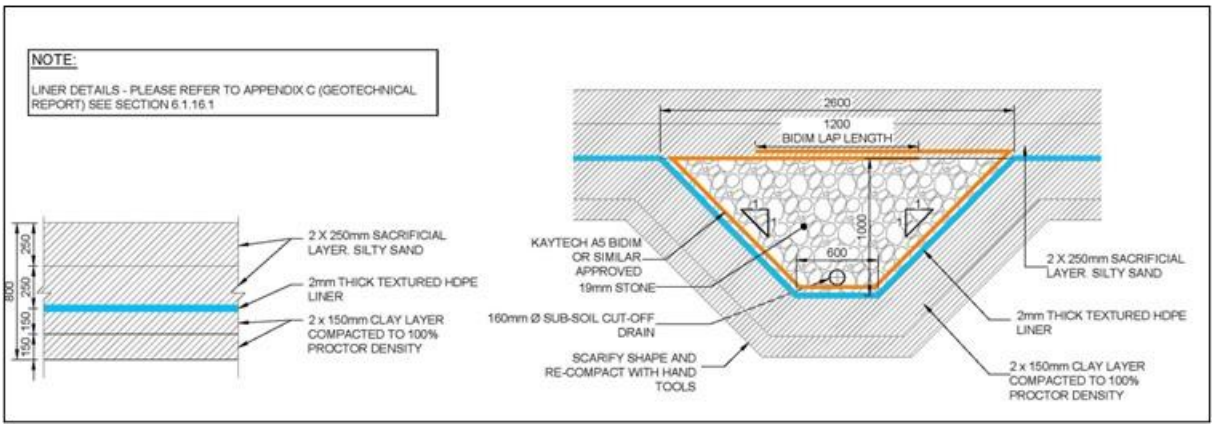


Figure 5: Proposed Barrier System Detail and Subsoil Cut-off Drain (Delta BEC & cPod Consulting, 2022a)

4.5 Water Management, Supply and Reticulation

4.5.1 Process Water

Water will be recycled on site as far as possible and dirty water will be prioritised for process needs (use in the process plant, for use underground or for dust suppression). Process water will initially be sourced from rain water and the borehole, however once in steady state production this water will be pumped from the underground workings via a system of tanks, reservoirs and pollution control dams (PCDs). The plant requirement totals 256,740.00 m³/annum.

Water for dust suppression will be sourced from the PCD A where an estimated volume of 5 237.62 m³/annum is required. Water sourced from the PCDs for dust suppression will only be used within the dirty footprint area to prevent contamination of clean areas with dirty water (Delta Bec, 2022b).

The Mine's Water Balance (attached as APPENDIX F) indicates a surplus of water, and induced evaporation will be implemented to manage water levels within the PCDs as and when required.

4.5.2 Potable Water

Water for domestic use will be sourced from a borehole and stored within a reservoir/tank. The potable water storage was calculated for a 2-day operational use storage period, the volume of the reservoir is approximately 210 m³. The demand is expected to be 37,610 m³/annum (Delta Bec, 2022b). It is anticipated that a modular water treatment plant (reverse osmosis) will be installed on site to treat water for human consumption.

4.5.3 Stormwater Management

Clean stormwater runoff:

Berms and trenches will be constructed around areas of activity to divert upstream clean water runoff around the dirty footprint area; flow dissipaters will be constructed where necessary. Figure 6 overleaf illustrates the clean water surface flow regime.

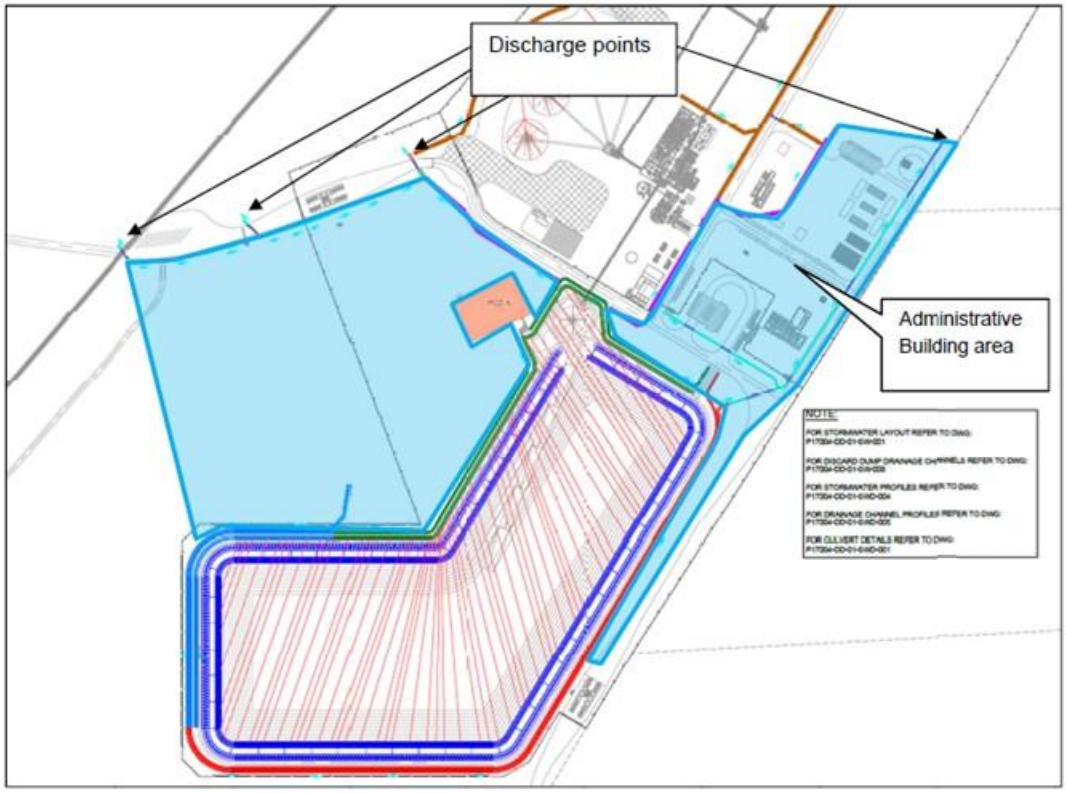


Figure 6: Clean Water Surface Flow Regime (Delta BEC, 2022c)

Dirty water runoff:

Filter drains will be installed at the base of the MRF, above the Class C barrier, to capture seepage. Further to this leakage detection drains will be installed below the barrier system to capture any seepage which may leak through a compromised liner (Delta BEC & cPod Consulting, 2022a).

Toe paddock walls and cross walls will be constructed on the MRF to intercept surface water runoff from the outer embankment slopes, and allow for settling out of fines before discharging excess water to a concrete lined solution trench which will channel the water to PCD A (Delta BEC & cPod Consulting, 2022a).

Dirty water runoff from the plant and stockpile area will be diverted via dirty water drains, to PCD B and C. All dirty water management facilities have been designed to cater for a 1:50 year storm event, as required by GN R 704 of the NWA and will be lined (Class C barrier system or equivalent). Figure 7 and Figure 8 illustrate the surface water flow regimes in the dirty water footprint areas.

Table 10 summarises the dimensions of the proposed water management facilities. Please refer to APPENDIX G for the detailed storm water management plan and relevant design drawings.

Table 10: PCD Dimensions

Description	Dimensions	Capacity
Pollution Control Dam A Receives dirty water runoff from the MRF, water is used for dust suppression on site. Excess water is pumped to the Process Water Reservoir for use within the plant.	(L) 75.3m x (W) 46.5m x (H) 2.8m Side Slopes 1:3	7,987.17m^3
Pollution Control Dam B Receives water from the underground workings, as well as grey water from the change house and dirty water runoff from the process plant, RoM stockpile and wash bay area. Water is pumped to the Process and Mine Water Reservoirs for use within the plant and underground mining activities.	(L) 52m x (W) 40m x (H) 2.8m Side Slopes 1:3	4,481.57 m^3
Pollution Control Dam C Receives dirty water runoff from the overburden and product stockpile area. Water is pumped to the Process Water Reservoir for use within the plant.	(L) 76m x (W) 45m x (H) 2.8m Side Slope 1:3	7,766.53 m^3
Process Water Reservoir Receives water from PCDs A, B and C for plant feed.	-	12,430 m^3
Mine Water Reservoir Receives water from PCD B for use underground.	-	1,775 m^3

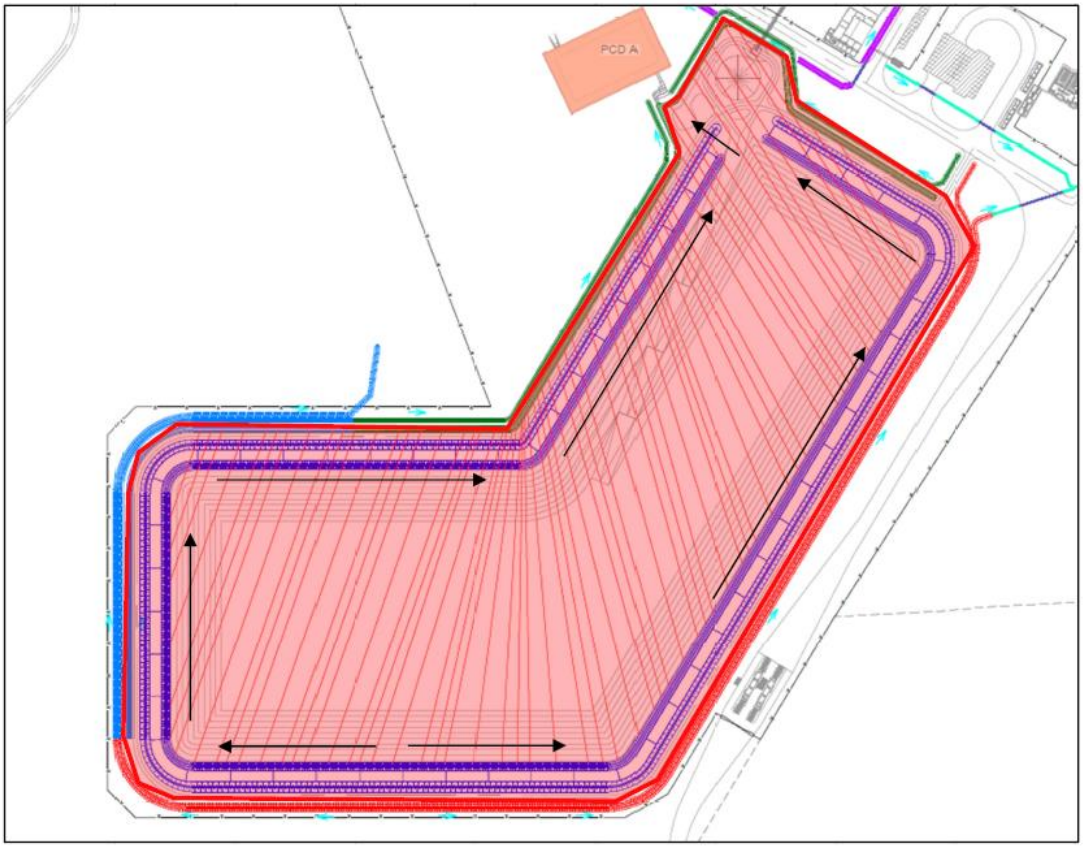


Figure 7: Surface Flow Regime at the Mine Residue Facility to PCD A (Delta BEC, 2022c)

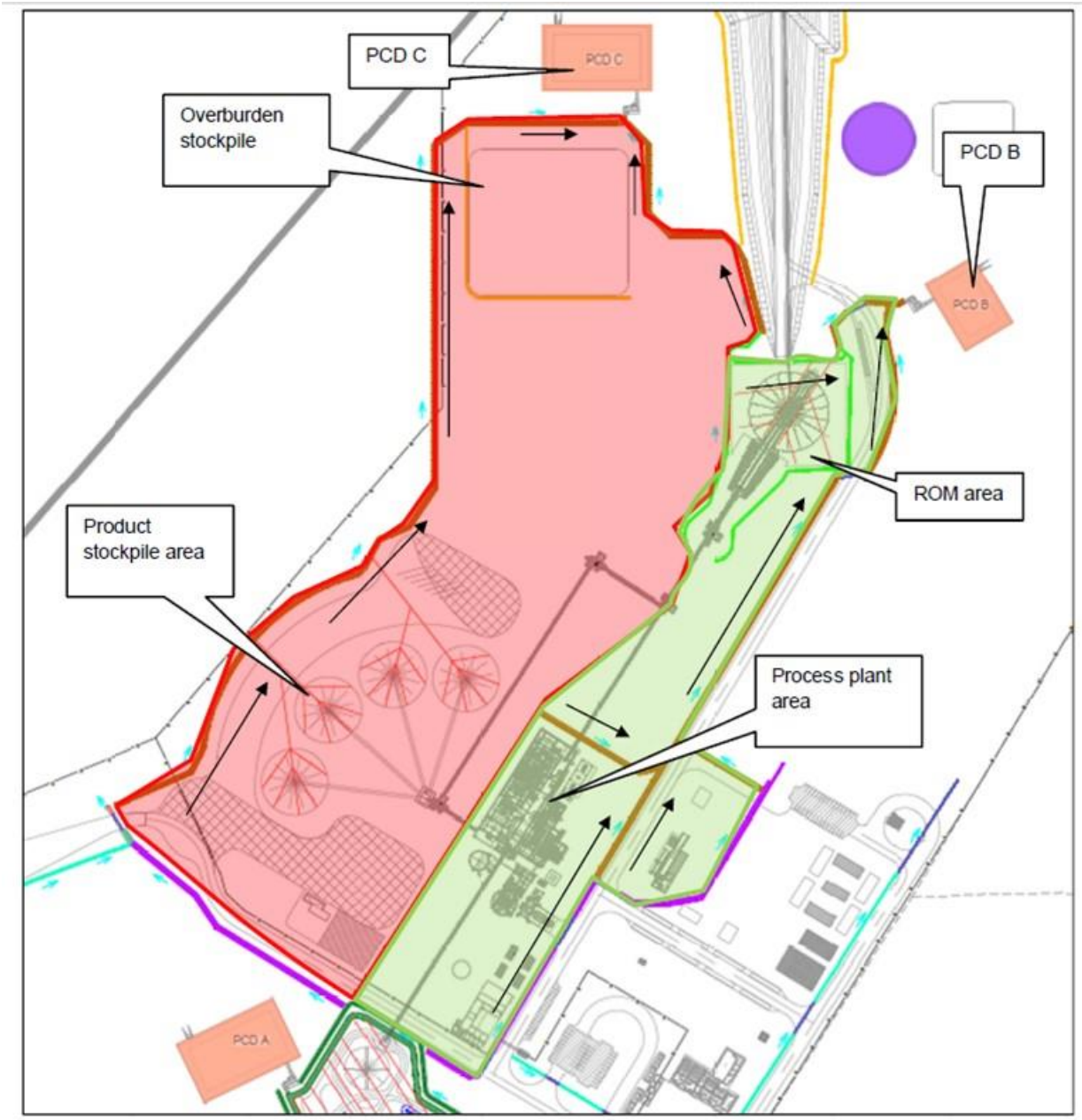


Figure 8: Surface Flow Regime to PCDs B and C (Delta BEC, 2022c)

4.6 Provision of Services

4.6.1 Power Supply

The bulk electricity supply will be provided by an Eskom overhead power line, with the point of supply located at the nearby Ysterkop substation located approximately 5km north east of the proposed infrastructure area. The bulk electrical supply will connect to a containerised main substation which will house the MV switchgear for the MV feeders to the site. The internal reticulation will be via 11kV overhead lines resulting in no transformers being required (Delta BEC, 2022d).

4.6.2 Waste Management (non-mineralised waste)

During the construction, operation and decommissioning phases various waste streams will be generated, including hazardous and general waste. A designated waste management area for the temporary storage of waste will be located at the laydown area during the construction phase, and at the O&AM area during operations.

A sufficient number of bins and skips to ensure separation of general and hazardous wastes will be provided on site for the duration of the Project. Recycling will be encouraged where possible. Waste will be removed off-site by contracted waste management companies. The mine's Environmental Control Officer (ECO) will be required to maintain all required waste management documentation, (waste register, waste manifests for all waste streams, and certificate of issue or safe disposal for hazardous waste removed from site).

Sewage waste will be managed in portable chemical toilets during the construction and decommissioning phases and in conservancy tanks during operations. The chemical toilets will be placed at the construction camp and temporary laydown area, while it proposed that conservancy tanks be installed at the plant and O&AM area for use during in the operational phase.

Conservancy tanks and chemical toilets will be serviced by a contracted waste management company on a regular basis. The ECO will be required to retain proof of safe and lawful disposal of sewage for the LoM.

Brine waste generated from the potable water treatment plant will be recycled back to the PCD. Any solid waste/filter cake generated from the water treatment plant will be stored within a sump for disposal off site at a licensed facility.

4.7 Operating Hours

Schurvekop Mine will be operational 24-hours per day, 7 days per week, with scheduled shut-downs taking place for maintenance. The mine will operate in various shifts.

4.8 Employment

The mine will utilise a model whereby the Mmakau Mining will provide a management and shared services team, and the core mining activities will be outsourced to a suitable mining contractor.

At steady status, the mine will have two hundred and seventy-nine (279) permanent employees, of which the majority (267 people) will be employed by a core contractor, still to be identified. According to the Social and Labour Plan (S&LP) the mine will preferentially recruit novice and entry level positions from the local community with only positions that cannot be filled locally, advertised and filled from further afield.

4.9 Timeframes for Implementation of the Project

The construction of the mine is planned to commence in 2024 and this phase is scheduled to take 12 months to complete. First production is scheduled for 2025, reaching steady state production within 9 months. The estimated life of mine is 16 years, ending in 2041. Decommissioning and Closure activities are expected to take a further 3 years.

4.10 Listed Activities Being Applied For

The Department of Environmental Affairs (DEA) have published three notices which list activities for which environmental authorisation is required in terms of section 24(2) and 24D of NEMA, prior to commencement.

Furthermore, a list of waste management activities that have, or are likely to have, a detrimental effect on the environment were published in terms of section 19(2) of the NEMWA. No person may commence, undertake or conduct a listed waste management activity unless a WML is issued in respect of that activity.

The DMRE is the Competent Authority for mining related activities in terms of both NEMA and NEMWA. As such an integrated application has been submitted as per the One Environmental System.

The Listed Activities in terms of the NEMA EIA Regulations 2014 (as amended) pertaining to the proposed Project are summarised in Table 11 - Table 13.

Waste Management Activities are detailed in Table 14.

Table 11: Listed Activities identified in Listing Notice 1 GN R 983 (as amended)

Listing Notice	Activity Number	Activity Description	Relevance to the Project
GN R 983 (as amended) Listing Notice 1	9	The development of infrastructure exceeding 1 000 metres in length for the bulk transportation of water or storm water— (i) with an internal diameter of 0,36 metres or more; or (ii) with a peak throughput of 120 litres per second or more; excluding where— (a) such infrastructure is for bulk transportation of water or storm water or storm water drainage inside a road reserve or railway line reserve; or (b) where such development will occur within an urban area.	Water reticulation pipelines for the processing plant may meet these thresholds and thus the activity is included in the Application.
GN R 983 (as amended) Listing Notice 1	10	The development and related operation of infrastructure exceeding 1 000 metres in length for the bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes – (i) with an internal diameter of 0,36 metres or more; or (ii) with a peak throughput of 120 litres per second or more; excluding where— (a) such infrastructure is for the bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes inside a road reserve or railway line reserve; or (b) where such development will occur within an urban area.	Slurry reticulation pipelines may meet these thresholds and thus the activity is included in the Application.
GN R 983 (as amended) Listing Notice 1	11	**The development of facilities or infrastructure for the transmission and distribution of electricity –** **(i) outside urban areas or industrial complexes with a**	A 132KVA substation will be constructed onsite, additional power lines may be required however, these will be 11kV.

Listing Notice	Activity Number	Activity Description	Relevance to the Project
		capacity of more than 33 but less than 275 kilovolts; or (ii) inside urban areas or industrial complexes with a capacity of 275 kilovolts or more; Excluding the development of bypass infrastructure for the transmission and distribution of electricity where such bypass infrastructure is – (a) temporarily required to allow for maintenance of existing infrastructure; (b) 2 kilometres or shorter in length; (c) within an existing transmission line servitude; and (d) will be removed within 18 months of the commencement of development.	
GN R 983 (as amended) Listing Notice 1	12	**The development of—** (i) dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 square metres; or **(ii) infrastructure or structures with a physical footprint of 100 square metres or more;** **where such development occurs—** **(a) within a watercourse;** (b) in front of a development setback; or (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse; — excluding— (aa) the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour;	The mine infrastructure area and MRF will encroach on a wetland.

Listing Notice	Activity Number	Activity Description	Relevance to the Project
		(bb) where such development activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies; (cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies; (dd) where such development occurs within an urban area; (ee) where such development occurs within existing roads, road reserves or railway line reserves; or (ff) the development of temporary infrastructure or structures where such infrastructure or structures will be removed within 6 weeks of the commencement of the development and where indigenous vegetation will not be cleared.	
GN R 983 (as amended) Listing Notice 1	14	The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres.	Hydrocarbon storage (80m^3) will be constructed at the workshop area.
GN R 983 (as amended) Listing Notice 1	19	The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse; but excluding where such infilling, depositing, dredging, excavation, removal or moving— (a) will occur behind a development setback; (b) is for maintenance purposes undertaken in accordance with a maintenance management plan;	The mine infrastructure area and MRF will encroach on a wetland. Construction activities may necessitate the need to remove soil, pebbles and rocks and the infilling/depositing of suitable material.

Listing Notice	Activity Number	Activity Description	Relevance to the Project
		(c) falls within the ambit of activity 21 in this Notice, in which case that activity applies; (d) occurs within existing ports or harbours that will not increase the development footprint of the port or harbour; or (e) where such development is related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies.	
GN R 983 (as amended) Listing Notice 1	24	**The development of a road—** (i) for which an environmental authorisation was obtained for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Government Notice 545 of 2010; or **(ii) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres;** but excluding a road— (a) which is identified and included in activity 27 in Listing Notice 2 of 2014; (b) where the entire road falls within an urban area; or (c) which is 1 kilometre or shorter.	Collectively, road upgrades required for access to the mine will exceed 1km in length and these roads may have to be wider than 8m. The road developments largely follow existing farm roads and may be seen as upgrades to existing roads in most locations, however new haul roads will also be required within the mine infrastructure area.
GN R 983 (as amended) Listing Notice 1	30	Any process or activity identified in terms of section 53(1) of the National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004)	Three nationally recognised Red Data plant species are expected within and/or surrounding the study area. Additionally, three plant species provincially protected in terms of the Mpumalanga Nature Conservation Act, 1998 (No. 10 of 1998) were recorded and includes: • *Eucomis* sp. (recorded along the *River* habitat),

Listing Notice	Activity Number	Activity Description	Relevance to the Project
			• *Gladiolus sericeovillosus* subsp. *calvatus* (single specimen recorded within the *River* habitat) and • *Haemanthus humilis* subsp. *hirsitus* (numerous specimens recorded throughout the *Rocky outcrops* habitat).
GN R 983 (as amended) Listing Notice 1	56	The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre— (i) where the existing reserve is wider than 13,5 meters; or (ii) where no reserve exists, where the existing road is wider than 8 metres; excluding where widening or lengthening occur inside urban areas	Collectively, road upgrades required for access to the mine will exceed 1km in length and these roads may have to be wider than 8m. The road developments largely follow existing farm roads and may be seen as upgrades to existing roads in most locations.

Table 12: Listed Activities identified in Listing Notice 2 GN R 984 (as amended)

Listing Notice	Activity Number	Activity Description	Relevance to the Project
GN R 984 (as amended) Listing Notice 2	6	The development of facilities or infrastructure for any process or activity which requires a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent, excluding— (i) activities which are identified and included in Listing Notice 1 of 2014; (ii) activities which are included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case the National Environmental Management: Waste Act, 2008 applies;	Water uses in terms of Section 21(g) of the NWA are applicable to the project.

Listing Notice	Activity Number	Activity Description	Relevance to the Project
		(iii) the development of facilities or infrastructure for the treatment of effluent, polluted water, wastewater or sewage where such facilities have a daily throughput capacity of 2 000 cubic metres or less; or (iv) where the development is directly related to aquaculture facilities or infrastructure where the wastewater discharge capacity will not exceed 50 cubic metres per day.	
GN R 984 (as amended) Listing Notice 2	15	The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for— (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.	Approximately 46 Ha will cleared and stripped for construction activities of which approximately 21 Ha is considered indigenous vegetation).
GN R 984 (as amended) Listing Notice 2	17	Any activity including the operation of that activity which requires a mining right in terms of section 22 of the Mineral and Petroleum Resources Development Act, as well as any other applicable activity as contained in this Listing Notice, in Listing Notice 1 of 2014 or Listing Notice 3 of 2014, required to exercise the mining right.	An application for a Mining Right has been submitted in terms of the MPRDA.

Table 13: Listed Activities identified in Listing Notice 3 GN R 985 (as amended)

Listing Notice	Activity Number	Activity Description	Mpumalanga	Relevance to the Project
GN R 985 (as amended) Listing Notice 3	2	The development of reservoirs, excluding dams, with a capacity of more than 250 cubic metres.	**(ii) Outside urban areas:** (aa) A protected area identified in terms of NEMPA, excluding conservancies;	3 reservoirs will be constructed/installed on site (process water, mine water and potable water), the capacity of which exceeds 250m^3.

Listing Notice	Activity Number	Activity Description	Mpumalanga	Relevance to the Project
			(bb) National Protected Area Expansion Strategy Focus areas; **(cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority;** (dd) Sites or areas identified in terms of an international convention; (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (ff) Core areas in biosphere reserves; or (gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve, where such areas comprise indigenous vegetation; or (iii) Inside urban areas: (aa) Areas zoned for use as public open space; or	The site falls within the Eastern Highveld Grassland which is listed as Endangered on the revised national list of ecosystems that are threatened and in need of protection (DFFE, 2022).

Listing Notice	Activity Number	Activity Description	Mpumalanga	Relevance to the Project
			(bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority, or zoned for a conservation purpose.	
GN R 985 (as amended) Listing Notice 3	4	The development of a road wider than 4 metres with a reserve less than 13,5 metres	**i. Outside urban areas:** (aa) A protected area identified in terms of NEMPAA, excluding disturbed areas; (bb) National Protected Area Expansion Strategy Focus areas; **(cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority;** (dd) Sites or areas identified in terms of an international convention; (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (ff) Core areas in biosphere reserves; or (gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area	Collectively, road upgrades required for access to the mine will exceed 1km in length and these roads may have to be wider than 8m. The road developments largely follow existing farm roads and may be seen as upgrades to existing roads in most locations, however new haul roads will also be required within the mine infrastructure area. The site falls within the Eastern Highveld Grassland which is listed as Endangered on the revised national list of ecosystems that are threatened and in need of protection (DFFE, 2022).

Listing Notice	Activity Number	Activity Description	Mpumalanga	Relevance to the Project
			identified in terms of NEMPAA or from the core areas of a biosphere reserve, excluding disturbed areas, where such areas comprise indigenous vegetation; or ii. Inside urban areas: (aa) Areas zoned for use as public open space; or (bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority or zoned for a conservation purpose.	
GN R 985 (as amended)Listing Notice 3	12	The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.	i. **Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004;** ii. Within critical biodiversity areas identified in bioregional plans; or iii. On land, where, at the time of the coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an	Approximately 46 Ha will cleared and stripped for construction activities of which approximately 21 Ha is considered indigenous vegetation). The site falls within the Eastern Highveld Grassland which is listed as Endangered on the revised national list of ecosystems that are threatened and in need of protection (DFFE, 2022).

Listing Notice	Activity Number	Activity Description	Mpumalanga	Relevance to the Project
			equivalent zoning or proclamation in terms of NEMPAA.	
GN R 985 (as amended)Listing Notice 3	14	**The development of—** (i) dams or weirs, where the dam or weir, including infrastructure and water surface area exceeds 10 square metres; or **(ii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs—** **(a) within a watercourse;** (b) in front of a development setback; or (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse; excluding the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour.	**(i) Outside urban areas:** (aa) A protected area identified in terms of NEMPAA, excluding conservancies; (bb) National Protected Area Expansion Strategy Focus areas; (cc) World Heritage Sites; **(dd) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority;** (ee) Sites or areas identified in terms of an international convention; (ff) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (gg) Core areas in biosphere reserves; (hh) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area	The mine infrastructure area and MRF will encroach on a wetland. The site falls within the Eastern Highveld Grassland which is listed as Endangered on the revised national list of ecosystems that are threatened and in need of protection (DFFE, 2022).

Listing Notice	Activity Number	Activity Description	Mpumalanga	Relevance to the Project
			identified in terms of NEMPAA or from the core areas of a biosphere reserve, where such areas comprise indigenous vegetation; or (ii) Inside urban areas: (aa) Areas zoned for use as public open space; or (bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority or zoned for a conservation purpose.	
GN R 985 (as amended) Listing Notice 3	18	The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre.	**i. Outside urban areas:** (aa) A protected area identified in terms of NEMPAA, excluding conservancies; (bb) National Protected Area Expansion Strategy Focus areas; **(cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority;** (dd) Sites or areas identified in terms of an international convention; (ee) Critical biodiversity areas as identified in systematic	Collectively, road upgrades required for access to the mine will exceed 1km in length and these roads may have to be wider than 8m. The site falls within the Eastern Highveld Grassland which is listed as Endangered on the revised national list of ecosystems that are threatened and in need of protection (DFFE, 2022).

Listing Notice	Activity Number	Activity Description	Mpumalanga	Relevance to the Project
			biodiversity plans adopted by the competent authority or in bioregional plans; (ff) Core areas in biosphere reserves; or (gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve, where such areas comprise indigenous vegetation; or ii. Inside urban areas: (aa) Areas zoned for use as public open space; or (bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority or zoned for a conservation purpose.	

Table 14: Listed Waste Management Activities in terms of NEMWA (GN 921)[3]

NEMWA Category	Activity Number	Activity Description	Relevance to the Project
Category B	7	The disposal of any quantity of hazardous waste to land	Carbonaceous overburden stockpiles. These will be used to backfill the void on closure. This activity is also applicable to the integrated dump (mine residue facility).
Category B	9	The disposal of inert waste to land in excess of 25 000 tons, excluding the disposal of such waste for the purposes of levelling and building which has been authorised by or under other legislation.	Non-carbonaceous overburden stockpiles. These will be used to backfill the void on closure.
Category B	10	The construction of a facility for a waste management activity listed in Category B of this Schedule (not in isolation to associated waste management activity).	The construction of the MRF (integrated dump) and overburden stockpiles.
Category B	11	The establishment or reclamation of a residue stockpile or residue deposit resulting from activities which require a mining right, exploration right or production right in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002).	The establishment of the MRF (integrated dump).
Category C	1	The storage of general waste at a facility that has the capacity to store in excess of 100m^3 of general waste at any one time, excluding the storage of waste in lagoons or temporary storage of such waste.	Storage of general (domestic and office) waste in skips at the refuse area.

[3] No Waste Management License required for Category C activities, however registration and compliance with the Norms and Standards applies.

NEMWA Category	Activity Number	Activity Description	Relevance to the Project
Category C	2	The storage of hazardous waste at a facility that has the capacity to store in excess of 80m^3 of hazardous waste at any one time, excluding the storage of hazardous waste in lagoons or temporary storage of such waste.	Storage of hazardous waste i.e. used hydrocarbons, oil filters, oily rags at the workshop and refuse area.

5 POLICY & LEGISLATIVE CONTEXT

Section 24 of the Constitution of the Republic of South Africa states that:

> *Everyone has the right to (a) an environment that is not harmful to their health or well-being; and (b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that –*
>
> - *Prevent pollution and ecological degradation;*
> - *Promote conservation; and*
> - *Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.*

To give effect to Section 24 of the Constitution, several laws have been promulgated towards realisation of these rights. This section describes the key legislation, policies, plans, guidelines and development planning frameworks and tools and their relevance to the proposed Project.

5.1 Mineral and Petroleum Resources Development Act, 2002 (MPRDA)

The MPRDA (Act No. 28 of 2002) and its Regulations (GNR527, 23 April 2004 as amended by: GNR R1288 dated 29 October 2004; GNR1203 dated 30 November 2006; and GNR349 dated 18 April 2011) is the predominant legislation dealing with the acquisition of rights to search for, extract and process mineral resources in South Africa. The MPRDA came into effect on 1 May 2004. The MPRDA holds that mineral resources in South Africa belong to the Nation and that the State is the custodian thereof.

Mmakau Coal has submitted an application for a Mining Right in terms of the MPRDA, the application was accepted by the DMRE on the 26th July 2022 (Ref: MP30/5/1/2/2/10366MR).

The MPRDA further states that nobody may mine without environmental authorisation (Section 5A) in terms of the NEMA (see Section 5.4). An application for integrated environmental authorisation was submitted simultaneously with the application for a Mining Right.

5.2 Mining Charter, 2018

Section 100(2)(a) of the MPRDA empowers the Minister to develop a Broad-Based Black Economic Empowerment (BBBEE) Charter for the South African Mining and Minerals Industry ("Mining Charter") as a regulatory instrument.

One of the objectives of the MPRDA and Mining Charter is to ensure the attainment of Government's objectives to redress historical socio-economic inequalities, to ensure broad-based economic empowerment and the meaningful participation of Historically Disadvantaged Persons in the mining and minerals industry.

The first Mining Charter was published in 2004. The Mining Charter was amended in 2010 to streamline and expedite the attainment of its objectives. Further shortcomings of the previous Charter were identified and Government initiated another review process in 2015, culminating in the publication of the latest Mining Charter, 2018.

Mmakau Coal is a Level 1 BBBEE contributor with 100% black ownership.

The Mining Charter also prescribes allocation of benefits to host communities in accordance with an approved host community development programme, in addition to the Social and

Labour Plan (S&LP) requirements as per Section 23 of the MPRDA. Further to the direct benefits accruing to historically disadvantaged South Africans by the implementation of elements of the Mining Charter (including ownership, employment equity and Human Resources Development), Mines are also now obligated to meet certain BBBEE targets in terms of procurement, supplier and enterprise development.

5.3 Other Mining Legislation

Regulation 17(8) of the Mine Health and Safety Act, 1996, (MHSA) Regulations state that "no person may erect, establish or construct any buildings, roads, railways, dams, waste dumps, reserve land, excavations or any other structures whatsoever within a horizontal distance of 100 (one hundred) metres from workings, unless a lesser distance has been determined safe by a professional geotechnical specialist and all restrictions and conditions determined by him or her or by the Chief Inspector of Mines are complied with."

It is anticipated that some of the mine infrastructure will be placed within 100m of the Adit, in addition to this existing surface infrastructure associated with existing farmsteads and the Schurvekop Community will be undermined, Mmakau Coal will have to obtain the necessary permissions in this regard.

There are several other pieces of legislation which deal with such issues such as royalties (the Mineral and Petroleum Resources Royalty Act, 2008), title registration (the Mining Titles Registration Act, 1967), and MHSA. These issues constitute specialist fields on their own and will not be discussed in further detail.

Sections of the MPRDA have been amended to make the Minister of Mineral Resources the responsible authority for implementing environmental matters in terms of the NEMA as it relates to mining and prospecting operations and incidental activities, and to align the MPRDA with NEMA.

5.4 The National Environmental Management Act, 1998 (Act No 107 of 1998) (NEMA)

The NEMA, as amended was set in place in accordance with Section 24 of the Constitution of the Republic of South Africa. Certain environmental principles under NEMA have to be adhered to, to inform decision making for issues affecting the environment. Section 24 (1)(a) and (b) of NEMA state that the potential impact on the environment and socio-economic conditions of activities that require authorisation or permission by law and which may significantly affect the environment, must be considered, investigated and assessed prior to their implementation and reported to the organ of state charged by law with authorising, permitting, or otherwise allowing the implementation of an activity.

The EIA Regulations, Government Notice Regulation (GN R) I 982 were published on 04 December 2014 and promulgated on 08 December 2014. Together with the EIA Regulations, the Minister also published GN R 983 (Listing Notice No. 1), GN 984 (Listing Notice No. 2) and GN R 985 (Listing Notice No. 3). The NEMA EIA Regulations, 2014 and Listing Notices have been amended numerous times.

The undertaking of Listed Activities in terms of the EIA Regulations requires Environmental Authorisation to be obtained. There are new Listed Activities associated with the proposed Project, as summarised in Table 11 - Table 13. These Activities are identified in terms of Listing

Notice No. 1, 2 and 3 of the EIA Regulations 2014 (as amended), a S&EIR Process is therefore relevant to the application. The EIA Regulations further set out the requirements for reporting, timeframes, public participation and specialist reports.

This report constitutes the EIA and EMP Report, and is being made available for public review and comment for a period of thirty (30) days).

5.5 National Environmental Management Waste Act,

Regulations to the NEMWA identifies a number of activities which require a WML prior to being undertaken. The establishment of residue deposits and residue stockpiles, including overburden stockpiles, is one such activity that will be associated with the proposed project.

Waste Management Activities associated with the proposed Project are summarised in Table 14 and include activities listed in Category B and C of the List of Waste Management Activities that have, or are likely to have, a detrimental effect on the environment (as amended).

The process to apply for a WML is in this case an integrated process to the application for Environmental Authorisation. GNR632 (2015) of NEMWA provides for the planning and management of residue stockpiles and deposits, and has been considered in the compilation of the engineering report and associated designs (APPENDIX H).

Further to this, the NEMWA provides for National Norms and Standards for regulating the management of waste. These Norms and Standards have been incorporated into the EMP where applicable.

5.6 National Water Act, 1998 (NWA)

The NWA provides for the sustainable and equitable use and protection of water resources. It is founded on the principle that the National Government has overall responsibility for and authority over water resource management, including the equitable allocation and beneficial use of water in the public interest, and that a person can only be entitled to use water if the use is permissible in terms of Section 22 of the NWA.

Mmakau Coal has an approved Water Use License (WUL) (License number: 06/B11B/GJACIB/6810) which authorises the following water uses at the Mine:

- Section 21 (a): Taking water from a water resource;
- Section 21 (c): Impeding or diverting the flow of water in a watercourse;
- Section 21 (i): Altering the bed, banks, course or characteristics of a watercourse;
- Section 21 (g): Disposing of waste in a manner that could detrimentally impacts on a water resource; and
- Section 21 (j): Removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people.

Should additional water uses be identified, a new application will be submitted. The competent authority in respect of water use licenses is the Department of Water and Sanitation (DWS).

Specific regulations made in terms of Section 26(1) of the NWA pertain to the use of water for mining and related activities. The provisions of GN R704 have been incorporated into the design of the proposed Project, where possible. Where the implementation of provisions of GN R 704 is not possible, an application for exemption will be made as per Regulation 3 of GN R 704.

Regulation 2 of GN R 704 stipulates this Mine's obligations in terms of notifications to the DWS, if changes take place at the Mine, or if incidents occur. These provisions have been incorporated into the EMP and associated emergency response plan and communication protocols.

5.7 The Explosives Act ,1956 (as amended)

The Explosives Act relates to the manufacture, storage, sale, transport, import, export and use of explosives.

Construction of the adit will be associated with blasting. A blast and vibration assessment was completed for the proposed operations in 2017 and remains valid.

5.8 National Environmental Management Air Quality Act, 2004 (NEMAQA)

According to the National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004) (NEMAQA) the DFFE, the provincial environmental departments and local authorities (district and local municipalities) are separately and jointly responsible for the implementation and enforcement of various aspects of NEMAQA. A fundamental aspect of the new approach to the air quality regulation, as reflected in the NEMAQA is the establishment of National Ambient Air Quality Standards (NAAQS) (GN R 1210 of 2009). These standards provide the goals for air quality management plans and also provide the benchmark by which the effectiveness of these management plans is measured.

Activities that are identified in GN 983 require an Atmospheric Emissions License (AEL) to be issued in terms of NEMAQA. No such activities are associated with the proposed project and an AEL will not be required.

GN1123 declared the Highveld Priority Area (HPA) in terms of the NEMAQA. The HPA Air Quality Management Plan (AQMP) was published in GN144. The proposed project site falls within the HPA and thus must comply with the AQMP. Specific measures have been included in the EMP, along with specific requirements for prevention and management of dust and emissions potentially arising from the proposed development, and monitoring and reporting requirements. An Air Quality Impact Assessment (AQIA) was completed for the proposed operations in 2017 and remains valid.

GN701 declared greenhouse gases as priority air pollutants. The greenhouse gas reporting regulations (GN275) identifies Mining and Quarrying as one of the industries who must report their Greenhouse Gas Emissions to the competent authority. Mmakau Coal is therefore obligated to determine and report on their emissions, once operational.

The National Atmospheric Emission Reporting Regulations, 2015 identifies all mines as a Group C Emission Source, and requires the Mine to report to the National Atmospheric Emissions Information System (NAEIS) on their dust, PM_{10} and $PM_{2.5}$ emissions on an annual basis. This requirement has been incorporated into the EMP.

5.9 National Environmental Management: Protected Areas Act, 2003 (NEMPAA)

The National Environmental Management: Protected Areas Act, 2003 (Act No 57 of 2003) (NEMPAA) (as amended) provides for the protection and conservation of ecologically viable areas of South Africa's biological diversity, natural landscapes and seascapes. It further provides for the establishment of a register of protected areas (SAPAD), the management of those areas

and for intergovernmental co-operation and public consultation in matters concerning protected areas.

The project site is over 30km from the nearest formally protected area and the NEMPAA is therefore not considered relevant to the proposed Project.

5.10 National Environmental Management Biodiversity Act, 2004 (NEMBA)

The NEMBA provides for the management and conservation of South Africa's biodiversity within the framework of the NEMA. The Act relates to the protection of species and ecosystems that warrant national protection, among others.

Certain Fauna and Flora Species of Conservation Concern (SCC) are known to occur in the area, a Terrestrial Biodiversity Assessment was completed in 2017 and updated in 2022, which study identified three plant species provincially protected in terms of the Mpumalanga Nature Conservation Act, 1998 (No. 10 of 1998) onsite.

5.11 Conservation of Agricultural Resources Act, 1983 (CARA)

CARA provides for control over the utilisation of the natural agricultural resources of the Republic to promote the conservation of soil, water sources and vegetation and the combating of weeds and invader plants.

A soils study was undertaken by The Biodiversity Company in March 2017 and updated in 2022, the site of the proposed MRA comprises different soil types with different agricultural potential including class III land capability (moderate cultivation), Class IV land capability (light cultivation/intensive grazing) and VI land capability (moderate grazing).

Due to extensive mining and other ecological disturbance in the wider region alien invasive species are considered a threat to the biological diversity of surrounding areas. Alien invasive management have been incorporated into the EMP.

5.12 National Heritage Resources Act, 1999 (NHRA)

The NHRA aims to promote good management and preservation of the country's heritage resources. The NHRA requires (Section 38) that a person who intends to undertake certain types of activities (including developments that will change the character of a site), must notify the responsible Heritage Authority of such development proposal and furnish such information that the Authority may require.

The South African Heritage Resources Agency (SAHRA) and Mpumalanga Provincial Heritage Resources Agency (MPHRA) were notified of the proposed Project via the South African Heritage Resources Information System (SAHRIS).

A Heritage / Archaeological impact assessment was completed for the proposed operations in 2017 and updated in 2022. Heritage resources have been identified on site. It is anticipated that these can be preserved *in-situ* as they are not directly affected by the project footprint. The heritage resources on and adjacent to the site must be managed and preserved by the implementation of appropriate buffer zones and access control. Monitoring of the effects of blasting on heritage resources close by to the proposed Adit have been included in the EMP.

5.13 Other relevant Legislation

In addition to the Laws and Guidelines discussed above, Table 15 summarises some of the other key legislation and guidelines relevant to this application:

Table 15: Other Relevant Legislation and Guidelines

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	HOW THIS DEVELOPMENT COMPLIES WITH THE LEGISLATION AND GUIDELINES
NEMA: Public Participation Guidelines (GNR807). Department of Environmental Affairs (2017), Public Participation guideline in terms of NEMA EIA Regulations, Department of Environmental Affairs, Pretoria, South Africa.	Guidelines have and will continue to be followed during the Public Participation Process (PPP).
DEA (2017), Guideline on Need and Desirability, Department of Environmental Affairs (DEA), Pretoria, South Africa	The Guideline was considered in assessing the need and desirability of the Project aspects.
Department of Environmental Affairs, Department of Mineral Resources, Chamber of Mines, South African Mining and Biodiversity Forum, and South African National Biodiversity Institute, 2013. Mining and Biodiversity Guideline: Mainstreaming biodiversity into the mining sector. Pretoria	The Mining and Biodiversity Guideline was considered and acknowledged in the compilation of the EMP.
Spatial Land Use and Management Act, 2013 (Act No. 16 of 2013) (SPLUMA)	SPLUMA aims to develop a framework to govern planning permissions and the lawful use of land. In terms of SPLUMA Mmakau Coal will have to apply for a change in land use from agriculture to mining.
Restitution of Land Rights Act, 1994, the Land Reform (Labour Tenants) Act, 1996 and the Extension of Security of Tenure Act, 1997.	The Regional Land Claims Commission has indicated that a Land Claim has been submitted on Portion 16 and 7[1] of the farm Schurvekop 227 IS. A small community resides on Portions 17 and 20 of Schurvekop 227 IS. Farmsteads are associated with Portions 6 and 8.
Govan Mbeki Land Use Scheme, 2010 in association with Municipal Structures Act, Act 117 of 1998 and the Municipal Systems Act, Act 32 of 2000.	The Act requires local government to compile a Spatial Development Framework (SDF) which must include the provision of basic guidelines for a land use management system for the municipality. The objectives of an SDF are to promote sustainable functional and integrated human settlements, maximise resource efficiency, and enhance regional identity and unique character of a place. In addition, Municipalities are required to develop Integrated Development Plans (IDPs) which is a government co-ordinated approach to planning that seeks to ensure the economic and social enhancement of all within their jurisdiction. It provides a land use framework, considers

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	HOW THIS DEVELOPMENT COMPLIES WITH THE LEGISLATION AND GUIDELINES
	infrastructure development, and the protection of the environment.
Development Facilitation Act, 1995 (Act No. 67 of 1995)	The Act promotes the integration of the social, economic, institutional and physical aspects of land development and also promotes integrated land development in rural and urban areas in support of each other. The Act encourages the availability of residential and employment opportunities in close proximity to or integrated with each other, while optimising the use of existing resources including such resources relating to agriculture, land, minerals, bulk infrastructure, roads, transportation and social facilities.
The Subdivision of Agricultural Land Act, 1970 (Act 70 of 1970)	The Subdivision of Agricultural Land Act, 1970 (Act 70 of 1970) controls the subdivision and use of agricultural land. Portions of the development footprint traverse land used for agricultural purposes. Land with high-value agricultural potential should be protected and not sub-divided or fragmented into smaller portions that would threaten the viability of agricultural activities. Sub-division of agricultural land requires the consent of the Minister of Agriculture, and the registration of servitudes over agricultural land also requires Ministerial Consent, except for (Section 6A(1)(a) a "servitude for the conducting of electricity with a width not exceeding 15 metres". Potential impacts of the proposed project on agricultural land are assessed in Section 11.3.2
NEMA Regulations pertaining to the financial provision for prospecting, exploration, mining or production activities (GNR1147 –20 November 2015) (as amended).	Financial Provision has been calculated (Section 13.3) and will be provided for by means of a Guarantee.
National Road Traffic Act, Act No. 93 of 1996 and National Land Transport Act, Act No. 5 of 2008	These Acts relate specifically to the planning and development of transport systems and the safe use of roads. A traffic impact assessment has been undertaken to ensure the proposed project does not adversely affect the integrity of the transport system (APPENDIX K 12).
Hazardous Substances Act, 1973 (Act No 15 of 1973)	The Hazardous Substances Act provides for the control of hazardous substances (sub-divided into four groups) defined as any substance that by their nature are toxic, corrosive, irritant, flammable, sensitising or pressure generating, which may cause ill-health, injury or death in humans. Minimum requirements for hazardous substances associated with the project have been incorporated into the EMP.
Mpumalanga Tourism and Parks Agency Act, Act No. 5 of 2005 (MTPA Act)	The Mpumalanga Nature Conservation Act was considered, management measures to protect natural fauna and flora in line with the Act have been included in the EMP where relevant.
Environmental Conservation Act, 1989 (Act No 73 of 1989) (ECA) and	Noise Control Regulations were promulgated in terms of the (ECA), to set out the powers of local authorities to control noise,

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	HOW THIS DEVELOPMENT COMPLIES WITH THE LEGISLATION AND GUIDELINES
Govan Mbeki Local Municipality Nuisance bylaws	define legal prohibitions relating to noisy activities and define and prohibit noise nuisance. Govan Mbeki Local Municipality has published a nuisance bylaw which (among others) prohibits noise disturbance, but does not set out specific noise limits (http://www.govanmbeki.gov.za/wp-content/Bylaws/bylaw_nuisance.pdf).
Procedures for the Assessment and Minimum Criteria (National Gazettes, No. 43110 of 20 March, 2020)	Specialist Reports (APPENDIX K) have been compiled in line with the protocols and minimum requirements, where applicable.

6 NEED AND DESIRABILITY OF THE PROPOSED ACTIVITIES

The DEA (now DFFE) published an updated Integrated Environmental Management Guideline on Need and Desirability in 2017.

According to these guidelines, the consideration of "need and desirability" in EIA decision-making requires the consideration of the strategic context of the proposed Project along with the broader public interest and societal needs. Furthermore, the development must not exceed ecological limits and the proposed actions must be measured against the short-term and long-term public interest to promote justifiable social and economic development.

The latest Guideline Document on the assessment of Need and Desirability (DEA, 2017a)) includes a number of questions, the answers to which should be considered in the EIA Process. These questions (as per the Guideline) have been summarised and grouped and answers to each are presented in Table 16.

Table 16: Need and Desirability Motivation

Theme	Specific Questions	Answer related to this Application
"Securing ecological sustainable development and use of natural resources"	How will this development (and its separate elements/aspects) impact on the ecological integrity of the area?	A detailed impact assessment is presented in Section 11.3 of this Report.
	How were the following ecological integrity considerations considered? • Threatened and sensitive Ecosystems • Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) • Conservation targets	The proposed MRA is located within the Eastern Highveld Grassland national vegetation type which is listed as Endangered on the revised national list of ecosystems that are Threatened and in need of protection (DFFE, 2022). The Eastern Highveld Grassland has conservation target of 24%, approximately 44% has been transformed primarily through cultivation, plantations, mining, urbanisation and the building of dams (Mucina & Rutherford, 2006). The MRA largely consists of modified areas due to cultivation; however some area of ecological significance are present. Local Ecological Support Areas (ESA's) total approximately 14% of the MRA and which are associated with the river and floodplain wetlands. Similarly, parts of this habitat are mapped as a Critical Biodiversity Area (CBA) with Irreplaceable status, where this constitutes only 1% of the proposed MRA. No surface infrastructure is proposed in any ESA or CBA area. The MRA is over 30km from the nearest formally protected area.
	How does the proposed development respond to the relevant framework documents? • Environmental Management Framework, • Spatial Development Framework • Global and international responsibilities relating to the environment (e.g. RAMSAR sites, Climate Change, etc.).	The Mpumalanga Spatial Development Framework (SDF) (MPSDF, 2019) mentions mining as the predominant Regional Spatial Development Initiative in the area where the site is located. Mining and Energy-related development is identified as one of nine key drivers of the Mpumalanga Vision 2030, and states the following: "Infrastructure investment aimed at enhancing the mining and electricity industry should be consolidated in the western Highveld of Mpumalanga where the vast majority of coal mines and power stations are located. In areas such as eMalahleni, Steve Tshwete, Standerton and Secunda" (MPSDF, 2019).

Theme	Specific Questions	Answer related to this Application
		The site is not located in close proximity to any RAMSAR Sites, the closest being the Blesbokspruit approximately 100km west of the site, Verloren Valei Nature Reserve over 120km north-east of the site and Seekoeivlei Nature Reserve approximately 140km south of the site.
	How will this development disturb or enhance ecosystems and/or result in the loss or protection of biological diversity, or pollute or degrade the biophysical environment? What measures were explored to avoid negative impacts, or minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	Vegetation clearance associated with the construction of the Adit and infrastructure area will disturb ecosystems and biological diversity of the site. Alternative layouts were considered, and environmentally sensitive areas avoided as far as possible. A portion of the infrastructure area and MRF will however encroach on a wetland, and thus an offset is proposed (refer to APPENDIX M). Further discussion on management and mitigation is included in Section 12 and further discussion on alternatives is included in Section 7.
	What waste will be generated by this development? What measures were explored to firstly avoid waste, and where waste could not be avoided altogether, to minimise, reuse and/or recycle or to safely treat and/or dispose of unavoidable waste?	Schurvekop Mine will generate general (domestic) waste, hazardous waste, sewage and mineral waste. These will be managed according to the provisions outlined in the EMP (Section 12). The geochemical characterisation of the coal and waste material was undertaken by Future Flow GPMS (refer to APPENDIX K 4), to ensure the facility is designed, constructed and operated to contain waste adequately. The mine residue can be classed as Type 3 waste and therefore requires disposal to a facility with a Class C containment barrier system or equivalent. Refer to APPENDIX H for copies of the relevant engineering report and design drawings.
	How will this development disturb or enhance landscapes and/or sites that constitute the nation's cultural heritage? What measures were explored to avoid these impacts or minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	A visual impact assessment was completed to assess the disturbance of the landscape (APPENDIX K 10). Further to this a Phase I heritage impact assessment was completed (APPENDIX K 6). No heritages sites will be directly impacted by the proposed operations, and all sites can be managed *in-situ*. Impacts and Management measures are discussed in Section 11 and Section 12.

Theme	Specific Questions	Answer related to this Application
	How will this development use and/or impact on natural resources? What measures were explored to ensure responsible and equitable use of the resources? How have the consequences of the depletion of resources been considered? What measures were explored to avoid these impacts or minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	The mineral resource to be mined is coal, which is a non-renewable resource. A portion of the product coal will be targeted for Eskom, and used for electricity generation. Further resource use relates to the use of water. Water will be used for processing, dust suppression and underground for mining. A detailed mine water balance has been compiled (APPENDIX F). All dirty water will be captured on site and re-used as far as possible. Impacts and Management measures are discussed in Section 11 and Section 12.
	Does the proposed development exacerbate the increased dependency on increased use of resources to maintain economic growth or does it reduce resource dependency? Do the proposed location, type and scale of development promote a reduced dependency on resources?	South Africa is largely dependent on coal for electricity generation - approximately 77 percent of South Africa's primary energy needs are provided by coal. (Coal Resources, 2022). It can't be said that the proposed project exacerbates dependence on increased use of resources to maintain economic growth, but it does not reduce the dependency either. The location of the project has been associated with coal mining for many years, as is evident by the current and historical coal mining operations in the area, as well as the existing coal-fired power stations in the surroundings. Mitigation measures as outlined in the EMP (Section 12), along with the rehabilitation measures outlined in this report (Section 13), will to some extent ensure sustainability objectives are met.
	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?	South Africa's dependency on coal for electricity generation is unlikely to change significantly in the next two decades (Coal Resources, 2022). Until alternative energy solutions are introduced, coal mining is and will remain an essential part of our economy.
	How were a risk-averse and cautious approach applied in identifying and assessing impacts?	The impact assessment methodology is described in Section 11.1. Where information is lacking the precautionary approach is implemented.

Theme	Specific Questions	Answer related to this Application
	What are the limits of current knowledge and the risks associated therewith?	Knowledge gaps and assumptions are further discussed in Section 14. Environmental Impact Assessment is by its very nature associated with some uncertainty. However, the use of qualified and reputable specialists in the compilation of this report reduces the level of uncertainty.
	How will the ecological impacts of this development impact on people's environmental rights?	The Project will negatively impact on the current land use, which is a combination of grazing and crop cultivation. Consultation with land owners and users in the design and planning phase has led to the current preferred layout, which limits the Adit and associated infrastructure to Portion 8 of the farm Schurvekop 227 IS – owned by the Applicant. According to the groundwater study (APPENDIX K 4) the following privately owned boreholes will be impacted by mine dewatering or contaminant migration: Bosman BH1, Bosman Handpump, Community Borehole, Community Windpump, and Community Handpump. Mmakau Coal will need to ensure that an alternate supply of water is provided.
	Considering the need to secure ecological integrity and a healthy biophysical environment, describe how the alternatives identified resulted in the selection of the "best practicable environmental option"	The project site is generally delimited by the mineral resource. The location of the Adit and associated infrastructure considered the following: • Topography; • Depth of the coal seam; • Environmental sensitive areas, such as CBAs, ESAs, the Viskuile River, Joubertsvleispruit and associated floodplains; • Proximity to nearby Farmstead and the Schurvekop Community; • Identified graves and heritage sites; • Land claims, surface rights and Servitudes. Alternatives are discussed in detail in Section 7.
" pro motin g	What is the socio-economic context of the area in terms of:	The Govan Mbeki IDP (GMLM, 2022) acknowledges the contribution of mining to the local economy. According to the IDP, "Govan Mbeki has

Theme	Specific Questions	Answer related to this Application
	• The IDP and any other strategic plans, frameworks of policies applicable to the area, • Spatial priorities and desired spatial patterns; • Existing land uses, planned land uses, cultural landscapes etc. • Municipal Economic Development Strategy ("LED Strategy")	the largest underground coal mining complex in the world which makes it an important strategic area within the national context". The current land use is agriculture, with some natural grasslands and wetlands identified in the MRA. As the operations will be mined via underground methods, and the area of disturbance will be limited to Portion 8, the Mine will not exclude other land uses from occurring on the remainder of the portions occurring within the MRA.
	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? Will the impact be socially and economically sustainable in the short- and long-term?	Please refer to the impact assessment in Section 11, where socio-economic impacts have been assessed. The negative socio-economic impacts associated with the project primarily relate to the loss of agricultural land, limited to Portion 8 of the farm Schurvekop 227 IS, owned by the Applicant. Positive impacts are associated with the implementation of the S&LP including Local Economic Development (LED) projects and skills development projects. The project will contribute directly and indirectly to the Country's Gross Domestic Product, as well as provide employment to members of the surrounding communities.
	In terms of location, describe how the placement of the proposed development will: • result in the creation of residential and employment opportunities in close proximity to or integrated with each other; • reduce the need for transport of people and goods; • result in access to public transport or enable non-motorised and pedestrian transport; • compliment other uses in the area; be in line with the planning for the area; • optimise the use of existing resources and infrastructure;	The project is not aimed at the provision of residential opportunities. According to the S&LP the mine will preferentially recruit novice and entry level positions from the local community with only positions that cannot be filled locally, advertised and filled from further afield. The MRA is situated approximately 20km to the north of Bethal and 20km east of Ga-Nala (Kriel), the relatively close proximity reduces the need for transport of people and goods over long distances. At least some mine employees will access the mine using public transport. The MRA is contiguous to the Katlego Coal's Forzando Complex and Thungela Coal's Elders Colliery . The project is therefore considered to be complimentary to the existing mining land use in the area but not complimentary of existing agricultural land use of the MRA. The project

Theme	Specific Questions	Answer related to this Application
	• 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; • encourage environmentally sustainable land development practices and processes; • the investment in the settlement or area in question will generate the highest socio-economic returns; • 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; • in terms of the nature, scale and location of the development promote or act as a catalyst to create a more integrated settlement?	will result in a change in sense of place, refer to APPENDIX K 10 for a copy of the Visual Impact Assessment. The site can be accessed via existing farm roads which will need to be upgraded, thus optimising the use of existing infrastructure. Investment in local settlements forms part of the Mine's S&LP. The project will not be undertaken prior to the relevant approvals being obtained. The Mine already has an approved IWUL in terms of the NWA. This application relates to approvals in terms of the MPRDA, NEMA and NEMWA and aims amongst others to ensure management measures are put into place to ensure environmentally sustainable development. The project will not act as a catalyst to creation for integrated settlements as it is not associated with residential land use. No employees will be housed on site.
	What measures were taken to pursue environmental justice and equitable access to environmental resources, benefits and services so that adverse environmental impacts shall not be distributed so as to unfairly discriminate against any person, (who are the beneficiaries and is the development located appropriately)? What measures were taken 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 primary beneficiaries of the Project are considered to be the existing employees of Mmakau Coal and those local residents successful in their potential applications for new job opportunities at the Schurvekop Mine. The development location is determined by the location and depth of the coal resource, and other environmental considerations. The Mine's S&LP will contribute to the socio-economic development of the area through projects identified in collaboration with the Local and District Municipalities. The Project does not promote unfair discrimination against any group of people.
	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?	The mine will be operated in strict accordance with the Mine Health and Safety Act, which is beyond the scope of the EIA process and beyond the expertise of the EAP.

Theme	Specific Questions	Answer related to this Application
	What measures were taken to: • ensure the participation of all interested and affected parties, • provide all people with an opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation, • ensure participation by vulnerable and disadvantaged persons • ensure openness and transparency, and access to information in terms of the process, • 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	A comprehensive public participation process (PPP) has been undertaken for the Project. The PPP is guided by the EIA Regulations, 2014 (as amended). Extensive consultation with interested and affected parties (I&APs) has been undertaken with authorities, local land owners, communities and interest groups. Public Participation is undertaken to ensure the opportunity for all potential I&APs to participate in meetings and the EIA process. Documents for public review have and will be made available electronically (on the internet) and in hard copy. I&APs will be kept informed of the process and any developments/meetings/report availability via e-mail and SMS communication. I&AP comments have and will be incorporated in to the reports, and into the comment and response report (APPENDIX J) along with the EAP's response to each comment or question. This process ensures that all I&AP comments are addressed in the Scoping and EIA Reports and incorporated into the studies.
	Considering the interests, needs and values of all the I&APs, 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)?	Schurvekop Mine will employ people of varying skills levels. The S&LP includes amongst others a skills development plan and a community adult education programme. The community adult education programme will afford previously illiterate and innumerate community members the opportunity to access further education or employment opportunities either with Schurvekop or elsewhere.
	What measures have been taken to ensure that workers will be informed of work that might be harmful to human health or the environment or dangerous, and what measures have been taken to ensure that the right of workers to refuse such work will be respected and protected?	Mmakau Coal are cognisant of the provisions of the Mine Health and Safety Act and the Basic Conditions of Employment Act. Further to the above, specific environmental awareness training will be required for all personnel involved in the proposed Project. Please see Section 12.4 for details.

Theme	Specific Questions	Answer related to this Application
	Describe how the development will impact on job creation in terms of, amongst other aspects: - the number of temporary versus permanent jobs that will be created; - 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); - the distance from where labourers will have to travel; - the location of jobs opportunities versus the location of impacts (i.e. equitable distribution of costs and benefits); and - the opportunity costs in terms of job creation (e.g. a mine might create 100 jobs, but impact on 1000 agricultural jobs, etc.).	At steady status, the mine will have two hundred and seventy-nine (279) permanent employees, of which the majority (267 people) will be employed by a core contractor, still to be identified. More clarity regarding the availability of local and appropriate skills will be gained by the Mine's procurement processes, however the area has a history of mining and it is expected that many of the required skills will be available locally. Mmakau Coal implements a strict local procurement policy, thereby ensuring minimal travel distances between the labour force's current homes and the proposed Project. The communities closest to the mine will be most directly impacted by the proposed projects, and should be evaluated for the availability of appropriate skills before advertising such job opportunities further afield, to ensure that the communities that are most affected, also benefit the most from the proposed Project. Furthermore, the S&LP should focus on the upliftment of the communities closest to the Mine, in consultation with the relevant authorities. Agricultural activities in the area provide employment to some members of the local communities. As the operations will be mined via underground methods, and the area of disturbance will be limited to Portion 8, the Mine will not exclude other land uses from occurring on the remainder of the portions included in the MRA.
	What measures were taken to ensure: • that there were intergovernmental coordination and harmonisation of policies, legislation and actions relating to the environment, and • that actual or potential conflicts of interest between organs of state were resolved through conflict resolution procedures?	Various government departments at different levels were informed of the proposed project and requested to participate in the PPP. Please refer to Section 5 for a discussion on the policy and legislative context of the Project.

