October 2020

BASIC ASSESMENT REPORT & ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT.

MINING PERMIT FOR COAL ON PORTION OF PORTION 08 OF THE FARM WOESTALLEEN 477 JS, SITUATED UNDER MAGISTERIAL DISTRICT OF MIDDLEBURG, MPUMALANGA PROVINCE.

On behalf of:

SOTHABA CAPITAL (PTY) LTD

Prepared by

Singo Consulting (Pty) Ltd

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Prepared for:

mineral resources

Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

Department of Minerals and Resources

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Mpumalanga

DMRE REF: MP 30/5/1/3/3/2/ 11712 MP

BASIC ASSESSMENT REPORT

And

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

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

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FILE REFERENCE NUMBER SAMRAD : ***MP 30/5/1/3/3/2/11712 MP***

IMPORTANT NOTICE

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

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

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

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

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

OBJECTIVE OF THE BASIC ASSESSMENT PROCESS

The objective of the basic assessment process is to, through a consultative process–

a) determine the policy and legislative context within which the proposed activity is located and how the activity complies with and responds to the policy and legislative context.

b) identify the alternatives considered, including the activity, location, and technology alternatives.

c) describe the need and desirability of the proposed alternatives,

d) through the undertaking of an impact and risk assessment process inclusive of cumulative impacts which focused on determining the geographical, physical, biological, social, economic, heritage, and cultural sensitivity of the sites and locations within sites and the risk of impact of the proposed activity and technology alternatives on these aspects to determine:

e) the nature, significance, consequence, extent, duration, and probability of the impacts occurring to; and

f) the degree to which these impacts can be reversed; may cause irreplaceable loss of resources; and can be managed, avoided, or mitigated.

g) through a ranking of the site sensitivities and possible impacts the activity and technology alternatives will impose on the sites and location identified through the life of the activity to

- identify and motivate a preferred site, activity, and technology alternative.
- identify suitable measures to manage, avoid or mitigate identified impacts; and identify residual risks that need to be managed and monitored.

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PART A: SCOPE OF ASSESSMENT AND BASIC ASSESSMENT REPORT

1 Contact person and correspondence address

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a) Expertise of the EAP

Please refer to Annexure B for the EAP's qualifications and Curriculum Vitae.

Singo Consulting (Pty) Ltd is a growing organization in the field of geological sciences, environmental sciences and environmental management. This organization has provided sound practicable solutions to unavoidable environmental problems, particularly those triggered by human activities. This is achieved by tackling environmental problems using various fields of applied science, such as chemistry, hydrology, environmental geology, geochemistry, geophysics, and soil sciences. This leads to proper and sound environmental impact assessments and the production of enforceable environmental management plans. This organization has conducted over 26 successful Environmental Impact Assessments (EIAs) in various provinces of South Africa, basic assessment reports and environmental management plans (EMPs) which protect and promote the sustainable utilization of environment.

Qualifications of the EAP Supervisor (with evidence)

Please refer to the Appendix.

2 Location of the overall activity

Farm name	Woestalleen 477 JS, Portion of Portion 08
Application area (ha)	5 ha
Magisterial district	Middleburg
Distance and direction from nearest town	Approximately 18 km south-east of Middleburg town along N11
21-digit Surveyor General code for each farm portion	T0JS00000000047700000

2.1 Locality map (show nearest town, scale not smaller than 1: 250,000)

Portion 08 of the Farm Woestalleen 477 JS is located approximately 26.3 km south-east of Middelburg town along N11, approximately 49.2 km south-east of eMalahleni and approximately 75.9 km northern side of Ermelo. The proposed permit Woestalleen 477 JS within Steve Tswete local municipality, District Nkangala in Mpumalanga Province.

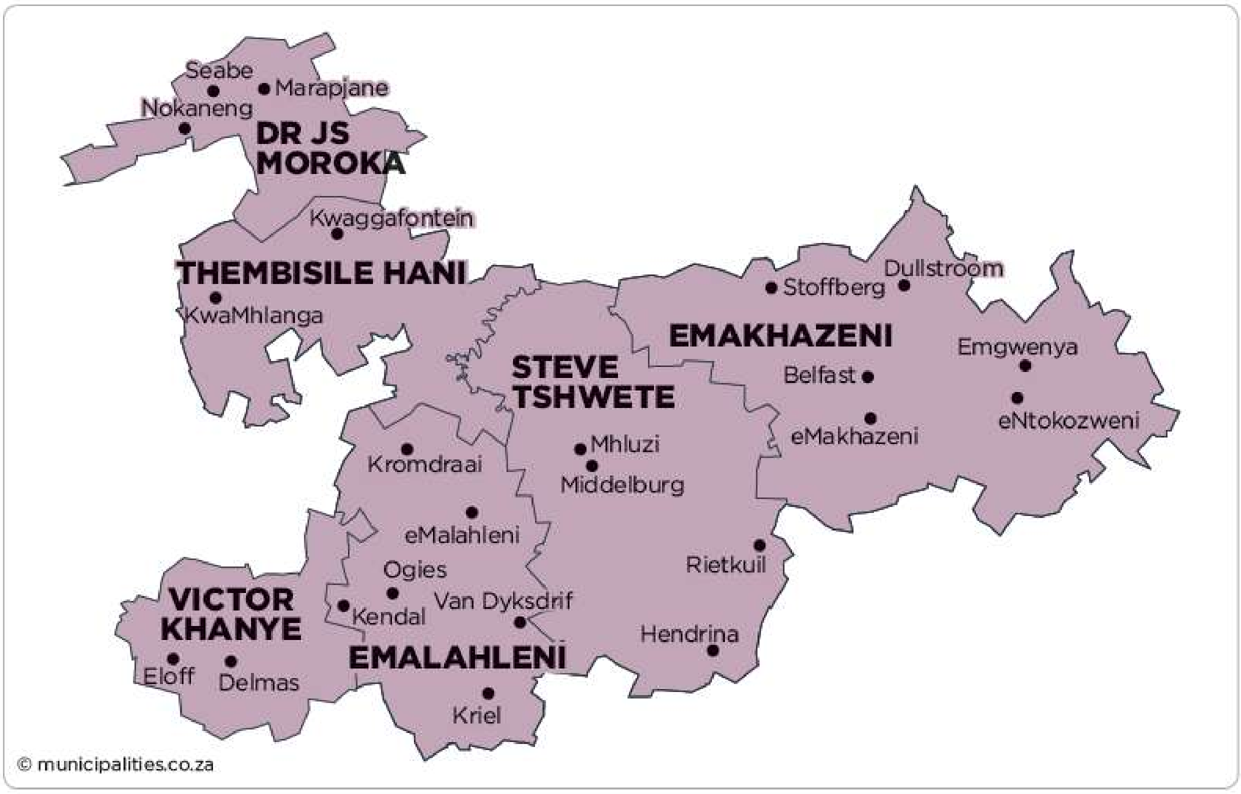

Figure 1: Locality map showing the local municipality and district the project area falls under (Nkangala District)

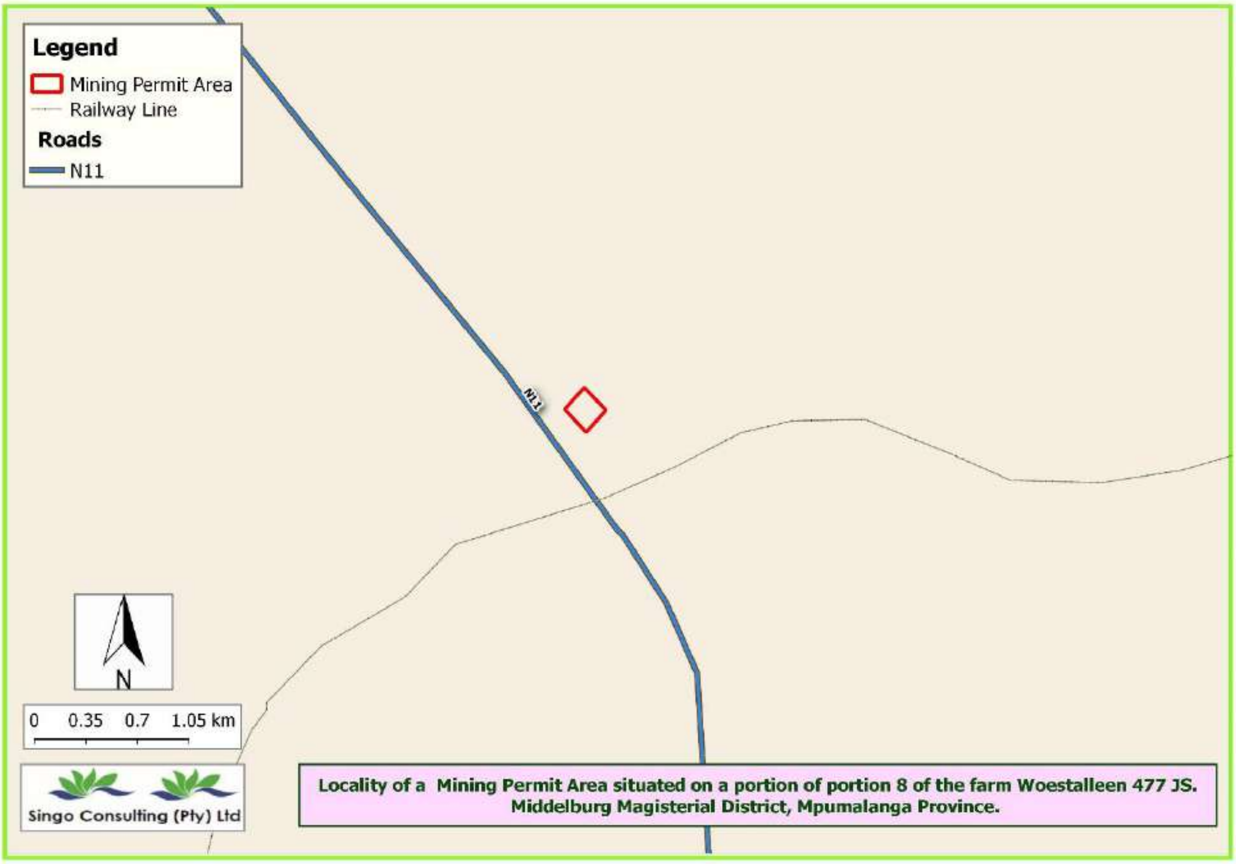

Figure 2: Locality map showing the location of the project area

2.2 Description of the scope of the proposed overall activity

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

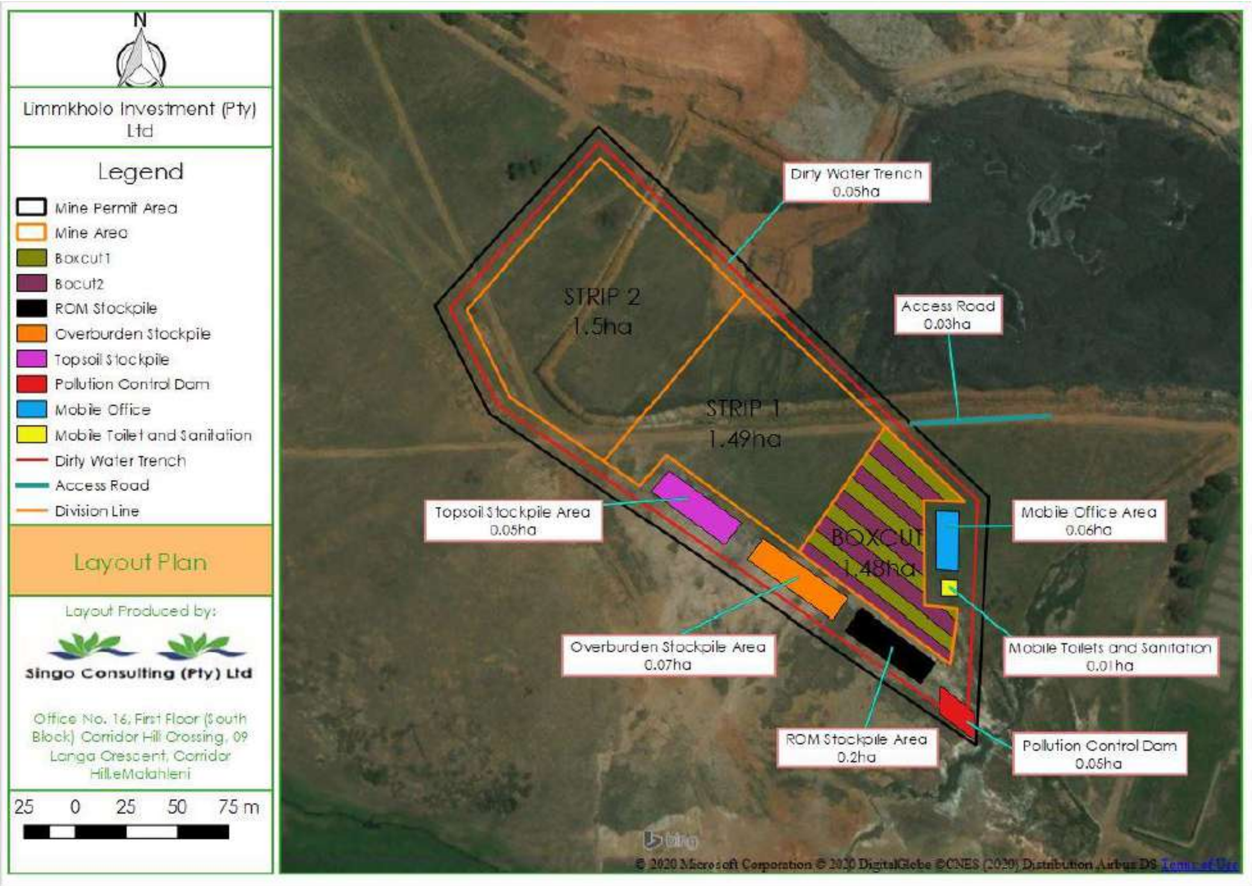

Figure 3: Proposed mine layout (infrastructure plans)

Table 1: Listed and specified activities

NAME OF ACTIVITY E.g. for prospecting: drill site, site camp, ablution facility, accommodation, equipment storage, sample storage, site office and access route; and for mining: excavations, blasting, stockpiles, discard dumps/ dams, loading, hauling, transport, water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines and conveyors.	Aerial extent of the activity Ha or m²	Listed activity Mark with X where applicable	Applicable listing notice **(GNR 324, GNR 325 OR GNR 327)**
Open cast mining and crushing to produce coal specs required by clients	5Ha	X	GNR 327 Listing notice 1 activity 21: Any activity, including the operation thereof, which requires a mining permit in terms of section 27 of the Mineral and Petroleum Resources Development Act (MPRDA), 2002 (No. 28 of 2002), including related infrastructure, structures and earthworks directly related to the extraction of a mineral resource, including activities for which an exemption has been issued in terms of section 106 of the MPRDA, 2002 (28 of 2002)
a closure certificate in terms of section 43 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)	5Ha	X	GNR 327 Listing notice 1 activity 22 Decommissioning of any activity requiring a closure certificate in terms of section 43 of the MPRDA 2002 (No 28 of 2002)
Overburden stockpile	0.07Ha	X	Not listed
Access road	0.03Ha	X	Not listed
Topsoil stockpile	0.05Ha	X	Not listed
ROM stockpile area	0.2Ha	X	Not listed
Dirty water trench	0.05Ha	X	Not listed
Mobile offices	0.06Ha	X	Not listed
Toilets and sanitation	0.01Ha	X	Not listed

Pollution Control Dam (PCD) construction	0.05Ha	X	Not listed
Vegetation clearing	5.00Ha	X	Activity 27
Box cut construction	4.99Ha	X	Not listed
Drilling and blasting	4.99 Ha	X	Not listed
Coal extraction	4.99 Ha	X	Not listed
Rehabilitation	5 Ha	X	Not listed

2.3 Description of the activities to be undertaken

Describe methodology/technology to be employed, including type of commodity to be prospected/mined, a linear activity and a description of the route of the activity.

The mining method proposed involves open cast extraction of coal from a pit to be established on virgin ground. The pit at the site will be operated by cutting a bench which will be progressed in a north-easterly direction and the depth of the pit will be 10 metres deep. . The mining methods will include blasting with explosives to loosen the hard rock (overburden) when necessary, see Figures below. The material will be loaded with excavators and hauled to the mobile crushing and screening plants that will be established within the boundaries of the mining area. The coal will be stockpiled and transported to clients via trucks and trailers. All activities will be contained within the boundaries of the mining site.

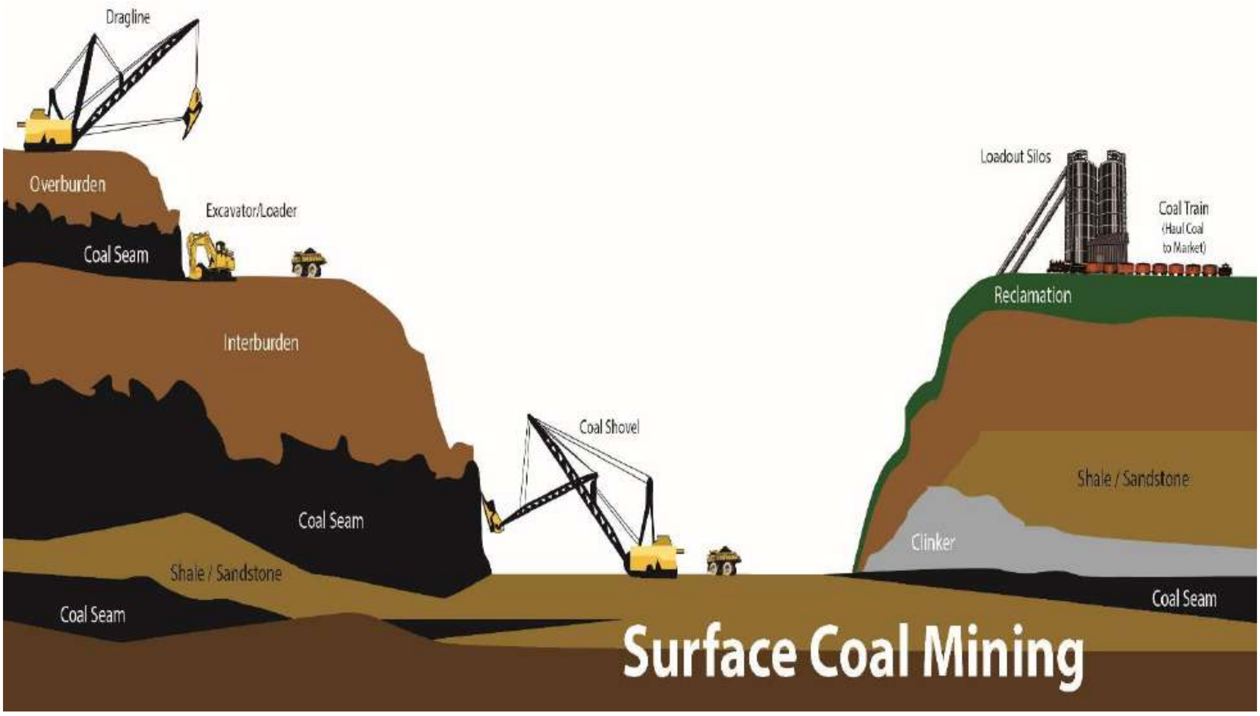

Figure 4: Schematic representation of open cast mining technique operation

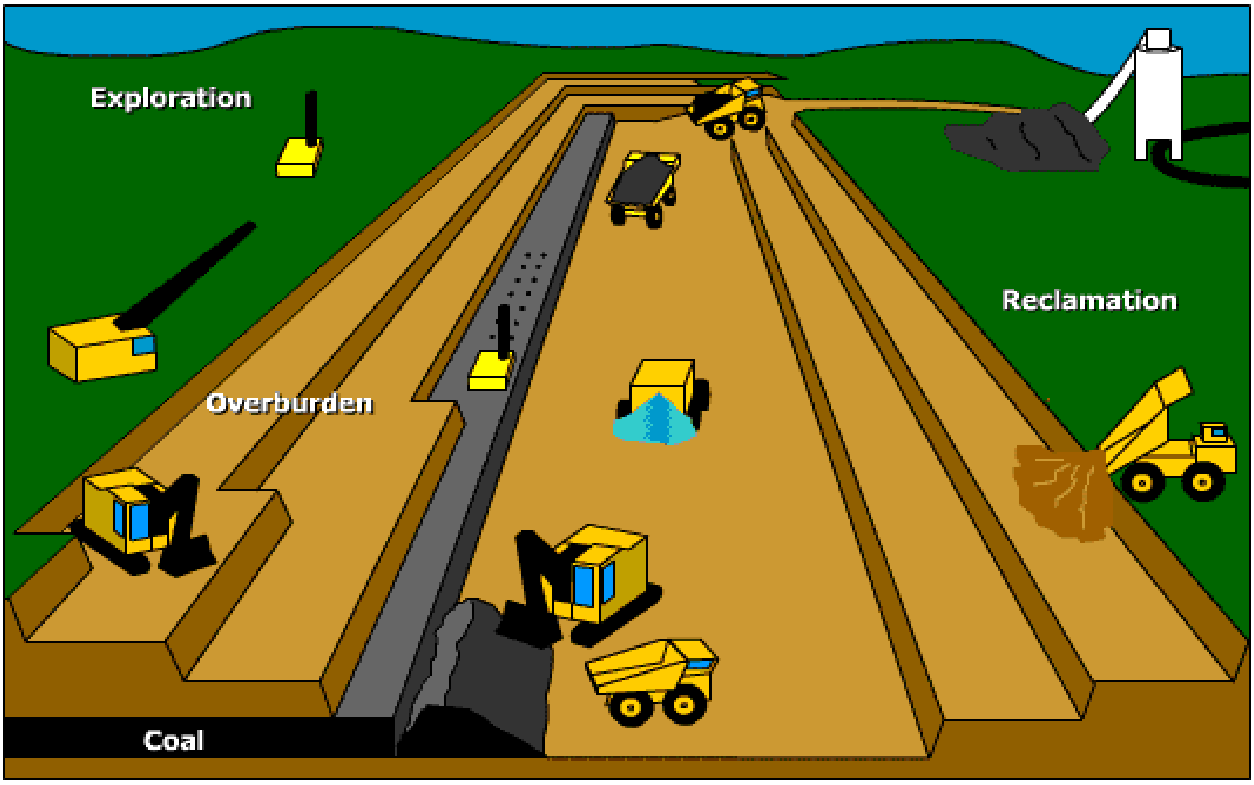

Figure 5: Coal mining stages; removal of top soil, overburden removal, excavating of coal (sometimes blasting comes first), replacing the overburden and topsoil, preparing the top soil for rehabilitation and natural vegetation is restored.

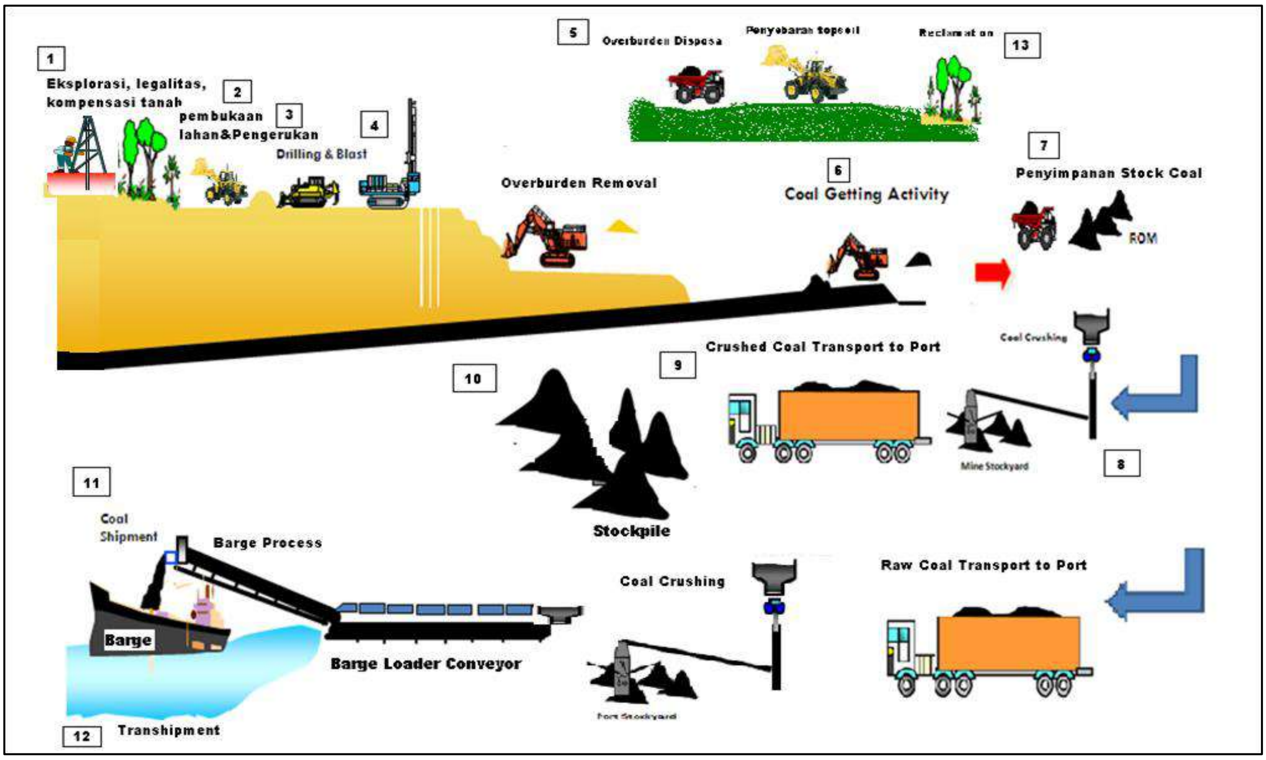

Figure 6: Flow diagram representing typical mining operations, crushing processes and finally supply to the power station

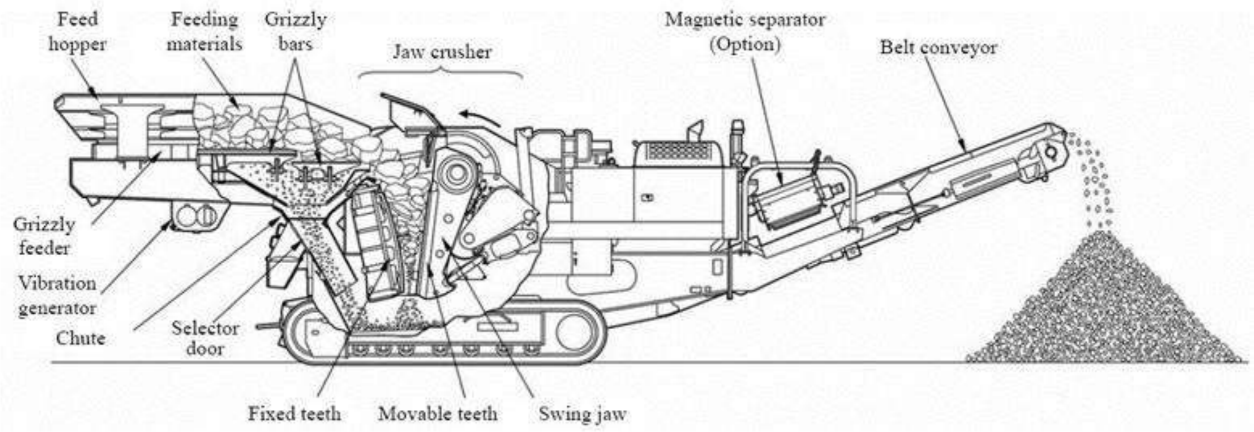

Figure 7: Typical mobile crusher

Table 2: Listed and specified activities

NAME OF ACTIVITY E.g. for prospecting: drill site, site camp, ablution facility, accommodation, equipment storage, sample storage, site office and access route; and for mining: excavations, blasting, stockpiles, discard dumps/ dams, loading, hauling, transport, water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines and conveyors.	**Aerial extent of the activity** Ha or m²	**Listed activity** Mark with X where applicable	**Applicable listing notice** **(GNR 324, GNR 325 OR GNR 327)**
Open cast mining and crushing to produce coal specs required by clients	5ha	X	GNR 327 Listing notice 1 activity 21: Any activity, including the operation thereof, which requires a mining permit in terms of section 27 of the Mineral and Petroleum Resources Development Act (MPRDA), 2002 (No. 28 of 2002), including related infrastructure, structures and earthworks directly related to the extraction of a mineral resource, including activities for which an exemption has been issued in terms of section 106 of the MPRDA, 2002 (28 of 2002)
a closure certificate in terms of section 43 of the Mineral and Petroleum	5ha	X	GNR 327 Listing notice 1 activity 22: Decommissioning of any activity

Resources Development Act, 2002 (Act No. 28 of 2002)			requiring a closure certificate in terms of section 43 of the MPRDA, 2002 (No 28 of 2002)

The mining method proposed involves open cast extraction of coal from a pit. The pit at the site will be worked by cutting a bench which will be progressed in a north-easterly direction 10 metres deep. The mining methods will include blasting with explosives to loosen the hard rock (overburden) when necessary. The material will be loaded with excavators and hauled to the mobile crushing and screening plants that will be established within the project area. The coal will be stockpiled and transported to clients via trucks and trailers. All activities will be contained within the boundaries of the mining site, see Figure below. Sothaba Capital (Pty) Ltd prefer this because its lower cost compared with other methods and a higher safety level.

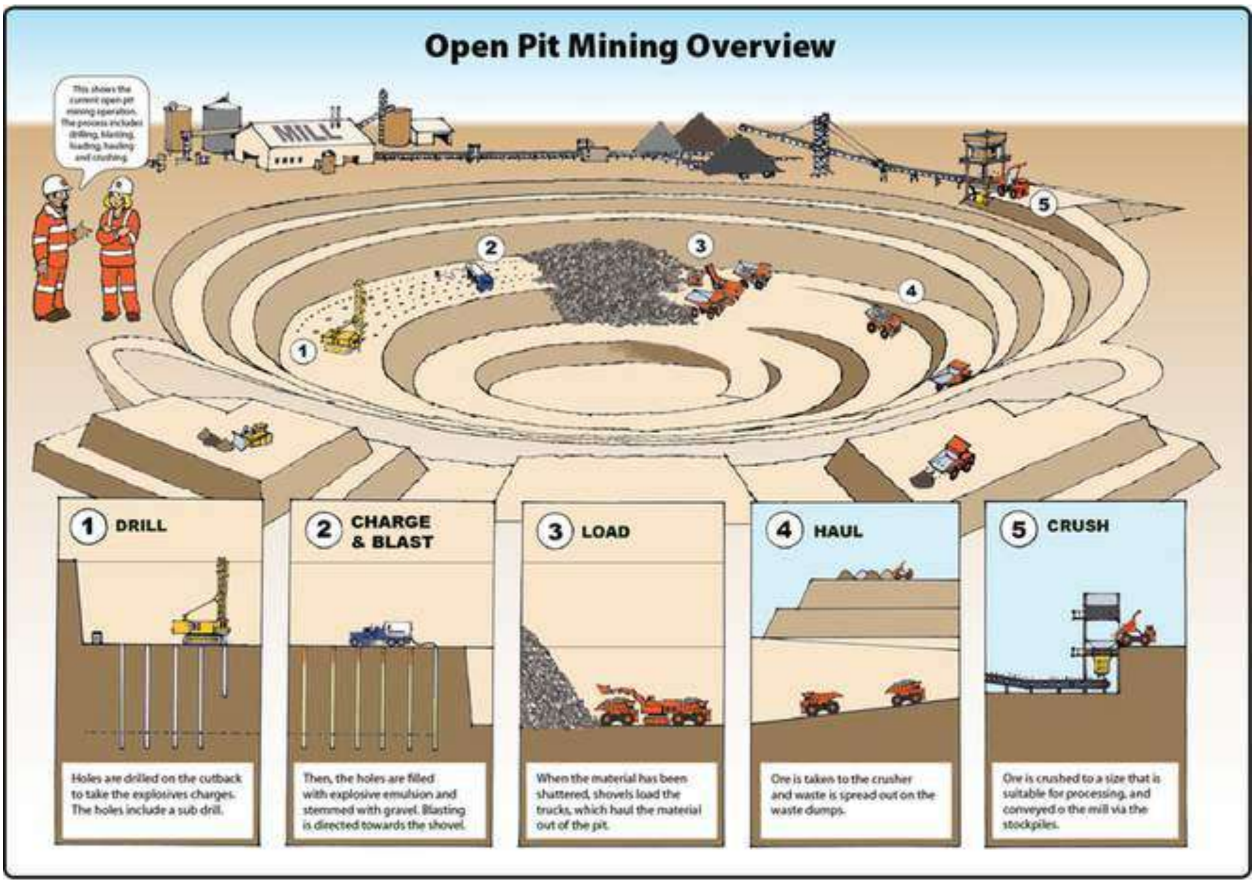

Figure 8: Typical illustration of opencast mining process

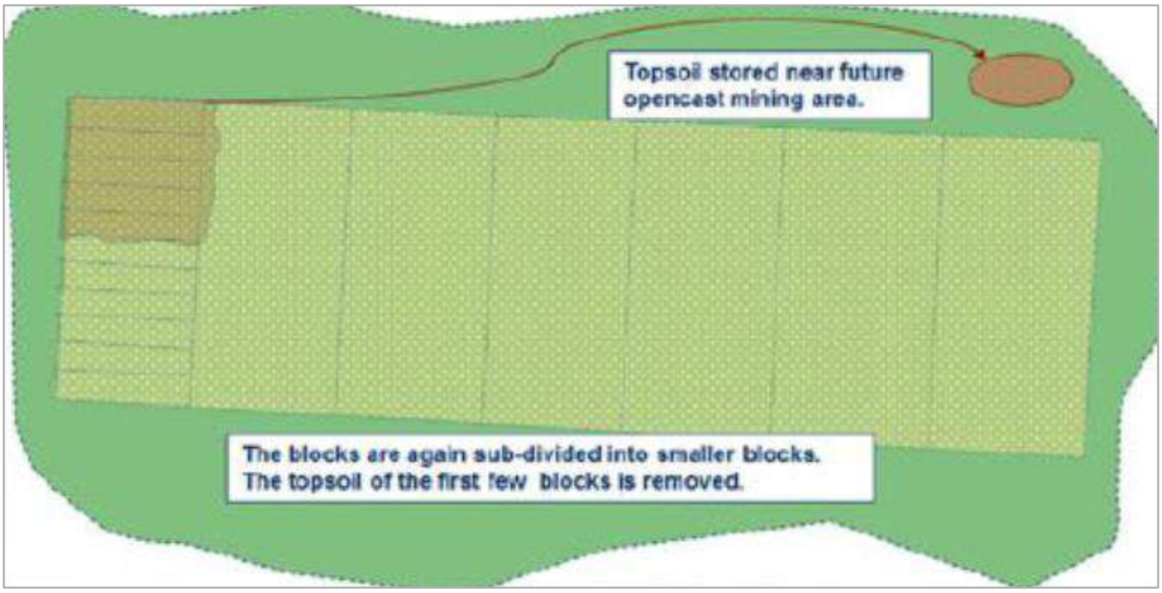

Figure 9: Topsoil removal

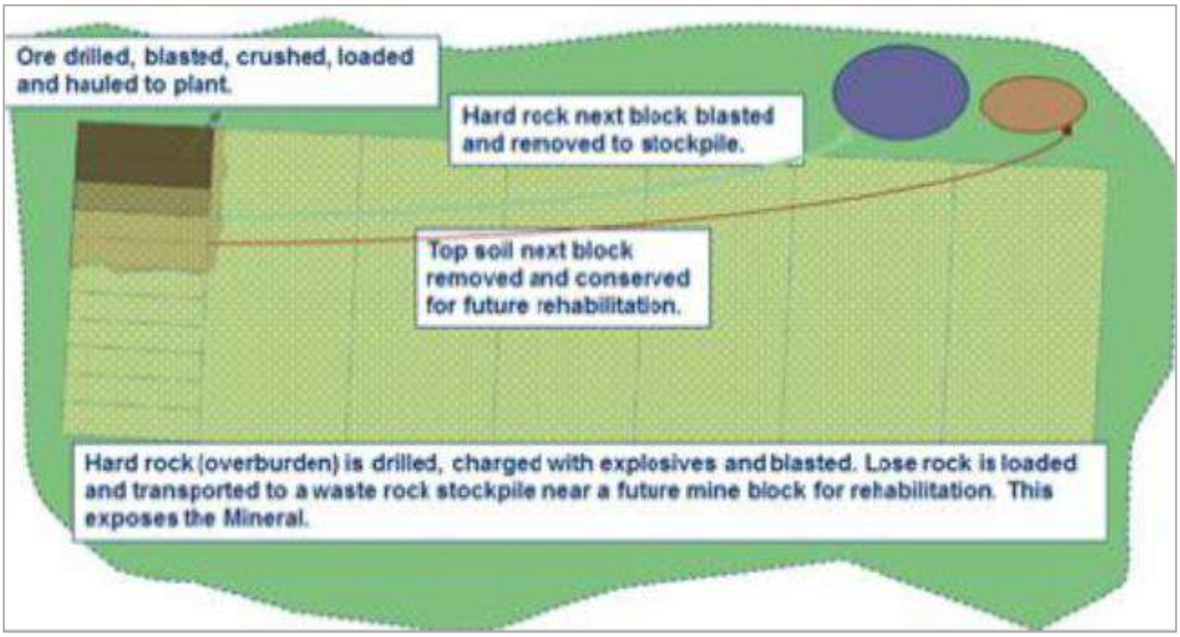

Figure 10: Overburden blasting and removal

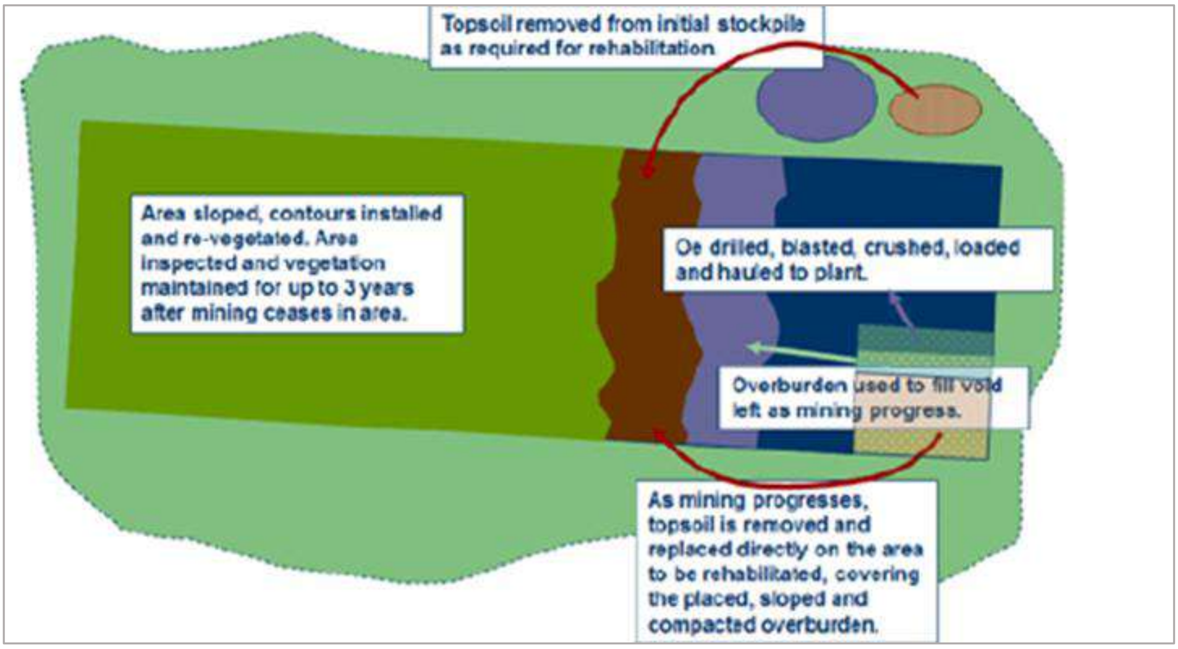

Figure 11: Backfilling and rehabilitation stage

The proposed coal pit triggers GN R. 324/GN R. 325/GN R. 327 Activities 12, 21, and 22 as:

- Activity 12: The clearance of an area of 300 square meters or more of indigenous vegetation.
- Activity 21: The project requires a mining permit in terms of the MPRDA
- Activity 22: Upon closure of the site a closure permit in terms of the MPRDA will be required

The company intends to loosen the hard rock by drilling and blasting activities, upon which it will be mechanically recovered with drilling, excavating and earth-moving equipment. A mobile crushing and screening plant will be present at the mining area. After the blast, recovered coal will be filled on a tipper truck and transported to the crusher plant where it will be crushed and screened to various specifications, as per customer requirements. Transportation of the final product will be from the stockpile area to the client by means of trucks. The mine process map is shown in the table below.

Phase	Activity no	Activity
Construction	1	Site clearing: Removal of topsoil and vegetation
	2	Construction of any surface infrastructure, e.g. Haul roads, pipes, storm water diversion berms (incl. transportation of materials and stockpiling)
	3	Blasting and development of initial box cut for mining
	4	Temporary storage of hazardous products (fuel, explosives) and waste
Operation	5	Removal of overburden and backfilling when possible (incl. drilling/blasting of hard overburden and stockpiling)

	6	Use and maintenance of haul roads.
	7	Extraction of coal (mining process) and run of mine (RoM) coal stockpile
	8	Water use and storage on site
	9	Storage, handling and treatment of hazardous products (fuel, explosives, oil) and waste activities (waste, discard)
	10	Concurrent replacement of overburden, topsoil and re-vegetation
Decommissioning	11	Removal of all infrastructure (incl. transportation off site)
	12	Rehabilitation (spreading of soil, re-vegetation and profiling)
	13	Installation of post-closure water infrastructure
	14	Environmental monitoring of decommissioning activities
	15	Storage, handling and treatment of hazardous products (fuel, explosives, oil) and waste activities (waste discard)
Post-closure	16	Post-closure monitoring and rehabilitation

2.3.1 Site establishment/construction phase

During site establishment, the applicant must demarcate the site boundaries and clear the topsoil and overburden from the extension area to open it for drilling and blasting. Upon stripping, the topsoil and overburden will be stockpiled along the boundaries of the quarry pit for use during the rehabilitation phase. Topsoil stripping will be restricted to the areas to be mined. The complete A-horizon (topsoil – the top 100-200 mm of soil, which is generally darker in colour due to high organic matter content) will be removed. If it is unclear where the topsoil layer ends, the top 300 mm of soil must be stripped.

The topsoil will be stockpiled in the form of a berm alongside the boundary of the mine pit where it will not be driven over, contaminated, flooded or moved during the operational phase. The topsoil berm will measure a maximum of 1.5 m high and indigenous grass species must be planted on it, if vegetation does not naturally establish within 6 months of stockpiling, to prevent soil erosion and discourage weed growth. The roots of the grass will improve soil viability for rehabilitation purposes. The stripped overburden will be stockpiled on a designated area after the topsoil has been removed.

The applicant will introduce the mining equipment to the area during the site establishment phase. The equipment to be used on site will include:

- Weigh bridge
- Mobile in-pit crusher plant
- Chemical toilet
- Drilling equipment
- Excavating equipment

- Earth moving equipment

2.3.2 Operational phase

The coal mining process includes drilling to set charges, detonation, loading and short haul, and stockpiling. Mining will be conducted by blasting benches from the rock face of the pit face. Blasting is estimated to occur weekly. The noise caused by blasting will be instantaneous and of short duration. The applicant must ensure that all surrounding residents/farmers are informed of each blasting event. After a blast, the larger coal will be broken into smaller pieces by hydraulic hammer. The manageable pieces will be transported by tipper or dumper trucks to the crusher plant. The coal is run through the crushers to produce the end product in various coal grades, depending on the market.

The mining activities will consist of the following:

- Excavating
- Blasting
- Crushing
- Stockpiling and transporting

The machinery used in the operation will be serviced at the applicant's existing off-site workshop. Only emergency repairs will be conducted on site with regular equipment maintenance at the above-mentioned workshop. The mining site will not require the storage of large quantities of diesel, as this is already available at the applicant's workshop area. Fuelling of tracked vehicles must be done at the mining site for logistical reasons. A chemical toilet will be established on site to be used by the employees. The existing farm road will be used to access the mining area.

2.3.3 Decommissioning phase

The closure objectives include making the coal pit safe and ensuring that the remainder of the site is fit for agricultural use. The coal pit will be incorporated into the closure objectives of the proposed extension area, which will entail the benching of the site. Benches will be built with overburden, top-dressed with topsoil and vegetated with an appropriate grass mix if vegetation is not naturally established in the area within six months of the replacement of the topsoil. Control of weeds and alien invasive plant species is an important aspect after topsoil replacement and seeding (if applicable) has been done in an area. Site management will implement an alien invasive plant management plan during the 12-month aftercare period to address germination of problem plants in the area.

The decommissioning activities will include:

- Sloping and landscaping during rehabilitation
- Replacing of topsoil

- Implementation of an alien invader plant management plan

2.4 Policy and legislative context

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT (a description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process)	REFERENCE WHERE APPLIED	HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE LEGISLATION AND POLICY CONTEXT. (E.g. In terms of the National Water Act a Water Use License has/ has not been applied for)
Minerals and Petroleum Development Resources Act, Act 28 of 2002 (MPRDA) and the MPRDA Amendment Act, Act 49 of 2008	DMR	**The conditions and requirements attached to the granting of the mining permit will apply to the mining activities.**

Constitution of South Africa, specifically everyone has the right: **a) to an environment that is not harmful to their health or wellbeing; and** **b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that** **i) prevent pollution and ecological degradation.** **ii) promote conservation; and** **iii) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.**	BAR & EMP	**The mining activities will only proceed after effective consultation. All activities will be conducted in a manner that does not violates the Constitution of the Republic of South Africa.**
Environmental Impact Assessment Regulations	BAR & EMP	**This Basic Assessment Report is being undertaken in terms of the Environmental Impact Assessment**

2.5 Need and desirability of the proposed activities

Describe methodology/technology to be employed, including the type of commodity to the prospected/mined and for a linear activity, a description of the route of the activity.

The mining sector in South Africa has traditionally occupied a principal role in the creation of economic output. It offers employment and reduces poverty. The mining companies have an obligation to improve and develop the state of the communities in which they operate through infrastructure, education and skills growth. The mining activities bring different kinds of business, which has significant economic benefits for communities. And in most cases, the jobs created by the mines pay more than the average salary. The mining industry makes a big contribution to South Africa's export market. It generates significant gains from the foreign exchange rate differences. Mining contributions to the total government revenue are directed to the national and sub-national levels. The profits of mining companies and taxes generated by companies, in addition, contribute to the Gross Domestic Product (GDP) of the country.

South Africa produces an average of 224 million tonnes of marketable coal annually, making it the fifth largest coal producing country in the world. A total of 25% of our production is exported internationally, making South Africa the third largest coal exporting country. The remainder of South Africa's coal production feeds the various local industries, with 53% used for electricity generation. The key role played by our coal reserves in the economy is illustrated by the fact that Eskom is the 7th largest electricity generator in the world, and Sasol the largest coal-to-chemicals producer. The Mpumalanga province is rich in coal resources, which provides many employment opportunities in the area. Most of the coal is mined in the Witbank Coalfield in South Africa, the seams of which have diverse characteristics, resulting in a range of potential markets/utilisation in power generation, export, domestic, metallurgical, liquefaction and chemical sectors.

2.5.1 Advantages

- SA has abundant coal reserves
- Coal-fired power stations are reliable
- SA coal resources are at shallow depth, hence the low mining cost
- South Africa's infrastructure to generate electricity from coal is well-established
- Burning coal is the most cost-effective and energy-efficient way of generating electricity

2.5.2 Disadvantages

- Coal has the most waste problems of all energy sources. Waste includes sulphur and nitrogen oxides, organic compounds, heavy metals, radioactive elements, greenhouse gases and a lot of ash
- Building a coal-fired power station is a long and expensive process
- South Africa's coal fields are concentrated in Mpumalanga, which limits the location options for power stations

2.6 Motivation for the overall preferred site, activities and technology alternative

The proposed site earmarked for the winning of the coal will include the pit. The proposed site was identified as the preferred alternative due to the following reasons:

- Although the area is virgin ground, it has minimal vegetation cover.
- The site offers the sought-after resource.
- The mining impacts can be contained to one area.
- Very little natural vegetation needs to be disturbed to establish the mining area as most of the area is bare land without no residents or agricultural activities.

- The mining area can be reached by an existing access road from the provincial road north of the property (R 555). No new road infrastructure needs to be constructed.
- The open cast mining of the coal has been identified as the most effective method to produce the desired coal. Due to the remote location of the pit, the potential impacts on the surrounding environment, associated with open cast mining, is deemed to be of low significance.
- The general waste produced on-site will be contained in sealed refuse bins to be transported to the local municipal landfill site.
- As equipment maintenance and servicing will be done at an off-site workshop, the amount of hazardous waste to be produced at the site will be minimal and mainly as a result of accidental oil or diesel spillages.
- Contaminated soil will be removed to the depth of the spillage and contained in sealed bins until removed from site by a hazardous waste-handling contractor to be disposed of at a registered hazardous waste handling site.

2.7 Full description of process followed to reach proposed preferred alternatives within the site

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

2.7.1 Preferred site

The area is being utilised for crop farming (see Fig.12). Therefore, on the proposed applied mining permit area there are no environmental sensitive areas, there are no major infrastructures, and the site has been chosen based on a small-scale geological investigation done in the area concerning coal resources.

Figure 12: Existing crops at the project area

2.7.2 Preferred activities

The preferred and only manner of extracting coal for this proposed activity is through mining. The life of a mine is currently intended to exist for two years, therefore temporary structures will be erected on site for the operation.

2.7.3 Technology alternatives

There are no technological alternatives to the proposed mining activities. Opencast mining is the only method that will be used.

2.8 Details of the development footprint alternatives considered

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

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

Sothaba Capital (Pty) Ltd identified the need for coal in the area due to an increase in coal usage. In this light, the applicant identified the proposed areas as the preferred and only viable site alternative. From extensive work conducted previously in this area, it is known that this area contains the resource being sought.

Various project alternatives were considered during the planning phase of the project. These included the following:

2.8.1 Open cast mining (preferred alternative) vs. underground mining

- The open cast mining method is used when deposits of commercially useful minerals or rock are found near the surface, where the overburden is relatively thin, or the material is structurally unsuitable for tunnelling.
- Underground mining is used where the mineral occurs deep below the surface and the overburden is thick.
- Open cast mining of the coal has been identified as the most cost-effective method to produce the desired coal as it is found near the surface, with only a narrow layer of overburden that needs to be removed.
- The geology of the area and depth of coal to be mined is structurally unsuitable for tunnelling.
- The open cast mining method will not produce any residual waste to be disposed of. Due to the location of the proposed coal pits, the potential impacts on the surrounding environment is expected to be insignificant. It is proposed that all mining-related infrastructure be contained in the boundary of the mining area.

2.8.2 Temporary infrastructure (preferred alternative) vs. permanent infrastructure

- Temporary infrastructure use will entail the use of truck-based or easily removable infrastructure. This includes a mobile in-pit crusher plant, temporary weigh bridge and chemical toilet, with off-site vehicle and equipment servicing (at the applicant's existing workshop). The off-site office will be used for project administration purposes.

- Positive aspects: The infrastructure can be moved around in the mining area boundaries as mining progresses, decreasing the distance material has to be transported from the crusher plant to the stockpile area. In addition, the crusher plant and other equipment can move out of the mining area (and onto the existing road) during a blast to prevent potential fly rock damage. During the decommissioning phase, infrastructure will be removed from the mining area, making site rehabilitation easy and effective.
- Permanent infrastructure will entail the construction of an office building with ablution facilities, installation of a septic tank to be connected to the ablution facilities, installation of a permanent weigh bridge and permanent crusher plant.
- The use of permanent infrastructure will increase the impact of the proposed project on the environment as it will entail the establishment of more structures, necessitate the use of concrete products on site in order to establish these infrastructure, lengthen the period required for rehabilitation as well as increase the rehabilitation cost as the permanent infrastructure will either have to be decommissioned or be maintained after the closure of the site.
- Due to the small size of the mining area the infrastructure may be exposed to fly rock damage during blasting events.
- The construction of permanent infrastructure on site will increase the visual impact of the proposed project on the surrounding environment and additional mitigation measures will have to be implemented to address the impact.
- In the light of the above, the use of temporary infrastructure is deemed to be the most viable preferred alternative.

2.8.3 Access onto provincial road (preferred alternative) vs. national road

- Provincial road which can be used R555 as an alternative to the project area to reduce traffic.
- National road (N11): The turning of trucks transporting material from the mining area to clients onto the N11 considered here, since the road is about 19 km away. To minimise the impact the activity may have on traffic and the alternative provincial road (as mentioned above) be used as access road to and from the coal pit.

2.8.4 No-go alternative

The no-go alternative entails no change to the status quo and should therefore be considered. The coal to be mined at the site will be used for energy and power industries. If the no-go alternative is implemented, the applicant will not be able to expand the mine to utilise the mineral present in the area. This could have major impacts on aspects such as transporting of material to power stations from far off mining areas, cost-effectiveness of material, impact on roads and road users due to long distance hauling of coal and loss of income to the Witbank business area.

The no-go alternative was not considered the preferred alternative, as:

- The applicant will not be able to supply in the demand of power station.
- The application, if approved, would allow the applicant to utilise the available coal, as well as provide employment opportunities to local employees. Should the no-go alternative be followed, these opportunities will be lost to the applicant, potential employees and clients.
- The applicant will not be able to diversify the income of the property.