Theme	Specific Questions	Answer related to this Application
	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?	The EIA process, and development of the EMP Report aims to achieve environmental protection (where relevant) and restoration of the environment. Closure and rehabilitation are discussed in Section 13.
	Are the mitigation measures proposed realistic and what long-term environmental legacy and managed burden will be left?	Long term environmental monitoring and remediation are associated with post-closure water treatment and proposed MRF as detailed in Section 13.
	What measures were taken to ensure that the costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects will be paid for by those responsible for harming the environment?	Please refer to Section 13. of this report which addresses the rehabilitation, closure and financial provision. Mmakau Coal has to update their rehabilitation, closure and financial provision reports on an annual basis, to ensure the availability of sufficient funds, to implement rehabilitation plans. This must be done in accordance with the Financial Provision Regulations promulgated in terms of NEMA.

7 ALTERNATIVES ASSESSMENT

Meaningful consideration should be given to alternative processes or practices which can be employed to meet the requirements of mine development, operation and closure (DEA, 2018).

Consideration of alternatives is one of the most critical elements of the environmental assessment process (DEAT, 2004). Key criteria that must be considered when identifying alternatives are that they should be "practicable, feasible, relevant, reasonable and viable".

This section discusses the various alternatives that have been considered by the Mmakau Coal, and explains how the Applicant decided on the preferred option.

7.1 Process to Assess Alternatives

The concept of an "alternative" can be defined as a possible course of action, in place of another, that would meet the same purpose and need as the development proposal. The starting point for the identification and evaluation of alternatives to the proposed Project is the clear identification of the purpose and need for the Project.

The purpose of the Project is to mine the economically viable coal reserves for local and/or export markets, for the business to be profitable and to contribute to the local economy as well as to meet Eskom demand for electricity generation. The Need and Desirability of the Project has been assessed in Section 6.

DEA (2018) identifies six potential categories of alternatives and emphasises that "the number of alternatives that are selected for an assessment should be determined by the range of potential alternatives that could be reasonable and feasible" (DEA, 2018). The alternatives that have been considered are discussed in these terms and grouped according to the categories defined by DEA.

7.2 The Property or Location

The properties selected for the overall MRA are limited to those held under the existing Prospecting Right by Mmakau Coal, and finally the coal resource determination and the economic feasibility of mining the reserve.

No property alternatives are therefore relevant.

7.3 The Type of Activity to be Undertaken

Mining of coal can be undertaken by means of surface (opencast) or underground mining methods. The choice of mining method depends primarily on the depth and thickness of the coal seam. Based on the geology of the site, and depth of the 2 Seam, opencast mining was not deemed to be economically viable, and was therefore not considered further.

7.4 Technology to be Used

Mechanised bord-and-pillar methods, using continuous miners is proposed for the Project. Continuous miners will ensure a constant flow of ore from the working face of the mine and is different from conventional or cyclical mining methods which halt the extraction process in order to load ore. This will result in an optimal balance of production rate and cost per ton.

In mechanised bord-and-pillar mining, extraction is achieved by developing a series of roadways (bords) in the coal seam and connecting them by splits (cut-through) to form pillars.

These pillars are left behind as part of a primary roof support system. The safety factor and pillar dimensions to support the overburden will be determined for each mining block.

The quality of coal excavated from the properties dictates the need for a full beneficiation plant in order to meet market requirements. The processing plant has been selected based on mineable tonnages and coal quality being mined, as well as market requirements. No technology alternatives with regards to the beneficiation process have been assessed.

In terms of the MRF, integrated disposal versus separate discard and slurry handling was considered. Integrated disposal was opted for, as this would negate the need for separate handling facilities and thus reduce the overall area of disturbance. Furthermore, the fines (slurry) will settle in between the cavities within the discard making the dump more stable; and reducing the potential for spontaneous combustion.

In all other instances, best practices as utilised in the industry have been selected and, where applicable, SANS standards and legislative requirements will be followed in design, construction and management of infrastructure and activities on site. Technological alternatives will therefore not be assessed further.

7.5 Design or Layout of Activity

Two access alternatives have been identified for the Project, the first being via a boxcut Adit constructed on Portion 8 of the farm Schurvekop 227 IS and the second involves accessing the reserves from the adjacent Forzando South underground workings. While the possibility of accessing the reserves from Forzando South has not yet been ruled out, the current business model is based on the construction of the boxcut Adit.

The position of the boxcut Adit was selected based on the topography of the site and the depth to mineral. The mining and supporting infrastructure was then positioned to be in close proximity of the Adit so as to limit conveyance distance.

Layout alternatives were considered during the pre-feasibility stage of the Project, these are presented in Figure 9 to Figure 12. Based on consultation with the affected land owners, users and land claimants, and their reluctance to lease or sell the surface rights of the affected properties it was decided to limit all mine infrastructure to Portion 8 of the farm Schurvekop 227 IS (owned by the Applicant). The layout was then refined based on:

- Proximity of nearby communities and farmsteads;
- Existing servitudes; and
- Environmental sensitivities - infrastructure has been placed to avoid graves, CBAs, water courses and their associated riparian zones as far as possible.

Figure 12 presents the preferred layout.

Should negotiations with Forzando South prove favourable, limited surface infrastructure (administrative in nature) will be required at Schurvekop Mine. Where necessary amendments will be submitted to DMRE.

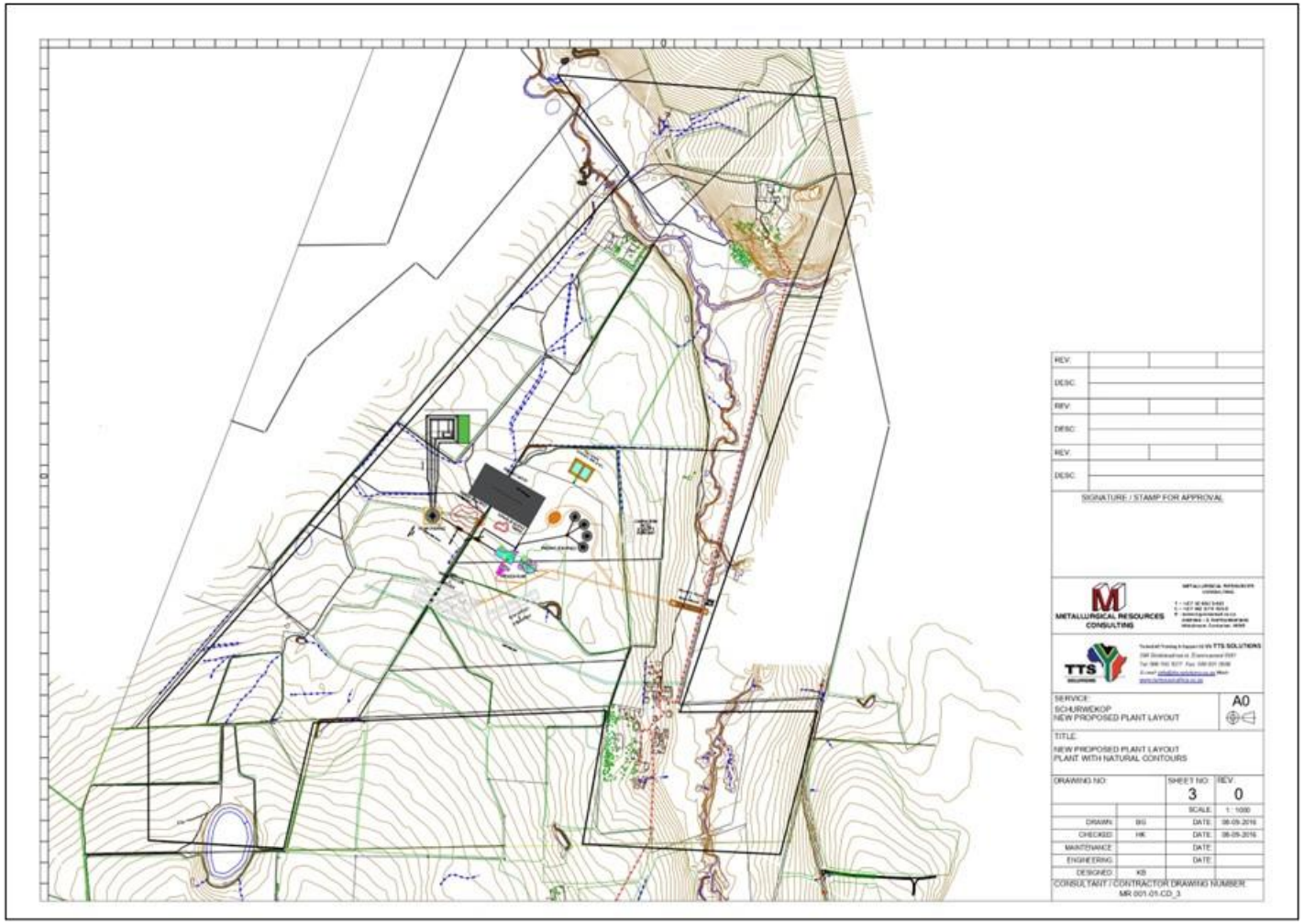


Figure 9: Layout Alternative 1 (Metallurgical Resources Consulting, 2016)

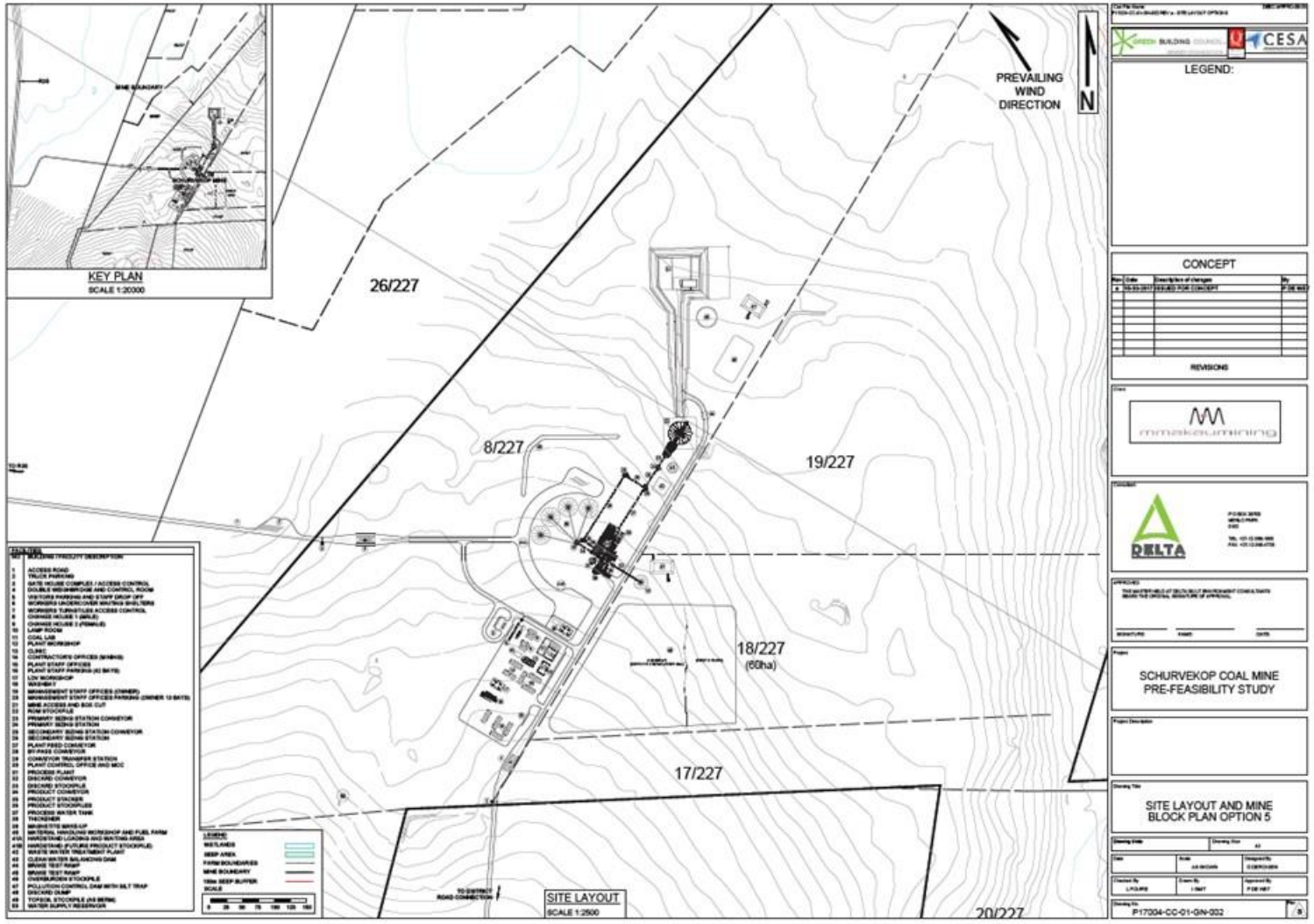


Figure 10: Layout Alternative 2 (Delta BEC, 2017)

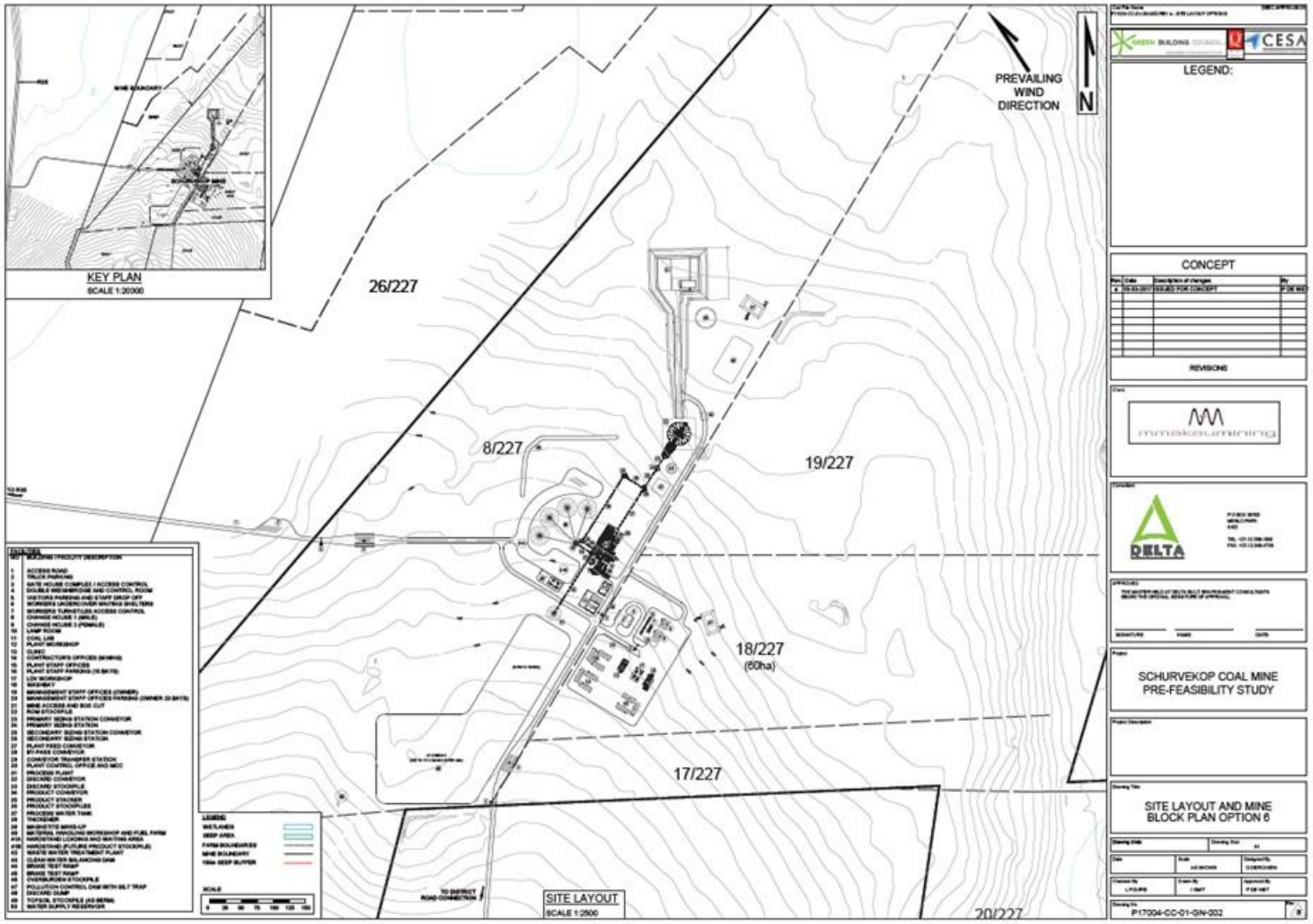


Figure 11: Layout Alternative 3 (Delta BEC, 2017)

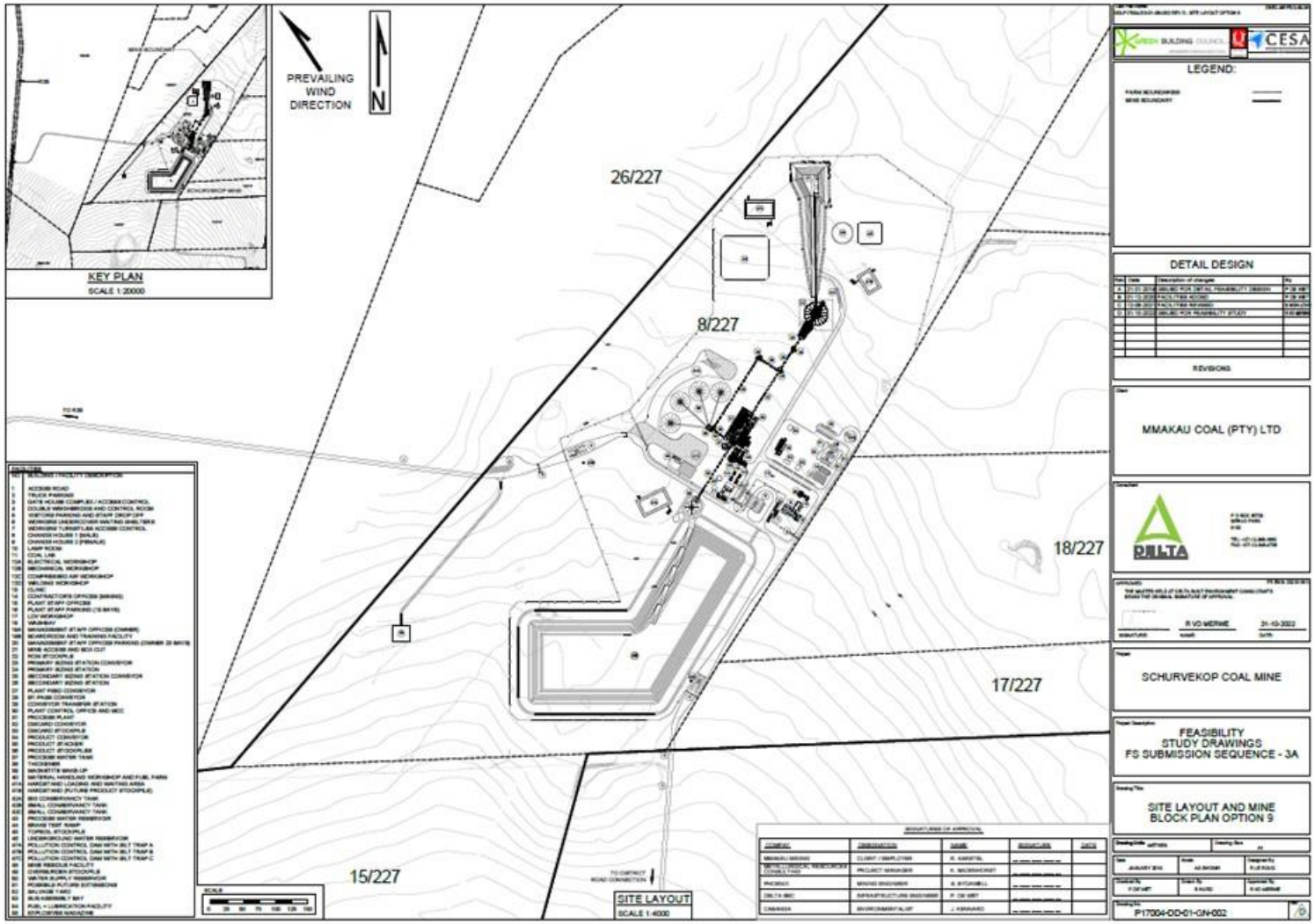


Figure 12: Layout Alternative 4 (Preferred Layout) (Delta BEC, 2022d)

7.6 Route Alternatives

Currently road haulage is the primary option for transporting coal to Eskom and no rail or conveyor transportation is envisaged for the Project. During the pre-feasibility study three route alternatives were considered for the access route to the proposed Schurvekop Mine, these include:

- **Route Alternative 1:** Constructing a new access road off the D622 (situated east of the MRA). This route would pass in close proximity to the Schurvekop Community residing on Portions 17 and 20 of the farm Schurvekop 227 IS;
- **Route Alternative 2:** (Preferred Alterative): Upgrading the existing farm road off the R35 (situated west of the MRA);
- **Route Alternative 3:** Upgrading the farm road off the gravel D1476 (situated south of the MRA).

Based on consultation with directly affected land owners and communities, Route Alternative 1 was abandoned due to pedestrian safety concerns and land use conflicts and has not been discussed further. Route Alternatives 2 and 3 are illustrated in Figure 13 and briefly discussed below.

The preferred, and shortest, route option is Route Alternative 2. Route Alternative 2 was selected for its accessibility and proximity to the R35, which is considered an appropriate corridor for coal transportation to Eskom. The access route is located 4.4km north of the R35/D1476 intersection onto the R35 creating a one-way stop-controlled T-intersection. The intersection will need to be upgraded to include right and left turning lanes, including deceleration lanes (Delta BEC, 2022e).

Route Alternative 3 is from the gravel road to the south of the MRA (D1476). The D1476 is a class 4 district collector and intersects the R35 and the D622. This option is not ideal for coal haulage because it is a longer detour route to Eskom compared to Route Alternative 2, and it is a Municipal road which is not always adequately maintained. Therefore, this is not the preferred access route and is only recommended for emergency use (Delta BEC, 2022e).

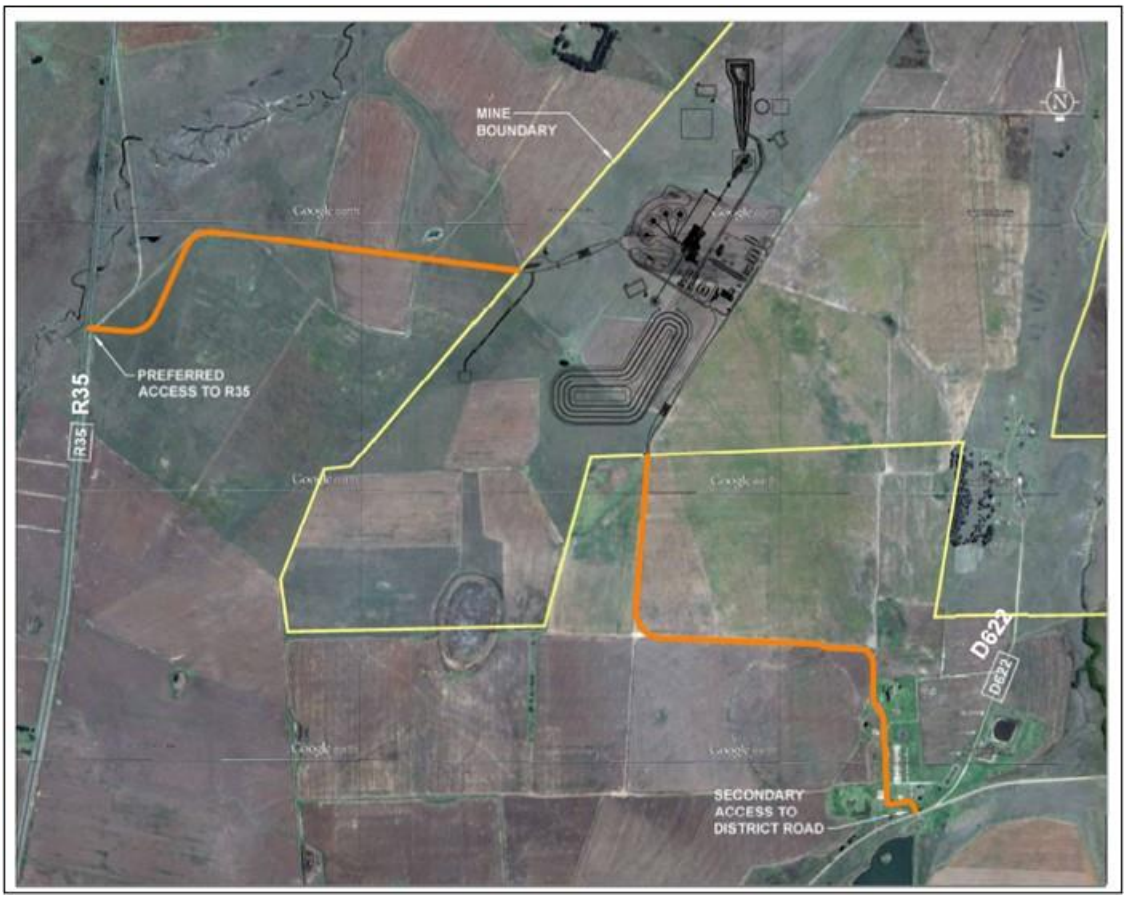


Figure 13: Proposed Access to the Mine (Delta BEC, 2022e)

7.7 Operational Aspects

These are dependent on the type of operation but may include:

- Operating hours and designating set times for specific activities.
- Dust control methods such as the use of chemical dust suppressant on mine roads.

It is proposed that construction be restricted to daylight hours to reduce safety risks and noise and visual impacts associated with night-time activities.

Once operational, the Schurvekop Mine will operate 24-hours per day, 7 days per week, with scheduled shut-downs taking place for maintenance. The mine will operate in various shifts. It is recommended that discard deposition onto the MRF be restricted to daylight hours for safety reasons.

Dust suppression via watering cart is recommended on gravel road areas, the use of dust binding agents should be considered where dust generation is significant. This is considered a mitigation measure and has not been discussed further under Alternatives.

7.8 No-Development Alternative

The no-go option will result in the protection of the environment *in situ* and the continued use of the land for agricultural purposes. Not mining the area for coal will result in the sterilisation of the

coal resource. This would reduce coal resources for power generation which is currently an issue in South Africa, as no viable base load power generation alternatives exist. The no-go option would also prevent the socio-economic benefits, including the need for job creation, increased socio-economic activity and social upliftment.

If Mmakau Coal (Pty) Ltd does not proceed with the Mining Right application, another company is almost certain to apply for the rights.

7.9 Confirmation of the Preferred Alternative

The preferred infrastructure layout is Alternative 4, as illustrated in Figure 12 above.

Figure 3 of this report illustrates the preferred infrastructure layout overlain with the underground mine block plan. A3 prints of these plans are attached as APPENDIX D.

8 PUBLIC PARTICIPATION PROCESS

The latest Public Participation Guideline in terms of the NEMA was published by the Department of Environmental Affairs in 2017 (DEA, 2017b). The NEMA requires the participation of all Interested and Affected Parties (I&APs) in environmental governance (Section (2)(4)) and holds that the beneficial use of environmental resources must serve the public interest. Decisions that may affect the environment, have to include sufficient opportunity for public participation.

The public participation process (PPP) related to this Project is detailed in APPENDIX J. The below serves as a summary only.

8.1 Details of the PPP followed to date

8.1.1 Identification and Notification of Stakeholders

The competent authority for the applications in terms of the MPRDA, NEMA and NEMWA is the DMRE. A number of commenting authorities have also been identified and notified of the proposed project:

- DWS;
- Mpumalanga Department of Economic Development, Environment and Tourism (MDEDET);
- Department of Rural Development and Land Reform;
- Govan Mbeki Local Municipality;
- Gert Sibande District Municipality;
- South African Heritage Resource Agency (SAHRA);
- Mpumalanga Tourism and Parks Board (MTPA); and
- Eskom.

The I&AP database further includes occupiers and owners of the affected property and adjacent properties, the relevant municipal ward councillor, the local and district municipalities, and various organisations and interest groups. The I&APs were notified of the proposed Project through the following means:

- Notice boards in English (erected on 04 August 2022);

- Written notices in the form of Background information documents (BID) in English, Afrikaans and isiZulu (distributed on 05 August 2022); and
- Advertisements in English and Afrikaans (published in the Ridge Times on 12 August 2022).

8.1.2 Micro-Consultation / Focus Group Meetings

Micro-consultation was undertaken with the landowners in January 2022, the purpose of the micro-consultation was to make the landowners aware of Mmakau Coal's intention to resubmit an application for a Mining Right and associated application for Environmental Authorisation, and to obtain Landowner's Consent to conduct the relevant specialist studies and EIA.

Further to this, a focus group meeting was held with the Schurvekop Community on Sunday, 04 September 2022 to discuss the proposed project and way forward.

8.1.3 Document Review

The Scoping Report was made available for public review and comment for a period of thirty (30) days, from 08 August to 07 September 2022. Notification of the Scoping Report's availability was included in the BID, posters, advertisements and SMS.

The Scoping report was then updated with all comments received and submitted to the DMRE for consideration. The DMRE approved the Scoping Report and Plan of Study for EIA on 06 October 2022 (APPENDIX B).

This report, the EIA and EMP Report, is currently being made available for review and comment for a period of thirty (30) days, from 09January 2023 until 08 February 2023, at the following locations:

- Bethal Public Library; and
- Online at www.cabangaenvironmental.co.za under the "Public Participation" tab.

8.2 PPP still to be Undertaken

Following the comment period, the EIA and EMP Report will be updated with the comments received and the responses of the EAP. The EIA report (this report) will then be submitted to the DMRE for consideration.

I&APs will be informed of the DMRE's decision, once a decision is reached, and also informed of the relevant appeal procedures.

8.3 Summary of issues raised by I&APs

All comments and concerns received to date have been included in the table overleaf.

Table 17: Issues & Response Table

Interested and Affected Parties	Date Comments Received		Issues raised	Initial Response	EAP Response & Reference to Section in Report
AFFECTED PARTY					
Landowner/s	**X**				
Mr.D.Te Water, Zelpy 1100 (Pty) Ltd, Portions 17, 18, 19 & 20 Schurvekop 227 IS	X	20-Jan-22 Micro-consultation	Queried the proposed position of the infrastructure and Adit. Stated that he is not interested in selling or leasing his properties. Has no objections to the project at this stage, confirmed that the environmental specialists may access the properties for the EIA process. Requested to please be kept informed of the project going forward.	The Adit and all associated infrastructure will be limited to Portion 8 of the Farm Schurvekop 227 IS, owned by Mmakau Coal (Pty) Ltd Cabanga confirms that Mr. Te Water and Zelpy 1100 (Pty) Ltd have been registered as an I&AP and will be kept informed of the project. Access will be pre-arranged for all specialist surveys.	Landowner consent, to undertake the EIA process and specialist studies, received on 20 February 2022 - refer to APPENDIX J The preferred layout limits all infrastructure and surface disturbance to Portion 8 of the farm Schurvekop 227 IS. Proposed infrastructure layout is illustrated in Plan 3 and Figure 3. Please refer to APPENDIX D for copies of all plans in A3 format.
Ms. Leonore van Wyk, Anglo / Thungela, Portions 6 & 16 Schurvekop 227 IS	X	20-Jan-22 E-mail	Requested clarification on the proposed application, understood that this had been rejected? This overlaps with our surface rights, and is directly adjacent to our long existing mining right (Elders Colliery).	The previous application for environmental authorisation received a negative record of decision, this was appealed by the applicant. The appeal was dismissed and Mmakau Coal (Pty) Ltd was advised that they could re-apply with the guidance of DMRE. Mmakau therefore intends to re-apply, as advised by their legal counsel. The surface rights for Portions 6 and 16 are held by Anglo Operations	The previous Mining Right Application was withdrawn in favour of this application. Mmakau submitted a new application for Environmental Authorisation simultaneously. Landowner consent, to undertake the EIA process and specialist studies, received 08 February 2022 - refer to APPENDIX J Changes to Regulation 39(2)(b) subsequently repealed.

Interested and Affected Parties	Date Comments Received	Issues raised	Initial Response	EAP Response & Reference to Section in Report
			(Pty) Ltd (now Thungela), although no surface infrastructure is proposed for these portions they will be undermined. In terms of the new amendments to the EIA Regulations the application for environmental authorisation must be accompanied by the landowners consent as GN517 of 11 June 2021 deleted Regulation 39(2)(b).	
	06-Feb-22 E-mail	I have received the following requests for our internal disciplines: - Please be so kind to provide a list of specialist studies that will be conducted in the process, also the manner in which it will be conducted (e.g. site visit with auguring), and also all drilling information please. - We are slightly confused in terms of the entity and structures as there are links to Mmakau, Exxaro and Tumelo Mine and it is also our understanding that Exxaro sold all their interests in the area and that Overlooked acquired the said, we stand to be	A full range of specialist studies were completed in 2016/2017 for the proposed project, at this stage it is anticipated that the specialists will only need to undertake site visits to verify the *status quo* and ensure that the findings of the studies are still relevant. No drilling or auguring is anticipated on the Anglo / Thungela owned properties. In terms of the Applicant entity, the application is in the name of Mmakau Coal (Pty) Ltd which is owned by Mmakau Mining (Pty) 51% and Overlooked Colliery (Pty) Ltd 49%. Organogram e-mailed on 08 February 2022.	Landowner consent, to undertake the EIA process and specialist studies, received 08 February 2022 - refer to APPENDIX J

Interested and Affected Parties	Date Comments Received		Issues raised	Initial Response	EAP Response & Reference to Section in Report
			corrected though? Therefore may we please have a company organogram/structure. We are not opposed to providing consent as a landowner, however there are a few considerations. Such as for example, if drilling will take place, we will be required to enter into a formal access agreement.		
Lawful occupier/s of the land	**X**				
Mr. A.Bosman, Lessee, Portion 8 & 15 Schurvekop 227IS	*X*	04-Aug-22 Telephone Call	Confirmed his contact details are correct. Requested a copy of the BID in English and Afrikaans.	A copy of the BID was sent on 05 August 2022.	Proof of correspondence included in the PPP Report (APPENDIX J)
Communities					
Mr.J.Mtsweni, Community Representative: Portions 17 & 20 Schurvekop 227, and Ward 15 Cllr.	*X*	05-Aug-22 Telephone Call	Confirmed that he is the community representative, as well as the Ward 15 Councillor. Requested a copy of the BID and will then request additional information and/or meeting.	A copy of the BID was sent on 05 August 2022.	Proof of correspondence included in the PPP Report (APPENDIX J)
		05-Aug-22 SMS	Sent his e-mail address for the BID.	A copy of the BID was sent on 05 August 2022.	
		05-Aug-22 E-mail	Confirmed receipt of e-mail.	*No response required.*	

Interested and Affected Parties	Date Comments Received		Issues raised	Initial Response	EAP Response & Reference to Section in Report
Mr.J.Mtsweni, Community Representative: Portions 17 & 20 Schurvekop 227, and Ward 15 Cllr.	*X*	04-Sept-2022 Focus Group Meeting	Is Portion 20 still owned by Mr. Te Water or the Mine?	Only Portions 8 and 15 are owned by the Mine (indicated on plan). Only these will be affected by mine infrastructure.	Portion 20 is owned by Zelpy 1100 (Pty) Ltd of which Mr.Te Water is the shareholder. Table 7 list the Surface Rights Ownership of the properties included in the MRA (also refer to Plan 2).
			There are lots of graves on the property. These must be respected.	Noted.	A Heritage Impact Assessment was undertaken in 2017, which study identified graves. A follow up survey was undertaken in 2022 and the report updated accordingly (APPENDIX K 6). No graves or heritage sites will be directly impacted by the proposed Project, and all sites can be managed *in-situ*.
			Main key issues is water. The community depends on groundwater, especially in winter. These impacts need to be looked at, as well as blasting.	We have identified water as significant impact, the existing studies from 2017 highlighted this. These impacts will be assessed in the Environmental Impact Assessment, and management measures proposed such as water treatment.	A Groundwater Impact Assessment was undertaken in 2017. This study modelled the potential impacts associated with the proposed mining (dewatering and pollution plume). The community borehole, windpump and handpump will be affected by the dewatering cone during operations. The water quality of these boreholes may also be affected post-closure (refer to Section 11.3.5, Mmakau Coal will need to provide an alternative water supply of equal quality and quantity.

Interested and Affected Parties	Date Comments Received		Issues raised	Initial Response	EAP Response & Reference to Section in Report
Schurvekop Community	*X*	04-Sept-2022 Focus Group Meeting	The Community must also benefit from the project, and should be treated equally. If the project starts there will be an influx of foreigners to the area.	Communities in the area include Bethal, Hendrina and Pullenshope. Currently Mmakau Coal employs 70% of its labour force at Tumelo Mine from Hendrina and Pullenshope, approximately 30% come from outside the area due to skills requirements. The same is expected for this project, and the labour force is expected to come from the Bethal Municipal area.	Section 9.17 provides information on the Socio-economics of the Govan Mbeki Local Municipal area.
Schurvekop Community	*X*	04-Sept-2022 Focus Group Meeting	Of the 267 employees, how many will be sourced from the community?	Must be remembered that there is also the alternative of mining from the Forzando South operations, underground. If that happens then the plant and adit will not be constructed, only a small office will be built. Mining will be undertaken by the same contractor and the existing staff from Forzando will be used.	Alternative mining methods have been assessed in Section 7 Employment will be undertaken as per the S&LP. The mine will preferentially recruit novice and entry level positions from the local community with only positions that cannot be filled locally, advertised and filled from further afield.
			Positions must be advertised with qualifications. If the community does not have these skills / qualifications, what will happen? Will the community be trained before the mine commences? The community requested that training be provided as part of skills development.	Mmakau Coal explained that mining is dangerous. Skilled and experienced people are needed. It is not just about the qualification but experience as well.	Employment will be undertaken as per the S&LP. The mine will preferentially recruit novice and entry level positions from the local community with only positions that cannot be filled locally, advertised and filled from further afield.

Interested and Affected Parties	Date Comments Received		Issues raised	Initial Response	EAP Response & Reference to Section in Report
			The Community has a database of people, indicating those skilled and unskilled. Would like the Mine to have a look at this database and where necessary train these people to fill vacancies at the mine.	Mmakau Coal requested a copy of the database. Contact details will be provided after the meeting. From that list no one else will be added except for a baby born and then Mmakau Coal will work with that list for skills development and see who is skilled etc.	Skills development will be undertaken as per the S&LP.
Schurvekop Community	*X*	04-Sept-2022 Focus Group Meeting	Many mines come into the area and make promises to the communities but do not deliver. They employ people from outside the area and the people affected by the project are not employed. The communities should benefit based on a radius. First priority should be given to people within a 5km radius and not further away.	Mmakau Coal will need to look at the structure of the larger Bethal community and municipal guidelines in this regard.	Employment and procurement will be undertaken as per the S&LP.
			What about the elderly that are too old to work?	There will be training for adults, basic educational training for reading, writing etc. If you are willing. Portable skills training for example how to farm chickens, cattle or know the health of your cattle. These skills can then be passed onto your children down line.	Skills development will be undertaken as per the S&LP.
			People in the community have been promised jobs in the past by surrounding mines and when you	This is difficult. We will need to have a look at the current forum structure.	It is anticipated that a similar structure to that of the Forzando Mines will be adopted.

Interested and Affected Parties	Date Comments Received		Issues raised	Initial Response	EAP Response & Reference to Section in Report
			question this, you are told to join forums. These forums are large and too far to join. Please treat us as a community and not a forum.		
			We struggle with water. Can the mine assist with providing water?	Mmakau Coal can look at possibly drilling a borehole and gravity feeding this to a central jojo tank for the community.	-
Schurvekop Community	X	04-Sept-2022 Focus Group Meeting	A lot of grannies are coughing. Is it possible to get a local sister out here?	The Mine will investigate the possibility of a mobile clinic once operational.	The Mine will investigate the possibility of a mobile clinic once operational.
			A lot of houses are cracking, can the mine assist?	Unable to assist with this. The mine will be underground and limited blasting and/or surface disturbance will occur.	Blasting will be limited to the construction phase. A Blast Impact Assessment was undertaken in 2017 (APPENDIX K 13. This study modelled the potential impacts associated with the construction of the Adit. The nearest house or building is approximately 598m away. The model concluded that ground vibrations could be experienced as unpleasant at the maximum charge on the human perception scale however, no structures considered in the study showed any concern for possible damage – see Section 11.3.13
			Cattle and animals should not be disturbed as the elderly rely on them for their livelihood.	Specialist studies have been undertaken in the past, where necessary these are being updated.	The specialist studies are attached as APPENDIX K.

Interested and Affected Parties	Date Comments Received		Issues raised	Initial Response	EAP Response & Reference to Section in Report
				These will give an indication of the impacts and propose management measures to reduce the impact.	
			Most people present here at the meeting have licenses and experience. We know how to operate opencast machinery. Since this project will be going underground, what will be done to assist us?	Depending on what machinery you operated and what training you have, this could form part of the skills development programme. The community's database can assist us with the skills plan.	Skills development and employment will be as per the S&LP. The mine will preferentially recruit novice and entry level positions from the local community with only positions that cannot be filled locally, advertised and filled from further afield.
			Will the mine help the school children with bursaries and scholarships?	Scholarships and bursaries are addressed in the S&LP.	Scholarships and bursaries are addressed in the S&LP.
			When will the mine start?	In approximately 2 – 3 years.	Section 4.9 the timeframes for the implementation of the Project. Construction can only commence once all the licenses and authorisations are in place.
			Requested assistance with groceries for the elderly.	Food parcels are handed out in December by Mmakau Coal.	-
			Requested a library and WIFI for the kids to do homework and study.	Can look at possibly assisting with a creche for the community. The creche can then include WIFI facilities and an area for homework and studying.	-
OTHER AFFECTED PARTIES	**X**				

Interested and Affected Parties	Date Comments Received		Issues raised	Initial Response	EAP Response & Reference to Section in Report
Jabulani Normal Mahlangu, Land Claimant	X	08-Aug-22 Online Form	The land in question falls under the land claim. I am the beneficiary of the land claim Schurvekop IS277, which is the heritage that falls under the untold history of the Mahlangu family one of king Magodongo royal house.	According to the Land Claims commission your claim is over Portion 16 of the Farm Schurvekop? Please confirm? We understand that Portions 6, 8, 15, 17, 18, 19 & 20 are not affected by the land claim. Please note that the proposed surface infrastructure will be limited to Portion 8.	Land Claim on Portions 16 and 7[4] of the farm Schurvekop 227 IS confirmed. Proof of correspondence included in the PPP Report (APPENDIX J). No infrastructure or surface disturbance is proposed for either property. Only Portion 16 is included in the Mining Right application, it is proposed that this farm be undermined. The necessary safety factors will be implemented to limit the possibility of subsidence (refer to APPENDIX E for a copy of the Geotechnical and Rock Engineering Report). Figure 3 depicts the proposed infrastructure and underground mine block layout. Also refer to Section 15.2
		11-Aug-22 E-mail	Please find this attachment and refer to the report dated 08/09/17 to the office of the Chief Director: Land Restitution Support Mpumalanga Province	Thank you, received. The letter confirms that your land claims is over Portion 16 and 7 of the Farm Schurvekop. Portion 7 does not form part of the Mining Right Area under	Land Claim on Portions 16 and 7 of the farm Schurvekop 227 IS confirmed. Proof of correspondence included in the PPP Report (APPENDIX J).

[4] Portion 7 is excluded from the Mining Right Application.

Interested and Affected Parties	Date Comments Received		Issues raised	Initial Response	EAP Response & Reference to Section in Report
				application however, Portion 16 does. Currently no surface mining or infrastructure is proposed for the properties under land claim, however Portion 16 is earmarked for undermining at a depth of approx. 60 m below surface. Studies have been completed to determine the safety factors, as well as groundwater impacts associated with the project. A Health Impact Assessment and Noise Impact Assessment have been commissioned, to determine whether there will be any health or noise impacts to surrounding land users / owners. Mr Mahlangu has been registered as an Interested & Affected Party and will be kept updated on the project as it proceeds, and notified of document availability.	No infrastructure or surface disturbance is proposed for either property. Only Portion 16 is included in the Mining Right application, it is proposed that this farm be undermined. The necessary safety factors will be implemented to limit the possibility of subsidence (refer to APPENDIX E for a copy of the Geotechnical and Rock Engineering Report). Also refer to Section 15.2 Figure 3 depicts the proposed infrastructure and underground mine block layout.
Landowners or lawful occupiers on adjacent properties	**X**				
No comments received to date.					
Municipal Councillor	**X**				
See comments from Cllr. J.Mtsweni under Communities.					

Interested and Affected Parties	Date Comments Received		Issues raised	Initial Response	EAP Response & Reference to Section in Report
DEPT. OF MINERAL RESOURCES					
No comments received to date					
ORGANS OF STATE	**X**				
No comments received to date					
Dept. of Land Affairs	**X**				
No comments received to date					
Traditional Leaders	**X**				
No comments received to date					
Dept. of Environmental Affairs	**X**				
No comments received to date					
Other Competent & Commenting Authorities	**X**				
Mr.F.N.Krige, MTPA/DARDLEA	X	05-Aug-22 E-mail	Please register the MTPA as an I&AP and send hardcopy of application to Phumla Nkosi at Head office Mbombela as usual.	Cabanga confirms that the MTPA has been registered as and I&AP. A hard copy of the Scoping Report will be couriered to the Mbombela office for review and comment.	A copy of the Scoping Report was couriered to MTPA on 08 August 2022. Proof of delivery included in the PPP Report (APPENDIX J). A copy of the EIA and EMP report for review and comment will also be couriered.
Thabile Mnisi MTPA	X	11-Aug-22 E-mail	The MTPA request a hard copy of the Scoping Report to be delivered to the following address: Head office	A hard copy has already been couriered and should already have been delivered. It was marked for the attention of Phumla Nkosi, as per Mr. Krige's mail.	

Interested and Affected Parties	Date Comments Received		Issues raised	Initial Response	EAP Response & Reference to Section in Report
			N4 National Road Hall's gateway Mataffin Mbombela Attention to Phumla Nkosi Office G3D		
INTERESTED PARTIES	**X**				
Mr. Mlungisi.F. Mabizela, Lungisa Supply and Maintenance(Pty)Ltd – Harry Kotzen Farm	X	05-Aug-22 Online Form	We are a SMME from Harry Kotzen Farm and would like to participate in the development of Mmakau Mining.	Cabanga confirms that Mr. Mlungisi.F. Mabizela, Lungisa Supply and Maintenance (Pty)Ltd has been registered as an I&AP.	A copy of the I&AP Register is included in the PPP Report (APPENDIX J).
Sibu-Simelone, Sibabusi Trading	X	08-Aug-22 E-mail	Confirmed receipt of the BID.	No response required.	Proof of correspondence included in the PPP Report (APPENDIX J).
Bertie van Wyk BVW Construction (Pty) Ltd	X	09-Aug-22 Online Form	I want to register as an I&AP.	Cabanga confirms that Mr. Bertie van Wyk, BVW Construction (Pty) Ltd has been registered as an I&AP.	A copy of the I&AP Register is included in the PPP Report (APPENDIX J).
Sibusiso Nkosi		16-Aug-22 E-mail	Confirmed receipt of the BID.	No response required.	Proof of correspondence included in the PPP Report (APPENDIX J).

9 EXISTING SITE ATTRIBUTES

Just as a project is associated with certain impacts on the environment where it is undertaken, the existing environment can also influence a proposed development in terms of design, location, technology and layout. It is therefore important to define the environmental baseline conditions (*status quo*) or context of a proposed development project.

This section describes the environmental attributes associated with the affected sites focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects. Information is presented on different scales as relevant to the information that is available:

- Regional scale – the areas, land uses and communities surrounding the site including, in some cases, the larger municipal area;
- Immediate surroundings; and
- Site-specific.

A number of specialist assessments have been completed for the project in the past, these have been reviewed an updated where necessary (APPENDIX K), the findings of which are summarised below.

9.1 Climate and Meteorology

The MRA is located in the Mpumalanga Province of South Africa, which is characterised by a mild to warm summers and cool to cold winters. Rainfall primarily occurs from October to March and almost exclusively as showers and thunderstorms. Severe lightening, strong winds and hail often accompany these thunderstorms. According to the Water Research Commission (WRC) the mean annual precipitation (MAP) for the Project area is 718.1 mm whilst the mean annual evaporation (MAE) is 1,934.7mm, almost three times the MAP (Bailey & Pitman, 2016) (see Table 18).

Meteoblue has modelled climate data for the MRA as illustrated in Figure 14. The mean maximum temperatures in summer time is 27°C while the mean minimum temperatures in winter is 2°C (Meteoblue, 2022).

The wind rose presented in Figure 15 shows that average wind speeds in the area rarely exceeds 28km/h and is predominantly from the east-north-east, though stronger winds are sometimes experienced from the west-north-west (Meteoblue, 2022).

Table 18: Rainfall and Evaporation Data for Station B1E004 (Rietfontein)

Description	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Annual
Average Rainfall (mm)	97.6	122.3	134.4	108.7	81.5	80.9	38	11.1	8.7	2.2	9	23.7	**718.1**
Average Evaporation (mm)	198.4	202.4	204.6	207.1	178.3	165.6	135.7	122.1	91.5	105.1	141.1	182.8	**1934.7**

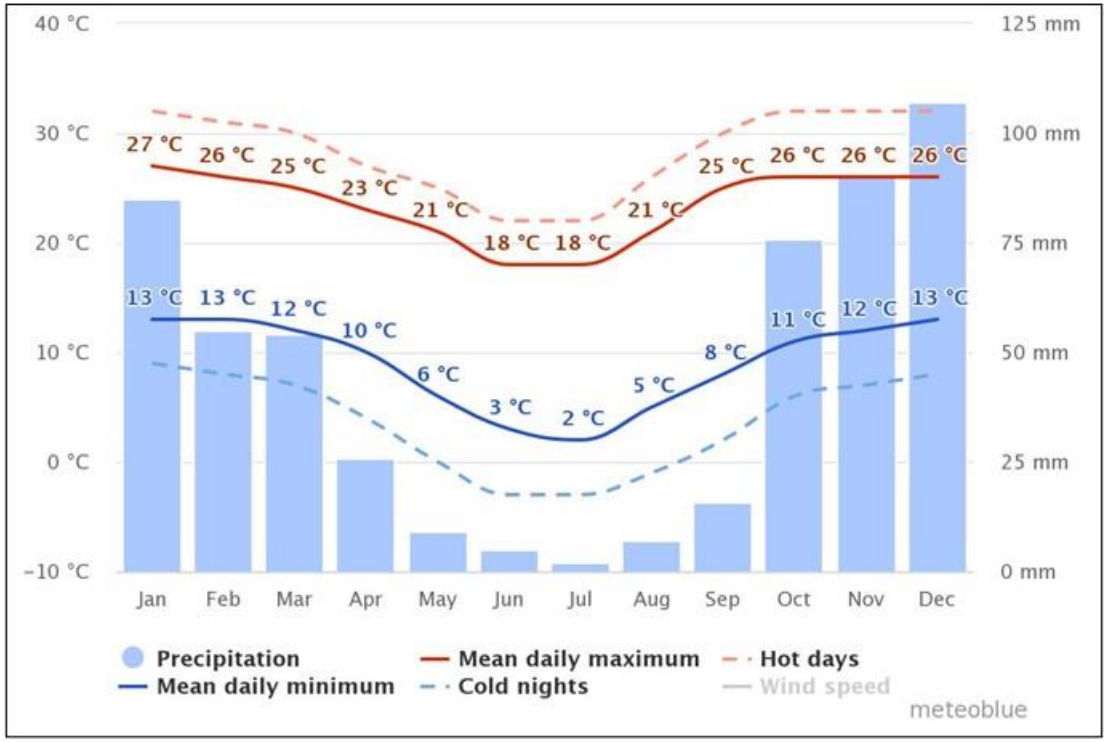


Figure 14: Modelled Climate data for the project area (Meteoblue, 2022)

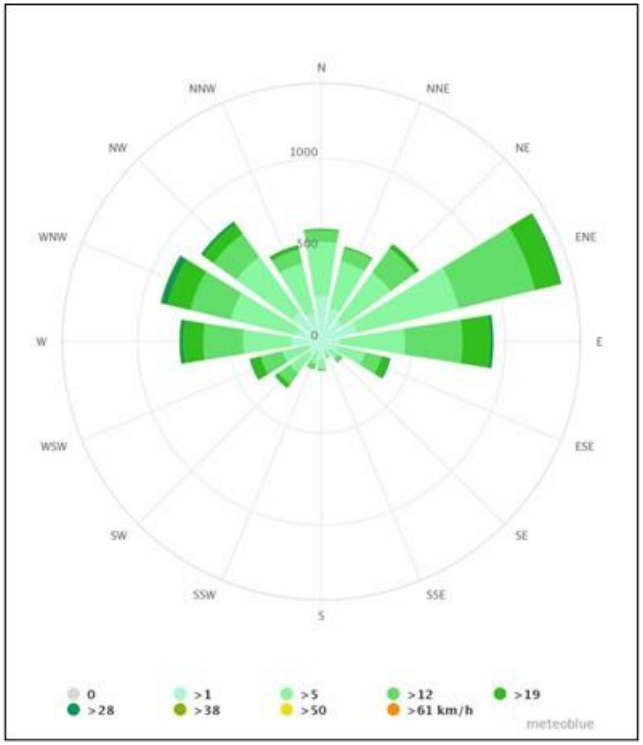
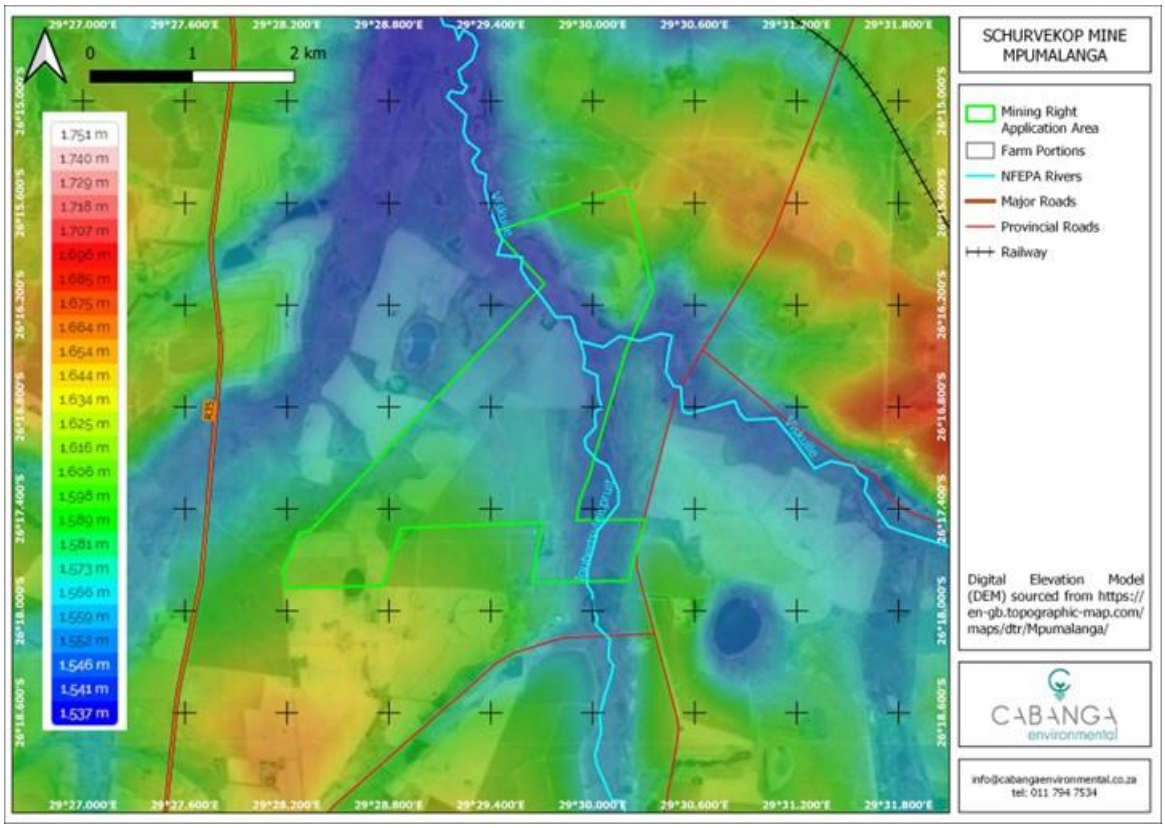


Figure 15: Wind Rose (Meteoblue, 2022)

9.2 Topography

The Project area is characterised by gently undulating topography. The topography dips at gradients of between 1:50 and 1:100 towards the Viskuile River. Topographical elevations in the MRA range between 1 630 and 1 580 mamsl (Plan 4).



Plan 4: Topography

9.3 Geology

The MRA falls within the north eastern extremity of the Highveld Coal field separated by the pre-Karoo Smithfield ridge from the Witbank Coal field to the north (Plan 5). The section below is extracted from the Mining Works Programme (Mmakau Coal (Pty) Ltd, 2022).

Rooiberg felsites as well as the Bushveld – Lebowa granites comprise the basement lithology. These basement rocks can be weathered to great depths indicating the surface exposure that they encountered in the past. Also abundantly encountered in this area is Diabase which has the same chemical composition as dolerite. A northwest – southeast trending palaeo-valley, with steeply dipping contours in the northeast, can be seen traversing Schurvekop on the top of basement plan. A distinct palaeo-ridge can be seen in the northeast. This palaeo-ridge is in the same vicinity as the Koppie. The top of basement elevation ranges from 1480 to 1598 metres above mean sea level (mamsl) (Mmakau Coal (Pty) Ltd, 2022).

Deposited above the basement rocks are sediments of glacial origin which were deposited by the continental ice sheets during Permo-Carboniferous times. Resulting from this erosional and depositional process were elongated low ridges and shallow valleys which influenced the

depositional patterns. The sediments mentioned above formed the Dwyka Formation and were composed mainly of tillites and varvites (Mmakau Coal (Pty) Ltd, 2022).

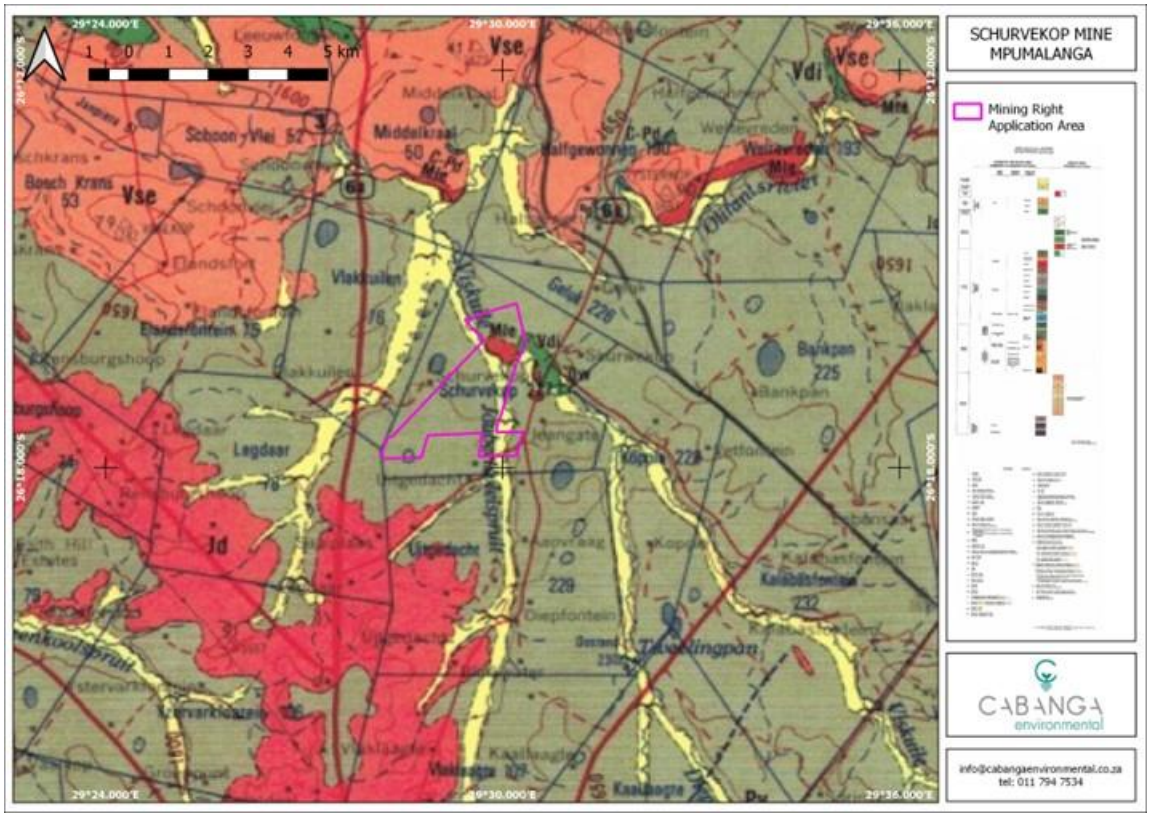
The top of Dwyka Formation elevation contours mirror that of the top of basement with elevations ranging from 1584 to 1578 mamsl. Deposited above the Dwyka Formation were arenaceous sequences of sandstones and conglomerates with subordinate siltstones, shales and coal seams. This sequence is referred to as the Vryheid Formation. Five major coal seams, named from bottom upwards, were formed in this area. Namely:

- No 1, No 2, No3, No 4 and No 5. Seam splitting occurs of three of the seams due to breaks in the plant formation process;
- No. 2 Seam may be split into the No. 2 Lower Seam and the No. 2 Upper Seam;
- No. 4 Seam into the No. 4 Lower Seam, No. 4 Upper Seam and the No. 4A Seam; and
- No. 5 Seam into the No. 5 Lower Seam and the No. 5 Seam.

The thickest and most consistent coals are contained in the No. 2 and 4 Seam zone. The No. 1 Seam is restricted to the palaeo-valley. The No. 3 is not persistent laterally. The No. 5 seam is only present in topographically high areas; elsewhere it has been removed by erosion. Of the seams mentioned above the No. 4 Lower and No. 2 Lower seams have been identified as being potentially economically viable (Mmakau Coal (Pty) Ltd, 2022).

At the end of the Karoo depositional cycle the Karoo Supergroup and with it the Vryheid Formation were subjected to injection of hot molten magma in the form of dolerite sills and dykes during the late Jurassic times. These intrusions resulted in the displacement of the coal seams and the devolatilization or burning of extensive areas of coal. The width of devitalization and burning is dependent on the width of the intrusion as well as the temperature of the magma during injection. Whilst the former intrusion type is readily detected during the exploration drilling, detection of the latter is more difficult. This results from the near-vertical nature and limited thickness of dykes as well as the reasonably wide-spaced drilling grid. Therefore, geophysical methods have been employed quite successfully to locate these dykes (Mmakau Coal (Pty) Ltd, 2022).

From experience gathered during mining at the Forzando Complex it was determined that the sill burning and devolatilization zone was normally within one and a half times the width of the sill. In areas where the sill adopted the dyke like behaviour it was associated with numerous fractures and dolerite stringers indicating hazardous mining conditions (Mmakau Coal (Pty) Ltd, 2022).



Plan 5: Geological Setting

9.4 Soils, Land Use and Land Capability

The Project area can be classified as rural in nature, with a few informal residential settlements located on Portions 17 and 20 of the farm Schurvekop 227 IS, and farmsteads on Portions 6 and 8. Surrounding land use includes agriculture (cultivation and grazing), waterbodies and mining (coal). Servitudes are associated with the existing powerlines, farm roads and the Usuthu bulk water supply pipeline which runs parallel to the D622 road.

Three primary land uses were identified in the MRA (Figure 16), namely:

- Cultivation;
- Natural veld/secondary grassland; and
- Waterbodies.

According to the land type database (Land Type Survey Staff, 1972 - 2006) the MRA falls within the Bb4 land type. The Bb4 land type is characterised by the plinthic catena, upland duplex and margalitic soils. It is expected that the dominant soils will be Avalon, Longlands, Rensburg, Estcourt and Katspruit soil forms.

An agricultural potential study was undertaken by The Biodiversity Company in March 2017 and updated in November 2022 (APPENDIX K 1). The study found that the midslopes are dominated by Longlands and Tukulu soils, and the foot slopes and valley bottoms were Katspruit and Sepane soils. There is a rocky outcrop situated to the north east of the MRA and this was mainly of the Mispah form (Figure 17).

The Tukulu and Sepane soils were classified as having a Class III (moderate cultivation) capability with the albic, Longland soils in the midslopes having a Class IV (light cultivation/intensive grazing) land capability. The shallow rocky outcrop is classified as Class VI (moderate grazing). The wetlands are classified as Vlei areas (Class V). Vlei areas are classified as soil with a wetness indicator within 20cm of the surface. Many of the other wetland type soils only show wetness at 30cm and beyond and thus are not included in this class. See Figure 18.

Furthermore, the class III land capability was determined to have a L3 good potential. Class IV land capability was determined to have a L4 moderate potential, whilst the class VI land capability was determined to be a L5 restricted potential. See Figure 19.

Figure 16: Photos showing the maize crops (top left), water bodies (top right) and in-tact grassland (bottom) that characterise the study area indicating agriculture and grazing of livestock as the main land uses

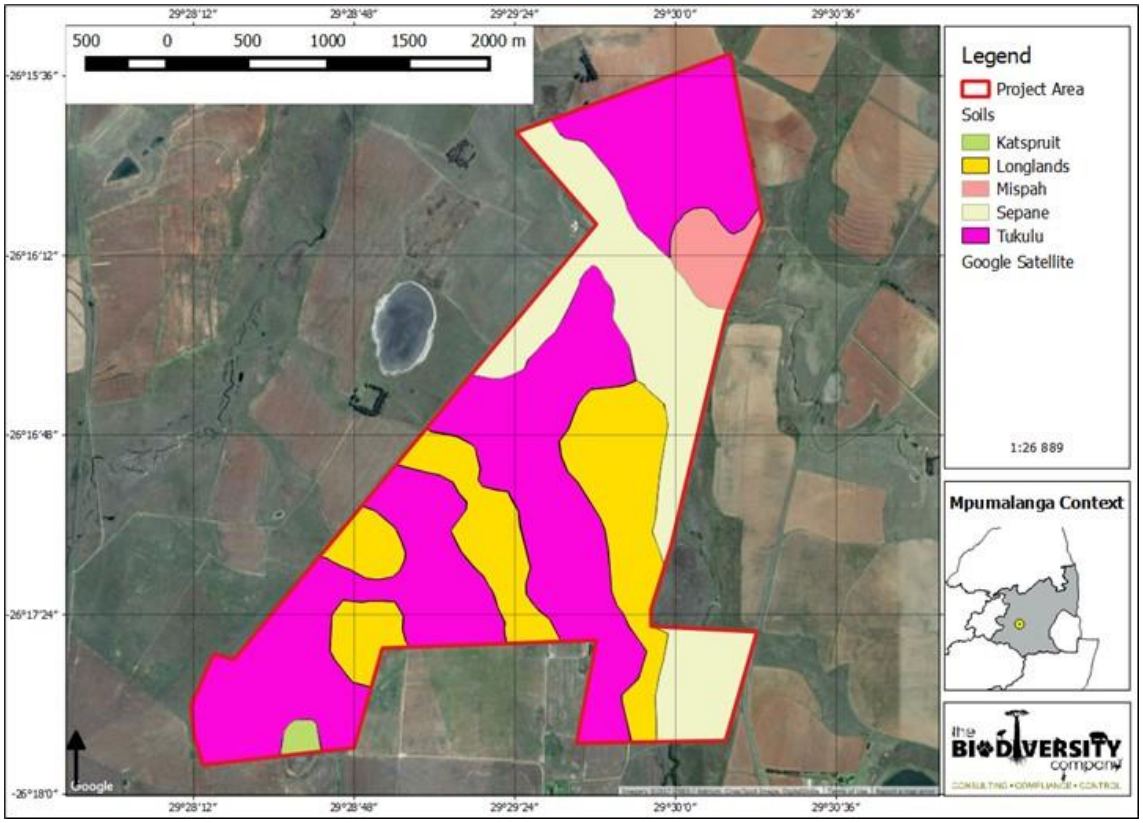


Figure 17: Soil Forms (TBC, 2022a)

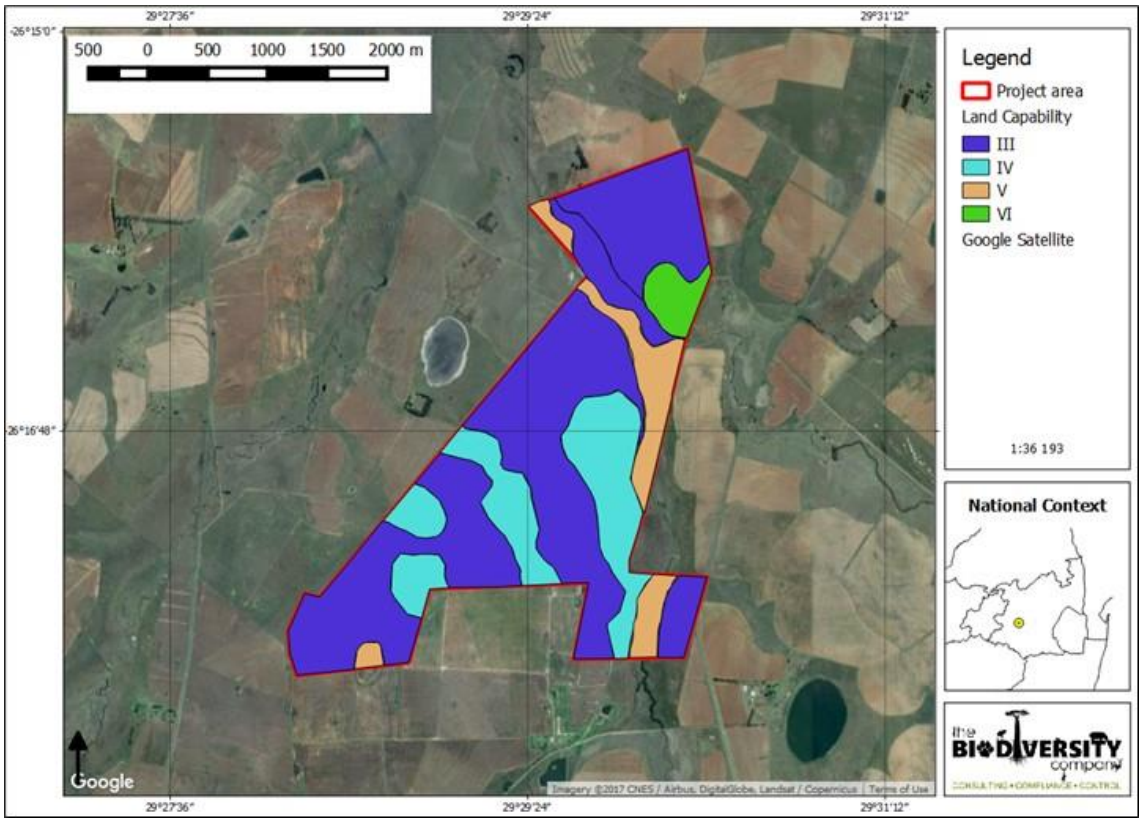


Figure 18: Land Capability (TBC, 2022a)

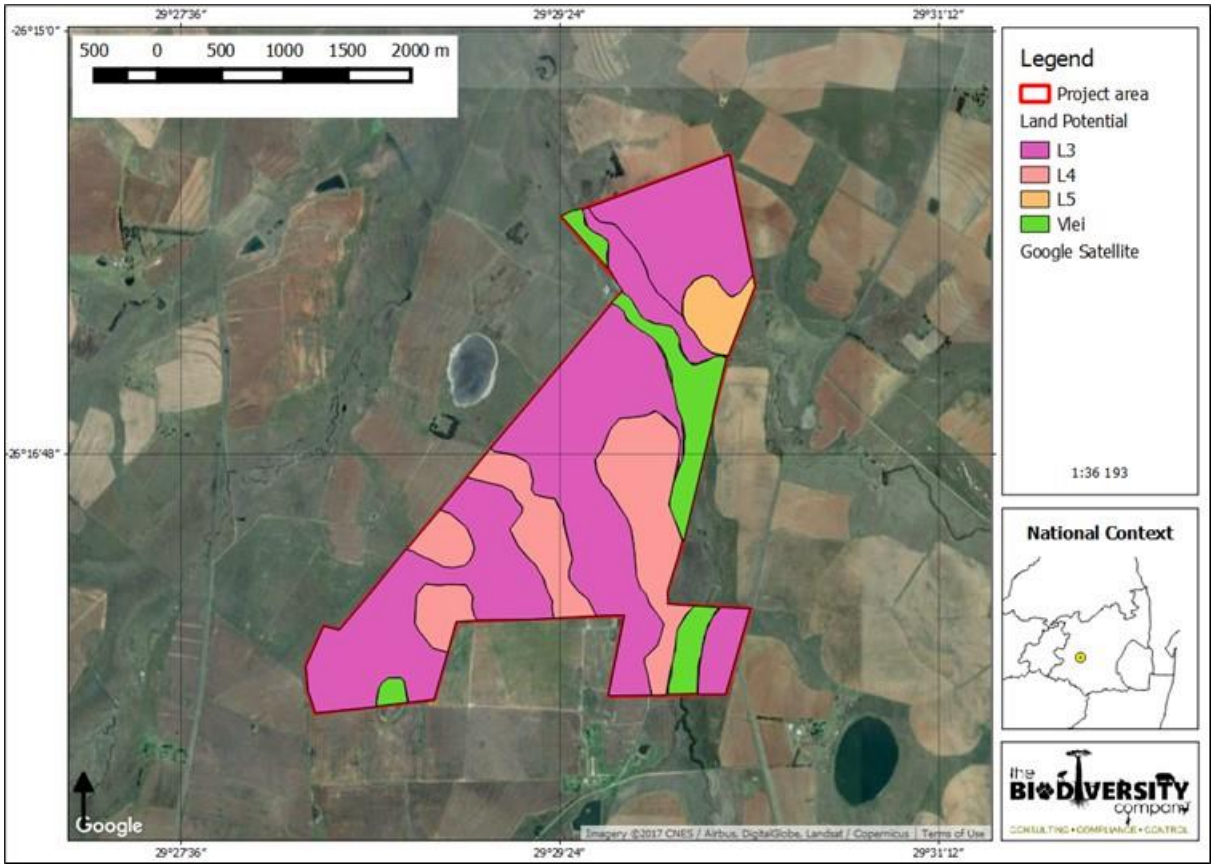


Figure 19: Land Potential (TBC, 2022a)

9.5 Surface Water

9.5.1 Water Management Area (WMA)

The proposed Project falls within the Water Management Area 2: Olifants and in the B11A quaternary catchment.

Formal economic activity in the Olifants WMA is highly diverse and is characterised by commercial and subsistence agriculture (both irrigated and rain fed), diverse mining activities, manufacturing, commerce and tourism. Large coal deposits are found in the Emalahleni and Middelburg areas (Upper Olifants) and large platinum group metal deposits are found in the Steelpoort, Polokwane and Phalaborwa areas. The WMA is home to several large thermal power stations, which provide energy to large portions of the country. Extensive agriculture can be found in the Loskop Dam area, the lower catchment near the confluence of the Blyde and Olifants Rivers as well as the in the Steelpoort Valley and the upper Selati catchment.

The Olifants Catchment Management Agency (CMA) was officially established by Regulation 168 of 2015 following the evaluation of the CMA business case published by the Department of Water Affairs (DWA, October 2013). At the time of writing this report, no governing board for the Olifants CMA has been appointed and no Catchment Management Strategy (CMS) for the Olifants WMA has been published. A regional steering committee (Upper Olifants Catchment Technical Working Group) is operational.

Quaternary Catchment information is summarised in Table 19.

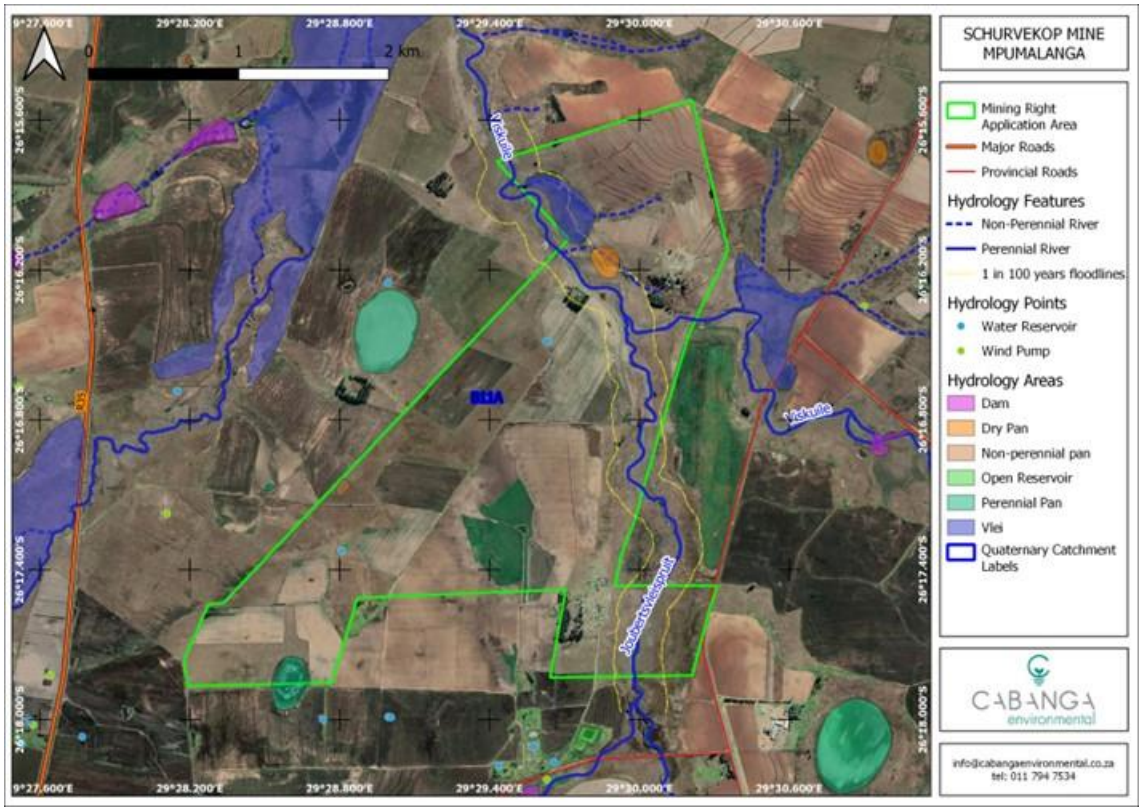
Table 19: Quaternary Catchment Information (DWA, 2010)

Attribute/Catchment	B11A
Quaternary catchment area (km^2)	954.4
Mean annual rainfall (mm/a)	699
Mean annual runoff (mm/a)	39
Baseflow (mm/a)	7
Mean annual evaporation (mm/a)	1500 - 1600
Total groundwater use (Mm^3/a)	0.05
Ecoregion	Highveld
Present Eco Status Category	B
Recharge (mm/a)	42
Exploitation potential (Mm^3/a)	10
Vegetation type	Moist Sandy Highveld Grassland
Soil	SaClLm
Groundwater General Authorisation $m^3/ha/a$	75

9.5.2 Hydrology

The Viskuile River enters the MRA from the east and confluences with the Joubertsvleispruit entering from the South, after which they flow northwest converging with the Olifants River approximately 3.5km northwest of the property (Plan 6). The mining area is characterised by gently undulating topography, which dips at gradients of between 1:50 and 1:100 towards the rivers. The proposed Project infrastructure will be placed on a lateral catchment divide.

The floodlines were calculated by Letsolo Water and Environmental Services (Letsolo, 2016). Due to the flat terrain, the 1:100 year floodline of the Viskuile River is greater than 100m (Plan 6). No surface disturbance or mine infrastructure will be located within the 1:100 year floodline; however these areas have been earmarked for underground mining.



Plan 6: Surface water resources

9.5.3 Surface Water Quality

Three surface water samples were taken by Letsolo in 2016, two were taken within the Olifants River (up and downstream of the Viskuile confluence) and one was taken from the Viskuile River, just to the east of the mining right boundary. The following can be concluded from the monitoring results (Table 20):

- Generally the water quality is good. However there seems to be evidence of some contamination upstream of the study area, in the Olifants River. Elevated EC, TDS, SO_4, Fe, Al, and Mn associated with low pH values are indicators of mine related impacts.
- The pH value of the three samples collected are within the SANS 241- 2015 standard limit, ranging between 6.5 and 9.2 pH value.
- Electrical Conductivity (EC) which is the ability for water to conduct electricity, mostly resulting from the presence of dissolved salts is within the standard limit with the highest 163mS/m recorded at the Olifants (upstream).
- Total Dissolved Solids (TDS) comprise inorganic salts (principally calcium, magnesium, potassium, sodium, bicarbonates, chlorides, and sulphates) and some small amounts of organic matter that are dissolved in water. High TDS was recorded at the Olifants River (upstream) with a value of 1 238mg/L which is exceeding the standard limit of 1,200mg/L.
- Sulphates are a major indicative contaminant of mining related activities. Sulphates are reactive and have a potential to form Acid Mine Drainage (AMD) if not managed

properly. The high value was recorded in the Olifants River (upstream) with a value of 621mg/L exceeding the standard limit of 500mg/L for acute health.

- The major ionic constituents such as Na, K, Mg, and Ca indicate good conditions with no high values of concern.
- The analysis of metals indicated that Olifants River (downstream) showed the highest concentrations for metals.
- Aluminum was recorded high at the Olifants River (downstream) with the value of 1.55 mg/L exceeding the standard limit for operational risks at 0.3 mg/L. The Viskuile River also exceeded this limit with a value of 0.361 mg/L.
- Iron (Fe) was recorded high in the Olifants River (downstream) with a value of 1.44 mg/l exceeding standard limit of 0.3 mg/L aesthetic. The Viskuile River also exceeded this limit with a value of 0.351 mg/L.
- Manganese (Mn) exceeded the standard limit of 0.1mg/L aesthetic in the Olifants River ranging from 0.339 to 0.438 mg/L. The downstream point also exceeded the 0.4 mg/L limit associated with risk to chronic health by 0.438mg/L.

Table 20: Summary results of baseline surface water quality testing (Letsolo, 2016)

Analyses in mg/ℓ (Unless specified otherwise)	**SANS 241-1 2015**	**Sample Identification: Schurvekop Mine**		
		Viskuile	**Olifants River (Downstream)**	**Olifants River (Upstream)**
pH – Value at 25°C	≥5 to ≤9.7	6.5	9.2	7
Electrical Conductivity in mS/m at 25°C	≤170 mS/m	34.6	47.3	163
Total Dissolved Solids at 180°C *	≤ 1 200 mg/L	242	326	1 238
Suspended Solids at 105°C *		38	181	51
Total Alkalinity as $CaCO_3$		140	92	208
Total Hardness as $CaCO_3$ *		103	143	840
Chloride as Cl	≤300 mg/L	12	19	15
Sulphate as SO_4	≤500 mg/L Acute Health ≤250 mg/L Aesthetic	27	100	621
Fluoride as F	≤1.5 mg/L	0.4	0.9	0.4
Nitrate as N	≤11 mg/L	0.1	0.1	0.1
Ortho Phosphate as P		<0.1	<0.1	<0.1
Oil & Grease *		2	4	1
Free & Saline Ammonia as N	≤1.5 mg/L	0.3	0.1	<0.1
Sodium as Na	≤200 mg/L	31	35	79

Analyses in mg/ℓ (Unless specified otherwise)	SANS 241-1 2015	Sample Identification: Schurvekop Mine		
		Viskuile	Olifants River (Downstream)	Olifants River (Upstream)
Potassium as K		2.8	9	13.8
Calcium as Ca		20	26	142
Magnesium as Mg		13	19	118
Aluminium as Al	≤0.3 mg/L Operational	0.361	1.55	0.187
Iron as Fe	≤2 mg/L Chronic health ≤0.3 mg/L Aesthetic	0.351	1.44	0.182
Manganese as Mn	≤0.4 mg/L Chronic health ≤0.1mg/L Aesthetic	0.073	0.438	0.339
Zinc as Zn	≤5 mg/L	<0.025	<0.025	<0.025

9.6 Mean Annual Runoff (MAR)

Delta BEC delineated 9 clean water areas and 12 dirty water areas within the proposed Project Area (Figure 20). Mean Annual Runoff (MAR) per catchments site is summarised in Table 21.

The stormwater management plan is attached as APPENDIX G, the layout was designed with the following considerations in mind (Delta BEC, 2022c):

- Dirty and clean water to be separated;
- Sub-surface water to be catered for;
- Three (3) PCDs required to attenuate the runoff from a 1:50 year storm event;
- Dirty water to be conveyed with concrete lined drains;
- Clean water to be diverted via earth dug drains; and
- Box culverts to be provided at road crossings.

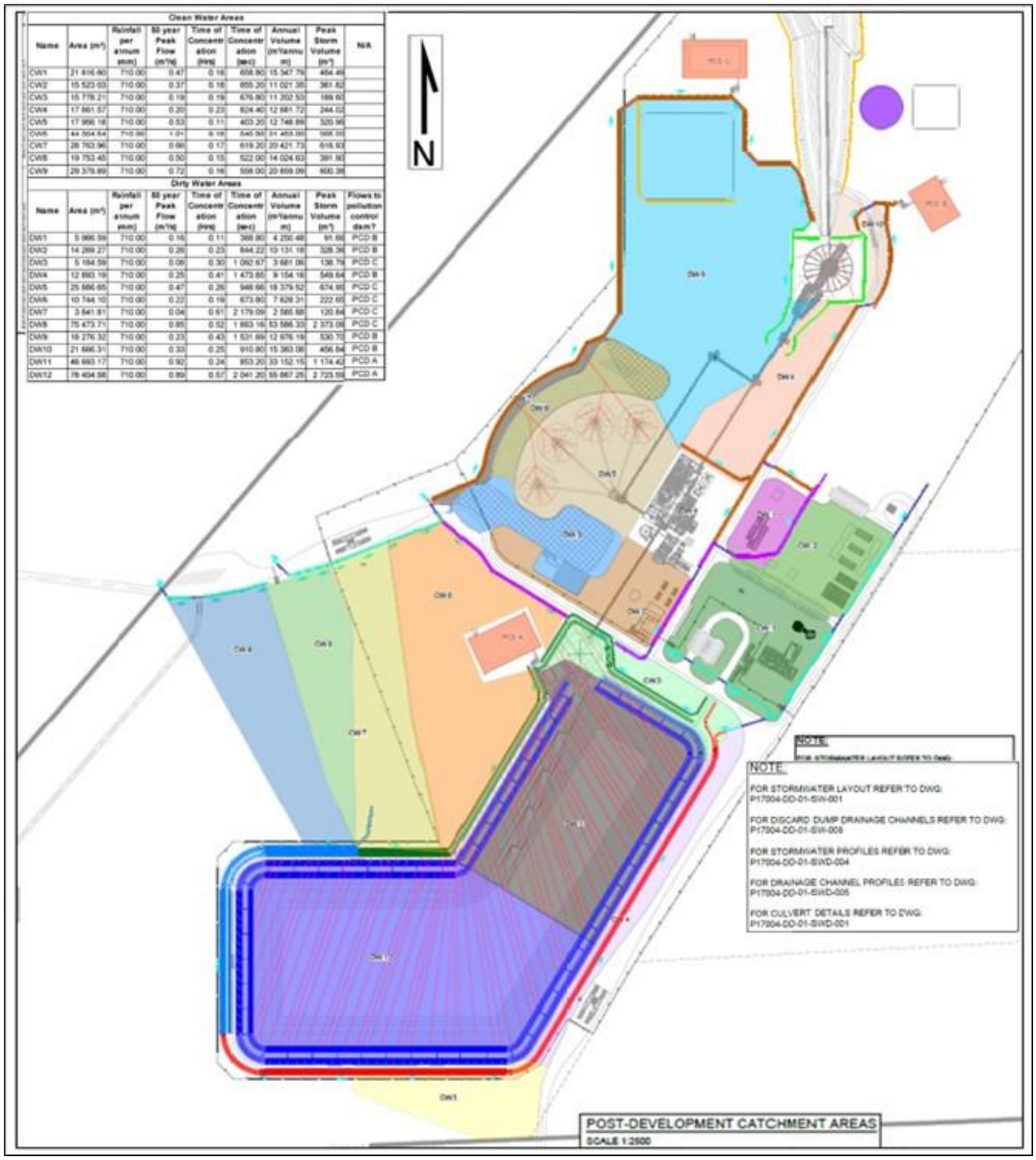


Figure 20: Post Development Catchment Management Areas (Delta BEC, 2022c)

Table 21: MAR per Catchment Management Area (Delta BEC, 2022c)

Description	Surface area (m^2)	Rainfall (mm/annum)	MAR (m^3/annum)
Clean Water Area 1	21 616.60	710	15 346.79
Clean Water Area 2	15 523.03	710	11 021.35
Clean Water Area 3	15 778.21	710	11 202.53
Clean Water Area 4	17 861.57	710	12 681.72
Clean Water Area 5	17 956.18	710	12 748.89
Clean Water Area 6	44 304.64	710	31 453.00

Description	Surface area (m²)	Rainfall (mm/annum)	MAR (m³/annum)
Clean Water Area 7	28 763.96	710	20 421.73
Clean Water Area 8	19 753.45	710	14 024.63
Clean Water Area 9	29 379.89	710	20 859.09
Dirty Water Area 1	5 986.59	710	4 250.48
Dirty Water Area 2	14 269.27	710	10 131.18
Dirty Water Area 3	5 184.59	710	3 681.06
Dirty Water Area 4	12 893.19	710	9 154.16
Dirty Water Area 5	25 886.65	710	18 379.52
Dirty Water Area 6	10 744.10	710	7 628.31
Dirty Water Area 7	3 641.81	710	2 585.68
Dirty Water Area 8	75 473.71	710	53 586.33
Dirty Water Area 9	18 276.32	710	12 976.19
Dirty Water Area 10	21 666.31	710	15 383.08
Dirty Water Area 11	46 693.17	710	33 152.15
Dirty Water Area 12	78 404.58	710	55 667.25

9.7 Resource Class and River Health

The Schurvekop MRA traverses through three sub-quaternary catchments (SQC) 1411, 1443 and 1430. These catchments drain the three SQR's B11A-1443, B11A-1430 and B11A-1411. Table 22 summarises their ecological status according to national data (TBC, 2022b).

Aquatic baseline data was collected at three sites in 2017 (SCH1, SCH2 and SCH3), with the addition of one site in 2022 (SCH4) (Figure 21). Table 23 summarises the biomonitoring findings which concluded that *in-situ* water quality generally complies with the Target Water Quality Range (TWQR) for aquatic ecosystems and Resource Quality Objectives (RQOs) for the Olifants WMA. The only exception to this was the recorded dissolved oxygen at site SCH2 which coincides with the recorded dissolved oxygen deficiency at the same site in the 2017 survey; and SCH3 elevated above the RQO limit at the time of the 2022 survey (TBC, 2022b).

The Habitat Integrity Assessment (HIA) indicated a largely modified (class D) instream and riparian habitat for the Joubertsvleispruit and moderately modified (class C) instream habitat and riparian habitat for the Viskuile River and tributary (TBC, 2022b).

Aquatic macroinvertebrate species diversity was found to have improved since the 2017 survey comprising moderately tolerant taxa which were prolific in the 2022 survey. The calculated ecological category of the watercourse in the project were largely natural (class B) barring the tributary of the Viskuile River at largely modified (class D). The fish assessment indicated that the fish assemblages were largely intact with few expected species not sampled during the two surveys (TBC, 2022b).

According to the Mpumalanga Biodiversity Conservation Plan 2019 for the freshwater biodiversity assessment of the Mpumalanga Province, the Joubertsvleispruit and Viskuile Rivers are considered a Wetland Ecological Support Area (ESA) with isolated sections of particular tributaries, located outside of the MRA, considered Critical Biodiversity Areas (CBAs). The 'other natural areas' surround the watercourses with the remaining terrestrial habitat are considered heavily modified (TBC, 2022b).

The Project area was categorised as possessing aquatic habitats with 'High' Site Ecological Importance (SEI), the watercourses are sensitive as they are considered freshwater ecosystem priority areas (FEPAs) which are Ecosystem Support Areas which are critically endangered and poorly protected (Figure 22 - Figure 23). These watercourses also comprise multiple wetland National Freshwater Ecosystem Priority Areas (NFEPA's). Despite noted modification of wetland areas by cultivation these wetlands remain sensitive as seep and valley bottom wetlands in the Mesic Highveld Grassland Bioregion are classified as critically endangered (TBC, 2022b).

Table 22: Present Ecological Status of the three nationally assessed SQR's associated with the study area (TBC, 2022b)

SQR	Present Ecological State	Ecological Importance	Ecological Sensitivity
Joubertsvleispruit SQR B11A-1443 (SCH2 Upstream)	D (Largely modified)	Moderate	High
Viskuile SQR B11A-1430 (SCH1 Upstream)	C (Moderately modified)	High	High
Viskuile SQR B11A-1411 (SCH3 Downstream)	C (Moderately modified)	Moderate	High

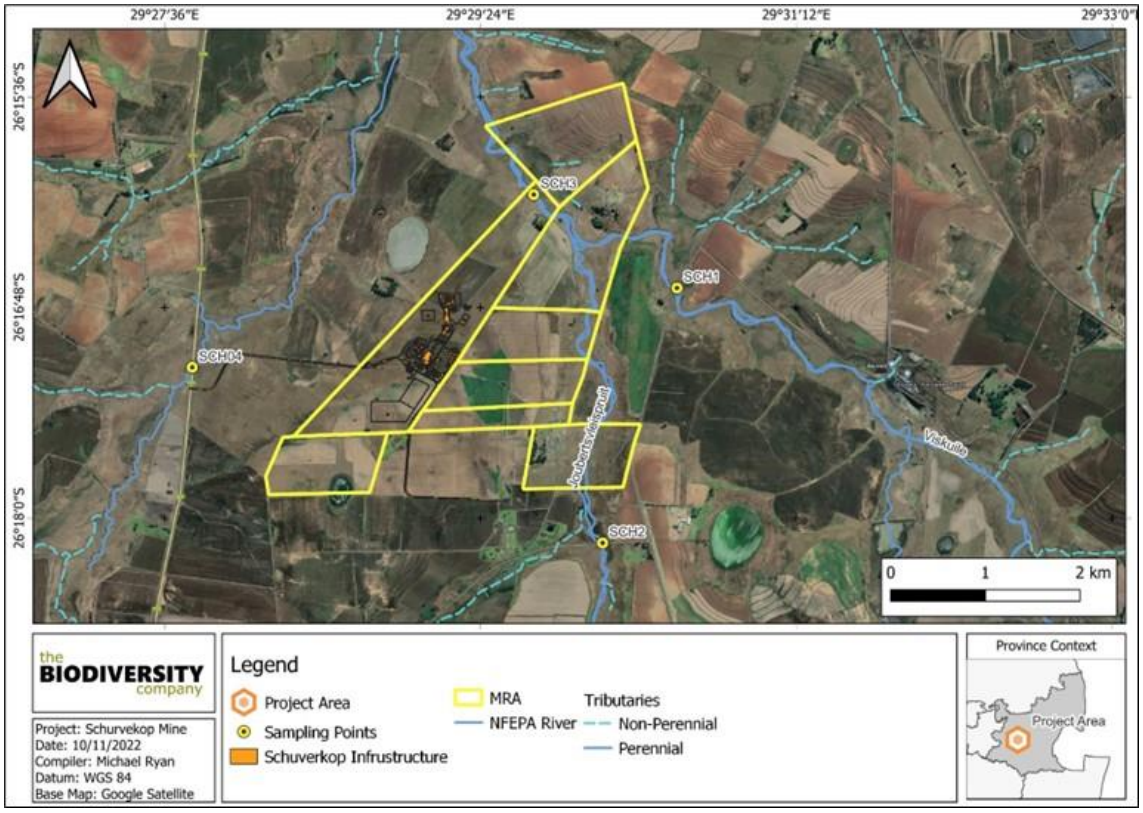


Figure 21: Aquatic Ecology Sample Sites for Biomonitoring (TBC, 2022b)

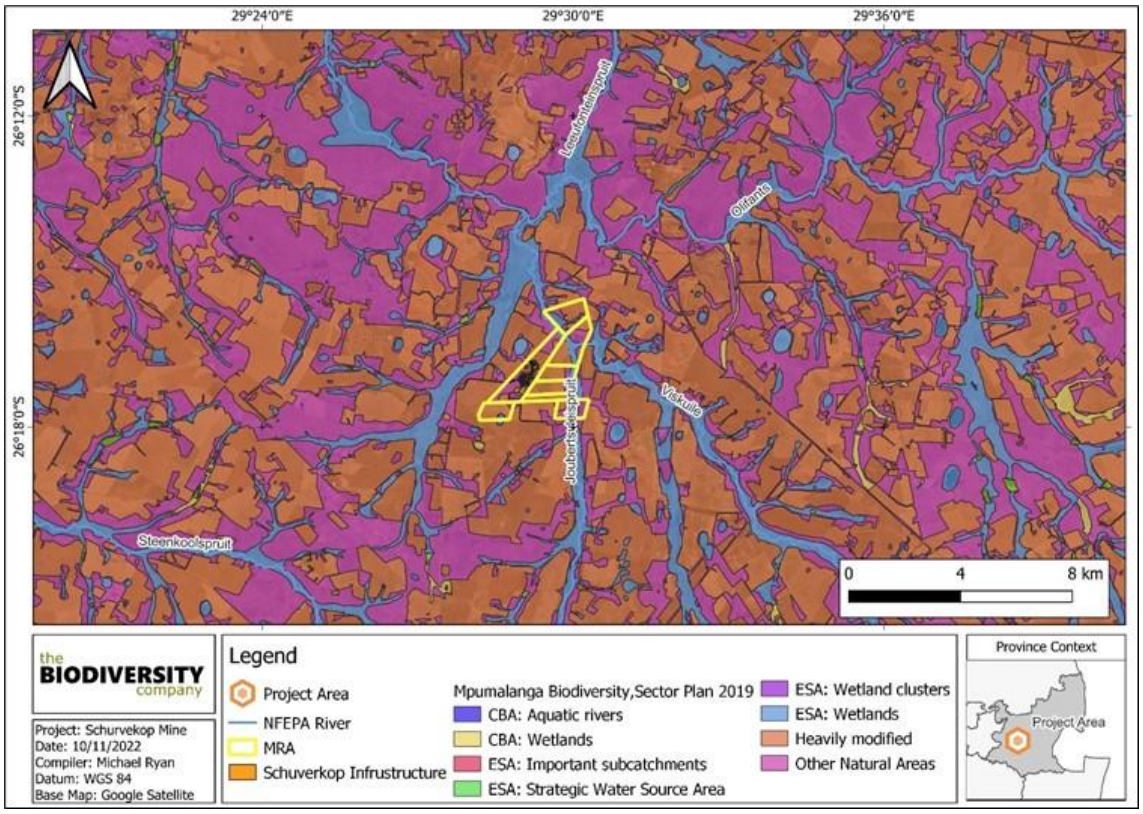


Figure 22: Freshwater CBAs (TBC, 2022b)

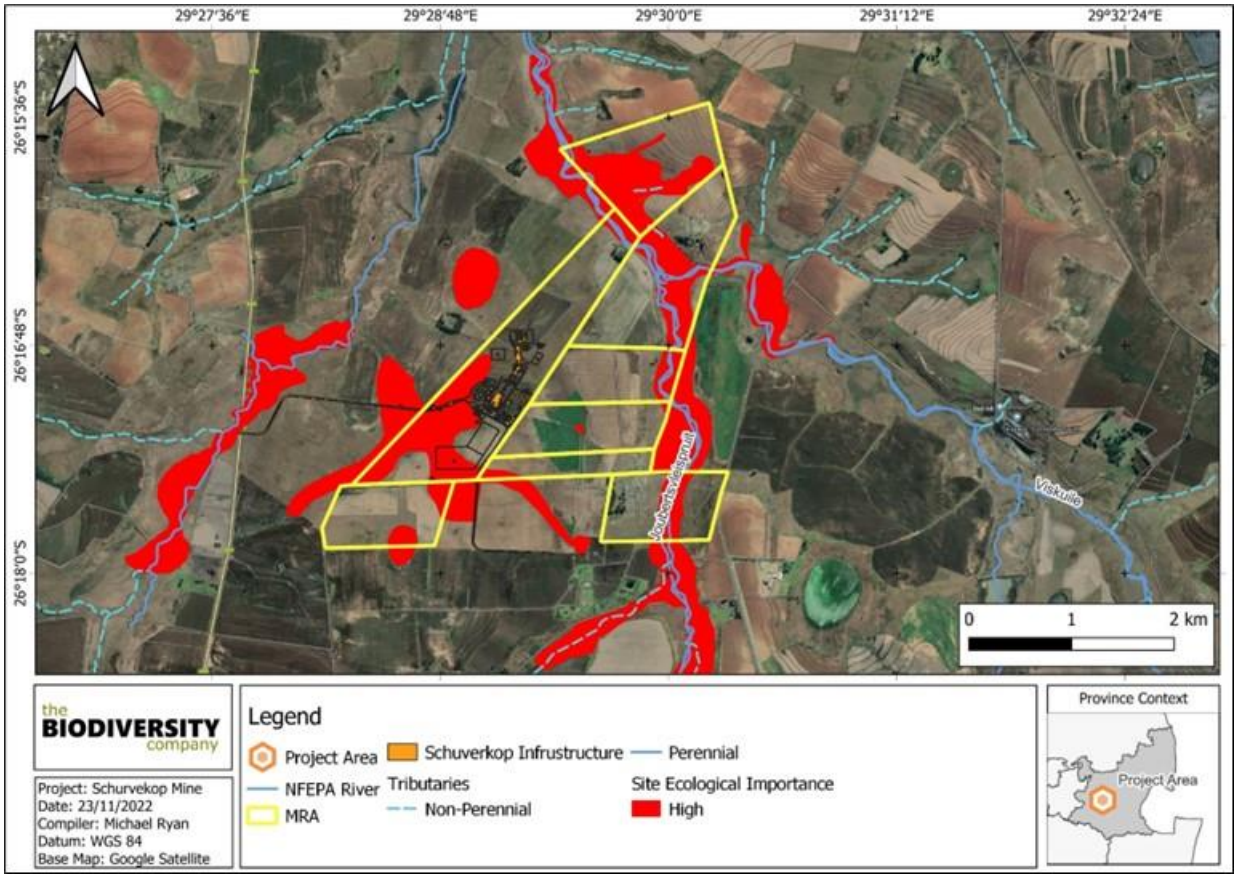


Figure 23: Site Ecological Importance (TBC, 2022b)

Table 23: Summary of results of the aquatic ecosystems assessments (TBC, 2022b)

Sampling Site	Site Description	Sampling Event	Temp (°C)	pH	EC (mS/m)	DO (mg/l)	IHAS	In stream Habitat Integrity Assessment	Riparian Habitat Integrity Assessment	SASS5
SCH1 Viskuile River (Upstream Control site) 26°16'42.03"S 29°30'30.68"E	SCH1 acts as the control site located in the Viskuile River. The site is characterized by slow flowing water over stones and sandy substrate with marginal vegetation limited to grasses. Main impacts from livestock, solid waste, erosion of the riparian area.	**2017**	25.8	7.7	209.5	6.10	51 - Poor	Moderately Modified, C	Largely Modified, D	Largely Modified, D
		2022	20	7.74	613	8.30	49 - Poor	Moderately Modified, C	Moderately Modified, C	Largely Natural - B
SCH2 Joubertsvleispruit (Upstream) 26°17'49.56"S 29°29'58.87"E	SCH2 is located on the Joubertsvleispruit, upstream of the proposed Schurvekop Mining area. The site was characterised by slow flowing waters over stones. Good marginal vegetation is present mainly in the form of grasses. Main impacts from livestock, and solid waste.	**2017**	22.5	7.7	474.0	4.76	51 - Poor	Largely Modified, D	Largely Modified, D	Moderately Modified, C
		2022	19.9	7.67	295	4.70	48 - Poor	Largely Modified, D	Largely Modified, D	Largely Natural - B
SCH3 Viskuile River (Downstream) 26°16'9.98"S	SCH3 is located on the Viskuile River downstream of the proposed Schurvekop mining area. The site was characterised by	**2017**	23.6	7.6	291.0	6.83	48 - Poor	Moderately Modified, C	Largely Modified, D	Moderately Modified, C

Sampling Site	Site Description	Sampling Event	Temp (°C)	pH	EC (mS/m)	DO (mg/l)	IHAS	In stream Habitat Integrity Assessment	Riparian Habitat Integrity Assessment	SASS5
29°29'42.59"E	homogenous habitat with slow flowing water over a sandy substrate, stones and boulder habitats were present but limited. Marginal vegetation was abundant. The riparian habitat was characterised by grass. Main impacts from livestock.	**2022**	19.6	7.78	494	5.50	50 - Poor	Moderately Modified, C	Moderately Modified, C	Largely Natural - B
SCH4 **Tributary of the Viskuile River** 26°17'8.42"S 29°27'45.46"E	The site was added to the tributary as a control site due to the proximity of the associated infrastructure of the MRA. Impacts from livestock and nutrient loading allowing high aquatic vegetation growth.	**2022**	23	8.25	1005	7.30	44 - Poor	Moderately Modified, C	Moderately Modified, C	Largely Modified, D

*Levels that exceed the recommended guideline are indicated in red.

9.8 Wetlands

An aquatic and wetland assessment was undertaken by The Biodiversity Company (TBC) in February 2017 and updated in December 2022 for the proposed MRA. The full report is attached as APPENDIX K 2 and can be referred to for detailed information, the findings of which are summarised below (TBC, 2022b):

- **HGM 1 – Floodplain:** The floodplain wetland is located in the north and along the eastern boundary of the study area. The wetland vegetation was dominated by *Phragmites australis* (Reed) and *Typha capensis* (Bulrush) along the edges of the banks. The banks of the channel were dominated by *Themeda triandra*, *Digitaria* spp and *Sporobolus africana*.
- **HGM 2 – Seepage:** The seepage wetland was found in the northern part of the project area. The wetland was dominated by separated clumps of *Juncus* spp and shorter well grazed grasses. In other areas the dominant grass species was *Pennisetum clandestinum* (Kikuyu grass), which is not regarded as a wetland indicator but the species does invade wetland areas due to grazing and subsequent spread through cattle.
- **HGM 3 – Flat:** The wetland flat was found in the central and south-western regions of the project area. This wetland is generally surrounded by maize fields and even some portions of the wetland had been lost to maize fields. The dominant plant was *Pennisetum clandestinum* (Kikuyu grass). Due to the extent of agricultural activities across the project area, soils have been tilled and ripped which has impacted on the both the vegetation and soil characteristics of the wetlands.
- **HGM 4 – Depressions:** One depression wetland intersects the southern border of the MRA. The depression was characterised by sections of open water and the presence of *Typha capensis*. The wetland was surrounded by maize fields, however, the wetland remained intact and maintained its functionality

A second pan is found west of the MRA; however, within 500m. The pan is used by grazing animals as a watering hole and the only wetland vegetation that could be identified was *Imperata cylindrica* on the edge of the pan.

The seep, flat and floodplain wetlands were assessed to have a Present Ecological Status (PES) of C, being Moderately Modified, whilst the depressions have a PES of B, Largely Natural (Table 24). The wetlands of the study area have been impacted due to the extensive transformation of the catchment to agriculture. This has led to loss of biodiversity, of decreased water quality and modification of natural flow regimes. All the HGM units in the Schurvekop study area showed Moderate (C) levels of importance for the EIS as well as for the hydrological importance. The direct human benefits were rated to be of low importance with a (D) rating (TBC, 2022b).

A comprehensive application of the buffer tool was undertaken considering the in-field findings of the wetland areas (TBC, 2022b). According to the buffer guideline (Macfarlane, et al., 2015) a high risk activity would require a buffer that is 95% effective to reduce the risk of the impact to a low level threat. The recommended buffer zone was determined to be 22 m during the construction phase and 70 m during the operational phase. The largest buffer zone of 70 m is applied for all the phases to ensure wetland protection. However, this is not possible as surface infrastructure will encroach on a wetland flat – see Figure 24.

Table 24: The Ecological characteristics for the Schurvekop Wetlands (TBC, 2022b)

Wetland	HGM	PES	Ecological Importance and Sensitivity (EIS)			Key Ecosystem Services
			Biodiversity	Hydrological	Direct Human	
HGM 1	Floodplain	C: Moderately Modified	Moderate	Moderate	Low	Flood attenuation; Erosion control
HGM 2	Seepage	C: Moderately Modified	Moderate	Moderate	Low	Nitrate and Toxicant assimilation; Erosion control
HGM 3	Flat	C: Moderately Modified	Moderate	Moderate	Low	Phosphate/Nitrate/Toxicant assimilation; Erosion control
HGM 4	Depression	B: Largely Natural	Moderate	Moderate	Low	Erosion control

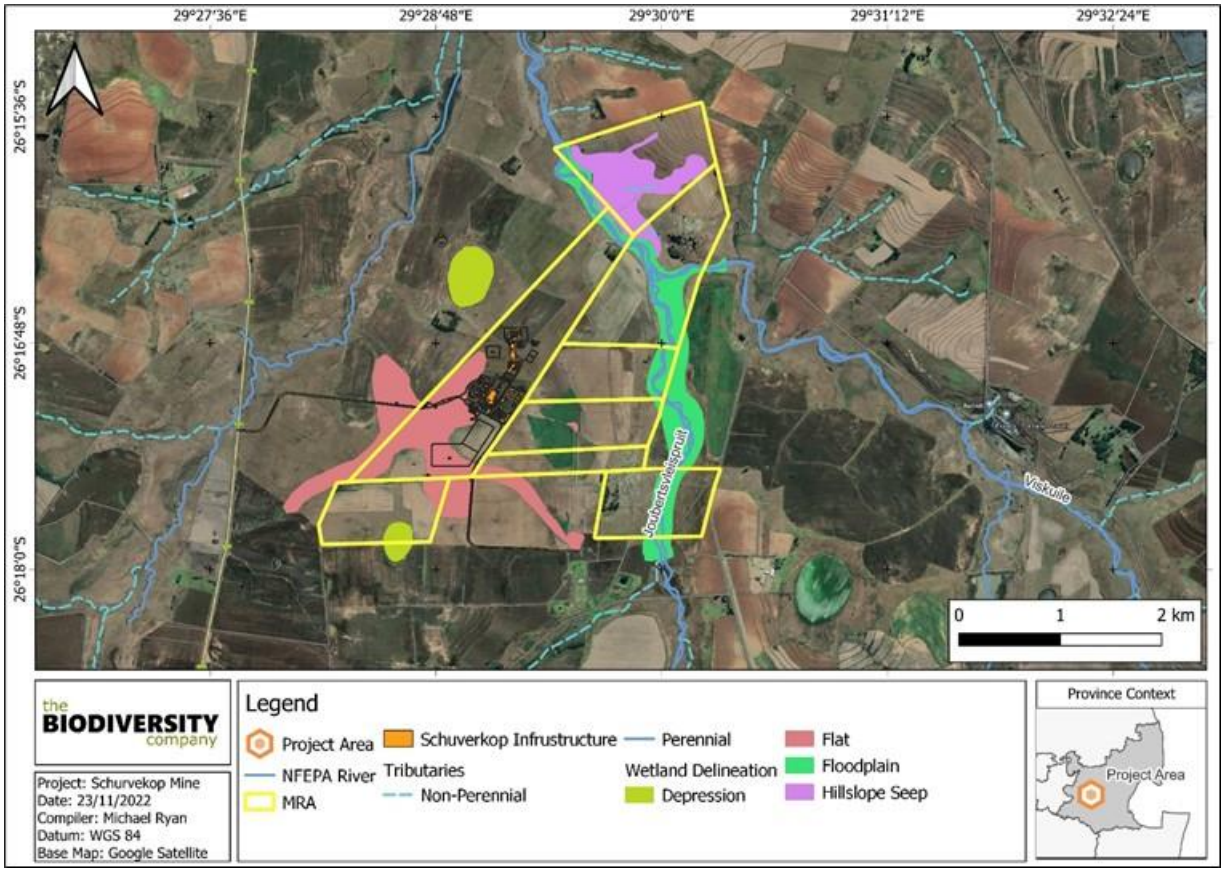


Figure 24: Delineated Wetlands (TBC, 2022b)

9.9 Hydropedology

A hydropedological study was completed for the MRA in 2017 and updated in 2018 (APPENDIX K 3), which found that the soil forms within the MRA all show signs of moisture varying from within 20cm to 100cm. Thus, all these soils are hydrologically linked and functioning as interflow soils, where water moves vertically through the upper profile and then either moves laterally (Longlands) or stays in situ to create redox conditions (Tukulu/Sepane). Only where signs of moisture are within 50cm of surface are these delineated as wetland (TBC, 2018).

It can be seen that these interflow soils are playing a role in feeding water to the wetlands of the area, including the pan to the west, and the stream to the east to a lesser degree.

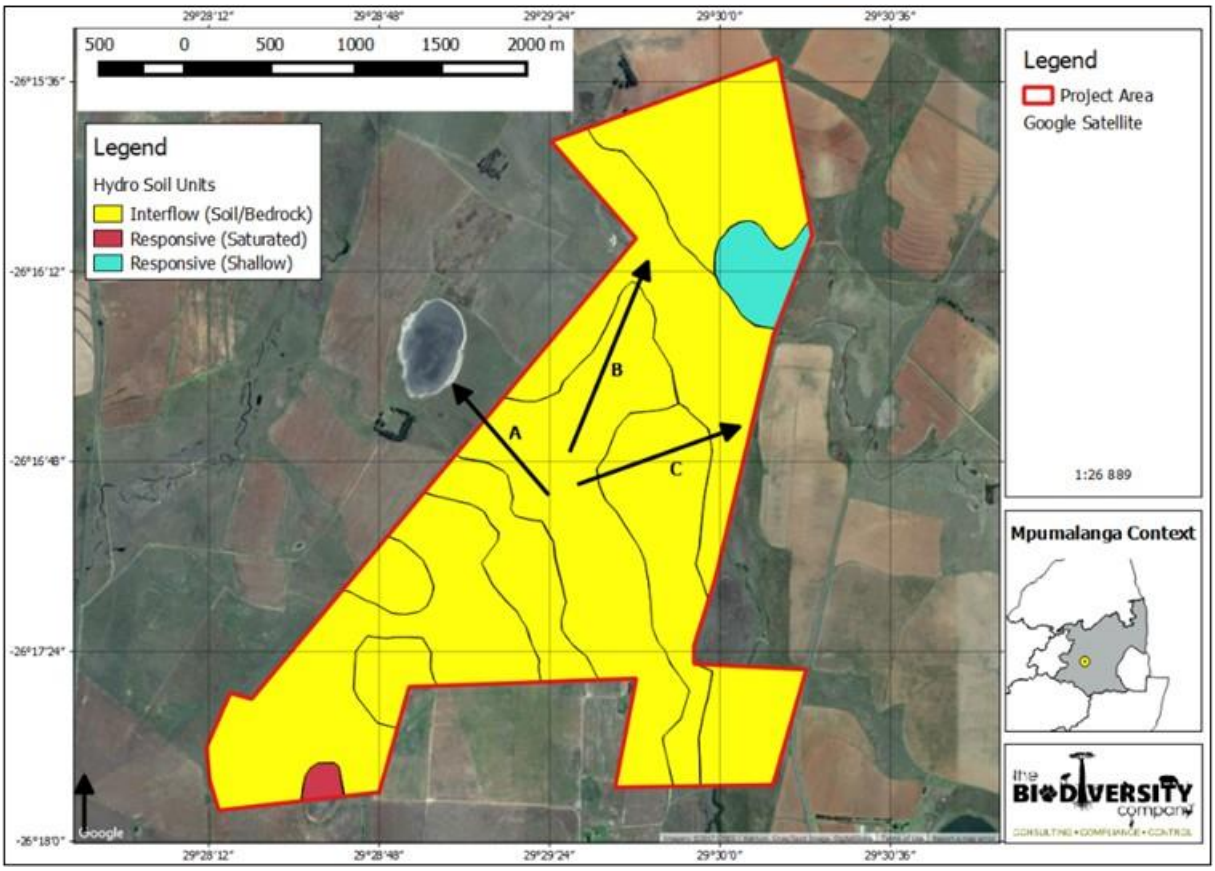


Figure 25: Hydrological Soil Types (TBC, 2018)

9.10 Groundwater

The geohydrological assessment was completed by Future Flow in 2018, refer to APPENDIX K 4.

A hydrocensus was undertaken during April 2017 to identify and document groundwater users in the region (Figure 28). In total 16 boreholes were located in the field, including the five monitoring boreholes drilled for the project.

- Four of the hydrocensus boreholes could not be accessed to measure the depth to groundwater level due to the equipment installed in the boreholes.

- Borehole BH3 that was drilled for monitoring purposes was dry and no groundwater level measurement could be taken.

9.10.1 Groundwater Depth and Flow

Two aquifers occur in the area. These two aquifers are associated with a) the upper weathered material, and b) the underlying competent and fractured rock material.

The results of the hydrocensus show that the measured depth to groundwater level ranges between 2.37 and 11.30 mbgl. It is concluded that the groundwater levels less than 4.3 m are associated with the weathered material aquifer. Where the depth to groundwater level range from 6.5m and deeper, it was considered to represent the groundwater levels in the fractured rock aquifer (Future Flow, 2018).

The weathered material aquifer show a 99% correlation between topographical and groundwater level elevations. Similarly, the fractured rock aquifer shows a 95% correlation between the topographical and groundwater level elevations. These are very high correlations between the groundwater level and topographical elevations, and the correlations are calculated from limited data sets. However, it can be concluded that the groundwater levels in both aquifers mimic topography (Future Flow, 2018).

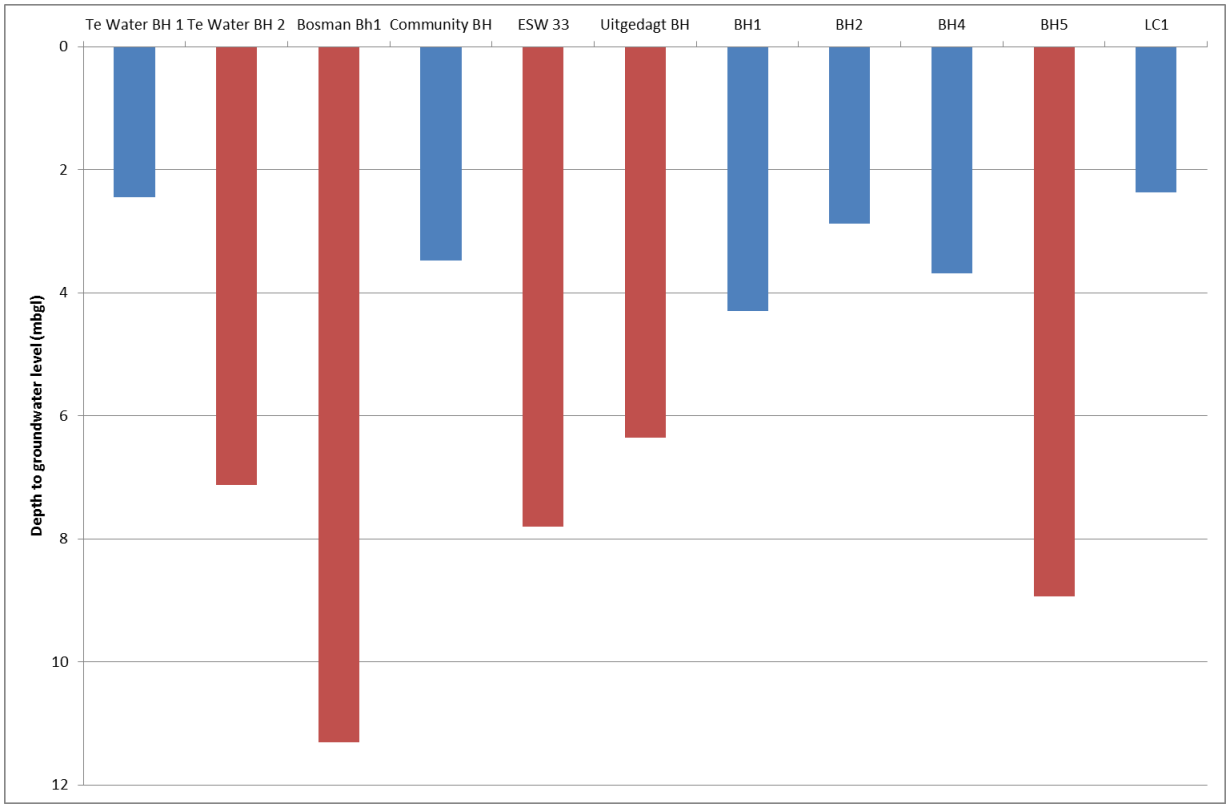


Figure 26: Depth to groundwater level (Future Flow, 2018)

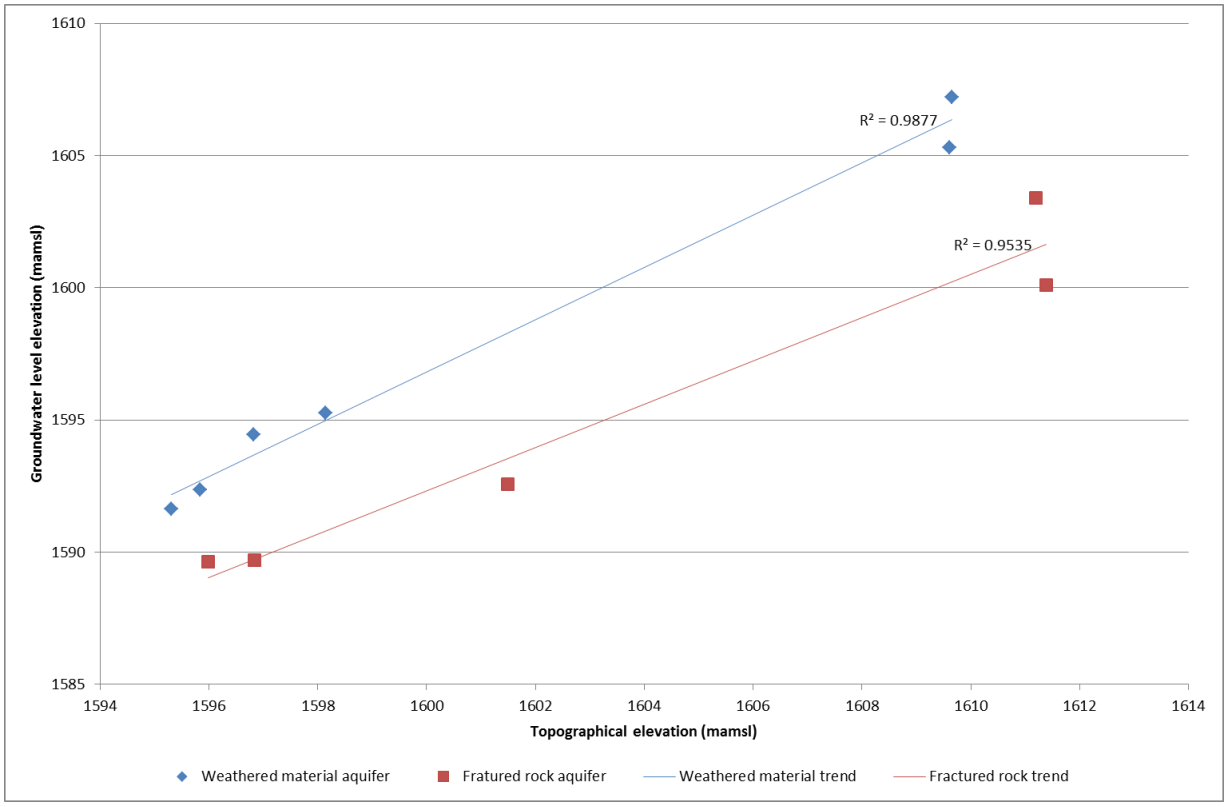


Figure 27: Topographical vs. groundwater elevation plot (Future Flow, 2018)

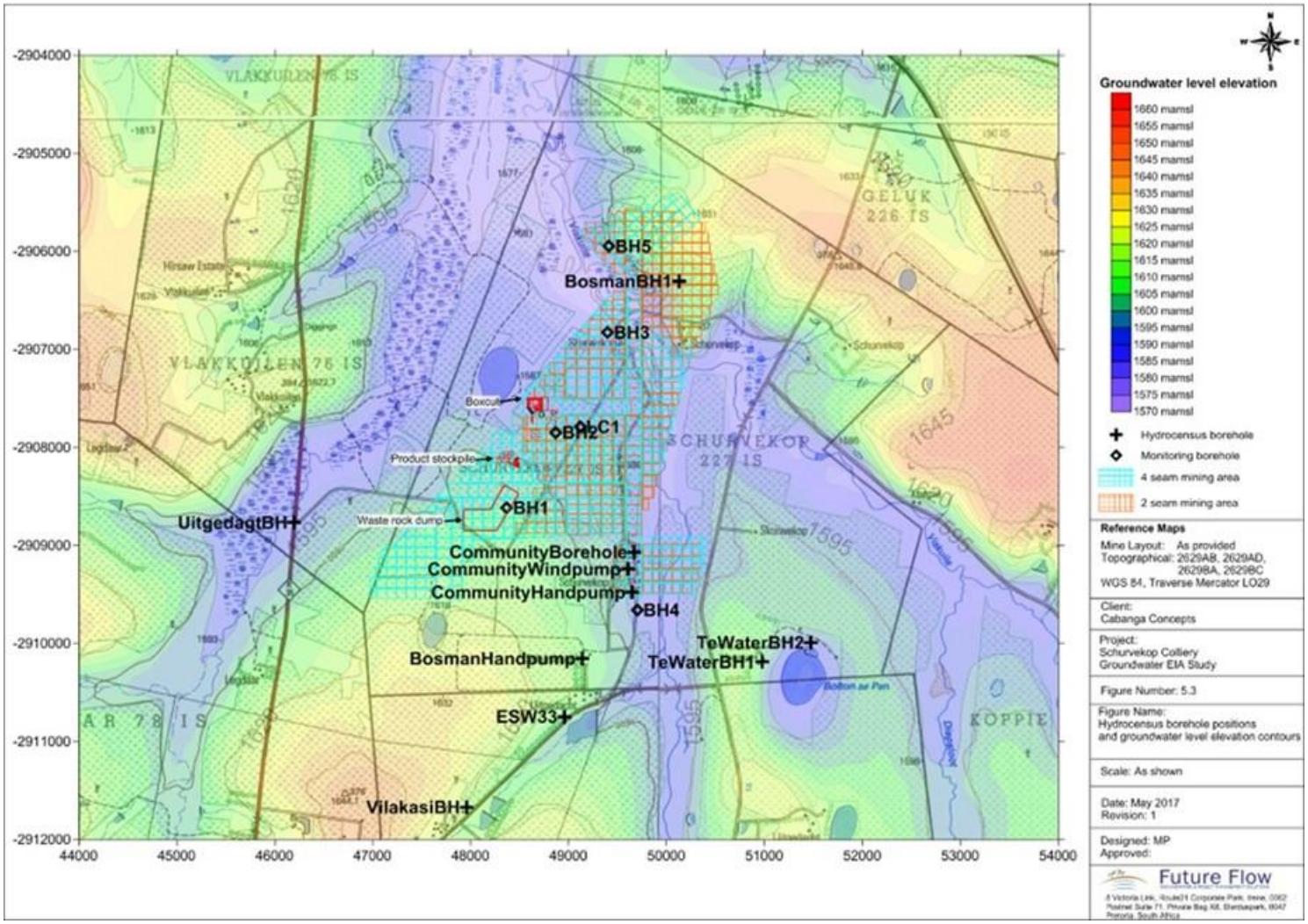


Figure 28: Hydrocensus & groundwater monitoring borehole locations showing groundwater elevation profile (Future Flow, 2018)

Table 25: Hydrocensus results (Future Flow, 2018)

Borehole	Easting	Northing	Elevation	Groundwater level		Owner	Water use
	WGS84, LO29	WGS84, LO29	mamsl	mbgl	mamsl		
Te Water BH1	50 974	-2 910 188	1609.66	2.45	1607.21	Dewald te Water	Pump broken
Te Water BH2	51 475	-2 909 990	1596.84	7.13	1589.71	Dewald te Water	Pump broken
Bosman BH1	50 127	-2 906 303	1611.39	11.30	1600.09	Adolf Bosman	Domestic
Community Borehole	49 672	-2 909 065	1595.84	3.48	1592.36	Community	Monitoring borehole
Community Windpump	49 605	-2 909 241	1597.99	Not accessible		Community	Domestic
Community Handpump	49 651	-2 909 478	1597.33	Not accessible		Community	Domestic
Bosman Handpump	49 141	-2 910 153	1615.66	Not accessible		Adolf Bosman	Domestic
ESW 33	48 956	-2 910 746	1611.2	7.80	1603.40	Adolf Bosman	Monitoring borehole
Vilakasi BH	47 962	-2 911 669	1621.62	Not accessible		Vilakasi Village	Domestic
Uitgedagt BH	46 200	-2 908 766	1595.99	6.35	1589.64	Uitgedagt	Monitoring borehole
BH1	48 370	-2 908 614	1609.61	4.30	1605.31	Mmakau Coal	Monitoring borehole
BH2	48 869	-2 907 847	1598.15	2.88	1595.27	Mmakau Coal	Monitoring borehole
BH3	49 397	-2 906 826	1585.49	Dry		Mmakau Coal	Monitoring borehole
BH4	49 700	-2 909 659	1595.31	3.69	1591.62	Mmakau Coal	Monitoring borehole
BH5	49 412	-2 905 947	1601.49	8.93	1592.56	Mmakau Coal	Monitoring borehole
LC1	49 117	-2 907 789	1596.82	2.37	1594.45	Mmakau Coal	Exploration borehole

9.10.2 Groundwater Quality

The chemical analysis results of the ten groundwater samples taken from the study area (5 from hydrocensus points and 5 from onsite monitoring boreholes) are summarised in Table 27 and are compared to the SANS 241:2015 drinking water standards. The standard represents a numerical limit of the listed element concentrations that will protect the health of the consumer over a lifetime of consumption. All elements that exceed the guidelines are highlighted in the table (Future Flow, 2018).