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Farm List

Date Requested	2020/07/30 10:56
Deeds Office	MPUMALANGA
Registration Division	JS
Farm Name	WOESTALLEEN
Farm Number	477
Remaining Extent	NOT SELECTED

PORTION LIST

Portion	Owner	Title Deed	Registration Date	Purchase Price (R)
0	MANDIFUSION PTY LTD	T16504/2016	2016/11/21	R15000000.00
1	DESSEL FARMING PROP PTY LTD	T101446/1993	1993/12/30	R250000.00
2	*** NO LONGER EXISTS - SEE ENDORSEMENTS ***		-	
4	VENTER TERVEN	T71442/2001	2001/07/12	R312000.00
9	VENTER TERVEN	T110709/1997	1997/10/22	R120000.00
10	STURGESS MICHAEL ANDREW	T6216/2011	2011/06/29	R2500000.00
11	WOESTALLEEN COLLIERY PTY LTD	T132463/1998	1998/10/30	R3800231.00
12	DESSEL FARM PROP WOESTALLEEN PTY LTD	T52366/2006	2006/07/19	R600000.00
13	*** NO LONGER EXISTS - SEE ENDORSEMENTS ***		-	
14	WOESTALLEEN COLLIERY PTY LTD	T34490/1999	1999/03/31	R3450000.00
16	BOSSPRUIT ONDERNEMINGS PTY LTD	T160844/2002	2002/12/18	R0.00
18	WOESTALLEEN COLLIERY PTY LTD	T99269/2002	2002/08/20	R1325000.00
20	DESSEL FARM PROP WOESTALLEEN PTY LTD	T157619/2004	2004/11/11	R0.00
22	ALZU ONDERNEMINGS PTY LTD	T68231/2005	2005/06/01	R0.00

Windeed Search Results

2.9 Details of the public participation process followed

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

Public Participation Process was conducted by TPR Mining Resources (Pty) Ltd (See Appendix) and further consultation was done by Singo consulting (See Appendix 4).

2.10 Summary of issues raised by I&APs

Compile the table summarising comments and issues raised, and reaction to those responses.

I&APs List the names of persons consulted in this column. Mark with an X where those who must be consulted were in fact consulted.	**Date comments received**	**Issues raised**	**EAPs response to issues as mandated by the applicant**	**Section and paragraph reference** In this report where issues and/or responses were incorporated
Affected parties				
Landowner/s				
Landowner representative				
		.		
Local Municipal Officials				

I&APs List the names of persons consulted in this column. Mark with an X where those who must be consulted were in fact consulted.		**Date comments received**	**Issues raised**	**EAPs response to issues as mandated by the applicant**	**Section and paragraph reference** In this report where issues and/or responses were incorporated
Organs of state (Responsible for infrastructure that may be affected: Roads Department, Eskom, Telkom, DWA)					
Communities					
Mpumalanga Provincial Government					
			.		
Other competent authorities affected					
			.		
			.		
.					
Other affected parties					
Interested and affected parties					

I&APs List the names of persons consulted in this column. Mark with an X where those who must be consulted were in fact consulted.	**Date comments received**	**Issues raised**	**EAPs response to issues as mandated by the applicant**	**Section and paragraph reference** In this report where issues and/or responses were incorporated

3 The environmental attributes associated with the alternatives.

The environmental attributes described must include socio-economic, social, heritage, cultural, geographical, physical and biological aspects.

4 Baseline environment

4.1 Type of environment affected by the proposed activity

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

4.1.1 Regional geology

4.1.1.1 Karoo geology

In general, the coal deposits in South Africa are hosted by the Karoo Supergroup, which was deposited in the Gondwana basin that covered parts of Africa, Antarctica, South America and Australia. The basal stratigraphy of the Karoo Supergroup comprises the Dwyka Group, which is a late carboniferous to early Permian (~320Ma) sequence of glacial and periglacial sediments, including diamictite, till moraine, conglomerate, sandstone, mudstone and varved shale.

This is overlain by the Ecca Group which is an early to late Permain (~260 Ma) sequence comprising sandstone, siltstone, mudstone and significant coal seams deposited in a terrestrial basin on a gently subsiding shelf platform. In the surrounding Witbank Coalfield areas, the Ecca Group is overlain by the Beaufort Group, which is Early Triassic (~260 to 210 Ma), comprising multi-coloured mudstone and sandstone with only minor coal accumulation and was deposited in a fluvial environment. The Molteno Formation rests unconformably on the Beaufort Group and comprises Late Triassic (~210 Ma) coarse, immature sandstone with minor argillaceous layers derived from braided streams. This, in turn, is overlain by the Elliot Formation consisting of red mudstone and sandstone and the Clarens Formation comprising Aeolian sandstone. At the top of the Karoo Supergroup stratigraphy is the Drakensburg Group, which comprises early to middle Jurassic (~180 Ma) flood basalts.

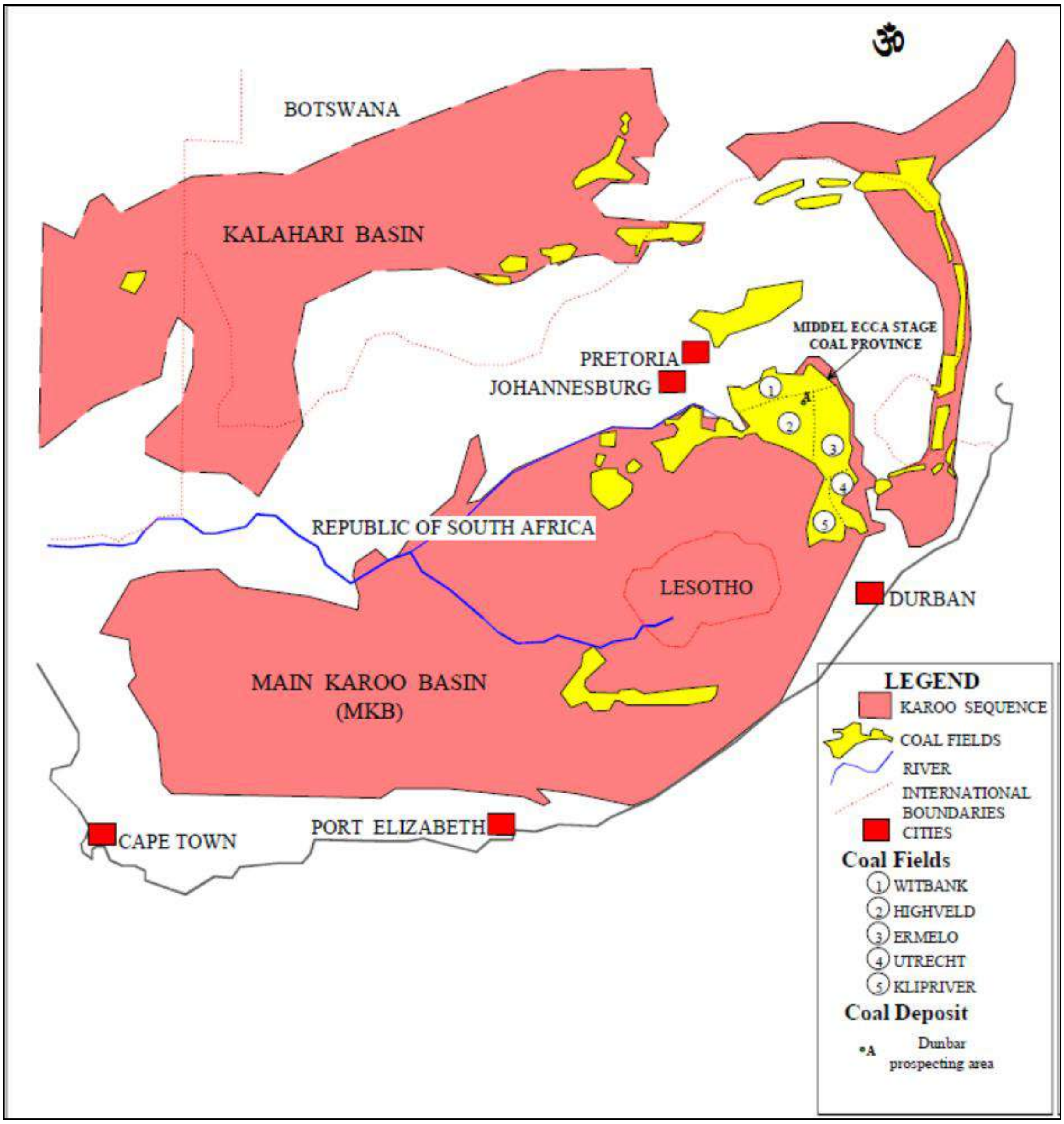

Figure 13: Karoo and coal basin map

4.1.1.2 Local geology

The Witbank Coalfield was first exploited in 1895 and became the most significant production area in South Africa supporting many collieries. Six coal seams (numbered 1 through 6 from the base upwards) are contained in a 70m-thick succession comprising dominantly of sandstone with subordinate siltstone, mudstone and shale (Vryheid Formation). The partings between the seams are remarkably constant, although seam splitting is common.

The distribution and attitude of the No.1 and 2 seams is largely determined by the pre-Karoo topography and all seams are controlled by the current erosion surface. Generally, the No.1, 2, 4 and 5 seams are considered economic based on seam thickness and quality. Intrusive dolerite dykes and sills are ubiquitous and devolatilization of the coal seams can be significant. The area is underlain by thin sequences of sedimentary rocks of the Dwyka Group which represent re-worked glacial tillite. They rest unconformably on an uneven floor of older pre-Karoo rocks composed of granite, gabbro, diabase and felsite.

The basement and Dwyka Group are unconformably overlain by the coal-bearing Vryheid Formation of the Ecca Group comprising the six recognised coal seams separated by sedimentary packages consisting mainly of sandstone and thinly laminated siltstone with subordinate mudstone and shale. The lithological units are variable in thickness, but readily identifiable in all boreholes throughout the area.

The colliery coal seams are contained in the Vryheid Formation of the Karoo Sequence and are underlain by Dwyka Group strata. Due to the presence of palaeohighs and present-day erosion, not all the coal seams are developed in all reserve areas. The colliery reserve area stratigraphy is typical of the Witbank Coalfield. Four main coal seams are present: they are, in ascending, stratigraphic order, the No.1, 2, 4 and 5 Seams. The Landau coal reserves are primarily contained in the No.1, 2 and 4 seams.

Sediments of shale, siltstone and sandstone overlie and separate the various coal seams. Underlying the lowermost coal seam is a coarse-grained diamictite. The overburden thickness and preservation of the coal seams is dependent on the surface topography and the pre-Karoo basement floor. In general, the depth of weathering does not extend deeper than the first couple of metres and the overburden thus comprises hard, competent material. Consequently, the weathering seldom has any significant impact on the slope stability of the highwall or on the quality of the coal seams. The overburden and interburden lithologies vary across the reserve.

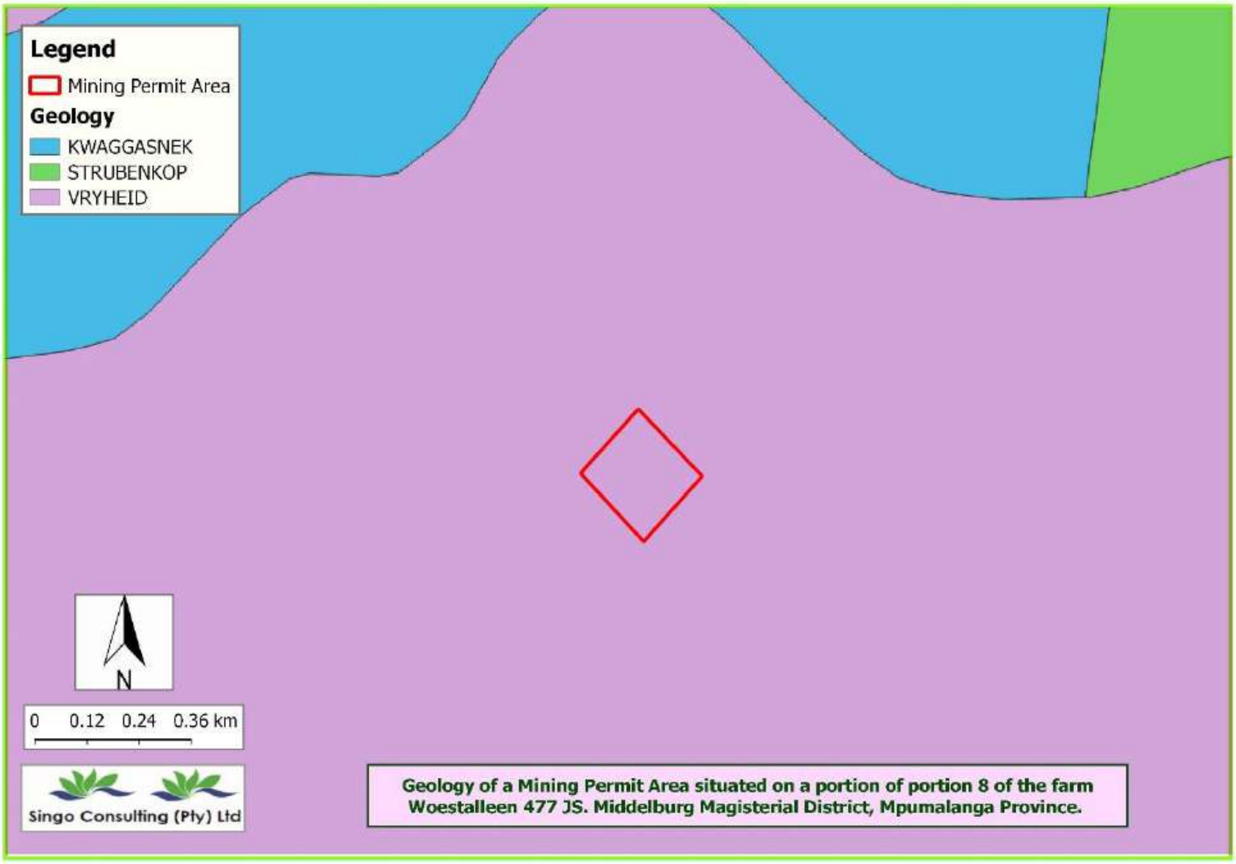

Figure 14: Geology Map for the mining permit area.

The proposed project area falls within the Witbank coalfields. This Coalfield was first exploited in 1895 and became the most significant production area in South Africa supporting many collieries. Six coal seams (numbered 1 through 6 from the base upwards) are contained in a 70 m-thick succession comprising dominantly of sandstone with subordinate siltstone, mudstone and shale (Vryheid Formation). The partings between the seams are remarkably constant, although seam splitting is common.

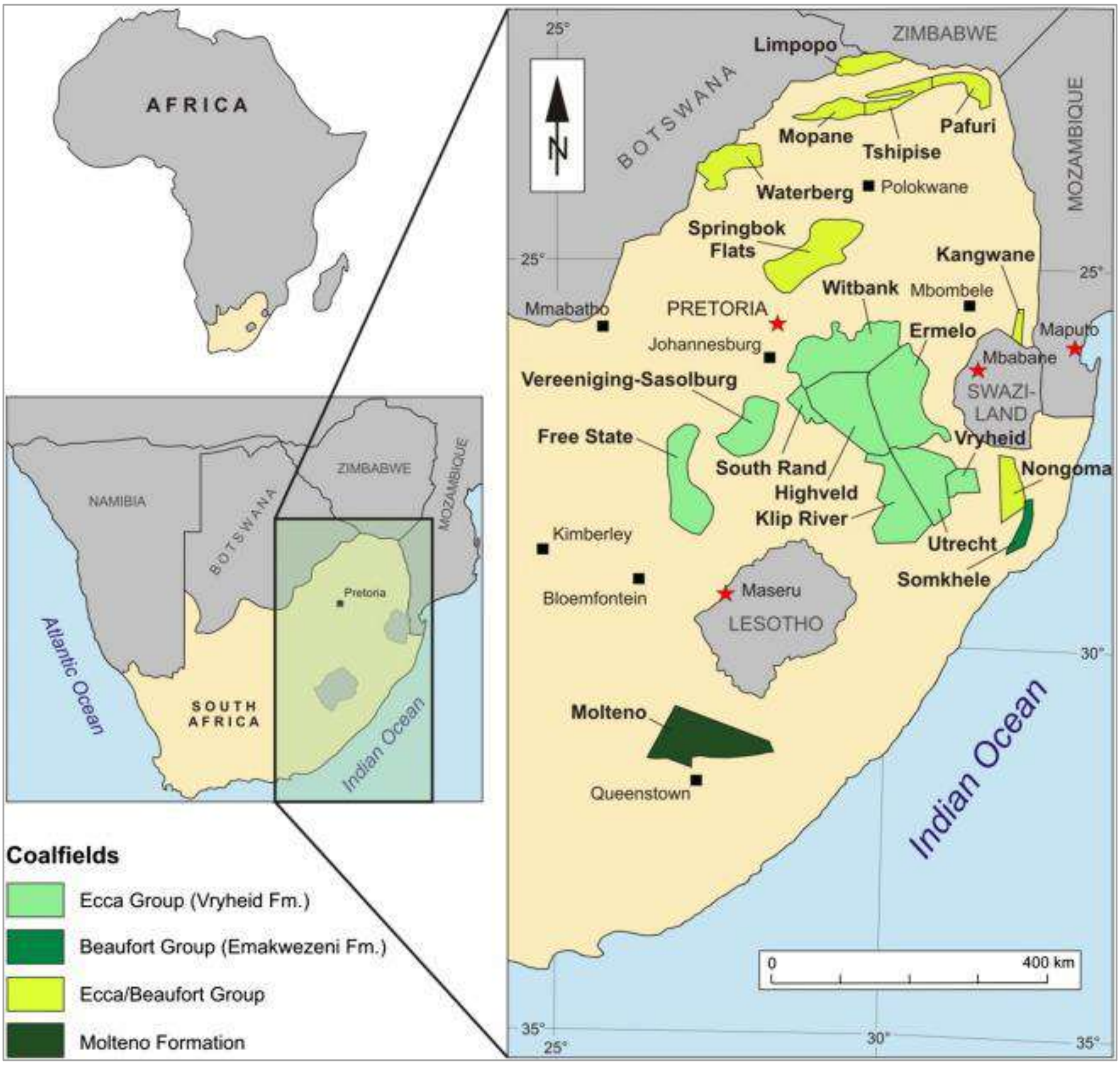

Figure 15: Coalfields of South Africa.

The distribution and attitude of the No.1 and 2 seams is largely determined by the pre-Karoo topography and all seams are controlled by the current erosion surface. Generally, the No.1, 2, 4 and 5 seams are considered economic based on seam thickness and quality. Intrusive dolerite dykes and sills are ubiquitous and devolatilisation of the coal seams can be significant. The area is underlain by thin sequences of sedimentary rocks of the Dwyka Group which represent re-worked glacial tillite. They rest unconformably on an uneven floor of older pre-Karoo rocks composed of granite, gabbro, diabase and felsite.

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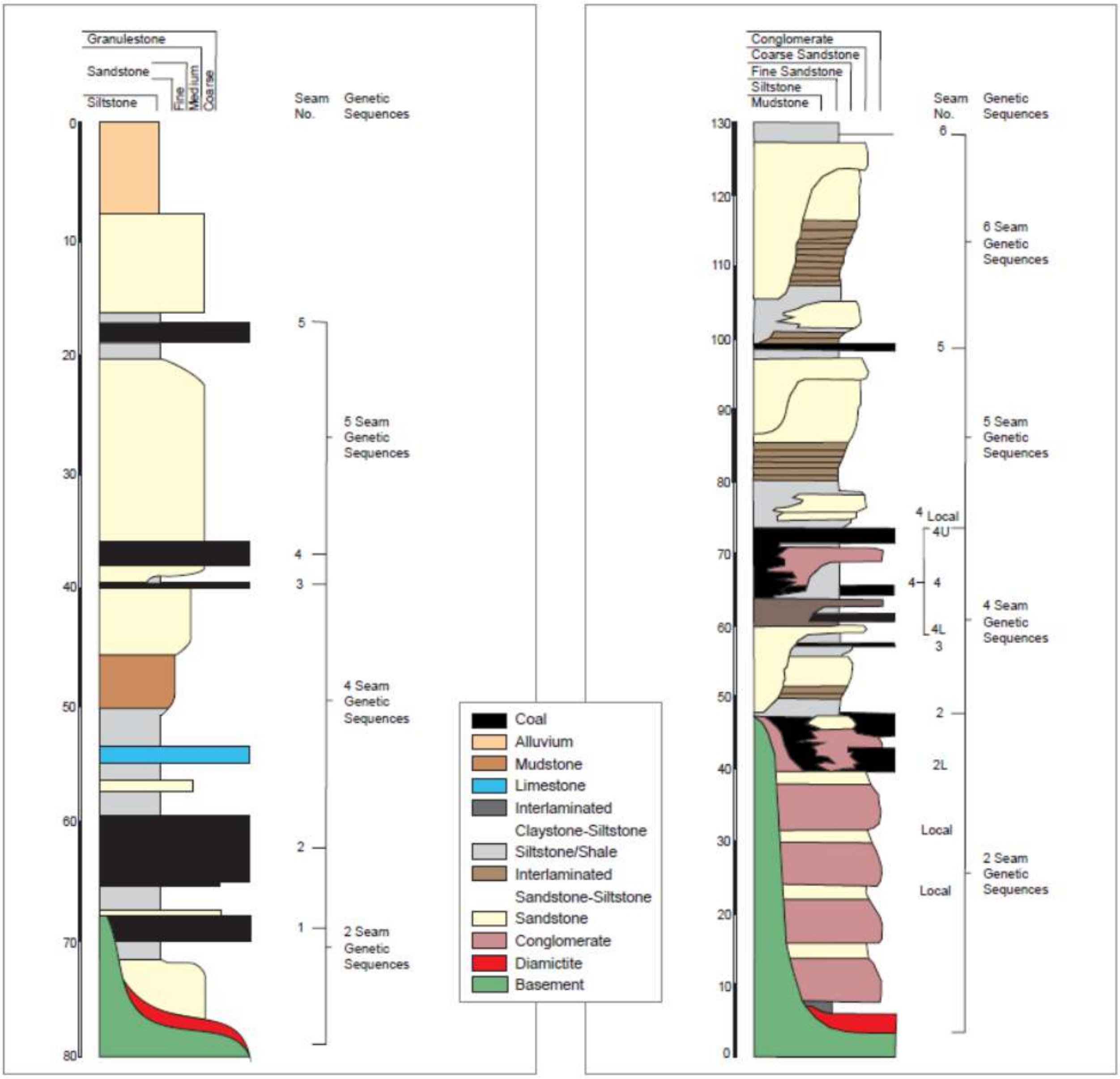


Figure 16: Description of major coal seams, coal seam stratigraphy and expected depth

5 Flora and Fauna

Flora is the plant life occurring in a particular region or time, generally the naturally occurring or indigenous—native plant life while Fauna is all the animal life present in a particular region or time. The map below illustrates the vegetation type for the project area.

5.1.1.1 Flora

The Proposed Mining Permit falls under moist sandy Highveld grassland. The Highveld grassland has its agriculture severely fragmenting due to the anthropogenic changes. From all the grasslands all over the world, the Highveld grassland now provides the last remaining stronghold of several species that have suffered major reductions in abundance in the grassland biome, and which are consequently threatened with extinction.

The grasslands habitat across its range (EOO 19 900 km²) is extensively transformed by urban development, crop cultivation, mining and invasive alien plants. Mining is causing a continuing decline in habitat between Witbank and Carolina.

The dominant vegetation comprises of grasses, with geophytes and herbs also being well represented. Dominant and diagnostic grass species are Hyparrhenia hirta and Sporobolus pyramidalis. Non-grassy forbs include Acacia sieberiana, Rhus rehmanniana, Walafrida densiflora, Spermacoce natalensis, Kohautia cynanchica, and Phyllanthus glaucophyllus (Bredenkamp et al. 1989; Coetzee et al. 1993; Eckhardt et al. 1993; Fuls et al. 1993; Cowling et al. 1997).

From the screening report generated, the development footprint environmental sensitivities have been identified. These sensitivities include agricultural theme sensitivity which is medium sensitivity. sensitivities that were observed from the screening report include the plant species theme sensitivity. This theme showed footprint of medium sensitivity on the proposed mining area. The features on this footprint include the Pachycarpus suaveolens. The Pachycarpus suaveolens is a red list species that is highly threatened by agricultural and mining activities as well as alien species, this species is not endemic to South Africa and it is highly distributed around the Gauteng and Mpumalanga to Swaziland regions.

Figure 17: Typical example of Pachycarpus suaveolens flora species in the project area

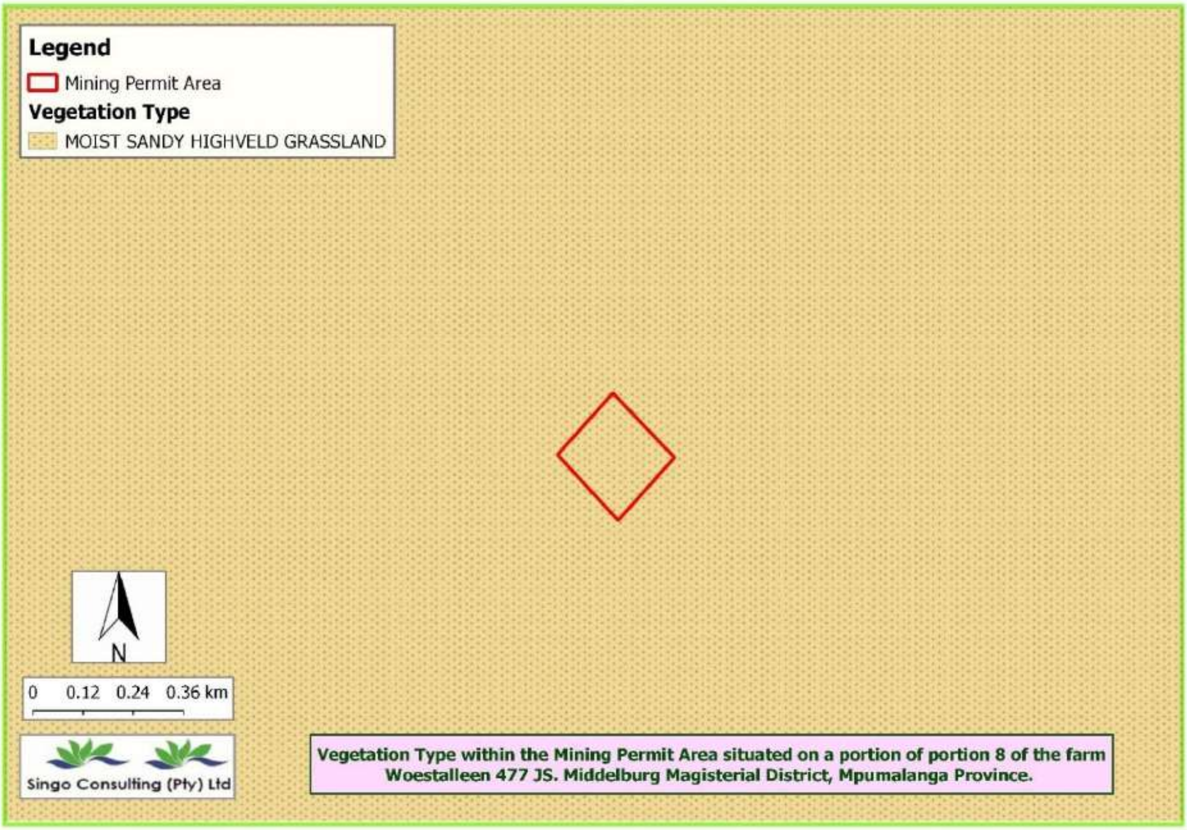


Figure 18: Vegetation type within the project area.

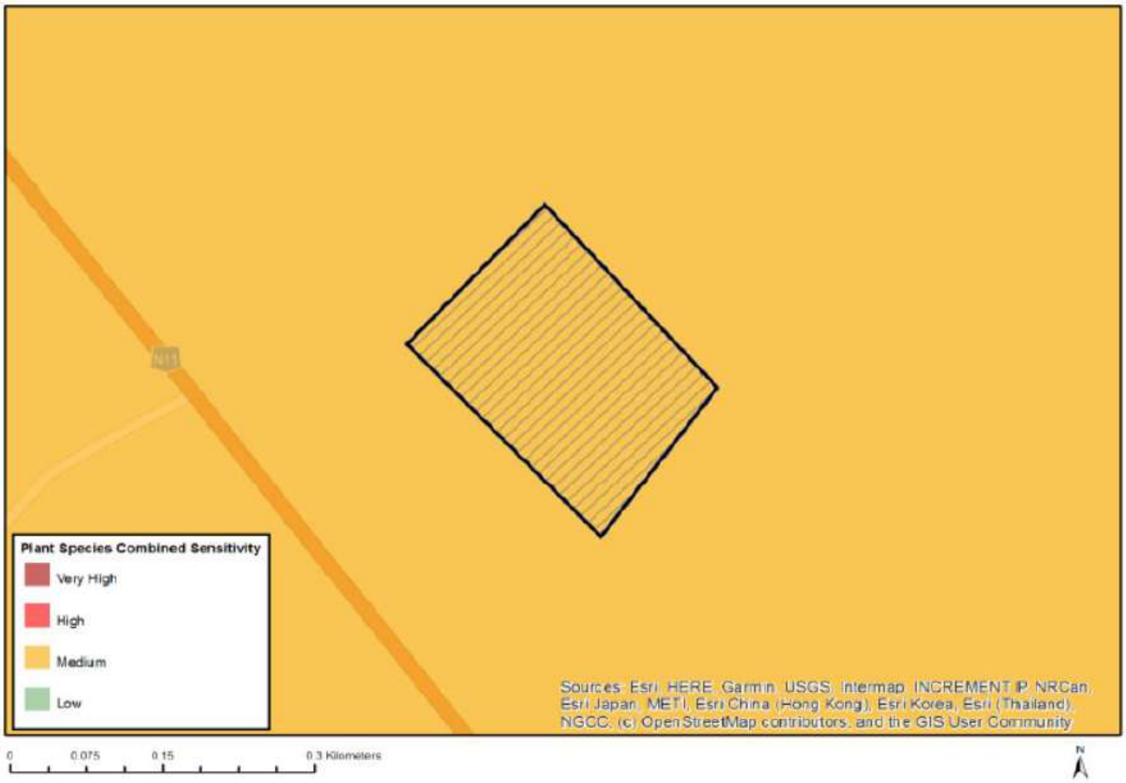


Figure 19: Plant Species Theme Sensitivity Map from Screening Tool

Figure 20: Type of vegetation found on site during assessment.

5.1.1.2 Fauna

From the screening report generated, the development footprint animal species theme sensitivity map showed the proposed area to be of medium sensitivity. This theme showed footprint of medium sensitivity on the proposed mining area. The features on this footprint include the Mammalia-Chrysospalax villosus . Chrysospalax villosus is a Rough-haired Golden Mole
this species often forages above ground, especially after rains. Despite being blind, individuals are able to escape to the nearest burrow with uncanny speed and precision when danger is detected.

The Rough-haired Golden Mole occurs in sandy soils in grasslands, meadows and along edges of marshes in Savannah and Grassland biomes of South Africa. villosus presumably does not make subsurface runs, but rather excavates burrows and lives in chambers, emerging most commonly after rainfall events (Roberts 1951; G.N. Bronner unpubl. data). They feed on insects and earthworms. The major threats to this species are habitat alteration and degradation. Alteration occurs as a result of mining.

Figure 21: Typical example of Chrysospalax villosus animal species in project area (Chrysospalax villosus (A. Smith 1833))

Domestic fauna was observed during site assessment such as cows and birds like doves although no wild fauna was observed at the time of the site inspection. Should any wild fauna enter the mining area there will be no impact on the proposed mining activity as they will be able to move away or through the site, without being harmed.

The fauna at the site will not be impacted by the proposed processing activity, as they will be able to move away from or through the site unharmed. Workers must be educated and managed to ensure that no fauna at the site is harmed. Upon commencement of the proposed processing activities, the processing area will be fenced off to prevent livestock, such as cattle from wandering into the work areas.

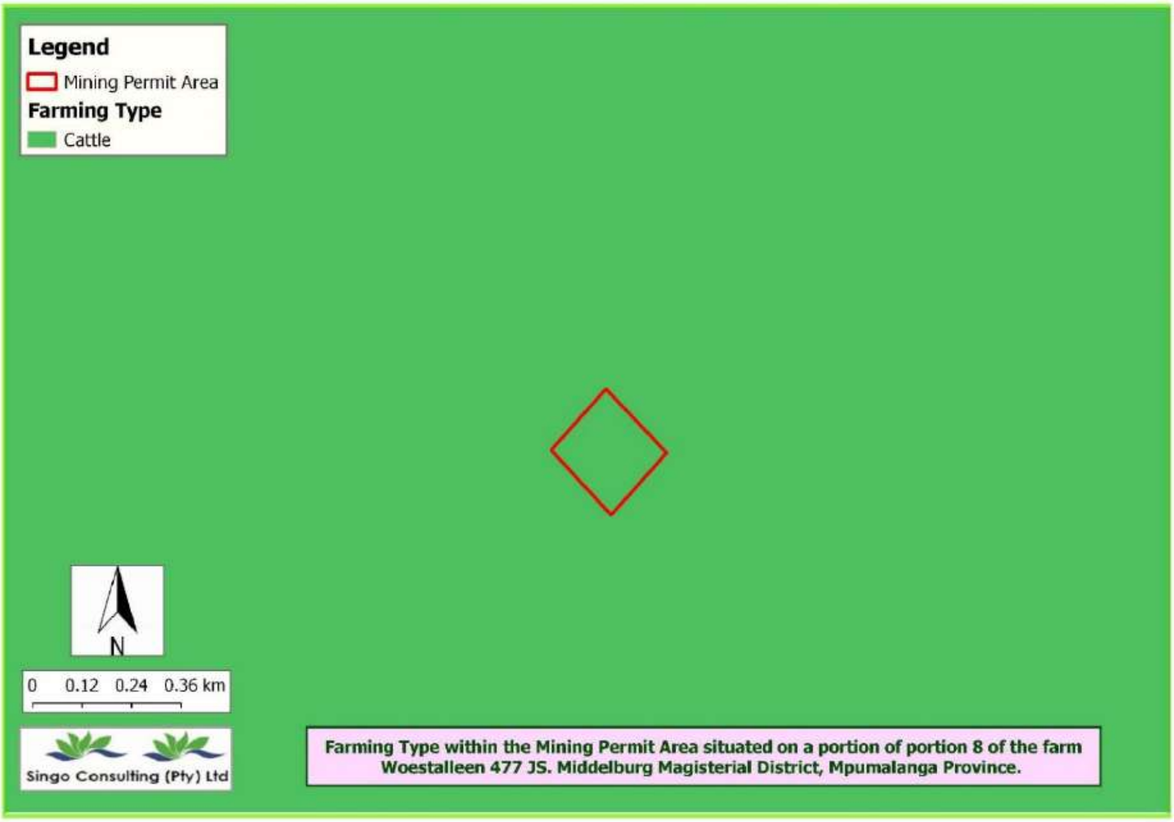


Figure 22: Farming type map

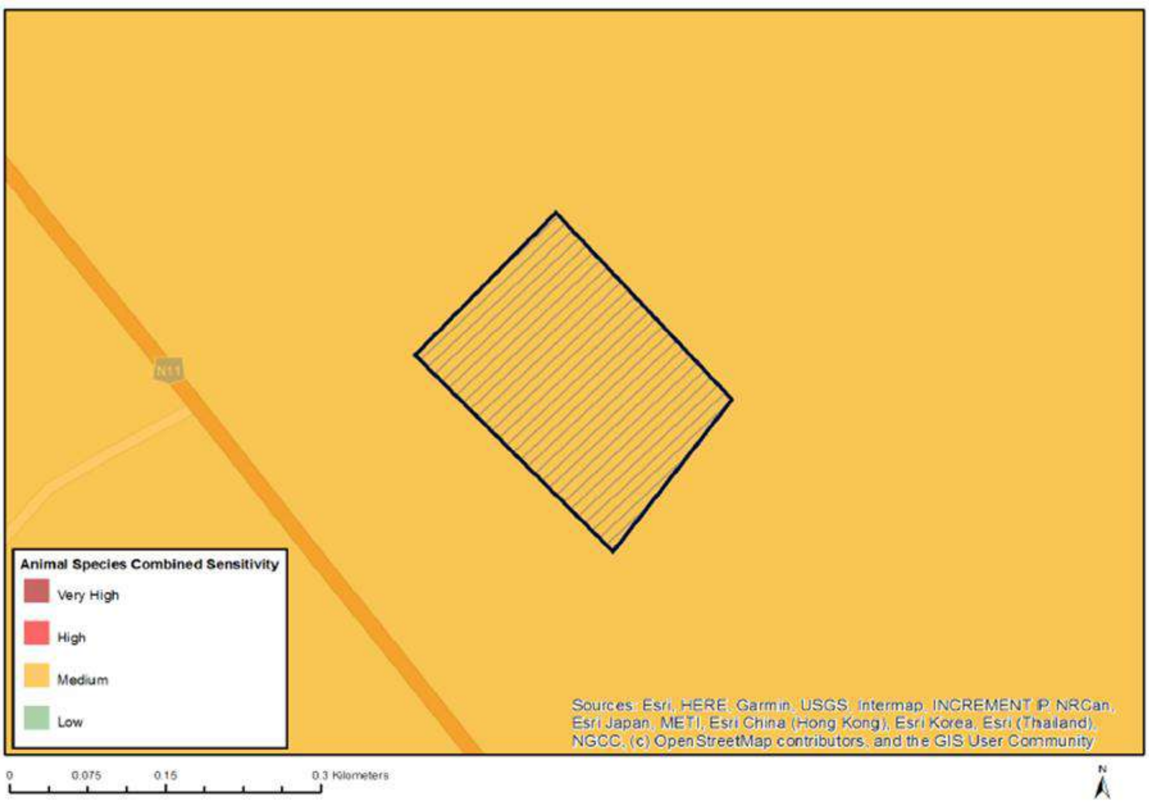


Figure 23: Medium sensitivity Map from Screening Tool

5.1.1.3 Soil

From a desktop study that was conducted, a map in Figure was produced. This map shows that the coal project area is covered with undifferentiated structureless soils. This type of soil is characterized by sand, red soil which is less productivity due to dominating of sand soils have severe limitations that reduce the choice of plants or that require special conservation practices, soils and miscellaneous areas have limitations that preclude commercial plant production and restrict their use to recreational purposes, wildlife habitat, or esthetic purposes.

The top soil of many parts of the property and on alternative site is disturbed or degraded by erosion as the property is used for grazing and the permit area is located in a steep slope where rain water easily flows in a high speed to the Northern side where there is Douglas dam. As it is highlighted below on Figure the project falls under soil classes 1 to 4 as stated in the soil classification map. Soil classes from 1 to 4 has favourable physical properties and it also has low base status, restricted soil depth, excessive or imperfect drainage, high erodibility

Soil classes table

Soil Classes	Land Capability
Class 1	Has few limitations that restrict its use; it may be used safely and profitably. Suitable land with negligible limitations and is highly productive requiring only simple management practices. When it used for crops it need ordinary management practice to maintain productivity. They are easily worked and are also fairly well supplied with plant nutrients or are highly responsive to inputs of fertilizer.
Class 2	Has some limitations that reduce the choice of plants or require moderate conservation practice. Suitable land with minor limitations which either reduce production or require more than simple management practices to sustain the use. Slight to moderate salinity or sodicity, easily corrected, but likely to persist is taken to imply that strong subsoil acidity, costly to correct and likely to reappear, would disqualify land from Class II.
Class 3	Has severe limitations that reduce the choice of plants or require special conservation practices. Suitable land with moderate limitations which is moderately suited to a proposed use, but which

	requires significant inputs to ensure sustainable use.
Class 4	Has very severe limitations that restrict the choice of plants, require very careful management. Marginal land with severe limitations which make it doubtful whether the inputs required to achieve and maintain production outweigh the benefits in the long term.
Class 5	Land in this class has little or no erosion hazard but have other limitations impractical to remove that limit its use largely to pasture, range, woodland or wildlife food and cover. These limitations restrict the kind of plants that can be grown and prevent normal tillage of cultivated crops. Pastures can be improved and benefits from proper management can be expected.

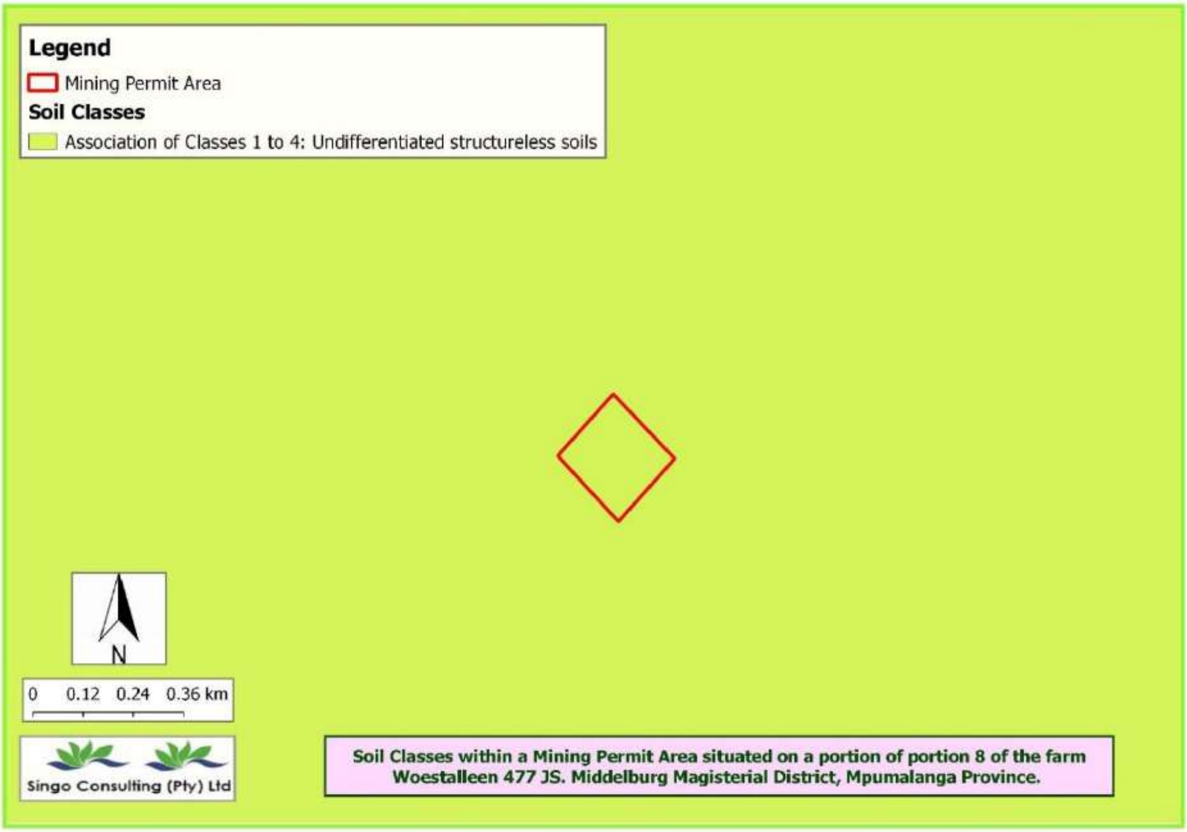


Figure 24: Map showing soil classes in the project area.

Figure 25: Project area soil type map

5.1.1.4 Critical Biodiversity

The map below in Figure presenting critical biodiversity of the area, it is confirmed that the permit is situated in heavily modified area. The permit area is heavily modified transformed areas, biodiversity and ecological function have been lost to the point that they are not worth considering for conservation. These are types of areas that have been excessively altered from their natural state.

There are no critical species will be affected by the proposed project as there are critical plants and sensitivity within and around the proposed mining permit. Therefore, critical species will be harmed even though identified during the operation of proposed project as Eco will be onsite every day to monitor the operation. Although the area is characterized by Moist Sandy Highveld Grassland according to the GIS specialist, the area is heavily modified by other activities which leads to vanished of these Moist Sandy Highveld grassland mentioned on the vegetation type section.

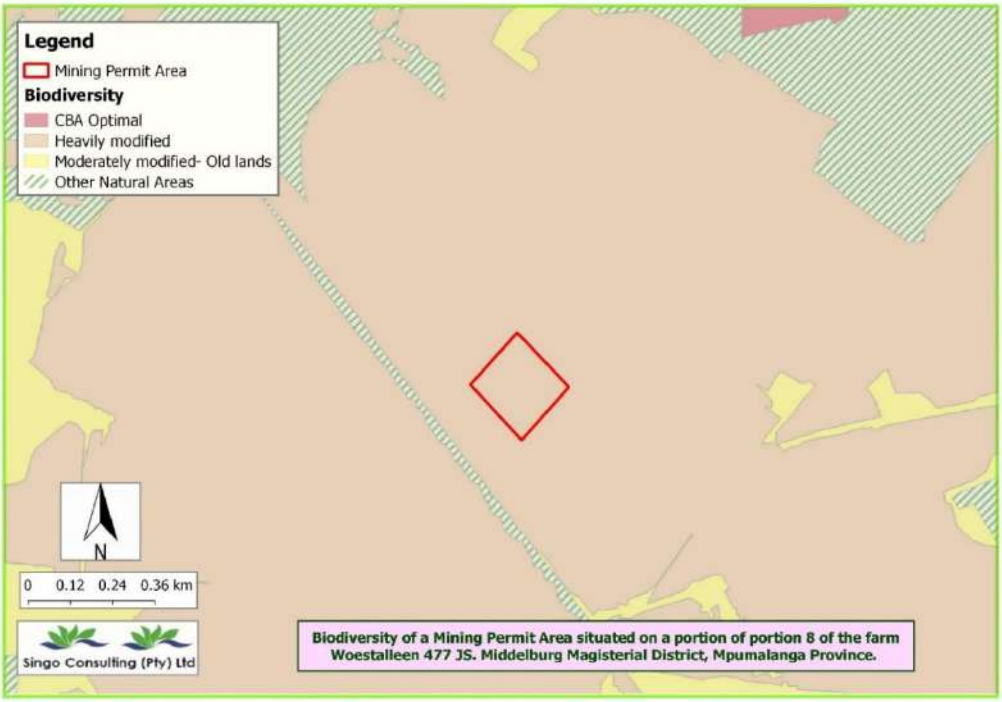


Figure 26: Biodiversity map of the Area (heavily modified area)

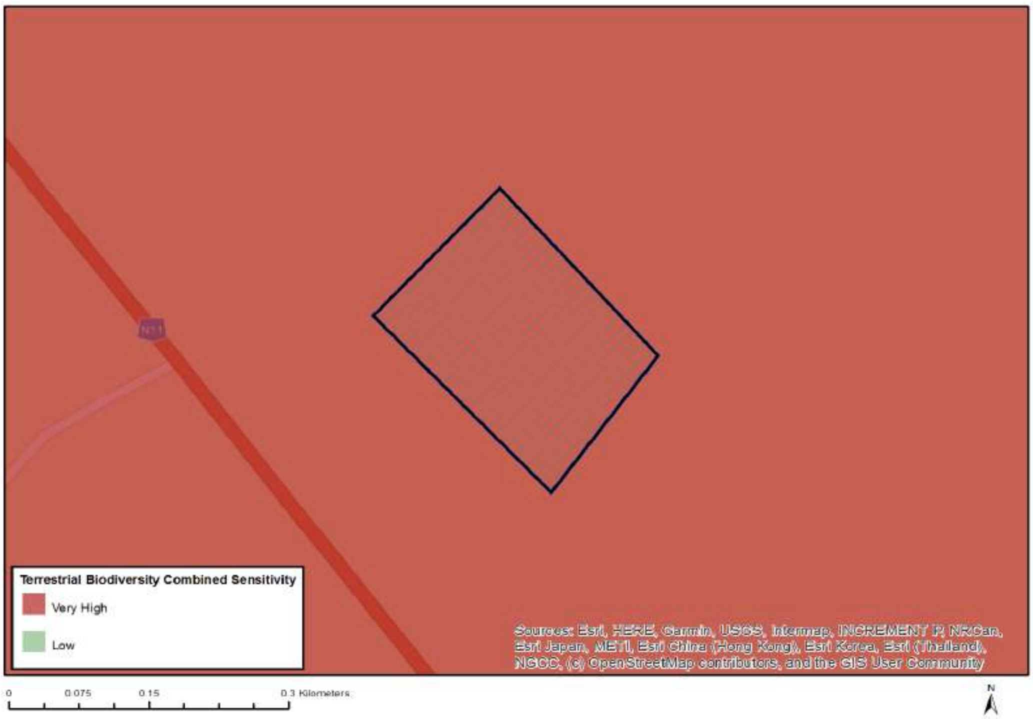


Figure 27: Terrestrial Biodiversity Map from screening tool

5.1.1.5 Surface and ground water

The mining area is in the Upper Olifant catchment of the Water Management Area (WMA). The main quaternary catchment is B12B.

The WR2012 study, presents hydrological parameters for each quaternary catchment including area, mean annual precipitation (MAP) and mean annual runoff (MAR). Based on the WR2012 study, the project area falls within the quaternary catchment B12B. The total catchment area of B12B is 570.7 km2, with a net MAR of 20,09 million cubic meters (mcm) and a MAP of 695 millimetre (mm).

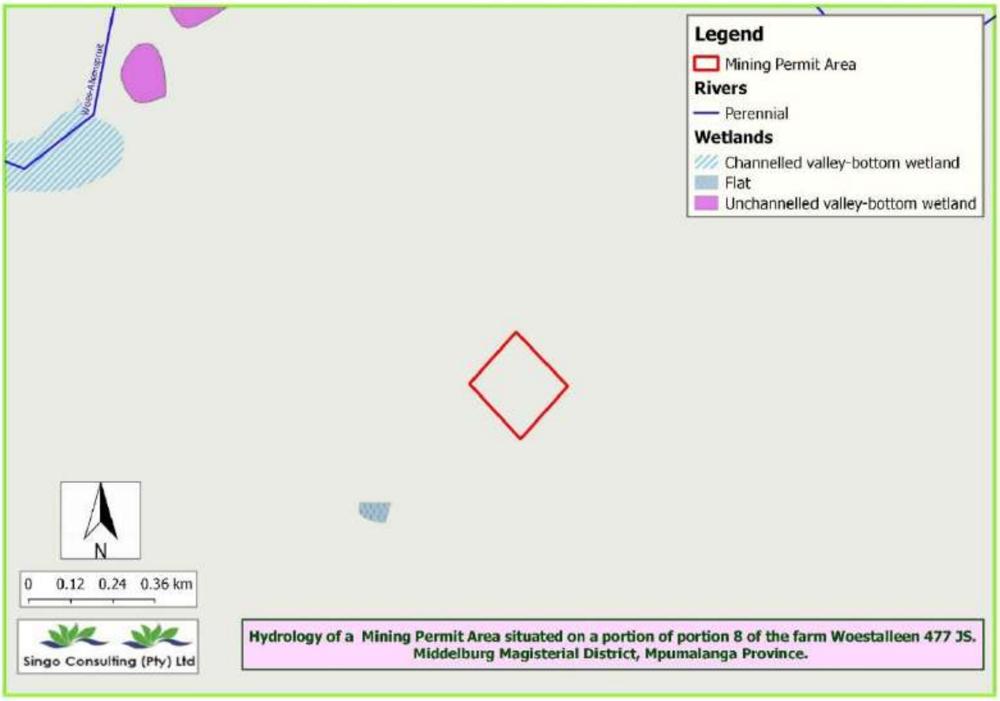


Figure 28: Hydrology map of the proposed Mining Permit Area

hydrological map illustrating flat wetland found nearby the project area. The flat wetland as observed on the hydrological map is situated 450 m in the western side of the permit.

The site is in the Karoo Sequence (Vryheid Formation) which consists of mudstone, shale, rhythmite, siltstone and fine to coarse-grained sandstone. The permeabilities of these sandstones are usually very low. These sedimentary formations have been extensively intruded by dolerite dykes. From the data reviewed two aquifer systems exists with little potential of yielding large volumes of water :

- Sandstone. The water bearing strata is mainly the sandstone above the coal seams with the major flow path being on the contact between the sandstone and coal strata. Groundwater occurrence is within pores in disintegrated/decomposed, partly decomposed rock and fractures which are principally restricted to a zone directly below the water table. The average depth to the groundwater level is at 10 to 2mbgl. The mean groundwater recharge is estimated at 35mm (Vegter, 1995).
- Dolerite. The Karoo dolerite consists of an interconnected network of dykes and sills. Dolerite dykes are vertical to sub-vertical discontinuities that, in general, represent thin, linear zones of a lower permeability sandwiched between fracture zones. These fracture zones can have a relatively higher permeability and can therefore act as conduits for groundwater

flow. The dykes on the other hand may also act as semi- to impermeable barriers to the movement of groundwater.