In general it can be said that the groundwater qualities are quite good and complies with the SANS241:2015 drinking water guidelines. Only some individual element concentrations are slightly elevated in individual samples.

9.10.3 Aquifer Transmissivity

Aquifer tests were performed on 5 of the 6 new boreholes that were drilled (BH1, BH2, BH4, BH5 and LC1). Borehole BH3 was dry and could not be tested. The aquifer test data was analysed to calculate the aquifer transmissivity using the AquiferWin32 software package developed by Environmental Simulations, Inc.

The obtained results for the tested boreholes are summarised in Table 26. From the table it can be seen that the aquifer transmissivities range between 0.1 and around 3 m^2/day. The relatively low transmissivities measured in BH1 and BH2 (around 0.1 m2/day) reflect the general host geology. The relatively higher transmissivities measured from BH4 and BH5 (around 1 m^3/day) represents fracture zones. The highest transmissivity seen in LC1 also reflect a fracture zone, possibly a better developed zone than that seen in BH4 and BH5 (Future Flow, 2018).

These values are typical of the Karoo geology that occurs in the area.

Table 26: Aquifer test results (Future Flow, 2018).

BH ID	Constant rate test				Transmissivity (m^2/day)		
	Pumping Rate (L/s)	Drawdown obtained (m)	Constant Test Period (minutes)	Recovery period (minutes)	Theis	Cooper-Jacob	Hantush
BH1	0.3	29.56	5	150	0.1	0.14	0.12
BH2	0.2	28.18	35	360	0.09	0.1	0.07
BH4	0.5	19.02	1 200	210	1.26	0.91	1.16
BH5	0.8	35.82	1 440	480	0.93	0.96	1.10
LC1	1.5	21.45	1 440	360	2.37	2.84	3.78

According to the aquifer vulnerability map of South Africa, a moderate aquifer vulnerability is present for the project area (Future Flow, 2018).

Table 27: Groundwater chemical analysis results (Future Flow, 2018)

Analysis	Units	SANS 241:2015 guideline value	Te Water BH1	Bosman BH1	Community Borehole	Community Windpump	Bosman handpump	BH1	BH2	BH4	BH5	LC1
pH		≥5 - ≤9.7	7.6	8.18	8.05	8.28	8.48	7.97	8.22	8.28	8.1	8.51
Electrical Conductivity (EC)	mS/m	≤170	63.7	49.7	48.1	30.8	54.7	31.9	41.2	40.7	27.1	56.1
Total Dissolved Solids (TDS)	mg/L	≤1 200	361	269	263	175	322	199	250	278	166	348
Total alkalinity	mg/L $CaCO_3$	N/L	99.7	178	170	156	210	159	207	182	104	298
Calcium (Ca)	mg/L	N/L	45.6	27.8	45.1	29	53.5	8.79	16.5	20.8	16.9	16.2
Potassium (K)	mg/L	N/L	18.2	6.46	9.69	4.42	8.4	6.1	2.18	6.76	3.88	3.69
Magnesium (Mg)	mg/L	N/L	24.8	11.3	15.4	15.5	26	5.94	8.61	7.83	12.2	8.31
Sodium (Na)	mg/L	≤200	29.9	61.8	32.7	19.6	31.8	57.3	69.2	65.7	20.8	111
Chloride (Cl)	mg/L	≤300	68.8	46.4	34.4	4.79	16.3	12.7	19.6	9.52	10.3	21.3
Fluoride (F)	mg/L	≤1.5	0.466	0.298	<0.263	0.301	<0.263	0.584	1.38	0.799	0.351	2.97
Nitrate (NO_3)	mg/L	≤11	23	0.224	2.75	0.346	1.56	0.241	0.253	0.305	6.27	0.242
Phosphate (PO_4)	mg/L	N/L	0.023	0.015	0.019	0.014	0.012	<0.005	<0.005	<0.005	<0.005	<0.005
Sulphate (SO_4)	mg/L	≤500 (health)	10.3	4.9	10.3	4.27	50.7	9.23	4.78	54	9.81	<0.141
Aluminium (Al)	mg/L	≤0.3	<0.002	<0.002	<0.002	<0.002	<0.002	0.39	<0.002	<0.002	<0.002	<0.002
Cadmium (Cd)	mg/L	≤0.003	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002

Analysis	Units	SANS 241:2015 guideline value	Te Water BH1	Bosman BH1	Community Borehole	Community Windpump	Bosman handpump	BH1	BH2	BH4	BH5	LC1
Cobalt (Co)	mg/L	N/L	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Chromium (Cr)	mg/L	≤0.05	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Copper (Cu)	mg/L	≤2	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Iron (Fe)	mg/L	≤2 (health)	<0.004	<0.004	<0.004	<0.004	<0.004	0.158	0.489	<0.004	<0.004	<0.004
Manganese (Mn)	mg/L	≤0.4 (health)	<0.001	0.047	<0.001	<0.001	<0.001	0.3	0.243	<0.001	<0.001	<0.001
Nickel	mg/L	≤0.07	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Lead (Pb)	mg/L	≤0.01	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Zinc (Zn)	mg/L	≤5	5.26	<0.002	0.224	0.574	0.17	<0.002	<0.002	<0.002	<0.002	<0.002
Total Hardness	mg/L $CaCO_3$	N/L	216	116	176	136	240	46	77	84	92	75

Exceed SANS241:2015 guideline values

N/L = No guideline specified

9.10.4 Geochemical Analysis and Waste Assessment Characteristics

The testing that was done on the material complies with the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) Waste Classification Regulations. Six rock samples were collected from the project area to represent the typical lithologies encountered in the area (Table 28). Total Concentration (TC) testing, Leach Concentration (LC) testing and Acid-Base-Accounting (ABA) testing was done. The coal and waste material that will be handled on site was classified as Type 3 Waste following the GN 635 classification system due to the results summarised below.

Table 28: Sample description for geochemical analysis (Future Flow, 2018)

Sample ID	Lithology
BH5 (carbonaceous shale)	Carbonaceous shale
BH4 (carbonaceous shale)	Carbonaceous shale
BH5 (coal seam)	Coal seam
BH1 (carbonaceous shale)	Carbonaceous shale
LC1 (carbonaceous)	Carbonaceous shale
LC1 (coal seam)	Coal seam

Total Concentration: Barium and fluoride exceed the TCT0 in all of the samples; and lead, manganese and antimony exceed the TCT0 guidelines in some of the samples. All the samples comply with the TCT1 guidelines. See Table 29.

Leach Concentration: With the exception of sample "LC1 Carbonaceous", all the elements comply with the LCT0 guidelines. Sample "LC1 Carbonaceous" show slightly elevated concentrations of arsenic, lead and fluoride that exceed the LCT0 guideline values. See Table 30.

ABA: In terms of the net neutralisation potential, all the samples fall within the "uncertain" range of between -20 and 20. The neutralisation potential ratio of all the samples except "LC1 coal" is less than 1:1. Sample "LC1 coal" has a NPR of just above 1:1. In general the total sulphur percentage ranges between 0.22 and 1.22 %. Only "LC1 Carbonaceous" shows an anomalously low value of 0.07 %. Comparing the test results to the guidelines, the sulphide percentages are above 0.3 % while the NPR is below 1:1. See Table 31.

It is concluded that both the waste rock and the coal seam material that will be handled on site is likely to be AMD generating. Once the acid conditions have formed it is likely to be sustained for a prolonged period of time due to the high sulphide percentage (Future Flow, 2018).

Table 29: Total concentration test results compared to TCT guideline values (Future Flow, 2018)

Constituent	Units	TCT Guidelines Values			BH5 Carbonaceous	BH4 Carbonaceous	BH5 Coal seam	BH1 Carbonaceous	LC1 Carbonaceous	LC1 Coal seam
		TCT0	TCT1	TCT2						
Arsenic (As)	mg/kg	5.8	500	2 000	<4.00	<4.00	4.80	<4.00	<4.00	8.80
Boron (B)	mg/kg	150	15 000	60 000	<10	<10	47	<10	<10	30
Barium (Ba)	mg/kg	62.5	6 250	25 000	452	379	337	724	572	261
Cadmium (Cd)	mg/kg	7.5	260	1 040	2.40	4.80	1.60	7.60	7.20	<1.20
Cobalt (Co)	mg/kg	50	5 000	20 000	26	29	12	21	43	6.40
Total Chromium (Cr)	mg/kg	46 000	800 000	N/A	229	277	36	65	116	24
Copper (Cu)	mg/kg	16	19 500	78 000	5.60	<4.00	<4.00	<4.00	16	<4.00
Mercury (Hg)	mg/kg	0.93	160	640	<0.400	<0.400	<0.400	<0.400	<0.400	0.400
Manganese (Mn)	mg/kg	1 000	25 000	100 000	36	145	72	424	1 132	178
Molybdenum (Mo)	mg/kg	40	1 000	4 000	<10	<10	<10	<10	<10	<10
Nickel (Ni)	mg/kg	91	10 600	42 400	53	78	22	29	67	12
Lead (Pb)	mg/kg	20	1 900	7 600	27	34	37	20	27	<4.00
Antimony(Sb)	mg/kg	10	75	300	<8.00	<8.00	<8.00	<8.00	<8.00	<8.00
Selenium (Se)	mg/kg	10	50	200	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00
Vanadium (V)	mg/kg	150	2 680	10 720	119	116	37	67	110	<10
Zinc (Zn)	mg/kg	240	160 000	640 000	122	110	15	104	146	42
Chromium (VI)	mg/kg	6.5	500	2 000	<5	<5	<5	<5	<5	<5
Total Fluoride (F)	mg/kg	100	10 000	40 000	259	205	161	775	873	161
Total Cyanide (CN)	mg/kg	14	10 500	42 000	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

Constituent	Units	TCT Guidelines Values			BH5 Carbonaceous	BH4 Carbonaceous	BH5 Coal seam	BH1 Carbonaceous	LC1 Carbonaceous	LC1 Coal seam
		TCT0	TCT1	TCT2						
	Exceed TCT0 guideline value									

Table 30: Leachable concentration test results compared to LCT guideline values (Future Flow, 2018)

Constituent	Units	LCT Guidelines Values				BH5 Carbonaceous	BH4 Carbonaceous	BH5 Coal seam	BH1 Carbonaceous	LC1 Carbonaceous	LC1 Coal seam
		LCT0	LCT1	LCT2	LCT3						
Arsenic (As)	mg/L	0.01	0.5	1	4	<0.010	<0.010	<0.010	<0.010	0.012	<0.010
Boron (B)	mg/L	0.5	25	50	200	<0.025	0.060	<0.025	<0.025	0.107	0.057
Barium (Ba)	mg/L	0.7	35	70	280	0.111	0.033	0.167	0.072	0.508	0.099
Cadmium (Cd)	mg/L	0.003	0.15	0.3	1.2	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Cobalt (Co)	mg/L	0.5	25	50	200	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025
Total Chromium (Cr)	mg/L	0.1	5	10	40	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025
Chromium VI (Cr^{6+})	mg/L	0.05	2.5	5	20	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Copper (Cu)	mg/L	2.0	100	200	800	<0.025	<0.025	<0.025	<0.025	0.014	<0.025
Mercury (Hg)	mg/L	0.006	0.3	0.6	2.4	<0.001	<0.001	<0.001	<0.001	<0.001	0.005
Manganese (Mn)	mg/L	0.5	25	50	200	<0.025	<0.025	<0.025	0.041	0.177	<0.025
Molybdenum (Mo)	mg/L	0.07	3.5	7	28	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025
Nickel (Ni)	mg/L	0.07	3.5	7	28	<0.025	<0.025	<0.025	<0.025	0.031	<0.025
Lead (Pb)	mg/L	0.01	0.5	1	4	<0.010	<0.010	<0.010	<0.010	0.014	<0.010
Antimony (Sb)	mg//L	0.02	1.0	2	8	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010

Constituent	Units	LCT Guidelines Values				BH5 Carbonaceous	BH4 Carbonaceous	BH5 Coal seam	BH1 Carbonaceous	LC1 Carbonaceous	LC1 Coal seam
		LCT0	LCT1	LCT2	LCT3						
Selenium (Se)	mg/L	0.01	0.5	1	4	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Vanadium (V)	mg/L	0.2	10	20	80	<0.025	<0.025	<0.025	<0.025	0.028	<0.025
Zinc (Zn)	mg/L	5.0	250	500	2 000	<0.025	<0.025	<0.025	<0.025	0.049	<0.025
Total dissolved solids (TDS)	mg/L	1 000	12 500	25 000	100 000	64	98	42	58	40	32
Chloride (Cl)	mg/L	300	15 000	30 000	120 000	<2	<2	2	<2	2	2
Sulphate (SO_4)	mg/L	250	12 500	25 000	100 000	9	23	10	13	6	6
Nitrate (NO_3)	mg/L	11	550	1 100	4 400	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoride (F)	mg/L	1.5	75	150	600	0.3	0.7	<0.2	0.3	2.0	0.4
Total cyanide (CN)	mg/L	0.07	3.5	7	28	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Exceed LCT0 guideline value										

Table 31: ABA test results (Future Flow, 2018)

Sample	Paste pH	Total Sulphur %	Acid Potential (AP) (kg/t)	Neutralisation potential (NP)	Net Neutralisation Potential (NNP)	Neutralising Potential Ratio (NPR) (NP:AP)	Rock Type
BH5 Carbonaceous	7.7	0.22	6.88	3.66	-3.22	0.532	II
BH4 Carbonaceous	7.9	0.47	15	2.43	-12	0.165	I
BH5 Coal	7.6	0.85	27	21	-5.18	0.805	I
BH1 Carbonaceous	7.7	0.31	9.69	3.40	-6.29	0.351	I
LC1 Carbonaceous	8.2	0.07	2.19	-1.45	-3.64	0.663	II
LC1 Coal	7.7	1.22	38	40	1.67	1.04	I

9.10.5 Numerical Groundwater Model

The baseline data was analysed and compiled into a conceptual model which is summarised as follows:

- Two aquifers occur in the area. These two aquifers are associated with the upper weathered material, and the underlying competent and fractured rock material. The upper aquifer has an average depth of approximately 4.33 m.
- Groundwater flow in the lower fractured aquifer is associated with the secondary fracturing in the competent rock and as such will be along discrete pathways associated with the fractures. Faults and fractures in the sandstone and shale can be a significant source of groundwater depending on whether the fractures have been filled with secondary mineralisation.
- Analysis of the depth to groundwater level data show that there is a slight disconnect between the weathered material and the fractured rock aquifers. Depth to groundwater level in the weathered material aquifer extend to 4.3 mbgl, while the groundwater levels in the fractured rock aquifer range from 6.5 mbgl and deeper. Groundwater flow patterns generally mimic topography in the study area.
- It is considered that effectively 1 to 2% of the mean annual rainfall eventually reaches the groundwater table after taking into account evaporation, transpiration and seasonal variance in rainfall (Future Flow, 2018).

Refer to Section 11.3.5.2 for the modelled pollution plume.

9.11 Terrestrial Biodiversity

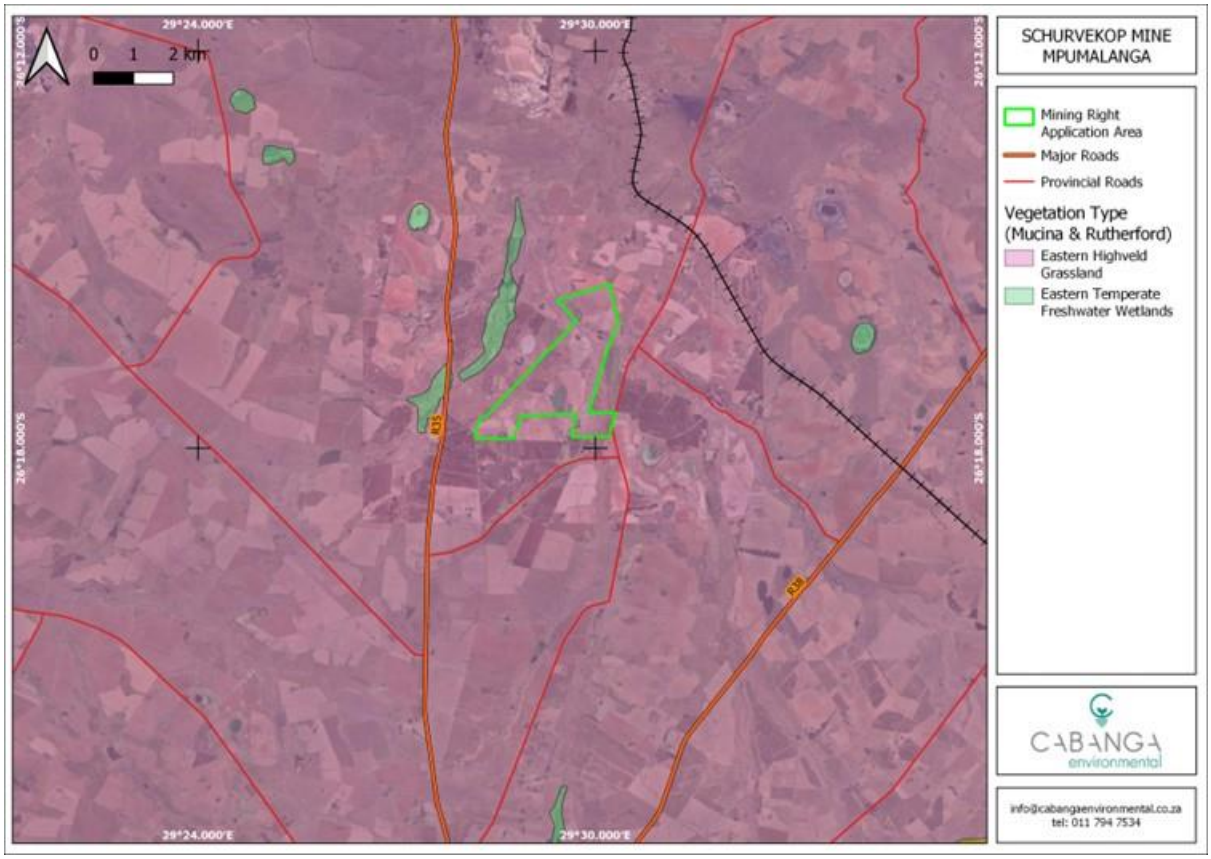
A terrestrial biodiversity survey was undertaken by The Biodiversity Company (TBC) in associated with Enviro Insight in 2017, with follow up survey conducted in October 2022. The full report, and its addendum (2022) can be referred to for detailed information (APPENDIX K 5), the findings of which are summarised below.

9.11.1 Flora

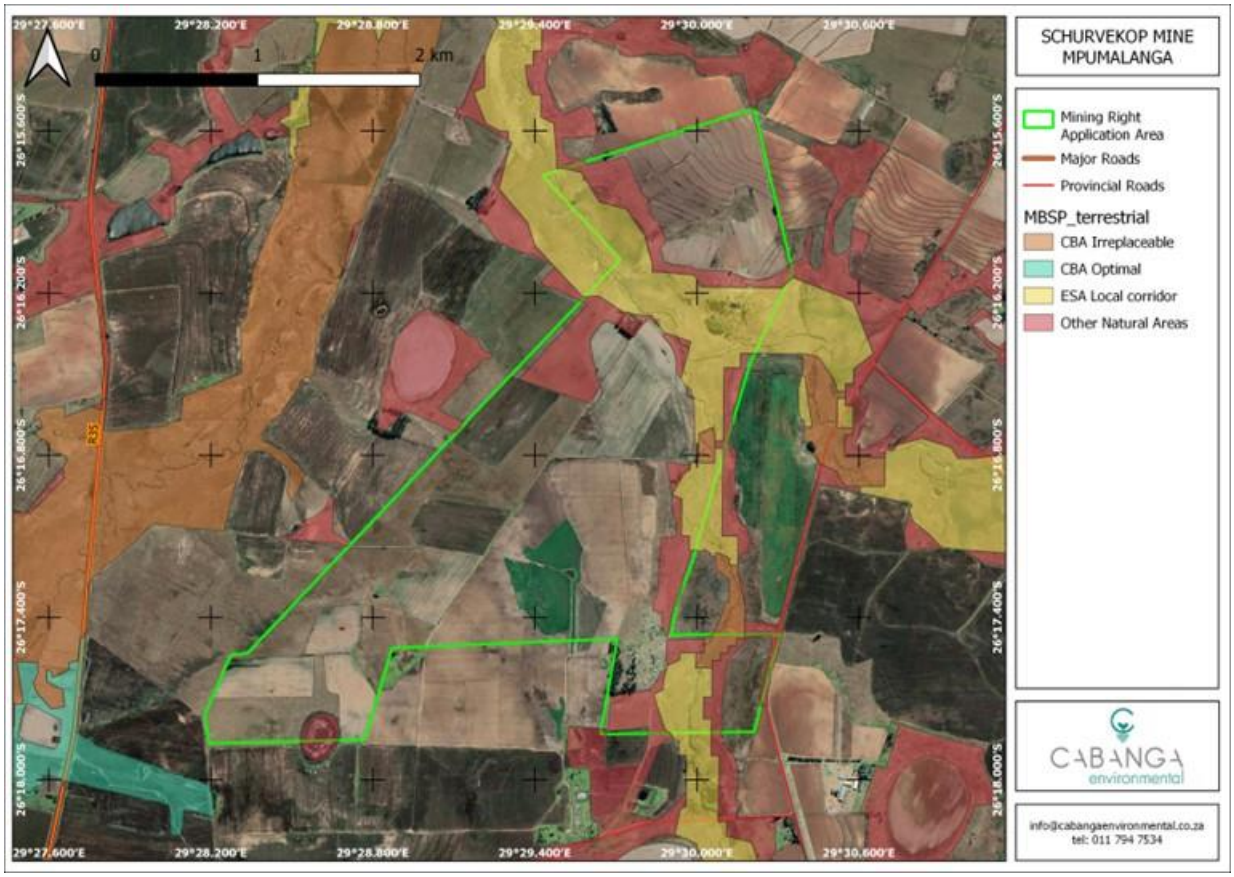
The proposed MRA is located within the Eastern Highveld Grassland national vegetation type of the Mesic Highveld Grassland Bioregion – see Plan 7 (Mucina & Rutherford, 2006). The Eastern Highveld Grassland is listed as Endangered on the revised national list of threatened ecosystems for South Africa (DFFE, 2022) and is characterised by slight to moderately undulating plains consisting of low hills and pan depressions with scattered rocky outcrops.

According to the terrestrial MBSP (MTPA, 2014), the MRA largely consists of modified areas due to cultivation; however some area of ecological significance are present (TBC, 2017a). Local Ecological Support Areas (ESA's) total approximately 14% of the site and which are associated with the river and floodplain wetlands. Similarly, parts of this habitat are mapped as a Critical Biodiversity Area (CBA) with Irreplaceable status, where this constitutes only 1% of the proposed MRA (Plan 8). No formally protected areas occur on site. No surface infrastructure is proposed in any ESA or CBA area.

According to the Mining and Biodiversity Guideline (SANBI, 2012), the proposed MRA is characterised by areas of Moderate and Highest Biodiversity Importance, which are mostly associated with the wetlands, rocky habitats and areas of less agriculture disturbance.



Plan 7: Vegetation Type



Plan 8: The Schurvekop MRA and provincial biodiversity areas of importance

9.11.1.1 On-site Habitat and Vegetation Composition

Eight different habitat types were delineated within the Project area as summarised in Table 32 below. Site surveys place emphasis on the natural habitats and therefore habitats with a higher potential of hosting species of conservation concern (SCC); including the Rocky outcrops and Mesic grassland as well as the river and wetland habitats. The remaining habitats were surveyed briefly and time was mostly spent looking for obvious variation and/or areas of interest within these habitats (TBC, 2017, updated 2018).

A total of 190 plant species were recorded during the dual season surveys, the bulk of which were recorded during the wet season. The list of plant species recorded to date is therefore not comprehensive and repeated surveys during different phenological periods will likely yield up to 30% additional floral species for the study area. However, floristic analysis conducted to date is regarded as a sound representation of the local flora for the Project area (TBC, 2017, updated 2018).

The current impacts observed include:

- Commercial crop production;
- Fences;
- Overgrazing and trampling of veld by livestock;
- Farm roads;

- Artificial impoundments and berms;
- Artificial sub-surface drainage in agricultural fields;
- Farmsteads and houses;
- Riparian degradation due to overgrazing and bank trampling;
- Alien and/or Invasive Plants (AIP);
- Water contamination;
- Vegetation removal;
- Refuse dumping; and
- Erosion.

9.11.1.2 Species of Conservation Concern (SCC)

At least three nationally recognised Red Data plant species are expected within and/or surrounding the Schurvekop MRA, and there is a moderate likelihood that various others may be present. These species, their habitat requirements and national conservation status are given in Table 33.

In addition, three plant species provincially protected in terms of the Mpumalanga Nature Conservation Act, 1998 (No. 10 of 1998) were recorded and includes:

- *Eucomis* sp. (recorded along the *River* habitat),
- *Gladiolus sericeovillosus* subsp. *calvatus* (single specimen recorded within the *River* habitat) and
- *Haemanthus humilis* subsp. *hirsitus* (numerous specimens recorded throughout the *Rocky outcrops* habitat).

Table 32: Brief description of the eight habitat types within the MRA (TBC, 2017, updated 2018)

Habitat type & area (ha)	Summary Description	Sensitivity
Rocky outcrop 11.1 ha	Consists of large boulders interspersed with grassy and rocky slopes which are: largely limited to a single large area on the north-eastern section of the study area; natural with some disturbance due to grazing; 51% of the medicinal plants recorded on the Schurvekop Mine study area are associated with the Rocky outcrops of which 23% were recorded exclusively within this habitat. No SCC were recorded; however some are expected to occur.	Very High
River 7.54 ha	Two rivers transect the Schurvekop Mine study area, namely the Viskuile River and the Joubertsvleispruit. Typical flora species recorded on the banks of these rivers include *Imperata cylindrica*, species of the genus *Paspalum*, Milkweed (*Euphorbia striata)*, Shrubby milkweed (*Gomphocarpus fruticosus),* River milkweed (*Gomphocarpus rivularis*), and the alien plants namely Spotted knotweed (*Persicaria lapathifolia*) and Weeping willow (*Salix babylonica)*.	Very High
Wetland 305.55 ha	Wetlands are extensive within the study area. Typical flora species recorded within this habitat type include Reed Mace (*Typha capensis)*, *Phragmites australis*, Sedge-leaved broom grass (*Miscanthus junceus*), Finger sedge (*Eleocharis dregeana*), Coarse Oxygen Weed (*Lagarosiphon major)*, *Limosella maior* and Buttercups (*Ranunculus* sp.).	Very high
Mesic grassland 85.27 ha	Habitat varies considerably in condition largely due to grazing pressure. This habitat is continuous and inclusive of the wetland habitat. 65% of the medicinal plants recorded are associated with the Mesic grasslands of which 20% were exclusively found within this habitat.	High
Agricultural field, 224.77 ha	Contains the commercial crop fields mostly maize and soybeans.	Very Low
Old lands 43.61 ha	This habitat consists of planted grassland pastures on old agricultural lands. These areas range from monoculture grass stands of Weeping love grass (*Eragrostis curvula*) to areas of recovering primary to early secondary grassland that resemble plant associations found within the *Mesic grassland* habitat.	Low
Transformed 13.56 ha	This habitat type represents all of the farm infrastructure and includes houses, barns, feedlots, camps etc. Most of the alien and/or invasive species recorded on the Schurvekop Mine study area were limited to this habitat type and includes Bluegums (*Eucalyptus* spp.), Pines (*Pinus* spp.), Acorn Tree (*Quercus robur)*, False Acacia (*Robinia pseudoacacia)*, Four-o'clocks (*Mirabilis jalapa*), Agaves (*Agave* spp.), *Datura* spp. and Prickly Pear (*Opuntia ficus-indica)*.	Very Low

Habitat type & area (ha)	Summary Description	Sensitivity
Woodland 5.8 ha	This habitat type is limited to two small sections on the Schurvekop Mine study area and consist of semi-closed tall alien trees of the genus' *Populus*, *Eucalyptus* and *Quercus*.	Very Low

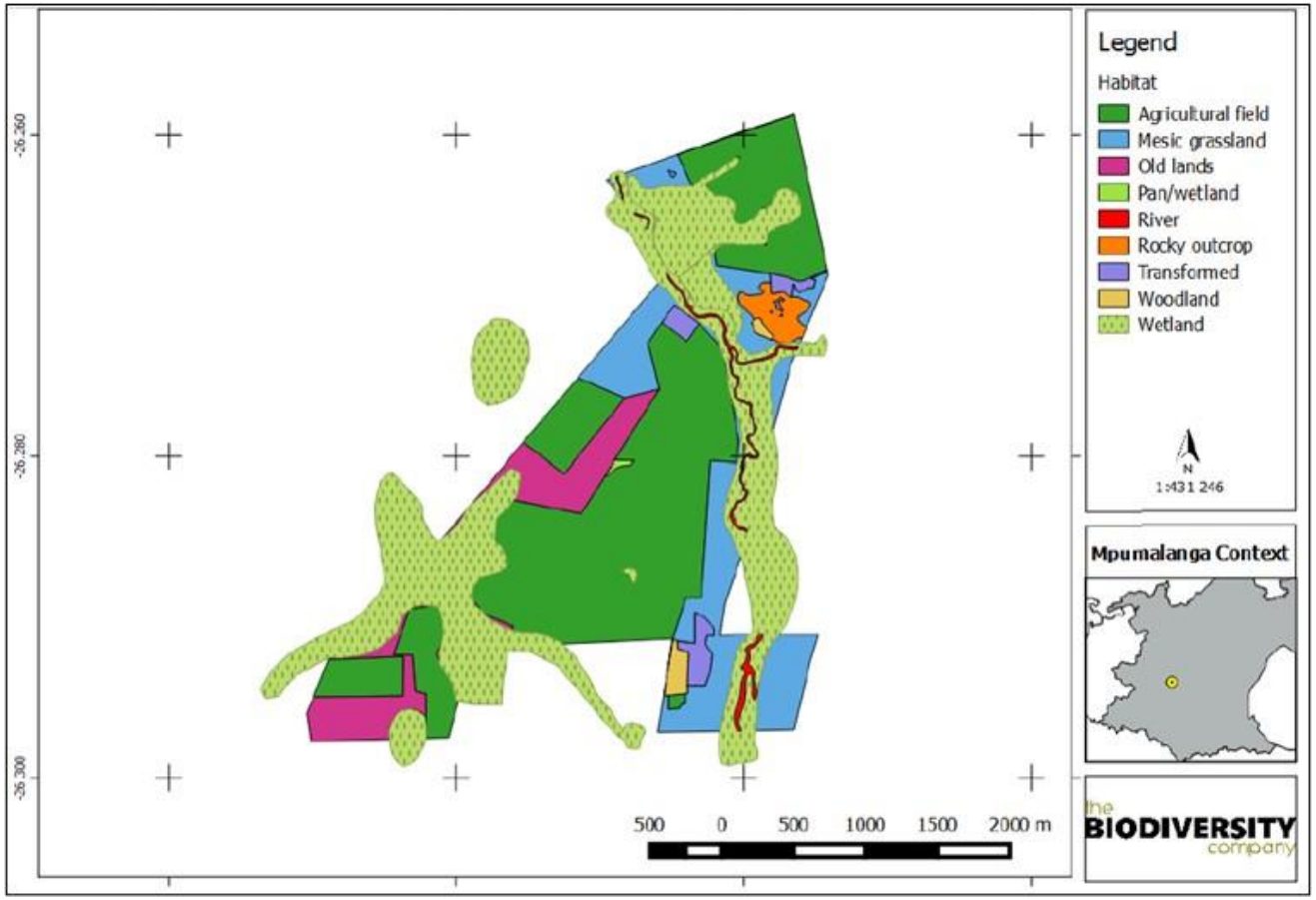


Figure 29: Habitat Map for the Schurvekop MRA (TBC, 2017, updated 2018)

Table 33: Expected flora SCC for the Schurvekop MRA (TBC, 2017, updated 2018)

Family	Species	Status	Habitat
ASPARAGACEAE	*Asparagus fractiflexus*	Endangered	High-altitude, open grasslands on rocky outcrops or among boulders
FABACEAE	*Argyrolobium campicola*	Near Threatened	Highveld grassland
AIZOACEAE	*Khadia carolinensis*	Vulnerable	Well-drained, sandy loam soils among rocky outcrops, or at the edge of sandstone sheets, Highveld grassland, 170 m

9.11.1.3 Alien Invasive Species

Thirty eight (38) alien and/or invasive plants were recorded during the surveys (Table 34).

Table 34: Alien and invasive flora species for the Schurvekop Mine study area

Common name	Species	Invasive	CARA Category[5]
Fog grass	*Agrostis montevidensis*		
Amaranth	*Amaranthus* sp.		
Black-jack	*Bidens pilosa*		
Rescue grass	*Bromus catharticus*		
Pompom weed	*Campuloclinium macrocephalum*	Yes	Category 1
Common thistle	*Cirsium vulgare*	Yes	Category 1
Flax-leaf fleabane	*Conyza bonariensis*		
	Crepis hypochaeridea		
Yellow dodder	*Cuscuta campestris*		Category 1
Long spined thorn apple	*Datura ferox*	Yes	Category 1
Devil's trumpet	*Datura inoxia*		Category 1
Jimson weed	*Datura stramonium*	Yes	Category 1
River red gum	*Eucalyptus camaldulensis*	Yes	Category 2
Bachelor's button	*Gomphrena celosioides*		
Bladder weed	*Hibiscus trionum*		

[5] Conservation of Agriculture Resources Act 1983 (Act 43 of 1983) - Category 1: Invader plants must be removed & destroyed immediately. No trade in these plants; Category 2: Invader plants may be grown under controlled conditions in permitted zones. No trade in these plants; Category 3: Invader plants may no longer be propagated or sold. Existing plants do not need to be removed.

Common name	Species	Invasive	CARA Category[5]
Common morning-glory	*Ipomoea purpurea*	Yes	Category 3
Four o'clock flower	*Mirabilis jalapa*		
White evening primrose	*Oenothera tetraptera*		
Prickly pear	*Opuntia ficus-indica*	Yes	
Creeping sorrel	*Oxalis corniculata*		
Paspalum	*Paspalum dilatatum*		
Kikuyu grass	*Pennisetum clandestinum*	Yes	
Spotted knotweed	*Persicaria lapathifolia*		
Gooseberry	*Physalis angulata*		
Pine	*Pinus* sp.	Yes	Category 2
Common plantain	*Plantago major*		
Poplar	*Populus* sp.	Yes	Category 2
Jersey cudweed	*Pseudognaphalium luteo-album*		
Oak	*Quercus robur*		
Tropical Mexican clover	*Richardia brasiliensis*		
False acacia	*Robinia pseudoacacia*	Yes	Category 2
Weeping willow	*Salix babylonica var. babylonica*		Category 2
Dwarf marigold	*Schkuhria pinnata*		
Common sow-thistle	*Sonchus asper subsp. asper*		
Marigold	*Tagetes minuta*		
Dandelion	*Taraxacum officinale*		
Purpletop	*Verbena bonariensis*	Yes	
Rough cocklebur	*Xanthium strumarium*	Yes	Category 1

9.11.2 Fauna

9.11.2.1 Mammals

The complete list of mammals, their conservation status, TOPS status, method of acquisition, sensitivity (local and regionally) and season of acquisition is detailed in the Biodiversity Report (TBC, 2017, updated 2018)) attached in APPENDIX K 5.

In total, 29 mammal species were recorded during the two survey periods, which represent strong evidence of significant, reasonably diverse and functional mammal assemblage in the study area. Furthermore, seven mammal SCC were recorded with another three species considered highly likely to occur (Table 35).

The natural vegetation areas are of high sensitivity but are highly fragmented by agriculture and the road network development. The *Rocky outcrops*, *Mesic grassland*, *Pans/wetlands* and *Rivers* habitats have not been ploughed/transformed and are therefore considered to be less disturbed and in a better ecological condition. The connected nature of the corridor areas (for migration of mammals between their home ranges) promote gene flow and maintenance of population integrity.

One of the major threats affecting the assemblages and the movement of mammals is the continued effects of haul roads and vehicle traffic and appropriate mitigations should be applied in order to maintain and preserve the existing sensitive habitats for mammals which form a portion of the greater natural system in the region (TBC, 2017, updated 2018).

Table 35: Expected mammal SCC for the Schurvekop Mine study area (TBC, 2017, updated 2018)

Family	Genus	Species	Common name	Status
BOVIDAE	*Ourebia*	*ourebi*	Oribi	EN[6]
BOVIDAE	*Redunca*	*andinum*	Southern Reedbuck	Tops Protected
ERINACEIDAE	*Atelerix*	*frontalis*	Southern African Hedgehog	NT
NESOMYIDAE	*Mystromys*	*Albicaudatus*	White-tailed Rat	EN
FELIDAE	*Leptailurus*	*serval*	Serval	NT
HYAENIDAE	*Parahyaena*	*brunnea*	Brown Hyena	NT
MUSTELIDAE	*Mellivora*	*capensis*	Honey Badger	TOPS Protected
MUSTELIDAE	*Ictonyx*	striatus	African Weasel	NT
MUSTELIDAE	*Aonyx*	*capensis*	African Clawless Otter	NT
CHRYSOCHLORIDAE	*Amblysomus s*	*septentrionale*	Highveld Golden Mole	NT
CANIDAE	*Vulpes*	*chama*	Cape Fox	TOPS protected

9.11.2.2 Avifauna

The regional avifaunal assemblage of the study area is relatively well known with between 106 and 140 bird species observed in the region (SABAP 2, Harrison et al, 1997). The variable habitat types (pans, outcrops, impoundments, rivers, grasslands) are expected to attract migrants and a rich diversity of bird species to the study area, including large flocks of water birds. Since much of the surrounding grasslands have been transformed to agricultural land or coal mining activities, it elevates the importance of proper avifaunal management and mitigation. Despite the abundance of wetland systems and large numbers of waterfowl in the region, the area does not qualify as an Important Bird Area (Barnes, 1998) although The *Amersfoort-Bethal-Carolina Important Bird Area* (IBA) is situated approximately 6 km east of the Schurvekop MRA.

[6] Due to lack of suitable habitat the Oribi has been excluded from the discussion despite occurring in the region

Within the study area a total of 139 bird species were recorded during the two survey periods (TBC, 2017, updated 2018). The Wetland and Mesic Grassland had the greatest species richness of all sites, accounting for 78% (104) of all observed species, mostly due to the large number of water-associated bird species present as well as the more intense sampling.

Two avifaunal SCC were recorded with another six species considered highly likely to occur. It must be noted that not all of the avifaunal SCC predicted to occur are expected to be found across all habitats within the study area. Therefore, a likelihood of occurrence for SCC found per habitat is shown (Table 36).

Table 36: Probability of occurrence for the predicted avifauna SCC per habitat (TBC, 2017, updated 2018)

Species	Rocky Outcrops	Mesic Grassland	Old Lands	Cultivated lands	Wetlands/ dams	Rivers	Woodlands
Alcedo semitorquata (Half-collared Kingfisher)	Low	Low	Low	Low	Low	High	Low
Anthropoides paradiseus (Blue Crane)	Low	High	High	High	Low	Low	Low
Balearica regulorum (Grey Crowned Crane)	Low	Moderate	Moderate	Low	Low	Low	Low
Bugeranus carunculatus (Wattled Crane)	Low	Low	Low	Low	Low	Low	Low
Ciconia abdimii (Abdim's Stork)	Low	Moderate	Moderate	Low	Low	Low	Low
Ciconia nigra (Black Stork)	Low	Moderate	Moderate	Moderate	Low	Low	Low
Circus ranivorus (African Marsh Harrier)	Low	Moderate	Low	Low	Confirmed	Low	Low
Eupodotis caerulescens (Blue Korhaan)	High	High	High	High	Low	Low	Low
Eupodotis senegalensis	Low	Moderate	Moderate	Low	Low	Low	Low

Species	Rocky Outcrops	Mesic Grassland	Old Lands	Cultivated lands	Wetlands/ dams	Rivers	Woodlands
(White-bellied Korhaan)							
Falco biarmicus (Lanner Falcon)	Moderate	Moderate	Moderate	Moderate	Moderate	Low	Low
Glareola nordmanni (Black-winged Pratincole)	Low	Low	Low	Low	Moderate	Low	Low
Geronticus calvus (Southern Bald Ibis)	High	High	High	Low	High	Low	Low
Lioptilus nigricapillus (Bush Blackcap)	Low	Low	Low	Low	Low	Low	Moderate
Oxyura maccoa (Maccoa Duck)	Low	Low	Low	Low	Confirmed	Low	Low
Polemaetus bellicosus (Martial Eagle)	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
Sagittarius serpentarius (Secretarybird)	Low	High	High	Moderate	Low	Low	Low
Tyto capensis (African Grass-owl)	Low	Moderate	Low	Low	High	Low	Low
Total (High & Confirmed)	2	4	4	2	4	1	0

9.11.2.3 Herpetofauna

A total of nine amphibian species were observed within the study area, none of which are SCC and all of which are considered to be common. Similarly, 11 reptile species (9 snakes, 2 lizards) were observed within the study area and none are considered to be SCC. The Transvaal Gecko (*Pachydactylus affinis*) and Aurora House Snake (*Lamprophis aurora*) observed are endemic to South Africa (TBC, 2017, updated 2018).

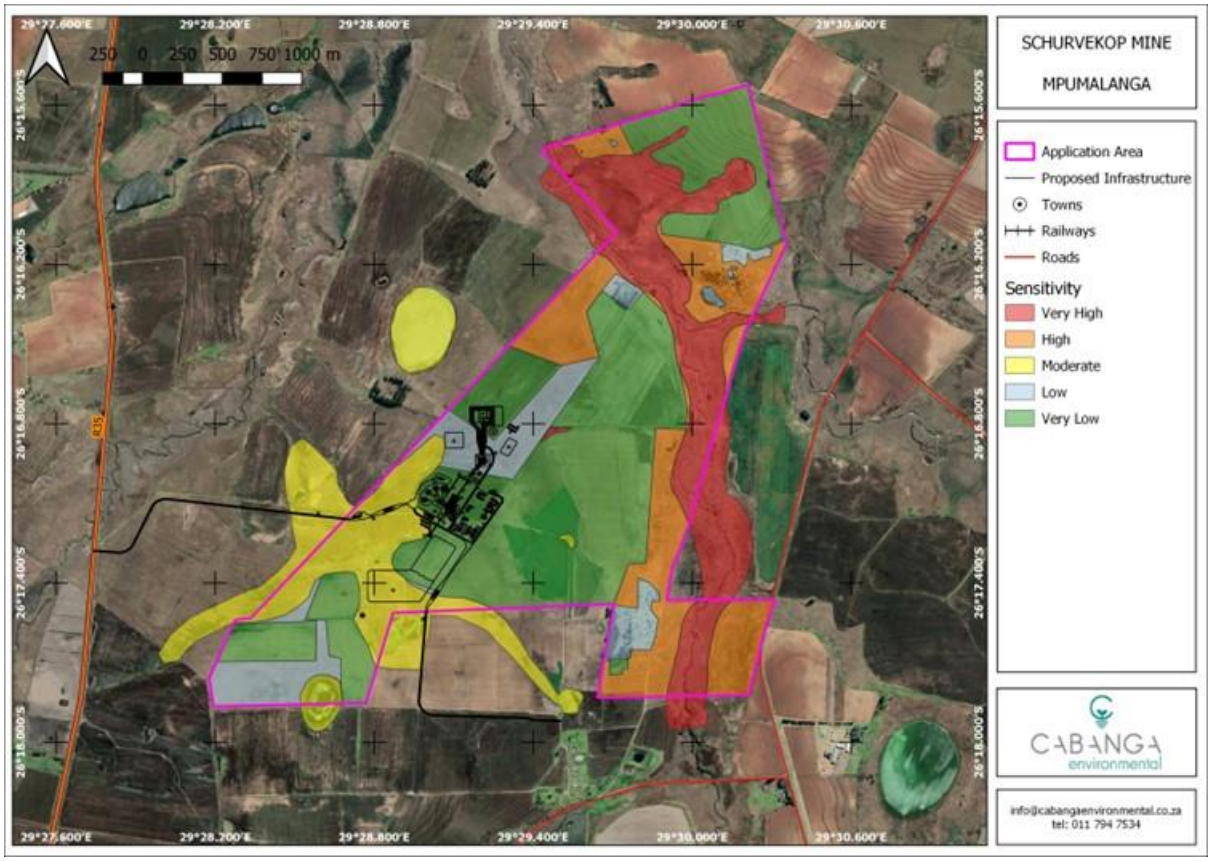
9.11.3 Combined Sensitivity

Table 37 gives the habitat sensitivity scores per discipline as well as a combined sensitivity score for the Project area. The sensitivity scores were rated on a scale of 1-5, where 1 is very low sensitivity and 5 is very high sensitivity. The combined sensitivity scores were obtained by taking the average sensitivity score across disciplines and rounding off the result (TBC, 2017, updated 2018).

The combined sensitivity scores for each habitat were then visually mapped in relation to the proposed aboveground mine infrastructure (Plan 9). It is clear that the mining infrastructure placement is optimal in terms of avoiding the high sensitivity habitats.

Table 37: Habitat Sensitivity Scoring (TBC, 2017, updated 2018)

Habitat	Area (ha)	Flora sensitivity	Mammal sensitivity	Avifauna sensitivity	Herpetofauna sensitivity	Combined
Agricultural field	224.77	1	2	1	1	**1**
Mesic grassland	85.27	4	4	4	4	**4**
Old lands	43.61	2	2	1	3	**2**
Wetland	305.55	5	4	5	4	**5**
River	7.54	5	4	4	4	**4**
Rocky outcrop	11.09	5	4	4	3	**4**
Transformed	13.56	1	2	2	1	**2**
Woodland	5.75	1	3	2	1	**2**

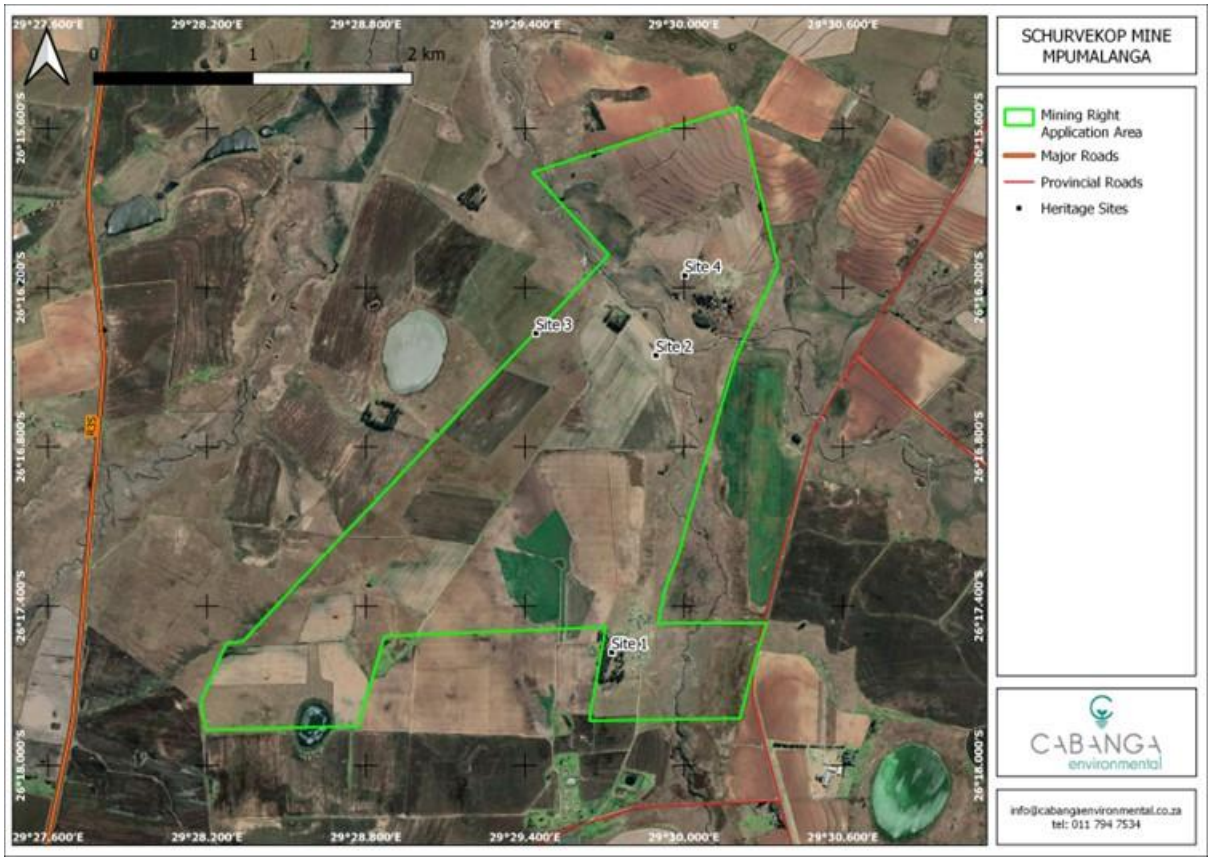


Plan 9: Infrastructure in relation to the combined habitat sensitivity

9.12 Heritage and Archaeology

A Heritage Impact Assessment (HIA) study was completed by Archaetnos Culture and Cultural Consultants in 2017, with a follow up survey conducted in 2022 (refer to APPENDIX K 6 for a copy of the full report). Four grave sites were identified within the MRA (Plan 10) as summarised in Table 38 overleaf (Archaetnos, 2022). All the sites are of high cultural significance but vary in condition, thus all sites are rated as Local Grade IIIB, where impacts may be mitigated and the site should be included in the heritage register.

No graves or heritage sites are located within the area earmarked for surface disturbance, and thus it is expected that these will be managed *in situ*.



Plan 10: Identified Heritage Sites

Table 38: Summary findings of the Heritage resources (Archaetnos, 2017)

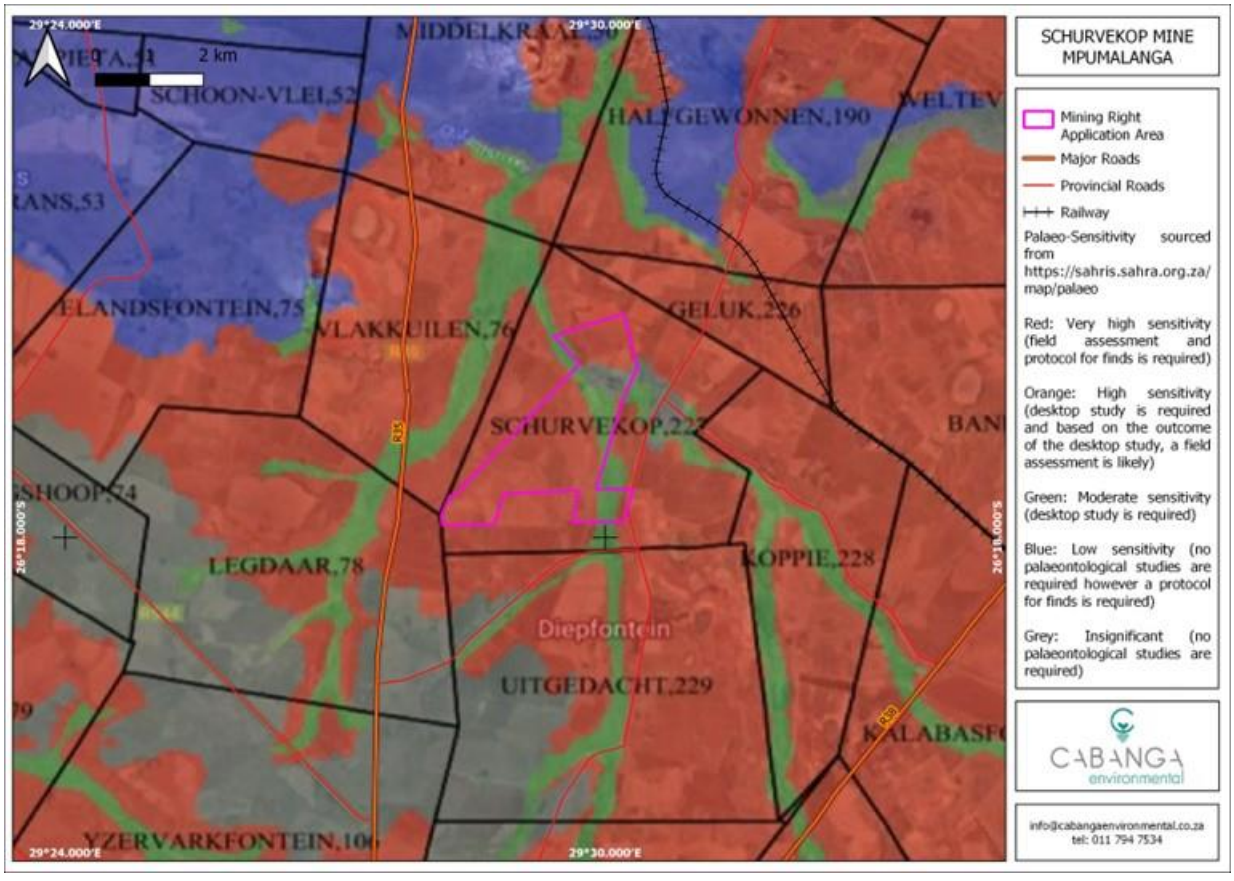
ID	Description	Photo
Site 1	This is a large grave yard found in close proximity to the homesteads of farm workers and a blue gum plantation consisting of at least 80 graves. Most graves have stone dressings and headstones without any information, whilst some don't have a headstone. Some recent graves are only indicated by a heap of soil. The few graves with dates seem to range between 1959 and 2008. Some of the surnames identified include Mtimunye, Mtsweni, Skosana and Malekobane. **Cultural Significance rating:** High **Integrity Rating:** 4 – Reasonable state of preservation and includes contextual information **In-field rating:** Local Grade IIIB, where it may be mitigated and should be included in the heritage register.	
Site 2	This is a grave yard consisting of at least 3 graves located in the middle of a soya bean field. The graves are not in a very good condition thus it is very likely that there may be more graves here. No headstones could be identified and the graves are covered with what is left of stone dressing where no information of the date of death nor names is known. In 2012 the farmer Mr. F van der Spuy, indicated that sometimes people still visit these graves. **Cultural Significance rating:** High **Integrity Rating:** 1 – Bad state of preservation; no contextual information. **In-field rating:** Local Grade IIIB, where it may be mitigated and should be included in the heritage register.	

ID	Description	Photo
Site 3	This site is a grave yard consisting of at least 9 graves, all of which have stone dressing and none have headstones. Therefore they all have an unknown date of death. There are signs of damage to the grave caused by burrowing animals. **Cultural Significance rating:** High **Integrity Rating:** 3 – Reasonable state of preservation, but no contextual information. **In-field rating:** Local Grade IIIB, where it may be mitigated and should be included in the heritage register.	
Site 4	This grave yard consists of at least 26 graves where there are two kinds of dressings and headstones being either stone or cement. None however have legible information and therefore they all have an unknown date of death. There are signs of damage to the graves, caused by burrowing animals. **Cultural Significance rating:** High **Integrity Rating:** 4 – Reasonable state of preservation and includes contextual information. **In-field rating:** Local Grade IIIB, where it may be mitigated and should be included in the heritage register.	

9.13 Palaeontological Setting

According to SAHRIS, the MRA falls within a moderate – very high palaeosensitivity (Plan 11). A desktop assessment was completed by Prof. Marion Bamford at the University of the Witwatersrand in 2017, attached as APPENDIX K 7. The report concluded the following:

The coal deposit is in the Vryheid Formation, Ecca Group and there are fossil plants of the Glossopteris flora associated with the shales between the coal seams but not in the coal itself. Based on the geology of the area and the palaeontological record as we know it, it can be assumed that the formation and layout of the basement rocks, dolomites, sandstones, shales, coals, quartzites, basalts and volcanic rocks are typical for the country and do not contain any fossil material. It is possible that some fossil plants will be destroyed in the mining process but they have not been reported from this area before and would be very sparsely distributed if present. As there is a chance find, a monitoring protocol is recommended. Any further palaeontological assessment would only be required after excavations and drilling have commenced and if fossils are found by the geologist or ECO (Bamford, 2017).



Plan 11: Palaeo-sensitivity

9.14 Air Quality

Permanent ambient air quality monitoring stations and dust-fall networks operated near the Project site are often used to evaluate the existing air quality situation, however, there was no air quality monitoring data from the South African Air Quality Information System (SAAQIS) (that

could be determined) to present background concentrations for SO_2, NO_2, CO, PM_{10} and $PM_{2.5}$ concentrations at the Project site (Rayten, 2016).

Background dust-fallout monitoring data from surrounding mining operations is available, and generally indicates compliance with the Dust Fallout Standards for non-residential areas. It is anticipated that background Particulate Matter (PM) concentrations in the area could be high due to existing mining activity in the surrounding areas.

Existing key sources of air pollution surrounding the Project site have been identified to be (Rayten, 2016):

- Agricultural activity and biomass burning;
- Mining activity;
- Vehicle dust entrainment on unpaved roads;
- Wind erosion from exposed areas (e.g. opencast pits, stockpiles, open storage piles, cultivated land, etc.); and
- Power Stations.

9.15 Noise

Ambient (background) noise levels were measured at three locations between 6 – 9 September 2022 in accordance with the South African National Standard (SANS) 10103:2008 (see APPENDIX K 9 for additional details on the methodology used) (E.A.R, 2022).

Considering the sound level data collected in the area:

- Average daytime impulse-weighted sound levels were 51.9 dBA, with average night-time impulse-weighted sound levels being 41.7 dBA;
- Average daytime fast-weighted sound levels were 47.8 dBA, with average night-time fast-weighted sound levels being 38.9 dBA; and
- Average daytime 90th percentile sound levels of 40.4 dBA90, with the average nigh-time 90th percentile levels being 33.0 dBA90.

Considering the long-term ambient sound levels measured (501 daytime measurements and 288 night-time measurements), the development character of the area as well as auditable observation, the recommended noise levels for the area would be (E.A.R, 2022).:

- 45 dBA for the daytime (rural rating level); and
- 40 dBA for the night-time(suburban rating level).

Potential noise-sensitive receptors identified in the Project area are listed in Table 39. The relative distance between the receptor and potential noise sources associated with the Schurvekop Mine, is illustrated in the Figure overleaf.