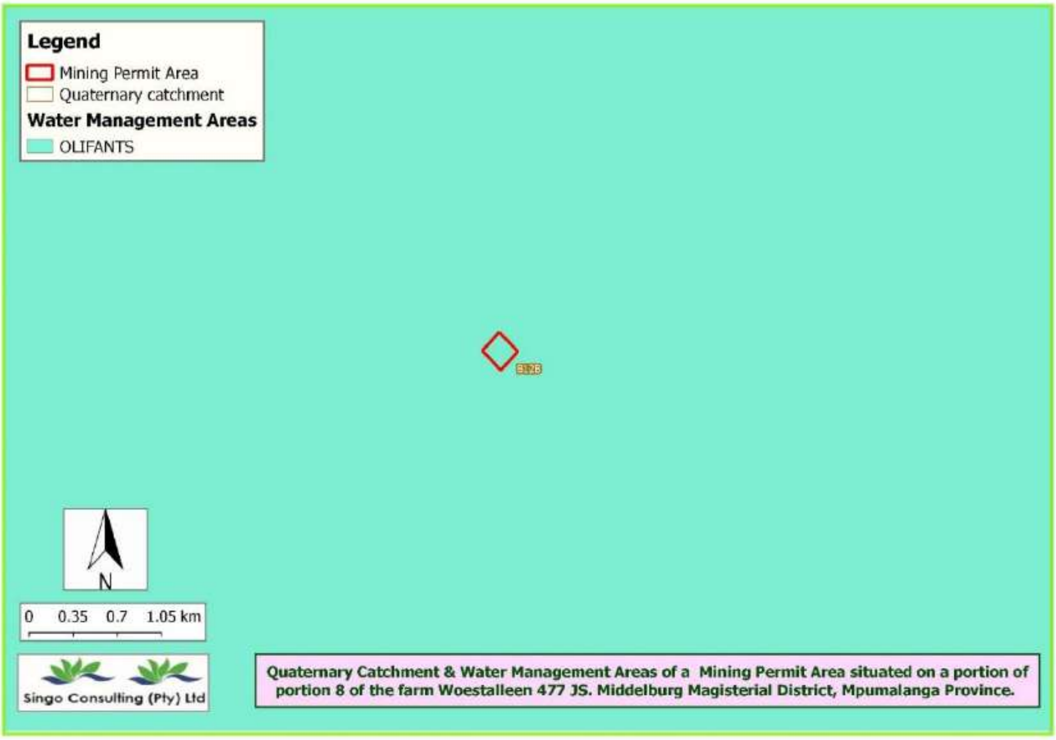


Figure 29: The catchments of the project area

5.1.1.6 Regional Climate

The proposed opencast mining area is in the Mpumalanga Highveld Region approximately 1 600m above sea level. Overall, the climate of this region is described as a summer rainfall area, where summers are mild to warm, whilst winters are cool to cold and dry.

5.1.1.7 Local Climate

In Middelburg, the climate is warm and temperate. In winter, there is much less rainfall in than in summer. In Middelburg, the average annual temperature is 15.5 °C. The rainfall here averages 683 mm. The driest month is July. There is 5 mm of precipitation in July. With an average of 115 mm, the most precipitation falls in November. With an average of 20.3 °C, January is the warmest month. June has the lowest average temperature of the year. It is 8.5 °C. The precipitation varies 110 mm between the driest month and the wettest month. During the year, the average temperatures vary by 11.8 °C.

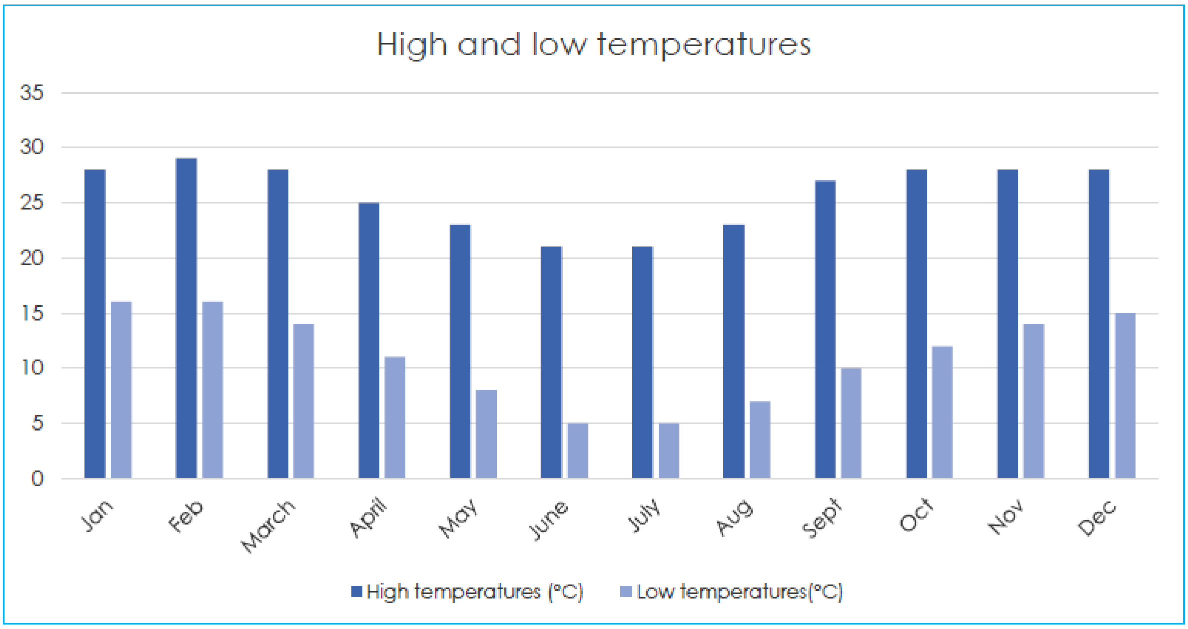


Figure 30: High and Low temperatures of Middelburg

5.1.1.8 Wind Direction and Speed

The winter months in the Highveld are characterised by calm, stable and dry conditions which are conducive to the formation of temperature inversions. Winds are generally light, with strong gusty westerly winds associated with the passage of weather disturbances. The prevailing winds, however, predominate from the north west, north east and east during summer and from the North West and south west in winter.

5.1.1.9 Air quality

Mpumalanga experiences a wide range of both natural and anthropogenic sources of air pollution ranging from veld fires to industrial processes, agriculture, mining activities, power generation, paper and pulp processing, vehicle use and domestic use of fossil fuels. Different pollutants are associated with each of the above activities, varying from volatile organic compounds and heavy metals to dusts and odours.

The permit area is located within a region of mining activities and these activities result in a significant negative impact on air quality in the area and require specific air quality management actions to rectify the situation.

Ambient air quality in Mpumalanga is strongly influenced by regional atmospheric movements, together with local climatic and meteorological conditions. The most important of these atmospheric movement routes are the direct transport towards the

Indian Ocean and the recirculation over the sub-continents (Scholes, 2002). It is these climatic conditions and circulation movements that are responsible for the distribution and dispersion of air pollutants within Mpumalanga and between neighbouring provinces and countries bordering South Africa.

Mpumalanga experiences distinct weather patterns in summer and winter that affect the dispersal of pollutants in the atmosphere. In summer, unstable atmospheric conditions result in mixing of the atmosphere and rapid dispersion of pollutants. Summer rainfall also aids in removing pollutants through wet deposition. In contrast, winter is characterized by atmospheric stability affected by a persistent high-pressure system over South Africa. This dominant high-pressure system results in subsidence, causing clear skies and a pronounced temperature inversion over the Highveld. This inversion layer traps the pollutants in the lower atmosphere, which results in reduced dispersion and a poorer ambient air quality. Preston-Whyte and Tyson (1988) describe the atmospheric conditions in the winter months as highly unfavorable for the dispersion of atmospheric pollutants.

Plumes emitted at night from stacks during stable conditions can be transported up to thousands of kilometers downwind of the source before reaching ground level in a well diluted state. During daytime however, strong convection currents transport plumes upward and downward whilst drifting downwind (Mpumalanga State of Environment report, 2003). Pollutants thus reach ground level nearby the point source of emission and are well diluted due to convective mixing (Turner, 2001). Emissions at low levels (such as from mine residue deposits, households or vehicles) do not disperse much at night because of the atmospheric stability, resulting in high concentrations of pollutants at ground level despite the relatively low emissions quantities. During the day, these low-level emissions are readily mixed into the convective layer near the earth's surface (Turner, 2001), which results in lower concentrations of pollutants at ground level and better air quality.

5.1.1.10 **Topography**

The proposed mining permit is situated in an altitude of 1585 mamsl as seen in the topology and hydrology map and the project area is located in an area that is flat as seen in the topographic map.

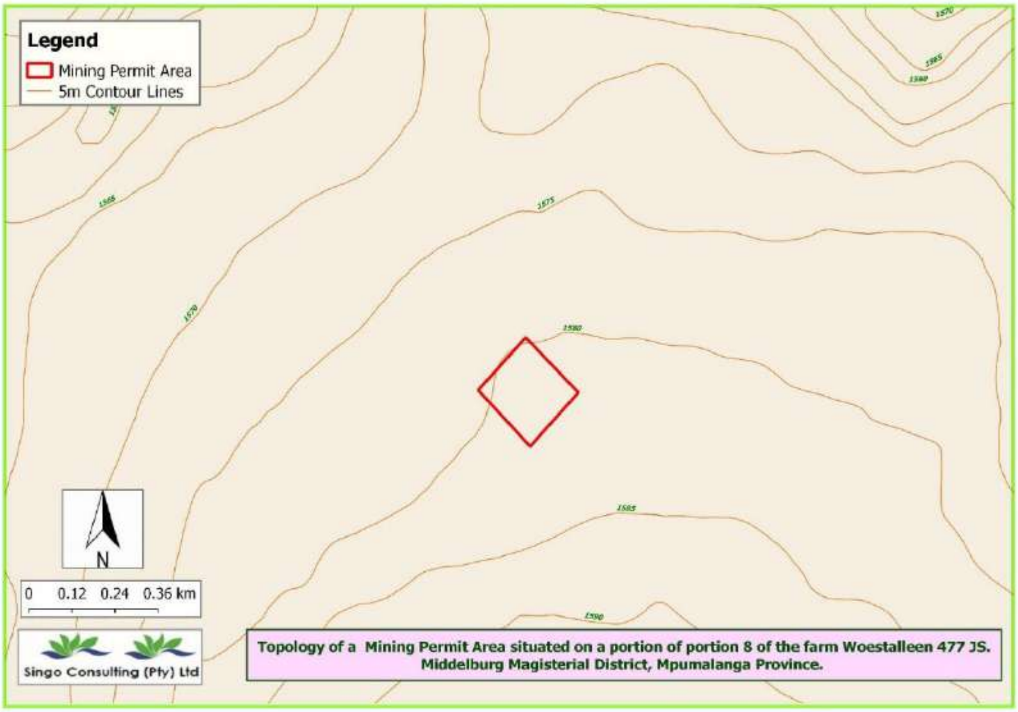


Figure 31: Topography of the project area and surface hydrological setting.

Figure 32: flat to gentle slope seen at the proposed area

5.1.1.11 Public roads

Project Area is located approximately 26.3 km south-east of Middelburg town along N11, approximately 49.2 km south-east of eMalahleni and approximately 75.9 km northern side of Ermelo.

The mine can be accessed from national road N11 and also through provincial road R555.

The project area is situated on portion of portion 8 of the Farm Woestalleen 447 JS and covers an area 5 ha.

5.1.1.12 Cultural and heritage environment

The proposed mine is located within the cultivated area and there are no archaeological or heritage resources identified at the surface on site. SAHRA was consulted through online and the status of the land is not yet confirmed. Site visit did not reveal any critical feature which can be declared as heritage. Consultation with stakeholders more especially landowner and SAHRA will allude to the presence of any heritage feature.

5.1.1.13 Noise

The surrounding areas are characterised by agricultural and mining setting in which vehicles and equipment operate. The traffic on the public roads surrounding the property contributes to the ambient noise of the area. The noise to be generated at the proposed mining operation is expected to temporarily increase the noise levels of the area. Blasting noise will be instantaneous and of short duration. Transportation of the material will generate noise daily. Mitigation measures should be implemented to ensure employees conduct themselves in an acceptable manner while on site to lessen the noise impact of the proposed activity on the surrounding environment.

5.1.1.14 Visual exposure

The study area is located on the farm Woestalleen 447 JS, Portion of portion 08 in the Middelburg area. The study area fits into the context of the surrounding region in that the area, which is predominantly characterized by agricultural and mining activities. There is evidence of mining activities in the immediate vicinity of the project areas. The study area is not near any nature reserves and the area is largely disturbed by agricultural.

5.2 Description of current land uses

The surrounding land use on the proposed project area are associated with cultivated area and mining area (Woestalleen Colliery) opposite to the proposed permit. Mining Permit application is currently used for Cultivation, grazing. This was confirmed by site visit process that was conducted.

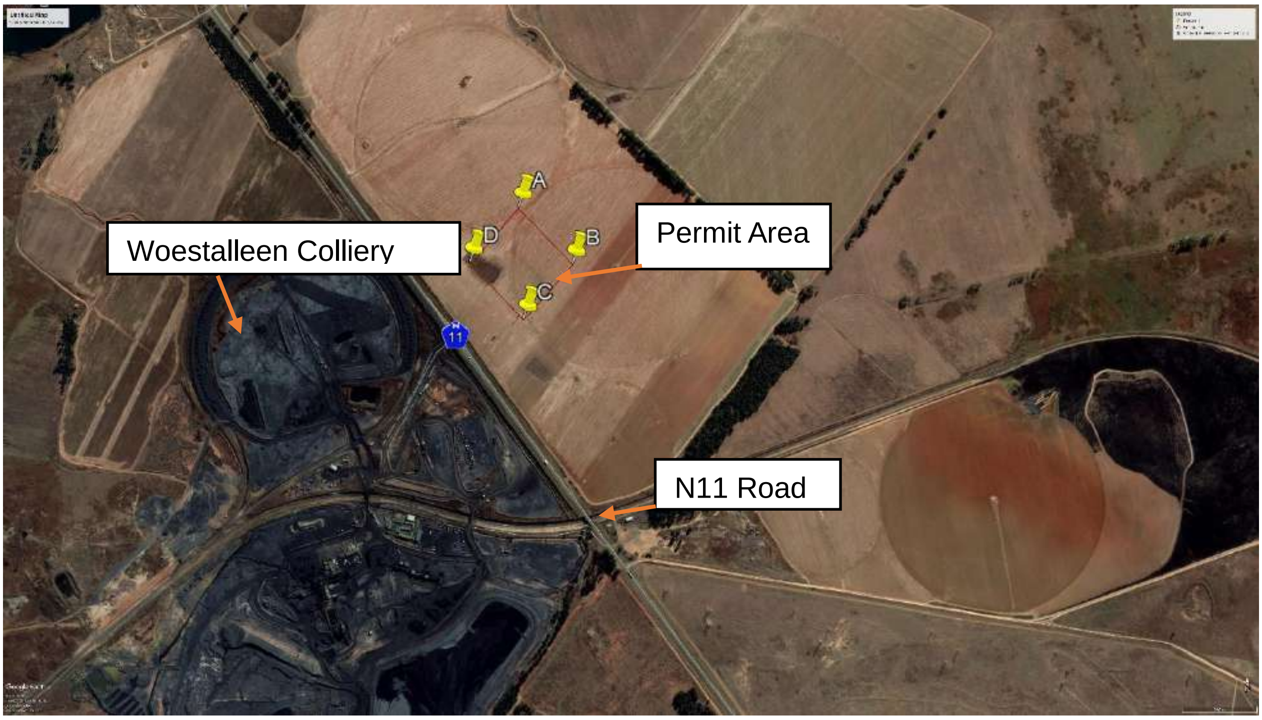


Figure 33: Land use map

Figure 34: Infrastructures at the boundary of proposed area.

Figure 35: Woestalleen Colliery opposite to the Permit

Environmental features

The proposed project area is situated Steve Tshwete Local Municipality, where classified within heavily modified as seen in Figure 22 (indicated by pink colour). There are no streams within the proposed permit area.

Infrastructure

Infrastructure is the basic facilities and systems that serve a state, region, or other place, including the services and facilities necessary for the functioning of its economy. Infrastructure consists of infrastructure developments, both public and private, such as Buildings, highways, bridges, tunnels, sewage electric grids and telecommunications.

The property lies within the proposed project area, there is electric power line within the proposed area which will be buffered 100 meters away from proposed area. public road opposite to the proposed permit buffer zone will be maintained 100 meters away from the road.

5.3 Impacts and risks identified, including the nature, significance, consequence, extent, duration and probability of the impacts

Provide a list of the potential impacts identified of the activities described in the initial site layout that will be undertaken, as informed by both the typical known impacts of such activities, and as informed by the consultations with affected parties together with the significance, probability, and duration of the impacts. Please indicate the extent to which they can be reversed, the extent to which they may cause irreplaceable loss of resources, and can be avoided, managed or mitigated

The following potential impacts were identified of each main activity in each phase. The significance rating was determined using the methodology as explained under vi) Methodology Used in Determining and Ranking the Significance. The impact rating listed below was determined for each impact prior to bringing the proposed mitigation measures into consideration. The degree of mitigation indicates the possibility of partial, full or no mitigation of the identified impact.

5.3.1 Stripping and stockpiling of topsoil

Visual intrusion associated with the establishment of the mining area

Rating: Medium-High **Degree of mitigation: Partial**

			Consequence			Likelihood	Significance
Severity	Duration	Extent		Probability	Frequency		
2	5	2	3	5	5	5	15

Dust nuisance caused by soil disturbance.

Rating: Medium **Degree of mitigation: Partial**

			Consequence			Likelihood	Significance
Severity	Duration	Extent		Probability	Frequency		
2	4	2	2.6	5	5	5	13

Noise nuisance caused by machinery stripping and stockpiling the topsoil.

Rating: Medium **Degree of mitigation: Partial**

			Consequence			Likelihood	Significance
Severity	Duration	Extent		Probability	Frequency		
2	4	2	2.6	5	5	5	13

Infestation of the topsoil heaps by weeds or invader plants.

Rating: Low-Medium **Degree of mitigation: Full**

			Consequence			Likelihood	Significance
Severity	Duration	Extent		Probability	Frequency		
3	4	1	2.6	5	2	3.5	9

Loss of topsoil due to incorrect storm water management.

Rating: Medium **Degree of mitigation: Full**

			Consequence			Likelihood	Significance
Severity	Duration	Extent		Probability	Frequency		
3	4	1	2.6	5	4	4.5	11.7

Contamination of area with hydrocarbons or hazardous waste materials.

Rating: Medium-High **Degree of mitigation: Full**

Severity	Duration	Extent	Consequence	Probability	Frequency	Likelihood	Significance
4	4	2	3.3	5	5	5	16.5

5.3.2 Blasting

Health and safety risk posed by blasting activities.

Rating: Medium **Degree of mitigation: Full**

Severity	Duration	Extent	Consequence	Probability	Frequency	Likelihood	Significance
4	4	1	3	5	2	3.5	10.5

Dust nuisance caused by blasting activities.

Rating: Low-Medium **Degree of mitigation: None**

Severity	Duration	Extent	Consequence	Probability	Frequency	Likelihood	Significance
2	1	2	1.6	5	2	3.5	5.6

Noise nuisance caused by blasting activities.

5.3.3 Excavation

Visual intrusion associated with the excavation activities.

Rating: Medium-High **Degree of mitigation: Partial**

Severity	Duration	Extent	Consequence	Probability	Frequency	Likelihood	Significance
2	5	2	3	5	5	5	15

Dust nuisance due to excavation activities.

Rating: Medium **Degree of mitigation: Partial**

Severity	Duration	Extent	Consequence	Probability	Frequency	Likelihood	Significance
2	4	2	2.6	5	5	5	13

Noise nuisance generated by excavation equipment.

Rating: Medium **Degree of mitigation: Partial**

Severity	Duration	Extent	Consequence	Probability	Frequency	Likelihood	Significance
2	4	1	2.3	4	5	4.5	10.4

Unsafe working conditions for employees.

Rating: Medium-High **Degree of mitigation: Full**

Severity	Duration	Extent	Consequence	Probability	Frequency	Likelihood	Significance
4	4	1	3	5	5	5	15

Negative impact of the fauna and flora of the area.

Rating: Low **Degree of mitigation: Full**

Severity	Duration	Extent	Consequence	Probability	Frequency	Likelihood	Significance
2	1	1	1.3	5	1	3	3.9

Contamination of area with hydrocarbons or hazardous waste materials.

Rating: Medium **Degree of mitigation: Full**

Severity	Duration	Extent	Consequence	Probability	Frequency	Likelihood	Significance
4	4	2	3.3	4	5	4.5	14.9

Weed and invader plant infestation of the area.

Rating: Low-Medium **Degree of mitigation: Full**

Severity	Duration	Extent	Consequence	Probability	Frequency	Likelihood	Significance
3	4	1	2.6	5	2	2	5.2

5.3.4 In-pit crushing

Dust nuisance due to the crushing activities.

Rating: Medium **Degree of mitigation: Full**

Severity	Duration	Extent	Consequence	Probability	Frequency	Likelihood	Significance
3	3	2	2.6	5	5	5	13

Noise nuisance generated by the crushing activities.

Rating: Medium **Degree of mitigation: Partial**

Severity	Duration	Extent	Consequence	Probability	Frequency	Likelihood	Significance
3	4	1	2.6	4	5	4.5	11.7

Contamination of area with hydrocarbons or hazardous waste materials.

Rating: Medium **Degree of mitigation: Full**

Severity	Duration	Extent	Consequence	Probability	Frequency	Likelihood	Significance
4	4	2	3.3	4	5	4.5	14.9

5.3.5 Stockpiling and transporting

Visual intrusion associated with the stockpiled material and vehicles transporting material.

Rating: Medium

Severity	Duration	Extent	Consequence	Probability	Frequency	Likelihood	Significance
2	4	2	2.6	4	5	4.5	11.7

Loss of material due to ineffective storm water handling

Rating: Low-Medium **Degree of mitigation: Partial**

Severity	Duration	Extent	Consequence	Probability	Frequency	Likelihood	Significance
2	4	1	2.3	4	3	3.5	8

Weed and invader plant infestation of the area due to the disturbance of the soil

Rating: Low-Medium **Degree of mitigation: Full**

Severity	Duration	Extent	Consequence	Probability	Frequency	Likelihood	Significance
2	4	2	2.6	4	2	3	7.8

Dust nuisance from stockpiled material and vehicles transporting the material

Rating: Medium **Degree of mitigation: Full**

Severity	Duration	Extent	Consequence	Probability	Frequency	Likelihood	Significance
2	4	2	2.6	4	5	4.5	11.7

Degradation of access roads

Rating: Medium **Degree of mitigation: Full**

Severity	Duration	Extent	Consequence	Probability	Frequency	Likelihood	Significance
3	4	2	3	4	5	4.5	13.5

Noise nuisance caused by vehicles

Rating: Medium **Degree of mitigation: Partial**

Severity	Duration	Extent	Consequence	Probability	Frequency	Likelihood	Significance
2	4	2	2.6	4	5	4.5	11.7

Contamination of area with hydrocarbons or hazardous waste materials

Rating: Medium **Degree of mitigation: Full**

Severity	Duration	Extent	Consequence	Probability	Frequency	Likelihood	Significance
4	4	2	3.3	4	5	4.5	14.9

5.3.6 Sloping and landscaping during rehabilitation

Soil erosion

Rating: Low-Medium **Degree of mitigation: Full**

Severity	Duration	Extent	Consequence	Probability	Frequency	Likelihood	Significance
4	4	1	3	3	3	3	9

Health and safety risk posed by un-sloped areas

Rating: Medium-High **Degree of mitigation: Full**

Severity	Duration	Extent	Consequence	Probability	Frequency	Likelihood	Significance
4	5	1	3.3	5	5	5	16.5

Dust nuisance caused during sloping and landscaping activities

Rating: Low-Medium **Degree of mitigation: Partial**

Severity	Duration	Extent	Consequence	Probability	Frequency	Likelihood	Significance
2	3	1	2	4	5	4.5	9

Noise nuisance caused by machinery

Rating: Low-Medium **Degree of mitigation: Partial**

Severity	Duration	Extent	Consequence	Probability	Frequency	Likelihood	Significance
2	1	2	1.6	3	5	4	6.4

Contamination of area with hydrocarbons or hazardous waste materials

Rating: Low-Medium **Degree of mitigation: Full**

Severity	Duration	Extent	Consequence	Probability	Frequency	Likelihood	Significance
4	4	1	3	3	1	2	6

5.3.7 Replacing of topsoil and rehabilitation of disturbed area

Loss of reinstated topsoil due to the absence of vegetation

Rating: Low-Medium **Degree of mitigation: Full**

Severity	Duration	Extent	Consequence	Probability	Frequency	Likelihood	Significance
3	3	1	2.3	3	2	2.5	5.8

Infestation of the area by weed and invader plants

Rating: Low-Medium **Degree of mitigation: Full**

Severity	Duration	Extent	Consequence	Probability	Frequency	Likelihood	Significance
3	4	1	2.6	4	2	3	7.8

5.4 Methodology for the assessment of the potential environmental, social and cultural impacts

Describe how the significance, probability, and duration of the aforesaid identified impacts that were identified through the consultation process was determined in order to decide the extent to which the initial site layout needs revision.

5.4.1 Definitions and concepts

5.4.1.1 Environmental significance

The concept of significance is at the core of impact identification, evaluation and decision making. The concept remains largely undefined and there is no international consensus on a single definition. The following common elements are recognised from the various interpretations:

- Environmental significance is a value judgement.
- The degree of environmental significance depends on the nature of the impact.
- The importance is rated in terms of both biophysical and socio-economic values.
- Determining significance involves the amount of change to the environment perceived to be acceptable to affected communities.

Significance can be differentiated into impact magnitude and impact significance. Impact magnitude is the measurable change (i.e. intensity, duration and likelihood). Impact significance is the value placed on the change by different affected parties (i.e. level of acceptability) (DEAT (2002) Impact Significance, Integrated Environmental Management, Information Series 5).

The concept of risk has two dimensions, namely the consequence of an event or set of circumstances, and the likelihood of particular consequences being realised (Environment Australia (1999) Environmental Risk Management).

5.4.1.2 Impact

The positive or negative effects on human well-being and/or the environment.

5.4.1.3 Consequence

The intermediate or final outcome of an event or situation, or the result on the environment of an event.

5.4.1.4 Likelihood

A qualitative term covering both probability and frequency.

5.4.1.5 Frequency

The number of occurrences of a defined event in a given time or rate.

5.4.1.6 Probability

The likelihood of a specific outcome measured by the ratio of a specific outcome to the total number of possible outcomes.

5.4.1.7 Environment

Surroundings in which an organisation operates, including air, water, land, natural resources, flora, fauna, humans and their interrelation (ISO 14004, 1996).

5.4.1.8 Methodology that will be used

The environmental significance assessment methodology is based on the following determination:

ENVIRONMENTAL SIGNIFICANCE = OVERALL CONSEQUENCE X OVERALL LIKELIHOOD

Determination of overall consequence

Consequence analysis is a mixture of quantitative and qualitative information; the outcome can be positive or negative. Several factors determine consequence. For the purpose of determining the environmental significance in terms of consequence, the following factors were chosen: ***Severity/Intensity, Duration and Extent/Spatial Scale***. Each factor is assigned a rating of 1 to 5, as described in the following tables.

Determination of severity/intensity

Severity relates to the nature of the event, aspect or impact on the environment and describes how severe the aspects impact the biophysical and socio-economic environment. The following section indicates the overall rating for severity, taking into consideration the various criteria.

5.4.1.9 Severity rating

Type of criteria	Rating				
	1	2	3	4	5
Quantitative	0-20%	21-40%	41-60%	61-80%	81-100%
Qualitative	Insignificant/ No harmful	Small / Potentially harmful	Significant/ harmful	Great/very harmful	Disastrous, extremely harmful
Social/ community response	Acceptable/ I&AP satisfied	Slightly tolerable / Possible objections	Intolerable/ sporadic complaints	Unacceptable/ widespread complaints	Totally unacceptable/ possible legal action
Irreversibility	Very low cost to mitigate/ High potential to mitigate impacts to level of insignificance/ easily reversible	Low cost to mitigate	Substantial cost to mitigate/ potential to mitigate impacts/ potential to reverse impact	High cost to mitigate	Prohibitive cost to mitigate/ Little or no mechanism to mitigate impact Irreversible
Biophysical (air quality, water quantity and quality, waste production,	Insignificant change/ deterioration or disturbance	Moderate change/ deterioration or disturbance	Significant change/ deterioration or disturbance	Very significant change/ deterioration or disturbance	Disastrous change/ deterioration or disturbance

fauna and flora)					

Determination of duration

Duration refers to the amount of time that the environment will be affected by the event, risk or impact, if no intervention e.g. remedial action takes place.

Rating of duration

Rating	Description
1	Up to 1 month
2	1-3 months (quarter)
3	3-12 months
4	1-10 years
5	Beyond 10 years

Determination of extent/spatial scale

Extent or spatial scale is the area affected by the event, aspect or impact.

Rating of extent/spatial scale

Rating	Description
1	Immediate, fully contained area
2	Surrounding area
3	Within business unit area of responsibility
4	Within the farm/neighboring farm area
5	Regional, national, international

Determination of overall consequence

Overall consequence is determined by adding the factors determined above and summarised below and dividing the sum by 3.

Example of calculating overall consequence

Consequence	Rating
Severity	Example 4
Duration	Example 2
Extent	Example 4
Subtotal	**10**
Total consequence (subtotal divided by 3)	**3.3**

DETERMINATION OF LIKELIHOOD

The determination of likelihood is a combination of Frequency and Probability. Each factor is assigned a rating of 1 to 5, as described in the following.

Determination of frequency

Frequency refers to how often the specific activity, related to the event, aspect or impact, is undertaken.

Rating of frequency

Rating	Description
1	Once a year or once/more during operation
2	Once/more in 6 months
3	Once/more a month
4	Once/more a week
5	Daily

Determination of probability

Probability refers to how often the activity or aspect has an impact on the environment.

Rating of probability

Rating	Description
1	Almost never/almost impossible
2	Very seldom/highly unlikely
3	Infrequent/unlikely/seldom
4	Often/regularly/likely/possible
5	Daily/highly likely/definitely

Overall likelihood

Overall likelihood is calculated by adding the factors determined above and summarised below and dividing the sum by 2.

Example of calculating overall Likelihood

Consequence	Rating
Frequency	Example 4
Probability	Example 2
Subtotal	**6**
Total likelihood (subtotal divided by 2)	**3**

5.4.2 Determination of overall environmental significance

The multiplication of overall consequence with overall likelihood will provide the environmental significance, which is a number that will fall into a range of low, low-medium, medium, medium-high or high, as shown in the table below.

5.4.2.1 Determination of overall environmental significance

Significance or risk	Low	Low-medium	Medium	Medium-high	High
Overall consequence X overall likelihood	1-4.9	5-9.9	10-14.9	15–19.9	20-25

5.4.2.2 Qualitative description or magnitude of environmental significance

Significance or risk	Low	Low-medium	Medium	Medium-high	High
Impact magnitude	Impact is of very low order and therefore likely to have very little real	Impact is of low order and therefore likely to have little real effect.	Impact is real, and potentially substantial in relation to other impacts.	Impact is real and substantial in relation to other impacts. Pose a risk to	Impact is of the highest order possible. Unacceptable. Fatal flaw.

	effect. Acceptable.	Acceptable.	Can pose a risk to company.	the company. Unacceptable.	
Action required	Maintain current management measures. Where possible improve.	Maintain current management measures. Implement monitoring and evaluate to determine potential increase in risk. Where possible improve.	Implement monitoring. Investigate mitigation measures and improve management measures to reduce risk, where possible.	Improve management measures to reduce risk.	Implement significant mitigation measures or implement alternatives.

This description is qualitative and an indication of the nature or magnitude environmental significance. It guides the prioritisations and decision-making process associated with this event, aspect or impact.

5.4.3 Description of environmental significance and related action required

Based on the above, the significance rating scale has been determined as follows:

High	Of the highest order possible within the bounds of impacts which could occur. In the case of negative impacts, there would be no possible mitigation and/or remedial activity to offset the impact at the spatial or time scale for which it was predicted. In the case of positive impacts, there is no real alternative to achieving the benefit.
Medium-high	Impacts of a substantial order. In the case of negative impacts, mitigation and/or remedial activity would be feasible but difficult, expensive, time consuming or some combination of these. In the case of positive impacts, other means of achieving this benefit would be feasible, but these would be more difficult, expensive, time-consuming or some combination of these.
Medium	Impact would be real but not substantial within the bounds of those, which could occur. In the case of negative impacts, mitigation and/or remedial activity would be both feasible and fairly easily possible. In case of positive impacts, other means of achieving these benefits would be about equal in time, cost and effort.
Low-medium	Impact would be of a low order and with little real effect. In the case of negative impacts, mitigation and/or remedial activity would be either easily achieved of little would be required, or both. In case of positive impacts alternative means for achieving this benefit would likely be easier, cheaper, more effective, less time-consuming, or some combination of these.
Low impact would be negligible	In the case of negative impacts, almost no mitigation and or remedial activity would be needed, and any minor steps, which might be needed, would be easy, cheap and simple. In the case of positive impacts, alternative means would almost all likely be better, in one or a number of ways, than this means of achieving the benefit.
Insignificant	There would be a no impact at all – not even a very low impact on the system or any of its parts.

5.5 The positive and negative impacts that the proposed activity (in terms of the initial site layout) and alternatives will have on the environment and the community that may be affected

Provide a discussion in terms of advantages and disadvantages of the initial site layout compared to alternative layout options to accommodate concerns raised by affected parties.

The proposed coal mine will be established on a brown field which is being utilize for crop farming with minimal vegetation cover. The adjacent land is being utilised for agricultural purposes and mining. Upon closure of the mining area, the land will, once again, be used for agricultural purposes.

Due to the distance from residential area to the mine, little to no significantly negative impacts on the community could be identified. The dust and noise impacts that may emanate from the mining area during the operational phase could have a negative impact on the surrounding community if the mitigation measures proposed in this document are not implemented and managed on-site. The operation of the mine will however, also have a number of positive impacts, such as permanent job creation for skilled, semi-skilled and un-skilled workers. The proposed mine will, therefore, contribute to upgrading/ maintaining infrastructure in and around Delmas area, which will indirectly contribute to the economy of the area.

5.6 The possible mitigation measures that could be applied and the level of risk

With regard to the issues and concerns raised by affected parties provide a list of the issues raised and an assessment/discussion of the mitigation or site layout alternatives available to accommodate or address their concerns, together with an assessment of the impacts or risks associated with the mitigation or alternatives considered.

5.6.1 Visual mitigation

The risk of the proposed mining activities having a negative impact on the aesthetic quality of the surrounding environment can be reduced to medium risk through the implementation of the following mitigation measures:

- The site must be kept neat and in good condition at all times.
- Upon closure, the site must be rehabilitated and sloped to ensure that the visual impact on the aesthetic value of the area is minimal.

5.6.2 Dust handling

The risk of dust generated from the proposed mining activities having a negative impact on the surrounding environment can be reduced to low medium through the implementation of the following mitigation measures:

- Dust liberation into the surrounding environment must be effectively controlled using *inter alia*, water spraying and/or other dust-allaying agents.
- The site manager must ensure continuous assessment of all dust suppression equipment to confirm its effectiveness in addressing dust suppression.
- Access road speeds must be limited to 40km/h to prevent excessive dust generation.
- Roads must be sprayed with water or an environmentally friendly dust allaying agent, that contains no Polychlorinated Biphenyl (PCBs) (e.g. DAS products), if dust is generated above acceptable limits.
- The in-pit crusher plant must have operational water sprayers to alleviate dust generation from the conveyor belts.

5.6.3 Noise handling

The risk of noise, generated from the proposed mining activities, having a negative impact on the surrounding environment can be reduced to low medium through the implementation of the following mitigation measures:

- The applicant must ensure that employees and staff conduct themselves in an acceptable manner while on site, both during work hours and after hours.
- No loud music may be permitted at the mining area.
- All mining vehicles must be equipped with silencers and kept roadworthy in terms of the Road Transport Act.
- The type, duration and timing of the blasting procedures must be planned with due cognisance of other land users and structures in the vicinity.
- Surrounding landowners must be notified, in writing, prior to blasting occasions.

5.6.4 Management of weed or invader plants

The risk of weeds or invader plants invading the disturbed area can be reduced to low through the implementation of the following mitigation measures:

- A weed and invader plant control management plan must be implemented at the site to ensure eradication of all listed invader plants in terms of Conservation of Agricultural Act (Act No 43 1983).
- Management must take responsibility to control declared invader or exotic species on the rehabilitated areas. The following control methods can be used:
  - The plants can be uprooted, felled or cut off and destroyed completely.
  - The plants can be treated with an herbicide that is registered for use in connection

therewith and in accordance with the directions for the use of such an herbicide.

- The temporary topsoil stockpiles must be kept free of weeds.

5.6.5 Storm water handling

The risk of contamination through dirty storm water escaping from work areas, or erosion or loss of material caused by uncontrolled storm water flowing through the mining area, can be reduced to low by implementing the following mitigation measures:

- Storm water must be diverted around the topsoil heaps, stockpile areas and access roads to prevent erosion and loss of material.
- Runoff water must also be diverted around the stockpile areas with trenches and contour structures to prevent erosion of the work areas.
- Mining must be conducted in accordance with the Best Practice Guideline for small scale mining that relates to storm water management, erosion and sediment control and waste management, developed by the Department of Water and Sanitation (DWS), and any other conditions the DWS may impose:
  - Clean water (e.g. rainwater) must be kept clean and routed to a natural watercourse by a system separate from the dirty water system. Clean water must be prevented from running or spilling into dirty water systems.
  - Dirty water must be collected and contained in a system separate from the clean water system.
  - Dirty water must be prevented from spilling/seeping into clean water systems.
  - The storm water management plan must apply for the entire life cycle of the mine and over different hydrological cycles (rainfall patterns).
  - The statutory requirements of various regulatory agencies and the interests of stakeholders must be considered and incorporated into the storm water management plan.

5.6.6 Management of health and safety risks

The health and safety risk posed by the proposed mining activities can be reduced to low through the implementation of the following mitigation measures:

- The type, duration and timing of the blasting procedures must be planned with due cognisance of other land users and structures in the vicinity,
- The surrounding landowners and communities must be informed, in writing, ahead of any blasting event.
- Measures to limit fly rock must be taken.

- Audible warning of a pending blast must be given at least 3 minutes before the blast.
- All fly rock (with diameters of 150 mm and larger) which falls beyond the working area, together with the rock spill, must be collected and removed,
- Workers must have access to the correct PPE, as required by law.
- All operations must comply with the Occupational Health and Safety Act (OHSA).

5.6.7 Waste management

The risk of waste generation having a negative impact on the surrounding environment can be reduced to low through by implementing the following mitigation measures:

- No processing area or waste pile may be established within 100 m of the edge of any river channel or other water bodies.
- Regular vehicle maintenance may only take place within the service bay area of the off-site workshop. If emergency repairs are needed on equipment unable to move to the workshop, drip trays must be present. All waste products must be disposed of in a 200 L closed container/bin to be removed from the emergency service area to the workshop to ensure proper disposal.
- Any effluents containing oil, grease or other industrial substances must be collected in a suitable receptacle and removed from the site, either for resale or for appropriate disposal at a recognised facility.
- Spills must be cleaned up immediately to the satisfaction of the Regional Manager by removing the spillage and the polluted soil and disposing of it at a recognised facility. Proof hereof should be filed.
- Suitable covered receptacles should be available always and conveniently placed for waste disposal.
- Non-biodegradable refuse, such as glass bottles, plastic bags, metal scrap, etc., should be stored in a container with a closable lid at a collecting point, collected on a regular basis and disposed of at a recognised landfill site. Specific precautions should be taken to prevent refuse from being dumped on or near the mine area.
- Biodegradable refuse generated should be handled as indicated above.

5.6.8 Management of access roads

The risk on the condition of the roads, as a result of the proposed mining activities, can be reduced to low medium by implementing the following mitigation measures:

- Storm water must be diverted around the access roads to prevent erosion.
- Erosion of access road: Vehicular movement must be restricted to existing access routes

to prevent criss-crossing of tracks through undisturbed areas. Rutting and erosion of the access road as a result of the mining activities should be repaired by the applicant.

5.6.9 Topsoil handling

The risk of topsoil loss can be reduced to low by implementing the following mitigation measures:

- Where applicable, the first 300 mm of topsoil should be removed in strips and stored along the boundary of the mining area. Stockpiling of topsoil must be done to protect it from erosion, which includes mixing it with overburden or other material. The topsoil must be used to cover the rehabilitated area and improve the establishment of natural vegetation.
- The temporary topsoil stockpiles of each removed strip must be kept weed free.
- Topsoil stockpiles must be placed on a levelled area and measures should be implemented to safeguard the piles from being washed away in the event of heavy rain/storm water.
- Topsoil heaps should not exceed 1.5 m, to preserve micro-organisms in the topsoil, which can be lost due to compaction and lack of oxygen.
- Should natural vegetation not establish on the heaps within 6 months of stockpiling, it must be planted with an indigenous grass species.
- Storm and runoff water should be diverted around the stockpile area and access roads to prevent erosion.

5.6.10 Protection of fauna and flora

The risk on the fauna and flora of the footprint area, as well as the surrounding environment, as a result of the proposed mining activities, can be reduced to low by implementing the following mitigation measures:

- The site manager must ensure that no fauna is caught, killed, harmed, sold or played with.
- Workers must be instructed to report any animals that may be trapped in the working area.
- No snares may be set or nests raided for eggs or young.
- No plants or trees may be removed without the approval of the Environmental Control Officer (ECO).

5.7 Motivation where no alternative sites were considered

Sothaba Capital (Pty) Ltd identified the growing need for coal resources due to an increase in power demand. In this light, the applicant identified the proposed area as the preferred and only viable site alternative because of its immediate availability backed by data reviewed in the

PWP, which has proven that coal resources are available in the area. The establishment of a coal pit in this un-utilised area was found to be most viable.

Various project alternatives were considered during the planning phase of the project and the preferred alternatives proved to be:

- The open cast mining of the coal has been identified as the most effective method to produce the desired coal product.
- The use of temporary infrastructure will reduce the impact on the environment and decrease closure objectives with regard to infrastructure decommissioning.
- It is recommended that the existing farm road connected to the provincial road (R555) to the property used as an access road.

5.8 Statement motivating the alternative development location within overall site

Provide a statement motivating the final site layout that is proposed.

The open cast mining of the coal has been identified as the most cost-effective method to produce the desired coal product. The proposed method will produce any residual (overburden) waste to be disposed of. Due to the remote location of the coal pit, the potential impacts on the surrounding environment, associated with open cast mining, is considered of low significance. It is proposed that all mining-related infrastructure will be contained within the boundaries of the mining area. As no permanent infrastructure will be established on site, the layout/position of the temporary infrastructure will be determined by the mining progress and available space in the 5-ha mining area.

5.9 Process undertaken to identify, assess and rank impacts and risk of site activities

Full description of the process undertaken to identify, assess and rank the impacts and risks the activity will impose on the preferred site (In respect of the final site layout plan) through the life of the activity, including (i) a description of all environmental issues and risks that were identified during the environmental impact assessment process and (ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures.

During the impact assessment process, several potential impacts were identified of each main activity in each phase (5.10). An initial significance rating was determined for each potential impact, should the mitigation measures proposed in this document not be implemented on-site. The impact assessment process continued to identify mitigation measures to address the impact that the proposed mining activity may have on the surrounding environment. A significance rating was again determined for each impact using a relevant methodology. The impact ratings listed in the following section was determined for each impact after bringing the proposed mitigation measures into consideration and therefore represents the final layout/activity proposal.

5.9.1 Stripping and stockpiling of topsoil

Visual intrusion associated with the establishment of the mining area.

Rating: Medium

			Consequence			Likelihood	Significance
Severity	Duration	Extent		Probability	Frequency		
2	4	2	2.6	5	5	5	13

Dust nuisance caused by the disturbance of the soil

Rating: Low

			Consequence			Likelihood	Significance
Severity	Duration	Extent		Probability	Frequency		
1	1	1	1	3	2	2.5	2.5

Noise nuisance caused by machinery stripping and stockpiling the topsoil

Rating: Low

			Consequence			Likelihood	Significance
Severity	Duration	Extent		Probability	Frequency		
1	1	2	1.3	3	2	2.5	3.3

Infestation of the topsoil heaps by weeds or invader plants

Rating: Low

			Consequence			Likelihood	Significance
Severity	Duration	Extent		Probability	Frequency		
3	1	1	1.6	3	2	2.5	4

Loss of topsoil due to incorrect storm water management

Rating: Low

			Consequence			Likelihood	Significance
Severity	Duration	Extent		Probability	Frequency		
3	1	1	1.6	3	2	2.5	4

Contamination of area with hydrocarbons or hazardous waste materials

Rating: Low

Severity	Duration	Extent	Consequence	Probability	Frequency	Likelihood	Significance
4	1	1	3	2	1	1.5	4.5

5.9.2 Blasting

Health and safety risk posed by blasting activities

Rating: Low

			Consequence			Likelihood	Significance
Severity	Duration	Extent		Probability	Frequency		
4	1	1	3	2	1	1.5	4.5

Dust nuisance caused by blasting activities

Rating: Low – Medium

			Consequence			Likelihood	Significance
Severity	Duration	Extent		Probability	Frequency		
2	1	2	1.6	5	2	3.5	5.6

Noise nuisance caused by blasting activities

Rating: Low – Medium

			Consequence			Likelihood	Significance
Severity	Duration	Extent		Probability	Frequency		
2	1	2	1.6	5	2	3.5	5.6

5.9.3 Excavation

Visual intrusion associated with the excavation activities

Rating: Medium

			Consequence			Likelihood	Significance
Severity	Duration	Extent		Probability	Frequency		
2	4	2	2.6	5	5	5	13

Dust nuisance due to excavation activities

Rating: Low

			Consequence			Likelihood	Significance
Severity	Duration	Extent		Probability	Frequency		
1	1	1	1	3	3	3	3

Noise nuisance generated by excavation equipment

Rating: Low – Medium

Severity	Duration	Extent	Consequence	Probability	Frequency	Likelihood	Significance
1	4	1	2	3	3	3	6

Unsafe working conditions for employees

Rating: Low

Severity	Duration	Extent	Consequence	Probability	Frequency	Likelihood	Significance
4	1	1	2	2	1	1.5	3

Negative impact on the fauna and flora of the area

Rating: Low

Severity	Duration	Extent	Consequence	Probability	Frequency	Likelihood	Significance
2	1	1	1.3	1	1	1	1.3

Contamination of area with hydrocarbons or hazardous waste materials

Rating: Low

Severity	Duration	Extent	Consequence	Probability	Frequency	Likelihood	Significance
4	1	1	2	3	1	2	4

Weed and invader plant infestation of the area

Rating: Low

Severity	Duration	Extent	Consequence	Probability	Frequency	Likelihood	Significance
3	1	1	1.6	2	2	2	3.2

5.9.4 Crushing

Dust nuisance due to the crushing activities

Rating: Low – Medium

Severity	Duration	Extent	Consequence	Probability	Frequency	Likelihood	Significance
2	3	1	2	2	3	2.5	5

Noise nuisance generated by the crushing activities

Rating: Low – Medium

Severity	Duration	Extent	Consequence	Probability	Frequency	Likelihood	Significance

2	4	1	2.3	2	3	2.5	5.8

Contamination of area with hydrocarbons or hazardous waste materials

Rating: Low

Severity	Duration	Extent	Consequence	Probability	Frequency	Likelihood	Significance
4	1	1	2	2	2	2	4

5.9.5 Stockpiling and transporting

Visual intrusion associated with the stockpiled material and vehicles transporting the material.

Rating: Low – Medium

Severity	Duration	Extent	Consequence	Probability	Frequency	Likelihood	Significance
2	4	2	2.6	2	3	2.5	6.5

Loss of material due to ineffective storm water handling.

Rating: Low

Severity	Duration	Extent	Consequence	Probability	Frequency	Likelihood	Significance
2	1	1	1.3	2	1	1.5	2

Weed and invader plant infestation of the area due to the disturbance of the soil.

Rating: Low

Severity	Duration	Extent	Consequence	Probability	Frequency	Likelihood	Significance
2	1	1	1.3	4	2	3	3.9

Dust nuisance from stockpiled material and vehicles transporting the material.

Rating: Low

Severity	Duration	Extent	Consequence	Probability	Frequency	Likelihood	Significance
1	1	1	1	2	3	2.5	2.5

Degradation of access roads.

Rating: Low – Medium

			Consequence			Likelihood	Significance
Severity	Duration	Extent		Probability	Frequency		
3	1	2	2	3	3	3	6

Noise nuisance caused by vehicles.

Rating: Low

			Consequence			Likelihood	Significance
Severity	Duration	Extent		Probability	Frequency		
1	1	2	1.3	2	3	2.5	3.3

Contamination of area with hydrocarbons or hazardous waste materials.

Rating: Low

			Consequence			Likelihood	Significance
Severity	Duration	Extent		Probability	Frequency		
4	1	1	2	2	2	2	4

5.9.6 Sloping and landscaping during rehabilitation

Soil erosion

Rating: Low

			Consequence			Likelihood	Significance
Severity	Duration	Extent		Probability	Frequency		
4	1	1	2	2	1	1.5	3

Health and safety risk posed by un-sloped areas.

Rating: Low

			Consequence			Likelihood	Significance
Severity	Duration	Extent		Probability	Frequency		
4	1	1	2	2	1	1.5	3

Dust nuisance caused during sloping and landscaping activities.

Rating: Low

			Consequence			Likelihood	Significance

Severity	Duration	Extent		Probability	Frequency		
1	1	1	1	2	1	1.5	1.5

Noise nuisance caused by machinery.

Rating: Low

			Consequence			Likelihood	Significance
Severity	Duration	Extent		Probability	Frequency		
2	1	2	1.6	2	1	1.5	2.4

Contamination of area with hydrocarbons or hazardous waste materials.

Rating: Low

			Consequence			Likelihood	Significance
Severity	Duration	Extent		Probability	Frequency		
4	1	1	2	2	1	1.5	3

5.9.7 Replacing of topsoil and rehabilitation of disturbed area

Loss of reinstated topsoil due to the absence of vegetation.

Rating: Low

			Consequence			Likelihood	Significance
Severity	Duration	Extent		Probability	Frequency		
3	1	1	1.6	3	2	2.5	4

Infestation of the area by weed and invader plants.

Rating: Low

			Consequence			Likelihood	Significance
Severity	Duration	Extent		Probability	Frequency		
3	1	1	1.6	2	2	2	3.2

5.10 Assessment of each identified potentially significant impact and risk

This section of the report must consider all the known typical impacts of each of the activities (including those that could or should have been identified by knowledgeable persons and not only those that were raised by registered I&APs).

NAME OF ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	SIGNIFICANCE	MITIGATION TYPE	SIGNIFICANCE
E.g. for prospecting - drill site, site camp, ablution facility, accommodation, equipment storage, sample storage, site office and access route. E.g. for mining - excavations, blasting, stockpiles, discard dumps or dams, loading, hauling and transport, water supply dams, boreholes, accommodation, offices, ablution, stores workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc.	Including the potential impacts for cumulative impacts, e.g. dust, noise, drainage, surface disturbance, fly rock and surface water contamination, groundwater contamination, and air pollution.		In which impact is anticipated, e.g. construction, commissioning, operational decommissioning, closure, post-closure.	if not mitigated	Modify, remedy, control, or stop through, e.g. noise control measures, storm water control, dust control, rehabilitation, design measures, blasting controls, avoidance, relocation and alternative activity. Modify through alternative method. Control through noise control. Control through management and monitoring through rehabilitation.	if mitigated
Stripping and stockpiling of topsoil	Visual intrusion associated with the establishment of the mining area	The visual impact may affect the residents of the immediate area.	Site establishment /construction phase	Medium – High	Control: Implementation of proper housekeeping	Medium
	Dust nuisance caused by the disturbance of soil	Dust will be contained within the property boundaries and will therefore affect only the landowner.		Medium	Control: Dust suppression	Low
	Noise nuisance	The noise impact		Medium	Control: Noise control	Low

NAME OF ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	SIGNIFICANCE	MITIGATION TYPE	SIGNIFICANCE
	caused by machinery stripping and stockpiling the topsoil	should be contained within the boundaries of the property, but might have a periodic impact on the closest residents of the Middelburg community.			measures	
	Infestation of the topsoil heaps by weeds and invader plants	Biodiversity		Low-medium	Control and remedy: Implementation of weed control	Low
	Loss of topsoil due to incorrect storm water management	Loss of topsoil will affect the rehabilitation of the mining area.		Medium	Control: Storm water management	Low
	Contamination of area with hydrocarbons or hazardous waste materials	Contamination may cause surface or ground water contamination if not addressed		Medium-high	Control and remedy: Implementation of waste management	Low
Blasting	Health and safety risk posed by blasting activities	Impact might affect the employees working on site	Operational phase	Medium	Control: Health and safety monitoring and management	Low
	Dust nuisance caused by blasting activities	Depends on the blast, the impact might affect the surrounding		Low-medium	Control: Dust suppression	Low-medium

NAME OF ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	SIGNIFICANCE	MITIGATION TYPE	SIGNIFICANCE
		community. Blasting will occur twice a year.				
	Noise nuisance caused by blasting activities	Dependent on the blast, the impact might affect the surrounding community. Blasting will occur twice a year.		Low-medium	Control: Noise control measures	Low
Excavation	Visual intrusion associated with the excavation activities	The visual impact may affect the residents of the immediate area.	Operational phase	Medium-high	Control: Implementation of proper housekeeping	Medium
	Dust nuisance due to excavation activities	Dust will be contained within the property boundaries and will therefore affect only the landowner.		Medium	Control: Dust suppression	Low
	Noise nuisance generated by excavation equipment	The noise impact should be contained within the boundaries of the property, but might have a periodic impact on the closest residents of the Middelburg community.		Medium-high	Control: Noise control measures	Low
	Unsafe working conditions for employees	Impact might affect employees.		Low	Control: Health and safety monitoring and management	Low

NAME OF ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	SIGNIFICANCE	MITIGATION TYPE	SIGNIFICANCE
	Negative impact on the fauna and flora of the area	Biodiversity		Medium	Control: Protection of fauna and flora through operational phase	Low
	Contamination of area with hydrocarbons or hazardous waste materials	Contamination may cause surface or ground water contamination if not addressed.		Medium	Control: Implementation of waste management	Low
	Weed and invader plant infestation	Biodiversity		Low-medium	Control: Implementation of weed control	Low
Crushing	Dust nuisance due to the crushing activities	Dust will be contained in property boundaries and therefore affect only the landowner.	Operational phase	Medium	Control: Dust suppression	Low-medium
	Noise nuisance generated by the crushing activities	The noise impact should be contained within the boundaries of the property, but might have a periodic impact on the closest residents of the Middelburg community.		Medium	Control: Noise control measures	Low-medium
	Contamination of area with hydrocarbons or hazardous waste materials	Contamination may cause surface or ground water contamination if not addressed		Medium	Control: Implementation of waste management	Low

NAME OF ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	SIGNIFICANCE	MITIGATION TYPE	SIGNIFICANCE
Stockpiling and transporting	Visual intrusion associated with the stockpiled material and vehicles transporting the material	The visual impact may affect the residents of the immediate area.	Operational phase	Medium	Control: Implementation of proper housekeeping	Low-medium
	Loss of material due to ineffective storm water handling	Impact will affect income of applicant.		Low-medium	Control: Storm water control measures	Low
	Weed and invader plant infestation of the area due to soil disturbance	Biodiversity		Low-medium	Control and remedy: Implementation of weed control	Low
	Dust nuisance from stockpiled material and vehicles transporting the material	Dust will be contained within the property boundaries and will therefore affect only the landowner.		Medium	Control: Dust suppression	Low
	Degradation of access roads	All road users will be affected.		Medium	Control and remedy: Road management	Low-medium
	Noise nuisance caused by vehicles	The noise impact should be contained within the boundaries of the property, but might have a periodic impact on the closest residents of the		Medium	Control: Noise management monitoring and management	Low

NAME OF ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	SIGNIFICANCE	MITIGATION TYPE	SIGNIFICANCE
		Middelburg community				
	Contamination of area with hydrocarbons or hazardous waste	Contamination may cause surface or ground water contamination if not addressed		Medium	Control: Implementation of waste management	Low
Sloping and landscaping during rehabilitation	Soil erosion	Biodiversity	Decommissioning phase	Low-medium	Control: Soil management	Low
	Health and safety risk posed by un-sloped areas	Impact will affect the employees and residents of the property		Medium-high	Control: Health and safety monitoring and management	Low
	Dust nuisance caused during sloping and landscaping	Dust will be contained within the property boundaries and will therefore affect only the landowner		Low-medium	Control: Dust suppression	Low
	Noise nuisance caused by machinery	The noise impact should be contained within the boundaries of the property, but might have a periodic impact on the closest residents of the Middelburg community.		Low-medium	Control: Noise monitoring	Low
	Contamination of area with hydrocarbons or hazardous waste	Contamination may cause surface/ground water contamination if not addressed		Low-medium	Control: Waste management	Low

NAME OF ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	SIGNIFICANCE	MITIGATION TYPE	SIGNIFICANCE
Replacing of topsoil and rehabilitation of disturbed area	Loss of reinstated topsoil due to the absence of vegetation	Biodiversity and soil management	Decommissioning phase	Low-medium	Control: Soil management	Low
	Infestation of the area by weed and invader plants	Biodiversity and soil management		Low-medium	Control and remedy: Implementation of weed control	Low

The supporting impact assessment conducted by the EAP must be attached as an appendix.