Table 39: Identified potential noise-sensitive receptors (NSRs) (E.A.R, 2022)

NSR	Coordinates		Comments
1	26°17'30.41"S	29°29'44.89"E	Residential use, part of Schurvekop Community
2	26°17'23.87"S	29°29'48.60"E	Residential use, part of Schurvekop Community
3	26°17'35.50"S	29°29'46.48"E	Residential use, part of Schurvekop Community
4	26°17'38.69"S	29°29'46.60"E	Residential use, part of Schurvekop Community

NSR	Coordinates		Comments
5	26°16'18.14"S	26°16'18.14"S	Residential use
6	26°16'15.82"S	29°30'6.90"E	Residential use

Figure 30:Potential noise-sensitive receptors in relation to the proposed Mine Area (E.A.R, 2022)

9.16 Visual Setting

The MRA, and in particularly the infrastructure area, is characterised by an agricultural landscape setting, including cultivation of mielies and soy as well as grazing by cattle, sheep and goats. The MRA also includes a floodplain associated with the Viskuile River and some rocky outcrops to the north, which gives some diversity to the landscape. Common to the area are the clusters of blue gum trees that are mostly associated with the farmsteads. Aesthetic quality (Figure 32) shows the spatial distribution of the various landscape types identified within the study area, typical views of the area are provided in Figure 31.

The study areas scenic quality has been rated as Moderate within the context of the sub-region and sensitive viewing areas and landscape types identified and mapped indicating potential sensitivity to the proposed development within a 15 km radius of the project site (Zone of potential Influence, ZoPI) (Green Tree Consulting, 2022).

When considering the proposed Project, the visual receptors identified include:

- Receptors located in the residential areas (farmsteads and associated farm worker's homes, Schurvekop Community, small towns);
- People travelling along the local roads located within the study area;

- People traveling to and from work;
- People visiting the surrounding mines.

Receptors/viewers located within or travelling through the northern, north-eastern and eastern section of the study area, will experience an urban or industrial sense of place that is mostly created by the mining activities taking place in this part of the study area. Whilst receptors/ viewers located in or travelling through the north-western, west, south-western, south and south-eastern part of the study area will experience a more pastoral sense of place that is created by the open grassland (grazing field), the agricultural fields, farming infrastructure and the various watercourses. Although the mining operations are still visible from these parts of the study area, they are not the dominating land use and therefore the sense of place is considered more a pastoral sense of place than an urban sense of place (Green Tree Consulting, 2022).

Please refer to APPENDIX K 10 for the full Visual Impact Assessment Report (Green Tree Consulting, 2022).

Photo taken from the D1476, approximately 2.5km south west of the proposed Project area.

Photo taken from D622, approximately 4.2km north east of the proposed Project area.

Photo taken from the R544, approximately 7,8km west of the Project area.

Figure 31: Landscape Character (Green Tree Consulting, 2022)

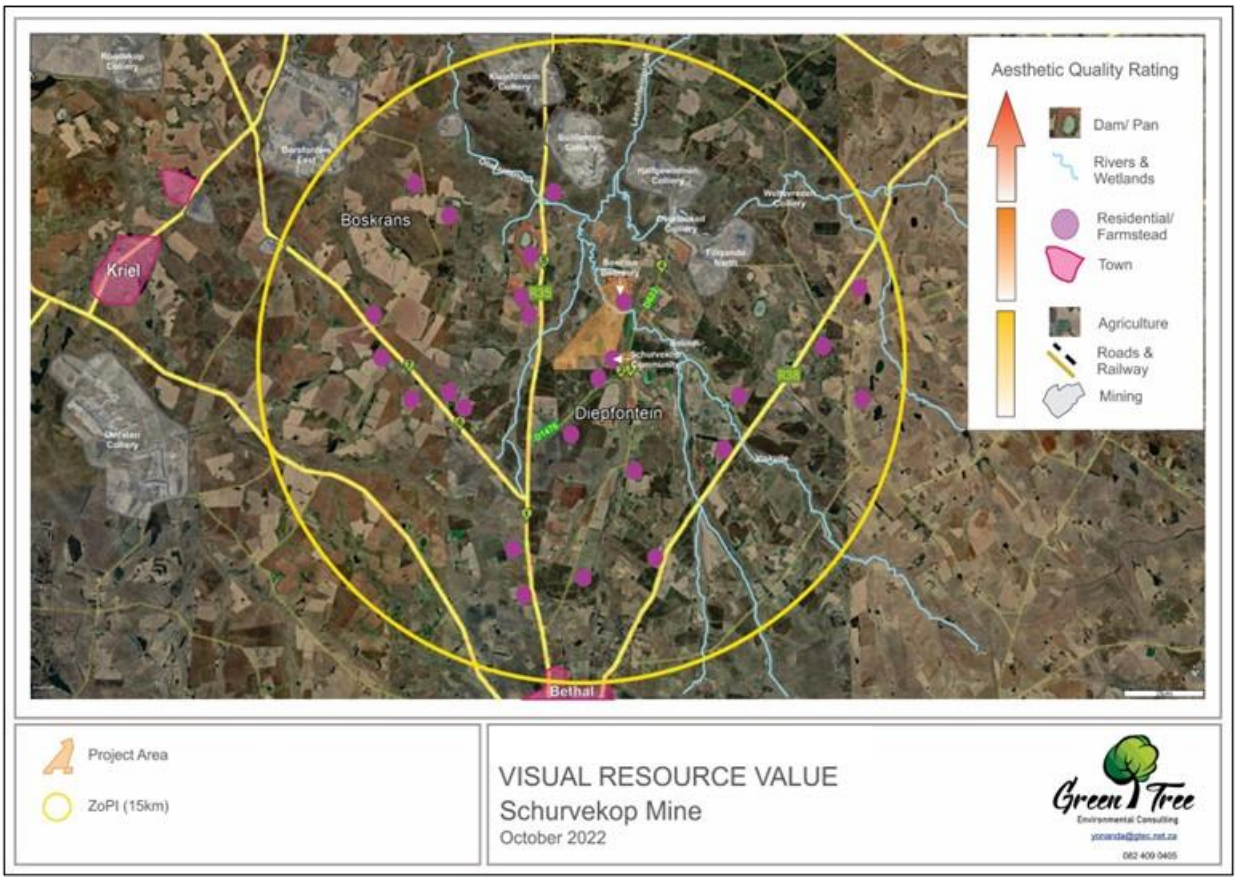


Figure 32: Scenic Quality (Green Tree Consulting, 2022)

9.17 Social Setting

The information below is largely abstracted from the Govan Mbeki Spatial Development Framework 2014 – 2034 and summarises the relevant demographics of the Govan Mbeki Local Municipality (GMLM) (DRDLR, 2014 - 2034):

- The population grew at a rate of 2.84% per annum over the period 2001 - 2011. This is higher than the district growth of 1.48% per annum and the province of 1.82 % p.a. This is likely as a result of migration of people from other provinces due to mining activities.
- The existing population within the developed areas of the GMLM (urban and rural) totals some 294 538 people approximately 28.2% of the district population.
  Within Govan Mbeki, the population is mostly concentrated within:
  - Embalenhle (40.4%);
  - Bethal/ Emzinoni (20.6%);
  - Secunda (14.5%);
  - Leandra (Leslie, Lebohang, Eendracht) (14.8%).

Only 4.5% of the population is associated with the mining villages and farms within the area.

- Number of households within the local municipality is 83 874 (average of 3.3 people per household).

- Approximately 66% of the population is black, 27.3 % is white and 6.7% coloured, Indian, Asian or other.
- The gender ratio over the period 2001 – 2011 indicates more males than females in the area indicating the presence of migrant workers.
- The Govan Mbeki unemployment rate (25.2%) is higher than the provincial rate of 24.5%, but lower than the district rate of 30.0%.
- The economic active population percentage of Govan Mbeki (43.3%) is higher than that of the country, province, district and Emalahleni, Steve Tshwete, Msukaligwa, Dipaleseng and Lesedi in the area. It has the same economic active population as Lekwa and lower than that of Victor Khanye (48.5%).

GMLM has a major influence on the Mpumalanga and GSDM economies. It contributes 19.8% to the Mpumalanga and 63.3% to the district economy. Within the subregion consisting of Govan Mbeki, Emalahleni, Steve Tshwete, Msukaligwa, Victor Khanye, Dipaleseng and Lekwa, the contribution of Govan Mbeki is 33.1% (DRDLR, 2014 - 2034).

Mining and Manufacturing are the dominant sectors within GMLM due to the strong petrochemical industry provided by Sasol and mining activities in the area. The expansion of these sectors as well as agricultural, tourism and finance within GMLM has been identified as future leading sectors to support economic and socio-economic development in the area (DRDLR, 2014 - 2034).

9.18 Existing Road Network

A Transport Impact Assessment study was previously completed by Sturgeon Consulting (Sturgeon Consulting , 2017). The baseline findings are summarised herein; the full report is attached in APPENDIX K 12.

Generally, the provincial roads are in fair condition. Road freight, transport and specifically coal transport, contribute to the deterioration of the provincial road surfaces and maintenance of these roads is not always adequate.

Roads between the various towns are subject to substantial commuter traffic volumes, with Secunda being the main employment area and the surrounding towns serving to a larger extent as dormitory towns.

The existing road infrastructure is well developed in the area and thus well connected to surrounding major centres via regional routes. The combination of national roads and first and second order roads provides good inter- and intra- regional accessibility. The South African National Roads Agency (SANRAL) are responsible for the maintenance of the national roads which are in a reasonable condition, however heavy traffic (especially coal trucks) contribute significantly to the deterioration of the road surfaces. Upgrades and extensions to the existing infrastructure will be implemented to accommodate the additional traffic volumes, if necessary. This means, possible upgrading of certain municipal, district and provincial routes, associated intersections and construction of new link roads, access roads and intersections where required (Sturgeon Consulting , 2017).

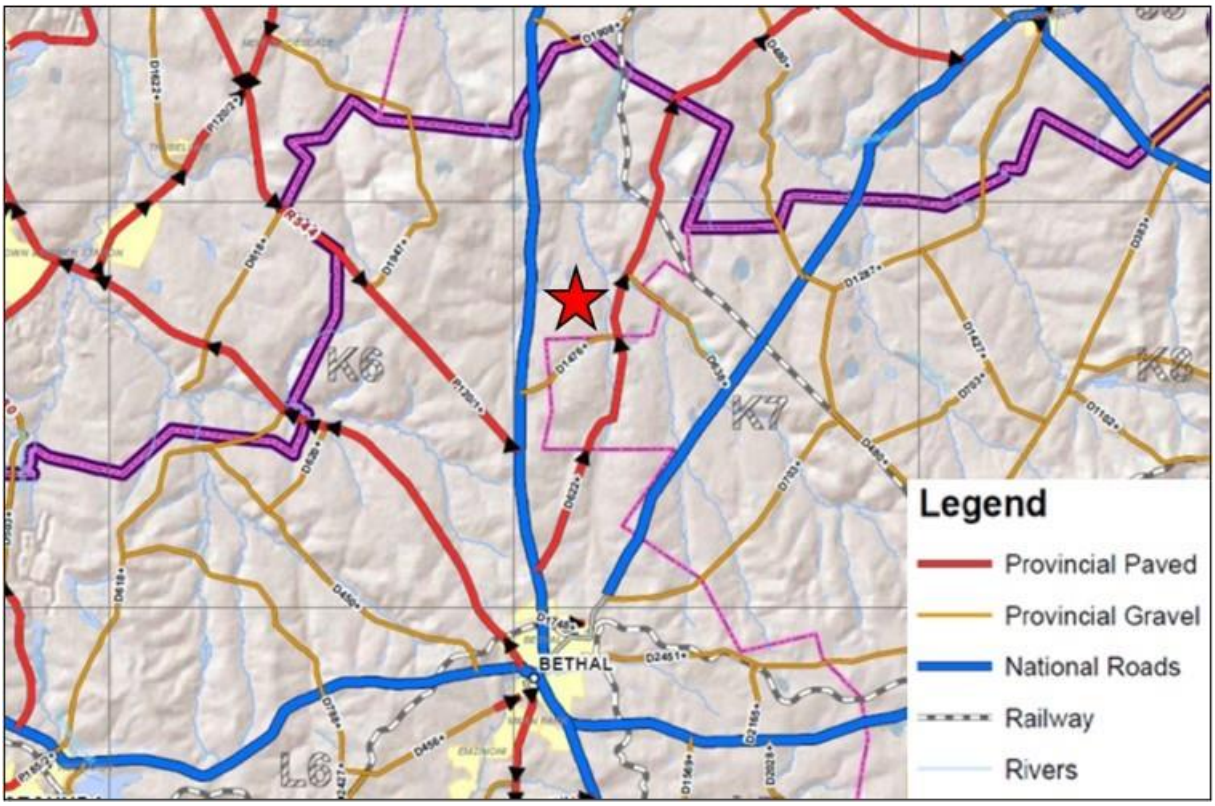


Figure 33: Overview of existing road network (Sturgeon Consulting , 2017)

9.19 Specific Features in Relation to Blasting

A blast impact study was completed for the construction of the boxcut Adit (BM&C, 2017). Please refer to APPENDIX K 13 for the detailed report. A summary of the baseline environment that may be affected by blasting is provided below.

The project is a greenfield project with no drilling and blasting currently active. A review of the Project area and surrounds was undertaken in order to identify all infrastructure within the possible influence area. The site was reviewed using Google Earth imagery and surface structures present within a 3,500 m radius from the proposed box-cut adit were identified. Table 41 details the structures and points of interest identified and taken into consideration when modelling the blast and vibration impacts (refer to Section 11.3.13). The type of structure has been further classified, a per Table 40, to determine the allowable ground vibration and air blast limits.

Figure 34 shows the identified points of interest (POI) in the surrounding area of the proposed boxcut Adit.

Table 40: POI Classification Used (BM&C, 2017)

Class	Description
1	Rural Building and structures of poor construction
2	Private Houses and people sensitive areas

Class	Description
3	Office and High-rise buildings
4	Animal related installations and animal sensitive areas
5	Industrial buildings and installations
6	Earth like structures – no surface structure
7	Graves & Heritage
8	Water Borehole

Table 41: List of POI's identified (BM&C, 2017)

Tag	Description	Classification	
1	Grave yard (Site 1 - ±78 graves)	7	Graves & Heritage
2	Grave yard (Site 2 - ±3 graves)	7	Graves & Heritage
3	Grave yard (Site 3 - ±9 graves)	7	Graves & Heritage
4	Grave yard (Site 4 - ±26 graves)	7	Graves & Heritage
5	Cement Dam	5	Industrial buildings & installations
6	Dam	5	Industrial buildings & installations
7	Farm Buildings/Structures	2	Private Houses and people sensitive areas
8	Farm Buildings/Structures	2	Private Houses and people sensitive areas
9	Dam	5	Industrial buildings & installations
10	Informal Housing	1	Rural Building and structures of poor construction
11	Dam	5	Industrial buildings & installations
12	Farm Buildings/Structures	2	Private Houses and people sensitive areas
13	Buildings/Structures	2	Private Houses and people sensitive areas
14	Ruins	1	Rural Building and structures of poor construction
15	Farm Buildings/Structures	2	Private Houses and people sensitive areas
16	Cement Dam	5	Industrial buildings & installations
17	Pan	6	Earth like structures – no surface structure
18	R35 Road	5	Industrial buildings & installations
19	Buildings/Structures	2	Private Houses and people sensitive areas
20	Informal Housing	1	Rural Building and structures of poor construction
21	Buildings/Structures	2	Private Houses and people sensitive areas
22	Informal Housing	1	Rural Building and structures of poor construction

Tag	Description	Classification	
23	Informal Housing	1	Rural Building and structures of poor construction
24	Informal Housing	1	Rural Building and structures of poor construction
25	Cement Dam	5	Industrial buildings & installations
26	R35 Road	5	Industrial buildings & installations
27	Viskuile River	6	Earth like structures – no surface structure
28	Viskuile River	6	Earth like structures – no surface structure
29	Road	5	Industrial buildings & installations
30	Cement Dam	5	Industrial buildings & installations
31	Ruins	1	Rural Building and structures of poor construction
32	Informal Housing	1	Rural Building and structures of poor construction
33	Informal Housing	1	Rural Building and structures of poor construction
34	Farm Buildings/Structures	2	Private Houses and people sensitive areas
35	Dam	5	Industrial buildings & installations
36	Buildings/Structures	2	Private Houses and people sensitive areas
37	Road	5	Industrial buildings & installations
38	Dam	5	Industrial buildings & installations
39	Cement Dam	5	Industrial buildings & installations
40	Cement Dam	5	Industrial buildings & installations
41	Cement Dams	5	Industrial buildings & installations
42	Viskuile River	6	Earth like structures – no surface structure
43	Viskuile River	6	Earth like structures – no surface structure
44	R35 Road	5	Industrial buildings & installations
45	Hydrocensus Borehole (Te Water BH 1)	8	Water Borehole
46	Hydrocensus Borehole (Te Water BH 2)	8	Water Borehole
47	Hydrocensus Borehole (Bosman Bh 1)	8	Water Borehole
48	Hydrocensus Borehole (Community BH)	8	Water Borehole
49	Hydrocensus Borehole (Community Windmill)	8	Water Borehole
50	Hydrocensus Borehole (Community Handpump)	8	Water Borehole
51	Hydrocensus Borehole (Bosman Handpump)	8	Water Borehole
52	Hydrocensus Borehole (ESW 33)	8	Water Borehole

Tag	Description	Classification	
53	Hydrocensus Borehole (Vilakasi BH)	8	Water Borehole
54	Hydrocensus Borehole (Uitgedagt BH)	8	Water Borehole
55	Usutu Pipeline	5	Industrial buildings & installations
56	Usutu Pipeline	5	Industrial buildings & installations
57	Usutu Pipeline	5	Industrial buildings & installations
58	Usutu Pipeline	5	Industrial buildings & installations
59	Power lines/Pylons	5	Industrial buildings & installations
60	Power lines/Pylons	5	Industrial buildings & installations
61	Power lines/Pylons	5	Industrial buildings & installations
62	Power lines/Pylons	5	Industrial buildings & installations
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83	Power lines/Pylons	5	Industrial buildings & installations
84	Power lines/Pylons	5	Industrial buildings & installations
85	Power lines/Pylons	5	Industrial buildings & installations
86	Power lines/Pylons	5	Industrial buildings & installations

Tag	Description	Classification	
87	Power lines/Pylons	5	Industrial buildings & installations
88	Power lines/Pylons	5	Industrial buildings & installations
89	Power lines/Pylons	5	Industrial buildings & installations
90	Power lines/Pylons	5	Industrial buildings & installations
91	Power lines/Pylons	5	Industrial buildings & installations
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93	Power lines/Pylons	5	Industrial buildings & installations
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95	Power lines/Pylons	5	Industrial buildings & installations
96	Power lines/Pylons	5	Industrial buildings & installations
97	Power lines/Pylons	5	Industrial buildings & installations
98	Power lines/Pylons	5	Industrial buildings & installations
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101	Power lines/Pylons	5	Industrial buildings & installations
102	Power lines/Pylons	5	Industrial buildings & installations
103	Power lines/Pylons	5	Industrial buildings & installations
104	Power lines/Pylons	5	Industrial buildings & installations
105	Power lines/Pylons	5	Industrial buildings & installations
106	Power lines/Pylons	5	Industrial buildings & installations
107	Power lines/Pylons	5	Industrial buildings & installations
108	Power lines/Pylons	5	Industrial buildings & installations
109	Power lines/Pylons	5	Industrial buildings & installations
110	Power lines/Pylons	5	Industrial buildings & installations
111	Power lines/Pylons	5	Industrial buildings & installations
112	Power lines/Pylons	5	Industrial buildings & installations
113	Power lines/Pylons	5	Industrial buildings & installations
114	Power lines/Pylons	5	Industrial buildings & installations
115	Power lines/Pylons	5	Industrial buildings & installations
116	Power lines/Pylons	5	Industrial buildings & installations
117	Power lines/Pylons	5	Industrial buildings & installations
118	Power lines/Pylons	5	Industrial buildings & installations
119	Power lines/Pylons	5	Industrial buildings & installations
120	Power lines/Pylons	5	Industrial buildings & installations

Tag	Description	Classification	
121	Power lines/Pylons	5	Industrial buildings & installations
122	Power lines/Pylons	5	Industrial buildings & installations
123	Structures	2	Private Houses and people sensitive areas

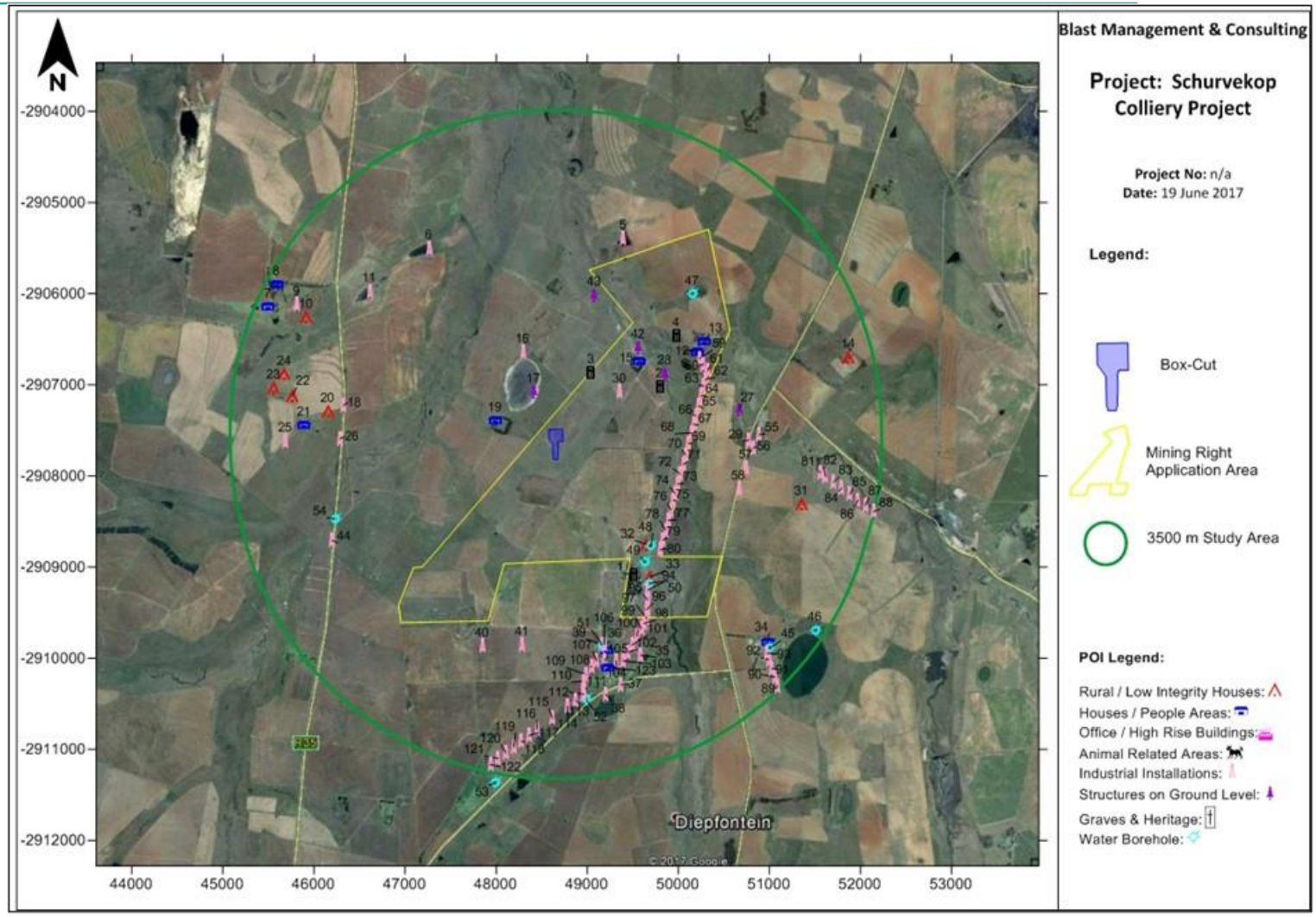


Figure 34: Identified points of interest (POI) within 3,500m of the blast area (BM&C, 2017)

10 ENVIRONMENTAL SENSITIVITY

The sensitive environmental features associated with the project area are as follows:

- Watercourses (Viskuile River and Joubertsvleispruit);
- Wetlands;
- CBA and ESA associated with the rivers and floodplain wetlands;
- Flora and fauna species; and
- Graves/heritage sites.

Existing infrastructure in the area includes:

- Farmsteads and informal housing;
- Farm dams and reservoirs;
- A number of farm/gravel roads exist within the MRA. These are associated with the various farmsteads, as well as the local community residing on Portions 17 and 20; and
- Servitudes associated with existing powerlines.

Figure 35 depicts the environmentally sensitive areas, in relation to, the proposed project infrastructure.

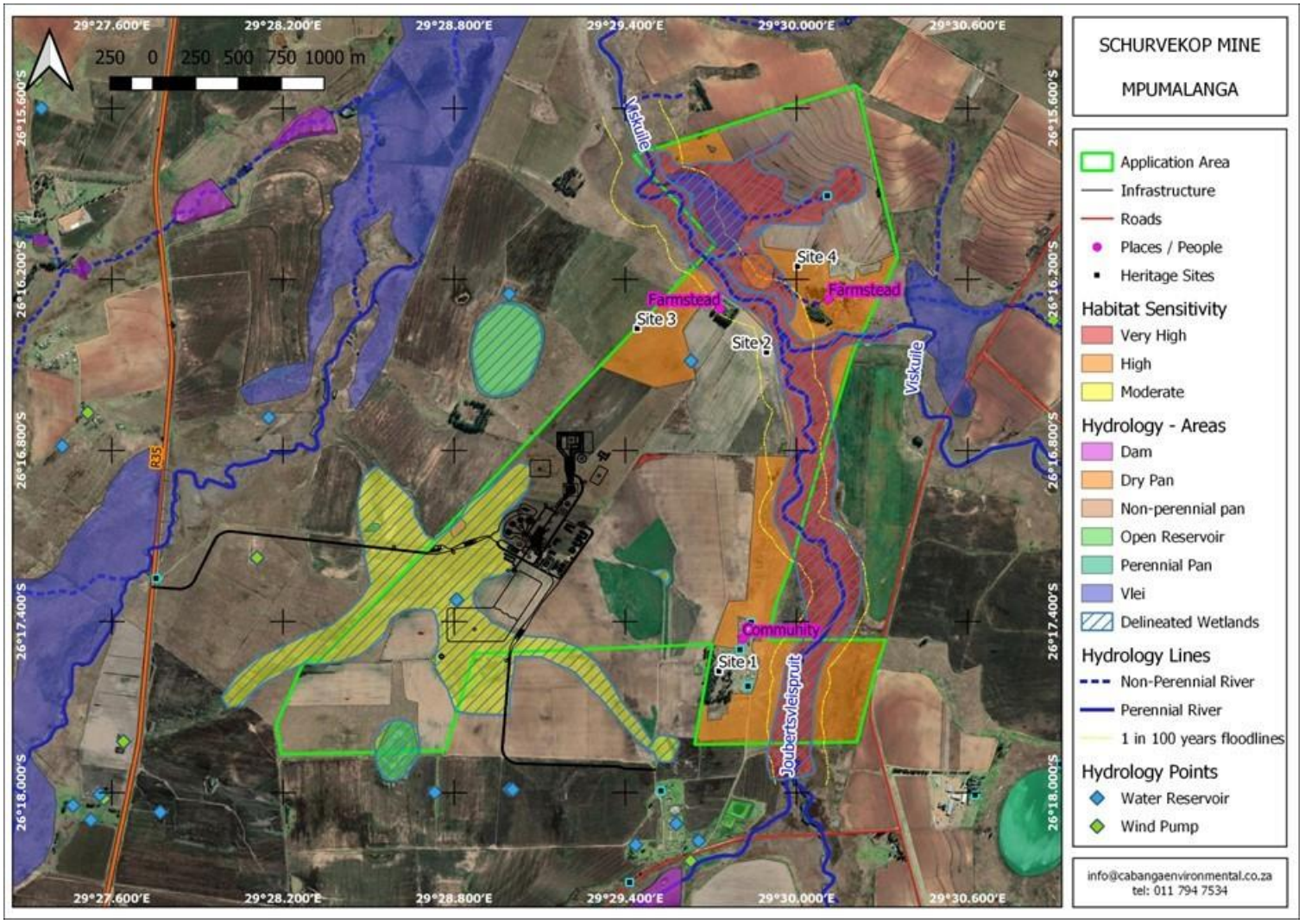


Figure 35: Overall Environmental Sensitivity Map

11 IMPACT ASSESSMENT

The purpose of the impact assessment is to determine the significance of potential impacts, so that those activities that are expected to result in high impacts can be altered, or management measures imposed to lessen the impact significance.

11.1 Impact Assessment Methodology

Impact assessment methods were developed to: (1) identify the potential impacts of a proposed development on the social and natural environment; (2) predict the probability of these impacts and (3) evaluate the significance of the potential impacts. The methodology used by Cabanga is as follows:

Table 42: Impact Assessment methodology

The status of the impact		
Status		Description
Positive:		a benefit to the holistic environment
Negative:		a cost to the holistic environment
Neutral:		no cost or benefit
The duration of the impact		
Score	Duration	Description
1	Short term	Less than 2 years
2	Short to medium term	2 – 5 years
3	Medium term	6 – 25 years
4	Long term	26 – 45 years
5	Permanent	46 years or more
The extent of the impact		
Score	Extent	Description
1	Site specific	Within the site boundary
2	Local	Affects immediate surrounding areas
3	Regional	Extends substantially beyond the site boundary
4	Provincial	Extends to almost entire province or larger region
5	National	Affects country or possibly world
The reversibility of the impact		
Score	Reversibility	Description
1	Completely reversible	Reverses with minimal rehabilitation & negligible residual affects
3	Reversible	Requires mitigation and rehabilitation to ensure reversibility
5	Irreversible	Cannot be rehabilitated completely/rehabilitation not viable
The magnitude (severe or beneficial) of the impact		

Score	Severe/beneficial effect	Description
1	Slight	Little effect – negligible disturbance/benefit
2	Slight to moderate	Effects observable – environmental impacts reversible with time
3	Moderate	Effects observable – impacts reversible with rehabilitation
4	Moderate to high	Extensive effects – irreversible alteration to the environment
5	High	Extensive permanent effects with irreversible alteration
The probability of the impact		
Score	Rating	Description
1	Unlikely	Less than 15% sure of an impact occurring
2	Possible	Between 15% and 40% sure of an impact occurring
3	Probable	Between 40% and 60% sure that the impact will occur
4	Highly Probable	Between 60% and 85% sure that the impact will occur
5	Definite	Over 85% sure that the impact will occur
The Consequence		= Magnitude + Spatial Scale + Duration + Reversibility.
The Significance		= Consequence x Probability.

The rating is described as follows:

Score out of 100	Significance
1 to 20	Low
21 to 40	Moderate to Low
41 to 60	Moderate
61 to 80	Moderate to high
81 to 100	High

Will mitigation be possible? Yes or no?

Finally, the negative impacts are rated according to the degree of loss of a resource due to the particular impact. This is only assessed from the pre-mitigation perspective of the impact. The degree of loss of a resource is evaluated in terms of:

- Low degree of loss: where the resource will recover on its own with no/limited rehabilitation over an observable period of time;
- Moderate degree of loss: where the resource will recover over extended period or with rehabilitation or remedial measures to assist recovery of resource; and
- High degree of loss: Where the resource cannot be recovered, or the resource will recover over extended time periods.

11.2 Identification of Impacts

Potential impacts associated with the Schurvekop Mine were identified by evaluating the activities associated with each project element in the environmental context of the Project

area. Impact identification was facilitated through specialist studies, the understanding of the EAP, inputs from the Applicant and inputs from the Public Participation Process (PPP). These are listed in the table below.

Table 43: Impacts identified for the proposed Project

No.	Activity	Impact Description	Aspect	Applicable Mine Phase
1	Clearance of vegetation, stripping and stockpiling of topsoil. Earthworks, civil works and construction of infrastructure, services and roads. Commencement of operations.	Alteration of topography.	Topography	Construction, Operation & Decommissioning
		Loss of agricultural land and / or loss of agricultural potential.	Soil, Land Use & Land Capability	Construction
		Loss of topsoil - Increased potential for erosion.	Soil, Land Use & Land Capability	Construction, Operation & Decommissioning
		Change in Land Use.	Soil, Land Use & Land Capability	Construction, Operation & Decommissioning
		Compaction and alteration of soil characteristics.	Soil & Land Capability	Construction, Operation, Decommissioning
		Altered hydrological regime.	Surface water & associated wetlands & aquatic ecosystems	Construction
		Loss of wetlands.	Wetlands & Aquatics	Construction
		Deterioration of water quality of wetlands and rivers due to activities and runoff of contaminants into the environment.	Surface water & associated wetlands & aquatic ecosystems	Construction, Operation, Decommissioning
		Runoff, erosion and sedimentation of water resources.	Surface water & associated wetlands & aquatic ecosystems	Construction, Operation & Decommissioning
		Destruction of SCC.	Flora & Fauna	Construction
		Loss of habitat.	Flora & Fauna	Construction
		Direct mortality of fauna.	Flora & Fauna	Construction
		Reduced dispersal/migration of fauna.	Flora & Fauna	Construction

No.	Activity	Impact Description	Aspect	Applicable Mine Phase
		Staff interacting directly with potentially dangerous fauna (snakes, bush pigs, bulls).	Flora & Fauna, Health & Safety	Construction, Operation & Decommissioning
		Disruption/alteration of ecological life cycles (breeding, migration, feeding).	Flora & Fauna	Construction
		Spread and/or establishment of alien and/or invasive plants and resultant impacts on surrounding natural vegetation.	Flora & Fauna	Construction, Operation, Decommissioning & Closure
		Loss of and disturbance to archaeological, paleontological and heritage sites.	Heritage & Paleontological	Construction
		Deterioration in visual aesthetics and sense of place.	Visual Aesthetic & Social	Construction
		Dust generation and particulate matter.	Air Quality	Construction, Operation & Decommissioning
		Gaseous emissions from machinery and vehicles.	Air Quality	Construction, Operation & Decommissioning
		Increase in environmental noise levels (day time) due to construction activities.	Noise, Social	Construction
		Increase in environmental noise levels (night-time) due to construction activities.	Noise, Social	Construction
		Increase in communicable and non-communicable diseases.	Social, Health & Safety	Construction, Operation & Decommissioning
		Influx or movement of labour into the area will pose an increased risk for sexually transmitted infections, including HIV/AIDS	Social, Health & Safety	Construction, Operation & Decommissioning

No.	Activity	Impact Description	Aspect	Applicable Mine Phase
		The Project may influence nutritional indicators in the study area through an influx of job seekers, change of livelihoods and practices.	Social, Health & Safety	Construction, Operation & Decommissioning
		Soil, water and waste related diseases.	Social, Health & Safety	Construction, Operation, Decommissioning
		Physical injuries at the workplace, road traffic incidences and other accidental injuries. Resultant health system issues (increased pressure on health services and infrastructure).	Social, Traffic & Transport	Construction, Operation & Decommissioning
		Employment opportunities, change in median household income, skills development and social determinants of health.	Socio-economic	Construction, Operation
2	Boxcut excavation and associated blasting	Impaired water quality through sedimentation and chemical contamination.	Surface water & associated wetlands & aquatic ecosystems	Construction
		Ground vibration impact on boreholes.	Groundwater	Construction
		Air blast impact on boreholes.	Groundwater	Construction
		Direct mortality of fauna.	Flora & Fauna	Construction
		Ground vibration impact on graves, pylons, roads & pipeline.	Heritage, Social, Health & Safety	Construction
		Air blast impact on graves, pylons, roads & pipeline.	Heritage, Social, Health & Safety	Construction
		Fly rock impact on graves, pylons, roads & pipeline.	Heritage, Social, Health & Safety	Construction
		Dust generation from blasting.	Air Quality	Construction

No.	Activity	Impact Description	Aspect	Applicable Mine Phase
		Destruction of palaeontological records.	Palaeontology	Construction
		Ground vibration impact on nearby farmsteads & houses.	Social, Health & Safety	Construction
		Air blast impact on nearby farmsteads & houses.	Social, Health & Safety	Construction
		Fly rock impact on nearby farmsteads & houses.	Social, Health & Safety	Construction
3	Underground mining of coal including dewatering	Alteration of the geological nature and sequence.	Geology	Construction, Operation, Decommissioning
		Alteration of topography and hydrological and geohydrological characteristics through potential subsidence of surface layers; leading to wetland loss.	Topography, Groundwater, Wetlands & Aquatics, Hydrology	Operation, Decommissioning, Closure, Post Closure
		Potential creation of a cone of depression, due to active dewatering of the underground mining area.	Groundwater	Operation
		Altered hydrological regime and flow of rivers due to active dewatering of the underground mining area.	Groundwater, Surface water, Wetlands & Aquatics,	Operation
		Impacts on groundwater quality due to poor quality seepage from the mining area.	Groundwater	Operation
		Destruction of palaeontological records.	Palaeontology	Operation
4	Coal handling and stockpiling, including processing	Stockpiles will change the topographical nature of the area.	Topography	Construction, Operation, Decommissioning

No.	Activity	Impact Description	Aspect	Applicable Mine Phase
		Soil pollution as a result of irresponsible handling of coal or generation of coal dust, coal spillages and coal dust deposition.	Soils & Land Capability	Construction, Operation
		Impacts on water quality due to poor quality seepage from the coal handling and stockpile areas via groundwater.	Groundwater	Operation, Decommissioning
		Erosion via wind and water leading to sedimentation and pollution of water resources.	Surface water, Wetlands & Aquatics	Construction, Operation, Decommissioning
		Runoff and spillages of dirty water into catchment.	Surface water, Wetlands & Aquatics	Operation, Decommissioning
		Impaired water quality from coal fines and dust generation being deposited into wetlands and rivers.	Wetlands & Aquatics	Operation, Decommissioning
		Potential for spontaneous combustion and associated emissions.	Air quality	Operation, Decommissioning
		Impacts on water quality due to poor quality seepage from the surface pollution source areas.	Groundwater	Operation
		Cumulative dust , PM10 & PM 2.5 generation.	Air Quality	Construction, Operation, Decommissioning
		Increase in environmental noise levels (day time) due to numerous, simultaneous operational activities.	Noise, Social	Operation
		Increase in environmental noise levels (day time) due to	Noise, Social	Operation

No.	Activity	Impact Description	Aspect	Applicable Mine Phase
		numerous, simultaneous operational activities.		
5	Mine Residue Disposal	MRF will permanently alter the topographical nature of the area.	Topography & Visual aesthetics	Construction, Operation, Decommissioning, Closure, Post Closure
		Uncontrolled runoff and spillages of dirty water into surrounding environment, leading to contamination of water resources.	Surface water, Wetlands & Aquatics	Construction, Operation, Decommissioning, Closure, Post Closure
		Impacts on water quality due to poor quality seepage.	Groundwater	Construction, Operation, Decommissioning, Closure
		Impacts on water quality due to poor quality seepage from the surface pollution source areas.	Groundwater	Operation
		Potential for spontaneous combustion and associated emissions.	Air Quality	Operation
6	Operation and maintenance of the stormwater management system & PCDs.	Altered hydrological regime (flow) of the rivers and local catchment.	Surface water, Wetlands & Aquatics	Construction, Operation, Decommissioning
		Environmental pollution due to uncontrolled runoff in to surrounding environment and water resources.	Flora & Fauna, Wetlands & Aquatics, Hydrology	Construction, Operation, Decommissioning
		Impacts on water quality due to poor quality seepage from the pollution source areas.	Groundwater	Construction, Operation, Decommissioning
7	Operation and movement of vehicles and machinery. Including access and hauling along roads.	Impaired water quality by hydrocarbon leaks / Spills	Surface water & associated wetlands & aquatic	Construction, Operation, Decommissioning

No.	Activity	Impact Description	Aspect	Applicable Mine Phase
			ecosystems, Groundwater	
		Cumulative dust , PM10 & PM 2.5 generation.	Air Quality	Construction, Operation, Decommissioning, Rehabilitation
		Increased risk of road traffic incidences.	Social, Traffic & Transport	Operation
		Emissions into the atmosphere through use of diesel powered equipment, machinery and vehicles: Nox SO2 and CO emissions.	Air Quality	Construction, Operation, Decommissioning, Rehabilitation
		Increased potential for road incidences. Road degradation.	Traffic & safety	Construction, Operation, Decommissioning, Closure, Post Closure
8	Substation, power transmission & Lighting	Direct mortality of fauna through increased collisions.	Flora & Fauna	Construction, Operation
		Hindrance to nocturnal animals, including nocturnal birds and bats.	Flora & Fauna	Construction, Operation, Decommissioning
		Increased visibility of the site.	Visual Aesthetic	Construction, Operation
		Potential danger to surrounding communities.	Social, Health & Safety	Construction, Operation
9	Water Supply and storage (potable and process)	Irresponsible use of water and water wastage.	Surface water & associated wetlands & aquatic ecosystems	Construction, Operation, Decommissioning
10	Waste generation, handling & storage	Potential surface contamination by litter and illegally dumped waste.	Soil & Land capability	Construction, Operation

No.	Activity	Impact Description	Aspect	Applicable Mine Phase
		Potential surface contamination which will impact surrounding areas through runoff and seepage.	Groundwater& Surface water & associated wetlands & aquatic ecosystems	Construction, Operation, Decommissioning
		Potential harm to flora and fauna through littering and waste toxins.	Flora & Fauna	Construction, Operation, Decommissioning
		Deterioration in visual aesthetics.	Visual aesthetics	Construction, Operation
		Potential contamination of surrounding environment with sewage.	Soil & Land capability	Construction, Operation, Decommissioning
		Potential contamination of surface water bodies with sewage and nutrient enrichment of aquatic environments.	Surface water & associated wetlands & aquatic ecosystems	Construction, Operation, Decommissioning
		Exposure to potentially hazardous materials, waste and malodours.	Social, Health & Safety	Construction, Operation, Decommissioning
11	Storage & handling of dangerous goods	Environmental pollution due to hydrocarbon/chemical contamination into the natural environment.	Soils, Flora & Fauna	Construction, Operation, Decommissioning
		Impaired water quality by hydrocarbon contamination on surface which could impact the environment through runoff and seepage.	Surface water & associated wetlands & aquatic ecosystems, Groundwater	Construction, Operation, Decommissioning
		Exposure to potentially hazardous materials, waste and malodours.	Social, Health & Safety	Construction, Operation, Decommissioning
12	Sealing of underground workings. Backfilling of boxcut adit, removal of surface infrastructure and overall	Profiling and restoration of free drainage.	Topography, Soils, Hydrology	Decommissioning, Rehabilitation and Closure

No.	Activity	Impact Description	Aspect	Applicable Mine Phase
	rehabilitation. Decommissioning and Closure of the Mine.	Recovery of groundwater level after dewatering stopped.	Groundwater	Decommissioning, Rehabilitation and Closure
		Impacts on groundwater quality due to poor quality seepage from the mining area once water level has recovered.	Groundwater	Decommissioning, Rehabilitation and Closure
		Sedimentation of water resources through erosion of replaced soil material.	Surface water	Rehabilitation, Closure, Post-closure
		Impacts on surface water quality due to poor quality seepage from the pollution source areas.	Groundwater, surface water, Wetlands & Aquatics	Decommissioning, Rehabilitation and Closure
		Soil replacement, amelioration and seeding. Vegetative cover and plant community succession. Influx of Animals to the area once vegetation establishes.	Soil & Land Capability, Flora & Fauna, Wetlands,	Decommissioning, Rehabilitation and Closure
		Deterioration in visual aesthetics and sense of place.	Visual	Decommissioning, Rehabilitation and Closure
		Increase in environmental noise levels (day time) due to construction activities.	Noise, Social	Construction
		Retrenchment/loss of employment and procurement opportunities.	Socio-economic	Decommissioning, Rehabilitation and Closure

11.3 Impact Assessment

Potential Environmental and Social Impacts that may result from the proposed Project, have been listed in Table 55 pre- and post-mitigation.

All specialists utilise some form of impact rating similar to the process detailed in Section 11.1. The impact rating completed by the specialists was as far as possible translated into the impact assessment process detailed in Table 55. As far as practically possible, considering variations in impact assessment methodology by different specialists, the specialist impact assessment is therefore duplicated within a single unified impact assessment process, to allow for all impacts to be assessed in the same way, reducing subjectivity and allowing for direct comparative ranking of all the impacts identified during the environmental process.

Key impacts as identified by the relevant specialist studies have been discussed further below. Mitigation measures are proposed in Section 12.

11.3.1 Geology, Physiography and Topography

The very nature of mining projects will inevitably result in altered geology. Despite the impact rating as Moderate, there is no mitigation for this impact as it is an inherent effect of mining. The cumulative effect is of Moderate to High significance, as coal reserves in South Africa are diminishing and are non-renewable.

When coal, rock and minerals are removed from an underground mine, the overlying earth can sink, i.e. subsidence can occur. The extent of mine subsidence depends on the mining method, local geology, depth of mining and amount of material extracted. Should surface subsidence occur this will create fractures and cracks that will not only increase recharge into the underground workings, but also increase the risk of decant due to the creation of preferential flow paths linking the deeper fractured aquifer to surface. Additional consequences resulting from surface subsidence are disturbances of the flow drivers into the wetlands and loss of post-closure land uses. The impact significance related to subsidence and the formation of sinkholes is therefore rated as High pre-mitigation.

Main development panels will be designed to a safety factor of 2.0; whilst production panels will be designed to a safety factor of 1.6 using the Salamon Formulae and designs by a rock Engineer. According to the geotechnical and rock engineering report (Delta BEC, 2022a) a safety factor of 2.5 has been recommended for environmentally sensitive areas (i.e. water courses and riparian habitats) and under buildings where people congregate (farmstead sand community). The following additional minimum standards should be applied to the pillar design:

- Minimum width-to-height ratio of pillars: 2.2
- Minimum pillar width: 7.0m

The table below is extracted from the geotechnical and rock engineering report (Delta BEC, 2022a) and indicates the calculated probability of failure of pillars designed with different safety factors, as well as, the possible number of pillar failures in a million pillars mined with each safety factor. Thus, post-mitigation the impact significance is rated as Moderate to Low.

Table 44: Probably of Pillar Failure based on Safety Factor (Delta BEC, 2022a)

Safety Factor	Probably of a stable geometry	No. of pillar collapse in one million
2.1	0.999999	<1
2.0	0.999994	6
1.9	0.999974	26
1.8	0.999894	106
1.7	0.999586	414
1.6	0.998468	1 532
1.5	0.9947	5 300
1.4	0.9830	17 000
1.3	0.9508	49 200
1.2	0.8748	125 200
1.1	0.7259	274 100
1.0	0.5000	500 000
0.9	0.2534	746 000
0.8	0.0799	920 100
0.7	0.0066	993 400
0.6	0.0060	999 400

The cumulative impact is considered to be of Moderate significance, as the surface can be rehabilitated to ensure the area blends into the natural environment and to ensure that storm water flow is re-established from the subsided area and returned to the catchment.

11.3.2 Soils, Land Use and Land Capability

The major concern is regarding the loss of agricultural land due to the change in land use and loss of agricultural potential by soil degradation. Soil can be degraded by impacts in three different ways: erosion; topsoil loss; and contamination.

The spatial extent of the impact is limited to the Project area and with mitigation can be reduced further. The severity of erosion or compaction on the soil resource without mitigation is profound as once topsoil is washed away it is lost permanently, however with mitigation the impacts can be reduced significantly. The duration of the impact if unmitigated is long lasting due to the natural soil regeneration process taking may hundreds of years, but with mitigation this can be reduced to a short impact timeframe.

The significance of the resource being lost is a very high as soil takes many hundreds of years to regenerate naturally and therefore is considered a non-renewable resource. However, the impacts can be mitigated at an early stage and the impact can be reduced significantly. The probability of these impacts occurring if no mitigation is taken is near certain, however with mitigation the probability reduces hugely.

In conclusion, the combined significance of the impact without mitigation is Medium but with mitigation the rating is Low (TBC, 2022a).

11.3.3 Surface Water

Sensitive water resources in relation to MRA are the Joubertsvleispruit and Viskuile Rivers, which confluence to form the Olifants River System, and thus any impacts to surface water quality will be considered cumulative in nature. Key impacts to surface water as a result of the project, relates primarily to the deterioration of water quality, erosion/sediment transportation and change in flow regime.

A clean water diversion channel will be constructed around the dirty water catchment area in order to separate clean and dirty water. This will result in the change in direction of runoff, as water will be collected within artificial infrastructure, ultimately reducing the catchment yield.

The potential impact on water quality in the Joubertvleispruit and Viskuile rivers associated with surface infrastructure was rated as Moderate. Although infrastructure such as the MRF and stockpiles have the potential to have a significant impact on water quality, the distance between these elements and the water courses (> 1 km) along with the inclusion of design elements such as the PCDs and silt traps reduced the significance of the impact.

The significance of the potential impact of reduced / altered flow in the Joubertvleispruit and Viskuile rivers associated with dewatering was rated as minor prior to mitigation. Although reduced flow has the potential to disrupt the lifecycles of aquatic biota and to have a significant impact on aquatic ecosystems, the limited extent of the proposed mining activities relative to the size of the quaternary catchment means that the reduction in flow is likely to be negligible.

As discussed under Section 11.3 a safety factor of 2.5 has been recommended for the undermining of environmentally sensitive areas (i.e. water courses and riparian habitats). The likelihood of pillar failure with a safety factor of 2.5 is less than 0.00001% and as a result, pillars beneath the water resources can be expected to be stable indefinably (Delta BEC, 2022a).

Changes to the hydrological regime, impaired water quality and the establishment of alien vegetation is likely to present a Moderate risk prior to mitigation. The significance of this risk is reduced to Low post mitigation.

11.3.4 Wetlands and Aquatic Ecology

The preferred layout has avoided wetlands as far as possible. However, the proposed underground mine plan will underlie wetlands and rivers and the surface infrastructure will partly encroach on a wetland flat.

The boxcut Adit is within 500m of the pan and the wetland flat; but more than 500m away from the rivers and sensitive floodplain wetlands (Figure 36).

The infrastructure and MRF will be placed at the catchment divide which is adjacent to and partly within the wetland flats. This will lead to the direct loss of approximately 7.6 Ha of wetlands. The significance for the loss of wetland area is considered to be High, whilst this cannot be mitigated an offset is proposed. Refer to APPENDIX M.

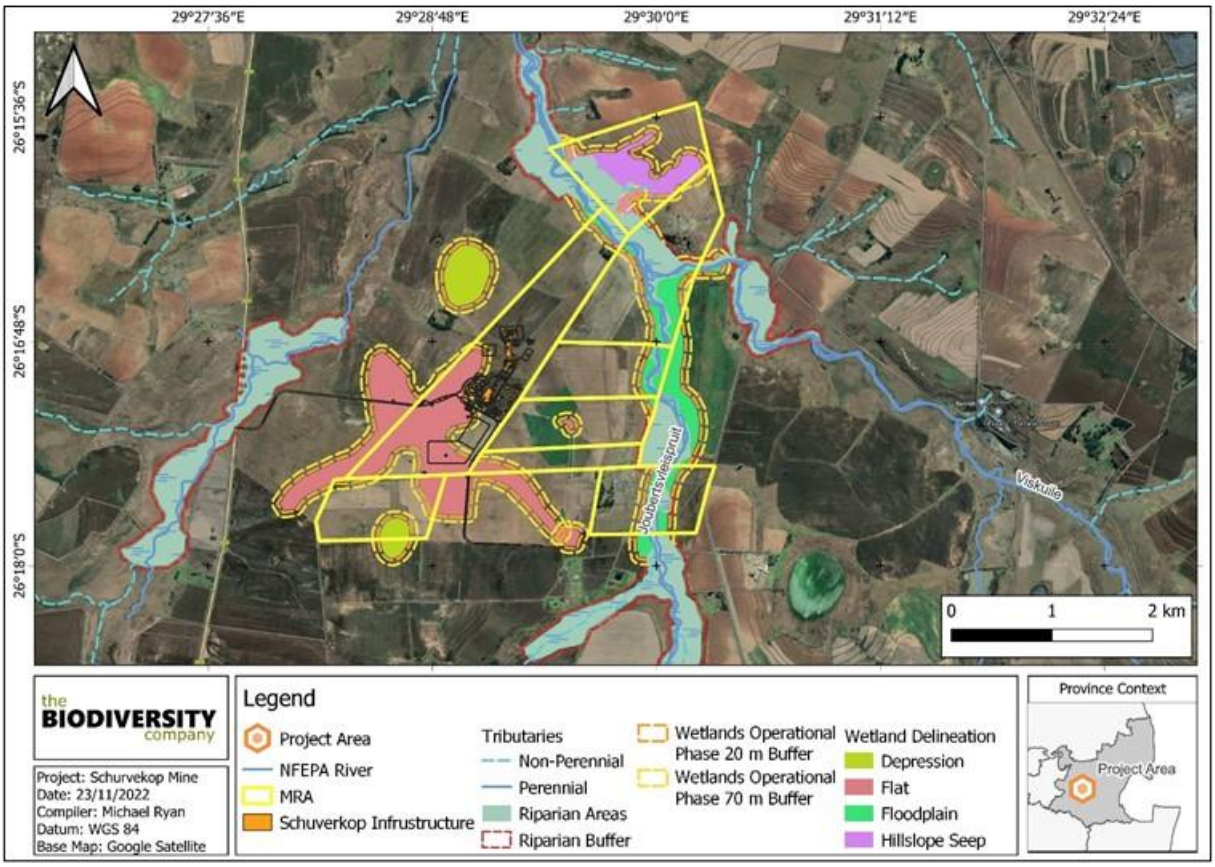


Figure 36: Proposed surface Infrastructure in relation to the local water resources (TBC, 2022b)

11.3.5 Groundwater

Impacts to the groundwater from the proposed mining activities include:

- Dewatering of the underground mine and the associated impacts on the surrounding groundwater environment;
- Contaminant migration away from the mining area;
- Impacts on surface water flow volumes due to mine dewatering and the possible reduction in base flow contribution to streams and wetland areas;
- Impacts on the surface water quality due to contaminant migration away from the mining area; and
- Potential decant from the mining area.

These impacts are discussed in the sections below according to the impacts on quantity and quality through the project and post-closure.

11.3.5.1 Groundwater Quantity

The boxcut and decline will breach the groundwater level and the workings will have to be dewatered in order to ensure safe working conditions. The groundwater level around the boxcut and decline will be lowered due to the dewatering. The zone of influence of the dewatering is expected to extend less than 200 m from the excavations. Groundwater inflow

volumes into the boxcut and decline are expected to be less than 100 m^3/day (Future Flow, 2018).

The mine floor elevations are below the general groundwater level, thus causing groundwater flows into the underground mining area from the surrounding aquifers during operations. Groundwater inflow volumes into the 4 seam workings will start off at around 130 m^3/day during the first year of operations and steadily increase to reach a maximum of around 400 m^3/day at the end of life of mine. Groundwater inflows into the 2 seam workings start off at around 180 m^3/day and increase to a maximum of approximately 455 m^3/day. The total groundwater inflow volume into the combined 4 seam and 2 seam workings increase from 130 m^3/day at the start of mining to a maximum of 860 m^3/day at the end of life of mine (Future Flow, 2018).

The maximum drawdown in the groundwater level from pre-mining levels in the upper weathered aquifer is negligible and calculated at less than 1 m due to the slight disconnect that exist between the fractured rock aquifer (where mining is located) and the weathered material aquifer. The zone of influence of the groundwater level drawdown in the weathered material aquifer is calculated to be less than 100 m and considered to be minor and thus not mapped here (Future Flow, 2018).

The drawdown in the groundwater level in the fractured rock aquifer around the 4 seam and 2 seam underground workings will be more significant. Groundwater flow simulations show that the maximum drawdown in groundwater level around the 4 seam workings is expected to be in the order of 45 m from pre-mining levels (Figure 37). The zone of influence of the groundwater level drawdown is calculated to reach a maximum distance of approximately 1 300 m. The maximum drawdown in groundwater level around the 2 seam workings is calculated to be approximately 75 m from pre-mining levels (Figure 38). The zone of influence of the drawdown cone around the 2 seam workings is expected to extend up to 1 600 m. The drawdown in groundwater level will be the most severe at the end of life of mine (Future Flow, 2018).

The zone of influence of the groundwater level drawdown cone will underlie a number of streams in the area. These streams include the unnamed tributary to the Olifants River west of the mining area, the Joubertsvleispruit, and the Viskuile River. The impact on the stream flow volumes from decreased base flow contribution will be mitigated by the slight hydraulic disconnect between the weathered material aquifer and the fractured rock aquifer. Using the available information it is calculated that the impact on base flow contribution to the streams will be less than 1% (Future Flow, 2018).

The groundwater levels in the privately owned boreholes around the mining area, which fall within the zone of influence of the groundwater level drawdown in the fractured rock aquifer, will be impacted by the mine dewatering and the associated reduction in groundwater level in the fractured rock aquifer. The maximum drawdown in groundwater level ranges from 37 m to 70 m (Table 45). These reductions in groundwater level in the boreholes will impact on the sustainable yields of the boreholes (Future Flow, 2018).

Table 45: Impacts on surrounding boreholes due to mine dewatering (Future Flow, 2018).

Borehole	Groundwater level drawdown (m)	First year of impact	Borehole use	Owner
Bosman BH1	37	3	Domestic (10 000 L/week)	Adolf Bosman
Community Borehole	67	8	Monitoring borehole	Community
Community Handpump	65	8	Domestic	Community
Community Windpump	65	8	Domestic	Community

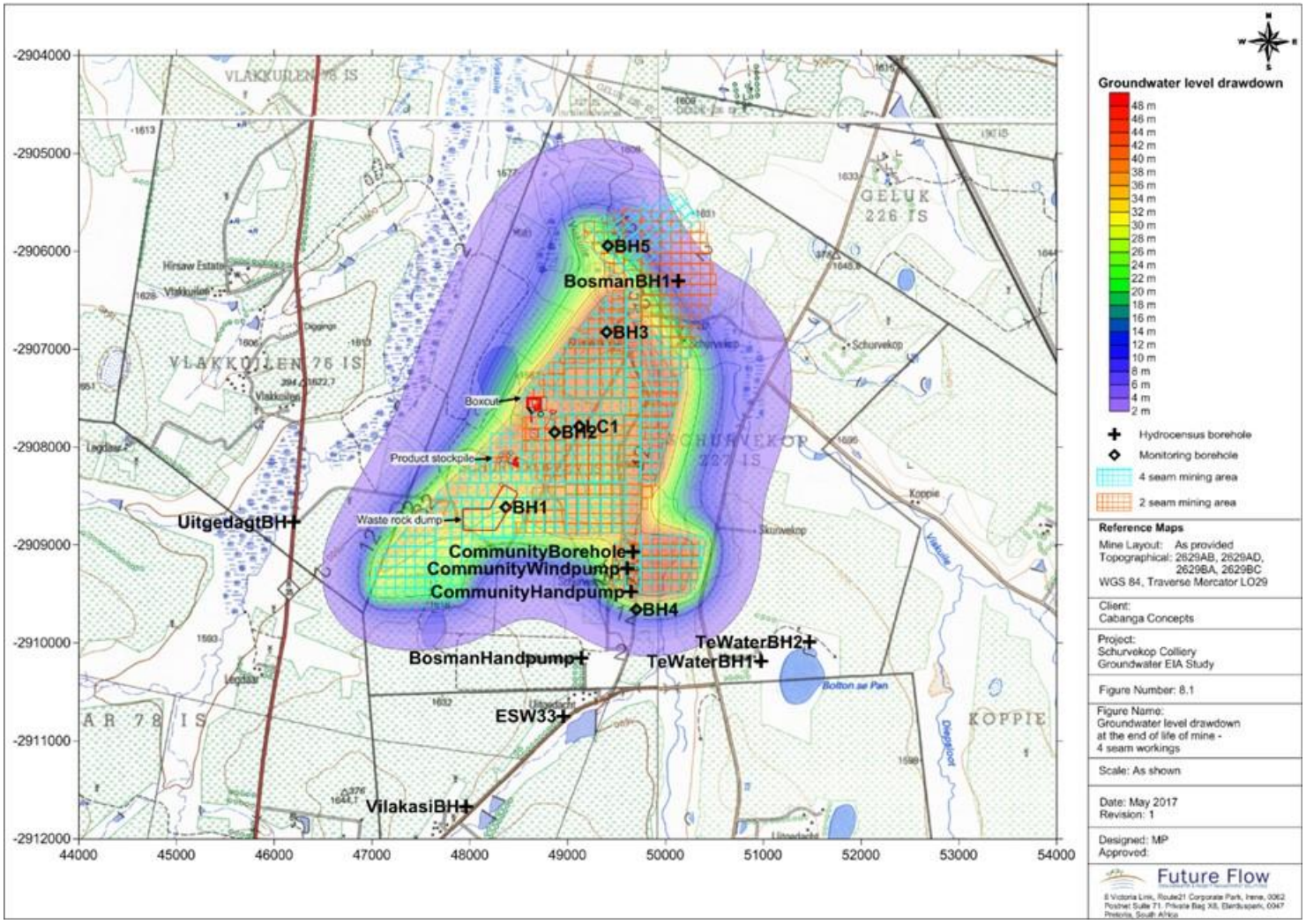


Figure 37: Groundwater level drawdown at end LOM in 4 seam workings (Future Flow, 2018)

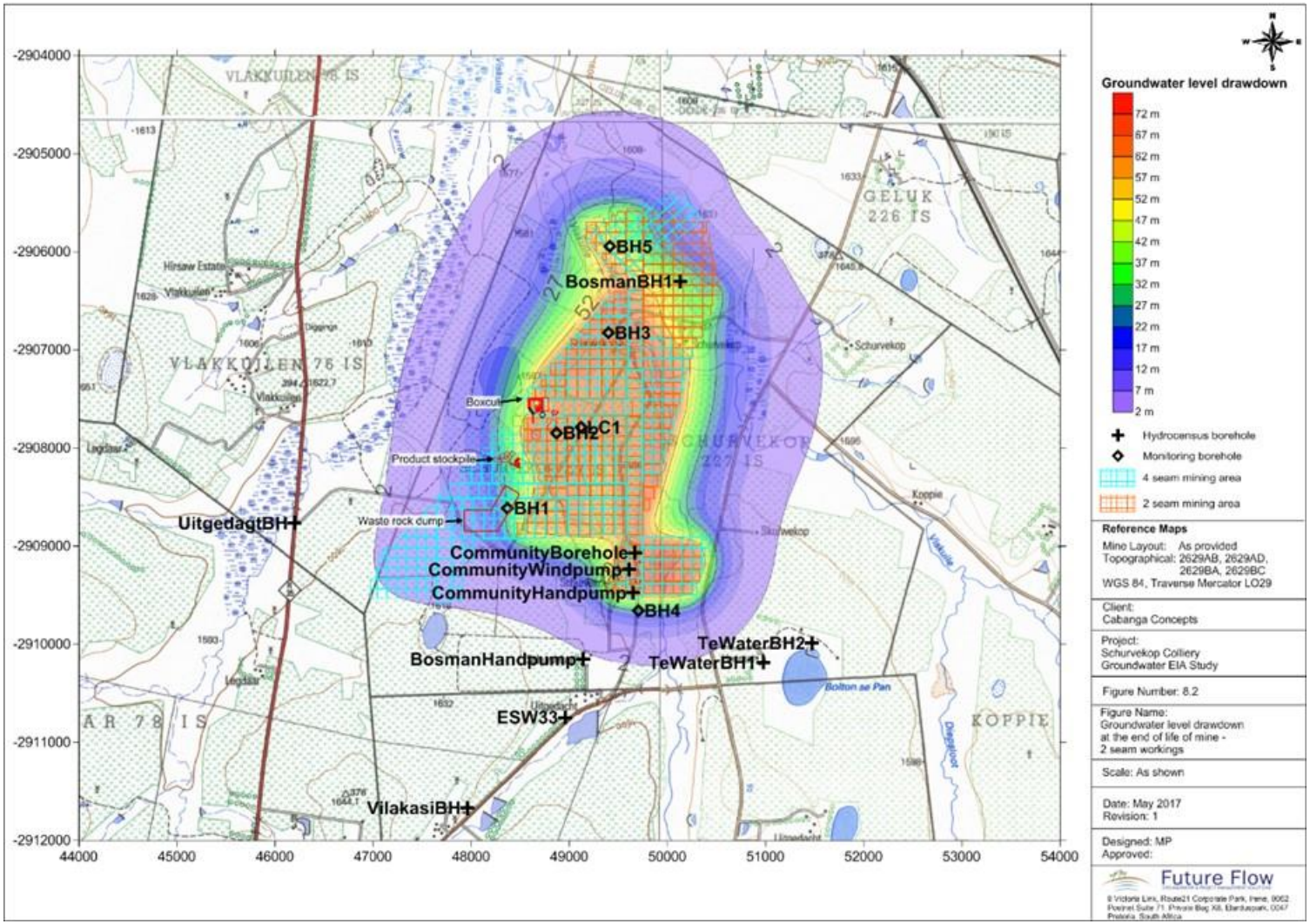


Figure 38: Groundwater level drawdown at end LOM in 2 seam workings (Future Flow, 2018)

In the post operational environment groundwater levels and flow patterns in the area will recover to near pre-operational levels. The time required for recovery of the groundwater levels to near pre-operational levels in the study area will be dependent on a combination of factors.