5.11 Summary of specialist reports

This summary must be completed if any specialist reports informed the impact assessment and final site layout process and must be in the following tabular form.

List of studies undertaken	**Recommendations of specialist reports**	**Specialist recommendations included in the EIA report** Mark with an X where applicable	**Reference to applicable report section** Where specialist recommendations have been included
Hydrogeological Study	**Monitoring** • Conduct water monitoring and implement remedial actions as required and effective rehabilitation to as close to pre-mining conditions as practically possible. • It is recommended that the monitoring network be extended to all the boundaries; north, south, east and west of the proposed mining permit. The construction must be overseen by a qualified Hydrogeologist to monitor pollution in the upper weathered aquifer as well as the lower fractured aquifer. • A monitoring network should be dynamic. This means that the network should be extended over time to accommodate the migration of contaminants through the aquifer as well as the expansion of infrastructure and/or addition of possible pollution sources. An audit on the monitoring network should be conducted annually **Modelling**	**x**	The possible mitigation measures that could be applied and the level of risk

List of studies undertaken	Recommendations of specialist reports	Specialist recommendations included in the EIA report Mark with an X where applicable	Reference to applicable report section Where specialist recommendations have been included
	• The numerical model should be recalibrated as soon as more hydrogeological data such as monitoring holes are made available. This would enhance model predictions and certainty. **Water contamination** • Prevention of pollution of surface water resources and impacts on other surface water users by training of workers to prevent pollution, equipment and vehicle maintenance, fast and effective clean-up of spills, effective waste management, manage clean and dirty water in accordance **Flow of water** • The disturbance of streams and surface drainage patterns and reduction in flow to downstream must be mitigated through careful design of ephemeral stream diversion that minimizes impacts on the downstream environment, limit activities and infrastructure within wetland and watercourses and their floodlines and implementation of storm water management plan to divert clean water • **Clean water trenches** should be constructed surrounding the mining permit to prevent clean water from entering the mining area, regarded as a dirty water catchment		

List of studies undertaken	Recommendations of specialist reports	Specialist recommendations included in the EIA report Mark with an X where applicable	Reference to applicable report section Where specialist recommendations have been included
	• **Dirty water trenches** must be constructed as well to direct water from the mine to the pollution control dam, thereby preventing any contaminant water from leaving the mine area.		
Hydrology Study	• Monitoring of the surface water quality shall be carried out regularly during the project's construction and operating phases. • The project's development process will be undertaken during the dry months to mitigate pollutant runoff. • An independent ECO is to be appointed during construction. The mine's internal Environmental officers will be conversant with best practices in accordance with rehabilitation during decommissioning and an audit is to be performed before and after rehabilitation. • Where mining infrastructure is required across natural watercourses, new storm water infrastructure such as pipes and culverts could replace the hydraulic function currently being offered by natural watercourses. Its system should be built for both the hydraulic and environmental efficiency. A thorough assessment of the appropriateness of the new stormwater infrastructure must be carried out at the preliminary design stage. • Prevention of pollution of surface water resources and impacts on other surface water users by training of workers to prevent pollution, equipment and	**x**	The possible mitigation measures that could be applied and the level of risk

List of studies undertaken	Recommendations of specialist reports	Specialist recommendations included in the EIA report Mark with an X where applicable	Reference to applicable report section Where specialist recommendations have been included
	vehicle maintenance, fast and effective clean-up of spills, effective waste management, manage clean and dirty water in accordance		
Soil Study	• The proposed mining land should be returned to its origin as before mining activities and the rehabilitation performance assessment in the proposed land must be done concurrently during the operational phase by a soil specialist. • Final surface rehabilitation of all disturbed areas during mine activities and Rehabilitation of unnecessary water management facilities once appropriate to do so. • A post-mining soil depth and land capability evaluation should be done by a soil specialist registered at the Council for Natural Scientific Professions (SACNASP). A post-mining land capability map should be compiled and submitted for closure purposes. • Limit impacts to the footprints to keep physical impacts as small as possible. Areas for road, site lay-out should be minimized, dust generation. • No striping or redistribution of top or subsoil if too wet should occur. A stick test must be used to determine if soil is too wet to redistribute. A sharpened broom sized stick must be pushed into and removed from the soil surface.	**x**	The possible mitigation measures that could be applied and the level of risk

List of studies undertaken	Recommendations of specialist reports	**Specialist recommendations included in the EIA report** Mark with an X where applicable	**Reference to applicable report section** Where specialist recommendations have been included

Attach copies of specialist reports as appendices.

5.12 Environmental impact statement

5.12.1 Summary of the key findings of the EIA

The key findings of the EIA are as follows:

- The project entails the establishment of a coal pit on virgin area, with minimal vegetation cover. Therefore, very little natural vegetation has to be disturbed by mining activities.
- The existing roads to the proposed coal mine pit will be used to gain access to the site. No new roads are needed.
- The applicant's off-site workshop will be used for servicing vehicles, thereby reducing the risk of hazardous spills and contamination at the mining site.
- Due to the remote setting of the coal pit, the majority of potential impacts can be contained within the boundaries, provided that mitigation measures proposed in this document is implemented on-site.
- The mining operation will have a temporary visual impact on the surrounding environment. Upon closure of the proposed mining area the visual impact on the proposed mining area will be mitigated and addressed.
- The proposed project is not expected to have an impact on the river passing the site to the south-east as mining activities will be contained within the boundaries of the permitted site. Proper storm water and waste management, however, must be implemented on the site in order to minimise the potential of pollution.

5.12.2 Final site map

Provide a map at an appropriate scale which superimposes the proposed overall activity and its associated structure and infrastructure on the environmental sensitivities of the preferred site indicating areas that must be avoided, including buffers. Attach as an Appendix.

The map indicating site activities is attached appendix.

5.12.3 Positive and negative impacts of the proposed activity and alternatives

The positive impacts associated with the project include:

- Job creation, although a fixed number of jobs to be created cannot be stated at this stage, will include multiple job opportunities for skilled, semi-skilled and unskilled personnel will be created by this project. This will contribute to the socio-economic status of the Middelburg area.
- The coal to be mined will be supplied to Eskom, hence it will enhance Eskom's coal resources security to generate electricity without re-occurrence of load shedding.

The negative impacts associated with the project and that was considered to be of Low-Medium or Medium significance includes:

Visual intrusion associated with the establishment of the mining area	Medium
Visual intrusion associated with the excavation activities	Medium
Visual intrusion associated with the stockpiled material and vehicles transporting the material	Low-medium
Dust nuisance caused by blasting activities	Low-medium
Dust nuisance due to the crushing activities	Low-medium
Noise nuisance generated by excavation equipment	Low-medium
Noise nuisance generated by the crushing activities	Low-medium
Degradation of access roads	Low-medium

5.13 Proposed impact management objectives and the impact management outcomes for inclusion in the EMPr

Based on the assessment and, where applicable, recommendations from specialist reports, recording of proposed impact management objectives, and impact management outcomes for development for inclusion in the EMPr and as authorisation condition.

Management objectives	**Role**	**Management outcomes**
Dust handling	Site Manager to ensure compliance with EMP guidelines. Compliance to be monitored by the Environmental Control Officer.	• Control dust liberation into the surrounding environment by using water spraying and/or other dust allaying agents. • Limit speed on the access roads to 40km/h to prevent the generation of excess dust. • Spray roads with water or an environmentally friendly dust-allaying agent that contains no PCB's (e.g. DAS products) if dust is generated above acceptable limits. • Assess effectiveness of dust suppression equipment. • Ensure the crusher plant has operational water sprayer to alleviate dust generation from the conveyor belts.
Noise handling	Site Manager to ensure compliance with EMP guidelines. Compliance to be monitored by the Environmental Control Officer.	• Ensure that employees and staff conduct themselves in an acceptable manner while on site. • No loud music may be permitted at the mining area. • Ensure that all mining vehicles are equipped with silencers and maintained in a road worthy condition in terms of the Road Transport Act. • Plan the type, duration and timing of the blasting procedures with due cognizance of other land users and structures in the vicinity. • Notify surrounding land owners in writing prior to blasting.
Management	Site Manager to ensure	• Implement a weed and invader plant control

Management objectives	Role	Management outcomes
of weed/ invader plants	compliance with EMP guidelines. Compliance to be monitored by the Environmental Control Officer.	management plan. • Control declared invader or exotic species on the rehabilitated areas. • Keep the temporary topsoil stockpiles free of weeds.
Surface and storm water handling	Site Manager to ensure compliance with EMP guidelines. Compliance to be monitored by the Environmental Control Officer.	• Divert storm water around topsoil heaps, stockpile areas and access roads to prevent erosion and material loss. • Divert runoff water around stockpile areas with trenches and contour structures to prevent erosion of work areas. • Conduct mining in accordance with the Best Practice Guideline for small scale mining that relates to storm water management, erosion and sediment control and waste management, developed by the Department of Water and Sanitation (DWS), and any other conditions which that Department may impose.
Management of health and safety risks	Site Manager to ensure compliance with EMP guidelines. Compliance to be monitored by the Environmental Control Officer. Blasting contractor to comply with national blasting requirements.	• Plan the type, duration and timing of the blasting procedures with due cognizance of other land users and structures in the vicinity. • Inform the surrounding landowners and communities of any blasting event. • Use noise mufflers and/or soft explosives during blasting, limit fly rock. • Give audible warning of a pending blast at least 3 minutes in advance of the blast. • Remove all fly rock (of diameter 150 mm and larger) which falls beyond the working area, with the rock spill. • Ensure that workers have access to the correct PPE as required by law. • Ensure all operations comply with the Occupational Health and Safety Act.
Waste management	Site Manager to ensure compliance with EMP guidelines. Compliance to be monitored by the Environmental Control Officer.	• Ensure no waste pile is established within 100 m of the edge of any river channel or other water bodies. • Ensure regular vehicle maintenance take place within the service bay area of the off-site workshop. If emergency repairs are needed on site, ensure drip trays is present. Ensure all waste products are disposed of in a 200 l closed container/bin inside the emergency service area. • Collect effluents containing oil, grease or other industrial substances in a suitable receptacle and remove from site, for resale or appropriate disposal at a recognised facility. • Clean spills immediately to the satisfaction of the Regional

Management objectives	Role	Management outcomes
		Manager by removing the spillage and polluted soil and disposing thereof at a recognised facility. File proof. • Ensure availability of suitable covered, conveniently placed receptacles at all times for waste disposal. • Store non-biodegradable refuse such as glass bottles, plastic bags, metal scrap, etc., in a container with a closable lid at a collecting point. Collection should take place on a regular basis and disposed of at the recognised landfill site at Witbank. Prevent refuse from being dumped on or in the vicinity of the mine area. • Biodegradable refuse to be handled as indicated above.
Management of access roads	Site Manager to ensure compliance with EMP guidelines. Compliance to be monitored by the Environmental Control Officer.	• Divert storm water around access roads to prevent erosion. • Erosion of access road: Restrict vehicular movement to existing access routes to prevent crisscrossing of tracks through undisturbed areas.
Topsoil handling	Site Manager to ensure compliance with EMP guidelines. Compliance to be monitored by the Environmental Control Officer.	• Remove the first 300mm of topsoil in strips and store at stockpile area. • Keep the temporary topsoil stockpiles free of weeds. • Place topsoil stockpiles on a levelled area and implement measures to safeguard the piles from being washed away in the event of heavy rains/storm water. • Topsoil heaps should not exceed 1.5 m in order to preserve micro-organisms within the topsoil, which can be lost due to compaction and lack of oxygen. • Seed the stockpiled topsoil heaps if vegetation does not re-establish within 6 months of stockpiling. • Divert storm- and runoff water around the stockpile area and access roads to prevent erosion.
Fauna and flora	Site Manager to ensure compliance with EMP guidelines. Compliance to be monitored by the Environmental Control Officer.	• Ensure no fauna is caught, killed, harmed, sold or played with. • Instruct workers to report any animals that may be trapped in the working area. Ensure no snares are set or nests raided for eggs or young. • Do not remove plants/trees without ECO approval.

5.14 Aspects for inclusion as conditions of authorisation

Any aspects which must be made conditions of the Environmental Authorisation.

The management objectives listed in this report (6.4) should be considered for inclusion in the environmental authorisation.

5.15 Description of any assumptions, uncertainties and gaps in knowledge

Which relate to the assessment and mitigation measures proposed.

The assumptions made in this document, which relate to the assessment and mitigation measures proposed, stem from site-specific information gathered from the property owner, as well as site inspections and background information gathering.

5.16 Reasoned opinion as to whether the proposed activity should be authorised

No fatal flaws could be identified that were deemed severe enough to prevent the activity from continuing, should the mitigation measures and monitoring programmes proposed in this document be implemented on site. The management objectives listed in this report should be considered for inclusion in the Environmental Authorisation.

5.17 Period for which the Environmental Authorisation is required

The applicant requests the Environmental Authorisation to be valid for a three-year period.

5.18 Undertaking

Confirm that the undertaking required to meet the requirements of this section is provided at the end of the EMPr and is applicable to the Basic Assessment Report and the Environmental Management Programme report.

The undertaking required to meet the requirements of this section is provided at the end of the EMPr and is applicable to the Basic Assessment Report and the Environmental Management Programme report.

5.19 Financial provision

State the amount required to manage and rehabilitate the environment.

A financial provision of R1, 562,255 is proposed for the mining application.

5.19.1 Explain how the aforesaid amount was derived

The amount was derived from the quantum calculations.

5.19.2 Confirm that this amount can be provided from operating expenditure

Confirm that the amount is anticipated to be an operating cost and is provided for as such in the Mining Work Programme, Financial and Technical Competence Report or PWP.

CALCULATION OF THE QUANTUM

Applicant:	**SOTHABA CAPITAL (PTY) LTD**	**Ref No.:**	**MP 30/5/1/3/3/2 11712 MP**
Evaluator:	**Takalani Rakuambo**	**Date:**	**Oct-20**

No.	Description	Unit	A Quantity	B Master Rate	C Multiplication factor	D Weighting factor 1	E=A*B*C*D Amount (Rands)
1	**Dismantling of processing plant and related structures (including overland conveyors and powerlines)**	m3	**0**	**16**	**1**	**1**	**0**
2 (A)	**Demolition of steel buildings and structures**	**m2**	**0**	**228**	**1**	**1**	**0**
2(B)	**Demolition of reinforced concrete buildings and struct**	**m2**	**0**	**336**	**1**	**1**	**0**
3	**Rehabilitation of access roads**	**m2**	**500**	**41**	**0,3**	**1**	**6150**
4 (A)	Demolition and rehabilitation of electrified railway lines	m	0	395	1	1	**0**
4 (A)	Demolition and rehabilitation of non-electrified railway lines	m	0	216	1	1	**0**
5	**Demolition of housing and/or administration facilities**	**m2**	**0**	**455**	**1**	**1**	**0**
6	**Opencast rehabilitation including final voids and ramps**	**ha**	**4,99**	**238697**	**0,2**	**1**	**238219,606**
7	**Sealing of shafts adits and inclines**	**m3**	**0**	**122**	**1**	**1**	**0**
8 (A)	**Rehabilitation of overburden and spoils**	**ha**	**0,07**	**159131**	**1**	**1**	**11139,17**
8 (B)	Rehabilitation of processing waste deposits and evaporation ponds (non-polluting potential)	ha	0	198195	1	1	0
8 (C)	Rehabilitation of processing waste deposits and evaporation ponds (polluting potential)	ha	0,05	5575653	1	1	**278782,65**
9	Rehabilitation of subsided areas	ha	0	133249	1	1	**0**
10	**General surface rehabilitation**	**ha**	5	126059	1	**1**	**630295**
11	River diversions	ha	0	126059	1	1	**0**
12	**Fencing**	**m**	**0**	**144**	**1**	**1**	**0**
13	**Water management**	**ha**	**0,03**	**47931**	**1**	**1**	**1437,93**
14	**2 to 3 years of maintenance and aftercare**	**ha**	**5**	**16776**	**1**	**1**	**83880**
15 (A)	**Specialist study**	**Sum**	**0**	**0**	**1**	**1**	**0**
15 (B)	Specialist study	Sum	0	0	1	1	**0**
					Sub Total 1		**1249904,356**

1	Preliminary and General	149988,5227	**weighting factor 2** 1	**149988,5227**
2	Contingencies	124990,4356		**124990,4356**
			Subtotal 2	**1524883,31**
			VAT (15%)	**37371,45**
			Grand Total	**1562255**

SIGN Takalani Rakuambo
DATE 2020/10/12

The amount of **R1, 562,255** . for financial provision was calculated for the mining application. Financial provision will be made in the form of a bank guarantee upon the successful granting of the mining permit.

5.20 Specific information required by the Competent Authority

Compliance with the provisions of sections 24(4) (a) and (b) read with section 24 (3)(a) and (7) of the NEMA (107 of 1998). The EIA report must include the:

5.20.1 Impact on the socio-economic conditions of any directly affected person

Provide the results of investigation, assessment, and evaluation of the impact of the mining, bulk sampling or alluvial diamond prospecting on any directly affected person including the landowner, lawful occupier, or, where applicable, potential beneficiaries of any land restitution claim, attach the investigation report as an Appendix.

The proposed coal pit will be established on virgin ground with no activity and minimal vegetation cover. The coal pit will, therefore, not have to compete with other land uses. Upon closure, the land will be rehabilitated to a state fit for agricultural purposes.

Due to the remote location of the coal pit, there will be little to no negative impacts on the community. The dust and noise impacts that may emanate from the mining area during the operational phase could have a negative impact on the surrounding community if the mitigation measures proposed in this document are not implemented and managed on-site. However, due to the distance of the community from the mining area (±600 m) these impacts are considered to be of low-medium significance.

The operation of the mine will have a number of positive impacts, such as job creation for skilled, semi-skilled and unskilled permanent workers. The proposed coal mine pit will therefore contribute locally by aiding in the development of the area and boosting the local economy through increased municipal revenue. On a national scale, this will aid by boosting the slowly growing SA economy.

5.20.2 Impact on any national estate referred to in section 3(2) of the National Heritage Resources Act

Provide the results of investigation, assessment and evaluation of the impact of the mining, bulk sampling or alluvial diamond prospecting on any national estate referred to in section 3(2) of the National Heritage Resources Act, 1999 (Act No 25 of 1999) with the exception of the national estate contemplated in section 3(2)(i)(vi) and (vii) of the Act, attach the investigation report as **Error! Reference source not found.** and confirm t hat the applicable mitigation is reflected herein.

Due to the already disturbed nature of the project area, adjacent areas, the fact that no residence or, by the occurrence of a large-scale mining, no area of archaeological or cultural importance could be identified.

5.21 Other matters required in terms of section 24(4)(a) and (b) of the Act

The EAP managing the application must provide the competent authority with detailed, written proof of an investigation as required by section 24(4)(b)(i) of the Act and motivation if no reasonable or feasible alternatives, as contemplated in sub-regulation 22(2)(h), exist. The EAP must attach such motivation as an Appendix.

The site and project alternatives investigated during the impact assessment process were done at the hand of information obtained during the site investigation, public participation process and desktop studies conducted of the study area. As discussed earlier, the following alternatives were considered:

- Establishment of a coal pit 1 km away from the residence or any form of development vs. establishment of a coal pit in an un-utilised, partially virgin area (preferred alternative)
- Open cast mining (preferred alternative) vs. underground mining

- Temporary Infrastructure (preferred alternative) vs. permanent Infrastructure
- Access onto provincial road (preferred alternative) vs. access onto national road
- No-go alternative

PART B

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

6 Environmental management programme

6.1 Details of the EAP

Confirm that the requirements for the provision of the details and expertise of the EAP are already included in Part A, section 1(a) herein as required).

Details of the EAP are included in Part A of this report.

6.2 Description of the aspects of the activity

Confirm that the requirements to describe the aspects of the activity that are covered by the draft environmental management programme is already included in Part A, 2.2, herein, as required.

The aspects of the activity that are covered by the environmental management programme has been described and included in Part A, 2.2.

6.3 Composite map

Provide a map (attached as an Appendix) at an appropriate scale which superimposes the proposed activity, its associated structures and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that any areas that should be avoided, such as buffers.

As mentioned in Part A, 2.1 this map has been compiled and attached

6.4 Description of impact management objectives, including management statements

6.4.1 Determination of closure objectives

Ensure that the closure objectives are informed by the type of environment described.

The decommissioning phase will entail the rehabilitation of the mining site. Once mining activities cease, the area will be fully rehabilitated. The perimeter walls of the open cast pit will either be sloped at 1:3 to the pit floor to prevent soil erosion or stepped by creating benches of not more than 3 m high. The applicant will comply with the minimum closure objectives as prescribed by DMR and detailed below.

Rehabilitation of the excavated area:

- Rocks and coarse material removed from the excavation must be dumped into the excavation.

- No waste will be permitted to be deposited in the excavations.
- Once overburden, rocks and coarse natural materials have been added to the excavation and profiled with acceptable contours and erosion control measures, the topsoil previously stored will be returned to its original depth over the area.
- The area will be fertilised if necessary, to allow vegetation to establish rapidly. The site will be seeded with a local or adapted indigenous seed mix in order to propagate the locally or regionally occurring flora, should natural vegetation not re-establish within 6 months from site closure.
- If a reasonable assessment indicates that the re-establishment of vegetation is unacceptably slow, the Regional Manager may require that the soil be analysed and any deleterious effects on the soil arising from the mining operation be corrected and the area seeded with a vegetation seed mix to their specification.

Rehabilitation of plant area:

- The compacted areas will be ripped, and the topsoil returned over the area.
- Coarse natural material used for the construction of ramps will be removed and dumped into the excavations.
- Stockpiles will be removed during the decommissioning phase, the area ripped, and the topsoil returned to its original depth to provide a growth medium.
- On completion of operations, all structures or objects will be dealt with in accordance with Section 44 of the MPRDA, 2002 (Act 28 of 2002):
  - Where sites have been rendered devoid of vegetation/grass or soils have been compacted by traffic, the surface will be scarified or ripped.
  - The site shall be seeded with a vegetation seed mix adapted to reflect the local indigenous flora if natural vegetation does not re-establish within 6 months of the closure of the site.
- Photographs of the mining area and office sites, before and during the mining operation and after rehabilitation, will be taken at selected fixed points and kept on record for the information of the Regional Manager.
- On completion of mining operations, the surface of these areas, if compacted due to hauling and dumping operations, will be scarified to a depth of at least 300 mm and graded to an even surface condition and the previously stored topsoil will be returned to its original depth over the area.
- Prior to replacing the topsoil, the overburden material that was removed from these areas will be replaced in the same order as it originally occurred.

- The area will then be fertilised if necessary, to allow vegetation to establish rapidly. The site will be seeded with a local, adapted indigenous seed mix if natural vegetation does not re-establish within 6 months after closure of the site.
  - If a reasonable assessment indicates that the re-establishment of vegetation is unacceptably slow, the Regional Manager may require that the soil be analysed and any deleterious effects on the soil arising from the mining operation be corrected and the area seeded with a seed mix to their specification.

Final rehabilitation:

- Rehabilitation of the surface area will entail landscaping, levelling, top dressing, land preparation, seeding (if required), maintenance and weed/alien clearing.
- All infrastructure, equipment, plant, temporary housing and other items used during the mining period will be removed from the site (section 44 of the MPRDA).
- Waste material of any description, including receptacles, scrap, rubble and tyres, will be removed entirely from the mining area and disposed of at a recognised landfill facility. It will not be permitted to be buried or burned on the site.
- Weed/alien clearing will be done sporadically during the life of the mining activities.
- Species regarded as Category 1 weeds according to CARA (Conservation of Agricultural Recourses Act, 1983 – Act 43; Regulations 15 & 16 (as amended in March 2001) need to be eradicated from the site.
- Final rehabilitation will be completed within a period specified by the Regional Manager.

6.5 Volume and rate of water use required for the operation

Water will only be used for dust suppression purposes as the mining method does not require any washing or related process water. Water sprayers will be fixed to the crusher plant and a water truck will be used to spray access roads and stockpile areas to alleviate dust generation. It is proposed that the mining activities will require approximately 10 000L of water per day.

6.6 Has a water use licence has been applied for?

Water licence has not been applied yet, it is proposed that water will be bought elsewhere and brought to the site by tankers. however, there is a risk that the proposed project will trigger section 21(g) of National Water Act, 1998 (Act no 38 of 1998) hence will require general authorisation of water use in terms of Section 39 of National Water Act, 1998 (Act no 38 of 1998) if this EMP is not adhered to.

6.7 Impacts to be mitigated in their respective phases

Measures to rehabilitate the environment affected by the undertaking of any listed activity.

Activities	Phase	Size and scale of disturbance	Mitigation measures	Compliance with standards	Time period for implementation
E.g. for prospecting – drill site, site camp, ablution, facilities, accommodation, equipment storage, sample storage, site office, access route, etc. E.g. for mining – excavations, blasting, stockpiles, discard dumps/dams, loading, hauling and transport. Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc.	Of operation in which activity will take place. State: Planning and design, pre-construction, construction operational, rehabilitation, closure, post-closure	Volumes, tonnages and hectares or m²	Describe how recommendations herein will remedy the cause of pollution or degradation	Description of how each recommendation herein will comply with any prescribed environmental management standards or practices that have been identified by Competent Authorities	Describe the time period when the measures in the environmental management programme must be implemented. Measures must be implemented when required. With regard to rehabilitation specifically this must take place at the earliest opportunity. With regard to rehabilitation, therefore state either: Upon cessation of the individual activity or, upon cessation of mining, bulk sampling or alluvial diamond prospecting as the case may be.
Stripping and stockpiling of topsoil	Site establishment/ construction phase	5 ha	**Visual mitigation** • The site must be neat and kept in good condition at all times. • Upon closure, the site must be rehabilitated and sloped to ensure that visual impact on the aesthetic value of	• Dust and Noise: NEMAQA, 2004 • Regulation 6(1) • Weeds: CARA, 1983 • Storm Water:	Throughout the site establishment phase.

Activities	Phase	Size and scale of disturbance	Mitigation measures	Compliance with standards	Time period for implementation
			the area is minimal. **Dust handling** • Dust liberation into the surrounding environment must be effectively controlled by the use of, inter alia, water spraying and/or other dust-allaying agents. • The site manager must ensure continuous assessment of all dust suppression equipment to confirm its effectiveness. • Speed on the access roads must be limited to 40km/h to prevent excess dust generation. • Roads must be sprayed with water or an environmentally-friendly dust-allaying agent that contains no PCBs (e.g. DAS products) if dust is generated above acceptable limits. **Noise handling** • The applicant must ensure that staff conduct themselves in an acceptable manner while on site, both during work hours and after hours. • No loud music permitted at the mining area.	NWA, 1998 • Waste: NEM:WA, 2008	

Activities	Phase	Size and scale of disturbance	Mitigation measures	Compliance with standards	Time period for implementation
			• All mining vehicles must be equipped with silencers and kept roadworthy in terms of the Road Transport Act. **Weed and invader plant management** • A weed and invader plant control management plan must be implemented at the site to ensure eradication of all listed invader plants in terms of CORA (Act No 43 1983). • Management must take responsibility to control declared invader or exotic species on the rehabilitated areas. The following control methods can be used: o The plants can be uprooted, felled or cut off and can be destroyed completely. o The plants can be treated with an herbicide that is registered for use in connection therewith and in accordance with the directions for the use of such an herbicide. o The temporary topsoil stockpiles must be kept free of weeds. **Storm water handling** • Storm water must be diverted around the topsoil heaps, stockpile areas and		

Activities	Phase	Size and scale of disturbance	Mitigation measures	Compliance with standards	Time period for implementation
			access roads to prevent erosion and material loss. • Runoff water must be diverted around the stockpile areas with trenches and contour structures to prevent erosion of the work areas. **Waste management** • No processing area or waste pile may be established within 100 m of the edge of any river channel or other water bodies. • Regular vehicle maintenance may only take place in the service bay area of the off-site workshop. If emergency repairs are needed on equipment not able to move to the workshop, drip trays must be present. All waste products must be disposed of in a 200 l closed container/bin to be removed from the emergency service area to the workshop to ensure proper disposal. • Any effluents containing oil, grease or other industrial substances must be collected in a suitable receptacle and removed from the site, for resale or appropriate disposal at a recognised		

Activities	Phase	Size and scale of disturbance	Mitigation measures	Compliance with standards	Time period for implementation
			facility. • Spills must be cleaned immediately to the satisfaction of the Regional Manager by removing the spillage and the polluted soil and disposing it at a recognised facility. Proof must be filed. • Suitable covered receptacles must be available at all times and conveniently placed for waste disposal. • Non-biodegradable refuse, such as glass bottles, plastic bags, metal scrap, etc., must be stored in a container with a closable lid at a collecting point and collected on a regular basis and disposed of at a recognised landfill site. Specific precautions must be taken to prevent refuse from being dumped on or in the vicinity of the mine area. • Biodegradable refuse generated must be handled as indicated above.		
Blasting	Operational phase	3.9ha	**Management of Health and Safety Risks** • The type, duration and timing of the blasting procedures must be planned with due cognizance of other land users and structures in the vicinity, • The surrounding landowners and	**Health and safety** • MHSA, 1996 • OHSA, 1993 • OHSAS 18001 **Dust and noise** NEMAQA, 2004	Applicable with each blasting event.

Activities	Phase	Size and scale of disturbance	Mitigation measures	Compliance with standards	Time period for implementation
			communities must be informed in writing ahead of any blasting event • Measures to limit fly rock must be taken • Audible warning of a pending blast must be given at least 3 minutes before the blast • All fly rock (of diameter 150mm and larger) which falls beyond the working area, together with the rock spill must be collected and removed, • Workers must have access to the correct PPE as required by law. • All operations must comply with the OHSA. **Dust handling** • Dust liberation into the surrounding environment must be effectively controlled by the use of, inter alia, water spraying and/or other dust-allaying agents. • Speed on the access roads must be limited to 40km/h to prevent the generation of excess dust. **Noise handling** • The applicant must ensure that staff conduct themselves in an acceptable	Regulation 6(1)	

Activities	Phase	Size and scale of disturbance	Mitigation measures	Compliance with standards	Time period for implementation
			manner while on site, both during work hours and after hours. • No loud music permitted at the mining area. • All mining vehicles must be equipped with silencers and maintained in a road worthy condition in terms of the Road Transport Act. • The type, duration and timing of the blasting procedures must be planned with due cognizance of other land users and structures in the vicinity. Surrounding land owners must be notified in writing prior to blasting.		
Excavation	Operational phase	3.9ha	**Visual mitigation** • The site needs to have a neat appearance and be kept in good condition at all times. • Upon closure the site needs to be rehabilitated and sloped to ensure that the visual impact on the aesthetic value of the area is kept to a minimum. **Dust handling** • Dust liberation into the surrounding environment must be effectively controlled by the use of, inter alia,	**Dust and noise** NEM:AQA, 2004 Regulation 6(1) **Health and safety** MHSA, 1996 OHSA, 1993 OHSAS 18001 **Fauna and flora** NEM:BA, 2004 **Waste** NEMWA, 2008	Throughout the operational phase

Activities	Phase	Size and scale of disturbance	Mitigation measures	Compliance with standards	Time period for implementation
			water spraying and/or other dust-allaying agents. • The site manager must ensure continuous assessment of all dust suppression equipment to confirm its effectiveness. • Speed on the access roads must be limited to 40km/h to prevent the generation of excess dust. • Roads must be sprayed with water or an environmentally friendly dust-allaying agent that contains no PCBs (e.g. DAS products) if dust is generated above acceptable limits. **Noise handling** • The applicant must ensure that staff conduct themselves in an acceptable manner while on site, both during work hours and after hours. • No loud music permitted at the mining area. • All mining vehicles must be equipped with silencers and maintained in a road worthy condition in terms of the Road Transport Act. **Management of health and safety risks**	**Weeds** CARA, 1983	

Activities	Phase	Size and scale of disturbance	Mitigation measures	Compliance with standards	Time period for implementation
			• Workers must have access to the correct PPE as required by law. • All operations must comply with the OHSA. **Protection of fauna and flora** • The site manager should ensure that no fauna is caught, killed, harmed, sold or played with. • Workers should be instructed to report any animals that may be trapped in the working area. • No snares may be set, or nests raided for eggs or young. • No plants or trees may be removed without the approval of the ECO. **Waste management** • No processing area or waste pile may be established within 100 m of the edge of any river channel or other water bodies. • Regular vehicle maintenance may only take place within the service bay area of the off-site workshop. If emergency repairs are needed on equipment not able to move to the workshop, drip trays must be present. All waste		

Activities	Phase	Size and scale of disturbance	Mitigation measures	Compliance with standards	Time period for implementation
			products must be disposed of in a 200 L closed container/bin to be removed from the emergency service area to the workshop in order to ensure proper disposal. • Any effluents containing oil, grease or other industrial substances must be collected in a suitable receptacle and removed from site, for resale/ appropriate disposal at a recognised facility. • Spills must be cleaned up immediately to the satisfaction of the Regional Manager by removing the spillage and polluted soil and disposing it at a recognised facility. Proof must be filed. • Suitable covered receptacles must be available at all times and conveniently placed for waste disposal. • Non-biodegradable refuse such as glass bottles, plastic bags, metal scrap, etc., should be stored in a container with a closable lid at a collecting point and collected on a regular basis and disposed of at a recognised landfill site. Specific precautions should be taken		

Activities	Phase	Size and scale of disturbance	Mitigation measures	Compliance with standards	Time period for implementation
			to prevent refuse from being dumped on or in the vicinity of the mine area. • Biodegradable refuse generated must be handled as indicated above. **Management of weed/invader plants** • A weed and invader plant control management plan must be implemented at the site to ensure eradication of all listed invader plants in terms of CORA (Act No 43 1983). • Management must take responsibility to control declared invader or exotic species on the rehabilitated areas. The following control methods can be used: o The plants can be uprooted, felled or cut off and can be destroyed completely. o The plants can be treated with an herbicide that is registered for use in connection therewith and in accordance with the directions for the use of such an herbicide. o The temporary topsoil stockpiles need to be kept free of weeds.		
Crushing	Operational phase	0.3ha	**Dust handling**	**Dust and noise**	Throughout the

Activities	Phase	Size and scale of disturbance	Mitigation measures	Compliance with standards	Time period for implementation
			• Dust liberation into the surrounding environment must be effectively controlled by using, inter alia, water spraying and/or other dust-allaying agents. • The site manager must ensure continuous assessment of all dust suppression equipment to confirm its effectiveness. • Speed on the access roads must be limited to 40km/h to prevent excess dust generation. • The crusher plant must have operational water sprayers to alleviate dust generation from conveyor belts. Noise handling • The applicant must ensure that staff conduct themselves in an acceptable manner while on site, during work hours and after hours. • No loud music permitted at the mining area. • All mining vehicles must be equipped with silencers and kept roadworthy in terms of the Road Transport Act. Waste management	NEMAQA 2004 **Waste** NEMWA 2008	operational phase

Activities	Phase	Size and scale of disturbance	Mitigation measures	Compliance with standards	Time period for implementation
			• No processing area or waste pile may be established within 100 m of the edge of any river channel or other water bodies. • Regular vehicle maintenance may only take place in the service bay of the off-site workshop. If emergency repairs are needed on equipment not able to move to the workshop, drip trays must be present. All waste products must be disposed of in a 200 l closed container/bin to be removed from the emergency service area to the workshop for proper disposal. • Any effluents containing oil, grease or other industrial substances must be collected in a suitable receptacle and removed from site, either for resale or appropriate disposal at a recognised facility. • Spills must be cleaned up immediately to the satisfaction of the Regional Manager by removing spillage and polluted soil and by disposing it at a recognised facility. Proof must be filed. • Suitable covered receptacles must be		

Activities	Phase	Size and scale of disturbance	Mitigation measures	Compliance with standards	Time period for implementation
			available at all times and conveniently placed for the disposal of waste. • Non-biodegradable refuse such as glass bottles, plastic bags, metal scrap, etc., should be stored in a container with a closable lid at a collecting point and collected on a regular basis and disposed of at a recognised landfill site. Specific precautions must be taken to prevent refuse from being dumped on or in the vicinity of the mine area. • Biodegradable refuse generated must be handled as indicated above.		
Stockpiling and transporting	Operational phase	0.7ha	**Visual mitigation** • The site must be neat and be kept in good condition at all times. • Upon closure, the site must be rehabilitated and sloped to ensure that the visual impact on the aesthetic value of the area is minimal. **Storm water handling** • Storm water must be diverted around the stockpile areas and access roads to prevent erosion and material loss. • Runoff water must be diverted around the stockpile areas with trenches and	**Storm water** NWA, 1998 **Weeds** CARA, 1983 **Dust and noise** NEMAQA, 2004 Regulation 6(1) **Waste** NEMWA, 2008	Throughout operational phase

Activities	Phase	Size and scale of disturbance	Mitigation measures	Compliance with standards	Time period for implementation
			contour structures to prevent erosion of work areas. • Mining must be conducted in accordance with the Best Practice Guideline for small scale mining that relates to storm water management, erosion and sediment control and waste management, developed by the DWS, and any other conditions that the DWS may impose: • Clean water (e.g. rainwater) must be kept clean and be routed to a natural watercourse by a system separate from the dirty water system. Prevent clean water from running or spilling into dirty water systems. • Dirty water must be collected and contained in a system separate from the clean water system. • Dirty water must be prevented from spilling/seeping into clean water systems. • The storm water management plan must apply for the entire life cycle of the mine and over different hydrological cycles (rainfall patterns).		

Activities	Phase	Size and scale of disturbance	Mitigation measures	Compliance with standards	Time period for implementation
			• The statutory requirements of various regulatory agencies and the interests of stakeholders must be considered and incorporated into the storm water management plan. **Management of weed/invader plants** • A weed and invader plant control management plan must be implemented at the site to ensure eradication of all listed invader plants in terms of CORA (Act No 43 1983). • Management must take responsibility to control declared invader or exotic species on the rehabilitated areas. The following control methods can be used: o The plants can be uprooted, felled or cut off and can be destroyed completely. o The plants can be treated with an herbicide that is registered for use in connection therewith and in accordance with the directions for the use of such an herbicide. • The temporary stockpile area must be kept free of weeds. **Dust handling**		

Activities	Phase	Size and scale of disturbance	Mitigation measures	Compliance with standards	Time period for implementation
			• Dust liberation into the surrounding environment must be effectively controlled by the use of, inter alia, water spraying and/or other dust-allaying agents. • The site manager must ensure continuous assessment of all dust suppression equipment to confirm its effectiveness. • Speed on the access roads must be limited to 40km/h to prevent excess dust generation. • Roads must be sprayed with water or an environmentally-friendly dust-allaying agent that contains no PCBs (e.g. DAS products) if dust is generated above acceptable limits. Management of access roads • Storm water should be diverted around the access roads to prevent erosion. • Vehicular movement must be restricted to existing access routes to prevent crisscrossing of tracks through undisturbed areas. • Rutting and erosion of the access road caused as a result of the mining		

Activities	Phase	Size and scale of disturbance	Mitigation measures	Compliance with standards	Time period for implementation
			activities must be repaired by the applicant. **Noise handling** • The applicant must ensure that staff conduct themselves in an acceptable manner while on site, both during work hours and after hours. • No loud music permitted at the mining area. • All mining vehicles must be equipped with silencers and kept roadworthy in terms of the Road Transport Act. **Waste management** • No processing area or waste pile may be established within 100 m of the edge of any river channel or other water bodies. • Regular vehicle maintenance may only take place in the service bay area of the off-site workshop. If emergency repairs are needed on equipment not able to move to the workshop, drip trays must be present. All waste products must be disposed of in a 200 l closed container/bin to be removed from the emergency service area to		

Activities	Phase	Size and scale of disturbance	Mitigation measures	Compliance with standards	Time period for implementation
			the workshop for proper disposal. • Any effluents containing oil, grease or other industrial substances must be collected in a suitable receptacle and removed from site, for resale or appropriate disposal at a recognised facility. • Spills must be cleaned up immediately to the satisfaction of the Regional Manager by removing the spillage and polluted soil and disposing of it at a recognised facility. Proof must be filed. • Suitable covered receptacles must be available at all times and conveniently placed for waste disposal. • Non-biodegradable refuse such as glass bottles, plastic bags, metal scrap, etc., should be stored in a container with a closable lid at a collecting point and collected on a regular basis and disposed of at a recognised landfill site. Specific precautions should be taken to prevent refuse from being dumped on or in the vicinity of the mine area. • Biodegradable refuse generated must be handled as indicated above.		

Activities	Phase	Size and scale of disturbance	Mitigation measures	Compliance with standards	Time period for implementation
Sloping and landscaping during rehabilitation	Decommissioning phase	5 ha	**Storm water handling** • Storm water must be diverted around the rehabilitated area to prevent erosion and loss of reinstated material. **Management of health and safety risks** • Excavations have to be rehabilitated as stipulated in the closure plan to ensure the site is safe upon closure. • Workers must have access to the correct PPE as required by law. • All operations must comply with the OHSA. **Dust handling** • Dust liberation into the surrounding environment must be effectively controlled by the use of, inter alia, water spraying and/or other dust-allaying agents. • The site manager must ensure continuous assessment of all dust suppression equipment to confirm its effectiveness. • Speed on the access roads must be limited to 40km/h to prevent excess dust generation. • Roads must be sprayed with water or	**Storm water** NWA, 1998 **Health and safety** MHSA, 1996 OHSA, 1993 OHSAS 18001 **Dust and noise** NEMAQA 2004, Regulation 6(1) **Waste** NEMWA 2008	Upon cessation of mining

Activities	Phase	Size and scale of disturbance	Mitigation measures	Compliance with standards	Time period for implementation
			an environmentally friendly dust-allaying agent that contains no PCBs (e.g. DAS products) if dust is generated above acceptable limits. **Noise handling** • The applicant must ensure that staff conduct themselves in an acceptable manner while on site, both during work hours and after hours. • No loud music permitted at the mining area. • All mining vehicles must be equipped with silencers and kept roadworthy in terms of the Road Transport Act. **Waste management** • Waste material of any description, including receptacles, scrap, rubble and tyres, will be removed entirely from the mining area and disposed of at a recognised landfill facility. It will not be permitted to be buried/burned on site • Any effluents containing oil, grease or other industrial substances must be collected in a suitable receptacle and removed from site, for resale/ appropriate disposal at a recognised		

Activities	Phase	Size and scale of disturbance	Mitigation measures	Compliance with standards	Time period for implementation
			facility. • Spills must be cleaned up immediately to the satisfaction of the Regional Manager by removing the spillage together with the polluted soil and disposing of it at a recognised facility. Proof should be filed. • Suitable covered receptacles must be available at all times and conveniently placed for waste disposal. • Non-biodegradable refuse, like glass bottles, plastic bags, metal scrap, etc., should be stored in a container with a closable lid at a collecting point and collected on a regular basis and disposed of at a recognised landfill site. Specific precautions should be taken to prevent refuse from being dumped on or in the vicinity of the mine area. • Biodegradable refuse generated must be handled as indicated above.		
Replacing of topsoil and rehabilitation of disturbed area	Decommissioning phase	5 ha	**Rehabilitation of excavated area** • Rocks and coarse material removed from the excavation must be dumped into the excavation. • No waste will be permitted to be	**Rehabilitation** MPRDA, 2008 **Health and safety** MHSA, 1996 OHSA, 1993	Upon cessation of mining

Activities	Phase	Size and scale of disturbance	Mitigation measures	Compliance with standards	Time period for implementation
			deposited in the excavations. • Once overburden, rocks and coarse natural materials have been added to the excavation and were profiled with acceptable contours and erosion control measures, the topsoil previously stored will be returned to its original depth over the area. • The area will be fertilised if necessary to allow vegetation to establish rapidly. The site will be seeded with a local or adapted indigenous seed mix in order to propagate the locally or regionally occurring flora, should natural vegetation not re-establish within 6 months from site closure. • If a reasonable assessment indicates that the re-establishment of vegetation is unacceptably slow, the Regional Manager may require that the soil be analysed and any deleterious effects on the soil arising from the mining operation be corrected and the area seeded with a vegetation seed mix to his or her specification. **Rehabilitation of plant area**	OHSAS 18001 **Dust and noise** NEMAQA, 2004 Regulation 6(1) **Weeds** CARA, 1983 **Waste** NEMWA, 2008	

Activities	Phase	Size and scale of disturbance	Mitigation measures	Compliance with standards	Time period for implementation
			• The compacted areas will be ripped and the topsoil returned over the area. • Coarse natural material used for the construction of ramps will be removed and dumped into the excavations. • Stockpiles will be removed during the decommissioning phase, the area ripped and topsoil returned to original depth to provide a growth medium. • On completion of operations, all structures or objects will be dealt with in accordance with Section 44 of the MPRDA 2002 (Act 28 of 2002): o Where sites have been rendered devoid of vegetation/grass or soils have been compacted by traffic, the surface will be scarified or ripped. o The site will be seeded with a vegetation seed mix adapted to reflect the local indigenous flora if natural vegetation does not re-establish within 6 months of site closure. o Photographs of the mining area and office sites, before and during		

Activities	Phase	Size and scale of disturbance	Mitigation measures	Compliance with standards	Time period for implementation
			the mining operation and after rehabilitation, will be taken at selected fixed points and kept on record for the information of the Regional Manager. o On completion of mining operations, the surface of these areas, if compacted due to hauling and dumping operations, will be scarified to a depth of at least 300 mm and graded to an even surface condition. The previously stored topsoil will be returned to its original depth over the area. o Prior to replacing the topsoil, the overburden material that was removed from these areas will be replaced in the same order as it originally occurred. o The area will then be fertilized if necessary to allow vegetation to establish rapidly. The site will be seeded with a local, adapted indigenous seed mix if natural vegetation does not re-establish		

Activities	Phase	Size and scale of disturbance	Mitigation measures	Compliance with standards	Time period for implementation
			within 6 months after site closure. o If a reasonable assessment indicates that the re-establishment of vegetation is unacceptably slow, the Regional Manager may require that the soil be analysed and any deleterious effects on the soil arising from the mining operation be corrected and the area be seeded with a seed mix to their specification. **Final rehabilitation** • Rehabilitation of the surface area will entail landscaping, levelling, top dressing, land preparation, seeding (if required) and maintenance, and weed/alien clearing. • All infrastructure, equipment, plant, temporary housing and other items used during the mining period will be removed from the site (section 44 of the MPRDA). • Waste material of any description, including receptacles, scrap, rubble and tyres, will be removed entirely from the mining area and disposed of at a		

Activities	Phase	Size and scale of disturbance	Mitigation measures	Compliance with standards	Time period for implementation
			recognized landfill facility. It will not be permitted to be buried/burned on site. • Weed/alien clearing will be done in a sporadic manner during the life of the mining activities. Species regarded as Category 1 weeds according to CORA, 1983 – Act 43; Regulations 15 & 16 (as amended in March 2001) must be eradicated from the site. • Final rehabilitation will be completed within a period specified by the Regional Manager.		

6.8 Impact management outcomes

A description of impact management outcomes, identifying the standard of impact management required for the aspects contemplated in paragraph.

Activity	Potential impact	Aspects affected	Phase	Mitigation type	Standard to be achieved
Whether listed or not. E.g. excavations, blasting, stockpiles, discard dumps/ dams, loading, hauling, transport, water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc.	E.g. dust, noise, drainage, surface disturbance, fly rock, surface water contamination, groundwater contamination, air pollution, etc.		In which impact is anticipated. E.g. construction, commissioning, operational decommissioning, closure and post-closure.	Modify, remedy, control or stop through, e.g. noise control measures, storm water control, dust control, rehabilitation, design measures, blasting controls, avoidance, relocation, alternative activity, etc.	Impact avoided, noise levels, dust levels, rehabilitation standards, end-use objectives, etc.
Topsoil stripping and stockpiling	Visual intrusion associated with the establishment of the mining area.	The visual impact may affect the residents of the immediate area.	**Site establishment/ construction phase**	Control: Implementation of proper housekeeping	• Impact on the surrounding environment mitigated until rehabilitation standards can be implemented.
	Dust nuisance caused by soil disturbance.	Dust will be contained within property boundaries		Control: Dust suppression	• Fallout dust levels has to comply with the acceptable dust fall rate published for non-residential areas in the National Dust

Activity	Potential impact	Aspects affected	Phase	Mitigation type	Standard to be achieved
		and therefore affect only the landowner.			Control Regulations 2013 – 600 < Dust Fall < 1 200 mg/m²/day. • Gravimetric dust levels have to comply with the standard published in the NIOSH guidelines – particulates >1/10th of the occupational exposure limit. NEMAQA 2004, Regulation 6(1)
	Noise nuisance caused by machinery stripping and stockpiling the topsoil.	The noise impact should be contained within property boundaries, but might have a periodic impact on the closest residents of the Witbank community.		Control: Noise control measures	• Noise levels on the site must be managed and needs to comply with the standards stipulated in NEMAQA, 2004 Regulation 6(1) as well as the n*oise standards of SANS 10103:2008* • Employees working in areas with noise levels of more than 82dBA need to be issue with hearing protection.
	Infestation of the topsoil heaps by weeds and invader plants	Biodiversity		Control and remedy: Implementation of weed control	• The impact must be avoided through the eradication of Category 1 weeds/ invader plants in terms of CARA, 1993 as well as the implementation of the mitigation measures in this document.
	Loss of topsoil due to incorrect storm water management.	Loss of topsoil will affect the rehabilitation of the mining area.		Control: Storm water management	• The impact must be avoided through the implementation of storm water management.

Activity	Potential impact	Aspects affected	Phase	Mitigation type	Standard to be achieved
	Contamination of area with hydrocarbons or hazardous waste materials.	Contamination may cause surface or ground water contamination if not addressed		Control and remedy: Implementation of waste management	• The impact must be avoided through the implementation of the mitigation measures stipulated in this document. • Should spillage occur, the area needs to be cleaned in accordance with the standards of the NEMWA, 2008.
Blasting	Health and safety risk posed by blasting activities	Impact might affect the employees working on site.	**Operational phase**	Control: Health and safety monitoring management	• Impact must be avoided through compliance with the MHSA, 1996, OHSA, 1993 and OHSAS 18001 • Fallout dust levels must comply with the acceptable dust fall rate published for non-residential areas in the National Dust Control Regulations 2013 – 600 < Dust Fall < 1 200 mg/m²/day.
	Dust nuisance caused by blasting activities	Dependent on the blast, the impact might affect the surrounding community. Blasting will only occur twice a year.		Control: Dust suppression	Gravimetric dust levels has to comply with the standard published in the NIOSH guidelines particulates >1/10th of the occupational exposure limit. NEMAQA, 2004 Regulation 6(1)
	Noise nuisance caused by blasting activities	Dependent on the blast, the impact might affect the surrounding community. Blasting will only		Control: Noise control measure	• Noise levels on the site has to be managed and need to comply with the standards stipulated in NEMAQA, 2004 Regulation 6(1) as well as the noise standards of SANS 10103:2008 • Employees working in areas with noise

Activity	Potential impact	Aspects affected	Phase	Mitigation type	Standard to be achieved
		occur twice a year.			levels of more than 82dBA need to be issue with hearing protection.
Excavation	Visual intrusion associated with the excavation activities	The visual impact may affect the residents of the immediate area.	**Operational phase**	Control: Implementation of proper housekeeping	• Impact on the surrounding environment mitigated until rehabilitation standards can be implemented.
	Dust nuisance due to excavation activities.	Dust will be contained within the property boundaries and will therefore affect only the landowner.		Control: Dust suppression	• Fallout dust levels must comply with the acceptable dust fall rate published for non-residential areas, as per National Dust Control • Regulations 2013 – 600 < Dust Fall < 1 200 mg/m²/day. • Gravimetric dust levels must comply with the standard published in the NIOSH guidelines –Particulates >1/10th of the occupational exposure limit. • NEMAQA, 2004 Regulation 6(1).
	Noise nuisance generated by excavation equipment	The noise impact must be contained within the boundaries of the property, but might have a periodic impact on the closest residents of the Witbank community.		Control: Noise control measures	• Noise levels on the site has to be managed and need to comply with the standards stipulated in NEMAQA, 2004 Regulation 6(1) as well as the noise standards of SANS 10103:2008. • Employees working in areas with noise levels of more than 82dBA need to be issue with hearing protection.
	Unsafe working	Impact might affect		Control: Health and	• Impact must be avoided through

Activity	Potential impact	Aspects affected	Phase	Mitigation type	Standard to be achieved
	conditions for employees.	employees		safety monitoring and management	compliance with the MHSA, 1996, OHSA, 1993 and OHSAS 18001
Excavation	Negative impact on the fauna and flora of the area.	Biodiversity	**Operational phase**	Control: Protection of fauna and flora through operational phase	• The impact must be avoided through implementation of the mitigation measures stipulated in this document. • NEMBA, 2004.
	Contamination of area with hydrocarbons or hazardous waste materials.	Contamination may cause surface or ground water contamination if not addressed.		Control: Implementation of waste management	• The impact should be avoided through the implementation the mitigation measures stipulated in this document. • Should spillage however occur the area needs to be cleaned in accordance with the standards of the NEMWA, 2008.
	Weed and invader plant infestation of the area.	Biodiversity		Control: Implementation of weed control	• The impact should be avoided through the eradication of Category 1 weeds/invader plants in terms of CARA, 1993 as well as the implementation of the mitigation measures in this document.
Crushing	Dust nuisance due to the crushing activities	Dust will be contained within the property boundaries and will therefore affect only the landowner.	**Operational phase**	Control: Dust suppression	• Fallout dust levels has to comply with the acceptable dust fall rate published for non-residential areas in the National Dust Control Regulations 2013 – 600 < Dust Fall < 1 200 mg/m²/day. • Gravimetric dust levels have to comply with the standard published in the NIOSH guidelines – Particulates >1/10th of the occupational exposure limit. • NEMAQA, 2004 Regulation 6(1).

Activity	Potential impact	Aspects affected	Phase	Mitigation type	Standard to be achieved
	Noise nuisance generated by the crushing activities	The noise impact should be contained within the boundaries of the property, but might have a periodic impact on the closest residents of the Witbank community.		Control: Noise control measures	• Noise levels on the site has to be managed and need to comply with the standards stipulated in NEMAQA, 2004 Regulation 6(1) as well as the n*oise standards of SANS 10103:2008.* • Employees working in areas with noise levels of more than 82dBA need to be issue with hearing protection.
	Contamination of area with hydrocarbons or hazardous waste materials.	Contamination may cause surface or ground water contamination if not addressed.		Control: Implementation of waste management	• The impact should be avoided through the implementation the mitigation measures stipulated in this document. • Should spillage however occur the area needs to be cleaned in accordance with the standards of the NEMWA, 2008.
	Loss of material due to ineffective storm water handling.	Impact will affect income of applicant.		Control: Storm water control measures	• The impact should be avoided through the implementation of storm water management.
	Weed and invader plant infestation of the area due to the disturbance of the soil	Biodiversity		Control and remedy: Implementation of weed control	• The impact should be avoided through the eradication of Category 1 weeds/invader plants in terms of CARA, 1993 as well as the implementation of the mitigation measures in this document.
Stockpiling and transporting	Dust nuisance from stockpiled material and vehicles transporting the	Dust will be contained within the property boundaries and will therefore	**Operational phase**	Control: Dust suppression	• Fallout dust levels has to comply with the acceptable dust fall rate published for non-residential areas in the National Dust Control Regulations 2013 – 600 < Dust Fall

Activity	Potential impact	Aspects affected	Phase	Mitigation type	Standard to be achieved
	material.	affect only the landowner.			< 1 200 mg/m²/day. • Gravimetric dust levels have to comply with the standard published in the NIOSH guidelines – Particulates >1/10th of the occupational exposure limit. • NEMAQA, 2004 Regulation 6(1).
	Degradation of access roads.	All road users will be affected.		Control and remedy: Road management	• The impact should be avoided through the implementation of the mitigation measures proposed in this document.
	Noise nuisance caused by vehicles.	The noise impact should be contained within the boundaries of the property, but might have a periodic impact on the closest residents of the Middelburg community.		Control: Noise management monitoring and management	• Noise levels on the site has to be managed and need to comply with the standards stipulated in NEMAQA, 2004 Regulation 6(1) as well as the n*oise standards of SANS 10103:2008*. • Employees working in areas with noise levels of more than 82dBA need to be issue with hearing protection.
Sloping and landscaping during rehabilitation	Contamination of area with hydrocarbons or hazardous waste materials	Contamination may cause surface or ground water contamination if not addressed.	**Decommissioning phase**	Control: Implementation of waste management	• The impact should be avoided through the implementation the mitigation measures stipulated in this document. • Should spillage however occur the area needs to be cleaned in accordance with the standards of the NEM: WA, 2008.
	Soil erosion	Biodiversity		Control: Soil management	• The impact should be avoided through the implementation the mitigation

Activity	Potential impact	Aspects affected	Phase	Mitigation type	Standard to be achieved
					measures stipulated in this document. • CARA, 1993
	Health and safety risk posed by un-sloped areas	Impact will affect employees and residents of the property		Control: Health and safety monitoring and management.	• The impact should be avoided through compliance with the standards of the MHSA, 1996, OHSA, 1993 and OHSAS 18001
	Dust nuisance caused during sloping and landscaping activities.	Dust will be contained within the property boundaries and will therefore affect only the landowner.		Control: Dust suppression	• Fallout dust levels has to comply with the acceptable dust fall rate published for non-residential areas in the National Dust Control Regulations 2013 – 600 < Dust Fall < 1 200 mg/m²/day. • Gravimetric dust levels have to comply with the standard published in the NIOSH guidelines – Particulates >1/10 of the occupational exposure limit. NEM:AQA, 2004 Regulation 6(1).
	Noise nuisance caused by machinery.	The noise impact should be contained within the boundaries of the property, but might have a periodic impact on the closest residents of the Middelburg community.		Control: Noise monitoring	• Noise levels on the site has to be managed and need to comply with the standards stipulated in NEM:AQA, 2004 Regulation 6(1) as well as the *noise standards of SANS 10103:2008.* • Employees working in areas with noise levels of more than 82dBA need to be issue with hearing protection.
	Contamination of area with hydrocarbons or	Contamination may cause surface or		Control: Waste management	• The impact should be avoided through the implementation the mitigation

Activity	Potential impact	Aspects affected	Phase	Mitigation type	Standard to be achieved
	hazardous waste materials.	ground water contamination if not addressed.			measures stipulated in this document. • Should spillage however occur the area needs to be cleaned in accordance with the standards of the NEM: WA, 2008.
Replacing of topsoil and rehabilitation of disturbed area	Loss of reinstated topsoil due to the absence of vegetation	Biodiversity and soil management	**Decommissioning phase**	Control: Soil management	• The impact should be avoided through the implementation the mitigation measures stipulated in this document. • CARA, 1993
	Infestation of the area by weed and invader plants.	Biodiversity and soil management		Control and remedy: Implementation of weed control	• The impact should be avoided through the eradication of Category 1 weeds/invader plants in terms of CARA, 1993 as well as the implementation of the mitigation measures in this document.

6.9 Impact management actions

A description of impact management actions, identifying the manner in which the impact management objectives and outcomes in paragraph (c) and (d) will be achieved.

Activity	Potential impact	Mitigation type	Time period for implementation	Compliance with standards
Whether listed or not, e.g. excavations, blasting, stockpiles, discard dumps/dams, loading, hauling, transport, water supply dams, boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc.	E.g. dust, noise, drainage, surface disturbance, fly rock, surface water contamination, groundwater contamination, air pollution, etc.	Modify, remedy, control or stop through, e.g. noise control measures, storm water control, dust control, rehabilitation, design measures, blasting controls, avoidance, relocation, alternative activity, etc. E.g. Modify through alternative method, control through noise control, control through management and monitoring, and remedy through rehabilitation.	Describe the time period when the measures in the environmental management programme must be implemented. Measures must be implemented when required. With regard to Rehabilitation specifically this must take place at the earliest opportunity. With regard to Rehabilitation therefore state either – Upon cessation of the individual activity or upon the cessation of mining, bulk sampling or alluvial diamond prospecting as the case may be.	A description of how each of the recommendations in 2.11.6 read with 2.12 and 2.15.2 herein will comply with any prescribed environmental management standards or practices that have been identified by Competent Authorities
Topsoil stripping and stockpiling	Visual intrusion associated with the establishment of the mining area.	Control: Implementation of proper housekeeping	To be implemented daily throughout the site establishment / construction phase: • Daily compliance monitoring by site management. • Quarterly compliance monitoring of site by an	Impact on the surrounding environment must be mitigated until rehabilitation standards can be implemented in terms of the MRDA.

Activity	Potential impact	Mitigation type	Time period for implementation	Compliance with standards
			• Environmental Control Officer.	
	Dust nuisance caused by the disturbance of soil.	Control: Dust suppression	To be implemented daily throughout the site establishment / construction phase: • Daily compliance monitoring by site management. • Quarterly compliance monitoring of site by an • Environmental Control Officer.	• Fallout dust levels has to comply with the acceptable dust fall rate published for non-residential areas in the National Dust Control Regulations 2013 – 600 < Dust Fall < 1 200 mg/m²/day. • Gravimetric dust levels have to comply with the standard published in the NIOSH guidelines – Particulates >1/10th of the occupational exposure limit NEMAQA, 2004 Regulation 6(1)
	Noise nuisance caused by machinery stripping and stockpiling the topsoil.	Control: Noise control measures	To be implemented daily throughout the site establishment / construction phase: • Daily compliance monitoring by site management. • Quarterly compliance monitoring of site by an • Environmental Control Officer.	• Noise levels on the site has to be managed and need to comply with the standards stipulated in NEM: AQA, 2004 Regulation 6(1) as well as the n*oise standards of SANS 10103:2008*. • Employees working in areas with noise levels of more than 82dBA need to be issue with hearing protection.
	Infestation of the topsoil heaps by weeds and invader plants	Control and remedy: Implementation of weed control	To be implemented when necessary throughout the site establishment / construction phase:	• The impact should be avoided through the eradication of Category 1 weeds/invader plants in terms of CARA, 1993 as well as the

Activity	Potential impact	Mitigation type	Time period for implementation	Compliance with standards
			• Daily compliance monitoring by site management. • Quarterly compliance monitoring of site by an • Environmental Control Officer.	implementation of the mitigation measures in this document.
	Loss of topsoil due to incorrect storm water management.	Control: Storm water management	To be implemented daily throughout the site establishment / construction phase: • Daily compliance monitoring by site management. • Quarterly compliance monitoring of site by an Environmental Control officer	• The impact should be avoided through the implementation of storm water management.
	Contamination of area with hydrocarbons or hazardous waste materials	Control and remedy: Implementation of waste management	To be implemented daily throughout the site establishment / construction phase: • Daily compliance monitoring by site management. • Quarterly compliance monitoring of site by an • Environmental Control Officer.	• The impact should be avoided through the implementation of the mitigation measures stipulated in this document. • Should spillage however occur the area needs to be cleaned in accordance with the standards of the NEM: WA, 2008.
Blasting	Health and safety risk posed by blasting activities	Control: Health and safety monitoring and management	To be implemented when necessary throughout the operational phase: • Daily compliance monitoring by site management. • Quarterly compliance	• The impact should be avoided through compliance with the standards of the MHSA, 1996, OHSA, 1993 and OHSAS 18001

Activity	Potential impact	Mitigation type	Time period for implementation	Compliance with standards
			monitoring of site by an • Environmental Control Officer.	
	Dust nuisance caused by blasting activities	Control: Dust suppression	To be implemented daily throughout the operational phase: • Daily compliance monitoring by site management. • Quarterly compliance monitoring of site by an • Environmental Control Officer.	• Fallout dust levels has to comply with the acceptable dust fall rate published for non-residential areas in the National Dust Control Regulations 2013 – 600 < Dust Fall < 1 200 mg/m²/day. • Gravimetric dust levels have to comply with the standard published in the NIOSH guidelines – Particulates >1/10th of the occupational exposure limit. • NEMAQA, 2004 Regulation 6(1)
	Noise nuisance caused by blasting activities	Control: Noise control measures	To be implemented daily throughout the operational phase: • Daily compliance monitoring by site management. • Quarterly compliance monitoring of site by an • Environmental Control Officer.	• Noise levels on the site has to be managed and need to comply with the standards stipulated in NEM: AQA, 2004 Regulation 6(1) as well as the noise standards of SANS 10103:2008. • Employees working in areas with noise levels of more than 82dBA need to be issue with hearing protection.
Excavation	Visual intrusion associated with the excavation activities	Control: Implementation of proper housekeeping	To be implemented daily throughout the operational phase:	• Impact on the surrounding environment mitigated until rehabilitation standards can be

Activity	Potential impact	Mitigation type	Time period for implementation	Compliance with standards
			• Daily compliance monitoring by site management. • Quarterly compliance monitoring of site by an • Environmental Control Officer.	implemented.
	Dust nuisance due to excavation activities.	Control: Dust suppression	To be implemented daily throughout the operational phase: • Daily compliance monitoring by site management. • Quarterly compliance monitoring of site by an • Environmental Control Officer.	• Fallout dust levels has to comply with the acceptable dust fall rate published for non-residential areas in the National Dust Control Regulations 2013 – 600 < Dust Fall < 1 200 mg/m²/day • Gravimetric dust levels have to comply with the standard published in the NIOSH guidelines – Particulates >1/10th of the occupational exposure limit. • NEM: AQA, 2004 Regulation 6(1).
	Noise nuisance generated by excavation equipment.	Control: Noise control measures	To be implemented daily throughout the operational phase: • Daily compliance monitoring by site management. • Quarterly compliance monitoring of site by an • Environmental Control Officer.	• Noise levels on the site has to be managed and need to comply with the standards stipulated in NEM: AQA, 2004 Regulation 6(1) as well as the n*oise standards of SANS 10103:2008*. • Employees working in areas with noise levels of more than 82dBA need to be issue with hearing protection.

Activity	Potential impact	Mitigation type	Time period for implementation	Compliance with standards
	Unsafe working conditions for employees.	Control: Health and safety monitoring and management	To be daily throughout the operational phase: • Daily compliance monitoring by site management. • Quarterly compliance monitoring of site by an • Environmental Control Officer.	• The impact should be avoided through compliance with the standards of the MHSA, 1996, OHSA, 1993 and OHSAS 18001
	Negative impact on the fauna and flora of the area.	Control: Protection of fauna and flora through operational phase	To be daily throughout the operational phase: • Daily compliance monitoring by site management. • Quarterly compliance monitoring of site by an • Environmental Control Officer.	• The impact should be avoided through the implementation of the mitigation measures stipulated in this document. • NEM:BA, 2004.
	Contamination of area with hydrocarbons or hazardous waste materials.	Control: Implementation of waste management	To be implemented daily throughout the operational phase: • Daily compliance monitoring by site management. • Quarterly compliance monitoring of site by an • Environmental Control Officer.	• The impact should be avoided through the implementation the mitigation measures stipulated in this document. • Should spillage however occur the area needs to be cleaned in accordance with the standards of the NEM: WA, 2008.
	Weed and invader plant infestation of the area.	Control: implementation of weed control	To be implemented when necessary throughout the operational phase: • Daily compliance monitoring by site management.	• The impact should be avoided through the eradication of Category 1 weeds/invader plants in terms of CARA, 1993 as well as the implementation of the mitigation

Activity	Potential impact	Mitigation type	Time period for implementation	Compliance with standards
			• Quarterly compliance monitoring of site by an • Environmental Control Officer.	measures in this document.
Crushing	Dust nuisance due to the crushing activities	Control: Dust suppression	To be implemented daily throughout the operational phase: • Daily compliance monitoring by site management. • Quarterly compliance monitoring of site by an • Environmental Control Officer.	• Fallout dust levels has to comply with the acceptable dust fall rate published for non-residential areas in the National Dust Control Regulations 2013 – 600 < Dust Fall < 1 200 mg/m²/day. • Gravimetric dust levels have to comply with the standard published in the NIOSH guidelines – Particulates >1/10th of the occupational exposure limit. • NEM: AQA, 2004 Regulation 6(1).
	Noise nuisance generated by the crushing activities.	Control: Noise control measures	To be implemented daily throughout the operational phase: • Daily compliance monitoring by site management. • Quarterly compliance monitoring of site by an • Environmental Control Officer.	• Noise levels on the site has to be managed and need to comply with the standards stipulated in NEM: AQA, 2004 Regulation 6(1) as well as the n*oise standards of SANS 10103:2008.* • Employees working in areas with noise levels of more than 82dBA need to be issue with hearing protection.

Activity	Potential impact	Mitigation type	Time period for implementation	Compliance with standards
	Contamination of area with hydrocarbons or hazardous waste materials.	Control: Implementation of waste management	To be implemented daily throughout the operational phase: • Daily compliance monitoring by site management. • Quarterly compliance monitoring of site by an • Environmental Control Officer.	• The impact should be avoided through the implementation the mitigation measures stipulated in this document. • Should spillage however occur the area needs to be cleaned in accordance with the standards of the NEM: WA, 2008.
Stockpiling and transporting	Visual intrusion associated with the stockpiled material and vehicles transporting the material.	Control: Implementation of proper housekeeping	To be implemented daily throughout the operational phase: • Daily compliance monitoring by site management. • Quarterly compliance monitoring of site by an • Environmental Control Officer.	• Impact on the surrounding environment mitigated until rehabilitation standards can be implemented.
	Loss of material due to ineffective storm water handling.	Control: Storm water control measures	• To be implemented daily throughout the operational phase: • Daily compliance monitoring by site management. • Quarterly compliance monitoring of site by an Environmental Control Officer.	• The impact should be avoided through the implementation of storm water management
	Weed and invader plant infestation of the	Control and remedy: Implementation of weed control	To be implemented when necessary throughout the operational phase:	• The impact should be avoided through the eradication of Category 1 weeds/invader plants in

Activity	Potential impact	Mitigation type	Time period for implementation	Compliance with standards
	area due to the disturbance of the soil		• Daily compliance monitoring by site management. • Quarterly compliance monitoring of site by an • Environmental Control Officer.	terms of CARA, 1993 as well as the implementation of the mitigation measures in this document.
	Dust nuisance from stockpiled material and vehicles transporting the material.	Control: Dust suppression	To be implemented daily throughout the operational phase: • Daily compliance monitoring by site management. • Quarterly compliance monitoring of site by an • Environmental Control Officer.	• Fallout dust levels has to comply with the acceptable dust fall rate published for non-residential areas in the National Dust Control Regulations 2013 – 600 < Dust Fall < 1 200 $mg/m^2/day$. • Gravimetric dust levels have to comply with the standard published in the NIOSH guidelines – Particulates >1/10th of the occupational exposure limit. • NEM: AQA, 2004 Regulation 6(1).
	Degradation of access roads	Control and remedy: Road management	To be implemented when necessary throughout the operational phase: • Daily compliance monitoring by site management. • Quarterly compliance monitoring of site by an Environmental Control Officer.	• The impact should be avoided through the implementation of the mitigation measures proposed in this document.

Activity	Potential impact	Mitigation type	Time period for implementation	Compliance with standards
	Noise nuisance caused by vehicles.	Control: Noise management monitoring and management	To be implemented daily throughout the operational phase: • Daily compliance monitoring by site management. • Quarterly compliance monitoring of site by an • Environmental Control Officer.	• Noise levels on the site has to be managed and need to comply with the standards stipulated in NEM: AQA, 2004 Regulation 6(1) as well as the n*oise standards of SANS 10103:2008.* • Employees working in areas with noise levels of more than 82dBA need to be issue with hearing protection.
	Contamination of area with hydrocarbons or hazardous waste materials.	Control: Implementation of waste management	To be implemented daily throughout the operational phase: • Daily compliance monitoring by site management. • Quarterly compliance monitoring of site by an • Environmental Control Officer.	• The impact should be avoided through the implementation the mitigation measures stipulated in this document. • Should spillage however occur the area needs to be cleaned in accordance with the standards of the NEMWA, 2008.
Sloping and landscaping during rehabilitation	Soil erosion	Control: Soil management	To be implemented throughout the rehabilitation / closure phase: • Daily compliance monitoring by site management. • Compliance monitoring of site by an Environmental Control Officer.	• The impact should be avoided through the implementation the mitigation measures stipulated in this document. • CARA, 1993

Activity	Potential impact	Mitigation type	Time period for implementation	Compliance with standards
	Health and safety risk posed by un-sloped areas	Control: Health and safety monitoring and management.	To be implemented throughout the rehabilitation / closure phase: • Daily compliance monitoring by site management. • Compliance monitoring of site by an Environmental Control Officer.	• The impact should be avoided through compliance with the standards of the MHSA, 1996, OHSA, 1993 and OHSAS 18001
	Dust nuisance caused during sloping and landscaping activities.	Control: Dust suppression	To be implemented throughout the rehabilitation / closure phase: • Daily compliance monitoring by site management. • Compliance monitoring of site by an Environmental Control Officer.	• Fallout dust levels has to comply with the acceptable dust fall rate published for non-residential areas in the National Dust Control Regulations 2013 – 600 < Dust Fall < 1 200 mg/m²/day. • Gravimetric dust levels have to comply with the standard published in the NIOSH guidelines – Particulates >1/10th of the occupational exposure limit. • NEM: AQA, 2004 Regulation 6(1).
	Noise nuisance caused by machinery.	Control: Noise monitoring	To be implemented throughout the rehabilitation / closure phase: • Daily compliance monitoring by site management. • Compliance monitoring of site by an Environmental Control Officer.	• Noise levels on the site has to be managed and need to comply with the standards stipulated in NEM: AQA, 2004 Regulation 6(1) as well as the n*oise standards of SANS 10103:2008.* • Employees working in areas with noise levels of more than 82dBA

Activity	Potential impact	Mitigation type	Time period for implementation	Compliance with standards
				need to be issue with hearing protection.
	Contamination of area with hydrocarbons or hazardous waste materials.	Controls: Waste management	To be implemented throughout the rehabilitation / closure phase: • Daily compliance monitoring by site management. • Compliance monitoring of site by an Environmental Control Officer.	• The impact must be avoided through implementation of mitigation measures stipulated in this document. • Should spillage however occur the area needs to be cleaned in accordance with the standards of the NEMWA, 2008.
Replacing of topsoil and rehabilitation of disturbed area	Loss of reinstated topsoil due to the absence of vegetation	Control: Soil management	To be implemented throughout the rehabilitation / closure phase: • Daily compliance monitoring by site management. • Compliance monitoring of site by an Environmental Control Officer.	• The impact should be avoided through the implementation the mitigation measures stipulated in this document. • CARA, 1993
	Infestation of the area by weed and invader plants.	Control and remedy: Implementation of weed control	To be implemented throughout the rehabilitation / closure phase: • Daily compliance monitoring by site management. • Compliance monitoring of site by an Environmental Control Officer.	• The impact should be avoided through the eradication of Category 1 weeds/invader plants in terms of CARA, 1993 as well as the implementation of the mitigation measures in this document.

7 Determination of the amount of financial provision

7.1 Closure objectives and the extent to which they have been aligned to the baseline environment described under the Regulation

Once mining activities cease, the area will be fully rehabilitated. The perimeter walls of the opencast pit will either be sloped at 1:3 to the pit floor to prevent soil erosion or be stepped by creating benches of not more than 3 m high. Compacted soil will be ripped and levelled in order to re-establish a growth medium. Stockpiles will be removed during the decommissioning phase, the stockpile area ripped and available topsoil that was removed will be spread over worked areas to enhance the establishment of vegetation. All waste materials will be removed from the site and dumped at recognised landfill sites. The applicant will comply with the minimum closure objectives as prescribed by DMRE.

7.2 Confirm specifically that the environmental objectives in relation to closure have been consulted with landowner and I&APs

This report, the Basic Assessment Report, includes all the environmental objectives in relation to closure and is available for perusal by I&AP's and stakeholders. Any additional comments received during the commenting period will be added to the Final Basic Assessment Report to be submitted to DMRE for approval.

7.3 Provide a rehabilitation plan that describes and shows the scale and aerial extent of the main mining activities, including the anticipated mining area at the time of closure

The requested rehabilitation plan is attached as Upon closure of the mine, all infrastructures will be removed. The compacted areas will be ripped and levelled upon which the topsoil will be replaced. The sides of the pit will be sloped to ensure safety and prevent erosion. No permanent structures will remain upon closure of the site.

7.4 Explain why it can be confirmed that the rehabilitation plan is compatible with the closure objectives

The decommissioning phase will entail the rehabilitation of the mining site. Upon cessation of the mining activities, the area will be fully rehabilitated. The perimeter walls of the opencast pit will be sloped at 1:3 to the pit floor to prevent soil erosion or stepped by creating benches of not more than 3 m. The rehabilitation of the coal pit as indicated on the rehabilitation plan attached as will comply with the minimum closure objectives as prescribed by DMR and detailed in the following, and therefore is deemed to be compatible.

7.4.1 Rehabilitation of the excavated area

- Rocks and coarse material removed from the excavation must be dumped into the excavation.
- No waste will be permitted to be deposited in the excavations.
- Once overburden, rocks and coarse natural materials has been added to the excavation and was profiled with acceptable contours and erosion control measures, the topsoil previously stored will be returned to its original depth over the area.
- The area will be fertilised if necessary, to allow vegetation to establish rapidly. The site will be seeded with a local or adapted indigenous seed mix in order to propagate the locally or regionally occurring flora, should natural vegetation not re-establish within 6 months from site closure.
- If a reasonable assessment indicates that the re-establishment of vegetation is unacceptably slow, the Regional Manager may require that the soil be analysed and any deleterious effects on the soil arising from the mining operation be corrected and the area be seeded with a vegetation seed mix to their specification.

7.4.2 Rehabilitation of plant area

- The compacted areas will be ripped, and the topsoil returned over the area.
- Coarse natural material used for the construction of ramps will be removed and dumped into the excavations.
- Stockpiles will be removed during the decommissioning phase, the area ripped, and the topsoil returned to its original depth to provide a growth medium.
- On completion of operations, all structures or objects will be dealt with in accordance with Section 44 of the MPRDA, 2002 (Act 28 of 2002):
    - Where sites have been rendered devoid of vegetation/grass or soils have been compacted owing to traffic, the surface will be scarified or ripped.
    - The site will be seeded with a vegetation seed mix adapted to reflect the local indigenous flora if natural vegetation does not re-establish within 6 months of the closure of the site.

- Photographs of the mining area and office sites, before and during the mining operation and after rehabilitation, will be taken at selected fixed points and kept on record for the information of the Regional Manager.
- On completion of mining operations, the surface of these areas, if compacted due to hauling and dumping operations, will be scarified to a depth of at least 300 mm and graded to an even surface condition and the previously stored topsoil will be returned to its original depth over the area.
- Prior to replacing the topsoil, the overburden material that was removed from these areas will be replaced in the same order as it originally occurred.
- The area shall then be fertilised if necessary, to allow vegetation to establish rapidly. The site will be seeded with a local, adapted indigenous seed mix if natural vegetation does not re-establish within 6 months after site closure.
- If a reasonable assessment indicates that the re-establishment of vegetation is unacceptably slow, the Regional Manager may require that the soil be analysed and any deleterious effects on the soil arising from the mining operation be corrected and the area be seeded with a seed mix to their specification.

7.4.3 Final rehabilitation

- Rehabilitation of the surface area will entail landscaping, levelling, top dressing, land preparation, seeding (if required), maintenance, and weed/ alien clearing.
- All infrastructures, equipment, plant, temporary housing and other items used during the mining period will be removed from the site (section 44 of the MPRDA).
- Waste material of any description, including receptacles, scrap, rubble and tyres, will be removed entirely from the mining area and disposed of at a recognised landfill facility. It will not be permitted to be buried/burned on site.
- Weed/alien clearing will be done in a sporadic manner during the life of the mining activities.
- Species considered Category 1 weeds as per CARA, 1983 – Act 43, Regulations 15 & 16 (as amended in March 2001) must be eradicated from site.
- Final rehabilitation will be completed within a period specified by the Regional Manager.

7.5 Calculate and state the quantum of the financial provision required to manage and rehabilitate the environment in accordance with the applicable guideline

The calculation of the quantum for financial provision was according to Section B of the working manual.

7.5.1 Mine type and saleable mineral by-product

Mine type	Coal
Saleable mineral by-product	None

7.5.2 Risk ranking

Primary risk ranking (either Table B.12 or B.13)	C (Low risk)
Revised risk ranking (B.14)	N/A

7.5.3 Environmental sensitivity of the mine area

Environmental sensitivity of the mine area	Low

7.5.4 Level of information

Level of information available	Limited

7.5.5 Identify closure components

Component nr	**Main description**	**Applicability of closure components**	
1	Dismantling of processing plant and related structures (including overland conveyors and power lines)		No
2 (A)	Demolition of steel buildings and structures		No
2 (B)	Demolition of reinforced concrete buildings and structures		No
3	Rehabilitation of access roads		No
4 (A)	Demolition and rehabilitation of electrified railway lines		No
4 (B)	Demolition and rehabilitation of non-electrified railway lines		No
5	Demolition of housing and facilities		No
6	Opencast rehabilitation including final voids and ramps	Yes	
7	Sealing of shafts, adits and inclines		No
8 (A)	Rehabilitation of overburden and spoils	Yes	
8 (B)	Rehabilitation of processing waste deposits and evaporation ponds (basic, salt-producing)		No
8 (C)	Rehabilitation of processing waste deposits and evaporation ponds (acidic, metal-rich)		No
9	Rehabilitation of subsided areas		No
10	General surface rehabilitation, including grassing of all denuded areas	Yes	
11	River diversions		No
12	Fencing		No

13	Water management (Separating clean and dirty water, managing polluted water and managing the impact on groundwater)		No
14	2 to 3 years of maintenance and aftercare		No

7.5.6 Calculation of closure costs

"Rules-based" assessment of the quantum for financial provision.

CALCULATION OF THE QUANTUM

MP 30/5/1/3/3/2 11712 MP

Applicant: **SOTHABA CAPITAL (PTY) LTD** Ref No.:

Evaluator: Takalani Rakuambo Date: Oct-20

No.	Description	Unit	A Quantity	B Master Rate	C Multiplication factor	D Weighting factor 1	E=A*B*C*D Amount (Rands)
1	Dismantling of processing plant and related structures (including overland conveyors and powerlines)	m3	0	16	1	1	0
2 (A)	Demolition of steel buildings and structures	m2	0	228	1	1	0
2(B)	Demolition of reinforced concrete buildings and struct	m2	0	336	1	1	0
3	Rehabilitation of access roads	m2	500	41	0,3	1	6150
4 (A)	Demolition and rehabilitation of electrified railway lines	m	0	395	1	1	0
4 (A)	Demolition and rehabilitation of non-electrified railway lines	m	0	216	1	1	0
5	Demolition of housing and/or administration facilities	m2	0	455	1	1	0
6	Opencast rehabilitation including final voids and ramps	ha	4,99	238697	0,2	1	238219,606
7	Sealing of shafts adits and inclines	m3	0	122	1	1	0
8 (A)	Rehabilitation of overburden and spoils	ha	0,07	159131	1	1	11139,17
8 (B)	Rehabilitation of processing waste deposits and evaporation ponds (non-polluting potential)	ha	0	198195	1	1	0
8 (C)	Rehabilitation of processing waste deposits and evaporation ponds (polluting potential)	ha	0,05	5575653	1	1	278782,65
9	Rehabilitation of subsided areas	ha	0	133249	1	1	0
10	General surface rehabilitation	ha	5	126059	1	1	630295
11	River diversions	ha	0	126059	1	1	0
12	Fencing	m	0	144	1	1	0
13	Water management	ha	0,03	47931	1	1	1437,93
14	2 to 3 years of maintenance and aftercare	ha	5	16776	1	1	83880
15 (A)	Specialist study	Sum	0	0	1	1	0
15 (B)	Specialist study	Sum	0	0	1	1	0
					Sub Total 1		1249904,356

1	Preliminary and General	149988,5227	weighting factor 2 1	149988,5227
2	Contingencies	124990,4356		124990,4356
			Subtotal 2	1524883,31
			VAT (15%)	37371,45
			Grand Total	1562255

SIGN Takalani Rakuambo

DATE 2020/10/12

The amount that will be necessary for the rehabilitation of damages caused by the operation, both sudden closures during the normal operation of the project and at final, planned closure gives a sum total of **R1, 562, 255**.

7.6 Confirm that the financial provision will be provided as determined

The financial provision will be provided as determined. Mechanisms for monitoring compliance with a performance assessment against the EMP and reporting.

7.7 Mechanisms for compliance monitoring against EMP

Mechanisms for monitoring compliance with and performance assessment against the environmental management programme and reporting thereon, including:

a) Monitoring of Impact Management Actions
b) Monitoring and reporting frequency
c) Responsible persons
d) Time period for implementing impact management actions
e) Mechanisms for monitoring compliance

Source activity	Impacts required monitoring programme	Functional requirements for monitoring	Roles and responsibilities for the execution of monitoring programmes	Monitoring and reporting frequency and time periods for implementing impact management actions
• Topsoil stripping and stockpiling • Blasting • Excavation • Crushing • Stockpiling and transporting • Sloping and landscaping during rehabilitation	**Dust monitoring** • The dust generated by the mining activities should be continuously monitored and addressed by the implementation of dust suppression methods.	**Dust handling and monitoring** • Dust suppression equipment, like a water car and water dispenser. The applicant already has this equipment available.	**Role** • Site Manager to ensure compliance with EMPr guidelines. • Compliance to be monitored by the Environmental Control Officer. **Responsibility** • Control dust liberation into surrounding environment by using, e.g., water spraying and/or other dust-allaying agents. • Limit speed on access roads to 40km/h to prevent excess dust generation. • Spray roads with water/environmentally-friendly dust allaying agent that contains no PCBs (e.g. DAS products) if dust is generated above acceptable limits. • Assess effectiveness of dust suppression equipment. • Re-vegetate all disturbed/exposed areas as soon as	Throughout construction, operational and decommissioning phase • Daily compliance monitoring by site management. • Quarterly compliance monitoring of site by an Environmental Control Officer.

Source activity	Impacts required monitoring programme	Functional requirements for monitoring	Roles and responsibilities for the execution of monitoring programmes	Monitoring and reporting frequency and time periods for implementing impact management actions
			possible to prevent any dust source from being created. • Ensure the crusher is equipped with water sprayers.	
• Topsoil stripping and stockpiling • Blasting • Excavation • Crushing • Sloping and landscaping during rehabilitation	**Noise monitoring** • The noise generated by the mining activities should be continuously monitored, and any excessive noise should be addressed.	**Noise handling and monitoring** • Site manager to ensure that the vehicles are equipped with silencers and kept roadworthy. • Compliance with the appropriate legislation with respect to noise will be mandatory.	**Role** • Site Manager to ensure compliance with EMPr guidelines. • Compliance to be monitored by the Environmental Control Officer. **Responsibility** • Ensure that staff conduct themselves in an acceptable manner while on site. • No loud music permitted at mining area. • Ensure that all mining vehicles are equipped with silencers and kept roadworthy in terms of the Road Transport Act. • Plan the type, duration and timing of the blasting procedures with due cognizance of other land users and structures in the vicinity. • Notify surrounding land owners in writing prior blasting occasions. • Use noise mufflers and/or soft explosives during blasting.	Throughout construction, operational and decommissioning phase • Daily compliance monitoring by site management. • Quarterly compliance monitoring of site by an Environmental Control Officer.
• Topsoil stripping and stockpiling • Excavation Stockpiling and transporting	**Management of weed or invader plants** • The presence of weed and/or invader plants should be continuously	**Management of weed or invader plants** • Removal of weeds should be manually or by the use of an	**Role** • Site Manager to ensure compliance with EMPr guidelines. • Compliance to be monitored by the Environmental Control Officer. **Responsibility** • Implement a weed and invader plant control	Throughout operational and decommissioning phase • Daily compliance monitoring by site management. • Quarterly compliance

Source activity	Impacts required monitoring programme	Functional requirements for monitoring	Roles and responsibilities for the execution of monitoring programmes	Monitoring and reporting frequency and time periods for implementing impact management actions
	monitored, and any unwanted plants should be removed.	approved herbicide	management plan. • Control declared invader or exotic species on the rehabilitated areas. • Keep the temporary topsoil stockpiles free of weeds.	monitoring of site by an Environmental Control Officer.
• Stockpiling and transporting • Sloping and Landscaping during rehabilitation	**Surface and storm water monitoring** • The effectiveness of the storm water infrastructure needs to be continuously monitored.	**Surface and storm water handling** • Trenches and contours to be made to direct storm- and runoff water around the stockpile areas.	**Role** • Site Manager to ensure compliance with EMPr guidelines. Compliance to be monitored by the Environmental Control Officer. **Responsibility** • Divert storm water around topsoil heaps, stockpile areas and access roads to prevent erosion and material loss. • Divert runoff water around the stockpile areas with trenches and contour structures to prevent erosion of the work areas. • Conduct mining in accordance with the Best Practice Guideline for small scale mining that relates to storm water management, erosion and sediment control and waste management, developed by the DWS, and any other conditions the DWS may impose.	
• Blasting • Excavation • Sloping and Landscaping during	**Management of health and safety** • All health and safety aspects need to be monitored on a daily	**Management of health and safety risks** • Site manager to ensure that workers	**Role** • Site Manager to ensure compliance with EMPr guidelines. • Compliance to be monitored by the Environmental Control Officer. **Responsibility**	Throughout construction, operational and decommissioning phase • Daily compliance monitoring by site

Source activity	Impacts required monitoring programme	Functional requirements for monitoring	Roles and responsibilities for the execution of monitoring programmes	Monitoring and reporting frequency and time periods for implementing impact management actions
rehabilitation	basis.	are equipped with required PPE while operating on site. • The necessary warning signs must be present at the site to inform the public and workers of mining activities.	• Submit an application for approval of access onto the R555 to the Department of Roads and Public Works prior to the commencement of work. • Inform the Traffic Department of each blast. If necessary, arrange for temporary road closure during a blast. • Plan the type, duration and timing of the blasting procedures with due cognizance of other land users and structures in the vicinity. • Inform the surrounding landowners and communities of any blasting event. • Use noise mufflers and/or soft explosives during blasting. • Limit fly rock. • Give audible warning of a pending blast at least 3 minutes before the blast. • Remove all fly rock (diameter 150mm and larger) which falls beyond working area, together with the rock spill. • Ensure that workers have access to the correct PPE as required by law.	management. • Quarterly compliance monitoring of site by an Environmental Control Officer

Source activity	Impacts required monitoring programme	Functional requirements for monitoring	Roles and responsibilities for the execution of monitoring programmes	Monitoring and reporting frequency and time periods for implementing impact management actions
• Excavation • Crushing stockpiling and transporting • Sloping and landscaping during rehabilitation	**Waste management** • Management of waste should be a daily monitoring activity. • Hydrocarbon spills need to be cleaned immediately and the site manager should check compliance daily.	**Waste management** • Closed containers for the storage of general/hazardous waste until waste is removed to the appropriate landfill site. • Hydrocarbon spill kits to enable sufficient clean-up of contaminated areas. • Drip trays should be available to place underneath haul vehicles while the vehicles are parked at night. • Should a vehicle have a break down, it should be serviced immediately.	**Role** • Site Manager to ensure compliance with EMPr guidelines. Compliance to be monitored by the Environmental Control Officer. **Responsibility** • Ensure that vehicle repairs only take place in the service bay area and all waste products are disposed of in a 200 l closed container/bin inside the emergency service area. • Collect any effluents containing oil, grease or other industrial substances in a suitable receptacle and remove from site, for resale or appropriate disposal at a recognised facility. • Clean spills immediately to the satisfaction of the Regional Manager by removing the spillage and polluted soil and by disposing of them at a recognised facility. • Ensure availability of suitable covered, conveniently placed receptacles at all times for waste disposal. • Place all used oils, grease or hydraulic fluids therein and remove receptacles from site regularly for disposal at a registered/licensed hazardous disposal facility. • Store non-biodegradable refuse such as glass bottles, plastic bags, metal scrap, etc., in a container with a closable lid at a collecting point. Collection should take place regularly and disposed of at the recognised landfill	Throughout construction, operational and decommissioning phase • Daily compliance monitoring by site management. • Quarterly compliance monitoring of site by an • Environmental Control Officer.

Source activity	Impacts required monitoring programme	Functional requirements for monitoring	Roles and responsibilities for the execution of monitoring programmes	Monitoring and reporting frequency and time periods for implementing impact management actions
			site at Witbank. Prevent refuse from being dumped on or in the vicinity of the mine area. • Biodegradable refuse to be handled as indicated above.	

Source activity	Impacts required monitoring programme	Functional requirements for monitoring	Roles and responsibilities for the execution of monitoring programmes	Monitoring and reporting frequency and time periods for implementing impact management actions
Stockpiling and transporting	**Management of access roads** • Access road conditions must be continuously monitored. • Vehicles carrying materials has to be equipped with adequate tarpaulin type covers to ensure that material being transported will not leave the vehicle during transportation.	**Management of access roads** • Dust suppression equipment such as a water car and dispenser. • Trenches and contours to be made to direct storm- and runoff water around the access roads.	**Role** • Site Manager to ensure compliance with EMPr guidelines. • Compliance to be monitored by the Environmental Control Officer. **Responsibility** • Maintain newly constructed access roads (if applicable) to minimise dust, erosion or undue surface damage. • Divert storm water around access roads to prevent erosion. • Erosion of access road: Restrict vehicular movement to existing access routes to prevent crisscrossing of tracks through undisturbed areas. • Cover vehicles carrying materials with adequate tarpaulin type covers to ensure that material being transported does leave the vehicle during transportation. • Ensure vehicles entering and using the public road system from the site does not exceed the permissible legal limits on gross vehicle mass and individual axle loads as prescribed in terms of the National Road Traffic Act (Act No 93 of 1996).	Throughout construction, operational and decommissioning phase • Daily compliance monitoring by site management. • Quarterly compliance monitoring of site by an • Environmental Control Officer.
Topsoil stripping and stockpiling	**Topsoil handling** • When topsoil has been removed from any area the topsoil	**Topsoil handling** • Excavating equipment to remove the first	**Role** • Site Manager to ensure compliance with EMPr guidelines. • Compliance to be monitored by the Environmental Control Officer.	Throughout construction, operational and decommissioning phase • Daily compliance

Source activity	Impacts required monitoring programme	Functional requirements for monitoring	Roles and responsibilities for the execution of monitoring programmes	Monitoring and reporting frequency and time periods for implementing impact management actions
	heaps need to be continuously protected against loss of soil due to wind and water erosion.	300mm of topsoil from the proposed work areas. The applicant already has this equipment available. • Trenches and contours to be made to direct storm and runoff water around stockpiled topsoil area.	**Responsibility** • Remove the first 300mm of topsoil in strips and store at the stockpile area. • Keep the temporary topsoil stockpiles free of weeds. • Place topsoil stockpiles on a levelled area and implement measures to safeguard the piles from being washed away in the event of heavy rains/storm water. • Topsoil heaps should not exceed 2 m in order to preserve micro-organisms within the topsoil, which can be lost due to compaction and lack of oxygen. • Divert storm- and runoff water around the stockpile area and access roads to prevent erosion.	monitoring by site management. • Quarterly compliance monitoring of site by an • Environmental Control Officer.

7.8 Indicate frequency of the submission of the performance assessment/ environmental audit report

The committed time frames for monitoring and reporting are stipulated in the following:

Monitoring aspect	Time frames	Reporting
Dust handling	Throughout construction, operational and decommissioning phase	• Daily compliance monitoring by site management • Quarterly compliance monitoring of site by an Environmental Control Officer
Noise handling		
Management of weed/invader plants	Throughout operational and decommissioning phase	
Surface and storm water handling		
Management of health and safety risks	Throughout construction, operational and decommissioning phase	
Waste management		
Management of access roads		
Topsoil handling		

It is proposed that the performance assessment/environmental audit report be quarterly submitted to DMRE.

7.9 Environmental Awareness Plan

7.9.1 Manner in which the applicant intends to inform employees of any environmental risk which may result from their work

Training, as detailed below, will address the specific measures and actions required for specific emergency events. In this way, each employee will be provided the knowledge required for their job to, firstly, prevent impact and secondly identify if an impact is likely to occur and then to report the possibility of risk or impact immediately so as to ensure immediate response. The most likely potential environmental emergencies in this proposed mining operation are fires and explosion, chemical spills/leaks, and flooding. In the case of environmental emergencies, the remedial measures and actions as listed in the Emergency Response Plan should be followed, in addition the following relevant authorities should be contacted:

Dept. of Water Affairs

Mr Masala Mulaudzi (Acting Chief Director: Mpumalanga)
Private Bag X11259
NELSPRUIT
1200
Tel: (013) 759 7300
Fax: (013) 759 7525
Cell: 082 327 5886

Prorom Building
c/o Brown & Paul Kruger Streets
NELSPRUIT
1200
MulaudziM@dws.gov.za

Dept. of Mineral Resources

Mpumalanga
Saveways Crescent Centre, Mandela Drive, Emalahleni, 1035
Private Bag X7279, EMALAHLENI, 1035(013) 653 0500 (013) 690 3288
Secretary
Ms L Maphopha
Lydia.Maphopha@dmr.gov.za

Delmas Fire Department

Van Der Walt St & Samuel Rd, Delmas, 2210
P.O. Box 6, Delmas, Mpumalanga, 2210

Contact number (s) (013) 665 3333 / (013) 665 2939
Fax (013) 665 2913

7.9.1.1 Fire and explosion control measures

Hazardous waste and dangerous substances can, by the verify definition, be flammable and reactive. As such, special precautionary measures must be taken when handling these substances. On the other hand, veld fires and fires resulting from other sources must be handled with extreme caution. In the event of a fire:

- Fire extinguishers must be placed around the mine at accessible locations and needs to be frequently inspected and maintained in working condition.
- An alarm must be activated to alert all employees and contractors.
- Identify the type of fire and the appropriate extinguishing material. E.g., water for a grass fire and mono ammonium phosphate-based fire extinguisher for chemical and electrical fires
- In the event of a small fire, the fire extinguishers placed around the mine should be used to contain and extinguish the fire.
- In the event of a large fire, the fire department will be notified.
- All staff will receive training in response to a fire emergency on site, including evacuation procedures.
- A Fire Association should be set up with the mine and surrounding landowners (especially

other mining permits and major collieries such as Woestalleen colliery in close proximity) to facilitate communication during fire events and assist in fighting fires, where necessary. If such an association exists, the mine will join it.

- If possible, surrounding drains, such as storm water drains must be covered and/or protected to prevent any contaminated water from entering the drains.
- In case of a chemical or petroleum fire, run-off from the area must be contained as far as possible using the most appropriate measures, e.g. spill absorbent cushions, sand or a physical barrier.
- Contaminated run-off must be diverted into an oil sump, or cleaned up.

Control measures include:

- Minimizing the storage of flammable liquids on site (e.g. fuel, flammable wastes)
- Using a nitrogen atmosphere for organic waste liquid with a low flashpoint stored in tanks
- Not allowing smoking anywhere on site
- Providing an emergency tipping area for waste loads identified to be on fire or otherwise deemed an immediate risk
- Preparing and annually reviewing a fire risk assessment
- Enduring all staff are appropriately trained for fire and explosion hazards

Other than explosion incidents related to mining, explosions can occur in the workshop areas when working with gas cylinders and chemicals. These could result in large numbers of employees being injured and requiring medical assistance.

The procedure to be followed includes:

- Devising safe evacuation routes in the event of an uncontrolled explosion and all staff trained on relevant evacuation routes and assembly points.
- Providing first aid to injured parties, once safe to do so for first responders.
- Notifying relevant emergency response units and hospitals of incoming patients.
- Notifying the DMRE of the incident.

7.9.1.2 Chemical spills

Hydrocarbons such as diesel, petrol, and oil used as fuel for mine machinery will be kept on site, meaning that spillage may occur. As this is a coal mine there is also the possibility of a coal spillage occurring. Any chemicals contained on site, such as those associated with explosives may also be detrimental to the environment if spills occur. In the event of a spillage, procedures must be put into place to ensure that there are minimal impacts to the surrounding environment.

The following procedure applies to a chemical spill:

- The incident must be reported to the SHE officer immediately.
- The SHE officer will assess the situation from the information provided and set up an investigation team. Included in this team could be the General Mine Manager, SHE Officer, the employee who reported the incident and an individual responsible for the incident.
- When investigating the incident, priority must be given to safety.
- Once the situation has been assessed, the Environmental Coordinator must report back to the Mine Manager.
- The General Mine Manager and the investigation team must make a decision on what measures can be taken to limit the damage caused by the incident, and if possible, any remediation measures that can be taken.
- In the event of a small spillage, the soil must be treated in situ, using Hazmat clean up kits and bioremediation.
- Every precaution must be taken to prevent the spill from entering the surface water environment.
- In the event of a large spillage, adequate emergency equipment for spill containment or collection, such as additional supplies of booms and absorbent materials, will be made available and if required, a specialised clean-up crew will be called in to decontaminate the area. The soil must be removed and treated at a special soil rehabilitation facility.
- Reasonable measures must be taken to stop the spread of spills and secure the area to limit access.

7.9.1.3 Flooding

There is always potential for flooding during the rainy season. This could result in a large volume of water accumulating in a water containment facility, which could cause major damage to equipment and endanger the lives of employees on site. Procedures must be put in place to ensure a quick response to flood events and minimal damage.

The procedure for flooding is as follows:

- During operations, DWS's flood warning system must be reviewed annually.
- The use of emergency pumps must occur if the water floods the pit.
- Mine management must be made aware of any such event so they can take appropriate action to ensure minimal production losses.
- The Pollution Control Dam should have a 0.8m freeboard and an overflow or outlet to

ensure that no damage occurs to the facilities.

- All contaminated water must be contained on site, as far as possible and discharges to the environment must only occur if absolutely necessary in an extreme flood event.

8 Manner in which risk will be dealt with to avoid pollution or environmental degradation

8.1 Training (educational needs)

The Safety, Health and Environment (SHE) Officer must ensure that:

- New employees attend environmental awareness programmes through inductions
- Mine management conducts bi-annual workshops
- Documented training and competency
- Training records be maintained
- Training includes proper management of waste streams, labelling, containers and emergency procedures outlined
- Hazardous waste handlers and their supervisors/managers must complete training or on-the-job instruction relevant to their duties to include hazardous waste management procedures and contingency plan implementation
- Training of all personnel must be completed before duties are assigned and training in terms of handling of hazardous waste must be repeated annually and as and when required

8.2 Outsourced specialist skills

A training department will be established on site during operations. All inductions and workshops will be hosted by this department. This department, in conjunction with the SHE Officer, is responsible for ensuring job-specific training for personnel performing tasks, which can cause significant environmental (e.g. receipt of bulk hazardous chemicals/fuel, hazardous materials handling, responding to emergency situations etc.). The General Mine Manager (GM) with the assistance of the SHE Officer must identify relevant personnel and training courses. Short courses such as First aid training, Level 1 and 2; Fire Fighting Level; safety representative training; etc. should be mandatory and sourced from the training providers,

8.3 Review and updating of training manual and course layout

Before implementing the emergency and response plans and other environmental standard operating procedure, the SHE Coordinator and GM/Supervisors will designate and train a sufficient number of persons to assist in the safe and orderly emergency evacuation of employees.

All training manual and courses must be reviewed with all employees at the following times:

- Initially when the plan is developed,
- Whenever the employee's responsibilities or designated action under the plan change, and whenever the plan or mining processes has changed.
- At least annually employee meetings are to be held to train employees of the contents of the EP&RP and revise the plan as appropriate.
- Drills will be conducted, and full participation encouraged.
- All training must be documented in writing and copies sent to GM.

Effectiveness of the environmental management training will be done by 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 shortcomings and non-compliancy will be highlighted, and management measures incorporated or improved upon within the training material.