The mined out volumes for the 2 seam mining area is 4 268 215 m^3 and the 4 seam mining area is 7 576 071 m^3; totalling 11 844 287 m^3. The total average inflow into the underground mining areas to approximately 665 m^3/day from the surrounding aquifers (~550 m^3/day) and rainfall infiltration (~115 m^3/day) (Future Flow, 2018).

From the above it is calculated that the 2 seam workings are expected to be flooded around 15 to 20 years after closure, where recovery of the groundwater levels will continue until the 4 seam workings are flooded approximately 48 years after closure.

At no point is the coal seam floor elevation above that of the surface elevation at the mine entrance. Therefore, no decant is expected.

Maximum decant volumes, in the unlikely event that it does occur, are expected to be in the order of 150 to 300 m^3/day. However, it has to be emphasised that this is the maximum number, and is likely to be less, if at all. The above conditions make artificial wetlands a viable management option. Indications from the leach testing that was done are that the decant qualities will be relatively good (Future Flow, 2018).

11.3.5.2 Groundwater Quality

There are a number of potential contaminant sources associated with the proposed Project; these include:

- Workshops;
- Fuel storage;
- Mining related:
    - Mine access and boxcut;
    - Underground mining area;
- Surface stockpiles:
    - Topsoil stockpile;
    - Overburden stockpile;
    - Discard stockpile;
    - MRF;
    - RoM stockpile;
- Plant and process related:
    - Process plant;
    - Product stockpiles;
- Water management infrastructure:
    - Process water tank;
    - Underground water reservoir; and
    - PCD.

Acid mine drainage (AMD) conditions can be expected to form as shown from the ABA testing that was done (see Section 9.10.4).

Upper weathered material aquifer:

The upper weathered material aquifer will be at risk of contamination from surface sources due to the shallow nature of the groundwater combined with the relatively high transmissivity of the weathered material. Any accidental spills on surface can easily seep into the ground and migrate vertically to join the saturated zone at around 2 to 4 m below surface. Seepage from surface stockpiles of overburden or discard could potentially contaminate the underlying aquifers.

The contaminant plumes are expected to only migrate approximately 200 m from the surface point sources during operations and at the end of LoM (Figure 39). Thus, no surface water areas are impacted, and no privately owned boreholes on surrounding properties are impacted through the LoM and at mine closure (Future Flow, 2018).

After 50 and 100 years post-closure, the contamination plume follows topography and migrates up to 1 000 m from the individual point sources (Figure 40 - Figure 41). However, this is at very low concentrations from the original; for example the maximum concentration that is expected to enter the pan to the west at 100 years after closure is around 2 to 3 % of the source concentration; the non-perennial Viskuile River tributary to the west is 1% of the source; and towards the east, the plume also enters the Viskuile River directly at a concentration of <1 % of the source concentration (Future Flow, 2018).

Deeper fractured aquifer:

The plumes are expected to migrate around 1 400 m and 1 100 m from the 2 seam and 4 workings respectively (Figure 42 - Figure 43). The difference in the migration distance is due to the fact that the 2 seam workings will be submerged first and contamination migration away from the mining area can start earlier (Future Flow, 2018).

The contaminant plumes that develop away from the 2 seam and 4 seam workings will underlie the Viskuile River and the Joubertsvleispruit. However, because the plumes develop deep under the surface, and the contamination is expected to remain at that level or move further downwards under gravity, it is not expected that the plumes will have a notable impact on the surface water qualities (Future Flow, 2018).

The following privately owned boreholes will be impacted, once the water qualities in these boreholes are impacted Mmakau Coal will have to provide an alternate water supply of similar quality and quantity (Future Flow, 2018):

- Bosman BH1,
- Community Borehole,
- Community Windpump, and
- Community Handpump.

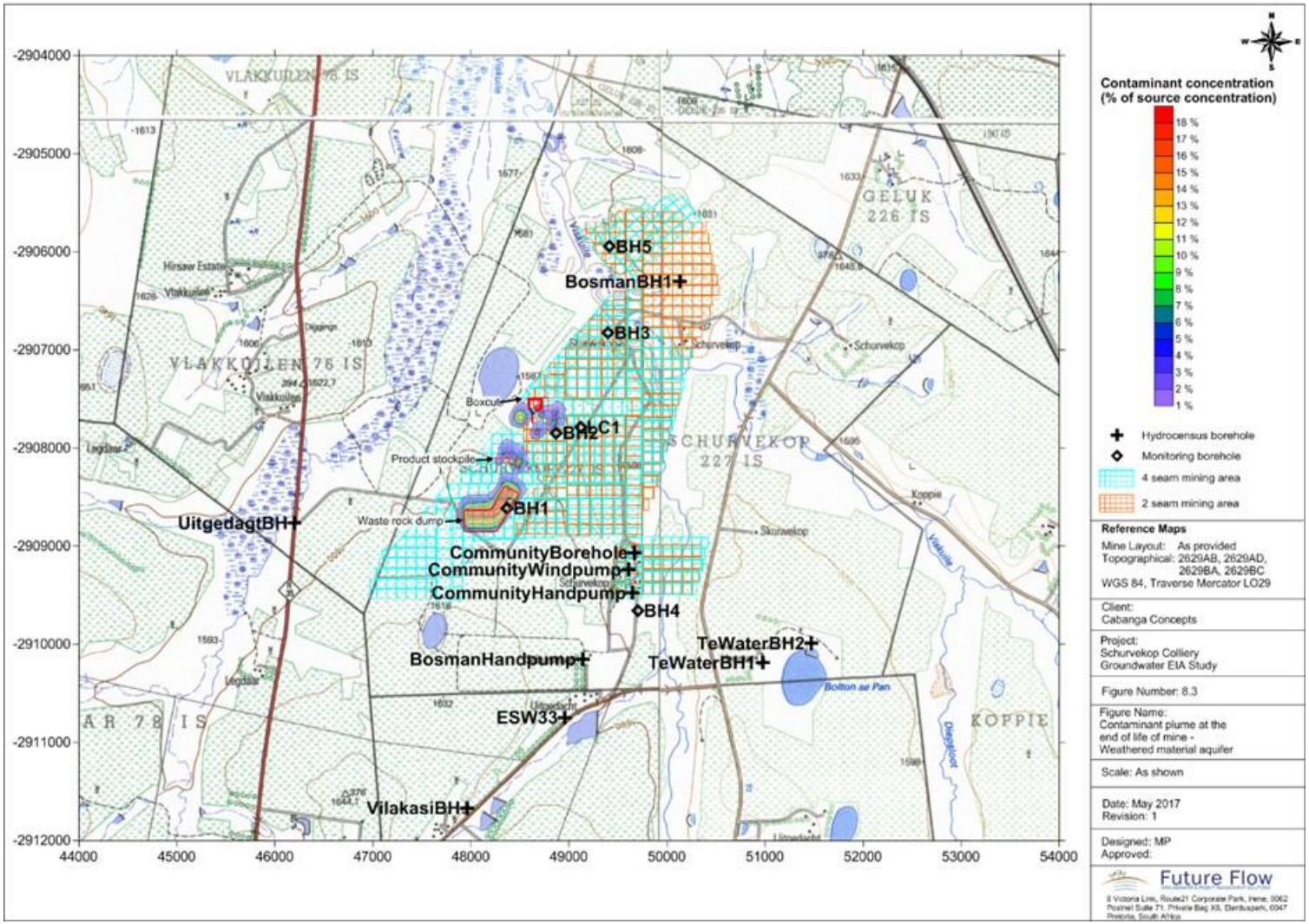


Figure 39: Upper weathered aquifer contamination plume at end of LOM (Future Flow, 2018)

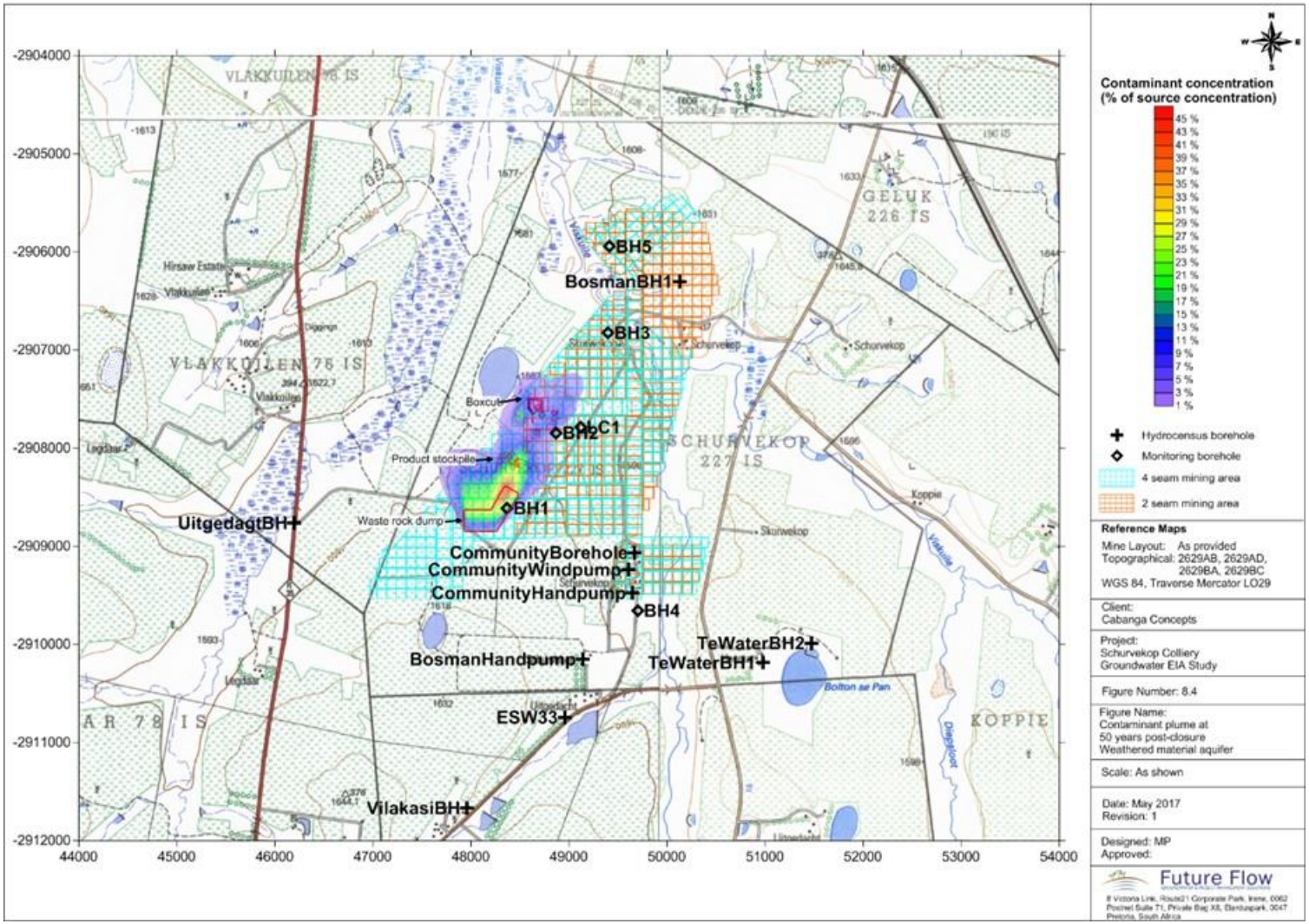


Figure 40:: Upper weathered aquifer contamination plume 50 years post-closure (Future Flow, 2018)

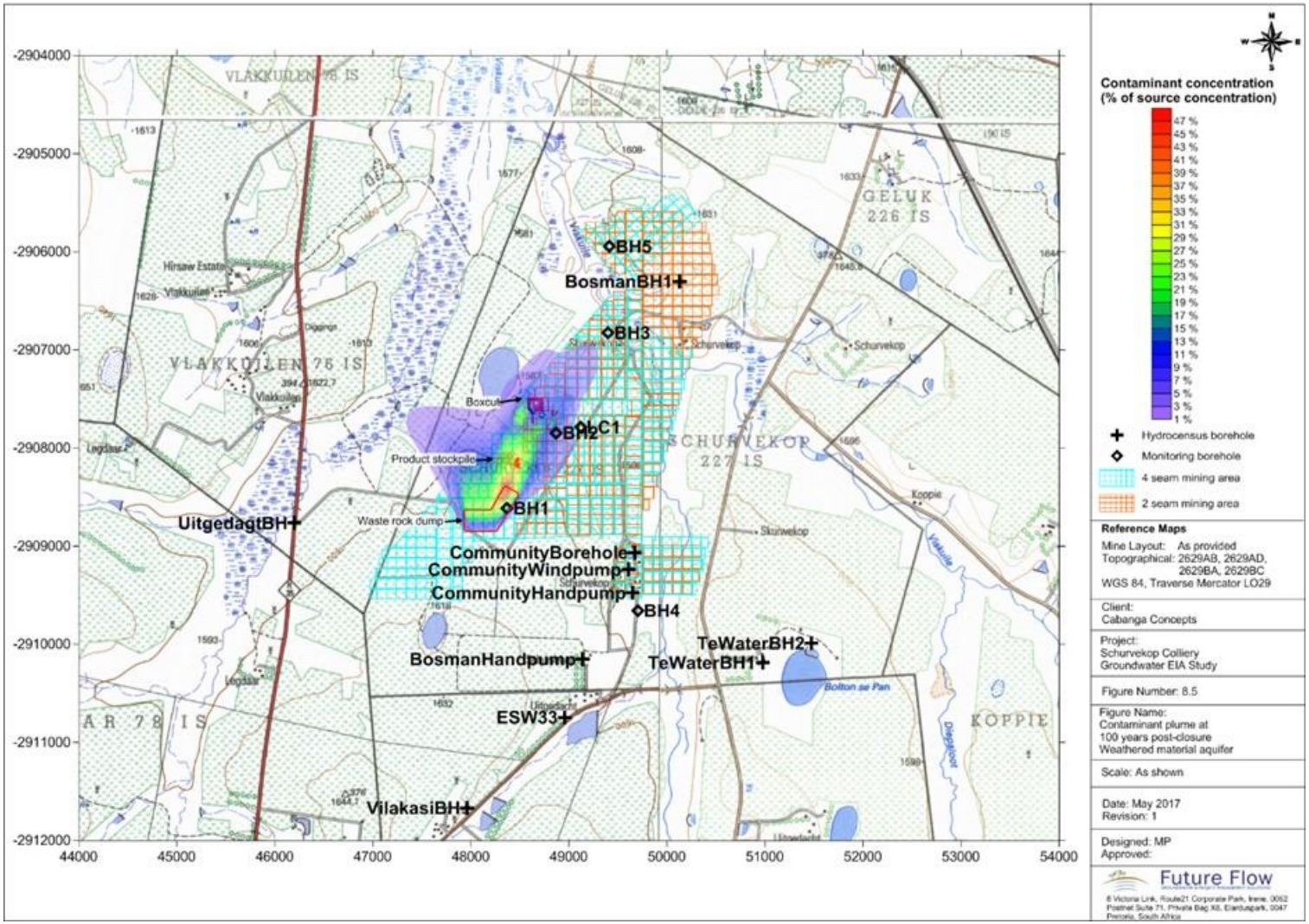


Figure 41::Upper weathered aquifer contamination plume 100 years post-closure (Future Flow, 2018)

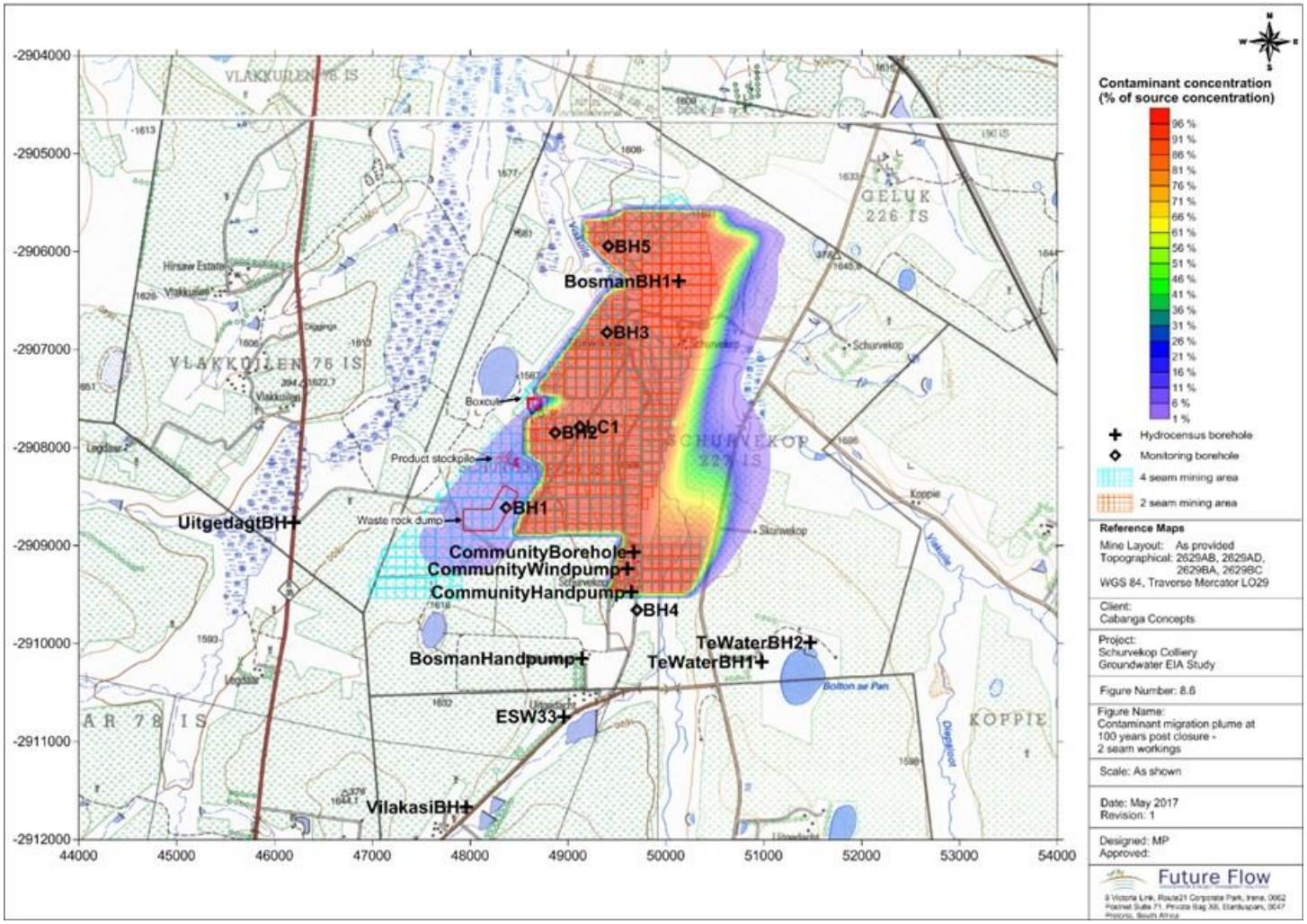


Figure 42: Deeper fractured aquifer contamination plume from the underground 2 seam workings 100 years post-closure (Future Flow, 2018)

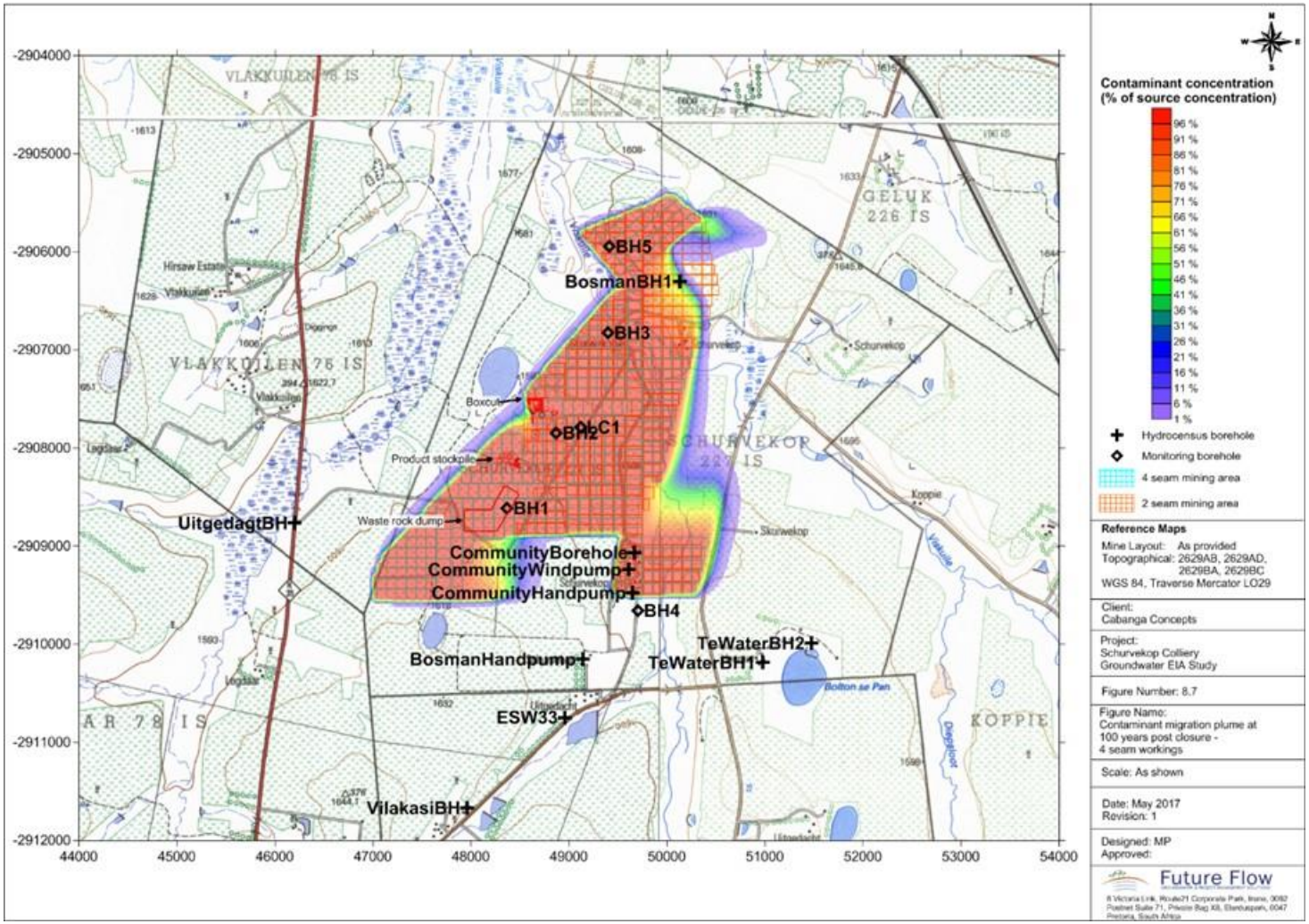


Figure 43: Deeper fractured aquifer contamination plume from the underground 4 seam workings 100 years post-closure ((Future Flow, 2018)

11.3.6 Terrestrial Biodiversity

The site falls within the Eastern Highveld Grassland which is listed as Endangered on the revised national list of ecosystems that are threatened and in need of protection (DFFE, 2022). Other sensitive habitat areas are associated with the river, wetlands and rocky outcrops. Mining infrastructure placement has avoided these sensitive habitats as far as possible, see Section 9.11.3.

The following list provides a summary of the anticipated impacts to the flora and fauna associated with the Project, the significance of these impacts range from Moderate to High pre-mitigation and Low to Moderate post-mitigation. Cumulative impacts are rated Moderate.

- Loss of habitat
- Spread and/or establishment of alien and/or invasive species
- Direct mortality of fauna
- Reduced dispersal/migration of fauna
- Environmental pollution due to increased sedimentation and chemical runoff in water courses
- Disruption/alteration of ecological life cycles (breeding, migration, feeding) due to noise, dust and light
- Staff interacting directly with potentially dangerous fauna (snakes, bush pigs, bulls)
- Alterations in hydrological regime (flow of surface and sub-surface water)

No CBAs or ESAs will be directly affected by the placement of the Adit and surface infrastructure.

11.3.7 Heritage, Archaeology and Palaeontology

The four grave sites will not be directly impacted by the mining activities; however they should be managed accordingly.

No impacts to the palaeontological record of the area are expected. However, since there is a small chance that fossils could be discovered when excavations or drilling commences a 'Chance Find' protocol and monitoring programme should be followed. It is concluded that the project may continue as far as the palaeontology is concerned.

No cumulative contribution to heritage impacts is expected from the Project.

11.3.8 Air Quality

Dust and gaseous emissions are identified for proposed surface operations at Schurvekop Mine and will be emitted from the following key sources:

- Dust and Particulate Emissions:
    - Heavy Construction Activities;
    - Bull dozing;
    - Land clearing, top soil and overburden removal;
    - Loading and offloading operations;
    - Material handling operations;
    - Conveying material;
    - Transportation of material off site (trucks);
    - Material storage: Stockpiling and dumps;

- Crushing and Screening (dry);
- Wind erosion from exposed areas;
- Vehicle-entrainment on unpaved roads due to hauling.

- Gaseous Emissions
  - Vehicle exhaust emissions

The following main conclusions are made based on the dispersion modelling plots for the construction (scenario A) and operational (scenario B) phases of the project:

- In both scenarios high PM_{10} concentrations, including exceedances of the daily and annual limits, are observed outside the farm boundary (Portion 8), within 6km from centre of the mine's operations. Under the worst-case scenario, exceedances of the daily and annual limits are predicted to occur at the nearby sensitive receptor located on farm portions 17 and 20.
- Predicted incremental $PM_{2.5}$ concentrations due to proposed construction and mining activities at Schurvekop mine are relatively low beyond 1km from the centre of the mine's operations. Elevated $PM_{2.5}$ concentrations are observed near the mine, with exceedances prevalent near the source of emissions. No exceedances of the annual limit are observed during the operational phase of the project.
- Air quality impacts due to truck hauling activities during the operational phase of the mine are predicted to be low in terms of SO_2 and CO; with low to negligible incremental concentrations observed over the project area. On the other hand, exceedances of the NO_2 daily limit are observed, but these occur near the source (hauling road). Predicted incremental NO_2 concentrations due to truck hauling activities are predicted to be low beyond 1km from the road.
- Impacts will be cumulative in nature.

The choice of mitigation measures will depend on the availability of resources, practicality, effectiveness and affordability. Therefore, it is recommended that a dust management plan is developed for the site, incorporating mitigation measures as discussed in the Air Quality Impact Assessment report and EMP (Rayten, 2016) – see APPENDIX K 8.

Table 46: Summary of predicted maximum modelled incremental concentrations at the sensitive receptor located on portion 17 & 20 of farm Schurvekop during the construction and operation phase (Rayten, 2016)

POLLUTANT	AVERAGING TIME	MAXIMUM MODELLED CONCENTRATION (µG/M3) (3)	COMPLIANCE AIR QUALITY STANDARD (µG/M3)
Construction Phase			
Dust Fallout(1)	Daily	180	600(2)
PM_{10}	Daily	>120	75
	Annual	15.74	40
$PM_{2.5}$	Daily	20.56	40
	Annual	0.95	20
Operational Phase			

POLLUTANT	AVERAGING TIME	MAXIMUM MODELLED CONCENTRATION (µG/M3) (3)	COMPLIANCE AIR QUALITY STANDARD (µG/M3)
Dust Fallout(1)	Daily	190	600(2)
PM_{10}	Daily	>120	75
	Annual	20.11	40
$PM_{2.5}$	Daily	17.7	40
	Annual	1.49	20
SO_2	Hourly	<0.01	350
	Daily	Negligible	125
	Annual	Negligible	50
NO_2	Hourly	8.69	200
	Annual	0.44	40
CO	Hourly	3.71	30 000
	8- hourly	3.12	10 000

Notes:
(1) Dust fallout given in $mg/m^2/day$
(2) Residential area dust fallout standard
(3) At an identified point at the receptor

Table 47: Summary of Predicted Dust Fallout Concentrations (Rayten, 2016)

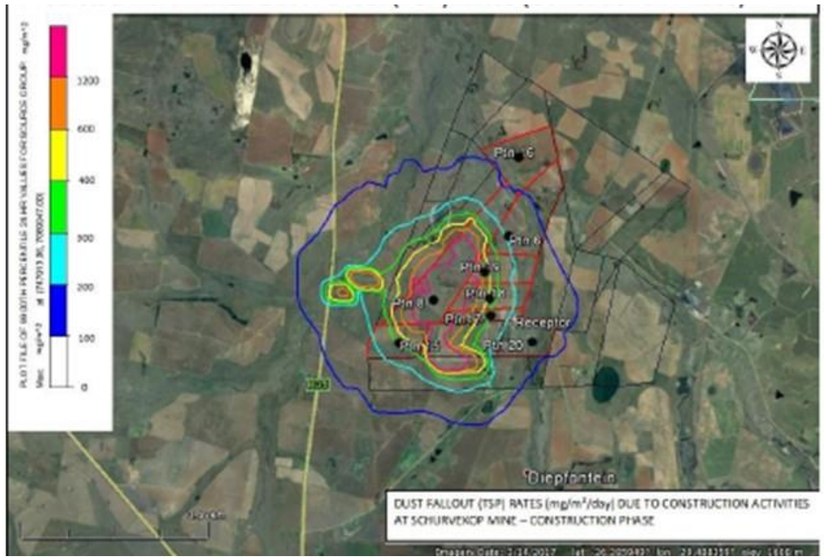
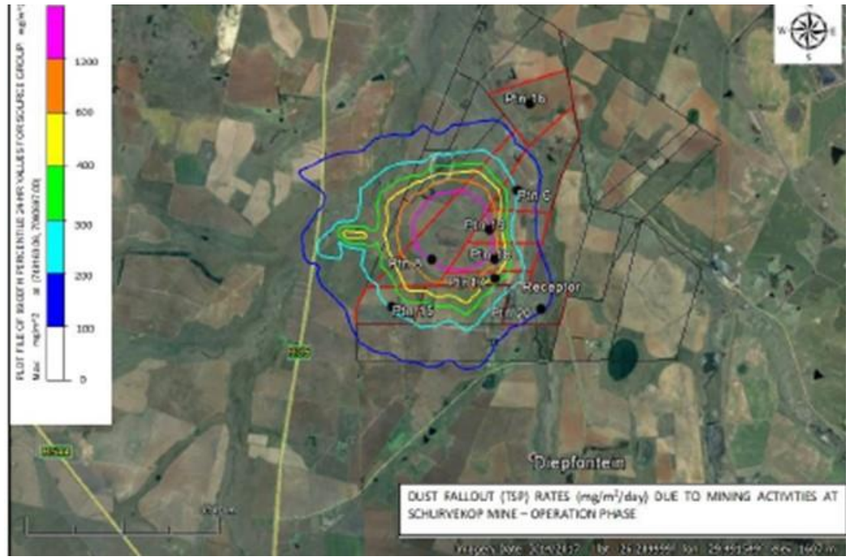
Construction	Operational
	

Table 48: Summary of Predicted Incremental PM_{10} Concentrations (Rayten, 2016)

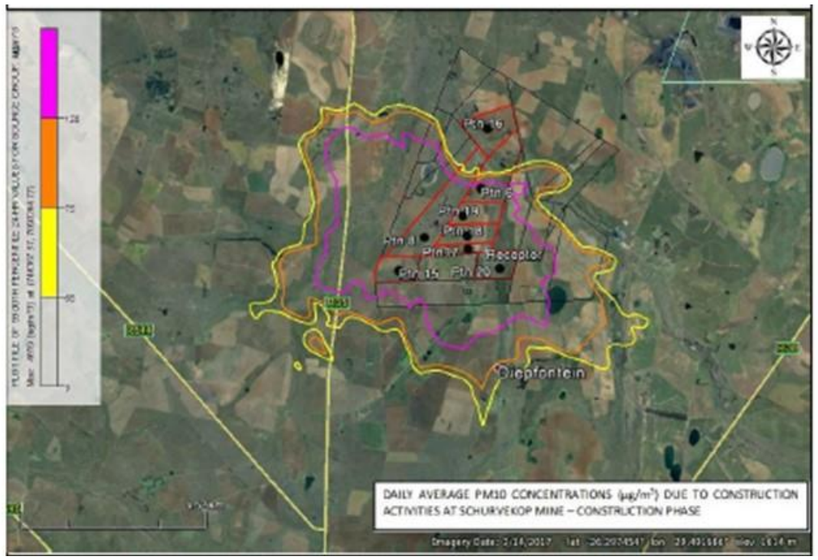
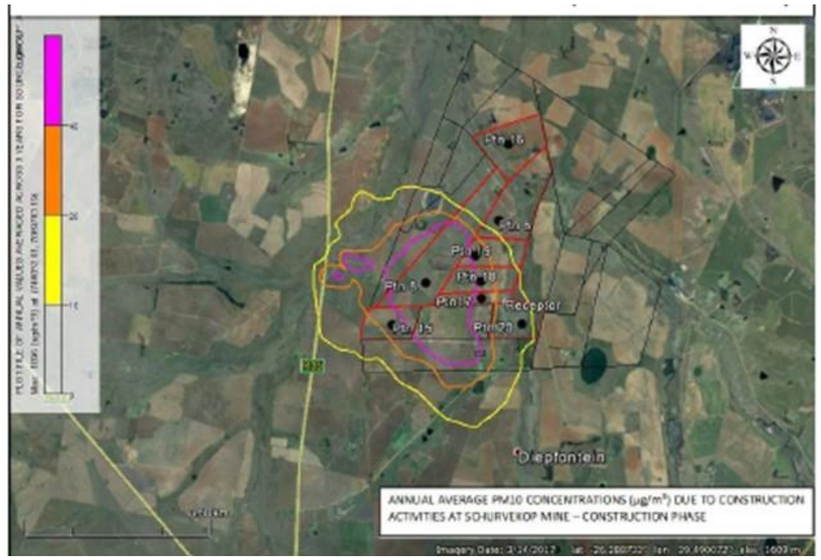
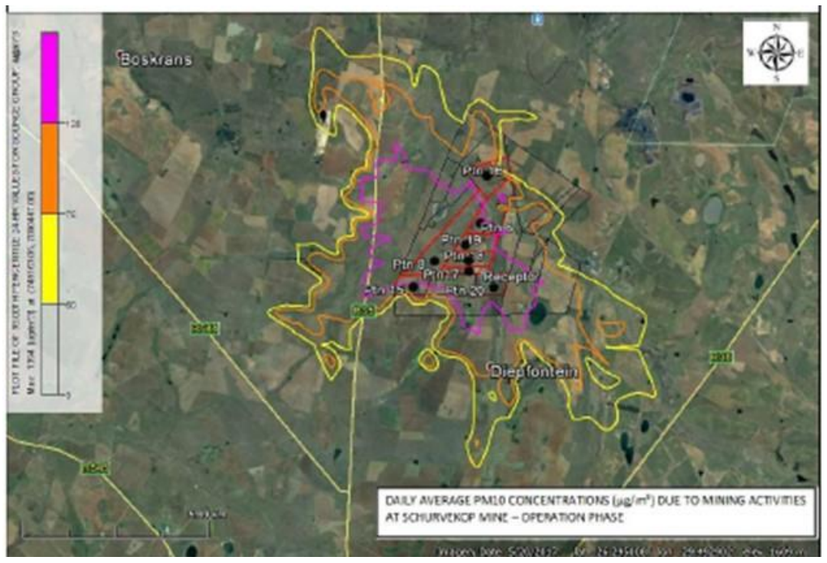
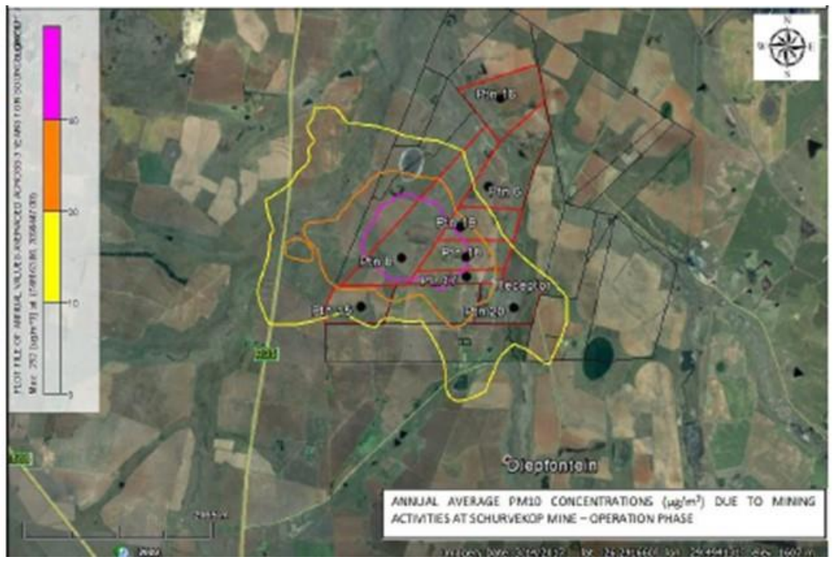
	Daily	Annual
Construction		
Operational		

Table 49: Summary of Predicted Incremental $PM_{2.5}$ Concentrations (Rayten, 2016)

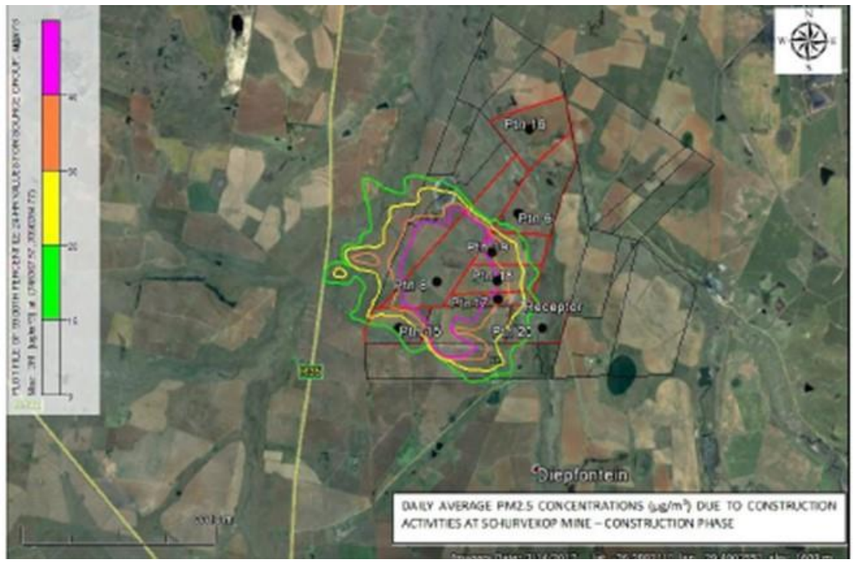
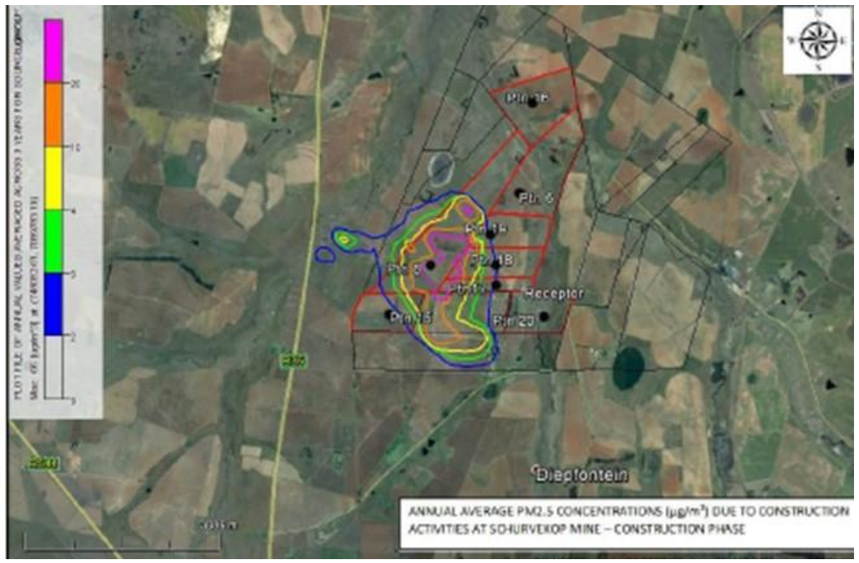
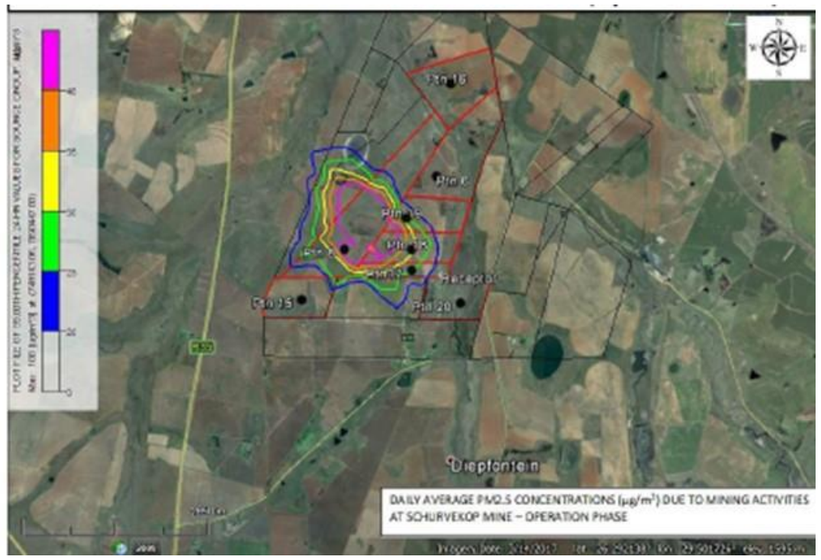
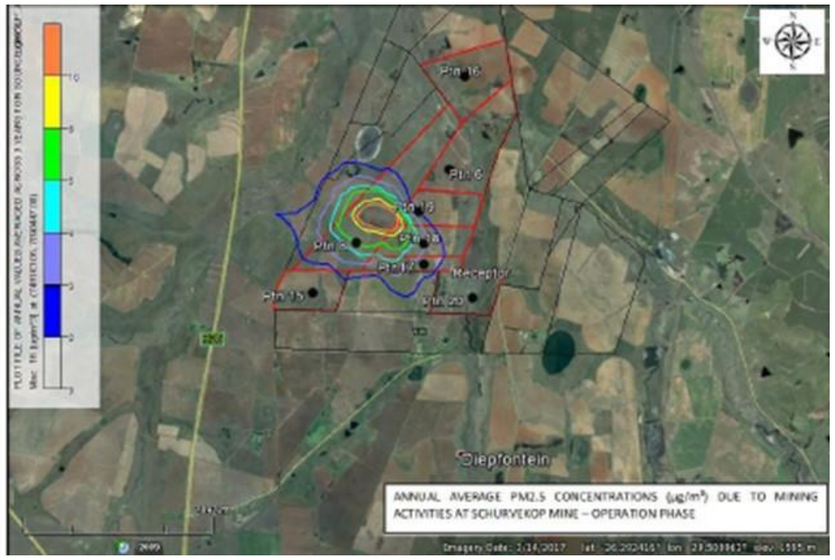
	Daily	Annual
Construction		
Operational		

Table 50: Summary of Predicted SO_2 Concentrations to operational activities (Rayten, 2016)

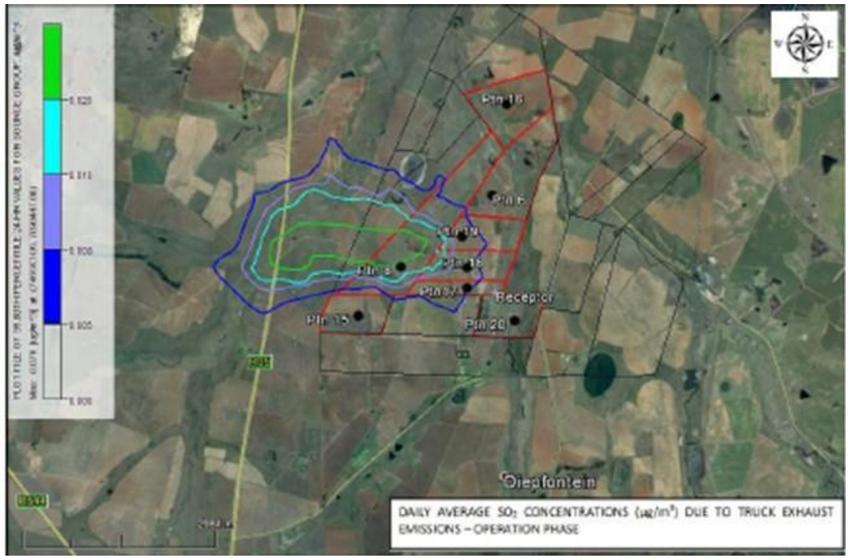
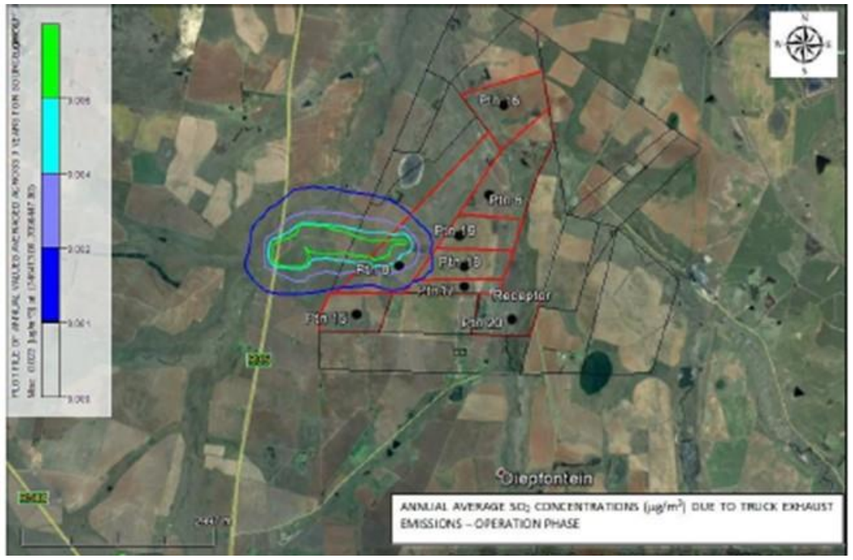
Daily	Annual
	

Table 51: Summary of Predicted NO_x Concentrations to operational activities (Rayten, 2016)

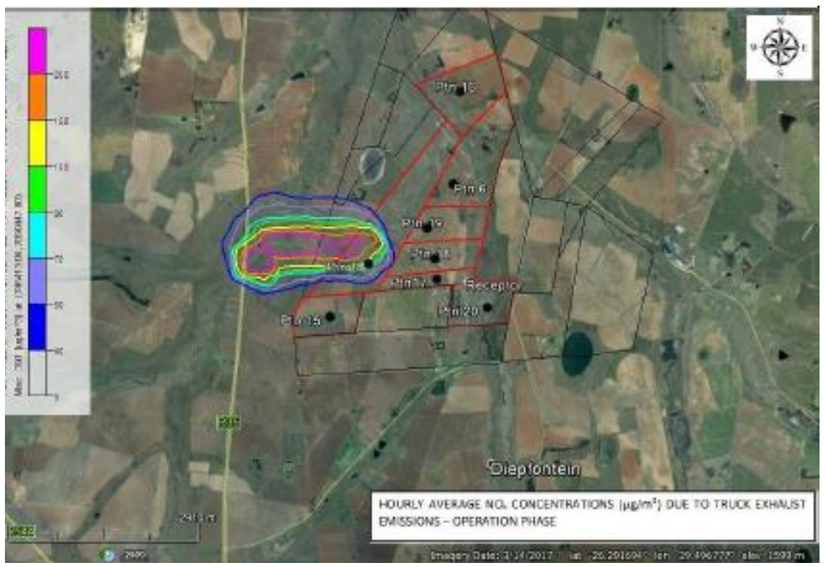
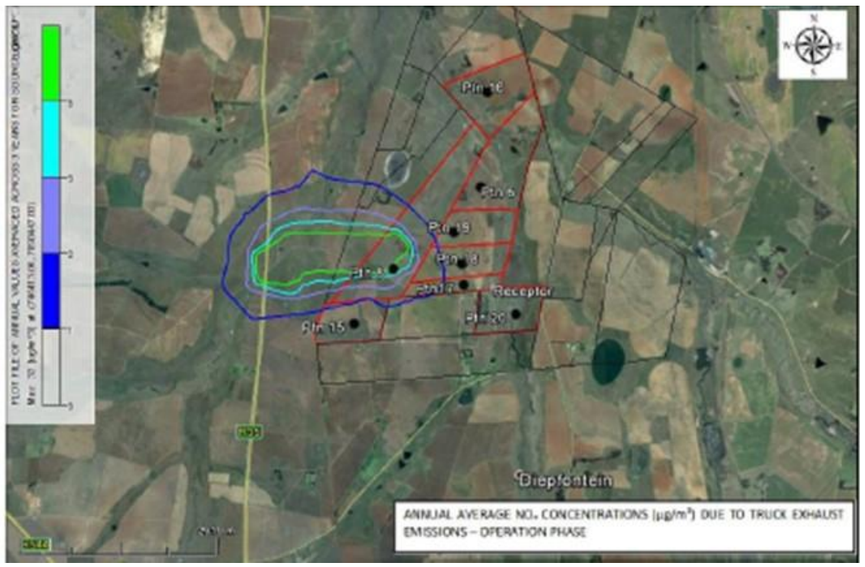
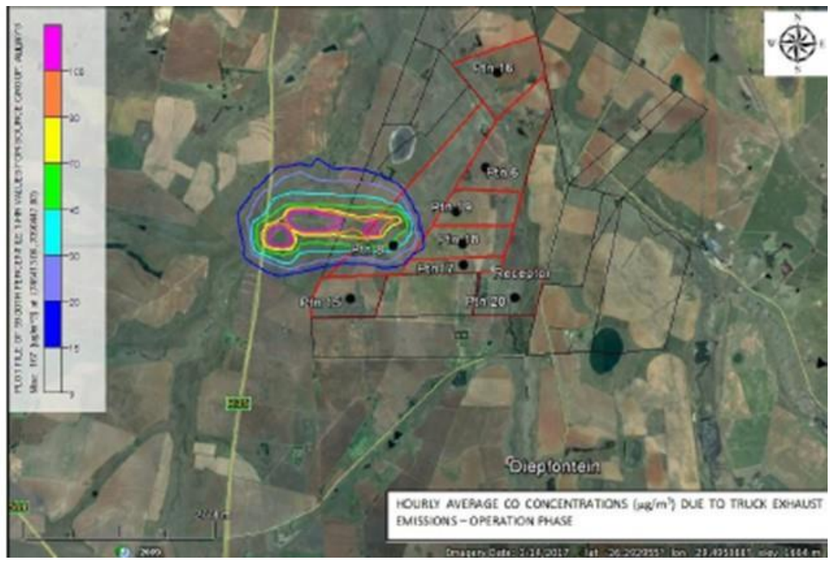
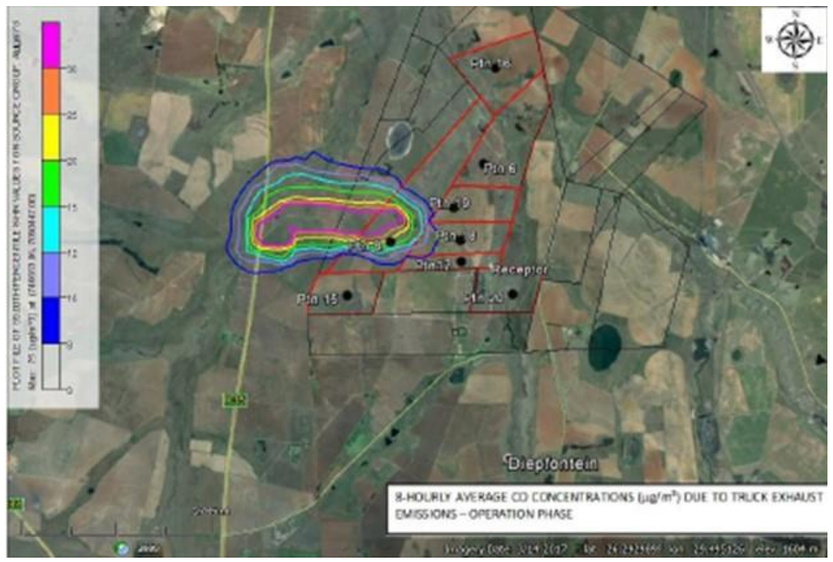
1 Hour	Annual
	

Table 52: Summary of Predicted CO Concentrations to operational activities (Rayten, 2016)

1 Hour	Annual
	

11.3.9 Environmental Noise

A noise model (worst case scenario) was developed considering the conceptual activities proposed for the Schurvekop Mine. Based on the noise models (Table 53 and Table 54), it was determined that the potential noise impacts at the project would be:

- of a low significance for daytime construction activities;
- of a low significance for night-time construction activities;
- of a low significance for daytime operational activities; and
- of a low significance for night-time operational activities.

The mining activity may be audible up to 2,000 m from the project at night and it is possible that the mining activities will raise the ambient sound levels slightly at the closest NSR. While mining noises may be audible, it is not expected that noise complaints will be registered. While additional mitigation measures are not required, general measures are recommended to ensure the that annoyance with the Project are minimised.

Final decommissioning activities will have a noise impact lower than either the construction or operational phases. This is because decommissioning and closure activities normally take place during the day using minimal equipment (due to the decreased urgency of the project).

Please refer to APPENDIX K 9 for the detailed study.

Table 53: Modelled worst case scenario noise rating levels during the Construction Phase (E.A.R, 2022)

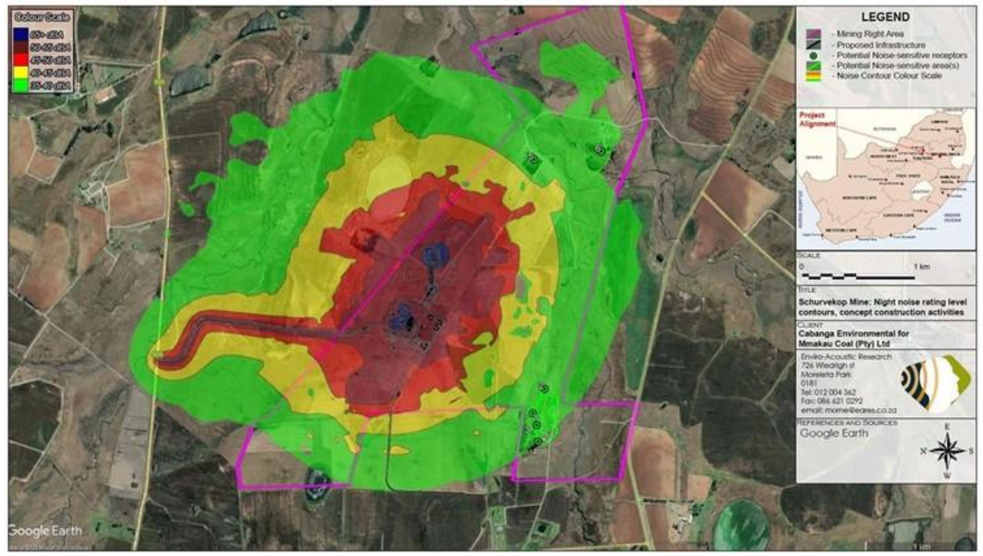
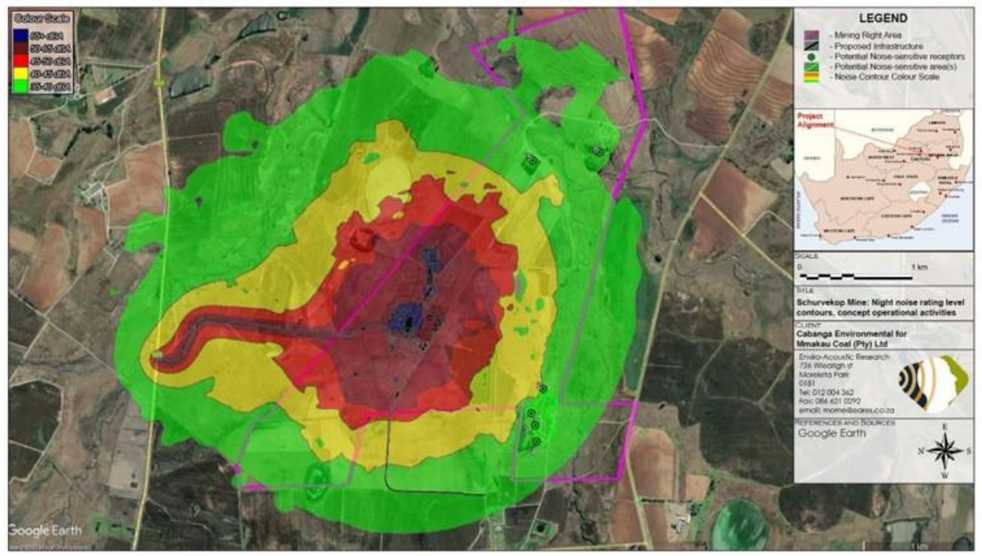
Daytime	Night-time
	

Table 54: Modelled worst case scenario noise rating levels during the Operational Phase (E.A.R, 2022)

Daytime	Night-time
	

11.3.10 Visual Aesthetics

Impacts to views are the highest when viewers are identified as being sensitive to change in the landscape, and their views are focused on and dominated by the change. Visual impacts occur when changes in the landscape are noticeable to viewers looking at the landscape from their homes or travel routes, and important cultural features and historic sites, especially in foreground views. Sensitivity to the proposed Project was considered to be Moderate primarily due to the existing mining activities within the study area as well as the surrounding areas (Green Tree Consulting, 2022). The proposed project will not be contrasting to the existing land use, but will also not be absorbed by the current mining activities, and will be noticeable from sensitive viewing points.

Sensitive viewers that were identified include the Schurvekop Community, the surrounding farmers, such as the Bosman Boerdery, and the farm workers. The Schurvekop Community will have a foreground view of the proposed Project and, unless mitigated, will have a clear to partially screened view (Green Tree Consulting, 2022).

During construction the significance of the visual impact will be moderate and will become high as the Project enters the operational phase and the MRF and overburden dump increase in height and become more visible. During decommissioning and closure the visual impact will decrease to moderate as the mining structures and infrastructure is removed, the MRF is cladded and vegetated, and the areas disturbed by mining rehabilitated (Green Tree Consulting, 2022).

Mitigation measures will be viable during the first phases of construction but as the structures increase in height the mitigation measures will be less effective. Good housekeeping will be essential as this will mitigate visual impacts to some extent (Green Tree Consulting, 2022).

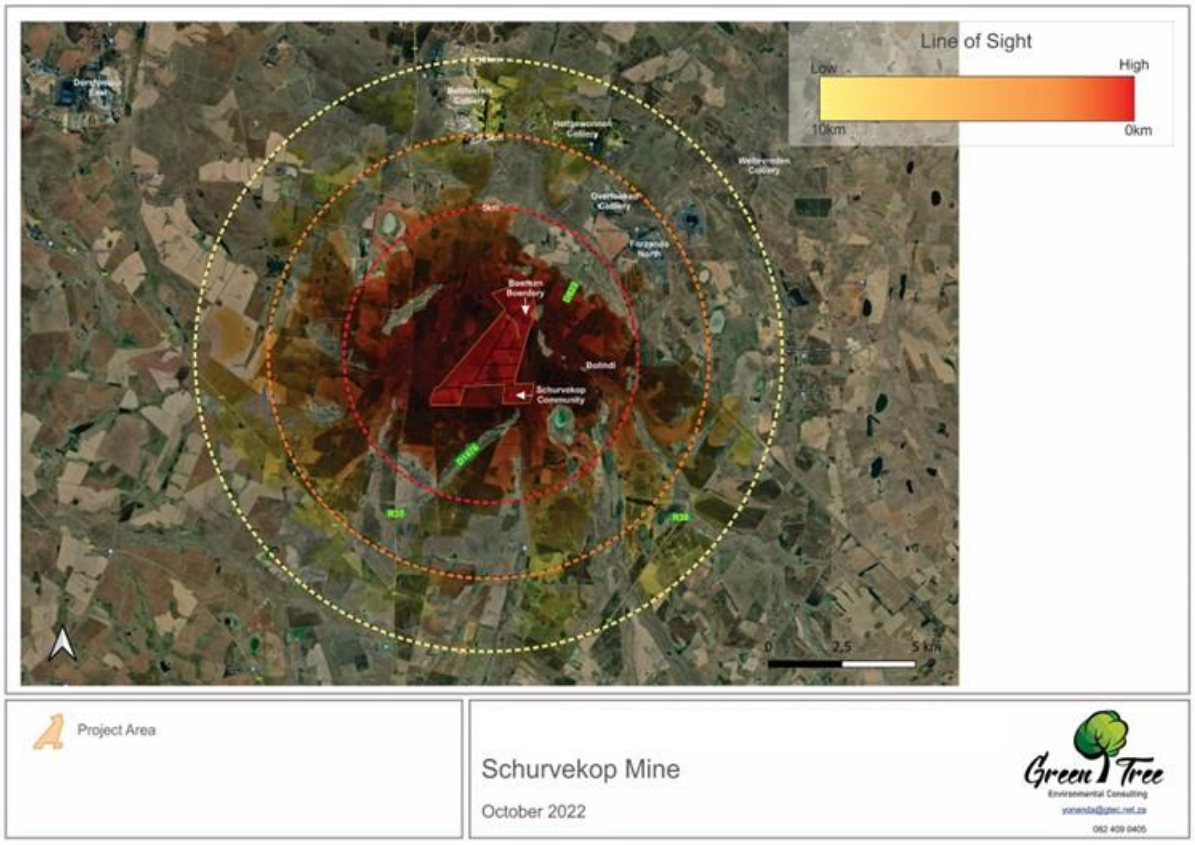


Figure 44: Line of Sight (viewshed) (Green Tree Consulting, 2022)

11.3.11 Social / Socio-economic

Positive socio-economic impacts associated with the proposed Project are generally economic in nature and relate to employment, procurement, and skills development. The expectations of the proposed Project from the local authorities and community are high. Furthermore, the expectation for the proposed Mine to support a range of social and development initiatives is significant (Niara, 2022).