8.4 Records

The mine will keep records such as waste, water, electricity usage etc. Record of incoming and outgoing waste must be kept, and these must include:

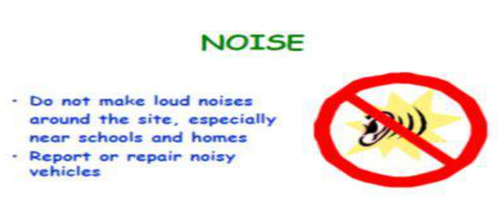
- Types and categories of incoming and outgoing waste
- Quantities of each waste type and category
- Transporter details
- Safe disposal certificate must always be returned and filed at waste disposal site
- Training records for all employees working on the hazardous waste facility
- All records must be computerised or legible paper trails and cross-referenced, waste tracking easily accessed
- Records must be kept in a database on site for 3 years or more

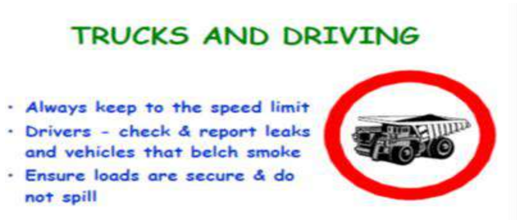
Records from the implementation of this EAP will be kept and controlled in accordance with the

SHE Management System Control of Records Procedure of the mine, which is required to be implemented so as to provide evidence of conformity and effective operation of the relevant requirements of the SHE management system.

8.5 Environmental awareness notice boards

The following basic environmental education material will be posted on a monthly basis on accessible notice boards on mine premises, one topic will be selected each month:





The operations manager must ensure that they understand the EMPr document, its requirements and commitments before any mining takes place. An Environmental Control Officer must ensure compliance of mining activities to the management programmes described in the EMPr. The following list represents the basic steps towards environmental awareness, which all participants in this project must consider whilst carrying out their tasks.

8.5.1 Site management

- Stay within site boundaries – do not enter adjacent properties
- Keep tools and material properly stored
- Smoke only in designated areas
- Use toilets provided – report full or leaking toilets

8.5.2 Water management and erosion

- Check that rainwater flows around work areas and is not contaminated
- Report any erosion
- Check that dirty water is kept from clean water
- Do not swim in or drink from streams

8.5.3 Waste management

- Take care of your own waste
- Keep waste separate into labelled containers – report full bins
- Place waste in containers and always close lid
- Don't burn waste
- Pick-up any litter laying around

8.5.4 Hazardous waste management (petrol, oil, diesel, grease)

- Never mix general waste with hazardous waste
- Use only sealed, non-leaking containers
- Keep all containers closed and store only in approved areas
- Always put drip trays under vehicles and machinery
- Empty drip trays after rain
- Stop leaks and spills, if safe
- Keep spilled liquids moving away
- Immediately report the spill to the site manager/supervision
- Locate spill kit/supplies and use to clean-up, if safe
- Place spill clean-up wastes in proper containers
- Label containers and move to approved storage area

8.5.5 Discoveries

- Stop work immediately
- Notify site manager/supervisor
- Includes archaeological finds, cultural artefacts, contaminated water, pipes, containers, tanks and drums, any buried structures

8.5.6 Air quality

- Wear protection when working in dusty areas
- Implement dust control measures:
  - Sweep paved roads
  - Water all roads and work areas
  - Minimise handling of material
  - Obey speed limit and cover trucks

8.5.7 Driving and noise

- Use only approved access roads
- Respect speed limits
- Only use turn-around areas – no crisscrossing through undisturbed areas

- Avoid unnecessary loud noises
- Report or repair noisy vehicles

8.5.8 Vegetation and animal life

- Do not remove any plants or trees without approval of the site manager
- Do not collect firewood
- Do not catch, kill, harm, sell or play with any animal, reptile, bird or amphibian on site
- Report any animal trapped in the work area
- Do not set snares or raid nests for eggs or young

8.5.9 Fire management

- Do not light any fires on site, unless contained in a drum at demarcated area
- Put cigarette butts in a rubbish bin
- Do not smoke near gas, paints or petrol
- Know the position of firefighting equipment
- Report all fires
- Don’t burn waste or vegetation

8.6 Specific information required by the Competent Authority

Among others, confirm that the financial provision will be reviewed annually.

The applicant undertakes to annually review and update the financial provision calculation, upon which it will be submitted to DMRE for review and approved as sufficient to cover the environmental liability at the time and for closure of the mine at that time.

9 Undertaking

The EAP herewith confirms

- the correctness of the information provided in the reports
- the inclusion of comments and inputs from stakeholders and I&APs
- the inclusion of inputs and recommendations from the specialist reports where relevant
- that the information provided by the EAP to I&APs and any response of the EAP to comments or inputs made by I&APs are correctly reflected herein

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Signature of the Environmental Assessment Practitioner

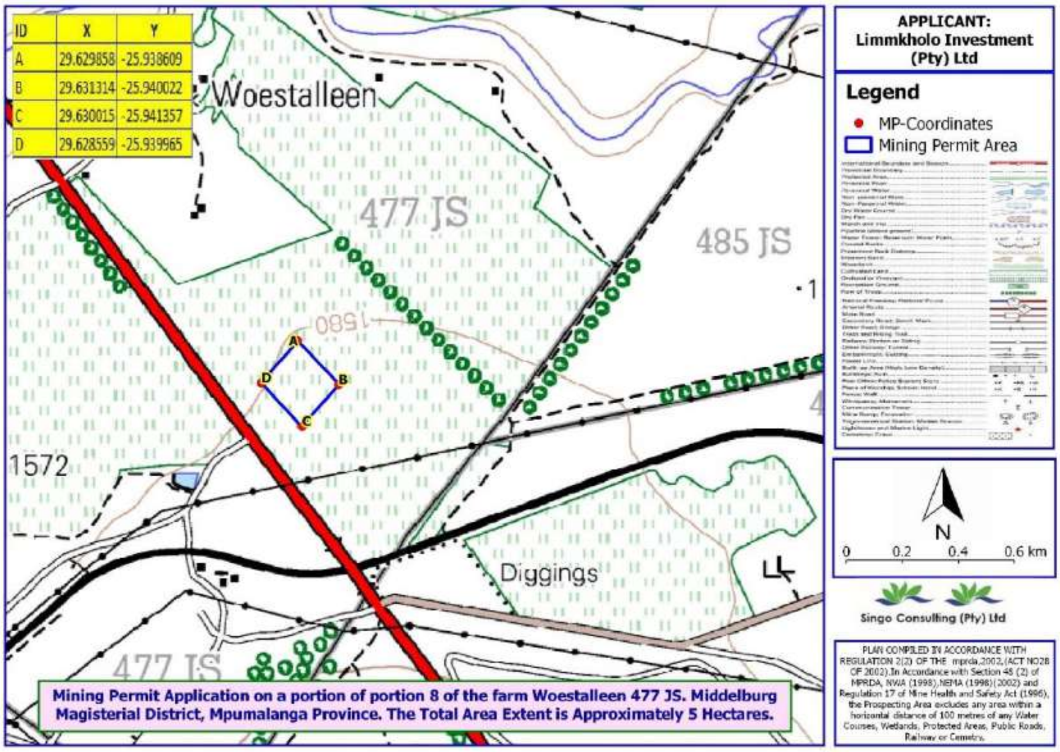
Singo Consulting (Pty) Limited

Name of company

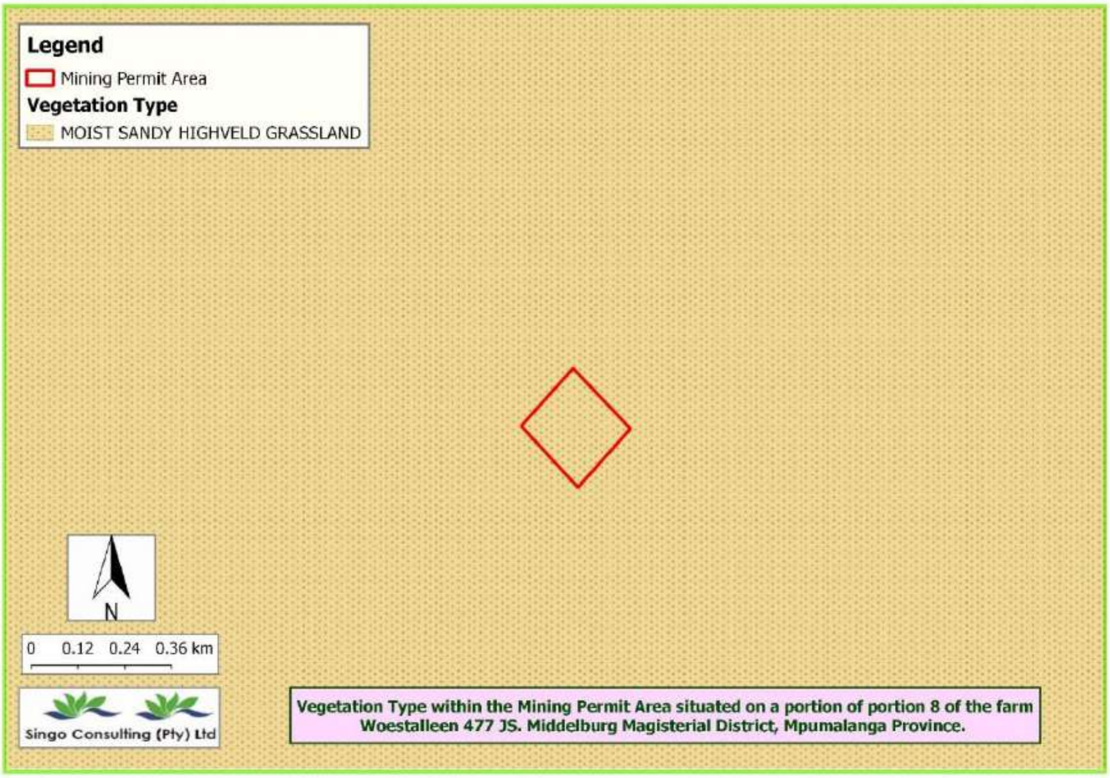
October 2020

Date

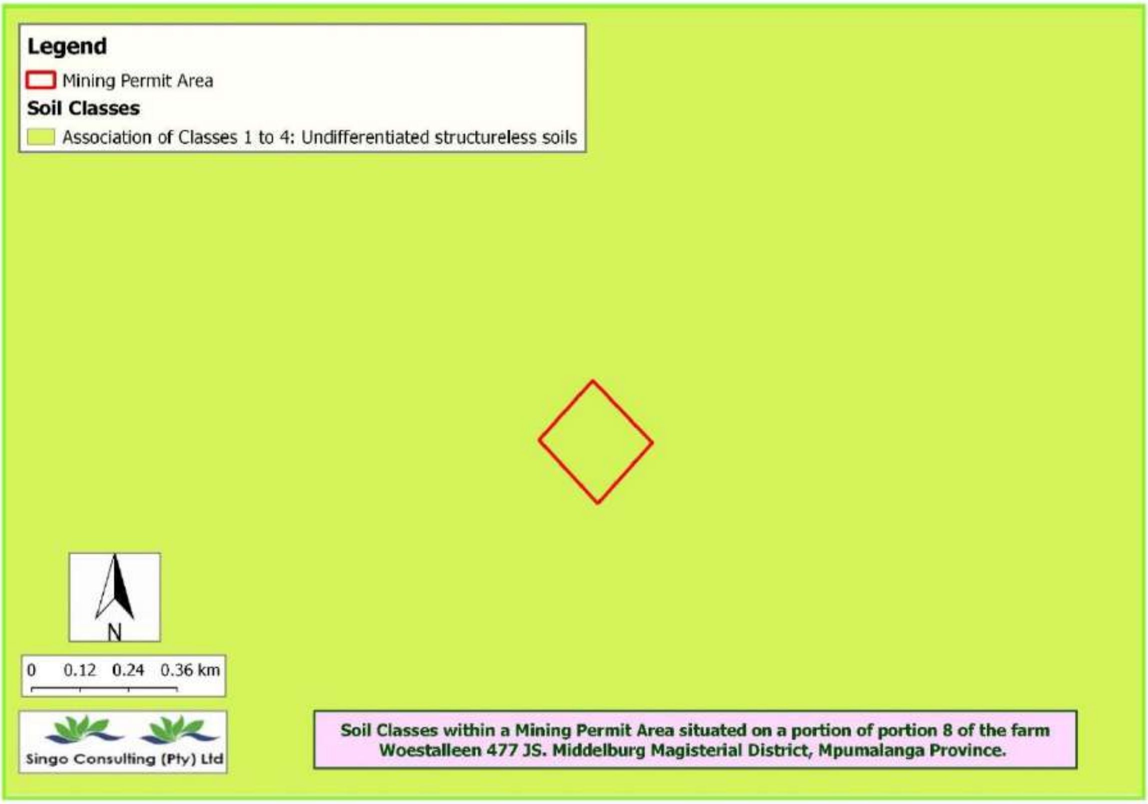
APPENDIX 1: PROJECT MAPS



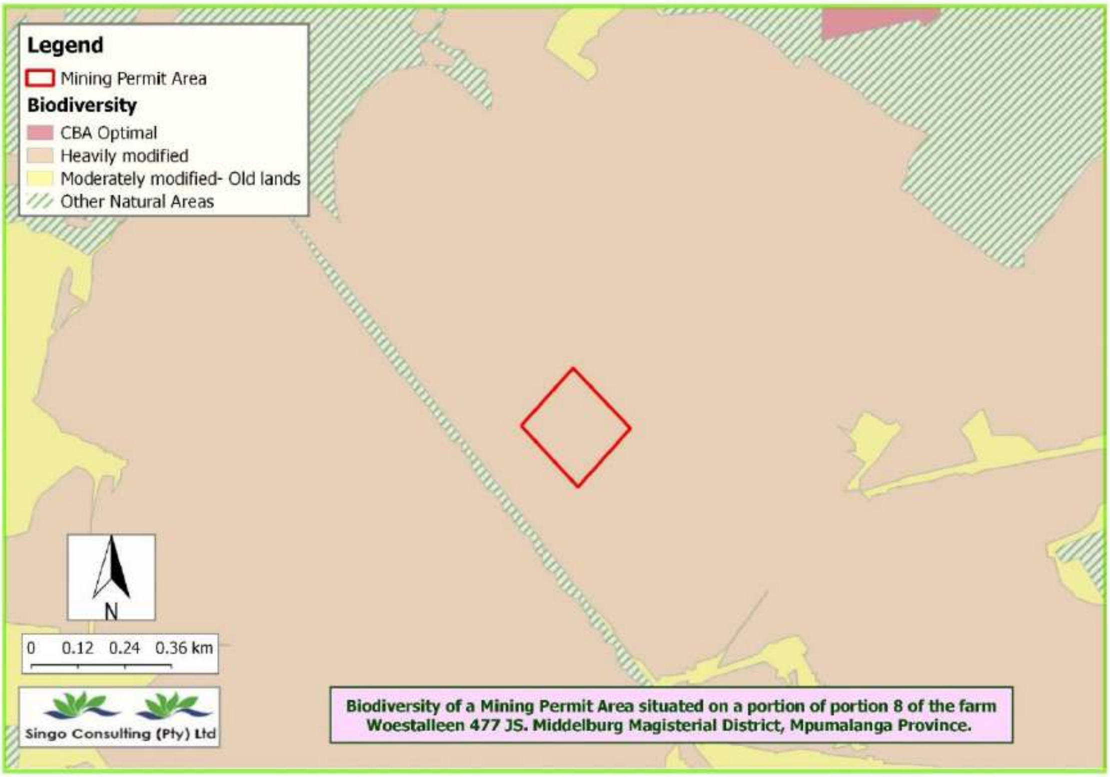
Regulation Map



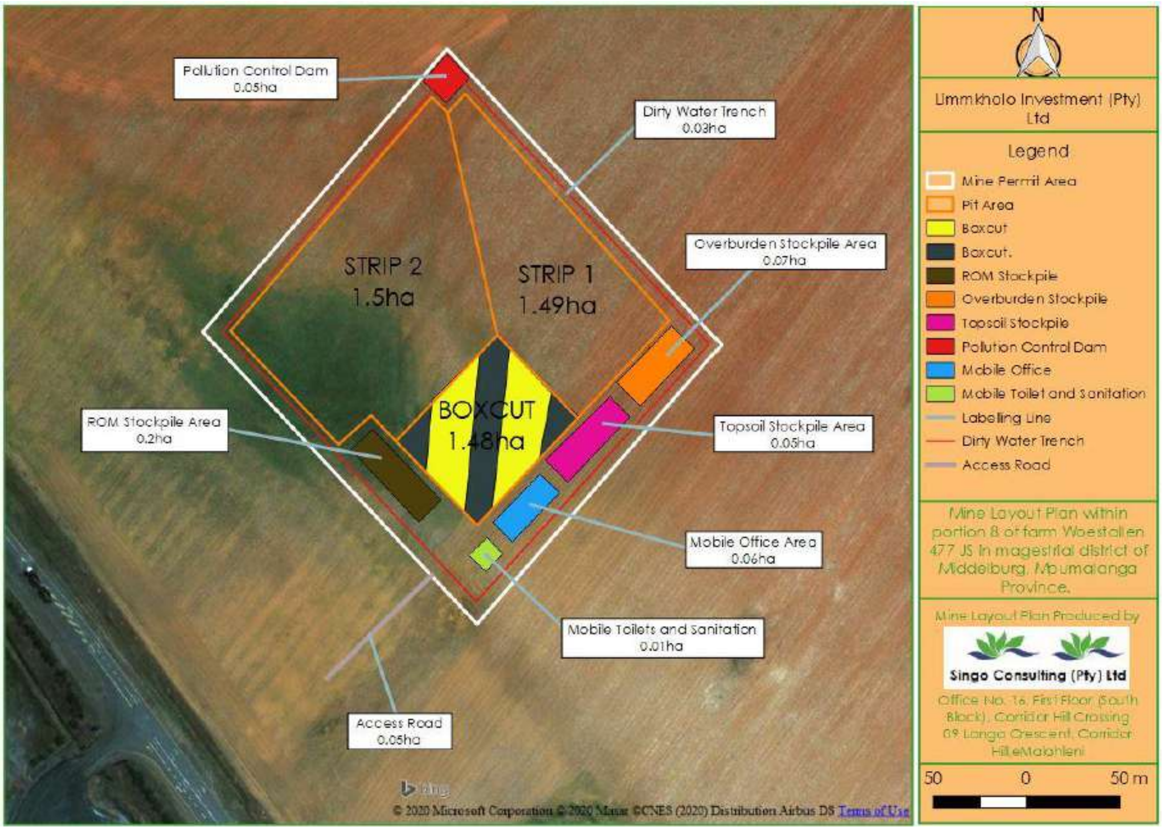
Vegetation Map



Soil Classes



Biodiversity Map


Pollution Control Dam
0.05ha
Dirty Water Trench
0.03ha
STRIP 2
1.5ha
STRIP 1
1.49ha
Overburden Stockpile Area
0.07ha
BOXCUT
1.48ha
ROM Stockpile Area
0.2ha
Topsoil Stockpile Area
0.05ha
Mobile Office Area
0.06ha
Mobile Toilets and Sanitation
0.01ha
Access Road
0.05ha
© 2020 Microsoft Corporation © 2020 Maxar ©CNES (2020) Distribution Airbus DS Terms of Use
N
Ummkholo Investment (Pty) Ltd
Legend
Mine Permit Area
Pit Area
Boxcut
Boxcut.
ROM Stockpile
Overburden Stockpile
Topsoil Stockpile
Pollution Control Dam
Mobile Office
Mobile Toilet and Sanitation
Labelling Line
Dirty Water Trench
Access Road
Mine Layout Plan within portion 8 of farm Woestallen 477 JS in magestrial district of Middelburg, Mpumalanga Province.
Mine Layout Plan Produced by
Singo Consulting (Pty) Ltd
Office No. 16, First Floor (South Block), Corridor Hill Crossing 09 Langa Crescent, Corridor Hill eMalahleni
50
0
50 m

Layout

APPENDIX 2: CONSULTATION BY TPR MINING RESOURCES (PTY) LTD

TPR MINING RESOURCES

No:137 Watermeyer Street
Klipfontein Ext
Emalahleni
Mobile: 079 244 2470
Fax: 086 599 3318
Email: info@tprmining-resources.co.za

Notice for Environmental Impact Assessment process for a prospecting right application

RE: Consultation with landowners/lawful occupier and Interested and affected parties (I&APs)

Sothaba Capital Pty Ltd have appointed TPR Mining Resources (Pty) Ltd to conduct Environmental Impact Assessment for the proposed open-cast Coal mining activities in terms of (NEMA) National Environmental Management Act (Act 107 of 1998) as amended read together with (MPRDA) Mineral and Petroleum Resource Development Act (Act 28 of 2002) on a portion of portion 8 of farm Woestalleen 477 IS within the magisterial district of Middleburg, Steve Tswete local municipality of Nkangala district, Mpumalanga province.

As part of the application the NEMA together with MPRDA regulations requires that the applicant notify and consult with landowners/lawful occupier and I&APs in order to get concerns and issues that will arise due to the proposed activity and address them with the parties concerned.

Mining activities will include Blasting, crushing, excavation, screening and washing of Coal ore. Take note that no mining activity will be conducted within 100m of any existing infrastructure, archaeological sites, railway lines and any other feature that is of importance to the affected party. This will be done in consultation with the landowner/Lawful occupier.

Acknowledgement of receipt

Name and Surname	D Hyman
Farm name and Portion	Woestalleen PTN 8
Address	
Contact details	D. Hyman
Email	desmond@sisgroup.co.za
Signature	

Issues relating to proposed mining operation

1. How do you feel about the proposed mining activities?

POORLY - IT MAKES ARABLE LAND AND FARMING NON SUSTAINABLE

2. What are your concerns regarding the mining activities?

NOISE, DUST, TRAFFIC, DISREGARD OF ROAD RULES

3. What impact do you think could occur as a result of the proposed mining activities?

ENVIRONMENTAL, H_2O POLUTION, AIR POLUTION EXTRA ROAD TRAFFIC ON ROADS THAT ARE UNDERDESIGNED FOR WEIGHT OF TRUCKS

4. Do you have any historically significant sites, such as graves, on your property? if so please specify

DON'T KNOW THERE ARE AT LEAST 2 GRAVE SITES ON THE FARM, THERE MAY BE UNMARKED GRAVES - need investigation

5. **Do you have any additional suggestions or comments that you would like to share with us?**

~~NOT~~ NOW THE POSITION OF YOUR
PERMIT WILL RENDER MY GROUND
UNWORKABLE AND UNECONOMICAL.

Signature :

Steve Tshwete
Local Municipality

PO Box 14 | Middelburg | 1050
Cnr Walter Sisulu Str & Wanderers Ave
Middelburg | Mpumalanga
T: +27 (0)13 249 7000 | F: +27 (0)13 243 2550
council@stlm.gov.za

Your reference: MP 30/5/1/1/3/2/11848MP

Our reference: A. Masia

Mr Thato Ramorwasi
TPR Mining Resources (Pty) Ltd
No. 137 Watermeyer Street
Emalahleni
1034

Comments: Proposed mining permit for coal on portion 8 of the farm Woestalleen 477 JS

The application for proposed mining on the above described portion of land is supported provided that the following conditions are met:

1. All legislations regarding mining operation must be adhered to at all times.
2. Applications for other environmental authorisations such as Integrated Water Use Licence Application (IWULA) should be submitted to the relevant Competent Authority.
3. Rehabilitation Plan, Waste Management Plan, Dust Management Plan and updated Environmental Management Programme must be submitted to the municipality prior to commencement of any activity.
4. All mitigation measures for all the impacts indicated in the different activities that will be taking place must be applied and adhered to at all times including that of dust handling, noise handling, top soil handling, waste management, management of weed and invader plants, access roads management as well as protection of flora and fauna.
5. Monitoring and reporting frequency of all aspects identified in page 105 (Table 8-2) must be adhered to at all times and quarterly monitoring reports must be provided to the municipality for monitoring purposes.

Yours faithfully

B KHENISA
MUNICIPAL MANAGER
29 April 2019

Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

MPUMALANGA

Private Bag X 11259, MBOMBELA, 1200 Prorom Building, Cnr Brown and Paul Kruger, MBOMBELA, 1200, Tel: 013 759 7300

Enquiries: Mr M.J Lubambo **Telephone:** 012 318 0573

Sothaba Capital (Pty) Ltd
P.O. Box 17603
WITBANK
1035

Attention: Mine Manager

FINAL BASIC ASSESSMENT REPORT AND ENVIRONMENTAL MANAGEMENT PROGRAMME OF AN APPLICATION FOR A MINING PERMIT TO MINE COAL AND CONCRETE SAND (SILICA) ON A PORTION OF PORTION 8 OF THE FARM WOESTALLEEN 477 IS: MPUMALANGA PROVINCE.

This Department acknowledges receipt of the above mentioned report dated 2018, prepared by TPR Mining Resources (Pty) Ltd on behalf of Sothaba Capital (Pty) Ltd with reference number: MP 30/5/1/3/2/11712 MP and the comments are as follows:

1. The Applicant shall conduct a preliminary legal assessment to identify all the water use activities associated with the proposed project that will require authorisation by the Department of Water and Sanitation (DWS) and the applicant is hereby referred to section 22(1) of the National Water Act, 1998 (Act 36 of 1998) (the Act).

2. Therefore any other water use related activities associated with this project that are not permissible as indicated on section 22(1) of the Act must be authorised by the DWS prior to such water use activities taking place.

3. ***Flood-lines:*** *The* applicant must note that no activities should occur within a 100m or within 1:100 year floodline (whichever is the greatest), unless authorised.

4. **Pollution of groundwater and surface water**: Pollution of water resources must be avoided by implementing proper water and waste management during the entire life of the project. The mitigation measures and the monitoring plan must be implemented in consultation with the department.

5. **Stormwater Management:** The applicant must ensure that the stormwater leaving the construction and operational areas is not contaminated by any substance, whether that substance is a solid, liquid, vapour or any combination thereof.

6. **Dust:** If dust suppression using water containing waste is the measure to be taken, the applicant should note that suppressing dust using wastewater is regarded as a water use in terms of section 21 (g) of the Act and it requires authorisation.

7. ***Wetlands and Streams:*** If wetlands, streams and drainages are to be destructed, the applicant should ensure that mitigation measures are taken to mitigate impacts or alternatively, the applicant should provide another option which will not involve destruction of these watercourses. The applicant should also note that destruction of watercourses (activity within the boundary of the regulated area) requires section 21 (c) and (i) authorisation in terms of the Act.

8. **Sanitation:** Reasonable measures must be taken to prevent the potential pollution of the ground and surface water resources due to the onsite sanitation facilities. The applicant must note that the use of septic tanks to dispose sewage is a water use in terms of section 21 (g) of the Act and it requires authorisation.

9. **Storage of oil, diesel, hydraulic fluids and grease:** It is recommended that the storage areas for these fluids be bunded with cement and in such a manner that any spillages can be contained and reclaimed without causing any pollution to the ground and surface water resources.

10. **Dewatering:** The applicant must note that dewatering activity is a water use in terms of section 21 (j) of the Act and it requires authorisation.

11. **Pollution Control Dam:** The applicant must note the construction and operation of a pollution control dam(s) and coal stockpile are water use in terms of section 21 (g) of the Act and it requires authorisation.

12. **Public participation:** The applicant must note that this is one of the critical requirements when processing a water use authorisation application and it must be done as per Regulation 267 (section 17 – 19) of the Act.

13. The Applicant is referred to section 19(1) of the National Water Act, and to report any pollution incidents originating from the proposed project to the relevant Regional Office of the Department of Water and Sanitation within 24 hours.

Should you have any queries, kindly contact Mr Musa Lubambo on the contact details listed above, alternatively e-mail: LubamboM@dws.gov.za or Fax: 086 488 6514/086 492 1588.

FINAL BASIC ASSESSMENT REPORT AND ENVIRONMENTAL MANAGEMENT PROGRAMME OF AN APPLICATION FOR A MINING PERMIT TO MINE COAL AND CONCRETE SAND (SILICA) ON A PORTION OF PORTION 8 OF THE FARM WOESTALLEEN 477 IS: MPUMALANGA PROVINCE.

Yours faithfully,

PROVINCIAL HEAD: MPUMALANGA (Act)
DATE: 28/2/2018

TPR Mining Resources

From:	Nkuna Sydney <NkunaS2@dws.gov.za>
Sent:	07 September 2018 09:46 AM
To:	Macevele Stanford (BHT)
Cc:	info@tprmining-resources.co.za
Subject:	FW: notification and request for comments on the proposed Open-cast mining of Coal on Portion 8 of Woestalleen 477 IS
Attachments:	Acceptance letter.pdf; Sothaba mining map 1.pdf; Sothaba mining map 2.pdf; Acceptance letter.pdf; Sothaba Capital MAP.pdf; Acceptance letter.pdf

...d Regards,

Mr. Sydney Nkuna
Department of Water and Sanitation
Mpumalanga Provincial Office: Institutional Establishment
Cnr. Paul Kruger and Brown Streets
Prorom Building
MBOMBELA
1200

Tel No.: 013 759 7300 / 7317
Mobile.: 066 474 9256
Fax2E-mail No.: 086 297 4826
E-mail: NkunaS2@dws.gov.za

From: TPR Mining Resources [mailto:info@tprmining-resources.co.za]
Sent: 06 September 2018 12:43 PM
To: Nkuna Sydney
Cc: Mulaudzi Masala (MBA)
Subject: notification and request for comments on the proposed Open-cast mining of Coal on Portion 8 of Woestalleen 477 IS

Good day Mr. Sydney Nkuna

Department of Water & Sanitation
Water Use Regulation

We as TPR Mining Resources have been appointed by Sothaba Capital to conduct Basic Environmental Impact Assessment for proposed Open-cast mining of Coal on the following properties;

- Portion of portion 8 of Woestalleen 477 IS
- Portion of portion 21 of Koornfontein 27 IS

- Portion of portion 10 of Wonderfontein 428 JS

Hard copies of each report will be hand delivered at your offices.

Regards,

Mr. Thato Ramoraswi(Mining Permitting Division)
TPR Mining Resources (Pty) Ltd
137 Watermeyer Street,Klipfontein
Emalahleni
1034
Mobile : 079 244 2470
Fax : 086 599 3318
Email : info@tprmining-resources.co.za

APPENDIX 3: CONSULTATION BY SINGO CONSULTING PTY (LTD)

APPENDIX 4: ENVIRONMENTAL IMPACT STATEMENT

Taking the assessment of potential impacts into account, herewith please receive an environmental impact statement that summarises the impact that the proposed activity may have on the environment after the management and mitigation of impacts have been taken into account, with specific reference to types of impact, duration of impacts, likelihood of potential impacts actually occurring and significance of impacts.

Type of impact		Likelihood	Significance
Site establishment/ construction phase	Duration: Planning phase		
Topsoil stripping and stockpiling			
Visual intrusion associated with mining area establishment		Possible	Medium concern
Dust nuisance caused by soil disturbance		Low possibility	Low concern
Noise nuisance caused by machinery stripping and stockpiling topsoil		Low possibility	Low concern
Infestation of topsoil heaps by weeds and invader plants		Low possibility	Low concern
Loss of topsoil due to incorrect storm water management		Low possibility	Low concern
Area contamination with hydrocarbon/hazardous waste		Low possibility	Low concern
Operational phase	Duration: Operational phase; minimum of 3 years		
Blasting			
Health and safety risk posed by blasting activities		Low possibility	Low concern
Dust nuisance caused by blasting activities		Definite	Low-medium concern
Noise nuisance caused by blasting activities		Definite	Low-medium concern
Excavation			
Visual intrusion associated with the excavation activities		Definite	Medium concern
Dust nuisance due to excavation activities		Low possibility	Low concern
Noise nuisance generated by excavation equipment		Low possibility	Low-medium concern
Unsafe working conditions for employees		Low possibility	Low concern
Negative impact on the fauna and flora of the area		Low possibility	Low concern
Area contamination with hydrocarbon/hazardous waste		Low possibility	Low concern
Weed and invader plant infestation of the area		Low possibility	Low concern

Crushing		
Dust nuisance due to the crushing activities	Possible	Low-medium concern

Noise nuisance generated by the crushing activities	Possible	Low-medium concern
Area contamination with hydrocarbon/hazardous waste	Low possibility	Low-medium concern
Stockpiling and transporting		
Visual intrusion associated with the stockpiled material and vehicles transporting the material	Low possibility	Low-medium concern
Loss of material due to ineffective storm water handling	Low possibility	Low concern
Weed/invader plant infestation of area due to soil disturbance	Low possibility	Low concern
Dust nuisance from stockpiled material and vehicles transporting the material	Low possibility	Low concern
Degradation of access roads	Possible	Low-medium concern
Noise nuisance caused by vehicles	Low possibility	Low concern
Area contamination with hydrocarbon/hazardous waste	Low possibility	Low concern
Decommissioning phase	Duration: Decommissioning phase	
Sloping and landscaping during rehabilitation		
Soil erosion	Low possibility	Low concern
Health and safety risk posed by un-sloped areas	Low possibility	Low concern
Dust nuisance caused by sloping and landscaping	Low possibility	Low concern
Noise nuisance caused by machinery	Low possibility	Low concern
Area contamination with hydrocarbon/hazardous waste	Low possibility	Low concern
Replacing of topsoil and rehabilitation of disturbed area		
Loss of reinstated topsoil due to absence of vegetation	Low possibility	Low concern
Infestation of the area by weed/invader plants	Low possibility	Low concern

APPENDIX 5: SITE PICTURES

APPENDIX 6: SOIL STUDY

APPENDIX 7: HYDROLOGICAL STUDY

APPENDIX 8: CV OF AN EAP MANAGER

NDINANNYI KENNETH SINGO

Singo Consulting (Pty) Ltd

Private Bag X 7214, Postnet Suite 125, Witbank 1035
Office No. 16, First Floor (South Block), Corridor Hill Crossing,
09 Langa Crescent, Corridor Hill, eMalahleni, Witbank, 1040.
Tel No.: 072-081-6682/078-2727-839
Fax No.: 086-514-4103
E-mail address: kenneth@singoconsulting.co.za

TERTIARY EDUCATION

Qualification	:	**Ph.D.** (Geology, Applied Environmental Mineralogy & Geochemistry)
Institution	:	University of Johannesburg
Year Obtained	:	Results issued, graduation date to be confirmed.
PhD Project Title	:	In Search of the Possible Economic Potential, through Conceptual Study, on Reclamation of Defunct Mine Residue areas for Development Purposes: Case study of Musina Copper Mine, Giyani Louis Moore Gold Mine and Zwigodini Nyala Magnesite Mine, South Africa
Qualification	:	**M.Sc.** (Environmental Management)
Institution	:	University of South Africa
Year Obtained	:	2013
Masters Project Title	:	An Assessment of Heavy Metal Pollution in the Vicinity of the Defunct Copper Mine Dumps in Musina, South Africa
Qualification	:	**B.Sc.** (Hons) Mining & Environmental Geology
Institution	:	University of Venda
Year Obtained	:	2008
Honours Project Title	:	Structural Control on Kimberlite Pipes: A Case Study of Venetia Kimberlite Pipe-K19, Venetia Open Cast Diamond Mine, South Africa

WORK EXPERIENCE

Company	:	Singo Consulting
Position	:	Director/Principal Consultant
Duration	:	9 August 2012—TODATE
Key Focus Area	:	Environmental Projects

Technical work:

- Environmental Impact Assessment
- Environmental Management Plans
- Social and Community Development Plans
- Geological (Exploration, Resource Estimation and Competency Report)
- Hydrological and Hydrology (Surface and Groundwater Studies)
- Soil Science (Soil profiling, Modelling and Soil Chemistry)
- Environmental Control Office
- Geotechnical (Soil and Rock)
- Mining Feasibility Studies

TRAINING COURSES

- 17- 19 April 2012: GSSA Drilling Methods & Techniques in Resource Exploration

- 13-14 September 2012: GSSA Exploration Drill Site Safety
- 3 May 2013: SHE Representative Training
- 6-10 May 2013: Witwatersrand University, A3 SHE Risk Assessment Management
- 22 July 2013: AATCGS Geophysics 101: Basics of Geophysics and Its Application in Coal
- 31 July 2013: Mentorship Training
- 14 April 2014: A2 Safety for Managers
- 13 May - 26 June: Lump Ore Beneficiation (Basic Coal Preparation): Metallurgy G101-105, Colliery Training College, Witbank
- 14-17 July 2014: Safety Leadership Programme
- 6-8 Oct 2014: Understanding Coal Quality, ALS Witbank Training
- 3-7 Nov 2014: Foundation for Leadership Programme
- 3 Feb 2015: 4X4 Defensive Driving Training
- 1 May 2015: Assertiveness Awareness and Training
- 21-22 July 2016: Time Management Training

SYMPOSIUMS

- 29 July 2013: **Presenter:** 4th Prof Humphrey Memorial Post-Graduate Symposium, University of South Africa
- 11 November 2015: **Presenter:** Wits GSSA REI Colloquium: Economic Potential and Viability of reclaiming mine dumps in the Limpopo Provice.

CONFERENCES

LIST OF CONFERENCE PROCEEDINGS AND SYMPOSIUMS:

- 26-28 November 2012: Aminergy Acid Mine Drainage South Africa Conference
- 10-12 March 2014: **Presenter**: SAICE 5th International Mining and Industrial Waste Management Conference
- 29 Sept-3 Oct 2014: 9th International Mine Closure Conference, Sandton
- 16-17 March 2015: Workshop: South Africa Mining-Related Landscape* Rehabilitation Status Quo: Identifying Work Required to Close Current Knowledge gaps, WRC, Pretoria.
- 8-11 Sept 2015: Land Rehabilitation Society of Southern Africa (**LaRSSA**): Mine rehab and biodiversity.
- N.K. Singo*, 2015. Wits GSSA REI Colloquium: Economic Potential and Viability of reclaiming mine dumps in the Limpopo Province. 11th November 2015, Witwatersrand University, Johannesburg, South Africa.
- N.K. Singo* and J.D. Kramers, 2016. Uranium as a potential health hazard as well as (even) an economic asset in the Louis Moore tailings dump, near Giyani, Limpopo Province. In symposium Proceedings; 6th Mintek Analytical Symposium "The Environment", Mintek G4, Randburg, Johannesburg, South Africa, Friday 21st October 2016.
- N.K. Singo* and J.D. Kramers, 2017. Chrysotile (white asbestos) occurrence in the Nyala Magnesite Mine dumps and the soils around them, and its health implications to the community of Zwigodini Village, Limpopo Province. 5th Annual Conference. 1-4 August 2017, Resilient Landscapes in a Changing Climate.
- N.K. Singo* and J.D. Kramers, 2017. Unlocking the potential economic benefit of a tailings dump through resource modelling and estimation: SHE (safety, health, and environmental) issues and solutions. MineSafe 2017 Conference, Striving for zero harm (driving excellence through compliance), Emperors Palace, Hotel Casino Convention Resort, Johannesburg, 30–31 August 2017, The Southern African Institute of Mining and Metallurgy (SAIMM).

List of publications:

- N.K. Singo, and J.D., Kramers, 2017. Geochemical and Mineralogical Characterization of two low grade stockpiles (mine residue deposits): acid mine drainage vs neutral-alkaline mine drainage perspectives. A case study of the Musina (Copper) and Nyala (Magnesium) mines, South Africa.
- N.K. Singo, and J.D., Kramers, 2017. Preferred tailings retreatment approach to unlock value and create environmental sustainability of the Louis Moore tailings dump, near Giyani, South Africa.
- N.K. Singo, and J.D., Kramers, 2017. Copper tailings retreatment to deliver economic value with concurrent rehabilitation at the Musina mine, South Africa.

List of Projects:

List of Projects conducted and successfully completed by your company in mining Permits and Right.

Client Name	Contract Start date (dd/mm/yyyy)	Contract End date (dd/mm/yyyy)	*Contact Person	Contact Person's phone number(s) and Email Address
Mashavane Quarry	03-02-2015	12-06-2018	Mr P Ngwenya	Pat.ngwenya@gmail.com 072 914 3508
CoalX-Carolina	02-04-2018	Ongoing	Rian Telma	H Mduza bramduza@icloud.com Riaan CoalX riaan@coalx.co.za
CoalX-Balmoral	28-02-2018	Ongoing	Rian Telma	H Mduza bramduza@icloud.com Riaan CoalX <riaan@coalx.co.za>
Malahleni Mining	6-6-2018	Ongoing	Roelf Depreez	roelf_dupreez@yahoo.com 081 273 7785
New Venture Mining	23-4-2017	Ongoing	Mr. GB Simelane	076 246 3677 simelanegb@gmail.com, simelane@jaments.co.za
Veralli Mineral	1-8-2017	Ongoing	Mr. Rambauli TJ	jrambauli@yahoo.com 073 501 2819
Benicon Mining	1-10-2018	Ongoing	Mr Gavin Kotzen	gk@kgroup.co.za 083 626 4555 017 647 1047

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Website: www.iaiasa.co.za

IAIAsa Confirmation of Membership: 2018/2020
Kenneth Singo Membership Number: 6091

27 November 2018

TO WHOM IT MAY CONCERN

Mr Kenneth Singo, Singo Consulting (Pty) Ltd (IAIAsa membership Number 6091) is a paid-up full member in good standing of the South African Affiliate of the International Association for Impact Assessment and has been a member of IAIAsa since 1 March 2018.

This membership is valid from 1 March 2018 to 28 February 2020.

IAIAsa is a voluntary organisation and is not a statutory body regulating the profession. Its members are however expected to abide by the organisation's code of ethics which is available on our website.

Any enquiries regarding this membership may be directed to the Secretariat at the above contact details.

Yours Sincerely

Robyn Luyt
IAIAsa President 2018/2019

CERTIFICATE

This Certifies that

Kenneth Singo

attended the

SAICE Geotechnical Division:

6th International Mining and Industrial Waste Management Conference

on 29, 30 & 31 October 2018

Legend Golf and Safari Resort, Limpopo

ECSA - SAICEgeo18/02443/18 (3 credits)

SACNASP

South African Council for Natural Scientific Professions

herewith certifies that

Ndinannyi Kenneth Singo

Registration Number: 400069/16

is registered as a

Professional Natural Scientist

in terms of section 20(3) of the Natural Scientific Professions Act, 2003
(Act 27 of 2003)
in the following fields(s) of practice (Schedule 1 of the Act)

Earth Science

Effective **9 March 2016**

Expires **31 March 2020**

Botha

Chairperson

Chief Executive Officer

Scan this code to view online version of this certificate

UNISA
UNIVERSITY OF SOUTH AFRICA

We certify that

NDINANNYI KENNETH SINGO

having complied with the requirements of the Higher Education Act
and the Institutional Statute, was admitted to the degree of

MASTER OF SCIENCE

in Environmental Management

at a congregation of the University
on 14 October 2013

Vice-Chancellor

Executive Dean

University Registrar

G05491

University of Venda

KNOWLEDGE IS PRECIOUS

This is to Certify that the Degree of

Bachelor of Earth Sciences in Mining and Environmental Geology

was Awarded to

SINGO NDINANNYI KENNETH

at a Ceremony held on the

07-MAY-2009

in Accordance with the Provisions of the Act and Statute

RIVER CRESCENT 1042

06/03/19

Vice Chancellor

University Registrar

Dean

PROSPER

28 March 2011

Mr N Singo
P O Box 1034
Makhado
0920

Dear Mr Singo

APPLICATION FOR MEMBERSHIP - MEMBER NO 967334

I have pleasure in advising you that your application for membership of the Geological Society of South Africa was ratified by the Council of the Society.

Trusting that your association with the Society will be pleasant and stimulating.

Kind regards

CRAIG SMITH
EXECUTIVE MANAGER

GSSA
Geological Society of South Africa

LAND REHABILITATION SOCIETY OF SOUTHERN AFRICA

LAND REHABILITATION SOCIETY OF SOUTHERN AFRICA

hereby certifies that

Mr Ndinannyi Kenneth Singo

is a fully paid-up member of the Society having all the rights and privileges of a

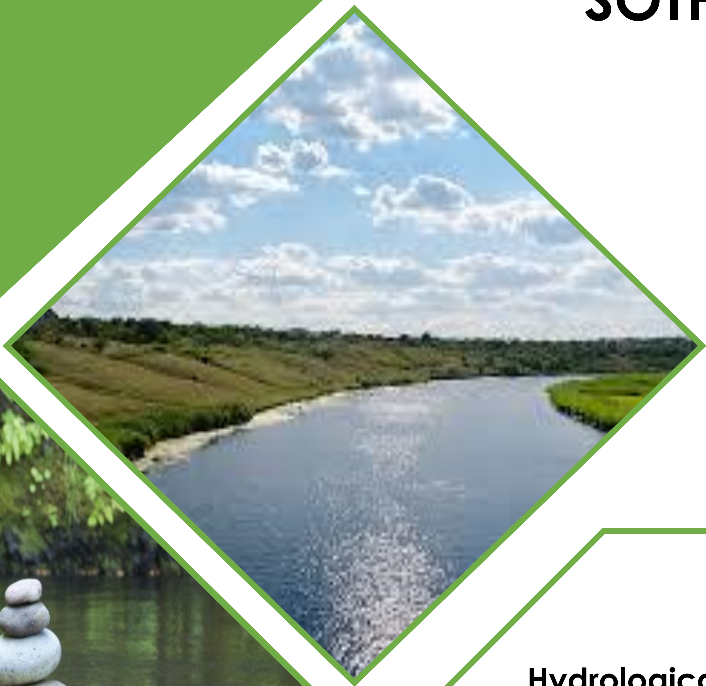
Associate Member

Membership ID:

On behalf of the Executive Council

President of the Society
Date Joined: 10 June 2015

Vice President of the Society
Expiry date: 26 February 2020



SOTHABA CAPITAL (PTY) LTD

DMRE REF: MP 30/5/1/1/3/2/11712 MP

HYDROLOGICAL STUDY

Hydrological Report for Mining Permit Application for Coal on Portion of Portion 08 of the Farm Woestalleen 477 JS situated under the Magisterial District of Middelburg, Mpumalanga Province.

PREPARED BY

Singo Consulting (Pty) Ltd

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Corridor Hill, eMalahleni, 1035.
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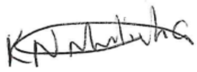
PROJECT INFORMATION

Report type	Hydrological Report	
Project Title	Mining permit for coal on Portion of Portion 08 of the Farm Woestalleen 477 JS, situated under the Magisterial District of Middelburg, Mpumalanga Province.	
Mineral	Coal	
Site Location	Magisterial District of Middelburg, Mpumalanga Province.	
Compiled for	Sothaba Capital (Pty) Ltd	
		Electronic Signatures
Lead Author	Talelani A Singo (Land and Water Division Lead)	
Author	Hulisani N Mulivha (Junior Hydrologist)	
Assessed by	Talelani A Singo	
Date	26 October 2020	

DECLARATION:

This is a legally binding document and many of the actions and recommendations remain the responsibility of client (as the owner/lessee of the property).

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Singo Consulting (Pty) Ltd exercises due care and diligence in rendering services and preparing documents, however it has been assumed that the information provided to Singo Consulting (Pty) Ltd is correct and as such the accuracy of the conclusions made are reliant on the accuracy and completeness of the data supplied.

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The document may not be altered or added to without the prior written consent of the author. This also to electronic copies of the report which are supplied for the purposes of inclusion as part of other report.

EXECUTIVE SUMMARY

Limkholo Investments (Pty) Ltd appointed Singo Consulting (Pty) Ltd to undertake a Specialist Surface Water Study to support an Environmental Impact Assessment (EIA) for the proposed mining permit (5 ha opencast mining) to take place on Portion of Portion 08 of the Farm Woestalleen 477 JS, situated within the Magisterial District of Middelburg in the Mpumalanga Province.

A Mining permit application was lodged with the DMRE (reference number: **MP 30/5/1/1/3/2/11712 MP**. The extent of the mining permit covers the above-mentioned farm portion, and the proposed project relates to the opencast mining within the project area. Open cast mining recovers a greater proportion of the mineral deposit than underground methods, as more of the coal seams in the strata can be exploited.

METHODOLOGY

The following methodologies were used for the hydrological assessment of the catchment that the mine will be situated in:

A holistic approach was followed, and an attempt was made to link local hydrological, strategies.

A site visit was conducted in order to obtain information on normal flow rates, river health and potential factors that could influence hydrological modelling of flows.

Generally accepted methods and formulae were used to determine design floods in the relevant catchments. The following paragraph will briefly explain the Rational Method that was ultimately used in the peak flow analyses:

Rational Method

The rational water quality and environmental studies to regional and national concerns, regulations and management method was developed in the mid-19th century and is one of the most widely used methods for the calculation of peak flows for small catchments. The formula indicates that Q = CiA, where Q is the peak flow, "i" is the rainfall intensity, A is the runoff area and C is the runoff coefficient.

Rainfall distribution is assumed to be uniform over small catchment areas of up to 15 km^2. A Time of Concentration (Tc) is calculated which represents the time it takes for rainfall to contribute to runoff at the same discharge point of the catchment from all areas (even furthest point) of the catchment. The slope of the catchment is used to determine Tc.

Average runoff from streams running through the site was calculated using accepted techniques to downscale quaternary catchment data (WR2005).

Software employed in the study includes:

- QGIS 2.14.9 for Geographic Information Systems (GIS) work and
- Design Rainfall Estimation package (Smithers and Schulze, 2003) for 24 design rainfall depth.

The likely surface water impact associated with the planned mining development was identified and possible mitigation measures were recommended to reduce the impacts thereof.

MONITORING PLAN

The objective of the surface water monitoring system is to ensure that the water management system performs in accordance with specifications, to act as a pollution early warning system, to check compliance with license requirements and for reporting purposes. The objectives of these systems will be achieved if there is no impact on the in-stream and downstream fitness for use criteria.

Water quality Sampling and Analysis

During the Construction and Operational Phases of the mine project, rivers, pans and dams should be sampled on a monthly basis.

Monitoring during the Decommissioning Phase will be based on the Operational Phase monitoring, adapted to suit the final works to be implemented during this phase. However, in terms of surface water this will be primarily downstream of the area as for the Operational Phase.

Monitoring during the Post Closure Phase will be undertaken only where required to prove the sustainability of the site. In terms of surface water, this relates primarily to managing the surface topography (monitoring for settlements), and water quality and levels within the mined-out area.

Any infrastructure (PCDs) that will remain on site, post closure, will continue to be included in the surface water monitoring programme and should be monitored in terms of water quality and water levels monthly.

Water Quantity Monitoring

For efficient management of water on the site, a good understanding of the site water balance will be required. To achieve this, the following monitoring will be needed:

- Rainfall – to be measured daily on site.

- Flows – including the following, to be measured weekly:
  - Mine water can pump from the opencast workings.
  - Inflows to the Pollution Control Dams.
  - Water pumped from the Pollution Control Dams for reuse in the operations.
  - Potable water use.

Data Management and Reporting

Monthly

The monthly report is an internal report which is used to keep records of changing water quantities at the site.

Quarterly

Quarterly report that may be required for submission to the DMR / DWS.

Annually

The annual report consists of all the active environmental components, and for the chapter on surface water.

Performance Assessment/ audit

Annual audits should be carried out to determine the effectiveness of the water management systems that are in place. These should include a GN 704 audit.

Conclusion

- The site layout and project infrastructure has been reviewed in the context of the baseline hydrology and a series of mitigation measures developed for the project to minimise impacts and ensure compliance with GN 704.
- It is not expected that the proposed mining activities will have a significant impact on the water resources mostly due to the fact that the activities are located more than 100 m from the nearest water resource.
- Contamination from the mining areas will be contained within the mining permit.

The following recommendations should be considered for this proposed mining project:

- Monitoring of the surface water quality shall be carried out regularly during the project's construction and operating phases.
- The project's development process will be undertaken during the dry months to mitigate pollutant runoff.
- An independent ECO is to be appointed during construction. The mine's internal Environmental officers will be conversant with best practices in accordance with rehabilitation during decommissioning and an audit is to be performed before and after rehabilitation.

- Where mining infrastructure is required across natural watercourses, new storm water infrastructure such as pipes and culverts could replace the hydraulic function currently being offered by natural watercourses. Its system should be built for both the hydraulic and environmental efficiency. A thorough assessment of the appropriateness of the new stormwater infrastructure must be carried out at the preliminary design stage.

SURFACE WATER STUDY FOR EIA

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ACRONYMS AND ABBREVIATIONS

Acronyms/ Abbreviations	Definition
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
GIS	Geographical Information System
GN	Government Notice
GSSA	Geological Society of South Africa
LaRSSA	Land Rehabilitation Society of Southern Africa
MAMSL	Mean Above Mean Sea Level
MAP	Mean Annual Precipitation
MAR	Mean Annual Runoff
mcm	Million Cube Metres
NEMWA	National Environmental Management Water Act
NWA	National Water Act
PCD	Pollution Control Dam
SACNASP	South African Council for National Scientific Professions
WISA	Southern Africa Water Institute
WMA	Water Management Area
WR2012	Water Resource of South African 2012 Study

1. INTRODUCTION

Sothaba Capital (Pty) Ltd appointed Singo Consulting (Pty) Ltd to undertake a Specialist Surface Water Study to support an Environmental Impact Assessment (EIA) for the proposed mining permit (5 ha opencast mining) to take place on Portion of Portion 08 of the Farm Woestalleen 477 JS, situated within the Magisterial District of Middelburg in the Mpumalanga Province.

The proposed mining right application is being undertaken in terms of the requirements of the Minerals and Petroleum Resources Development Act (MPRDA) (Act 28 of 2002), the National Environmental Management Act (NEMA) (Act 107 of 1998), as amended, and the 2014 Environmental Impact Assessment (EIA) Regulations, as amended.

1.1 TERMS OF REFERENCE

The surface water specialist study entails the following:

I. ***Baseline Assessment***
- Maps from the hydrology study will be used to indicate the catchment areas and any strategic points.
- The Mean Annual Runoff (MAR), peak flow rates and volumes will be estimated for these catchments using WR2012 data.

II. ***Impact Assessment***
- All surface water impacts will be described, and mitigation measures will then be proposed as normally required for the Environmental Impact Assessment/Environmental Management Plan (EIA/EMP), for the construction, operation, decommissioning and post closure phases.

III. ***Site Water Management***
- The terms of reference include a review of surface water management aspects in terms of the environmental legislation.
- The report includes surface water input required for the environmental applications for the proposed mine operations, as well as the formulation of a preliminary surface water management plan for the site.

1.2 ENVIRONMENTAL LEGISLATION - DWAF GOVERNMENT NOTICE 704

Government Notice 704 (Government Gazette 20118 of June 1999) (hereafter referred to as GN 704), was established to provide regulations on the use of water for mining and related activities aimed at the protection of water resources. Whilst the proposed ferrochrome smelter is not a mine, it is a related activity; more specifically it is a mineral processing facility, as listed under GN 704. Therefore, the proposed infrastructure is designed in accordance with GN 704, and the following design principles are applicable:

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

1.3 Locality

The project is located within the boundaries of the Steve Tshwete Local Municipality. Steve Tshwete is the fourth largest of the six local municipalities within the Nkangala District Municipality. Other Local Municipalities include:

- Delmas Local Municipality.
- Dr JS Moroka Local Municipality.
- eMakhazeni Local Municipality.
- EMalahleni Local Municipality
- Thembisile Local Municipality.

The Nkangala District Municipality, approximately 17 000 km2 in surface area, is one of the three district municipalities in Mpumalanga. The Nkangala District Municipality is the economic hub of the province, consisting of 165 towns and villages. The proposed mining permit is located approximately 26.3 km south-east of Middelburg town along N11, approximately 49.2 km south-east of eMalahleni and approximately 75.9 km northern side of Ermelo. The proposed permit Woestalleen 477 JS within Steve Tshwete local municipality, District Nkangala in Mpumalanga Province. There is a railway line that is situated on the southern side of the mining permit area.

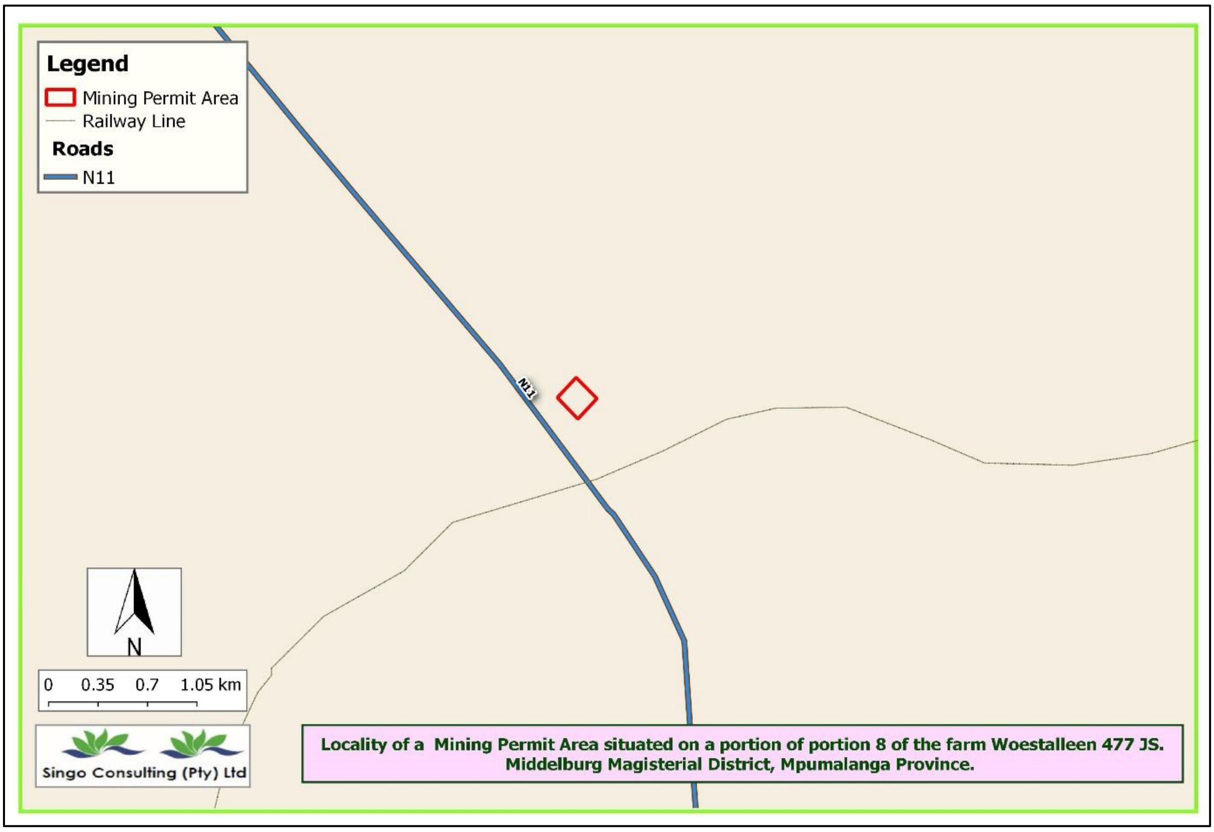

Figure 1: Locality Map

2. OBJECTIVES AND SCOPE OF WORK

2.1 Objectives

The focus of this assessment was to assess possible impacts on the surface water environment; the following was required from this assessment:

- Determine and assess the potential surface water impacts associated with the mining activities.
- Advise on mitigation measures for identified risks/impacts and enhance positive opportunities/impacts of the project.
- Provide input to the NEMA documentation.

2.2 Scope Of Work

2.2.1 Desktop Study

The surface water study has included desktop assessment. The desktop study included a use of an Arc Map 10.2 is a GIS software programme used to view, edit, create and analyse geospatial data. Arc Map was used to view spatial data and to create maps.

2.2.2 Site Visit

Site visit is the most significant part of the investigation, several site visits will be conducted to collect water samples and observe the surrounding environment of the project area.

3 METHODOLOGY

The following methodologies were used for the hydrological assessment of the catchment that the mine will be situated in: A holistic approach was followed, and an attempt was made to link local hydrological, water quality and environmental studies to regional and national concerns, regulations and management strategies.

A site visit was conducted to obtain information on normal flow rates, river health and potential factors that could influence hydrological modelling of flows. Generally accepted methods and formulae were used to determine design floods in the relevant catchments.

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The likely surface water impact associated with the planned mining development was identified and possible mitigation measures were recommended to reduce the impacts thereof.

3.1 Overview Of Relevant Legislation And Standards

The entire process followed was guided by the following Legislation:

3.1.1 Legal Framework

- DWA's vision for capacitated, loyal workforce to support its functions.

3.2 National Legislation

National legislation applicable to surface water management includes:

- Constitution of the Republic of South Africa, 1996 (No. 108 of 1996) – The Bill of Rights states that everyone has the right to an environment that is not harmful to their health or well-being.
- National Water Act, 1998 (Act 36 of 1998) – Provides for the protection of the quality of water and water resources in South Africa and provides for the establishment of Water Management

3.3 National Policy/Guidelines

National policy and guidelines applicable to surface water management includes:

South African Water Quality Guidelines, First Edition, 1996 – These guidelines set out the minimum water quality requirements for a range of water quality parameters for each water user.

- Development of a Waste Discharge Charge System: Framework Document. Second Edition, 2000 – Provides a framework for the implementation of a system to charge for water use such as the discharge of waste that impacts on water resources.
- Framework for a Water Quality Management Performance Assessment System: (WQMPAS), First Edition, 2000 – Reports results on an initial investigation into a performance management system to enable a more effective WQPMAS in future.
- Best Practice Guidelines for the mining sector, DWAF 2006, 2008 dealing with aspects of DWA's water management hierarchy and deals with integrated mine water management, pollution prevention and minimisation of impacts, water reuse and reclamation and water treatment.
- Best Practice Guidelines for the mining sector, DWAF 2006, 2008 dealing with general water management strategies, techniques and tools which could be applied cross – sectorial and deals with storm water management, water and salt balances, water monitoring systems, impact prediction.
- Best Practice Guidelines for the mining sector, DWAF 2006-2008 dealing with specific mining activities and addresses the prevention and management of impacts from small scale mining, water management for Mine Residue Deposits, pollution control dams, water management for surface mines, and water management for underground mines.

4 BASELINE HYDROLOGY

4.1 Objectives Of Baseline Investigations

The baseline describes the catchment and project area in respect of surface water resources and hydrological data for the current situation. This section presents a comprehensive review of various information sources to define the baseline climatic and hydrological conditions of the site and surroundings.

4.2 CLIMATE

According to (Climate-data.org), Middelburg lies on 1478m above sea level In Middelburg, the climate is warm and temperate. In winter, there is much less rainfall in Middelburg than in summer. The climate here is classified as Cwb by the Köppen-Geiger system. In Middelburg, the average annual temperature is 15.5 °C | 59.9 °F. The rainfall here is around 683 mm | 26.9 inch per year.

The driest month is July. There is 5 mm | 0.2 inch of precipitation in July. With an average of 115 mm | 4.5 inch, the most precipitation falls in November.

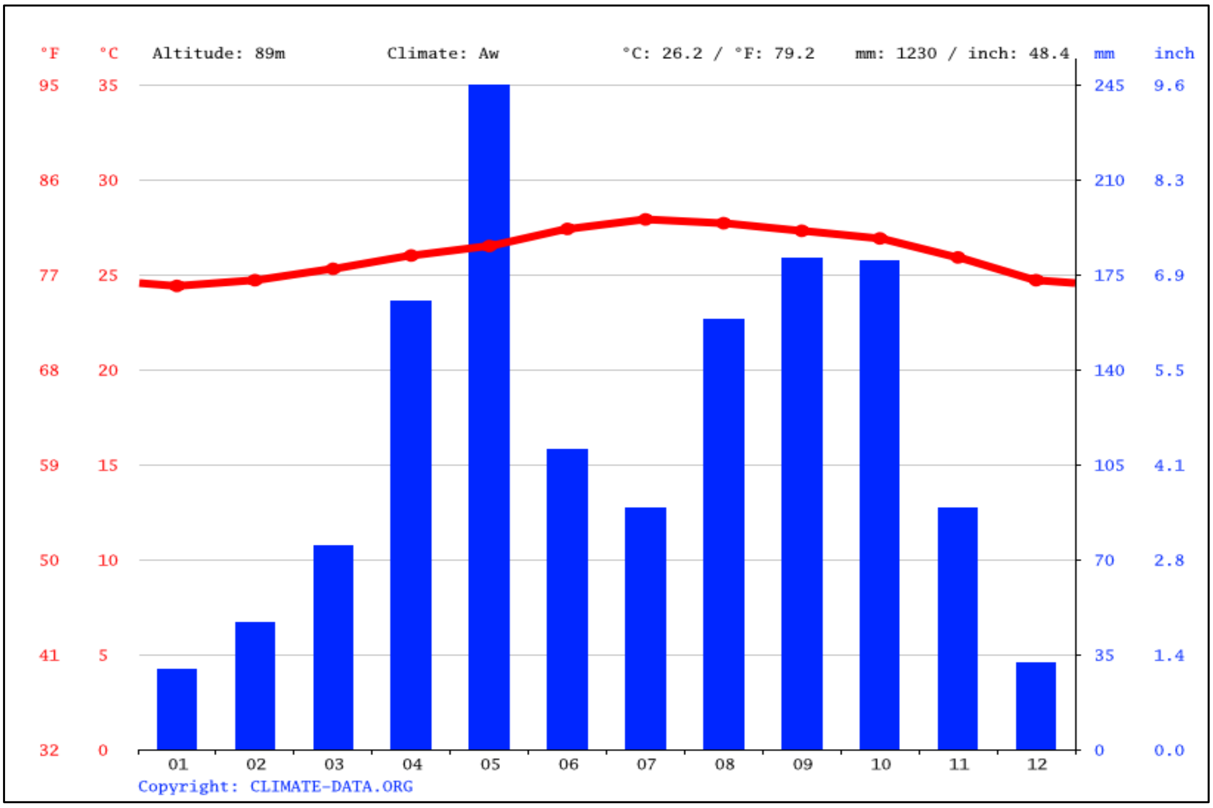

Figure 2: Middelburg Climate Graph

4.3 TOPOGRAPHY

With the aid of QGIS software the topographical map below was produced. A topographical map shows the physical features of the land. Besides just showing landforms such as mountains and rivers, the map also shows the elevation changes of the land. The proposed mining permit is situated in an altitude of 1585 mamsl and it can be deduced that the project area is in an area that is flat as seen in the topographic map.

Elevation is shown using contour lines. When a contour line is drawn on a map it represents a given elevation. Every point on the map touching the line should be the same elevation. On some maps, numbers on the lines will let you know what the elevation is for that line. Contour lines next to each other will represent different elevations. The closer the contour lines are to each other, the steeper the slope of the land.

In this environmental project, topography is used to determine how soil can be conserved and how water will flow over the land. Data from topography can help to conserve the environment. By understanding the contour of the land, scientists can determine how water and wind may cause erosion. They can help to establish conservation areas such as watersheds and wind blocks. In this project contour lines indicates a gentle slope and a lower chance of soil erosion as they are sparsely packed.

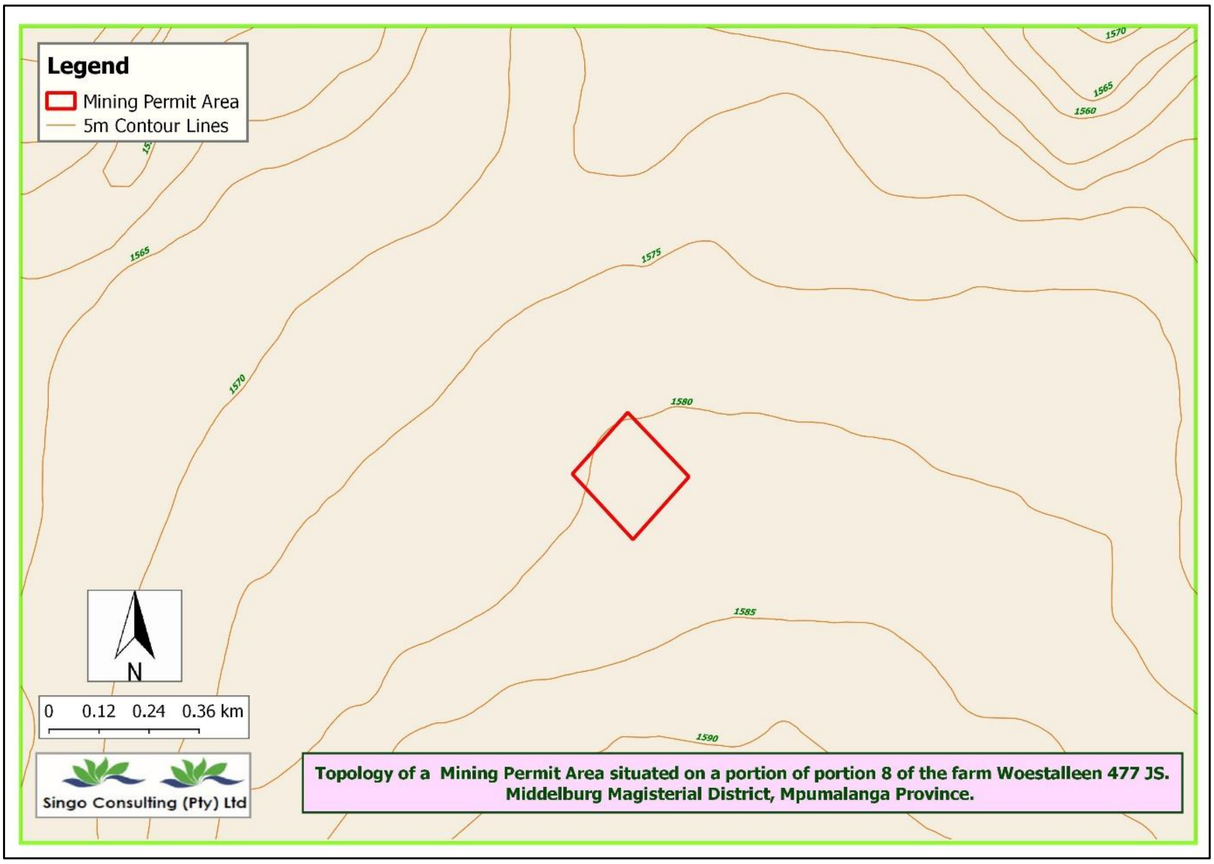

Figure 3: Topographical Map

4.4 HYDROLOGICAL DESCRIPTION

4.4.1 INTRODUCTION

South Africa is divided into 19 water management areas (National Water Resource Strategy, 2004), managed by its separate water board. Each of the water management areas (WMA) is made up of several quaternary catchments which relate to the drainage regions of South Africa.

4.4.2 Catchment Description

The regional hydrological setting of the project site is indicated in Figure 5. The mining area is in the Upper Olifant catchment of the Water Management Area (WMA). The main quaternary catchment is B12B.

The WR2012 study, presents hydrological parameters for each quaternary catchment including area, mean annual precipitation (MAP) and mean annual runoff (MAR). Based on the WR2012 study, the project area falls within the quaternary catchment B12B. The total catchment area of B12B is 570.7 km^2, with a net MAR of 20,09 million cubic meters (mcm) and a MAP of 695 millimetre (mm).

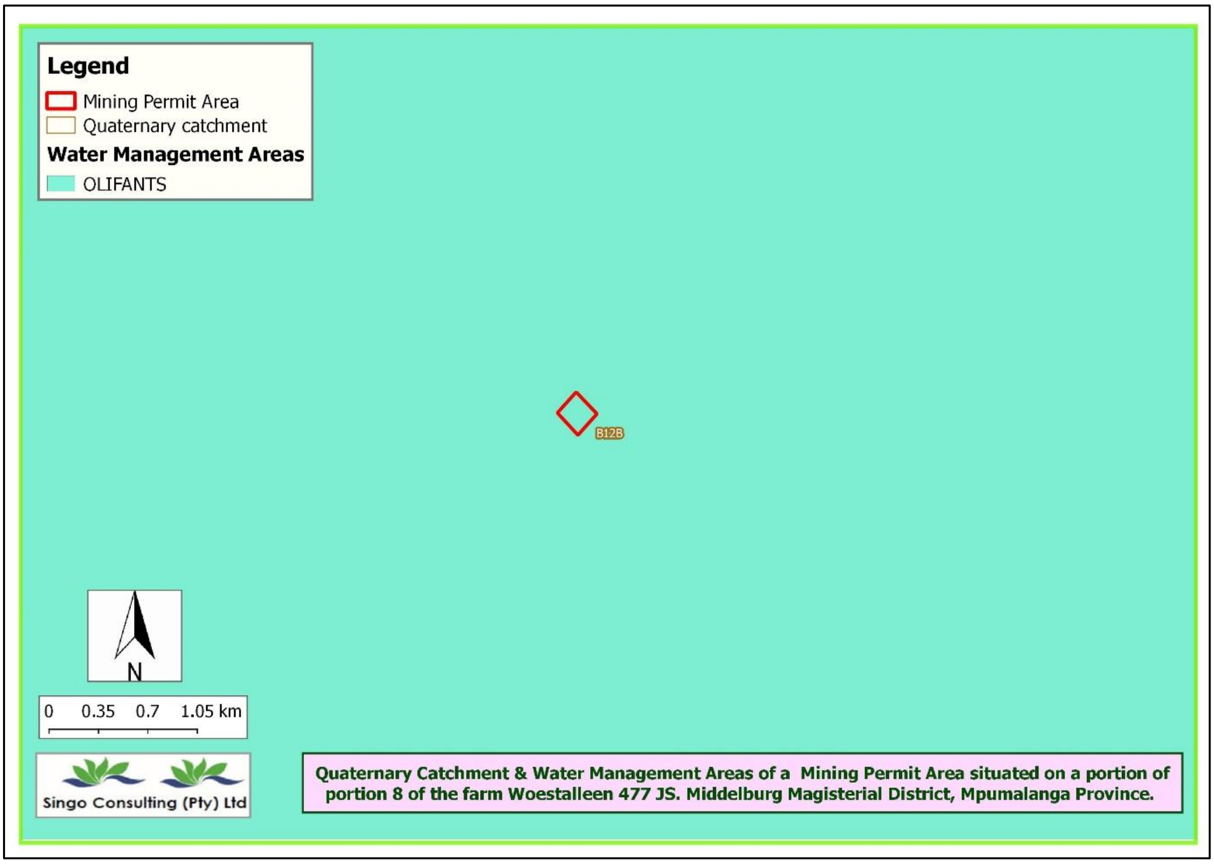

Figure 4: Quaternary Catchment and WMA

4.4.3 Local Hydrology

FIGURE 5 below illustrates the wetlands and Hydrology, respectively. There is a flat wetland situated in the western side, which is approximately 450m away from the mining permit area. There is a Woes- Allenspruit and unchanneled valley- bottom wetland and channelled valley bottom wetland within 2km radius of the mining permit area. However, there are no streams/rivers observed within the mining permit area.

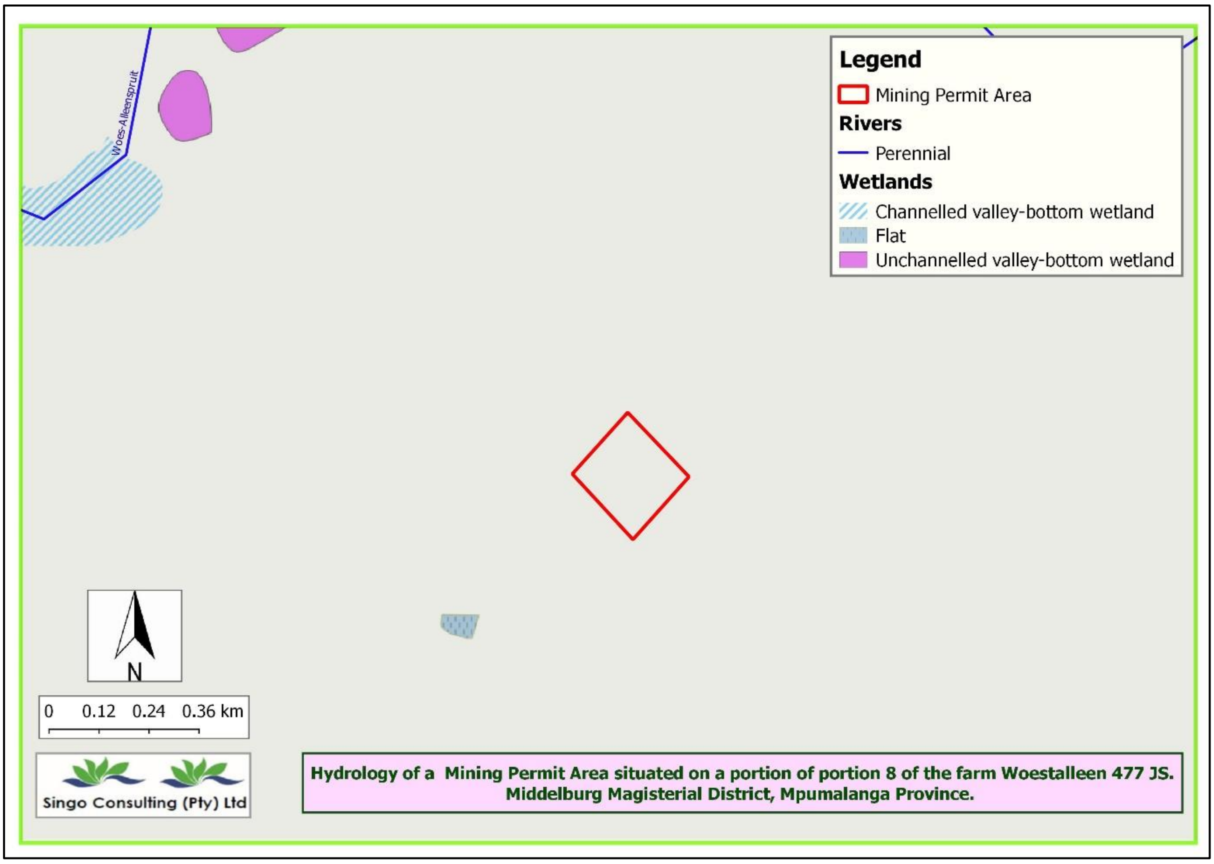

Figure 5: Hydrology Map

4.5 GEOLOGY

4.5.1 REGIONAL GEOLOGY

Typically, five distinct aquifer types:

1. Basement (fractured Achaean-Proterozoic igneous/ metamorphic)

2. Hard rock (e.g. Table Mountain TMG, Waterberg and Natal Groups sandstone; fractured)

3. Karst/ dolomite (dissolution)

4. Karoo (fractured and influenced by dykes)

5. Porous (intergranular Quaternary alluvial, coastal, Aeolian, and other surficial unconsolidated deposits)

The study area falls under **the Karoo (fractured and influenced by dykes)**. For effective borehole yields, the boreholes must target the fracture zones in this area.

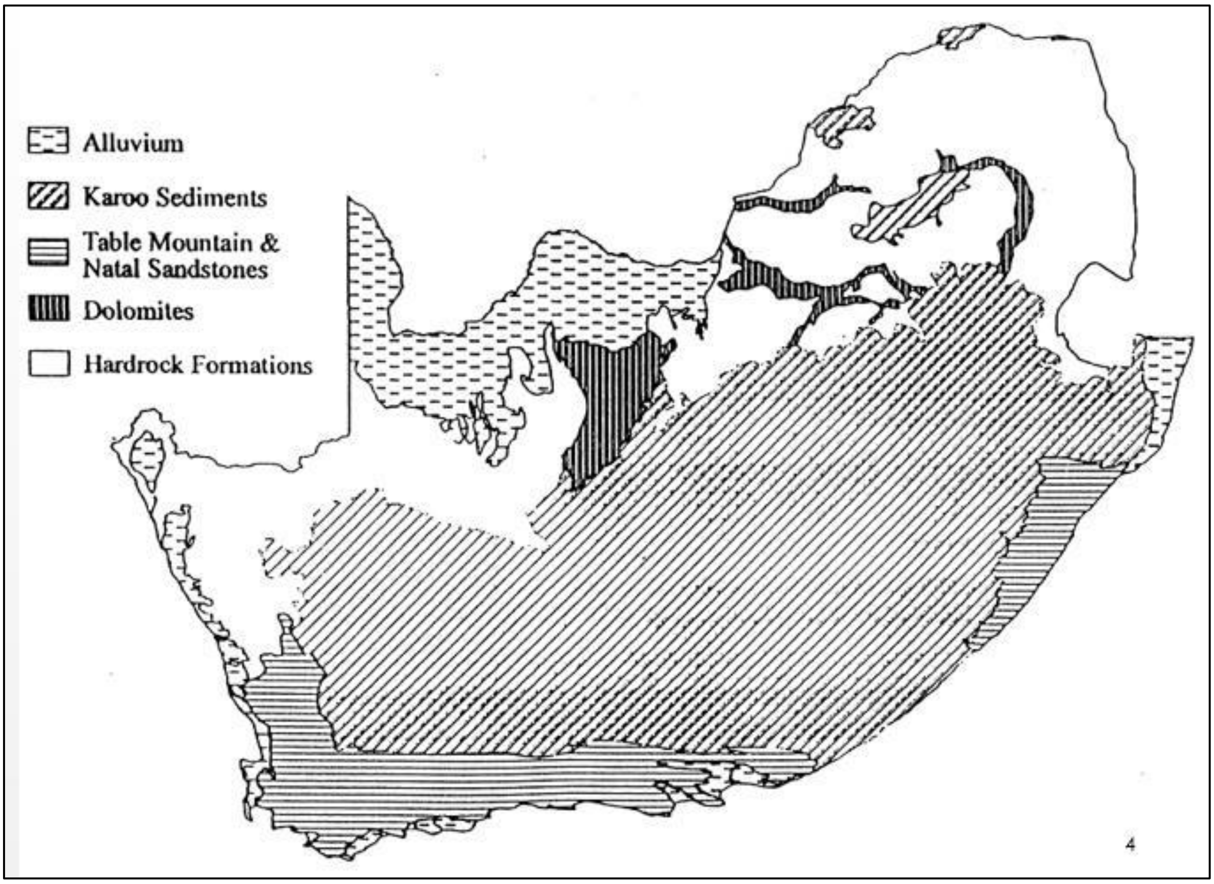

Figure 6: Aquifers of South Africa

The Vryheid Formation comprise predominantly of thick beds of yellowish to white cross-bedded sandstone and grit alternating with beds of soft sandy shale. This unit also contains the coal seams that underpin the coal mining activities. The sedimentary rocks are, however, so extensively and widely intruded by dolerite sheets and dykes, that two lithologies are considered to represent a single groundwater system. Vegter et al (1968) list six different modes of groundwater occurrence associated with these formations: (a) weathered and fractured sedimentary rocks not associated with dolerite intrusions, (b) indurated and jointed sedimentary rocks alongside dykes, (c) narrow weathered and fractured dolerite dykes, (d) basins of weathering in dolerite sills and highly jointed sedimentary rocks enclosed by dolerite, (e) weathered and fractured upper contact-zone of dolerite sills and (f) weathered and fractured lower contact-zones of dolerite sills. Minor groundwater strikes are also often encountered in association with the coal seams (Visser et al., 1949).

Regional Groundwater Occurrence and Aquifers

Based on the geology within the study area, the structural geology, and the geomorphology, the following conditions can arise to enhance aquifer development within the study area:

- The fractured transition zone between weathered and fresh bedrock

- Fractures along contact zones between the host rocks due to heating and cooling of rocks involved with the intrusions
- Contact zones between sedimentary rocks of different types
- Interbed or bedding plane fracturing
- Openings on discontinuities formed by fracturing
- Faulting due to tectonic forces
- Stratigraphic unconformities
- Zones of deeper weathering
- Fractures related to tensional and decompressional stresses due to off-loading of overlying material
- Groundwater occurs within the joints, bedding planes and along dolerite contacts.

Groundwater potential is generally low in these rocks, with 87% of borehole yields < 3 l/s. The fractured Karoo aquifer consists of the various lithologies of siltstone, shale, sandstone, and the coal seams. The pores of the geological units are generally well cemented, and the principle flow mechanism is fractured flow along secondary structures e.g. faults, bedding plane fractures etc. The intrusion of the fractured aquifer by dolerite dykes and sills has led to the formation of preferential flow paths along the contacts of these lithologies due to the formation of cooling joints. The dykes may act as permeable or semi-permeable features to impede flow across the dykes.

The fractured pre-Karoo aquifer is separated from the overlying fractured Karoo aquifer by Dwyka tillites which act as an aquiclude where present. The flow mechanism is fracture flow as can be expected from the crystalline nature of the granite rocks. The water quality is generally characterized by high fluoride levels which limits exploitation of this aquifer in combination with the general low yields, deep (expensive) drilling and the low recharge (Grobbelaar et al, 2004). Mining of the coal seams has resulted in the introduction of an artificial aquifer system which generally dominates the groundwater flow on a local and regional scale. Below is a summary of the geohydrological system.

4.5.2 LOCAL GEOLOGY

Two distinct aquifer types exist which are shallow weathered Karoo aquifer (unconfined) and Upper fractured aquifer (unconfined to semi-confined) (less than 70 to 90mbgl)

1. Shallow weathered Karoo aquifer (unconfined)

Overburden/Weathered Zone Aquifer

- The weathered zone of the Karoo sediments hosts the unconfined or semi-confined shallow weathered Karoo aquifer. Water levels are often shallow (few meters below ground level) and the water quality good due to direct rainfall recharge and dynamic groundwater flow through the unconfined aquifer in weathered sediments, which makes it also vulnerable to pollution.

- Water intersections in the weathered aquifer are mostly encountered above or at the interface to fresh, where the vertical infiltration of water is typically limited by impermeable layers of weathering products and capillary forces, with subsequent lateral movement following topographical gradients.
- Localized perched aquifers may occur on clay layers or lenses at shallower depth (soil zone) but are due to their localized and detached nature of no further interest in the context of the current study.
- Alluvial deposits occur in most valley bottoms associated with surface water courses, but their regional coverage is small. These unconsolidated alluvial sediments comprise of clay, sand, gravel, and boulder sized grains.

2. Fractured aquifer

Upper fractured aquifer (unconfined to semi-confined) (less than 70 to 90mbgl)

- The weathered aquifer is underlain by a deeper semi-confined to confined fractured aquifer in which fracture flow dominates. The fractured Karoo aquifer consists of the various lithologies of siltstone, shale, sandstone and the coal seams, where groundwater flow is governed by secondary porosities like faults, fractures, joints, bedding planes or other geological contacts, while the rock matrix itself is considered impermeable.
- Geological structures are generally better developed in competent rocks like sandstone, which subsequently show better water yields than the less competent silt- or mudstones. Not all secondary structures are water bearing due to e.g. compressional forces from the neo-tectonic stress field overburden closing the apertures.
- Although the Karoo aquifer supports domestic and stock water requirements in the area, their physical and hydraulic characteristics preclude large scale groundwater exploitation for e.g. irrigation.

Figure 7: Geology Map

5 DESCRIPTION OF SITE HYDROLOGY

5.1 RAINFALL

Rainfall Data for the site was obtained from the WR2005 study (Middleton and Bailey, 2009), the Rainfall Extraction Utility Programme (Kunz, 2004) and the Design Rainfall Estimation Program (Smithers and Schulze, 2002). The daily rainfall extraction utility contains daily patched rainfall data for all official South African Weather Services stations. The rainfall stations considered were close to the site had a reasonable length of record and a relatively complete and reliable data set. Please see Table 5-1.

TABLE 5-1: Rainfall Stations Considered

Station Name	SAWS Number	Distance from Site (km)	Record Length (years)	Mean Annual Precipitation (mm)	Altitude (m AMSL)
PONTDRIFT (POL)	0808253_W	5227.0	32	407	530
GOEREE	0809285_W	5228.8	32	285	618
MESSINA AGRIC RES	0809706_A	5230.0	58	345	530
MACAUVILLE (AGR)	0809706_W	5230.0	71	345	530
MESSINA (POL)	0810081_W	5238.7	33	338	525
PAFURI	0812567_W	5249.0	73	306	200

The Smithers and Schulze method of DDF rainfall estimation is considered more robust than previous single site methods. WRC Report No. K5/1060 provides further detail on the verification and validation of the method. Also, for comparison purposes, rainfall depth estimates for the site using the Hydrological Research Unit (HRU) methodology (WR2005) have also been undertaken for the 24-hour duration event of various return periods. The HRU methodology is a simplistic methodology which enables the estimation of DDF rainfall based on the MAP for the site (592 mm) and a site location factor in order to determine the DDF estimate. Comparison of the 24-hour rainfall depths estimated by each methodology indicates that the Smithers and Schulze method is higher than the HRU method estimates for all events except for the 1:200-year event.

TABLE 5-2: Depth Duration Frequency Estimates for the Site

Duration (hours)	Rainfall Depth (mm)						
	1:2yr	1:5yr	1:10yr	1:20yr	1:50yr	1:100yr	1:200yr
0.08	8.2	11.8	14.5	17.4	21.5	25.0	28.7
0.167	13.3	19.2	23.6	28.3	35.1	40.7	46.8
0.25	17.7	25.5	31.4	37.7	46.6	54.1	62.3
0.5	24.8	35.8	44.0	52.7	65.3	75.8	87.2
0.75	30.1	43.5	53.6	64.2	79.5	92.2	106.1
1	34.6	50.1	61.6	73.8	91.4	106.0	122.1
1.5	42.2	61.0	75.0	89.9	111.3	129.1	148.6
2	48.5	70.1	86.2	103.3	128.0	148.5	170.9
4	56.9	82.2	101.1	121.1	150.0	174.1	200.3
6	62.4	90.2	111.0	133.0	164.7	191.1	219.9
8	66.7	96.4	118.6	142.0	175.9	204.1	234.9
10	70.2	101.4	124.8	149.5	185.2	214.8	247.3
12	73.2	105.8	130.1	155.9	193.1	224.0	257.8
16	78.2	113.0	139.0	166.6	206.3	239.3	275.4
20	82.3	118.9	146.3	175.3	217.1	251.9	289.9
24	85.8	124.0	152.6	182.8	226.4	262.7	302.3

5.2 Average Evaporation And Rainfall

The table below shows the monthly rainfall and evaporation situation around the site, the rainfall around the site is 588.0 mm/year with evaporation of 1925.7 mm/year.

TABLE 5-3: Monthly Rainfall and Evaporation Distribution

Month	Rainfall (mm)	Lake Evaporation (mm)
Jan	97.7	237.6
Feb	69.2	202.1
Mar	51.2	190.4
Apr	42.9	161.1
May	8.1	123.1
Jun	3.4	121.6
Jul	9.9	108.0
Aug	9.7	146.8
Sep	34.0	181.3
Oct	45.3	200.4
Nov	54.5	204.5
Dec	97.2	226.2
Total	**588.0**	**1925.7**

6 CONCEPTUAL STORMWATER MANAGEMENT

6.1 INTRODUCTION

Storm water management involves the effective handling of the quantity and quality of runoff water being discharged into a land or water area. Effective management requires that possible pollution conditions of storm water be addressed adequately as these impact water bodies downstream.

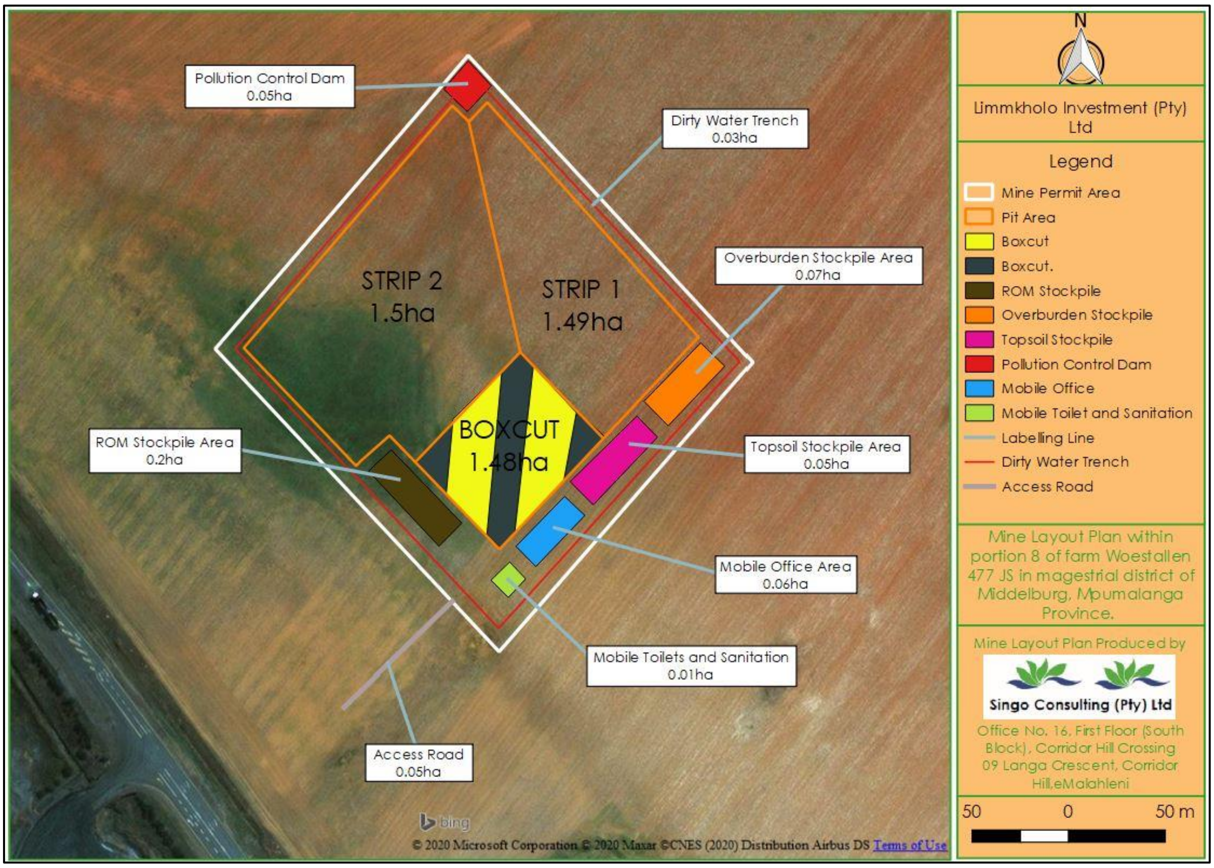

Figure 8: Conceptual Storm Water Management Plan

Mining operations have the potential to impact upon the baseline water quality of an area in the following ways:

- Bulk earthworks during construction will strip vegetation and expose topsoil and subsoils to erosion by storm water thereby increasing levels of suspended solids within local watercourses and water features.
- Stockpiles or waste material dumps will expose various chemical elements to storm water, mobilising elements into local watercourses and water features.

- Storage and usage of process specific chemicals and vehicular related pollutants which, if not effectively managed properly, may be washed by storm water into local watercourses and water features; and
- Discharge of polluted or improperly treated storm water, process water and sewage water into local watercourses or water features.

An impact upon the baseline water quality caused by mineral processing operations may impact upon the local aquatic ecosystems, and/or local human populations who use the water for drinking, washing, irrigating or livestock watering.

In addition to the above, if not managed correctly, stormwater may pose a risk of flooding to a proposed development.

The aim of this conceptual stormwater management plan is to mitigate the above impacts by fulfilling the requirements of the National Water Act (Act 36 of 1998) and more particularly GN 704.

The following definitions from GN 704 are appropriate to the classification of catchments and design of stormwater management measures at the project area:

- **Clean water system** includes any dam, other forms of impoundment, canal, works, pipeline and any other structure or facility constructed for the retention or conveyance of unpolluted (clean) water.
- **Dam:** includes any settling dam, slurry dam, evaporation dam, catchment or barrier dam and any other form of impoundment used for the storage of unpolluted water or water containing waste (i.e. dirty water).
- **Dirty area:** means any area at a mine or activity which causes, has caused or is likely to cause pollution of a water resource.
- **Dirty water system**: this includes any dirty water diversion bunds, channels, pipelines, dirty water dams or other forms of impoundment, and any other structure or facility constructed for the retention or conveyance of water containing waste (i.e. dirty water); and
- **Activity:** means any mining related process on the mine including the operation of washing plants, mineral processing facilities, mineral refineries and extraction plants; the operation and the use of mineral loading and off-loading zones, transport facilities and mineral storage yards, whether situated at the mine or not; in which any substance is stockpiled, stored, accumulated, dumped, disposed of or transported.

6.2 Design Principles for Stormwater Management

Informed by the baseline hydrology of the site and surroundings, a review of the proposed surface infrastructure has been undertaken, and a series of design principles for stormwater management have been developed to ensure compliance with the requirements of GN 704. The proposed conceptual stormwater management plan has the key features which include:

- Dirty stormwater from the waste rock dumps will be collected by perimeter drains and conveyed into the pollution control dam (PCD).
- Dirty stormwater from plant area will be collected by perimeter drains and conveyed into PCD.

In order to meet the design principles detailed above, conceptual design details for the proposed stormwater management measures are presented below, along with the specific hydraulic design standards, methodologies, assumptions and input parameters for each measure proposed.

6.2.1 Control Dam (PCDs)

A single PCD is proposed in the north of the site, which is the lowest point thereby ensuring gravity drainage of runoff from all dirty water catchments identified. The PCD will be lined to prevent seepage of dirty water, which otherwise might pollute local surface and ground water resources. The PCD will feature an engineered spillway to convey design exceedance events through the PCD to the environment without causing erosion of the dam walls, which may compromise the structural integrity of the PCD.

6.2.2 Hydraulic Design Standards

GN 704 requires that dirty water containment facilities are designed, constructed, maintained and operated so that they are not likely to spill into a clean water environment more than once in 50 years.

The following design standards are applied:

- The PCD is sized to accommodate runoff generated from a 1:50 year design rainfall (24 hour) event.

A critical component in sizing of PCDs in accordance with GN 704 is the rate at which water will be pumped from the pond for re-use at the plant.

6.2.3 Design Methodology

Runoff coefficients for the different catchment areas were estimated using Tables 3.7 and 3.8 of the SANRAL Drainage Manual. Different runoff coefficients were used to estimate runoff generated during different intensity storm events, or during a typical wet month.

6.2.4 Design Input Parameters

The design parameters used for sizing the PCD are presented Table 6- 1 in below.

TABLE 6- 1: PCD Design Parameters

1:50 year 24-hour Event

Catchment	Area (KM^2)	Runoff Coef.	Rainfall (mm)
Mine	0.05	0.42	139.1

7.2.5 Recommendations

Recommendations of PCD capacity are presented in Table 6- 2 below.

TABLE 6- 2: Recommendation of PCD Capacity

Facility	Storm Runoff (m^3)	Design Capacity (m^3)	PCD Footprint (m^2)
PCD1	2 500.74	250	500

7 EROSION CONTROL MEASURES

7.1 Introduction

This section provides an overview of best practices for surface erosion protection and sediment control for implementation during the development of surface coal mine. Development of a surface coal mine potentially involves significant land disturbance resulting in increased rates of erosion and sedimentation. A primary objective of erosion protection and sediment control for the development phase is to mitigate the effects of this land disturbance through a process that includes the following components: 1) completing soil and surface / near surface and underground hydrology assessments and integrating this information into the mine development planning and design process so as to avoid higher risk areas if possible, 2) as an output of this process, 2a) drainage management to divert offsite drainage safely around or over the areas of disturbance or sensitive soils, and 2b) developing effective best practices for surface erosion protection and sediment control to mitigate site and phase specific mine development activities, and 3) ensuring processes are in place to implement these best practices in an effective manner. By this approach, integrating the results of soil and hydrology surveys into a proactive mine development planning process is considered a fundamental best practice for mitigating land disturbance associated with surface mining.

7.2 Understanding Erosion Processes

Landscapes disturbed from surface mining will be subject to different erosion processes. Bigatel et al. (1998) describes five main erosion processes, which are summarized in. The primary erosion agent is water. Each process is caused by water impacting the landscape – either in the form of raindrops falling from the sky or flow on the land surface.

TABLE 7- 1: Summary of Five Main Erosion Processes (BIGATEL ET AL. 1998)

Erosion process	Defining characteristics and general approach for mitigation
Splash	• Caused by raindrops impacting the ground and dislodging soil particles. • Severity of erosion increases with the size and velocity of raindrops. • removing vegetation exposes the landscape to splash erosion • Best practices for mitigation include minimizing vegetation removal, applying mulches or installing erosion control blankets to reduce the kinetic energy of raindrops, and establishing a protective layer of vegetation as soon as possible after disturbance.
Sheet	• Occurs when rainfall forms a thin layer of flowing water on the land and transports soil particles dislodged by splash erosion. • Best practices for mitigation are similar to splash erosion but can also include installing sediment fences to disrupt surface water flow paths.
Rill	• Occurs when runoff begins to concentrate in small channels and the shearing force from water begins to erode soil particles. • Evidence of rill erosion is indicated by the presence of small, uniform, parallel channels flowing downslope. • controlling surface runoff is important for minimizing the potential for rill erosion; minimize slope lengths by disrupting surface flow paths also inhibits the potential formation of rills.
Gully	• Represents a progression from rill erosion when the smaller channels intersect to form larger channels; in turn the erosive power of the flowing water increases with increasing volume. • A gully will continue to erode and grow in size until a more erosion resistant layer is reached. • Whereas rills are more easily removed using heavy equipment to re-grade a site, gully erosion leaves large defined channels that can be more difficult to stabilize.
Channel	• Occurs in natural streams and in road, diversion, and collection ditches. is a natural process in stream channels that is exacerbated when the hydrology or channel geometry is impacted by development. • Improperly designed stream crossings can result in localized channel erosion. • Armouring ditches with rock and installing structures to slow water velocities are common practices for mitigating channel erosion in ditches.

There exists a progression from sheet erosion to rill erosion and then to gully erosion. For a disturbed landscape where erosion protection and sediment control practices are not implemented, factors such as topography, climate, and soil characteristics will determine the rate at which these processes progress. The presence of surface and near-surface seepage can exacerbate the erosion process. Integrating the results of overview soil assessments and surface / near surface hydrology assessments into the planning process helps maximize the effectiveness of surface erosion and sediment control best practices by matching the appropriate practice to the erosion process or processes operating at the site and the existing site condition. Figures below are example of some erosion types that causes a serious problem on surface and groundwater.

7.3 IMPLEMENTATION

The best practices provided in an erosion protection and sediment control plan are only effective if implemented according to the plan. In comparison to the operations phase, the development phase of a mine is a much shorter time period. Yet, this phase is the most critical for ensuring the appropriate measures are in place to manage erosion protection and sediment control over the life of the mine. There are two sides to implementation. On the one side, professionals working in the field of erosion and sediment control must produce plans that match site conditions with best practices that will be effective for meeting realistic objectives. On the other side, commitment from the proponent for implementation of the plan comes in the form of providing onsite supervision for specific plan components and making sure all onsite mine staff, from supervisors to contractors are aware of, and committed to, implementing the erosion protection and sediment control measures prescribed for specific phases of development. Specifically, effective implementation requires the responsibility for ensuring proper implementation of these tasks is given to one person who works onsite and oversees all phases of mine development. Ideally, this person would be experienced in erosion and sediment control and would be responsible for monitoring the implementation of the plan on a continual basis.

Effective implementation may also require a plan be adapted to changing circumstances. Continuous monitoring of the implementation of the surface erosion protection and sediment control plan would help facilitate this by identifying when alternative best practices will achieve the same environmental objectives. For one mine currently being developed that we have worked on, having a professional experienced in surface erosion protection and sediment control onsite during specific construction activities has also proven effective for implementing the original plan and adapting the plan to changing circumstances.

7.4 BEST PRACTICES FOR SURFACE EROSION PROTECTION AND SEDIMENT CONTROL

Activities that comprise the development phase of surface mines can be grouped accordingly: linear developments including temporary and permanent roads, and power lines; mine infrastructure and pit area development; and construction of the water management system including diversion and collector ditches and main sediment ponds. Described in the sub-sections below are erosion protection and sediment control best practices relevant to each activity group. The overview is based on Environmental Dynamics' experience working with several proponents mining in northeast BC and review of select literature.

7.4.1 Linear Development – Erosion Control for Road Approaches and Stream Crossings

Establishing permanent self-sustaining vegetation is the most effective means for minimizing erosion from cut slopes and fills slopes and disturbed areas adjacent to road ditches. Seeding and re-seeding with a locally adapted seed mixture is required to establish vegetation. It should be noted that applying fertilizer might be required to establish vegetation that is effective for erosion control. Large, exposed cut slopes and fill slopes do have the potential to form rills after only one or two significant storm events. For this situation, in addition to seeding, Environmental Dynamics has had success minimizing rill erosion by installing straw wattles spaced evenly across the slope on the contour. The straw wattles reduce the length of the slope and minimize the onset of sheet and rill erosion processes, which enables permanent vegetation to establish. Straw mulch and tackifier applied over top of the straw wattles has proven effective for protection from splash erosion.

Significant local channel erosion can also occur in ditches constructed in steeper terrain or in more erodible soils. Standard resource road construction practice aims to minimize erosion by installing cross drain culverts to shorten the length of the ditch and maintain natural drainage patterns. In addition to this measure, armouring specific segments of ditch with rock is an effective means of minimizing channel erosion. Ditch armouring was recommended for certain segments of the main haul road leading to a mine. In this example, the ditch armour prescription was in response to an onsite survey that noted areas of highly erodible soils in close proximity to seepage areas where larger cuts were also required for road construction. This particular road segment was located in steeper terrain along a slope with direct connectivity to a stream channel.

7.4.2 Linear Development - Managing Runoff and Sedimentation from Roads

All linear developments disrupt hillslope hydrology by capturing near-surface water in conduits such as ditches that can quickly deliver runoff to a stream channel. In addition, linear developments expose soil on cut and fill slopes to erosion and reduce the rate of infiltration, which in turn generates greater volumes of surface runoff. Roads crossing streams outside of the mine footprint will convey sediment-laden water directly to downstream aquatic systems and a poorly designed crossing will cause excessive channel erosion.

Runoff control for roads requires construction of ditches to manage drainage. Best practices for managing drainage for roads on or adjacent to surface mines are consistent with methods for constructing any natural resource access road. One effective best practice is to divert ditch drainage to stable, vegetated areas thereby preventing direct input into a stream channel or collection ditch. This approach uses the vegetation as a filter to remove sediment particles in suspension. Structures designed to slow runoff velocities and settle suspended sediments are also effective for removing sediment from runoff contained in ditches that cannot be diverted to stable, vegetated areas. Two types of structures have proven effective. Fifield (1997) provides detailed design specifications for a sediment trap consisting of a small basin that is installed in a ditch or as part of a drainage management system. McBride (2002) describes a similar structure that uses gravel and sandbags to form the ditch block and was highly successful for settling sediment in ditches at mine. Both techniques emphasize that complete removal of sediment is not possible, but that the structures in general are effective for reducing total sediment loads. McBride (2002) highlights the importance of innovation by recommending a cascading series of gravel / sandbag check dams to increase effectiveness of sediment removal. Sediment traps as described by Fifield (1997) have been the typical practice we have prescribed for the projects we have worked on.