Negative impacts in the construction and operational phases are associated with the influx of people seeking employment opportunities. An influx of people into the area may introduce a wide range of concerns, including:

- Increased use of land and demand for already inadequate community housing, water, sanitation;
- Potential increase for communicable diseases like tuberculosis (TB), and Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome (HIV/AIDS);
- Added burden to the limited emergency services and health care infrastructure due to an increase in illness, trauma and accidents; and
- Increased potential for road accidents and collisions (Niara, 2022).

Access to healthcare is a challenge for rural communities such as the local farmers and Schurvekop community, as they reside approximately 20km from the nearest healthcare

service point (Bethal Clinic). In the area surrounding the proposed Schurvekop Mine, healthcare provision is mainly in the form of mobile clinics which visit the community once a week. Emergency services are limited (Niara, 2022).

During the decommissioning and closure phase negative impacts will be associated with retrenchments/job losses.

11.3.12 Traffic and Transport

The current demand on the existing road network in the vicinity of the site is low and the road network and intersections operate at acceptable levels of service.

It is expected that the construction stage of the proposed development will generate the most vehicular trips as opposed to the operational stage. The majority of the construction vehicles and abnormal loads (if any) will come from Bethal in the south on the R35 - approximately 67 vehicles during the peak hours are anticipated (Sturgeon Consulting , 2017).

During construction, the road surface of the R35 may require maintenance at regular intervals. Access to the site will be off the R35 national road via the existing farm access road which will need upgrading. Additional right and left turning lanes (including deceleration lanes) will be necessary at this intersection and a tarred surface leading into the site is recommended (Sturgeon Consulting , 2017).

However, once construction is completed, the day to day operation of the proposed mine will generate relatively low traffic volumes which can be easily be accommodated by the existing road surface. The number of permanent staff on site is not expected to be more than 279 people, therefore, no additional upgrades are required to the R35 to accommodate the operational site staff. During the operational stage, the mine will generate approximately 25 vehicles per hour (vph) during the peak hours. The current daily traffic along the R35 is approximately 3 150 vehicles (± 315 vph, two-way) and along the D1476 approximately 11 vehicles (± 1 vph) (Sturgeon Consulting , 2017).

It is also recommended that the developer/client negotiate a chartered contract with existing minibus taxi or bus operators to transport the majority of the workers during the different stages of the development (Sturgeon Consulting , 2017).

Cumulative impacts are considered to be Moderate to Low.

11.3.13 Blast and Vibrations

Blasting activities are limited to the construction of the boxcut adit.

The three main effects of blasting, vibration, air blast and fly rock), have been modelled at the maximum charge mass of 1 360kg (BM&C, 2017). The results of which are discussed below.

11.3.13.1 Ground vibration

Structures identified outside of the box-cut area ranged from the Farm Buildings, Grave yard, Power lines, cement dam and Viskuile River that are close to the box-cut and the Usutu Pipeline that are relatively far from the Box-cut area. Structure conditions ranged from industrial construction to poor condition old structures. There is no main concern with regards to ground vibration for these structures. The nearest public houses are located 598 m from the box-cut boundary. The levels predicted do show low levels of ground vibration that could be

experienced as unpleasant at the maximum charge on the human perception scale. The ground vibration levels predicted ranged between 0.6 mm/s and 18.7 mm/s for structures surrounding the box-cut area. Ground vibration levels at the nearest buildings where people may be present is 11.5 mm/s. None of the structures considered in the evaluation showed any concern for possible damages (BM&C, 2017).

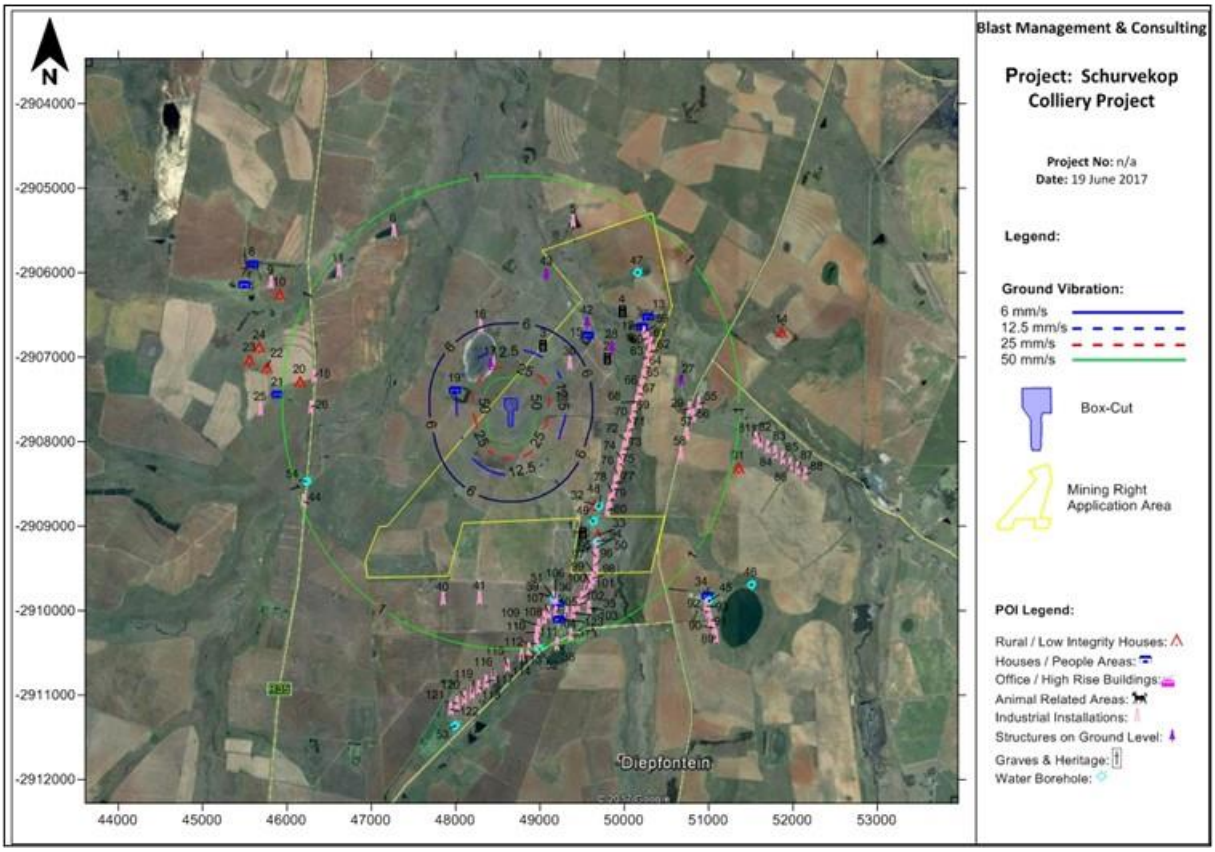


Figure 45: Ground vibration influence from maximum charge (BM&C, 2017)

Considering the effect of ground vibration with regards to human perception, vibration levels calculated were applied to an average of 30Hz frequency and plotted with expected human perceptions on the safe blasting criteria graph (see Figure 46 below). Data applicable to human response only is plotted. The frequency range selected is the expected average range for frequencies that will be measured for ground vibration when blasting is done. From Figure 46 it can be seen that the ground vibration levels predicted is expected to be greater than the perceptible level but mostly less than the unpleasant level. People at the nearest farmhouse may experience ground vibration levels as unpleasant. This analysis of vibration levels is only associated with POI where people may live or congregate.

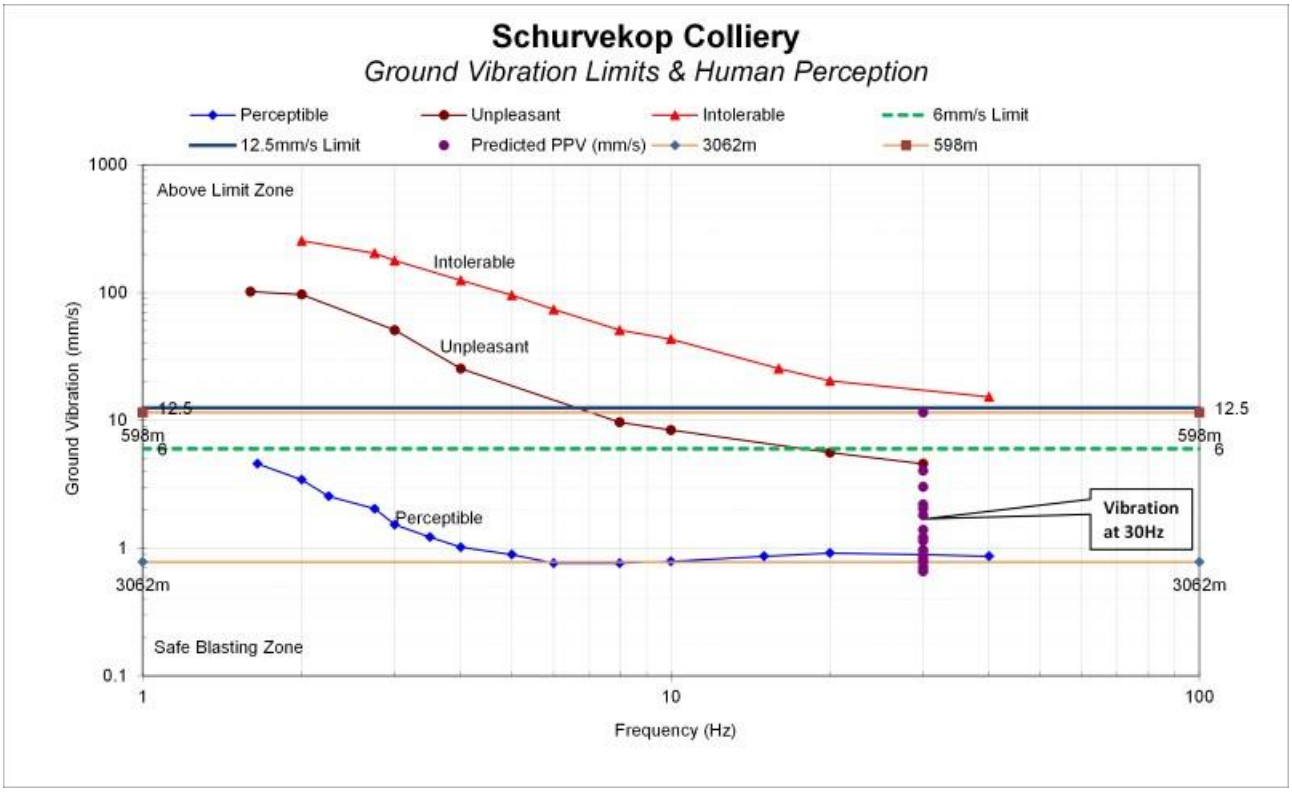


Figure 46: The effect of ground vibration with human perception and vibration limits (BM&C, 2017)

The R35 Provincial road is located 2272 m from the box-cut area. The expected levels of ground vibration are well within the limits for this road. No specific actions are required for this road. Gravel roads linking farm areas are within 2041 m of the box-cut area. These routes are specifically of concern when blasting is done. There may be people and animals on these routes and will require careful planning to maintain a safe blasting radius (BM&C, 2017).

Ground vibration and air blast generally upset people living in the vicinity of mining operations. The nearest settlement of people is buildings approximately 598 m from the planned operation. These settlements are located such that levels of ground vibration predicted may be perceptible and unpleasant but not damaging (BM&C, 2017).

The importance of good public relations cannot be over-stressed. People tend to react negatively on experiencing effects from blasting such as ground vibration and air blast. Even at low levels when damage to structures is out of the question it may upset people. Proper and appropriate communication with neighbours about blasting, monitoring and control will be required (BM&C, 2017).

11.3.13.2 Air Blast

Air blast levels predicted for the maximum charge ranges between 116.7 and 131.8 dB for all the points of interest considered. This includes the nearest points such as the Buildings and Farm Buildings. These levels may contribute to effects such as rattling of roofs or doors or windows but are not expected to be damaging. As indicated above there is a high probability that

effects due to air blast could lead to complaints. The current accepted limit on air blast is 134 dB. Damages are only expected to occur at levels greater than 134dB. Levels from prediction done indicate that air blast will only be greater than 134 dB at distance of 447 m from the box-cut boundary. There are no private structures in this area that are of concern. All private structures are further away. The nearest buildings are 598 m from the box-cut boundary. Infrastructure such as the Pan and Graveyard are close to the box-cut boundary but air blast does not have any influence on these installations (BM&C, 2017).

Complaints from air blast are normally based on the actual effects that are experienced due to rattling of roof, windows, doors etc. These effects could startle people and raise concern of possible damage.

The calculations for air blast is based on the use of basic rules for stemming length and stemming material. It is maintained that if stemming control is not exercised this effect could be greater with greater range of complaints or damage. The box-cut is located such that "free blasting" – meaning no controls on blast preparation – will not be possible. (BM&C, 2017).

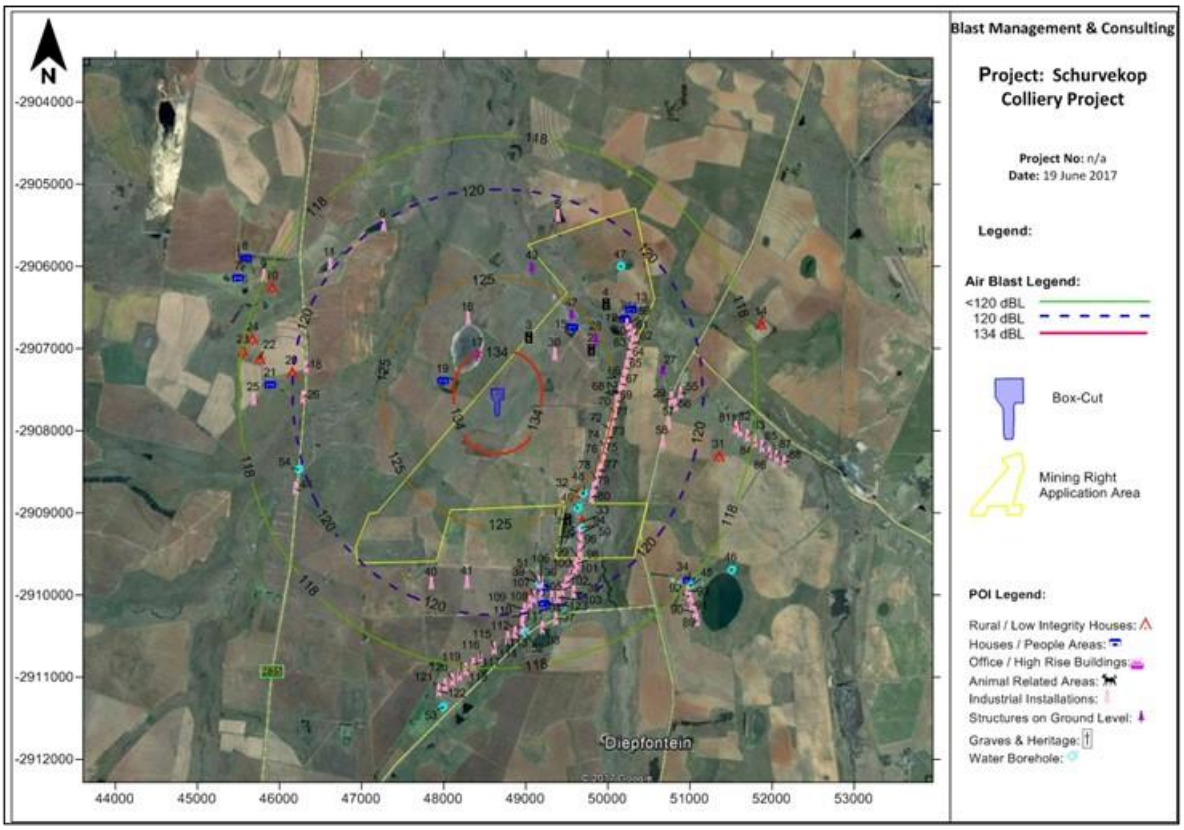


Figure 47: Air blast influence from maximum charge (BM&C, 2017)

11.3.13.3 Fly Rock

The occurrence of fly rock in any form will have a negative impact if found to travel outside the unsafe zone. This unsafe zone may be anything between 10m or 1 000m. A general unsafe zone is normally considered to be within a radius of 500 m from the blast; but needs to be qualified and determined as best possible.

Calculations are used to help and assist determining safe distances. A safe distance from blasting is calculated following rules and guidelines from the International Society of Explosives Engineers (ISEE) Blasters Handbook. Using this calculation the minimum safe distances can be determined that should be cleared of people, animals and equipment. Figure 48 shows the results from the ISEE calculations for fly rock range based on a 140 mm diameter blast hole and 3.5 m stemming length. Based on these values a possible fly rock range with a safety factor of 2 was calculated to be 172 m. The absolute minimum unsafe zone is then the 172 m. This calculation is a guideline and any distance cleared should not be less. The occurrence of fly rock can however never be 100% excluded. Best practices should be implemented at all times. The occurrence of fly rock can be mitigated but the possibility of the occurrence thereof can never be eliminated. Figure 47 shows the area around the box-cut that incorporates the 172m unsafe zone (BM&C, 2017).

Review of the calculated unsafe zone showed no POI's within the unsafe zone (BM&C, 2017).

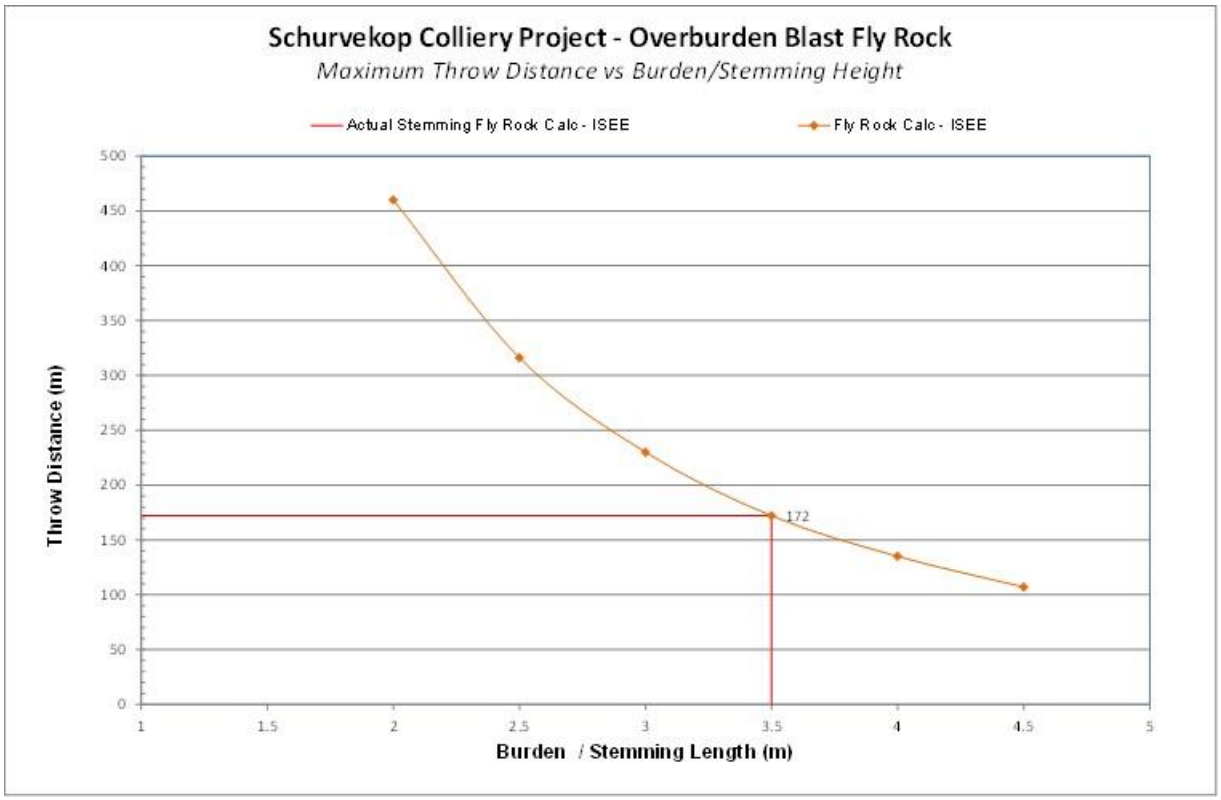


Figure 48: Fly rock prediction calculation (BM&C, 2017)

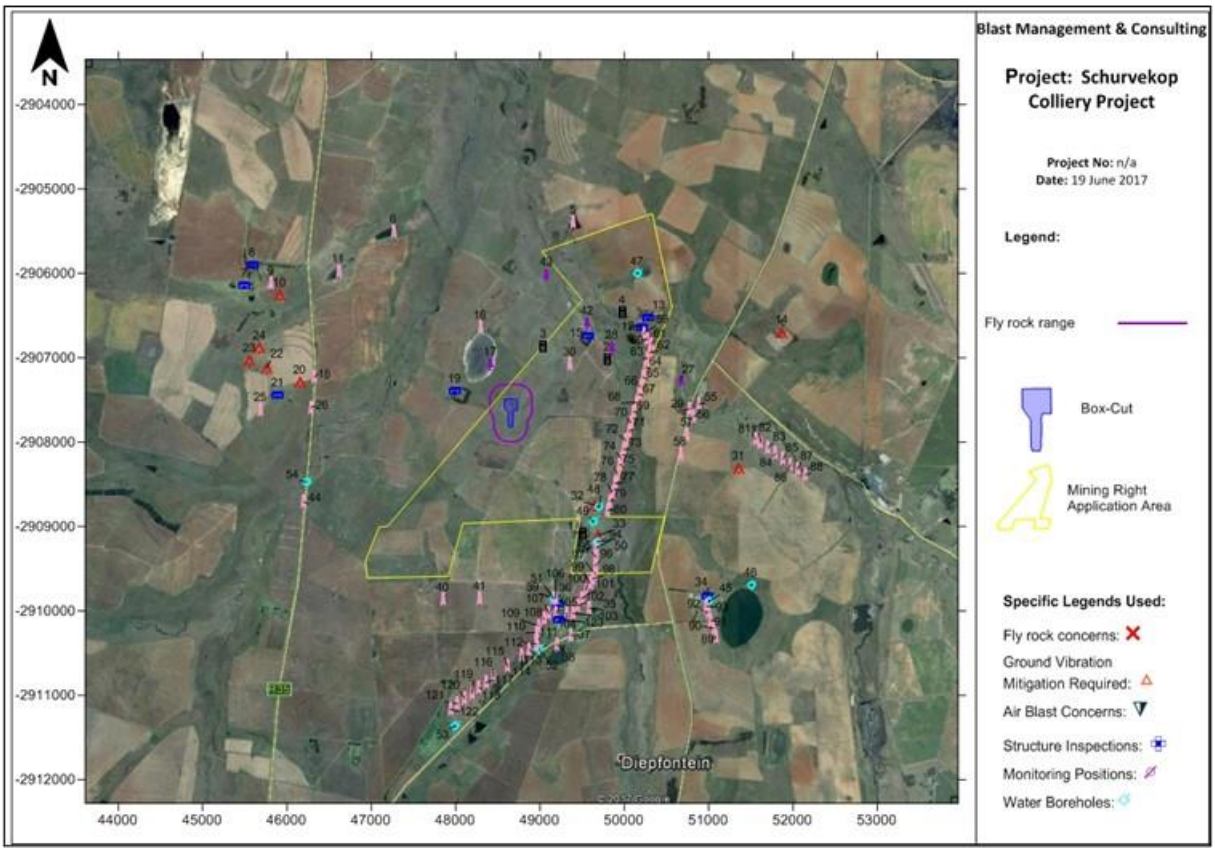


Figure 49: Predicted fly rock exclusion zone (BM&C, 2017)

Table 55: Impact Assessment

No.	Activity	Impact Description	Aspect	Applicable Mine Phase	STATUS	Duration	Extent	Magnitude	Reversibility	CONSEQUENCE	PROBABILITY	SIGNIFICANCE (pre-mitigation)	Degree of Loss of Resource	Mitigation possible?	Duration	Extent	Magnitude	Reversibility	CONSEQUENCE	PROBABILITY	SIGNIFICANCE (post-mitigation)
1	Clearance of vegetation, stripping and stockpiling of topsoil. Earthworks, civil works and construction of infrastructure, services and roads. Commencement of operations.	Alteration of topography.	Topography	Construction, Operation & Decommissioning	Neg	5	1	5	3	14	5	70	-	YES	5	1	3	3	12	5	60
		Loss of agricultural land and / or loss of agricultural potential.	Soil, Land Use & Land Capability	Construction	Neg	5	2	4	5	16	4	64	High	YES	3	1	1	2	7	3	21
		Loss of topsoil - Increased potential for erosion.	Soil, Land Use & Land Capability	Construction, Operation & Decommissioning	Neg	5	1	5	3	14	4	56	Low	Yes	5	1	5	3	14	2	28
		Change in Land Use.	Soil, Land Use & Land Capability	Construction, Operation & Decommissioning	Neg	3	1	3	3	10	5	50	High	NO	3	1	3	3	10	5	50
		Compaction and alteration of soil characteristics.	Soil & Land Capability	Construction, Operation, Decommissioning	Neg	3	1	2	3	9	3	27	Low	YES	1	1	2	3	7	2	14
		Altered hydrological regime.	Surface water & associated wetlands & aquatic ecosystems	Construction	Neg	4	2	4	3	13	4	52	Mod	YES	3	2	3	2	10	3	30
		Loss of wetlands.	Wetlands & Aquatics	Construction	Neg	5	3	5	4	17	5	85	High	NO	5	3	5	4	17	5	85
		Deterioration of water quality of wetlands and rivers due to activities and runoff of contaminants into the environment.	Surface water & associated wetlands & aquatic ecosystems	Construction, Operation, Decommissioning	Neg	3	3	4	3	13	4	52	Mod	YES	3	2	3	2	10	3	30
		Runoff, erosion and sedimentation of water resources.	Surface water & associated wetlands & aquatic ecosystems	Construction, Operation & Decommissioning	Neg	3	3	3	2	11	4	44	Mod	YES	1	2	3	2	8	3	24
		Destruction of SCC.	Flora & Fauna	Construction	Neg	5	2	5	3	15	4	60	High	YES	5	2	3	3	13	3	39
		Loss of habitat.	Flora & Fauna	Construction	Neg	4	2	5	5	16	5	80	Mod	YES	3	1	3	3	10	5	50
		Direct mortality of fauna.	Flora & Fauna	Construction	Neg	3	3	4	5	15	4	60	High	YES	3	1	2	5	11	3	33
		Reduced dispersal/migration of fauna.	Flora & Fauna	Construction	Neg	3	2	4	3	12	4	48	Mod	YES	3	1	2	3	9	3	27
		Staff interacting directly with potentially dangerous fauna (snakes, bush pigs, bulls).	Flora & Fauna, Health & Safety	Construction, Operation & Decommissioning	Neg	3	1	4	3	11	2	22		YES	3	1	1	3	8	1	8
		Disruption/alteration of ecological life cycles (breeding, migration, feeding).	Flora & Fauna	Construction	Neg	3	2	4	2	11	4	44	Mod	YES	3	2	2	1	8	3	24
		Spread and/or establishment of alien and/or invasive plants and resultant impacts on surrounding natural vegetation.	Flora & Fauna	Construction, Operation, Decommissioning & Closure	Neg	3	2	5	4	14	4	56	Mod	YES	2	1	3	3	9	2	18

No.	Activity	Impact Description	Aspect	Applicable Mine Phase	STATUS	Duration	Extent	Magnitude	Reversibility	CONSEQUENCE	PROBABILITY	SIGNIFICANCE (pre-mitigation)	Degree of Loss of Resource	Mitigation possible?	Duration	Extent	Magnitude	Reversibility	CONSEQUENCE	PROBABILITY	SIGNIFICANCE (post-mitigation)
		Loss of and disturbance to archaeological, paleontological and heritage sites.	Heritage & Paleontological	Construction	Neg	5	2	5	5	17	2	34	High	YES	3	2	5	5	15	1	15
		Deterioration in visual aesthetics and sense of place	Visual Aesthetic & Social	Construction	Neg	1	2	3	3	9	5	45	-	YES	1	2	3	3	9	3	27
		Dust generation and particulate matter.	Air Quality	Construction, Operation & Decommissioning	Neg	3	2	3	3	11	3	33	Mod	YES	3	2	2	3	10	3	30
		Gaseous emissions from machinery and vehicles.	Air Quality	Construction, Operation & Decommissioning	Neg	3	2	3	3	11	3	33	Mod	YES	3	2	2	3	10	3	30
		Increase in environmental noise levels (day time) due to construction activities.	Noise, Social	Construction	Neg	1	2	2	1	6	1	6		YES	1	1	2	1	5	1	5
		Increase in environmental noise levels (night-time) due to construction activities.	Noise, Social	Construction	Neg	1	2	3	1	7	2	14		YES	1	2	2	1	6	2	12
		Increase in communicable and non-communicable diseases.	Social, Health & Safety	Construction, Operation & Decommissioning	Neg	3	2	3	5	13	2	26	YES	YES	3	2	1	5	11	2	22
		Influx or movement of labour into the area will pose an increased risk for sexually transmitted infections, including HIV/AIDS.	Social, Health & Safety	Construction, Operation & Decommissioning	Neg	3	3	5	5	16	4	64		YES	3	3	3	5	14	3	42
		The Project may influence nutritional indicators in the study area through an influx of job seekers, change of livelihoods and practices.	Social, Health & Safety	Construction, Operation & Decommissioning	Neg	3	2	3	3	11	4	44	YES	YES	3	3	1	3	10	4	40
		Soil, water and waste related diseases.	Social, Health & Safety	Construction, Operation, Decommissioning	Neg	3	3	5	5	16	4	64		YES	3	3	3	5	14	3	42
		Physical injuries at the workplace, road traffic incidences and other accidental injuries. Resultant health system issues (increased pressure on health services and infrastructure).	Social, Traffic & Transport	Construction, Operation & Decommissioning	Neg	3	3	5	5	16	4	64		YES	3	3	3	5	13	3	39
		Employment opportunities, change in median household income, skills development and social determinants of health.	Socio-economic	Construction, Operation	Pos	3	3	5	3	14	5	70	-	-	3	3	5	3	14	5	70
2	Boxcut excavation and associated blasting	Impaired water quality through sedimentation and chemical contamination.	Surface water & associated wetlands & aquatic ecosystems	Construction	Neg	3	3	4	3	13	4	52	Mod	YES	3	2	3	2	10	3	30
		Ground vibration impact on boreholes.	Groundwater	Construction	Neg	1	2	1	1	5	1	5	High	YES	1	2	1	1	5	1	5
		Air blast impact on boreholes.	Groundwater	Construction	Neg	1	2	0	1	4	1	4	High	YES	1	2	0	1	4	0	0
		Direct mortality of fauna.	Flora & Fauna	Construction	Neg	3	3	4	5	15	4	60	High	YES	3	1	2	5	11	3	33

No.	Activity	Impact Description	Aspect	Applicable Mine Phase	STATUS	Duration	Extent	Magnitude	Reversibility	CONSEQUENCE	PROBABILITY	SIGNIFICANCE (pre-mitigation)	Degree of Loss of Resource	Mitigation possible?	Duration	Extent	Magnitude	Reversibility	CONSEQUENCE	PROBABILITY	SIGNIFICANCE (post-mitigation)
		Ground vibration impact on graves, pylons, roads & pipeline.	Heritage, Social, Health & Safety	Construction	Neg	1	2	1	1	5	1	5	-	YES	1	2	1	1	5	1	5
		Air blast impact on graves, pylons, roads & pipeline.	Heritage, Social, Health & Safety	Construction	Neg	1	2	1	1	5	1	5	-	YES	1	2	0	1	4	0	0
		Fly rock impact on graves, pylons, roads & pipeline.	Heritage, Social, Health & Safety	Construction	Neg	1	2	1	1	5	1	5	-	YES	1	2	0	1	4	0	0
		Dust generation from blasting.	Air Quality	Construction	Neg	1	2	4	3	10	5	50	Mod	YES	1	1	3	3	8	3	24
		Destruction of palaeontological records.	Palaeontology	Construction	Neg	5	2	2	5	14	1	14		NO	5	2	2	5	14	1	14
		Ground vibration impact on nearby farmsteads & houses.	Social, Health & Safety	Construction	Neg	1	2	1	1	5	2	10	-	YES	1	2	1	1	5	2	10
		Air blast impact on nearby farmsteads & houses.	Social, Health & Safety	Construction	Neg	1	2	2	1	6	3	18	-	YES	1	2	2	1	6	3	18
		Fly rock impact on nearby farmsteads & houses.	Social, Health & Safety	Construction	Neg	1	2	1	1	5	1	5	-	YES	1	2	1	1	5	1	5
3	Underground mining of coal including dewatering	Alteration of the geological nature and sequence.	Geology	Construction, Operation, Decommissioning	Neg	5	1	1	5	12	5	60	High	NO	5	1	1	5	12	5	60
		Alteration of topography and hydrological and geohydrological characteristics through potential subsidence of surface layers; leading to wetland loss.	Topography, Groundwater, Wetlands & Aquatics, Hydrology	Operation, Decommissioning, Closure, Post Closure	Neg	5	3	5	5	18	5	90	High	YES	3	2	3	4	12	3	36
		Potential creation of a cone of depression, due to active dewatering of the underground mining area.	Groundwater	Operation	Neg	3	2	3	3	11	5	55	High	YES	3	1	2	3	9	5	45
		Altered hydrological regime and flow of rivers due to active dewatering of the underground mining area.	Groundwater, Surface water, Wetlands & Aquatics,	Operation	Neg	4	2	4	3	13	4	52	High	YES	3	2	3	2	10	3	30
		Impacts on groundwater quality due to poor quality seepage from the mining area.	Groundwater	Operation	Neg	5	1	2	5	13	5	65	High	NO	5	1	2	5	13	5	65
		Destruction of palaeontological records.	Palaeontology	Operation	Neg	5	2	2	5	14	1	14		NO	5	2	2	5	14	1	14
4	Coal handling and stockpiling, including processing	Stockpiles will change the topographical nature of the area	Topography	Construction, Operation, Decommissioning	Neg	3	1	3	3	10	5	50	Mod	YES	3	1	1	3	8	5	40
		Soil pollution as a result of irresponsible handling of coal or generation of coal dust, coal spillages and coal dust deposition.	Soils & Land Capability	Construction, Operation	Neg	2	1	3	3	9	4	36	Low	YES	2	1	2	3	8	2	16
		Impacts on water quality due to poor quality seepage from the coal handling and stockpile areas via groundwater.	Groundwater	Operation, Decommissioning	Neg	5	2	1	5	13	3	39		YES	2	1	1	5	9	3	27

No.	Activity	Impact Description	Aspect	Applicable Mine Phase	STATUS	Duration	Extent	Magnitude	Reversibility	CONSEQUENCE	PROBABILITY	SIGNIFICANCE (pre-mitigation)	Degree of Loss of Resource	Mitigation possible?	Duration	Extent	Magnitude	Reversibility	CONSEQUENCE	PROBABILITY	SIGNIFICANCE (post-mitigation)
		Erosion via wind and water leading to sedimentation and pollution of water resources.	Surface water, Wetlands & Aquatics	Construction, Operation, Decommissioning	Neg	3	3	3	2	11	4	44	Mod	YES	3	2	3	2	10	3	30
		Runoff and spillages of dirty water into catchment.	Surface water, Wetlands & Aquatics	Operation, Decommissioning	Neg	3	3	3	3	12	4	48	Mod	YES	2	1	2	2	7	3	21
		Impaired water quality from coal fines and dust generation being deposited into wetlands and rivers.	Wetlands & Aquatics	Operation, Decommissioning	Neg	3	3	4	3	13	4	52	Mod	YES	3	2	3	2	10	3	30
		Potential for spontaneous combustion and associated emissions.	Air quality	Operation, Decommissioning	Neg	3	2	4	3	12	3	36		YES	1	1	2	3	7	2	14
		Impacts on water quality due to poor quality seepage from the surface pollution source areas .	Groundwater	Operation	Neg	5	2	1	5	13	3	39	YES	YES	2	1	1	5	9	3	27
		Cumulative dust, PM_{10} & $PM_{2.5}$ generation .	Air Quality	Construction, Operation, Decommissioning	Neg	3	2	4	5	14	5	70	Mod	YES	3	2	4	5	14	5	70
		Increase in environmental noise levels (day time) due to numerous, simultaneous operational activities.	Noise, Social	Operation	Neg	3	2	2	1	8	1	8		YES	3	2	1	1	7	1	7
		Increase in environmental noise levels (night-time) due to numerous, simultaneous operational activities.	Noise, Social	Operation	Neg	3	3	2	1	9	3	27		YES	3	3	1	1	8	3	24
5	Mine Residue Disposal	MRF will permanently alter the topographical nature of the area.	Topography & Visual aesthetics	Construction, Operation, Decommissioning, Closure, Post Closure	Neg	5	2	3	3	13	5	65	-	YES	5	2	3	3	13	3	39
		Uncontrolled runoff and spillages of dirty water into surrounding environment, leading to contamination of water resources.	Surface water, Wetlands & Aquatics	Construction, Operation, Decommissioning, Closure, Post Closure	Neg	3	3	3	3	12	4	48	-	YES	2	1	2	2	7	3	21
		Impacts on water quality due to poor quality seepage.	Groundwater	Construction, Operation, Decommissioning, Closure	Neg	5	2	1	5	13	3	39		YES	2	1	1	5	9	3	27
		Impacts on water quality due to poor quality seepage from the surface pollution source areas.	Groundwater	Operation	Neg	5	2	1	5	13	3	39	High	YES	2	1	1	5	9	3	27
		Potential for spontaneous combustion and associated emissions.	Air Quality	Operation	Neg	3	2	4	3	12	4	48	Mod	YES	1	1	2	3	7	2	14
6	Operation and maintenance of the stormwater management system & PCDs.	Altered hydrological regime (flow) of the rivers and local catchment.	Surface water, Wetlands & Aquatics	Construction, Operation, Decommissioning	Neg	4	2	4	3	13	4	52	Mod	YES	3	2	3	2	10	3	30
		Environmental pollution due to uncontrolled runoff in to	Flora & Fauna, Wetlands & Aquatics, Hydrology	Construction, Operation, Decommissioning	Neg	3	5	5	4	17	5	85	Mod	YES	3	1	3	3	10	2	20

No.	Activity	Impact Description	Aspect	Applicable Mine Phase	STATUS	Duration	Extent	Magnitude	Reversibility	CONSEQUENCE	PROBABILITY	SIGNIFICANCE (pre-mitigation)	Degree of Loss of Resource	Mitigation possible?	Duration	Extent	Magnitude	Reversibility	CONSEQUENCE	PROBABILITY	SIGNIFICANCE (post-mitigation)
		surrounding environment and water resources.																			
		Impacts on water quality due to poor quality seepage from the pollution source areas	Groundwater	Construction, Operation, Decommissioning	Neg	5	2	1	5	13	3	39		YES	2	1	1	5	9	3	27
7	Operation and movement of vehicles and machinery. Including access and hauling along roads.	Impaired water quality by hydrocarbon leaks / Spills.	Surface water & associated wetlands & aquatic ecosystems, Groundwater	Construction, Operation, Decommissioning	Neg	3	3	4	3	13	4	52	YES	YES	3	2	3	2	10	3	30
		Cumulative dust, PM_{10} & $PM_{2.5}$ generation.	Air Quality	Construction, Operation, Decommissioning, Rehabilitation	Neg	3	2	4	2	11	4	44	Mod	YES	3	2	2	2	9	4	36
		Increased risk of road traffic incidences.	Social, Traffic & Transport	Operation	Neg	3	3	5	5	16	2	32	YES	YES	3	3	3	5	14	2	28
		Emissions into the atmosphere through use of diesel powered equipment, machinery and vehicles: Nox SO2 and CO emissions.	Air Quality	Construction, Operation, Decommissioning, Rehabilitation	Neg	3	2	3	2	10	4	40		YES	3	1	1	1	6	4	24
		Increased potential for road incidences. Road degradation.	Traffic & safety	Construction, Operation, Decommissioning, Closure, Post Closure	Neg	1	2	2	1	6	4	24	-	YES	1	2	2	1	6	3	18
8	Substation, power transmission & Lighting	Direct mortality of fauna through increased collisions.	Flora & Fauna	Construction, Operation	Neg	3	3	4	5	15	4	60	High	YES	3	1	2	5	11	3	33
		Hindrance to nocturnal animals, including nocturnal birds and bats.	Flora & Fauna	Construction, Operation, Decommissioning	Neg	3	2	3	1	9	5	45	-	YES	3	2	1	1	7	4	28
		Increased visibility of the site.	Visual Aesthetic	Construction, Operation	Neg	3	2	3	1	9	5	45	-	YES	3	2	1	1	7	4	28
		Potential danger to surrounding communities.	Social, Health & Safety	Construction, Operation	Neg	5	1	5	5	16	3	48	-	YES	5	1	5	5	16	1	16
9	Water Supply and storage (potable and process)	Irresponsible use of water and water wastage.	Surface water & associated wetlands & aquatic ecosystems	Construction, Operation, Decommissioning	Neg	3	3	5	3	14	3	42	Mod	YES	3	2	2	2	9	2	18
10	Waste generation, handling & storage	Potential surface contamination by litter and illegally dumped waste.	Soil & Land capability	Construction, Operation	Neg	2	1	2	3	8	2	16		YES	1	1	2	3	7	2	14
		Potential surface contamination which will impact surrounding areas through runoff and seepage.	Groundwater& Surface water & associated wetlands & aquatic ecosystems	Construction, Operation, Decommissioning	Neg	3	3	3	3	12	3	36		YES	1	2	3	3	9	1	9
		Potential harm to flora and fauna through littering and waste toxins.	Flora & Fauna	Construction, Operation, Decommissioning	Neg	3	1	3	3	10	4	40		YES	2	1	3	3	9	2	18

No.	Activity	Impact Description	Aspect	Applicable Mine Phase	STATUS	Duration	Extent	Magnitude	Reversibility	CONSEQUENCE	PROBABILITY	SIGNIFICANCE (pre-mitigation)	Degree of Loss of Resource	Mitigation possible?	Duration	Extent	Magnitude	Reversibility	CONSEQUENCE	PROBABILITY	SIGNIFICANCE (post-mitigation)
		Deterioration in visual aesthetics.	Visual aesthetics	Construction, Operation	Neg	3	1	3	3	10	3	30		YES	1	1	3	1	6	1	6
		Potential contamination of surrounding environment with sewage.	Soil & Land capability	Construction, Operation, Decommissioning	Neg	3	2	1	3	9	3	27		YES	3	1	2	3	9	2	18
		Potential contamination of surface water bodies with sewage and nutrient enrichment of aquatic environments.	Surface water & associated wetlands & aquatic ecosystems	Construction, Operation, Decommissioning	Neg	3	3	4	1	11	5	55	Low	YES	3	3	2	1	9	3	27
		Exposure to potentially hazardous materials, waste and malodours.	Social, Health & Safety	Construction, Operation, Decommissioning	Neg	3	2	3	5	13	3	39		YES	3	2	1	5	11	3	33
11	Storage & handling of dangerous goods	Environmental pollution due to hydrocarbon/chemical contamination into the natural environment.	Soils, Flora & Fauna	Construction, Operation, Decommissioning	Neg	5	3	5	4	17	5	85	Mod	YES	3	1	3	3	10	2	20
		Impaired water quality by hydrocarbon contamination on surface which could impact the environment through runoff and seepage.	Surface water & associated wetlands & aquatic ecosystems, Groundwater	Construction, Operation, Decommissioning	Neg	3	3	4	3	13	4	52	High	YES	3	2	3	2	10	3	30
		Exposure to potentially hazardous materials, waste and malodours.	Social, Health & Safety	Construction, Operation, Decommissioning	Neg	3	2	3	5	13	3	39	YES	YES	3	2	1	5	11	3	33
12	Sealing of underground workings. Backfilling of boxcut adit, removal of surface infrastructure and overall rehabilitation. Decommissioning and Closure of the Mine.	Profiling and restoration of free drainage.	Topography, Soils, Hydrology	Decommissioning, Rehabilitation and Closure	Pos	5	1	4	1	11	4	44	-	-	5	1	4	1	11	4	44
		Recovery of groundwater level after dewatering stopped.	Groundwater	Decommissioning, Rehabilitation and Closure	Pos	5	3	4	3	15	5	75	High	-	5	3	4	3	15	5	75
		Impacts on groundwater quality due to poor quality seepage from the mining area once water level has recovered.	Groundwater	Decommissioning, Rehabilitation and Closure	Neg	5	2	4	5	16	5	80	High	NO	5	2	4	5	16	5	80
		Sedimentation of water resources through erosion of replaced soil material.	Surface water	Rehabilitation, Closure, Post-closure	Neg	2	2	3	3	10	3	30		YES	1	1	2	2	6	1	6
		Impacts on surface water quality due to poor quality seepage from the pollution source areas.	Groundwater, surface water, Wetlands & Aquatics	Decommissioning, Rehabilitation and Closure	Neg	5	2	2	5	14	5	70		YES	2	1	1	5	9	3	27
		Soil replacement, amelioration and seeding. Vegetative cover and plant community succession. Influx of Animals to the area once vegetation establishes.	Soil & Land Capability, Flora & Fauna, Wetlands,	Decommissioning, Rehabilitation and Closure	Pos	5	1	3	3	12	5	60	-	-	5	1	3	3	12	5	60
		Deterioration in visual aesthetics and sense of place.	Visual	Decommissioning, Rehabilitation and Closure	Neg	1	2	3	3	9	4	36	YES	YES	1	2	3	3	9	3	27

No.	Activity	Impact Description	Aspect	Applicable Mine Phase	STATUS	Duration	Extent	Magnitude	Reversibility	CONSEQUENCE	PROBABILITY	SIGNIFICANCE (pre-mitigation)	Degree of Loss of Resource	Mitigation possible?	Duration	Extent	Magnitude	Reversibility	CONSEQUENCE	PROBABILITY	SIGNIFICANCE (post-mitigation)
		Increase in environmental noise levels (day time) due to construction activities.	Noise, Social	Construction	Neg	1	2	2	1	6	1	6		YES	1	2	2	1	6	1	6
		Retrenchment/loss of employment and procurement opportunities.	Socio-economic	Decommissioning, Rehabilitation and Closure	Neg	5	3	2	5	15	5	75		-	5	3	2	5	15	5	75

12 ENVIRONMENTAL MANAGEMENT PLAN

The significance of impacts associated with the project is discussed in Section 11 in terms of the probability of the impact occurring, the intensity, the duration and the spatial scale of the impact.

Impact Management should be proportionate to the significance of an impact prior to the implementation of mitigation measures and will aim to reduce either the probability of an impact occurring, or the consequence of an impact (in terms of its duration, scale and intensity).

12.1 Impact Management Objectives and Outcomes

The objectives of impact mitigation and management are to:

- Primarily pre-empt impacts and prevent the realisation of these impacts -PREVENTION.
- To ensure activities that are expected to impact on the environment are undertaken and controlled in such a way so as to minimise their impacts – MODIFY and/or CONTROL.
- To ensure a system is in place for treating and/or rectifying any significant impacts that will occur due to the proposed activity – REMEDY.
- Implement an adequate monitoring programme to:
    - Ensure that mitigation and management measure are effective.
    - Allow quick detection of potential impacts, which in turn will allow for quick response to issue/impacts.
    - Reduce duration of any potential negative impacts.

Environmental impact management outcomes are:

- Mine and rehabilitate responsibly and ensure operation is compliant with legislative requirements.
- Protect the biophysical environment as far as possible.
- Protect the water resources in the area as far as possible.
- Ensure atmospheric pollution is kept to a minimum.
- Ensure socially responsible mining.
- Protect historical and cultural aspects where required.
- Maintain open and transparent dialogue with I&APs.

12.2 Impact Management

The management plan is detailed below for each aspect during each mining phase. Some measures are relevant to more than one aspect. These are not reiterated for each aspect.

12.2.1 Design and Planning Phase

Before any activities are physically undertaken on the project site, action can already be taken to pro-actively put management measures in place. Failure to do so could result in more significant impacts manifesting later on. The following is required prior to Project implementation:

- Permits for the removal, destruction or relocation of floral SCC.

- Written approvals that may be necessary in terms of structures and activities on site will be obtained prior to activities being carried out. Amongst others this includes:
    - Written authorisation from the Chief Fire Inspectorate for diesel storage facilities, explosives and firefighting facilities/infrastructure on site.
    - The necessary authorisations must be obtained from Eskom to undermine the power lines where applicable.
- Highly sensitive areas occur on the property including floodplain and pan wetlands, rivers, rocky outcrops and grave sites are to be demarcated. None of these areas are to be directly impacted by the surface infrastructure layout, located only on Portion 8. The following is relevant:
    - The construction area should be fenced off and all activity should be kept within the area and not permitted to go outside unless authorised and done so with full knowledge of sensitive features.
    - The sensitivity of these areas must be communicated to the land owners/users to advise better management.
    - The grave sites are out of the surface areas of the mine, however they will be undermined. Due to the relatively shallow depth of mining, a safety factor of 2.1 is required to prevent subsidence and impacts to surface features.
    - Monitoring of these sensitive features can be brought into the monitoring of subsidence during mining and post-mining.
- Pre-activity photos of each of the sites must be taken; each photo must be geo-tagged, date and time stamped prior to commencing with any activity to allow for photographic comparisons post-development to ensure rehabilitation is successful.
    - This data must be supplied to the Department of Agriculture, Rural Development, Land, and Environmental Affairs.
- A soils, land use and land capability study has been undertaken on the farm portion earmarked for disturbance. A soil utilisation guide must be compiled and implemented to preserve soil for rehabilitation requirements.
- When purchasing equipment, consideration must be given to quieter equipment, to assist in noise level management.
- Keep to existing paths surrounding the site before the commencement of the construction phase in order to prevent unnecessary changes to the site.
- Make sure that plans for infrastructure have been optimally designed in order to prevent excessive environmental or visual impacts where feasible, and ensure maximum maintenance of vegetation on site.
- A fugitive dust management plan will need to be developed prior to the commencement of any onsite activities.
- The storm water management plan must be finalised and in place before any other construction activities take place.
- The blast design plan must be finalised before any blasting commences on site.
- Pre-mining topographical surveys to be undertaken so as to aid in compilation of the rehabilitation plan.

12.2.2 Construction Phase

12.2.2.1 Geology, Physiography and topography

- Ensure construction activities are in designated area by demarcating active footprint and fencing off area. Keep activity footprint as compact as possible. No activity is to take place beyond the demarcations.
- Ensure top and subsoil stockpile heights do not exceed 6m and overburden 25m. Material placement for storage should consider remediation of other impacts, such as utilising material as a berm to shield visual impacts and act as noise buffer. Topsoil, and if needed subsoil, must be prioritised for upslope clean storm water diversion berm which must be well vegetated.
- Establish approved erosion control measures to reduce the risk of formation of erosion gullies.
- After construction activities are completed, all areas no longer required for operations will be fully rehabilitated. Rehabilitated areas must be contoured and free draining to prevent pooling of water and well vegetated to prevent erosion.

12.2.2.2 Soils, Land Use and Land Capability

- Soil handling must be as per the soil utilisation guide to ensure soil is preserved for use in future rehabilitation. This will include separate stripping and stockpiling of soil horizons.
- Construction activities should commence during the winter months as far as possible to minimise the runoff potential of exposed soils to rain.
- Demarcate all material stockpile areas and strip the topsoil from stockpile areas. Topsoil and subsoil must be prioritised for construction of the upslope storm water diversion berms. All berms must be well vegetated to prevent erosion. If high sediment load is observed in the diverted storm water runoff, pebbles can be placed on the upslope side of the berm. This will act as a flow dissipater and silt trap.
- All stockpiles must not exceed the stipulated heights i.e.
    - Topsoil perimeter berms ≤ 2 m and excess topsoil stockpiles ≤ 6 m.
    - All stockpiles must have an outer slope of approximately 1V:3H (to limit the potential for erosion of the outer pile face).
    - Construct perimeter berms on top of the excess topsoil stockpiles.
    - Cut off drain must be constructed upslope of all stockpiles. Seed all stockpiles. Seeding must be completed within seven (7) days of stockpiling.
- Ameliorate soils as needed to establish stable vegetation communities on berms and stockpiles.
- Incorporate herbaceous vegetation into soil stockpiles.
- Erosion control measures must be implemented as necessary. This includes:
    - Establishing top perimeter berms on stockpiles to prevent wash out of soils.
    - Constructing perimeter berms around all stockpiles.
    - Developing drainage control system for the construction area and diverting storm runoff away from areas with high erosion potential where possible.
    - Incorporating measures to reduce the flow velocity of storm water runoff.
    - Attending to all erosion observed on site by lifting and replacing the eroded soil back to the eroded site. Consideration will be given to gabion baskets, contour

berms, water flow dissipaters and possible downstream silt traps where excessive or persistent erosion is observed.
    - Seed eroded areas and all bare soil.
    - Road surfaces must be compacted in order to increase stability.
    - Gravel roads must be well drained in order to limit soil erosion.
- Fields should not be trafficked if they are wet. Artificial drainage can help increase the number of trafficable days on poorly drained soil.
- Where required the compacted soils should be disked to an adequate depth and re-vegetated with indigenous plants.
- Cement handling should only take place over protected ground, such as over appropriate sheeting.
- Chemicals will only be brought to site once the appropriate facilities are erected:
    - Storage and handling will be conducted in line with the Material Safety Data Sheets (MSDSs) for each relevant chemical.
    - Wet and dry chemicals, reducing and oxidising agents, will be stored separately.
    - Drip trays will be provided for all liquid chemicals.
- Waste generated on site should be collected in skips and bins placed around the site, separated and recycled as far as possible and sold/given to interested contractors. Where relevant, waste will be stored according to the Norms and Standards for Storage of Waste and should not be stored on site for excessive periods.
- Bulk hydrocarbon storage on site will only commence once the concrete lined bunded area has been constructed and approved by the Chief Fire Inspectorate. Hydrocarbons must be managed on site as these could contaminate soil and water and affect surrounding areas through water runoff. The following is relevant:
    - Emergency response procedure detailed in this EMP (Section 12.5) must be implemented on site and staff trained on this procedure.
    - Any generators used on site and any initial hydrocarbon storage on site will be within mobile bunding to contain all leaks until permanent concrete bunded areas are constructed.
    - Spill kits must be available on site and personnel trained to utilise these to clear hydrocarbon spills immediately.
    - All vehicles / machinery on site will be up-to-date with their service and maintenance plans to reduce risks of hydrocarbon leaks.
    - Vehicles will only be maintained on site once the appropriate concrete lined and bunded workshops have been constructed on site.
    - Vehicles will only be washed on site once the appropriate concrete lined and bunded washbays have been constructed on site, with the appropriate oil traps.
    - The use of persistently leaky equipment will be discontinued until such time that repairs are made or equipment will be replaced.
- Equipment will not be parked over bare ground; where unavoidable, drip trays will be placed under the equipment to collect potential leaks.

12.2.2.3 Surface Water, Wetlands and Aquatic Systems

- Construction activities should commence during the winter months, as far as possible, to minimise the runoff potential of exposed soils to rain.
- Clean and dirty water separation and dirty water containment features must be established on site, in line with GN R 704 requirements and engineered designs, prior to any other activity taking place on site:
    - The dirty water catchment must be demarcated and managed as small as possible.
    - Upslope soil berms will be constructed as close to the activity area as possible to divert clean water runoff around the site into natural drainage lines.
    - Where diverted storm water flow enters a wetland or drainage line, flow dissipaters and/or silt traps must be installed if high flow, erosion and/or sedimentation is observed.
    - Internal trenches will be excavated to drain dirty water from the active footprint to lined containment dams. Excavated soils will be placed upslope of the trenches to prevent contamination of the soil with dirty water runoff.
    - All storm water diversion features will be constructed to divert a 1:50 year 24hr storm event.
    - All dirty water runoff will be collected in these trenches which will divert the runoff to the PCDs.
    - Silt traps will be established upslope of PCDs to reduce the need for silt clearing in dirty water dams.
    - PCD and high-load trenches will be lined with an appropriate liner.
    - All trenches and PCDs will be constructed to contain a 1:50 year 24hr storm event.
    - Only environmentally friendly materials must be used during the construction phase.
    - Sheet runoff from hard surfaces and roads must be curtailed through proper drainage control and flow dissipaters as needed.
    - Storm water management features must be maintained on an on-going basis and all structures kept clear of obstructions.
- Pipelines and pumps required on site will be adequately sized and backups will be available on site to ensure continuation of water transfer activities in event of breakdowns.
    - Pipelines should be laid within the dirty water footprint area.
    - Paddocks should be considered for high volume slurry pipeline once the wash plant is established on site.
    - Pipelines should have a series of shut-off valves which can prevent flow of contaminated water should leaks occur.
    - Inspect, maintain and repair all pipelines and pumps throughout the life of mine.
- The mine's water balance must be strictly controlled at all times to ensure optimal water use and prevent overflow in dirty storm water management system.
    - Domestic water will be sourced from a groundwater resource and temporarily stored in a reservoir.

  - Utilise water on site responsibly.
  - Record all water usage on site.
  - Saving water initiatives will be included in environmental awareness training.
- Emergency response procedures for spills into the surrounding environment are provided in Section 12.5 and staff trained on these procedures.
- Grey water on site must be managed to prevent contamination to water and surrounding environment:
  - Conservancy tanks to be emptied on a regular basis, by a reputable contractor for treatment and disposal at a licensed facility.
  - Inspect and repair as necessary all plumbing, potable water and sewage pipelines and conservancy tanks as needed to reduce the risk of leaks.
  - All toilets and change house facilities will be kept clean and hygienic through regular cleaning and maintenance of a cleaning register.
- Baseline flow readings (wet and dry season) will be taken in the main streams at downstream locations before activity commences and monitored on a biannual basis (wet and dry season).
- Surface water monitoring programme will be initiated and continue on a monthly basis.
- Biannual biomonitoring to be conducted by a qualified specialist and their recommendations applied on site.
- The wetland and buffer areas should be visually inspected to ensure that the no-go demarcations and signs are properly established and maintained and that no activity is proceeding in the area and that no material is dumped in the area. It is critical to maintain the buffer areas as these serve to trap silt and nutrients prior to water flowing into wetlands and streams.
- The pan wetland downslope to the west must be monitored for any impact from surface or subsurface pollution/sediment. This is important as the soils are mapped as hydrologically active soils and part of a large wetland flat according to the wetland assessment (TBC, 2022b).
- The soils during excavation should be re-investigated for signs of wetness as they are designated as wetland soils. The soils utilisation guidelines should be updated accordingly.

12.2.2.4 Groundwater

- Apply soil management measures to reduce contaminated downstream runoff through surface contaminants (litter, hydrocarbons, waste, cement and chemicals).
- Apply surface water management measures.
- All carbonaceous material and coal stockpiling areas must form part of the dirty water footprint area and all runoff from these areas must be diverted and contained. The areas will be lined with an appropriate liner to prevent seepage to the groundwater table.
- MRF will be constructed as per engineered designs with proper under-drainage and base preparation. Construction to be signed off by a registered professional engineer.
- A sump will be established at the boxcut Adit to contain initial mine water ingress and this water will form part of the mine's dirty water and may not be released to the environment. Prioritise water for use underground and for on-site dust alleviation.

- Conduct groundwater quality monitoring and dip groundwater levels at least quarterly.

12.2.2.5 Terrestrial Biodiversity

- Construction activities should commence during the winter months, as far as possible, to minimise the impacts on breeding fauna and flora.
- Incorporate indigenous herbaceous vegetation into soil stockpiles to maintain a seed bank.
- Formalise access roads and make use of existing roads and tracks where feasible, rather than creating new routes through naturally vegetated areas.
- Eradicate and control all alien invasive species on site:
    - When removing these species, the spread of seeds must be prevented.
    - All alien seedlings and saplings must be removed as they become evident for the life of mine. Manual / mechanical removal is preferred to chemical control.
    - All vehicles and equipment, as well as material brought to site should be free of plant material.
    - Rehabilitate and revegetate all areas where alien invasive species were removed.
- No domesticated animals should be allowed on site. Should any domestic animals be found on site, the Society for the Prevention of Cruelty to Animals (SPCA) should be contacted to assist with their safe removal.
- To prevent possible collisions with animals, drivers of construction and mine vehicles must remain vigilant to the possibility of animals crossing their paths and a strict speed limit should be adhered to.
- Relocate larger animals with the aid of specialists only if such species are under threat from the development; ensure relevant permits are in place prior to relocating fauna.
- Ensure any crossing opportunities (viz. culverts, pipes and bridges) are designed to also facilitate small animal movements.
- Inform staff, contractors and visitors to not handle or harm fauna in the area in any way.
- Movement of construction vehicles and workers in the natural grasslands must be restricted. In addition, workers must be instructed to minimise disturbance of birds at all times, and steps must be taken to ensure that no illegal hunting occurs.
- No open fires must be allowed on site such as for cooking.
- Prohibit the harvesting of trees (if any) for firewood.
- Do not hinder, harm, or trap animals.
- Noise control measures as listed below (Section 12.2.2.8) will be applied.
- Consider the use of bird flappers and diversion balls on the power lines where these cross areas frequented by birds.
- Conduct activities during daylight hours as far as possible. When using lighting, ensure directional floodlights are utilised that focus light on the necessary areas and reduce light pollution to surrounding environment. Utilise lights in the orange and yellow light ranges rather than white. This has the added benefit of reducing strong light and dark contrasts which also has safety benefits for staff.

12.2.2.6 Heritage, Archaeology and Palaeontology

- Sites identified in the HIA will be cordoned off and no surface activities allowed within 50m of such site.
- It is recommended that the graves be fenced in, and a management plan drafted for the sustainable preservation thereof.
- After clearance of vegetation and during soil stripping, careful monitoring for potential heritage sites will be undertaken. If any of these are discovered, a qualified archaeologist should be called in to investigate the occurrence and adapt the HIA report.
- Should other artefacts, fossils or archaeological items be uncovered during further construction and operations, then all activity should cease immediately, the area marked off and a specialists consulted prior to any further activity.

12.2.2.7 Air Quality

- A monthly dust monitoring program must be implemented from construction phase and dust mitigation measures must be in place to reduce impacts such as:
    - A water cart will be used to spray gravel roads and relevant areas when dust levels are high.
    - Consideration will be given to reducing any activities generating excessive dust during very windy periods where it is feasible and practical to do so.
    - Stockpiles will be placed in locations sheltered from strong winds where possible. Stockpiles will be adequately vegetated.
    - Machinery and equipment will be regularly serviced to ensure they are in proper working condition and to reduce risk of excessive emissions.
    - Screens (berms, trees or wind breaks) can be considered around dusty sites on the side of the predominant wind direction should dust levels be excessive.
    - Speed limits will be established on the dirt road to minimise dust generation.
- Mmakau Coal must register and report on the NAEIS site as required under legislation.

12.2.2.8 Environmental Noise

- Limit construction activities to daytime hours.
- Mmakau Coal must implement a line of communication (i.e., a help line/contact number where complaints could be lodged). All potential sensitive receptors should be made aware of these contact numbers. All complaints should be responded to in an expedient fashion.
- Six-monthly ambient noise monitoring must start during construction phase and continue throughout the LoM. This will assist in formulating mitigation measures should complaints about noise be received from surrounding residents or communities. After two years (four data sets), if monitoring indicates no noise impact (noise levels less than calculated), noise monitoring can be stopped.
- Daytime noise levels should be below 55 dB at all potential NSRs. The operation may not increase the existing ambient noise levels by more than 7 dB.
- Occupational noise levels should be measured monthly and adequate PPE given to staff exposed to high noise levels.

- All employees and contractors should receive Health and Safety induction that includes an environmental awareness component (noise).
- Equipment should be switched off when not in use.
- Mining-related machinery and vehicles must be serviced on a regular basis to ensure noise suppression mechanisms are effective (e.g. installed exhaust mufflers). This is particularly important as it will affect the nearby sensitive receptors.
- Quieter equipment must be sought where feasible.

12.2.2.9 Visual Aesthetics

- Proper housekeeping and maintenance must be carried out continuously as part of the adaptive environmental management philosophy.
- It is recommended that a small berm be constructed along the west/northern boundary of the Schurvekop community, this berm should be vegetated with natural indigenous grasses. The following species are recommended for the vegetation screen, but should be confirmed by the ecologist or a landscape architect; *Searsia leptodictya* (Mountain Karee), *Searsia lancea* (Common Karee) and the *Olea europaea* subsp. *Africana* (Wild Olive).
- In addition to the berm, the existing row of trees can be extended along the boundary of the community to screen the view towards the mine.
- Prevent removal of plants or trees in areas not targeted for development.
- Vegetate any bare soils with local indigenous species. Should new vegetation be introduced to the site, an ecological approach to rehabilitation and vegetative screening measures, as opposed to a horticultural approach to landscaping should be adopted.
- Install light fixtures that provide precisely directed illumination to reduce light "spillage" beyond the immediate surrounds of the site.
- Avoid high pole top security lighting along the periphery of the site and use only lights that are activated on illegal entry to the site.
- Waste generated on site should be collected, separated and recycled as far as possible and all litter cleared from site.
- The staff must be given training on how to keep the area litter free. Bins to be provided on site.

12.2.2.10 Social / Socio-Economic

- Implement a "local first" recruitment policy. Employ as per the S&LP. Ensure that the local jobs created are linked to a skills development programme for permanent employment. Consider a recruitment office at an off-site location. Engage with local business forums as far as possible. Support equal employment opportunities.
- Ensure workers are provided with induction and sign a "code of conduct" at the start of employment which gives an overview of acceptable behaviour and information regarding health, safety and good environmental practices on the site.
- Develop an HIV/AIDS policy and management program that incorporates both the workplace and community considerations. Support community-based condom distribution centres.

- Collaborate with the Department of Health, local NGOs and schools on awareness creation around vaccinations, communicable diseases, alcohol abuse, gender based violence, water use, hygiene and general sanitation.
- Support community-based information campaigns and volunteer programs.
- Develop a disease prevention plan that involves traditional healers and builds on indigenous knowledge through the use of medicinal plants, home based care etc.
- Continuously engage with affected communities, municipalities and I&APs regarding mitigation practices and activities on site.
- Adopt preferential procurement policies towards local suppliers and distributors; ensuring that principle of "local first" when procuring consumables, construction materials etc.
- Ensure that all power-related structures are adequately marked with relevant signs and warnings and fenced off with access control.
- Blasting schedule to be communicated to surrounding landowners and users, including farm workers.
- Toilet and change house facilities will be kept clean and hygienic through regular cleaning and maintenance of a cleaning register. Monitor for groundwater organics bi-annually including Total Coliform, E.Coli and Heterotrophic plate count.
- Support the local authority in supporting and improving water, waste and sanitation services in the Schurvekop Community through the S&LP projects.
- A complaints/comments register should be established on site and be accessible to I&APs.

12.2.2.11 Traffic and Transport

- Access to site will be designed and constructed as per the engineered designs which will have to be approved by SANRAL and Roads Department. Additional right and left turning lanes (including deceleration lanes) will be necessary at this access location and a tarred surface leading into the site is recommended.
- All intersections with main tarred roads must be clearly signposted.
- Set speed limits to be enforced.
- All mine-related vehicles and contractor vehicles to be in road worthy condition.
- Contractor is required to monitor the condition of the roads used and repair the road where it becomes damaged due to construction traffic.

12.2.2.12 Blast and Vibrations

- Evacuate 500m radius prior to blasting, including farm roads.
- Use quality explosives.
- Blasting specialists must be contracted.
- Blasting schedule to be communicated to surrounding landowners and users, including farmworkers.
- It is recommended that a standard blasting time is fixed and blasting notice boards setup at various routes around the project area that will inform the community of blasting dates and times.
- Third party monitoring to be undertaken for all ground vibration and air blast.

12.2.3 Operational Phase

Construction phase management activities must continue into operations phase where relevant. Only additional operational measures have been included below.

12.2.3.1 Geology, Physiography and Topography

- The safety factors and guidelines for the bord and pillar mining must be followed, see APPENDIX E:
    - A safety factor of 2.5 must be used for mining under the Viskuile River, Joubertsvleispruit and floodplain wetlands. A safety factor of 2.0 is proposed for other wetland areas.
    - A minimum safety factor of 2.5 is required under buildings where people congregate (farmsteads and community).
- Inspect areas of underground mining and rehabilitate any surface cracks, subsidence or sinkholes by filling deeper structures with overburden and soil and shallow structures with soil. Re-profile to attain adequate drainage and rehabilitate sites.
- Coal stockpiles must be in designated areas and removed on a first-in-first-out basis. Excessive coal stockpiling on site must be avoided.
- The MRF must be constructed and managed in line with the engineered designs. The sides will be cladded and vegetated on an on-going basis as the facility develops. Drainage measures will also progressively be implemented to ensure water runoff from the sides of the dump without causing erosion.

12.2.3.2 Soils, Land Use and Land Capability

- Soil stockpiles and berms must be maintained throughout the life of mine.
- Implement surface stabilisation over the cladded walls of the MRF if needed to reduce erosion until a vegetative cover is established.
- All dangerous goods on site will be stored according to legislative requirements relevant at the time, so as to prevent contamination to the surrounding environment.
    - All diesel storage must be within concrete bunded areas that contain 110% of storage capacity if roofed or 120% storage capacity if not roofed.
    - Bunds will be fitted with an outlet which will only be opened under controlled circumstances.
    - The outflow from bunded areas will flow through an oil trap and water component will be treated and recycled as process water.
    - Oil from oil traps will be removed to the used hydrocarbon drums which will be temporarily stored in concrete bunded areas prior to removal from site by a reputable hydrocarbon waste contractor.
    - Spill kits must be available on site and personnel trained to utilise these to clear spills immediately.
- Biological amelioration must be conducted on soils placed on side walls and soil in berms and stockpiles so as to promote soil microbial activity which will in turn allow for the release of nutrients once seeding takes place.

12.2.3.3 Surface Water, Wetlands and Aquatic Systems

- Apply topography measures (Section 12.2.2.1) to reduce impact to drainage patterns.

- Apply soil management measures to reduce sedimentation and siltation and prevent contaminated downstream runoff through surface contaminants (litter, hydrocarbons, waste, cement and chemicals).
- Clean and dirty water separation and dirty water containment features must be maintained at all times in line with GN R 704 requirements and engineered designs:
    - Storm water management features must be maintained on an on-going basis and all structures kept clear of obstructions.
    - Clean out silt build up over dry season. Silt must be deposited onto the MRF.
- The mine's water balance must be updated annually and any necessary amendments to water uses and the IWUL will be applied for.
- Surface water monitoring programme will be done on a monthly basis.
- Biannual biomonitoring to be undertaken.
- Should poor quality seepage be noted at downstream environments through the water quality monitoring a cut-off trench will be constructed to capture poor quality seepage and this will either be channelled directly to the PCD, or alternatively to a sump fitted with a pump to pump the water to the PCD.
- Inspect, maintain and repair pipelines and pumps regularly.
- Access to water storage facilities should be restricted and warning signs must be placed at prominent locations.

12.2.3.4 Groundwater:

- Ensure registered affected water user is compensated in some way, either with alternative water supply/borehole or monetary equivalent so that they can source their own water at no additional cost should their water quality or quantity be affected by the mine.
- Keep mining areas as dry as possible during operations.
- Seal off individual major seepage zones intercepted during mining.
- Consider construction of cut-off trench to capture poor quality seepage and direct this to the PCD if needed.
- Regular (2 yearly) updates of the numerical groundwater flow and contaminant transport models. This will help ensure that the results discussed in this document remain relevant with changes in mining operations, and also increase the level of confidence in the model results (calibrating the model based on time series groundwater levels, dewatering volumes, and qualities yield higher levels of confidence than calibrating the models on once-off data points collected during this study.
- No decant expected. In the unlikely event that decant occurs this can be managed via constructed wetlands (passive water treatment). Refer to APPENDIX L for the conceptual management plan.
- Quarterly groundwater quality and quantity monitoring will be done.

12.2.3.5 Terrestrial

- Eradicate and control all alien invasive species on site.
- Conduct monthly visual surveys of berms, soil stockpiles, any areas re-seeded and the mine residue facility once established for germination and reseed areas with poor germination and consider planting these areas with seedling plugs.

12.2.3.6 Heritage, Archaeology and Palaeontology

- No additional mitigation is required other than generally monitoring the identified grave sites whilst the active mining is located underneath the areas.

12.2.3.7 Air Quality

- Coal dust must be managed to prevent deposition into neighbouring areas through wind dispersion:
    - Dust management measures, such as spraying with water, mist aerosoling, wind screens must be considered at the coal processing and storage areas.
    - Trucks transporting coal on site must not be overloaded and must be covered.
    - All coal spillages around site and along roads must be cleared and placed in designated coal handling areas.
- Implement strict vehicle restrictions such as speed limits, weight and number of trucks on the road per given time.
- Hauling activities should be restricted to designated hauling routes with regular maintenance of hauling routes.
- Coal will be moved on a first-in-first-out basis and no coal will stored on surface for excessive periods to prevent spontaneous combustion.
- Coal spills will be cleared at least daily and regular sweeping and cleaning of tarred/paved road surfaces will be undertaken to prevent the accumulation of dust.
- The sides of the MRF to be continuously be cladded, especially sides exposed to wind. These measures should reduce the risk of spontaneous combustion.
- Where spontaneous combustion takes place, fine subsoil material will be used to cover the surface and this must be compacted to douse the combustion.
- Consider use of chemical suppressants (binding agents) on all haul roads if dust management proves to be ineffective.
- Truck speeds should be kept as low as possible to minimise fugitive dust emissions.
- Continue with dust monitoring and annual reporting to NAEIS.

12.2.3.8 Environmental Noise

- Noise monitoring must continue during operations and must be undertaken at least six-monthly. After two years (four data sets), if monitoring indicates no noise impact (noise levels less than calculated), noise monitoring can be stopped.
- The ventilation fan should ideally point into a south-westerly direction, away from the identified NSR.

12.2.3.9 Visual Aesthetics

- All berms and other visual screens must be maintained.
- Lighting must be kept to a minimum and any lights used on site must be faced away from residents or farmsteads when lit. Lights in the yellow and orange range should be utilised rather than white lights where feasible.
- Continue with good housekeeping practices and keep area litter free and orderly.

12.2.3.10 Social / Socio-economic

- Continue with construction phase measures.

- Any retrenchment and employment to be done in accordance with the S&LP.
- Ensure environmental management measures are conscientiously applied and adaptive management is applied by way of taking appropriate actions to any issues identified through the monitoring plan to ensure environmental impact is contained and ensure an environment that is not harmful to surrounding land owners and users.

12.2.3.11 Traffic and Transport

- All intersections with main tarred roads will be clearly signposted and intersections will be maintained for the life of mine.
- The mine should look at negotiating a chartered contract with existing minibus taxi or bus operators to transport the majority of the workers during the various stages of the development.
- Directional floodlighting will be used to focus light on the area of activity only so as not to irritate road users.

12.2.4 Decommissioning and Closure Phase

Many of the operation phase management measures will need to be applied during decommissioning as activities are slowly phased out. Only additional measures strictly related to rehabilitation and closure phase are discussed below.

12.2.4.1 Geology, Physiography and Topography

- The rehabilitation model and plan will be finalised during the final stages of operations and applied from the onset of decommissioning.
- Once all infrastructure, linings and foundations are removed from site, the area will be ripped, contoured and rehabilitated to allow for free surface water drainage.
- All excavations, trenches and dams no longer required[7] will be filled, contoured and rehabilitated as per the rehabilitation plan to allow for free surface water drainage.
- General inspections of surface area overlying undermined areas will continue and any surface cracks and subsidence rehabilitated.
- Topographical surveys need to be conducted to ensure adequate elevations are obtained. Material should be added or removed as needed to obtain elevations as per the rehabilitation model.
- Runoff from the rehabilitated areas must be allowed to flow naturally to the environment.
- Areas where pooling of water occurs, or where erosion is prevalent should immediately be addressed to ensure that this does not occur by filling in and grading depressions and lifting eroded soils back to the eroded sites and revegetating the areas. If erosion is persistent or severe then erosion control measures, such as gabions, must be established at the sites.

[7] PCD A below the MRF will remain on closure.

12.2.4.2 Soils, Land Use and Land Capability

- Contaminated areas must be cleared of all surface contaminating material (hydrocarbons, coal and carbonaceous material) and rehabilitated to prevent contamination of surface runoff.
- Ensure reputable contractors are utilised for removal of all substances from site (hydrocarbons, chemicals, waste) and that these are adequately transported and where necessary adequately disposed of.
- The rehabilitation model and plan will be finalised during the final stages of operations and applied from the onset of decommissioning. Once all infrastructure, linings and foundations are removed from site, and the area has been ripped, contoured and rehabilitated to allow for free surface water drainage, the soil can be applied over the areas.
- The utilisable soil removed during the construction phase shall be redistributed in a manner that achieves an approximate uniform stable thickness consistent with the approved post-mining land use (pre-mining grazing and limited arable).
- Grading machinery must grade once to replace the topsoil. Levelling of the topsoiled area must be undertaken by agricultural machinery so as to minimise the compaction rate.
- Areas that would have been compacted by tyre action must be ripped, disced or scarified.
- Soil specialists should be consulted to conduct annual assessments and determine the correct treatment of soils on rehabilitated land. This must be undertaken for at least 2-3 years after closure. Apply specialist's recommendations on site.

12.2.4.3 Surface Water, Wetlands and Aquatic Systems

- All water within the area of activity will be contained on site and only released into the environment when rehabilitation is largely completed and water runoff from areas is of adequate quality.
- The MRF must be rehabilitated in line with designs and water runoff management features maintained on site in the long term to prevent runoff from this facility entering the downstream environment until such time that water quality is adequate
- Monitor area for erosion and pooling and rehabilitate if necessary.
- Continue with monthly surface water monitoring and biannual biomonitoring according to DWS requirements.
- Continue monitoring water quality in the PCD.

12.2.4.4 Groundwater

- Continue with quarterly groundwater quality and quantity monitoring according to DWS requirements.
- Ensure mine is properly sealed.

12.2.4.5 Terrestrial Biodiversity

- Conduct monthly visual surveys of seeded areas for germination and reseed areas with poor germination and consider planting these areas with seedling plugs, for a period of 3 years.

- Conduct annual floral surveys to monitor floral establishment on rehabilitated areas and apply specialist recommendations on site.
- The rehabilitation plan, using indigenous species from the study area, must be implemented so as to restore disturbed areas as close to pre-mining as possible on all disturbed areas.

12.2.4.6 Heritage, Archaeology and Palaeontology

- No additional mitigation is required other than maintaining the 50m buffer to ensure no inadvertent damaged is caused.

12.2.4.7 Air Quality

- No additional measures, but continue with dust suppression and monitoring.

12.2.4.8 Environmental Noise

- No additional measures required; continue with operational phase measures as long as rehabilitation activities continue on site.

12.2.4.9 Visual Aesthetics

- Apply the rehabilitation plan to improve visual appeal of post-mining site sustainably.
- Continue with general good housekeeping practices.

12.2.4.10 Social / Socio-economic

- Should any new contracts be created during the decommissioning phase, then local contractors should be sought first.
- All S&LP initiatives and commitments should be applied particularly with regard to retrenchment.
- Employ staff at other operations if feasible.

12.2.4.11 Traffic and Transport

- No additional measures; continue with operational phase measures as long as traffic to and from site continues.

12.3 Monitoring and Reporting Requirements

This section of the report contains the monitoring, auditing and reporting requirements relevant to the mine.

Table 56 contains a summary of the monitoring plans that must be implemented and identifies the person responsible for undertaking the audit / monitoring and the frequency of each monitoring / auditing and reporting exercise.

All monitoring that requires the analysis of laboratory results must only be associated with SANAS accredited laboratories. Surface and groundwater monitoring must be undertaken according to the Mine's approved IWUL. Air Quality and dust monitoring should be undertaken in accordance with the NEMAQA and the Regulations promulgated thereunder. Auditing will be in accordance with the EIA Regulations, 2014 (as amended).

Table 56: Monitoring, Auditing and Reporting Summary

Impact that requires monitoring	Monitoring description	Person responsible for monitoring	Frequency of monitoring	Reporting requirements
General compliance – all EMP commitments	Visual inspections	Mine Manager[8]	Weekly	Internal
	Internal audits	ECO	Monthly during construction, operations and decommissioning	Internal – maintain register
	External Regulation 34 Audits	Independent External Auditor	Annually	DMRE (note: registered I&APs must be notified of the reports availability, in addition the report should be published on the company website)
	Quantum for Financial Provision	Eexternal consultant Independent External Auditor	Annually	DMRE
Hazardous excavations and structures	Visual inspections to ensure that safety measures including barriers, fencing etc. are in place.	ECO	Weekly	Internal
		Mine Engineer	Monthly	Internal – maintain register
		Mine Manager	Bi-Annually	Mine Health & Safety
Pillar failure, surface subsidence and / or cracking	Visual Inspections and convergence monitors	Strata Control Officer and Rock Engineer	Bi-Annually	Mine Health & Safety
Physical destruction and general disturbance of biodiversity	Visual inspections to ensure that EMP commitments with respect to biodiversity are complied with	ECO	Monthly	Internal
	Rehabilitation monitoring.	ECO	Monthly	Internal
		Independent Specialist	Annually	Report to DMRE (Financial

[8] Or their appointed representative.

Impact that requires monitoring	Monitoring description	Person responsible for monitoring	Frequency of monitoring	Reporting requirements
				Provision & EMP Compliance)
	Monitoring the establishment and spread of Alien Invasive Plant Species.	ECO	Quarterly	Internal
		Independent Specialist	Annually	Report to DMRE (Financial Provision & EMP Compliance)
	Aquatic Biomonitoring and Wetland Monitoring	Independent Specialist	Bi-annually (wet & Dry season)	Annual Report to DWS
Deterioration of soil quality or loss of soils	Soil monitoring of rehabilitated areas.	Independent Specialist	Annually for fertility	Report to DMRE (Financial Provision & EMP Compliance)
		ECO	Bi-annually for erosion	Report to DMRE (Financial Provision & EMP Compliance)
Pollution of surface water resources	Surface Water Monitoring.	Samples: ECO or external consultant Analysis: SANAS accredited laboratory; Reporting: suitably qualified independent specialist	Monthly	Report to DWS as per the IWUL
Contamination of groundwater	The water monitoring programme should be assessed and updated by a professional geohydrologist on an annual basis. Effectiveness of monitoring borehole positions should be re-evaluated on closure.	Samples: ECO or external consultant Analysis: SANAS accredited laboratory; Reporting: suitably qualified independent specialist	Monthly for the first 12 months, and quarterly thereafter	Report to DWS as per the IWUL

Impact that requires monitoring	Monitoring description	Person responsible for monitoring	Frequency of monitoring	Reporting requirements
Groundwater quantity	Dipping of groundwater levels.	ECO or Independent Specialist	Monthly for the first 12 months, and quarterly thereafter	Report to DWS as per the IWUL
Increase in emissions	Dust Fallout Monitoring	ECO or Independent Specialist	Monthly	Annual Reporting to the National Atmospheric Emissions Inventory System (NAEIS)
	PM Monitoring	Independent Specialist	Annually	Annual Reporting to the NAEIS
	Greenhouse Gas (GHG)[9]	ECO or Independent Specialist	Annually	Annual Reporting to the NAEIS
Increase in noise levels	Occupational noise monitoring.	ECO or Independent Specialist	Monthly	Internal
	Ambient noise monitoring.	Independent Specialist	Six-monthly After two years (four data sets), if monitoring indicates no noise impact (noise levels less than calculated), noise monitoring can be stopped.	Internal Report and conflict resolution

12.3.1 Specific Monitoring Plans

12.3.1.1 Surface Water and Groundwater Monitoring

The surface and groundwater monitoring points are indicated in Plan 12.

Sampling for the first 12 months must be done monthly, thereafter the frequency of groundwater monitoring can change to quarterly. Groundwater monitoring must include dipping of levels. Surface water sampling will continue on a monthly basis.

Where a borehole is being used for potable water supply this must be compared to the SANS 241:2015 drinking water standards for compliance.

[9] GHG Emissions Reporting is also required to also comply with the Carbon Tax Act.

As the water management system is established, internal water management features must also form part of the monitoring plan, such as the PCD and in-Adit sump.

Two years after construction, after the completion and update of the next contaminant transport model, any additional monitoring boreholes that may be required will be drilled and included in the monitoring programme. It is likely that additional boreholes may be required downstream of the PCD's and the MRF once these are established.

Chemical elements that should be analysed for includes:

- General chemistry such as pH, TDS and EC;
- Major elements such as calcium, magnesium, sodium, potassium, sulphate, nitrate;
- An ICP scan of minor elements including aluminium, manganese, cadmium, mercury, chromium, vanadium and zinc.
- In addition, borehole and surface water monitoring site nearest to and downstream from diesel storage facilities will also be assessed for hydrocarbon parameters.

Furthermore, once groundwater inflow and groundwater level monitoring data is available, the 3D numerical model should be updated every 2 years of the life of operations in order to adjust for operational changes as well as improve the level of confidence in the predicted impacts.

Surface and groundwater monitoring must continue for a period of at least 3 years post closure.

12.3.1.2 Wetland and Aquatic Biomonitoring

Biomonitoring of the aquatic sites surveyed during the site assessments should continue throughout the life of mine and for a period of 3-5 years after mining, locations are indicated in Figure 21. Biomonitoring of these sites should take place every 6 months, once during the rainy season and once during the dry season. Although sites may be dry over winter, the sites must still be visited and assessed where possible.

Similarly, monitoring of wetlands should be carried out throughout the LoM for impacts from the surface infrastructure but also from the shallow undermining of these areas. Biannual monitoring including the wet and dry seasons (similar to aquatic sampling times) should be satisfactory unless stipulated otherwise by the wetland specialist through the project.

12.3.1.3 Dust Fallout and PM Monitoring

It is recommended that dust fallout, $PM_{2.5}$ and PM_{10} monitoring is conducted prior to construction for baseline and then during construction and into operations (Rayten, 2016). Dust fallout monitoring (4 compass directions) should be conducted and reported on a monthly basis for the life of mine until surface rehabilitation is fully completed.

Environmental PM monitoring can be done annually; however occupational PM monitoring must be done monthly.

12.3.1.4 Environmental Noise Monitoring

The following noise monitoring is proposed:

- Occupational noise will be monitored on a monthly basis during the life of mine as long as areas of elevated noise (crusher, underground drilling, etc.) are operational on site.
- Ambient environmental noise will be monitored on six-monthly basis at NSR 5 or 6, and within the Schurvekop Community. After two years (four data sets), if monitoring indicates no noise impact (noise levels less than calculated), noise monitoring can be stopped.
- When investigating a noise complaint, noise measurements must be conducted at the location of the person that registered a valid and reasonable noise complaint (staying within 2,000 m from the project).

Ambient sound measurements should be collected as defined in SANS 10103:2008, it is recommended that semi-continuous measurements are conducted over a period of at least 24 hours, covering at least a full day- (06:00 – 22:00) and night-time (22:00 – 06:00) period (E.A.R, 2022).

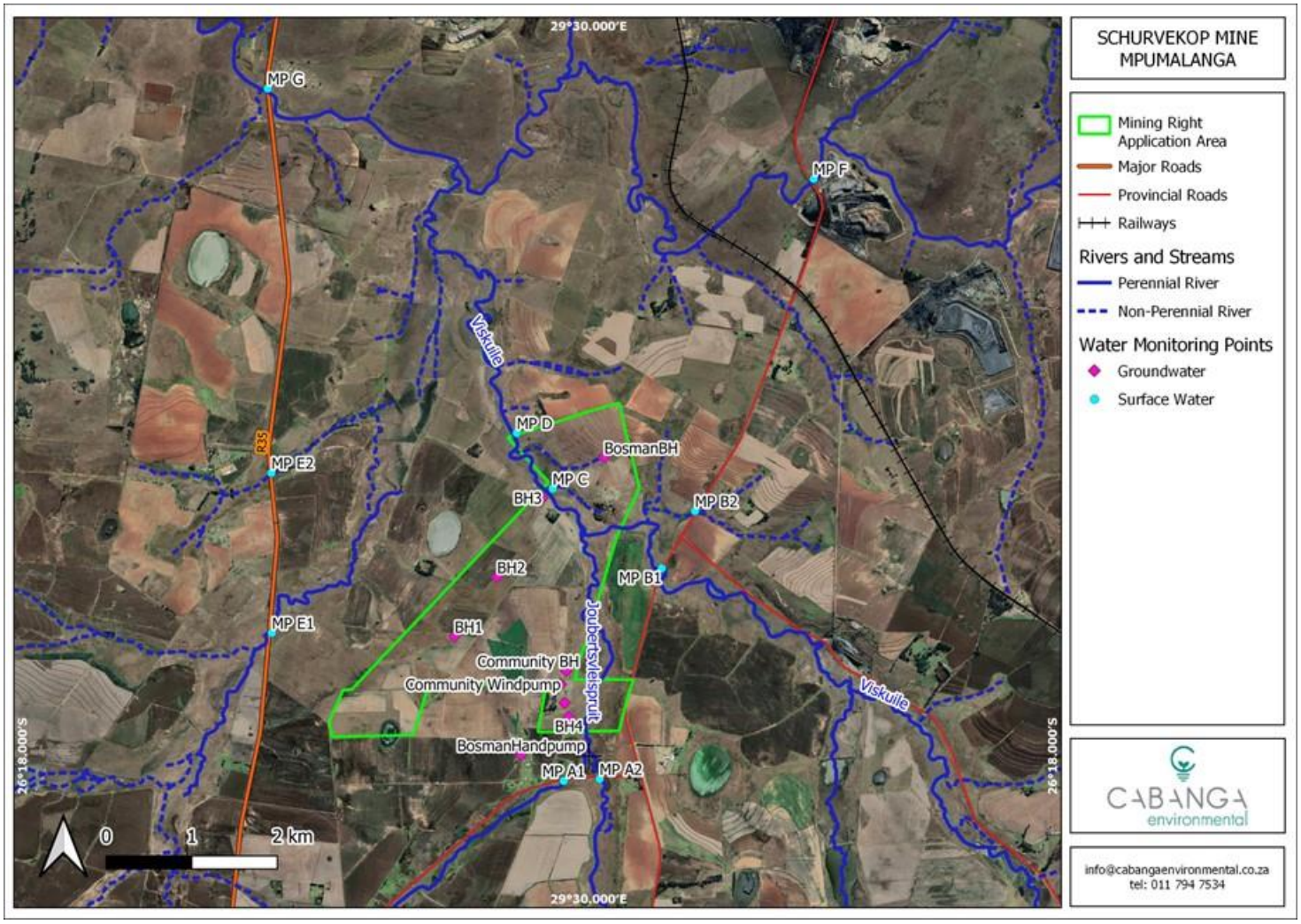
12.3.1.5 Blast and Vibration Monitoring

Monitoring of ground vibration and air blast is done to ensure that the generated levels of ground vibration and air blast comply with recommendations. Thus, a monitoring programme for recording blasting operations is recommended. This process will be for the development of the box-cut adit and is applicable to the construction phase only. The following elements are relevant:

- Ground vibration and air blast results;
- Blast Information summary;
- Meteorological information at time of the blast;
- Video Recording of the blast; and
- Fly rock observations.

12.3.1.6 Health Monitoring

Table 57 outlines the different health indicators that could be collected and used for monitoring by Mmakau Coal for the proposed Schurvekop Mine. It is further recommended that quantitative data be collected from different potentially-affected communities to inform the monitoring program going forward.



Plan 12: Surface and Groundwater Monitoring Points

Table 57: Health Monitoring Plan

Health Impact	Structural Indicators	Process Indicators	Outcome Indicators
Transmission of communicable disease due to overcrowding	• Household size and no. of room/people; • House-rice inflations; and • Effective project waste disposal services.	• Influx management; • Local recruitment; • Health education campaigns; • TB policy and program.	• Any epidemic outbreaks in community (e.g. meningitis).
Transmission of STIs and HIV/AIDS	• Community based peer health educator activities.	• HIV policy implemented; • Health education programs; and • Distribution of condoms.	• Health facility and district statistics.
Access to safe drinking water	• Proportion of households with access to improved water sources; and • Equality of improved water supply.	• Health education programs; • Influx management; and • Water quality results.	• Diarrhoea, skin and eye disease rates from health facility; and • End-user water quality results.
Sanitation and waste management	• Proportion of households with access to improved sanitation services; • Equality of sanitation services; and • Effectiveness of project sanitation services.	• Health education programs; • Influx management; and • Agreements with local authorities.	• Schistosomiasis and soil transmitted prevalence rates; and • Health facility statistics for schistosomiasis, intestinal parasites and diarrhoea, skin and eye disease.
Malnutrition and food security	• NGO agreements on nutritional programs.	• Effectiveness of nutritional support programs; • Health education programs; and food inflation.	• Malnutrition statistics from health facility.

12.4 Environmental Awareness Plan

Environmental awareness training is critical for two primary reasons:

1. the workforce must understand how they can play a role in achieving the objectives specified in the EMP, and
2. the workforce must understand their obligations in terms of the implementation of the EMP and adherence to environmental-legislative requirements.

A training needs analysis is to be performed through all levels of the organisation including those within the administration, plant, workshop and underground sectors. Each of the categories/levels of the organization have different responsibilities and roles, accordingly different knowledge requirements are applicable.

The Training Department in conjunction with the ECO are responsible for ensuring job specific training for personnel performing tasks, which can cause significant environmental and social impacts (e.g. receipt of bulk hazardous chemicals/fuel, hazardous materials handling, responding to emergency situations etc.).

The ECO responsible for environmental awareness training will keep records of the persons who attended the training sessions and these sessions must incorporate methods to test the training attendee's understanding of the subject matter presented. The ECO must, on the basis of evidence, determine that the employees are competent in the training material and learning outcomes.

Effectiveness of the environmental awareness training will be done by the management through task observations and during internal and external audits. All training material for presentation to personnel and contractors will be reviewed annually to ensure consistency with organisational requirements and best practice guidelines. In addition to this, annual monitoring reports, audit results and all incident reports will be reviewed; any short comings and non-compliancy will be highlighted and management measures incorporated or improved upon within the training material.

12.5 Emergency Response

Though every effort has been made to identify the potential impacts and risks associated with the proposed Schurvekop Mine and to prescribe management and mitigation measures associated with each impact, emergency situations can arise for which Mine Management has to prepare.

Procedures that the Mine has to implement in response to certain emergency events are detailed in the table below.

Table 58: Emergency Response

No	Situation	Response procedure
1	Spillage of chemicals, hydrocarbons or waste	If there is a risk of a spillage of any substance migrating outside of the dirty-water containment areas on the Mine, the Mine Management will immediately notify residents/users downstream of the pollution incident. The Mine will further identify and provide alternative resources should contamination impact adversely on the existing users.

No	Situation	Response procedure
		In the event of a spill occurring on site: • Cut off the source if the spill is originating from a pump, pipeline or valve and ensure the infrastructure is 'made safe'. • Contain the spill (e.g. construct temporary earth bund around source). • Pump excess hazardous liquids on the surface to temporary containers (e.g. 210 litre drums, mobile tanker, etc.) for appropriate disposal. • Remove hazardous substances from damaged infrastructure to an appropriate storage area before it is removed/repaired.
		Spill kits will be available at all areas where hydrocarbons, chemicals etc are stored and/or handled. Access to these areas will be restricted to those personnel who have received training in the storage and handling of hazardous substances, and the emergency clean-up procedure (including the use of spill kits and the appropriate disposal of contaminated soils as hazardous waste).
		All spill incidents must be reported to the ECO immediately, who will assess the incidents and set up an investigation team if deemed necessary.
		Reportable incidents must be reported to the DMRE, DWS and all other relevant authorities within 24 hours.
2	Discharge of dirty water to the environment (Dam Wall Failure, burst dirty water pipes / trenches, overtopping)	Turn off supply to the Dam / Pipeline.
		Dispatch necessary emergency services.
		All reasonable measures must be implemented to stop the spread of contaminated water (berms / channels can be placed around the spillage area).
		All incidents must be reported to the ECO immediately, who will assess the incidents and set up an investigation team if deemed necessary.
		As a preventative measure, all water containment facilities should be operated with a freeboard of at least 0.8 m.
		Reportable incidents must be reported to the DMRE, DWS and all other relevant authorities within 24 hours.
3	Pollution of surface water	Personnel discovering the incident must inform the ECO of the location and contaminant source (immediately).
		Apply the principals listed for Item 1 and 2 above.
		Absorbent brooms will be used to absorb surface spills of hydrocarbon contaminants.
		Contamination entering the surface water drainage system should be redirected into the dirty water system.
		The ECO will collect in-stream water samples downstream of the incident to assess the immediate risk of contamination.

No	Situation	Response procedure
4	Groundwater contamination	Use the groundwater monitoring boreholes as scavenger wells to pump out the polluted groundwater for re-use in the process water circuit (hence containing the contamination and preventing further migration).
		Investigate the source of contamination and implement control/mitigation measures.
5	Flooding (from failure of surface water control infrastructure and/or extreme rainfall events)	Evacuate the area downstream of the failure (if relevant).
		Using the emergency response team, rescue/recover and medically treat any injured personnel.
		Temporarily reinstate/repair storm-water diversions during the storm event (e.g. emergency supply of sandbags).
		Close the roads affected by localised flooding or where a storm-water surge has destroyed crossings/bridges.
		The use of emergency pumps should occur if the water floods the boxcut Adit.
6	Risk of drowning from falling into water dams	Attempt rescue of individuals from land.
		Get assistance of emergency response team whilst attempting rescue or to carry out rescue of animals and/or people as relevant.
		Ensure medical assistance is available to recovered individual.
		Prevent this situation by ensuring adequate access control to water containment facilities.
7	Veld fires	Evacuate mine employees (as well as contractors, visitors etc.) from areas at risk.
		Notify downwind residents and industries of the danger.
		Assist those in imminent danger/less able individuals to evacuate until danger has passed.
		Provide emergency firefighting assistance with available trained mine personnel and equipment.
8	Falling into hazardous excavations	Personnel discovering the fallen individual or animal must mobilise the emergency response team to the location of the incident and provide a general appraisal of the situation (e.g. human or animal, conscious or unconscious, etc.).
		The injured party should be recovered by trained professionals such as the mine emergency response team.
		A doctor (or appropriate medical practitioner)/ambulance should arrive at the scene to provide first aid and transport individual to hospital.
		A nearby vet should be consulted in the case of animal injury.
9	Road traffic accidents (on site)	The individual discovering the accident (be it bystander or able casualty) must raise the alarm giving the location of the incident. Able personnel at the scene should shut down vehicles where it is safe to do so.

No	Situation	Response procedure
		Access to the area should be restricted and access roads cleared for the emergency response team.
		Vehicles must be made safe first by trained professionals (e.g. crushed or overturned vehicles).
		Casualties will be moved to safety by trained professionals and provided with medical assistance.
		Medical centres in the vicinity with appropriate medical capabilities will be notified if multiple seriously injured casualties are expected.
		A nearby vet should be consulted in the case of animal injury.
10	Development of informal settlements	The mine will inform the local authorities (municipality and police) that people are illegally occupying the land and ensure that action is taken within 24hrs.
11	Explosions	Explosions can occur in the workshop areas when working with gas cylinders and chemicals. Explosives are also present on site for blasting during the Construction phase. Underground coal mining operations without proper ventilation can also lead to underground explosions. These could result in employees being injured and requiring medical assistance. The procedure to be followed is:
		Safe evacuation routes should be devised in the event of an uncontrolled explosion and all staff trained on relevant evacuation routes and assembly points
		Once safe to do so first responders may provide first aid to injured parties.
		All relevant emergency response units must be notified and hospitals informed of incoming patients.
		DMRE to be notified of the incident.
12	Uncovering of graves, archaeological / historical sites	Upon finding any archaeological or historical material all work at the affected area must cease.
		Personnel discovering the site must inform the ECO immediately.
		The area should be demarcated in order to prevent any further work there until an investigation has been completed.
		An archaeologist should be contacted immediately to provide advice on the matter. • Should it be a minor issue, the archaeologist will decide on future action. Depending on the nature of the find, it may include a site visit. • Should the find prove to be of archaeological significance a Phase 2 rescue operation may be required subject to permits issued by SAHRA.
		SAHRA's APM unit must be notified. In the event that unmarked human burials are uncovered, the SAHRA Burial Grounds and Graves unit should be notified.

No	Situation	Response procedure
		Prior to the relocation of any graves, permission for the exhumation and relocation of graves must be obtained from the relevant descendants (if known), SAHRA, the National Department of Health, the Provincial Department of Health, the Premier of the Province and the local Police.
		The exhumation process must comply with the requirements of the relevant Ordinance on Exhumations, and the Human Tissues Act, 65 of 1983 (and the NHRA if relevant).
		Work on site will only continue after the archaeologist/ SAHRA has agreed to such.
13	Uncovering of fossils	Personnel discovering the fossil must inform the ECO immediately.
		Any fossiliferous material (plants, insects, bone, coal) should be rescued, and put aside in a suitably protected place. This way the mining activities will not be interrupted.
		A professional palaeontologist should be contacted immediately to provide advice on the matter.
		Photographs of the putative fossils can be sent to the palaeontologist for a preliminary assessment.
		Fossil plants or vertebrates that are considered to be of good quality or scientific interest by the palaeontologist must be removed, catalogued and housed in a suitable institution where they can be made available for further study. Before the fossils are removed from the site a SAHRA permit must be obtained.

13 CLOSURE, REHABILITATION AND FINANCIAL PROVISION

13.1 Closure Objectives

The closure objectives for the proposed Schurvekop Mine, can be summarised as follows:

- To limit the possible health and safety threats to humans and animals. Ensure the area is made safe and that the backfilled boxcut adit is stable over time. Undertake suitable corrective actions in areas where surface subsidence may develop due to pillar extraction activities, integrating these into the surrounding topography, and ensuring they are free draining.
- To ensure post-mining land capability is at least similar to pre-mining which is grazing and some arable lands.
- To ensure that the land capability is self-sustaining.
- To ensure that pre-mining land uses can continue.
- To ensure that the final elevation will result in the continuation of the pre-mining surface drainage pattern, albeit that topographical changes on site, such as the MRF, will be altered permanently.
- To ensure that no dirty water from the site enters the surrounding surface water systems.
- To maintain flow in downstream rivers to prevent deterioration of downstream ecological status.

- To ensure that possible plumes originating from the mining areas do not impact significantly on the surface water features or surrounding users' boreholes.
- To ensure that groundwater users that are impacted have alternative sustainable water sources of the similar quality and quantity.
- To ensure that vegetation growth and cover on the rehabilitated areas is sustainable.
- To ensure that alien invasive growth is eradicated until the closure certificate is granted.
- To encourage surrounding animals to return into the rehabilitated areas to maintain the surrounding biodiversity.
- To ensure that aquatic ecosystems are maintained as close as possible to that of the pre-mining environment.
- To minimise the disturbance on wetlands.
- To ensure that the adjacent wetland conditions are similar to that of the current Present Ecological State.
- To ensure that residual impacts after closure of the mine are adequately managed.
- To ensure appropriate closure certification is obtained.

13.2 Closure Actions

Rehabilitation of the project will aim to:

- Ensure that the final elevation around the site is free draining.
- Ensure that soil replaced in the same sequence to ensure soil characteristics are retained as far as possible.
- Ensure a self-sustaining post-mining land capability similar to pre-mining of grazing and limited low-intensity arable lands.
- Ensure that the rehabilitated areas are cleared of all contaminating substances and that runoff from the area is returned to the natural catchment.
- Ensure that vegetation growth and cover on the rehabilitated areas is sustainable and local indigenous species are establishing on site and that succession and colonisation from surrounding areas is taking place on rehabilitated areas.
- Ensure that alien invasive growth is eradicated until the closure certificate is granted.

Some important aspects regarding the rehabilitation of the project area is summarised below.

The rehabilitation model must be drafted before final rehabilitation activities commence. The rehabilitation model must thereafter be finalised before decommissioning to ensure that final rehabilitation activities can commence in line with the final and approved rehabilitation model.

In order to ensure rehabilitation of the site can be undertaken responsibly, soils must be stripped and stockpiled separately. This will ensure preservation of soil for re-use in rehabilitation of the site.

The MRF will be a permanent feature as will the associated storm water management features around the dump, including the PCD. It is also anticipated that the main access road to site, and the roads to the MRF be retained in order to undertake the necessary post-closure monitoring.

Post mining land capability must be restored to as close to pre-mining land capabilities as possible, in this case grazing with some arable lands.

During closure of a mine area, infrastructure no longer required by the future land owner/user will be demolished or removed.

Non-leaching building waste, such as concrete foundations, can be placed in the boxcut adit if additional material is required.

Plant and processing infrastructure will be re-used at other sites or sold to other mining companies before being considered as scrap.

All scrap metal will be removed and sold where possible, or disposed of at an appropriate site.

All other waste will be separated and removed from site. These will be recycled where possible or removed by reputable contractors to appropriate waste facilities for that particular waste type.

All fences will be dismantled and either disposed of at a permitted disposal site or sold as scrap. Fences erected to cordon off dangerous areas will remain in place and maintained, and will only be removed once such sites are considered safe and stable.

Carbonaceous material cleared from the surface and the silt cleared from the PCDs and trenches will be placed on the MRF.

The underground mine will be sealed as per standard mining practices and the boxcut adit filled with the overburden and subsoil stockpile material. A slightly convex surface will be attained at the adit area.

Roads or sections of roads no longer required after completion of mining will be identified. These roads will be ripped down and rehabilitated, as will all compacted infrastructure areas.

The entire site will be appropriately graded and contoured and the topsoil will be spread over the site using agricultural equipment to prevent compaction of soils.

The site will then be seeded with local indigenous species.

13.2.1 Soil Management and Rehabilitation Plan

Retaining soil and soil characteristics is the single most critical component to successful rehabilitation. The aim of the soil management and rehabilitation plan is to highlight measures to be followed during the construction, operation, and decommissioning phases to preserve soil.

The primary objectives of the soil management plan are to:

- Devise and maintain a topsoil balance that achieves rehabilitation objectives during the life of mine;
- Ensure effective topsoil removal techniques are employed to maximise volumes of suitable topsoil removed and minimise wastage; and
- Maintain topsoil viability during stripping and stockpiling through best practice techniques and effective stockpile design and treatment.

13.2.1.1 Soil Stripping, Stockpiling and Replacement

Stripping and stockpiling of topsoil and subsoil for the infrastructure area and boxcut will take place during the construction phase, which must be supervised to ensure soils are stripped correctly.

According to the agricultural potential study (TBC, 2022a) two soil types are associated with the proposed surface infrastructure layout, being Tukulu and Longlands. Both of these soils types have an Orthic A-horizon (topsoil) but some areas are delineated as wetlands. Wetland soils must be stripped and stockpiled separately for rehabilitation.

Soils from the boxcut should be stockpiled near the Adit for final rehabilitation; similarly soils stripped from other areas should be stockpiled in clean areas as close to the source area as possible for easy rehabilitation, for example each PCD.

Topsoils to the depth of 0-30cm and sub soils to the depth of 30-60cm must be stripped and stockpiled separately for all stripped areas. Topsoils must not be stockpiled higher than 2m and subsoils 6m.

13.2.1.2 Considerations for Flora

A rehabilitation plan, using indigenous species from the study area, must be implemented that will restore disturbed areas beyond the footprint of the infrastructure to what it was prior to construction, thereby making the impact on the remainder of the site negligible in the long term.

Timeous rehabilitation is imperative. Ideally soils should be replaced during the latter part of the dry season, thereby reducing the risk of working with wet soil which would significantly increase the risk of soil compaction. In this way the soil will be ready for seeding just prior to the rainy season.

Even in the event of good rains, annual pioneer plants are short-lived and therefore an effort must be made to keep as many perennial plants in place as possible or to replace these as part of rehabilitation.

13.3 Quantum for Financial Provision

As per NEMA financial provision regulations, itemised costs must be provided within the financial provision. Table 59 indicates the Financial Provision required for the proposed Schurvekop Mine. These costs are based on areas provided in the Mine's Feasibility Study (Delta BEC, 2022d) and average rates for the activities provided by three different contractors adjusted with CPI, and may change significantly once more detailed closure cost assessments are carried out once the mine is operational. As the site is an underground operation no roll-over rehabilitation and remediation is possible. All rehabilitation costs will be associated with the decommissioning and closure of the site.

Financial Provision will be made by way of a guarantee acceptable to the DMRE.

The quantum for financial provision for rehabilitation of all the activities at Schurvekop Mine must be revised on an annual basis in accordance with the Financial Provision Regulations, 2015 (GNR 1147 of 20 November 2015) in terms of the NEMA.

Table 59: Quantum for Financial Provision

Template for Level 2: "Rules-base" assessment of the quantum for financial provision 2022							
Mine:	**Schurvekop Mine**	**Ref:**	**MP 30/5/1/2/3/2/1 (10366MR) EM**				
Applicant:	**Mmakau Coal (Pty) Ltd**	**Location:**	Bethal Magisterial District				
Evaluators:	Jane Barrett	**Date:**	Thursday, 01 December 2022				
Disclaimer: Calculations are based on survey data and information provided by the client, as well as visual observations on site & previous experience in the field. Rates are based on DMRE published rates (provided by Mashudu Maduka via e-mail on 02 August 2021, escalated with CPI of 6.7%). Whilst every attempt is made to ensure this information is accurate, these calculations are estimates only, based on the DMRE-prescribed methodology. Cabanga Concepts cannot be held liable for any discrepancies.							
No.:	**Description:**	**Unit:**	**A** **Quantity** **Step 4.5**	**B** **Master rate (DMRE)** **Step 4.3**	**C** **Multiplication factor** **Step 4.3**	**D** **Weighting Factor** **Step 4.4**	**E=A*B*C*D** **Amount (Rands)**
1	Dismantling of processing plant & related structures (incl. overland conveyors & Power lines)	m^3	12521,60	R 18,57	1,00	1,10	R 255 816,74
2 (A)	Demolition of steel buildings & Structures	m^2	3110,00	R 254,80	1,00	1,10	R 871 667,56
2 (B)	Demolition of reinforced concrete buildings & structures	m^2	3218,0	R 375,50	1,00	1,10	R 1 329 197,19
3	Rehabilitation of access roads	m^2	51518,00	R 45,60	1,00	1,10	R 2 584 104,80
4 (A)	Demolition & rehabilitation of electrified railway lines	m		R 442,55	1,00	1,10	
4 (B)	Demolition & rehabilitation of non electrified railway lines	m		R 241,39	1,00	1,10	
5	Demolition of housing &/or administration facilities	m^2	1495,00	R 509,60	1,00	1,10	R 838 034,09
6	Opencast rehabilitation including final voids & ramps	ha	3,00	R 259 361,28	**1,00**	1,10	R 855 892,23
7	Sealing of shafts, adits & inclines	m^3	108,00	R 136,79	1,00	1,10	R 16 250,33
8 (A)	Rehabilitation of overburden & spoils	ha	1,28	R 178 092,96	1,00	1,10	R 250 754,88
8 (B)	Rehabilitation of processing waste deposits & evaporation ponds (basic, salt producing waste)	ha		R 221 811,56	1,00	1,10	
8 (C)	Rehabilitation of processing waste deposits & evaporation ponds (acidic, metal-rich waste)	ha	13,57	R 644 245,91	**1,00**	1,10	R 9 617 296,51
9	Rehabilitation of subsided areas	ha		R 149 126,03	1,00	1,10	
10	General surface rehabilitation	ha	31,15	R 141 079,66	1,00	1,10	R 4 833 954,75
11	River diversions	ha		R 141 079,66	1,00	1,10	
12	Fencing	m		R 160,93	1,00	1,10	
13	Water management	ha		R 53 642,45	**1,00**	1,10	
14	2 to 3 years of maintenance & aftercare	ha	14,85	R 18 774,86	1,00	1,10	R 306 705,95
15 (A)	Specialist Studies: Groundwater	SUM	350000,00		1,00	1,10	R 385 000,00
15 (B)	Soils fertility and faunal survey	SUM	150000,00		1,00	1,10	R 165 000,00
		(Sum of items 1 to 15 Above)					R 22 309 675,04
	Sub-total 1: Multiply Sum * of 1 - 15 by Weighting Factor 2	Weighting factor 2 (step 4.4)				1,05	**R 23 425 158,79**
1	Preliminary and General	Add 6% of Subtotal 1 if Sub-total 1 >R100,000,000.00				6%	
		Add 12% of Subtotal 1 if Sub-total 1 < R100,000,000.00				12%	**R 2 811 019,05**
2	Contingencies	Add 10% of Sub-total 1				10%	**R 2 342 515,88**
	Sub-total 2: Sub-total 1 plus sum of management and contingency)						**R 28 578 693,73**
	Add VAT (15%)					15%	**R 4 286 804,06**
	GRAND TOTAL						**R 32 865 497,78**

14 ASSUMPTIONS, UNCERTAINTIES AND GAPS IN KNOWLEDGE

All specialist studies are conducted to certain levels of confidence, and in all instances known and accepted methodologies have been used and confidence levels are generally high. This means that in most cases the situation described in the pre-mining environment is accurate at high certainty levels, but there exists a low probability that some issues have not been identified during the studies. Such situations cannot be avoided simply due to the nature of field work and have therefore not been further discussed below.

In situations where species sampling or sensitive site assessment is conducted (fauna, flora, aquatic ecosystems and wetland assessments), it must be understood that time limitation and conditions on site means that not all species can be identified nor sites can be discovered during the surveys. Again, as accepted methodologies are used, this is not deemed to be a fatal flaw. Therefore this is not re-iterated below for each specialist study. It must be stressed that this has been considered within the EMP, where measures are proposed to reduce impact on specifically protected species and heritage sites should these be discovered in addition to those identified during surveys.

There are inherent errors in GPS and mapping programmes which must be considered when transferring plans to on-site activities.

Furthermore, statistical analyses and mathematical models are merely tools that assist the researcher in assessing field observations and have innate assumptions which can reduce objectivity of the results obtained. This is not seen as a major flaw but should always be considered when assessing results. This is not reiterated below for each specialist who has formulated impact assessment based on modelling.

Lastly, impact assessment is a predictive tool to identify aspects of a development that need to be prevented, altered or controlled in a manner to reduce the impact to the receiving environment, or determine where remediation activities will need to be incorporated into the overall development plan. This does not mean that the impact will occur at the predicted significance, but provides guidance on the formulation of the management and monitoring requirements which need to be incorporated into the EMP.

Specific knowledge gaps identified by the various specialists and the appointed EAP include:

- The level of project detail presented in this report is sufficient to ensure a realistic identification of potential impacts. In assessing the potential significance of those impacts, the precautionary principle was implemented and a worst-case scenario assessed in each instance.
- The information contained in the Agricultural Potential Report is based on auger points taken and observations on site. There may be variations in terms of the delineation of the soil forms across the area. Due to the size of the proposed area only the key areas where infrastructure is located were focused on, the remaining areas were predominantly delineated through means of desktop studies.
- Wetland systems within the Project area were assessed fully through the accepted methodologies with in field sampling; however areas outside the MRA but within 500 m of the project area were only looked at from a desktop level. The results of this assessment are based on data collected during a single February 2017 survey followed

by a single season survey conducted in October 2022, which would constitute a wet season survey. Thus, temporal trends were not investigated and are not part of the scope of work.

- The GPS used for delineations is accurate to within five metres. Therefore, the delineation plotted digitally may be offset by at least five metres to either side
- It is almost impossible to locate all cultural resources in a given area with no margin for error or omission due to accessibility, vegetation density, other visibility consideration or the sub-terranean nature of some heritage resources. It is therefore possible that some heritage resources would not have been identified during the study.
- The eastern portion of Portion 6 was not surveyed during the 2022 HIA due to the river and locked gate.
- No site visit was undertaken for the Paleontological Study.
- Only activities taking place within the Project boundary were considered in the AQIA, no background emissions sources were included. The study is limited by the amount of detailed information that could be provided at the time of modelling.
    - Operation hours were assumed to be 24/7, except for hauling which was assumed to occur from 06:00 – 20:00 each day.
    - Construction hours were assumed to occur for 10 hours a day, 5 days a week.
    - A hourly throughput of 250 tonnes/hour for the sizing stations and conveyor transfer points was used.
    - The only mitigation measures considered in the AQIA include standard water spraying on unpaved haul roads (75% control efficiency), and at the primary sizing stations and on the exposed stockpiles and MRF (50% control efficiency) during the operational phase.
    - No baseline air quality data was available for the area.
- Noise experienced at a certain location is the cumulative result of innumerable sounds emitted and generated both far and close, each in a different time domain, each having a different spectral character at a different sound level. Each of these sounds is also impacted differently by surrounding vegetation, structures and meteorological conditions that result in a total cumulative noise level represented by a few numbers on a sound level meter. It is not the purpose of noise modelling to accurately determine a likely noise level at a certain receptor but to calculate a noise rating level that is used to identify potential issues of concern.
- During the site inspection for the Visual Impact Assessment visibility was low due to dust and smog. The panoramic views are therefore a typical illustration of the conditions during the winter months but also illustrates the impact during the sowing and harvesting of crops. The extent of the study area is determined by the zone of potential influence, which in this study relates to a radius of 15km around the Project site. At 15km and beyond the Project would recede into background views and or be screened by existing buildings, vegetation, topography or infrastructure.
- It was assumed that the residential dwellings surrounding the proposed Project was occupied, unless otherwise confirmed during the site visit.
- Socio-economic data in this report is dependent on the accuracy of the publicly available secondary information, such as Statistics South Africa (StatsSA 2011 and Community Survey, 2016) and the District Health Barometer.

- The social and biophysical environments are dynamic. Care has been taken to identify the most likely and significant impacts. Individuals view impacts differently due to their association with the anticipated impact.
- The project is a greenfields project with no drilling and blasting operations currently active. The anticipated levels of influence estimated in the Blast and Vibrations Report are calculated using standard accepted methodology according to international and local regulations. Assumption is made that the predictions are a good estimate with significant safety factors to ensure that expected levels are based on worst case scenarios. These will have to be confirmed with actual measurements once the Mine is operational. The limitation is that no data is available from this operation for a confirmation of the predicted values as it is a greenfield site with no current blasting activities. The planned box-cut layout was used and blast designs proposed. These blast designs are used and applied in the evaluation done in this report.

15 CONCLUSION

Mmakau Coal (Pty) Ltd has applied for a Mining Right over Portions 6, 8, RE of 15, 16, 17, 18, 19 and 20 of the farm Schurvekop 227 IS, which is in the Magisterial District of Bethal, Mpumalanga Province.

The proposed mining operation comprises the underground mining of coal. Coal will be conveyed to surface for processing before being trucked to market. The processing of coal results in the generation of mine residue (slurry and discard) which will be placed on a MRF, to be constructed onsite. It is understood that a portion of the coal may also be processed at the nearby Forzando operations.

An application for integrated environmental authorisation in terms of NEMA and NEMWA was submitted simultaneous to the application for a Mining Right. As the application for environmental authorisation relates to activities identified in terms of Listing Notice 1, 2 and 3 of the EIA Regulations, 2014 (as amended) and Category B of the List of Waste Management Activities, a full S&EIR is required. The Scoping Report and plan of study for the EIA was approved by the DMRE on 06 October 2022. This report has been compiled in line with the approved Scoping Report, and constitutes the EIA and EMP Report.

15.1 Environmental Impact Statement

Although some impacts of high significance have been identified, no fatal flaws have been identified for the project. Impacts of high to Moderate-High to High significance (pre-mitigation) included:

- Loss of wetlands, habitat and agricultural lands associated with infrastructure area.
- Permanent alteration of topography.
- Influx of job seekers into the area, and associated social ills.
- Increased risk for injuries, traffic incidences and other accidents.
- Cumulative impacts on the air quality due to dust , PM_{10} & $PM_{2.5}$.
- Alteration of topography and hydrological and geohydrological characteristics through potential subsidence of surface layers; leading to wetland loss.
- Generation of poor surface and groundwater quality water which will:

- Impair water quality in downstream wetlands and streams;
- Affect flora and fauna species associated with wetlands and impair eco-services provided by wetlands;
- Alter the biodiversity of aquatic ecosystems; and
- Impact downstream water users.

The following privately owned boreholes fall within the groundwater level drawdown in the fractured rock aquifer, and will be impacted on by mine dewatering during the operational phase:

- Bosman BH1
- Community BH
- Community Windmill
- Community Handpump

The maximum drawdown in groundwater level ranges from 37m to 70m. Post-closure the water quality within these boreholes will be impacted by the migrating pollution plume. Once the water quality within these boreholes is impacted Mmakau Coal will have to provide water of similar quality and quantity (Future Flow, 2018)

The surface infrastructure area has been placed to avoid all highly sensitive habitat such as rivers, riparian habitats and ridges. However, this is still placed within a wetland flat with hydrologically active soils which is upslope of a large pan wetland. The flora associated with this area is transformed due to agriculture and thus the loss of biodiversity is not significant in this area.

The infrastructure area has been designed to minimise the overall footprint as far as possible. Clean and dirty water areas have been mapped and a storm water management plan has been compiled in accordance with GN R704. Ensuring properly designed storage areas (coal, waste, chemicals and mine residue) and practicing good housekeeping practices at all times by ensuring all materials are properly stored within designated areas, will further reduce the potential risk for contamination by surface water runoff.

In general, positive impacts will be experienced with job creation and economic development through the LoM.

Although not further detailed here, other impacts of moderate or lower significance must be managed in accordance with the EMP.

15.2 Specific Aspects to be Included in the Environmental Authorisation

It is Cabanga Environmental's reasoned opinion that the activity be authorised on condition that the EMP is fully adhered to, annually audited and amended where necessary based on audit findings.

Should the proposed project be approved, it is recommended that the following specific conditions be included as per the specialist's findings:

- The MRF must be constructed and operated by suitably qualified persons and under the supervision of suitably qualified engineers.
- A safety factor of 2.5 must be used for mining under the Viskuile River, Joubertsvleispruit and floodplain wetlands.

- A minimum safety factor of 2.5 is required under buildings where people congregate (farmsteads and community).
- Wetland Offset Strategy to be implemented as per APPENDIX M and the conditions of the approved IWUL.
- Should the operations impact on the water quality or quantity of other surrounding users, Mmakau Coal must supply them with a sustainable water source of equal quality and quantity.
- Compilation of a rescue and relocation plan for floral SCC affected by the project. The rescue and relocation plan should be compiled and implemented in consultation with the MTPA and the necessary permits obtained.
- An alien and invasive plant management plan must be developed and implemented throughout the LoM.
- Upon finding any fossils, archaeological, cultural or historical material all work at the affected area must cease and the chance find protocol as outlined in the Emergency Response Plan followed (Section 12.5).

16 UNDERTAKING BY THE AUTHOR

I, Jane Barrett, herewith confirm:

- That the information provided in this report are to the best of my knowledge true and correct;
- That comments and inputs from stakeholders and interested and affected parties that have been communicated to Cabanga Environmental to date, have been included in this report;
- That comments and inputs from stakeholders and interested and affected parties received at any time during the EIA process that is being undertaken for this project, will be included in subsequent reports or communicated to the relevant authorities;
- That the inputs and recommendations from specialist reports pertaining to the proposed project have been included in this report and its appendices.

I further declare that –

- I act as the independent environmental practitioner in this application;
- I have performed and will continue to perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant. I have no, and will not engage in, conflicting interests in the undertaking of the activity. I do not have and will not have any vested interest (either business, financial, personal or other) in the proposed activity proceeding other than remuneration for work performed in terms of the Regulations;
- there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting EIAs, including knowledge of the relevant Acts, Regulations and any guidelines that have relevance to the proposed activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by the competent authority;
- I will continue to ensure that participation by I&APs is facilitated so that all I&APs will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced for the application .I will keep a register of I&APs and ensure that the comments of all I&APs are recorded in reports that are submitted to the competent authority in respect of the application, provided that comments that are made by I&APs in respect of a final report may be attached to the report without further amendment to the report; and
- I realise that a false declaration is an offence and is punishable by law.

06/01/20223

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Signature of the Author: Date:

Name of company: Cabanga Concepts CC (t/a Cabanga Environmental)

17 UNDERTAKING BY THE ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)

I, Lelani Claassen, herewith confirm:

- That the information provided in this report are to the best of my knowledge true and correct;
- That comments and inputs from stakeholders and interested and affected parties that have been communicated to Cabanga Environmental to date, have been included in this report;
- That comments and inputs from stakeholders and interested and affected parties received at any time during the EIA process that is being undertaken for this project, will be included in subsequent reports or communicated to the relevant authorities;
- That the inputs and recommendations from specialist reports pertaining to the proposed project have been included in this report and its appendices.

I further declare that –

- I act as the independent environmental practitioner in this application;
- I have performed and will continue to perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant. I have no, and will not engage in, conflicting interests in the undertaking of the activity. I do not have and will not have any vested interest (either business, financial, personal or other) in the proposed activity proceeding other than remuneration for work performed in terms of the Regulations;
- there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting EIAs, including knowledge of the relevant Acts, Regulations and any guidelines that have relevance to the proposed activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by the competent authority;
- I will continue to ensure that participation by I&APs is facilitated so that all I&APs will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced for the application .I will keep a register of I&APs and ensure that the comments of all I&APs are recorded in reports that are submitted to the competent authority in respect of the application, provided that comments that are made by I&APs in respect of a final report may be attached to the report without further amendment to the report; and
- I realise that a false declaration is an offence and is punishable by law.

06/01/2023

_____ _____

Signature of the EAP: Date:

Name of company: Cabanga Concepts CC (t/a Cabanga Environmental)

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