7.4.3 Erosion and Sediment Control for Mine Infrastructure and Pit Area Development

Widespread removal of treed vegetation and grubbing of ground cover is required to prepare the pit area for development and the soil stockpile and waste rock areas. A number of practices are recommended to provide erosion protection and sediment control. Much of the treed vegetation present on the sites of recently developed surface coal mines in northeast BC consisted of non-merchantable young pine forests. For one mine development worked on, a tracked mulch machine that removes the trees and turns the wood into mulch was used. The wood chip mulch was immediately returned to the ground. The mulch provided effective protection from splash and sheet erosion for areas scheduled for development in subsequent years

Typical grubbing practice involves moving grubbed material to large discrete piles or wind-rows. The grubbing of stumps and ground shrubs into wind-rows of material placed along the contour has proven an effective temporary runoff and sediment control measure of particular importance when initial grubbing occurs concurrently with construction of the water management system. Temporary ditching and construction of small sediment traps is also effective for managing runoff and sediment in this instance. Small, temporary sediment traps installed close to the area grubbed can help remove a component of the suspended sediment. The size of the traps and their temporary nature does not require an engineered design. The next progression from isolated, smaller, temporary sediment basins is to construct a series of slightly larger ponds that decant from the surface of the upstream pond to a downstream pond. McBride (2002) refers to this design as a series of 'polishing ponds' and reported on their success for helping to meet water quality objectives. A series of ponds enables longer retention times for the settling of suspended sediments.

To date, flocculants have not been used on the projects we have worked on to increase the effectiveness of temporary sediment traps / ponds and the permanent ponds constructed as part of the water management system. It is proposed that environmentally sound flocculants could be used for increasing the effectiveness of temporary and permanent sediment ponds constructed to manage sediment generated from grubbing and site grading.

7.4.4 EROSION PROTECTION AND SEDIMENT CONTROL FOR SOIL STOCKPILES

For sediment control and runoff management, containment berms constructed using existing material and placed around mine infrastructure (work areas, processing areas, stockpiles and waste areas) ensure sediment-laden runoff is contained within the site and or directed down slope to a sediment control structure. Establishing vegetation on stockpiled soils is the primary objective for erosion control. Erosion control practices are nearly identical to those for exposed cut-slope areas. For soil stockpiles, more emphasis is placed on incorporating benches into the final grade of the stockpile to shorten the slope length. 'Tracking' with machinery up and down the slope is effective for minimizing sheet erosion and creating microsites that enhancing seed germination.

7.4.5 CONSTRUCTION OF WATER MANAGEMENT SYSTEM

Construction of the water management system requires development of temporary trails to access collector and diversion ditch segments and the main sediment pond(s) area. Erosion and sediment control issues that arise are concerned with deactivation of the access trails, construction sequencing, and minimizing sedimentation resulting from stream diversions. Standard road deactivation practices provide a means applicable for trail deactivation. Such practices include re-establishing natural drainage patterns, removing any temporary crossing structures installed for access, pulling back fill slopes, using heavy equipment to harrow compacted soils, and re-vegetating exposed mineral soils. For the mining projects worked on northeast BC, practices prescribed have included managing surface runoff so that it is directed toward stable, vegetated areas and re-vegetating trails by applying appropriate erosion control seed mixture. Material excavated to construct diversion and collector ditches is often cast to the side rather than hauled away. Casting material to the downslope side of the ditch is considered a best practice for minimizing the amount of additional sediment input into the water management system. Establishing vegetation on soil cast to the side is the primary means of erosion control.

Engineered design specifications are required to construct the rock armoured collector and diversion ditches that form the water management system. Natural streams are routed into the diversion ditches, which then carry the non-contact water around the mine footprint. While the rock armour protects against channel erosion over the long term, the diversion of a stream into a newly constructed ditch can produce a significant sediment pulse. The risk associated with the pulse depends on the magnitude and duration of the pulse and the distance to fish-bearing reaches. For segments of ditch considered higher risk, using structures to impound flow at the downstream end of ditch segments and a water pump to remove sediment-laden water (i.e. pump the sediment-laden water to a stable vegetated area) is an effective means for reducing the magnitude and duration of the sediment pulse. A similar structure to a rock check dam or a gravel / sandbag dam placed in the ditch is used to block the flow of water. Once the risk to downstream aquatic values has been reduced to an acceptable level, the structure used to block flow is removed.

8 SURFACE WATER IMPACT ASSESSMENT

This exercise of risk identification and mitigation involves identification of streams found downstream of the proposed development, as well as a description of the identified risks the environment may incur during the various phases of the project.

The risk rating matrix methodology used is based on the following quantitative measures:

- The probability of impact occurrence.
- The frequency of impact occurrence.
- The special extent of impact occurrence.
- The intensity of impact occurrence; and
- Duration of impact occurrence.

Risk significance value = (magnitude + duration + intensity + frequency) x probability

The maximum value is 18 risk points and ratings are scaled from high, medium to low in respect to their environmental impact. The ranking system used in the study is presented in TABLE 8- 1.

TABLE 8- 1: Risk Assessment Significance Value

The maximum value that can be achieved is 100 Significance Points (SP). Environmental effects were rated as follows:		
Significance	**Environmental Significance Points**	**Colour Code**
High (positive)	>60	H
Medium (positive)	30 to 60	M
Low (positive)	<30	L
Neutral	0	N
Low (negative)	>-30	L
Medium (negative)	-30 to -60	M
High (negative)	<-60	H

Status of Impact

+: Positive (A benefit to the receiving environment)

N: Neutral (No cost or benefit to the receiving environment)

-: Negative (A cost to the receiving environment)

Magnitude: =M	***Duration: =D***
10: Very high/don't know	5: Permanent
8: High	4: Long-term (ceases with the operational life)
6: Moderate	3: Medium-term (5-15 years)
4: Low	2: Short-term (0-5 years)
2: Minor	1: Immediate
0: Not applicable/none/negligible	0: Not applicable/none/negligible
Scale: =S	***Probability: =P***
5: International	5: Definite/do not know
4: National	4: Highly probable
3: Regional	3: Medium probability
2: Local	2: Low probability
1: Site only	1: Improbable
0: Not applicable/none/negligible	0: Not applicable/none/negligible

8.1 Construction Phase

The construction phase consists of the following activities:

- Footprint area clearance.
- The construction of the total clean water and dirty water diversion trenches; and
- Handling of truck fuel and oil spills.

8.1.1 SURFACE WATER CONTAMINATION

Truck oils and fuel could lick and spill to water resources. All oils and fuels must be stored in banded areas and any spillages must be managed immediately in accordance with the Emergency Response plan. The emergency response plan must be provided by contractors. This will reduce the risks from High to low.

8.1.2 SILTATION OF SURFACE WATER

Footprint clearance will expose soil. Prior to construction, clean and dirty separation infrastructure need to be in place to manage runoff velocity preventing erosion gullies. The risk will be reduced from high to low.

8.2 OPERATIONAL PHASE

During the operational phase, coal will be mined and processed in the crushing and screening plant. The coal will be washed and transported by truck to the stockpile area after processing. The associated residue will be disposed of at the discard dump facility

The Operational phase consists of the following activities:

- Exposure of soil surface and ineffective rehabilitation.

TABLE 8- 2: Operational Impact Assessment

Issue	**Site Description**	**Corrective measures**	**Impact rating criteria**					**Significance**
			Nature	Extent	Duration	Magnitude	Probability	
Decrease in water quality attributable to increased sediment load	Haul Roads and service road	No	Negative	2	1	6	8	72 High
		Yes	Negative	1	1	2	4	16 Low
Corrective Actions	▪ The water quality of the rivers and the planned canals will be controlled regularly, as outlined in the operational management plan ▪ Dust control should be carried out i.e. a water bowser should conduct dust suppression ▪ To track the efficacy of erosion control initiatives, a soil erosion evaluation must be performed biannually ▪ To prevent and manage sediment transport, a maintenance schedule must be drawn up for road maintenance. Among other aspects, the plan should include the maintenance of berms, and the dissipation and channelling of mechanisms such as wind rows. This will also assist in ensuring safe and polluted water is differentiated by obligations to the laws of the GN704 Regulations. ▪ The water quality of the rivers and the planned canals will be controlled regularly, as outlined in the operational management plan							

TABLE 8- 3: Subsidence Impact Assessment: Operational Phase

Issue	Site Description	Corrective measures	Impact rating criteria					Significance
			Nature	Extent	Duration	Magnitude	Probability	
Changes in the overall Hydrologic Regime	Subsidence due to undermining	No	Negative	2	4	10	4	72 High
		Yes	Negative	1	3	6	3	36 Medium
Corrective Actions	▪ Alteration in mining techniques can control damage to subsidence; post-mining stabilisation; architectural and structural design; and comprehensive planning. But none of these measures totally prevents subsidence ▪ Since it is not feasible to integrate all the variables into the design of a protective layer, mitigations using buffer zones will probably fail to avoid impacts on aquifers or watersheds where underground mining is being proposed. ▪ To be successful, seal designs should be site-specific, performance-based and address geotechnical and hydrogeological requirements							

TABLE 8- 4: Haul Roads Impact Assessment: Operational Phase

Issue	Site Description	Corrective measures	Impact rating criteria					Significance
			Nature	Extent	Duration	Magnitude	Probability	
Decrease in water quality due to increased sediment load	Haul Roads and service road	No	Negative	2	2	6	9	72
		Yes	Negative	1	2	3	5	16
Corrective Actions	▪ The water quality of the rivers and the proposed canals should be monitored monthly, as outlined in the operational management plan ▪ Dust reduction/management should be carried out i.e. a water bowser should perform dust suppression ▪ To avoid and control sediment transport, a maintenance plan must be drawn up for road maintenance. The program will include, among other things, dissipating and channelling mechanisms such as wind rows, the maintenance of berms and distance. It will also aid in the separation of clean and polluted water through contributions to the regulations of the							

	GN704 Regulations. ▪ To track the efficacy of erosion control initiatives, a soil erosion evaluation must be performed biannually

8.2.1 MANAGEMENT AND MITIGATION-OPERATIONAL PHASE

Dewatering is needed for safe working conditions and mine operational stability, and the impacts will be extremely high during mining. This can have a huge negative impact on surface water as well.

The update and continuation of the Surface water monitoring plan during operation should be focussed on the areas and Surface water users likely to be impacted by mining operations. The collected monitoring information should be used as part of an active water management system and to act as an early warning system for unacceptable levels of impacts. Where it is evident that surface water users are impacted by contamination of surface water, an alternative water supply / compensation should be made available to the affected parties.

Installing lining systems in all water storage facilities will mitigate any possible inlet of bad water quality to the groundwater systems underlying it as well as surface water bodies around that certain facility.

8.3 IMPACT ASSESSMENT – CLOSURE PHASE

The closure phase will be in accordance with an agreed and approved closure plan for the proposed project.

The depletion of watercourse habitat as a result of dismantling the facilities is the one big danger to the study area's hydrological regime. Decommission refers to the conclusion of project life and the elimination of the facilities connected to the project. Anticipated impacts contribute to eliminating all aspects of the network. During the decommissioning phase, it may be possible that some infrastructure would remain in place, such as vehicle access tracks due to the insistence of landowners or other third parties who used to use them during the project's operational phase.

Removal of infrastructure without rehabilitation (no mitigation scenario) will result in a high to medium impact on watercourse habitat in both alternatives corridors, while the design and implementation of site-specific rehabilitation during the decommissioning phase (with mitigation scenario) will result in a medium to low impact in both alternatives corridors.

TABLE 8- 5: Mine Operation Area Impact Assessment: Decommissioning Phase

Issue	Site Description	Corrective Measures	Impact rating criteria					Significance
			Nature	Extent	Duration	Magnitude	Probability	
Runoff and drainage from mine operation area continue to yield polluted water & Siltation of water courses	Proposed site	No	Negative	4	3	9	3	60 Medium
		Yes	Negative	2	3	5	2	38 Low
	▪ Effectively control waste to prevent pollution of water supplies ▪ Hold polluted water isolation systems in place before the site is rehabilitated and drain clear ▪ Rehabilitation as soon as possible, maintenance of erosion control for rehabilitation time							

TABLE 8- 6: Haul Roads Impact Assessment: Operational Phase

Issue	Site Description	Corrective measures	Impact rating criteria					Significance
			Nature	Extent	Duration	Magnitude	Probability	
Decrease in water quality due to increased sediment load	Haul Roads and service road	No	Negative	2	2	6	9	72
		Yes	Negative	1	2	3	5	16
Corrective Actions	▪ The water quality of the rivers and the proposed canals should be monitored monthly, as outlined in the operational management plan ▪ Dust reduction/management should be carried out i.e. a water bowser should perform dust suppression ▪ To avoid and control sediment transport, a maintenance plan must be drawn up for road maintenance. The program will include, among other things, dissipating and channelling mechanisms such as wind rows, the maintenance of berms and distance. It will also aid in the separation of clean and polluted water through contributions to the regulations of the GN704 Regulations. ▪ To track the efficacy of erosion control initiatives, a soil erosion evaluation must be performed biannually							

9 MONITORING PLANS

9.1 Surface Water Quality

A surface water quality monitoring programme is essential as a management tool to detect negative water quality impacts as they arise and to ensure that the necessary mitigation measures are implemented. Monthly monitoring should be implemented at least a year prior the commencement of construction activities to establish a baseline that captures all seasons, and then throughout the construction, operation, closure and post closure phases.

Reporting should be done on a quarterly basis (or as recommended by the DWS) and reports should be submitted to the DWS. Monitoring reports must include trend analyses, as well as separate table/s where results received from the lab are compared to standard/guideline indicating any parameters that may have exceeded limits.

9.2 Water Quantity Monitoring

For efficient management of water on the site, a good understanding of the site water balance will be required. To achieve this, the following monitoring will be needed:

- Rainfall – to be measured daily on site.
- Flows – including the following, to be measured weekly:
    - Mine water can pumped from the opencast workings.
    - Inflows to the Pollution Control Dams.
    - Water pumped from the Pollution Control Dams for reuse in the operations.
    - Potable water use.

9.3 Data Management and Reporting

9.3.1 Monthly

The monthly report is an internal report which is used to keep records of changing water quantities at the site. The report will include:

- Sites that are assessed.
- Flow rates on site

9.3.2 QUARTERLY

Quarterly report that may be required for submission to the DMR / DWS may consist of the following components:

- Brief compliance assessment description.
- Brief description of monitoring actions performed.

- Highlight significant issues that require immediate corrective/ preventative action.

9.3.3 Annually

The annual report consists of all the active environmental components, and for the chapter on surface water, the following components should be included:

- **System audit:**
    - Statutory/ regulatory requirements.
    - Monitoring infrastructure.
    - Data captured.
    - Information generation.
    - Management of system liquids
- **Data audit:**
    - Verification of data.
    - Setting of new objectives or recommendation of corrective measures.
    - Dam level status report.

9.4 Recommended Monitoring Framework

For the surface water component, monitoring of the downstream water resources as well as operation of the storm water system to ensure conveyor systems adequately designed and operated is important. **Error! Reference source not found.** sets out the proposed monitoring framework that includes:

- Monitoring of impact management actions.
- Monitoring and reporting frequency.
- Time period for implementing impact management actions; and.
- Mechanisms for monitoring compliance.

TABLE 9- 1: Proposed monitoring actions for the Surface Water Component

Source Activity	Impacts requiring monitoring programs	Functional requirements for monitoring	Monitoring and Reporting frequency and time periods for implanting impacts management actions.
Earth works and vegetation clearing during construction and decommissioning	Erosion (sedimentation) and surface water contamination	Assess area for erosion and Spillages.	Weekly or daily during high rainfall periods until construction and decommissioning are complete.
Use and storage of chemicals, including refuelling areas	Contamination (leaks/ spills/ overflows) from storage areas	Maintain storage areas; Clean and dispose in accordance with legislation.	Daily inspection to ensure no leaks is visible; Clean-up in the event of spills.
Operations	Maintenance of the stormwater management system, including the PCD	Monitor and maintain stormwater containment systems. Clean and dispose in accordance with legislation. Take samples from PCD as necessary if stormwater is to be discharged and analyse for hydrocarbons and metals to assess level of contamination. Monitor water resources.	Weekly or daily inspection during high rainfall periods. Monthly/ quarterly water quality samples for PCD and downstream water resources.

10 CONCLUSION AND RECOMMENDATION

- The site layout and project infrastructure has been reviewed in the context of the baseline hydrology and a series of mitigation measures developed for the project to minimise impacts and ensure compliance with GN 704.
- It is not expected that the proposed mining activities might have a significant impact on the water resources mostly due to the fact that the activities are located approximately 450m away from the nearest water resource.

The following recommendations should be considered for this proposed mining project:

- Monitoring of the surface water quality shall be carried out regularly during the project's construction and operating phases.
- The project's development process will be undertaken during the dry months to mitigate pollutant runoff.
- An independent ECO is to be appointed during construction. The mine's internal Environmental officers will be conversant with best practices in accordance with rehabilitation during decommissioning and an audit is to be performed before and after rehabilitation.
- Where mining infrastructure is required across natural watercourses, new storm water infrastructure such as pipes and culverts could replace the hydraulic function currently being offered by natural watercourses. Its system should be built for both the hydraulic and environmental efficiency. A thorough assessment of the appropriateness of the new stormwater infrastructure must be carried out at the preliminary design stage.
- Prevention of pollution of surface water resources and impacts on other surface water users by training of workers to prevent pollution, equipment and vehicle maintenance, fast and effective clean-up of spills, effective waste management, manage clean and dirty water in accordance.

11 REFERENCES

1. Darwall, W.R.T., Smith, K.G., Tweddle, D. & Skelton, P.H. (2009). The status and distribution of freshwater biodiversity in southern Africa. Gland, Switzerland: IUCN and Grahamstown, South Africa: SAIAB.120pp.
2. Department of Water, January 2013. Managing the hydrology and hydrogeology of water dependent ecosystems in urban development, Guidance Note 7.
3. Water Research Commission (2012) Water Resources of South Africa, 2012 Study (WR 2012.

APPENDIX A: (SANRAL TABLE 3.7)

Table 3.7: Recommended values of run-off factor C for use in the Rational method

Rural (C_1)					Urban (C_2)	
Component	**Classification**	**Mean annual rainfall (mm)**			**Use**	**Factor**
		< 600	**600 - 900**	**> 900**		
Surface slope (C_s)	Vleis and pans (<3%)	0,01	0,03	0,05	*Lawns*	
	Flat areas (3 to 10%)	0,06	0,08	0,11	- Sandy, flat (<2%)	0,05 – 0,10
	Hilly (10 to 30%)	0,12	0,16	0,20	- Sandy, steep (>7%)	0,15 – 0,20
	Steep areas (>30%)	0,22	0,26	0,30	- Heavy soil, flat (<2%)	0,13 – 0,17
					- Heavy soil, steep (>7%)	0,25 – 0,35
Permeability (C_p)	Very permeable	0,03	0,04	0,05	*Residential areas*	
	Permeable	0,06	0,08	0,10	- Houses	0,30 – 0,50
	Semi-permeable	0,12	0,16	0,20	- Flats	0,50 – 0,70
	Impermeable	0,21	0,26	0,30		
					Industry	
Vegetation (C_v)					- Light industry	0,50 – 0,80
	Thick bush and plantation	0,03	0,04	0,05	- Heavy industry	0,60 – 0,90
	Light bush and farm lands	0,07	0,11	0,15	*Business*	
					- City centre	0,70 – 0,95
	Grasslands	0,17	0,21	0,25	- Suburban	0,50 – 0,70
	No vegetation	0,26	0,28	0,30	- Streets	0,70 – 0,95
					- Maximum flood	1,00

APPENDIX B: (SAMRAL TABLE 3.8)

Table 3.8: Adjustment factors for value of C_1

Return period (years)	2	5	10	20	50	100
Factor (F_t) for steep and impermeable catchments	0,75	0,80	0,85	0,90	0,95	1,00
Factor (F_t) for flat and permeable catchments	0,50	0,55	0,60	0,67	0,83	1,00

DETAILED SOIL STUDY FOR SOTHABA CAPITAL (PTY) LTD COAL MINING PERMIT APPLICATION WITHIN ON PORTION OF PORTION 08 OF THE FARM WOESTALLEEN 477 JS, SITUATED UNDER MAGISTERIAL DISTRICT OF MIDDLEBURG, MPUMALANGA PROVINCE.

DMR REF NUMBER: MP 30/5/1/3/3/2/11712 MP

PREPARED BY

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PREPARED FOR

SOTHABA CAPITAL (PTY) LTD

2020

Executive Summary

This document is a detailed soil study including soil classification and agricultural potential prepared for Coal mining permit application on portion of portion 08 of the farm Woestalleen 477 JS, situated under magisterial district of Middleburg, Mpumalanga Province. Sothaba Capital (Pty) Ltd appointed Singo consulting (Pty) Ltd to conduct this soil study. The main aim of conducting this study is to find information with regards to the soil potential, land use as well as land capability.

Importance of the study

- The main significance of soil study is to conduct an Environmental Impact Assessment for the soils, land capability and land use, and propose mitigation measures for significant impacts.
- To assess the nature of the site in relation to the overall environmental state before mining and determine the impact to be caused by the proposed mining activity. It also gives a permanent record of the present soil resources in the area that are potentially going to be affected by the proposed mining permit.
- The study will assess present land use and land capability within the proposed surface disturbance. The study also helps to estimate how the soil will be impacted by mining activities.

Description of the scope of the proposed overall activity

The mining method proposed involves open cast extraction of coal from a pit to be established on virgin ground. The topsoil and overburden soil will be stockpiled and reserved for rehabilitation. Coal will be stockpiled on the topsoil and all activities will be contained within the boundaries of the mining site. Therefore, almost all of the topsoil within the applied area will be disturbed during mining activities.

The general activities that will take place will include:

- Access & Haul roads (with necessary security) including the upgrading of the access point to the gravel road
- Contractor's Yard with septic/chemical ablution facilities
- Offices
- Workshop and stores (with septic/chemical ablution facilities)
- Diesel facilities and a hardstand
- Boxcut
- Stockpiles (topsoil, overburden, subsoil/softs, ROM)

- Surface water management measures (storm water diversion berms and trenches, pollution control dams, tailings dam etc.)

The construction of all infrastructure associated with the project will be within the Coal Mine project boundary. This report describes the soil types and properties present thereby giving a detailed baseline soil assessment of the undisturbed areas. The major soil types present are undifferentiated structureless soil.

Potential impacts on soil

Construction phase

During the **construction phase** of the listed project activities, the work carried out will mainly be the construction of the haul roads and access, surface water management measures, new roads and construction of stock yard and stockpiles. This will entail the clearing of areas and the disturbance of the topsoil through excavations as well as soil stockpiling.

The topography and natural drainage lines may also be disturbed. The overall impact will be loss of topsoil as a result of erosion as well as potential contamination of the soil by coal and pseudocoal dust, fuel, and oils (hydrocarbons) as a result of general construction activities. Soil compaction caused by heavy vehicles and machinery may also be an additional problem. Construction activities will change the current land use to mining. In terms of the fuel storage depot, new roads and construction of stock yard and stockpile sites, there will be no substantial change to the land use within these areas.

Operational phase

Soil erosion through wind and storm water run-off, soil pollution by means of hydrocarbon contamination and potentially coal and pseudocoal dust may be encountered during the operational phase. Water runoff from roads and around the permit area must be controlled and managed by means of proper storm water management facilities in order to prevent soil erosion. Diesel and oil spills are common at mine sites due to the large volumes of diesel and oil consumed by construction vehicles. Pollution may however be localized. Small pockets of localized pollution may be cleared up easily using commercially available hydrocarbon emergency clean-up kits.

An additional impact that could occur (would be minor) is when soils are stripped and stockpiled as the natural sequence of the soil horizons is lost when stripping and stockpiling is undertaken. An associated impact could be compaction of soil stockpiles, if they are repeatedly driven over, which would result in compaction of soil stockpiles if the appropriate

dumping techniques are not adopted. This can be mitigated by demarcating soil stockpiles and minimize or prevent driving over stockpiles. Driving on soil stockpiles should be avoided were possible to avoid compaction. End tipping as a method of creating stockpiles can be adopted to avoid unnecessary compaction.

Decommissioning Phase

Mining infrastructure must be removed during the deconstruction phase. All foundation excavations must be backfilled and then covered with subsoil material and topsoil on the top layer, fertilized and re-vegetated. Backfilling of soil will impact on the land capability by restoring the land capability because vegetation can be supported and therefore returned to grazing. As open cast mining progresses and enough space is available concurrent rehabilitation should be undertaken, this would include backfilling, contouring and re-vegetation of impacted areas. This would typically be done during the operational phase, as concurrent rehabilitation, and during the decommissioning phase.

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1 Introduction

1.1 Background Information

This document is a basic soil study including soil classification and agricultural potential prepared for Coal on portion of portion 08 of the farm Woestalleen 477 JS, situated under magisterial district of Middleburg, Mpumalanga Province. Sothaba Capital (Pty) Ltd appointed Singo consulting (Pty) Ltd to conduct this soil study. The main aim of conducting this study is to find information with regards to the soil potential, land use as well as land capability. This Mining Area, as seen in Figure 1 below, is situated approximately 26.3 km south-east of Middelburg town along N11, approximately 49.2 km south-east of eMalahleni and approximately 75.9 km northern side of Ermelo

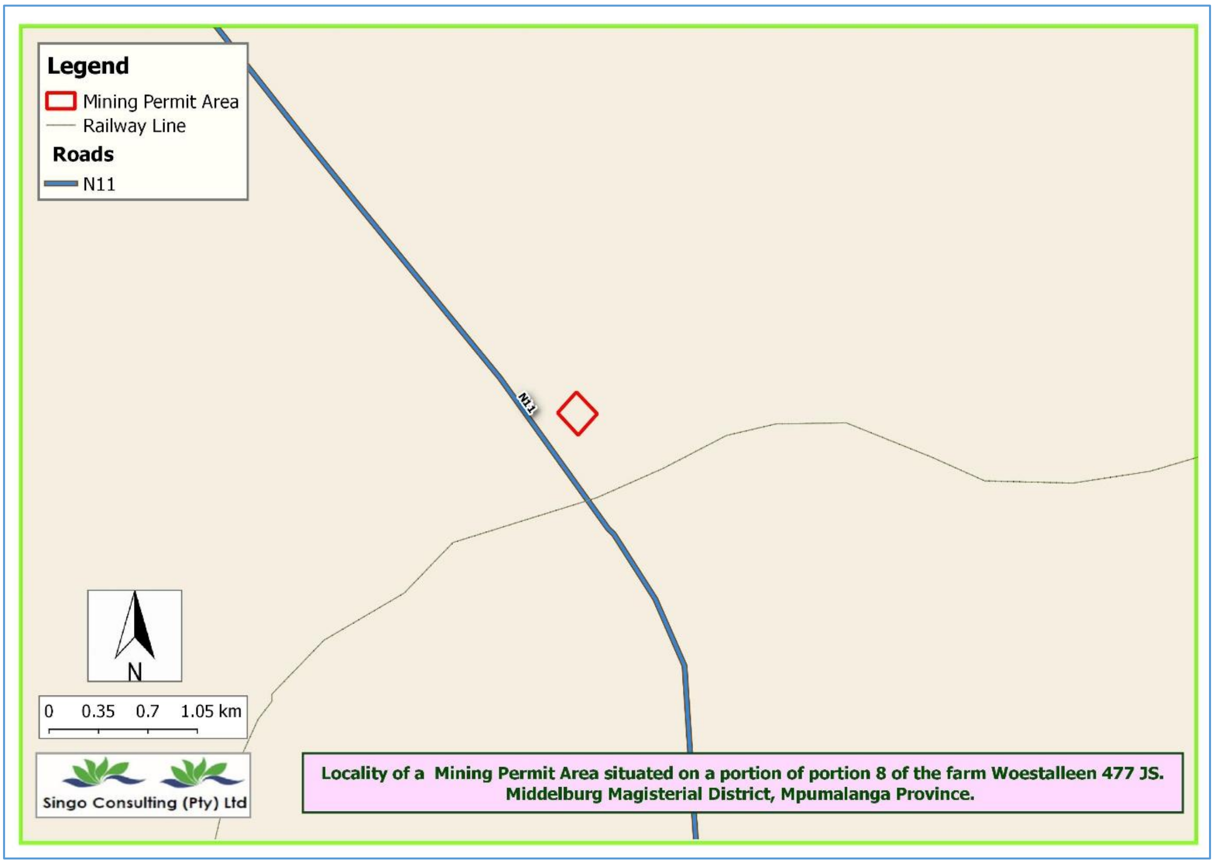

Figure 1: Locality map of the project area

1.2 Soil definition

Soil basically has no official and concise definition, but is often defined in terms of its composition, functions as well as the Origin and formation. In terms of composition soil is a mixture of partially weathered rock and mineral fragments, organic matter, Air, and water in the pore spaces. The soil or pedosphere is a sink and source for nutrients, water and gasses in the ecosystem and plays an important role in the cycling of nitrogen, phosphorus, Sulphur, carbon, water and other elements between the hydrosphere, lithosphere, and biosphere.

Human beings have utilised soil as a building and engineering medium for millennia. Magnificent structures, such as the Egyptian pyramids and the Mayan temples at Chichen Itza and Uxmal, illustrate the insight ancient Mediterranean and Mesoamerican civilisations had on the interactions between structures and the soil. In modern day engineering the designing and construction of any structure, e.g. foundations, dams, tunnels, roads, mines, hazardous waste landfills etc, require insight into the engineering properties of soil.

The vast majority of plants cannot survive or reproduce without soil. Soil anchors plants and supplies it with water and nutrients. Whether it is a forest, wetland or grassland, the vigour of these ecosystems is linked with the health of the soil and its ability to supply the plants it supports with nutrients and water.

The decomposition of organic matter in the soil releases nutrients, which in turn, are assimilated by living organisms. Soil is a terrestrial depository or reservoir for nitrogen, phosphorus, sulphur, as well as carbon and plays an important role in the cycling of these elements on earth. All this information tells us how important soil studies are and therefore studies like this one are relevant with an aim of protecting soil that could not possibly be negatively impacted by human activities.

This report discusses the dominating soils present within the proposed mining site, including the physical and chemical properties which characterize the soil. Furthermore, the results from the assessment have been used to determine the existing land capability and current Land Use within the listed proposed development footprint areas.

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2 Project Description

Mineral Applied For: Coal resources

Mining Methods: Open Cast Mining

Life of Mine: 2 years lifespan

Potential Market: International markets, Eskom, other domestic (i.e. coal stove & power generation) and (i.e. for steel production, liquid fuel and for cement manufacturing).

The mining method proposed involves open cast extraction of coal from a pit to be established on virgin ground. The topsoil and overburden soil will be stockpiled and reserved for rehabilitation. Coal will be stockpiled on the topsoil and all activities will be contained within the boundaries of the mining site. Therefore, almost all of the topsoil within the applied area will be disturbed during mining activities.

Infrastructures that will be used:

- ❖ Access & Haul roads (with necessary security) including the upgrading of the access point to the gravel road
- ❖ Contractor's Yard with septic/chemical ablution facilities.
- ❖ Offices
- ❖ Workshop and stores (with septic/chemical ablution facilities)
- ❖ Diesel facilities and a hardstand
- ❖ Boxcut
- ❖ Stockpiles (topsoil, overburden, subsoil/softs, ROM)
- ❖ Surface water management measures (storm water diversion berms and trenches, pollution control dams, tailings dam etc.)

3 Terms of Reference

The following tasks were undertaken in the compilation of the soil assessment, land use and land capability study:

3.1 Soil Study

- ❖ A detailed baseline soil assessment of the proposed project development footprint areas associated within the proposed Coal Mine site

- The soil classification will be done according to the Taxonomic Soil Classification System for South Africa, 1991. The following attributes were included at each observation:
    - Soil form and family
    - Soil depth
    - Estimated soil texture
    - Soil structure
    - Underlying material
    - Current land use
    - Land capability

4 Expertise of the specialist

Table 1: Expertise of the specialist

Junior Hydrogeologist (Mutshidzi Munyai)
Mutshidzi Munyai holds a BSc geology degree (Majoring in Geology and Soil Science) from the university of Pretoria as well as an honours degree in Geohydrology from the University of the Free State. Mutshidzi Munyai is competent and can write comprehensive reports applying the combination of the knowledge obtained from the tertiary level education. **Contact**: Email : mutshidzi@singoconsulting.co.za Tel : 0769244356
Junior Environment Consultant (Livhuwani Sigwadi)
Livhuwani Sigwadi holds an honours degree in Environmental Management obtained from the University of Venda. He possesses supreme experience in the environmental field especially on conducting soil surveys and doing technical analysis thereof. **Contact:** Email : livhuwani@singoconsulting.co.za Tel : 0766529062

5 Soil survey Methodology

5.1 Soil survey procedures

This allows soil surveyors to enter and study colour, texture, structure, and other soil properties as well to differentiate between horizons. This allows for classification. Chemical tests can be carried out in the field (e.g. pH, test for carbonates and test for Mn oxides). Classification is done at this stage, which provides information on the chemical, physical and mineralogical characterization of the soil. Soil scientists that map the area, familiarize themselves with soils they expect to find and use characteristics to distinguish them from other soils in the area by doing desktop study.

Delineating soil boundaries

Pits cannot be dug randomly, usually a map of the area will be taken and a grid will be made on the map to determine where samples will be taken from. An efficient soil mapper looks at changes in vegetation, topography, and soil colour. A bare soil map can also be looked at to see where changes in colour occur indicating differences in soil. Once sites are established, soil samples will be taken with a soil auger. **Soil augering** is the principle method used but intrusive and labour intensive

5.2 Soil and land capability

Land capability depends on soil capability in combination with climate. The land capability depends on soil depth which will be determined at soil survey positions. Survey positions will be recorded as waypoints using a handheld (Global Positioning System (GPS)). Present land use will be determined during the soil survey and it will be explained in chapter 6 of this report.

5.3 Structure of the SA classification system

Procedure to follow when identifying a soil:

- Demarcate master horizons in profile.
- Identify diagnostic horizons/materials.
- Establish soil form
- Establish soil family.
- Determine textural class.

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5.4 Environmental Impact Assessment

The impact rating process is designed to provide a numerical rating of the various environmental impacts identified by use of the Input-Output model. As discussed above, it has to be stressed that the purpose of this process is not to provide an incontrovertible rating of the significance of various aspects, but rather to provide a structured, traceable and defendable methodology of rating the relative significance of impacts in a specific context. This gives the project proponent a greater understanding of the impacts of this project and the issues which need to be addressed by mitigation and also give the regulators information on which to base their decisions.

The significance rating process follows the established impact/risk assessment formula:

Significance= Consequence x Probability

Where

Consequence = Severity + Spatial Scale + Duration

Probability = Likelihood of an impact occurring

The matrix calculates the rating out of 147, whereby Severity, Spatial Scale, Duration and Probability are each rated out of seven as indicated in Table 2. Weighting can be applied to the various parameters.

Impacts are rated prior to mitigation and again after consideration of the mitigation measure proposed in the Environmental Management Plans (EMP). The significance of an impact is then determined and categorized into one of four categories, as indicated in Table 3, which supports Table 2. Management actions will be assigned for all identified impacts.

A neutral impact implies that it causes the area to return to a pre-project state. This is not regarded as positive, as there would be no need for this activity if the operation were not carried out.

Table 2: Impact assessment parameter ratings

Rating	Severity		Spatial scale	Duration	Probability
	Environmental	Social, cultural and heritage			
7	Significant impact on the environment. Irreparable damage to highly	Irreparable damage to highly valued items of great cultural significance or	International The effect will occur across international borders	Permanent: No Mitigation No mitigation measures of natural process will	Certain/Definite. The impact will occur regardless of the implementation of

	valued species, habitat or eco system. Persistent severe damage	complete breakdown of social order.		reduce the impact after implementation	any preventative or corrective actions.
6	Significant impact on highly valued species, habitat or ecosystem	Irreparable damage to highly valued items of cultural significance or breakdown of social order.	National Will affect the entire country	Permanent: Mitigation measures of natural process will reduce the impact	Almost certain/Highly probable It is most likely that the impact will occur
5	Very serious, long term environmental impairment of ecosystem function that may take several years to rehabilitate	Very serious widespread social impacts. Irreparable damage to highly valued items.	Province/ Region Will affect the entire province or region	Project Life The impact will cease after the operational life span of the project	Likely The impact may occur
4	Serious medium term environmental effects. Environmental damage can be reversed in less than a year On	On-going serious social issues. Significant damage to structures / items of cultural significance	Municipal Area Will affect the whole municipal area	Long term 6-15 years	Probable Has occurred here or elsewhere and could therefore occur
3	Moderate, short-term effects but not affecting ecosystem function. Rehabilitation requires intervention of external specialists and can be done in less than a month	On-going social issues. Damage to items of cultural significance. Local	Local Local extending only as far as the development site area	Medium term 1-5 years	Unlikely Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur

2	Minor effects on biological or physical environment. Environmental damage can be rehabilitated internally with/ without help of external consultants	Minor medium-term social impacts on local population. Mostly repairable. Cultural functions and processes not affected.	Limited Limited to the site and its immediate surroundings	Short term Less than 1 year	Rare/ improbable Conceivable, but only in extreme circumstances and/ or has not happened during lifetime of the project but has happened elsewhere. The possibility of the impact materialising is very low as a result of design, historic experience or implementation of adequate mitigation measures
1	Limited damage to minimal area of low significance, (e.g. ad hoc spills within plant area). Will have no impact on the environment.	Low-level repairable damage to commonplace structures	Very limited Limited to specific isolated parts of the site.	Immediate Less than 1 month	Highly unlikely/None Expected never to happen

Table 3: Probability Consequence Matrix

	Consequence (severity + scale + duration)									
		1	**3**	**5**	**7**	**9**	**11**	**15**	**18**	**21**
Probability/Likelihood	**1**	**1**	**3**	**5**	**7**	**9**	**11**	**15**	**18**	**21**
	2	**2**	**6**	**10**	**14**	**18**	**22**	**30**	**36**	**42**
	3	**3**	**9**	**15**	**21**	**27**	**33**	**45**	**54**	**63**
	4	**4**	**12**	**20**	**28**	**36**	**44**	**60**	**72**	**84**
	5	**5**	**15**	**25**	**35**	**45**	**55**	**75**	**90**	**105**
	6	**6**	**18**	**30**	**42**	**54**	**66**	**90**	**108**	**126**
	7	**7**	**21**	**35**	**49**	**63**	**77**	**105**	**126**	**147**

Table 4: Impact significance threshold limits

Significance		
Low	**0 - 35**	
Low-Medium	**36 - 76**	
Medium- High	**73 - 107**	
High	**108 - 147**	

6 Description of the Receiving Environment

The proposed coal is located approximately 26.3 km south-east of Middelburg town along N11, approximately 49.2 km south-east of eMalahleni and approximately 75.9 km northern side of Ermelo. The proposed permit Woestalleen 477 JS within Steve Tshwete local municipality, District Nkangala in Mpumalanga Province.

6.1 Climate

The Middleburg lies on 1410m above sea level. Middleburg's climate is classified as warm and temperate. In winter, there is much less rainfall than in summer. The average annual temperature is 15.4 °C. About 693 mm of precipitation falls annually. The least amount of rainfall occurs in July. The average in this month is 6 mm. With an average of 119 mm, the most precipitation falls in January. The temperatures are highest on average in January, at around 20.1 °C. June has the lowest average temperature of the year It is 8.7 °C. The variation in the precipitation between the driest and wettest months is 113 mm. During the year, the average temperatures vary by 11.4 °C.

6.2 Soil

A map in Figure 2 was produced from a desktop study. From the map, it can be deduced that the mining area is covered with undifferentiated structureless soils.

The area consists of undifferentiated structureless soil that is confirmed on a soil map by GIS specialist. This type of soil is having few limitations that restrict its use; it may be used safely and profitably. Suitable land with negligible limitations and is highly productive requiring only simple management practices. When it used for crops it need ordinary management practice to maintain productivity. They are easily worked and are also fairly well supplied with plant nutrients or are highly responsive to inputs of fertilizer.

Primary topsoil is the uppermost layer of soil used in site rehabilitation. It is salvaged from the surface horizons of areas to be disturbed, is relatively stable, contains seeds and

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microorganisms and is relatively fertile. Secondary topsoil (if used) is placed directly in contact with waste rock and may be obtained from subsurface soil horizons, including weathered rock. The color of soil identified during site assessment in the proposed area are dark brown to red and light brown.

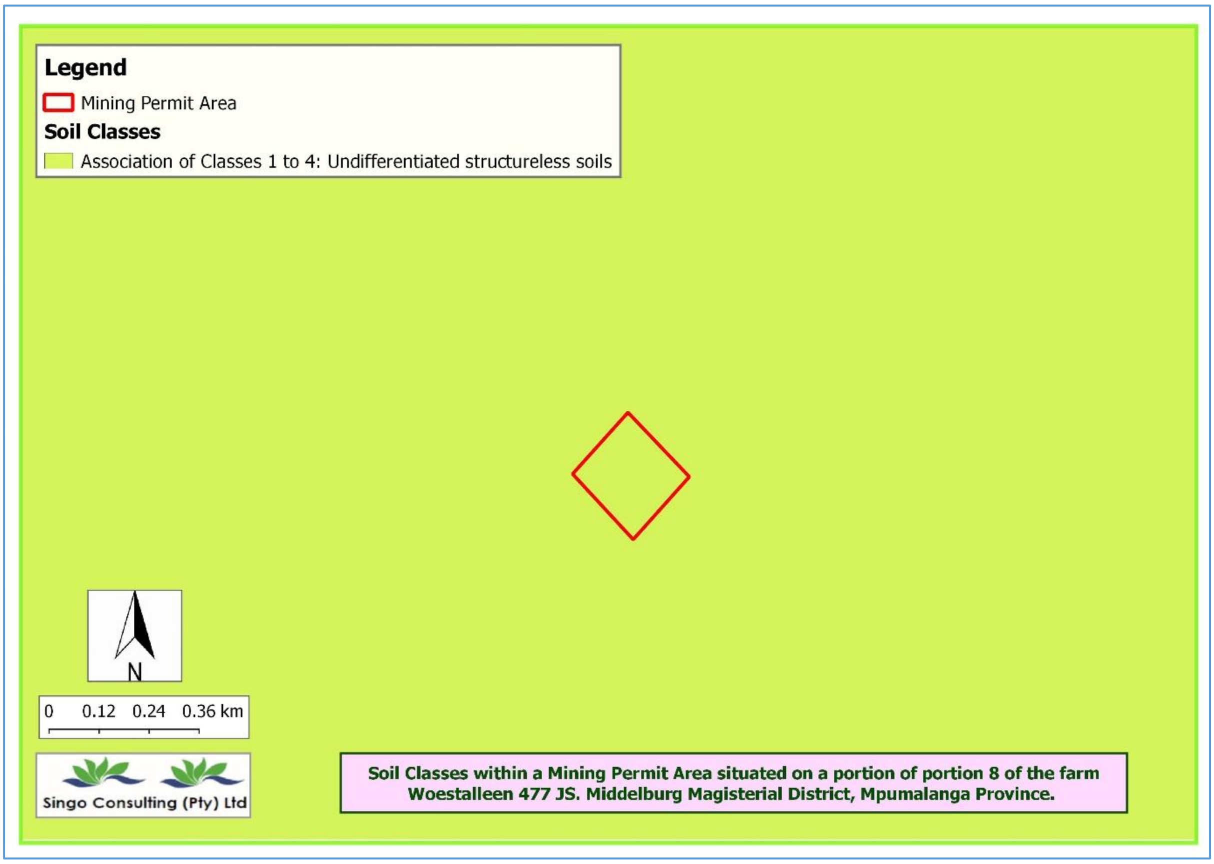

Figure 2: Soil classes map

Table 5: Soil classes and its land capability

Soil Classes	Land Capability
Class 1	Has few limitations that restrict its use; it may be used safely and profitably. Suitable land with negligible limitations and is highly productive requiring only simple management practices. When it used for crops it need ordinary management practice to maintain productivity. They are easily worked and are also fairly well supplied with plant nutrients or are highly responsive to inputs of fertilizer.

Class 2	Has some limitations that reduce the choice of plants or require moderate conservation practice. Suitable land with minor limitations which either reduce production or require more than simple management practices to sustain the use. Slight to moderate salinity or sodicity, easily corrected, but likely to persist is taken to imply that strong subsoil acidity, costly to correct and likely to reappear, would disqualify land from Class II.
Class 3	Has severe limitations that reduce the choice of plants or require special conservation practices. Suitable land with moderate limitations which is moderately suited to a proposed use, but which requires significant inputs to ensure sustainable use.
Class 4	Has very severe limitations that restrict the choice of plants, require careful management. Marginal land with severe limitations which make it doubtful whether the inputs required to achieve and maintain production outweigh the benefits in the long term.
Class 5	Land in this class has little or no erosion hazard but have other limitations impractical to remove that limit its use largely to pasture, range, woodland or wildlife food and cover. These limitations restrict the kind of plants that can be grown and prevent normal tillage of cultivated crops. Pastures can be improved and benefits from proper management can be expected.
Freely drained, structureless soil and Red or yellow structureless soil	This type of soil is characterised by sand, red soil which is less productivity due to dominating of sand soils have severe limitations that reduce the choice of plants or that require special conservation practices, soils and miscellaneous areas have limitations that preclude commercial plant production and restrict their use to recreational purposes, wildlife habitat, or aesthetic purposes.

6.3 Field soil identification

6.3.1 Soil sampling

Soil sampling will take place on the mining permit site. The main aim is to identify the soil moisture, colour, consistency, structure, soil type and origin (MSSCCO) of the soil. The soil form and family will also be identified.

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6.4 Soil profiles Interpretation

The two main dominant soil forms are **Hutton form** as well as the **Villafontes form.**

Hutton soil form

This soil form consists of an orthic Horizon as well as the Red apedal B horizon. The A horizon is classified as orthic A, as it does not qualify as an organic O, Humic A, Vertic A or melanic A horizon. This horizon occurs in all landscape positions on varying geology and with varying rainfall. In this type of soil, if the underlying horizon did not show signs of wetness, the A horizon could have qualified as Humic A Horizon.

The Red apedal B horizon have more or less uniform colours, falling within the range defined as red and that in the moist state, lack well-formed peds other than porous micro-aggregates, qualify as red apedal. The concept of these macroscopically weakly structured or structureless materials embraces that kind of weathering that takes place in a well-drained oxidizing environment to produce coatings of iron oxides on individual soil particles (hence the diagnostic red colours) and clay minerals dominated by non-swelling 1:1 type.

Villafontes form

This soil form contains three distinguishable horizon which are Orthic A horizon, E-horizon and the Neocutanic B Horizon. The E-horizon is essentially a greyish horizon which is usually paler than the overlying topsoil or the horizon which underlies it. Thus, when present, it occurs as the second in a sequence of diagnostic horizons, except where it has been exposed to the surface as a result of erosion of the topsoil or mixed with the A horizon by ploughing.

The Neocutanic character is recognized when soil formation in unconsolidated materials has not progressed sufficiently far to produce one or another distinctive diagnostic horizon. The materials in which Neocutanic horizons form are usually of alluvial or colluvial origin and the horizon is thus often, but not always of alluvial or colluvial origin and the horizon is thus often but not always found in certain landscapes positions, for example river terraces and foot slopes.

6.5 Land Use

The map in Figure 3 illustrates that the project area is located in a cultivated land. This type of soil within the mining permit has few limitations that restrict its use; it may be used safely and profitably. Suitable land with negligible limitations and is highly productive requiring only simple management practices. When it used for crops it need ordinary management practice to

maintain productivity. They are easily worked and are also fairly well supplied with plant nutrients or are highly responsive to inputs of fertilizer. It can be concluded that during the operational phase of the mining permit, the soil will get contaminated with coal dust. It is recommended that these soils get stockpiled in a proper manner and far away from the coal stockpile and access road to avoid compaction so that they will be useful for rehabilitation.

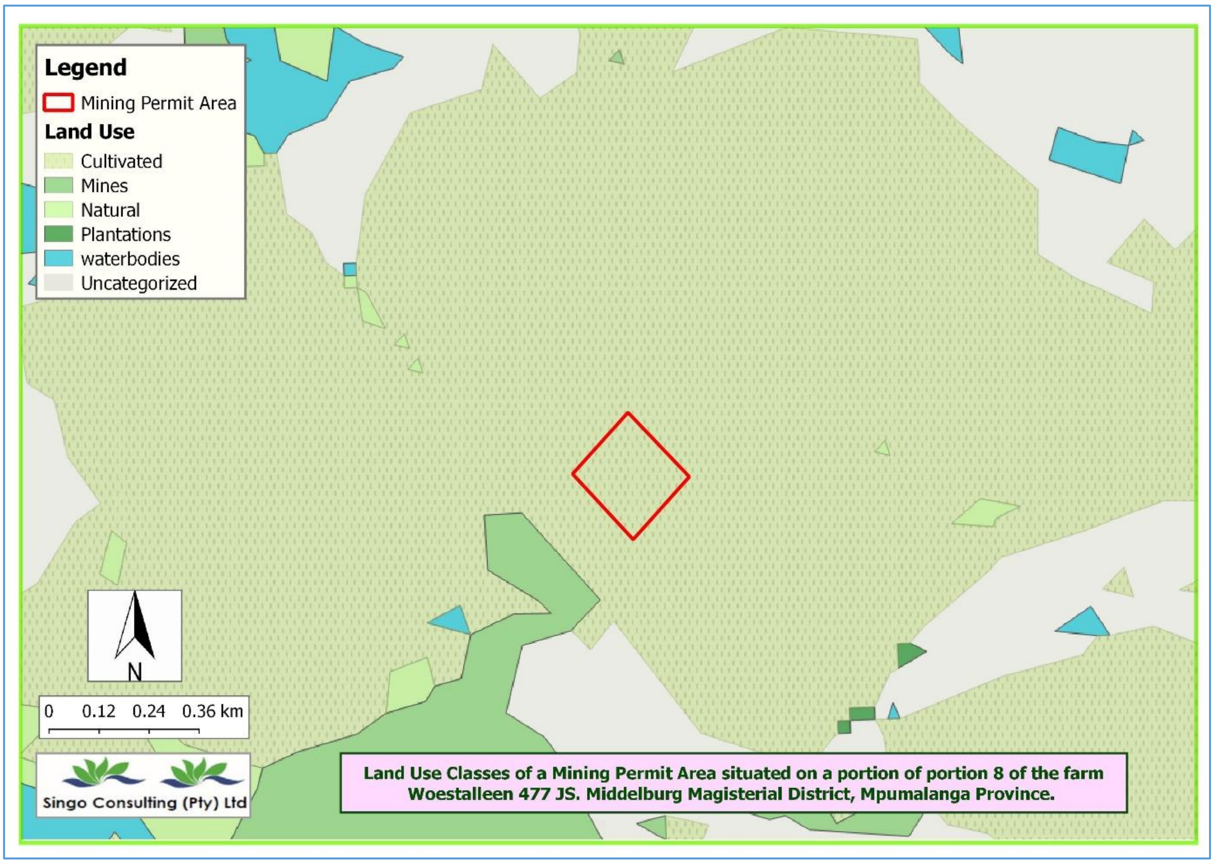

Figure 3: Land use map

7 Potential Environmental Impacts

- ❖ Access & Haul roads (with necessary security) including the upgrading of the access point to the gravel road
- ❖ Contractor's Yard with septic/chemical ablution facilities.
- ❖ Offices.
- ❖ Workshop and stores (with septic/chemical ablution facilities).
- ❖ Diesel facilities and a hardstand.
- ❖ Boxcut.

- Stockpiles (topsoil, overburden, subsoil/softs, ROM).
- Surface water management measures (storm water diversion berms and trenches, pollution control dams, tailings dam etc.).

7.1 Construction Phase

During the construction phase of the above listed activities, the work carried out will mainly be the construction of the fuel storage depot, beneficiation plants and associated infrastructure, new roads and preparation of stock yard and stockpiles.

This will entail the clearing of areas and the disturbance of the topsoil through excavations as well as the construction of a soil stockpile. The topography and natural drainage lines may also be disturbed. The overall impact will be loss of topsoil as a result of erosion and possible contamination of the soil by coal dust, fuel, and oils (hydrocarbons) as a result of general construction activities. Soil compaction caused by heavy vehicles and machinery may also be a problem.

Construction activities will change the land use to mining, beneficiation plants and associated infrastructure, conveyors, power line, new roads and preparation of stock yard and stockpile sites, there will be no substantial change to the land use within these areas. Areas that have been categorized as cultivation land use will change and will be unsuitable for any further farming during the life of the project.

7.2 Operational Phase

Soil erosion through wind and storm water run-off and soil pollution by means of hydrocarbon contamination and potentially coal dust may be encountered during the operational phase. Water runoff from roads and plant areas must be controlled and managed by means of proper storm water management facilities in order to prevent soil erosion. Diesel and oil spills are common at mine sites due to the large volumes of diesel and oil consumed by construction vehicles. Pollution may however be localized. Small pockets of localized pollution may be cleared up easily using commercially available hydrocarbon emergency clean-up kits.

An additional impact that could occur is when soils are stripped and stockpiled as the natural sequence of the soil horizons is lost when stripping and stockpiling is undertaken. An associated impact could be compaction of soil stockpiles, if they are repeatedly driven over, which would result in compaction of soil stockpiles if the appropriate dumping techniques are not adopted. This can be mitigated against by demarcating soil stockpiles and minimize or prevent driving

over stockpiles should be avoided were possible to avoid compaction. End tipping as a method of creating stockpiles can be adopted to avoid unnecessary compaction.

7.3 Decommissioning Phase

Mining infrastructure must be removed during the deconstruction phase. All foundation excavations must be backfilled and then covered with subsoil material and topsoil on the top layer, fertilized and re-vegetated. Backfilling of soil will impact on the land capability by restoring the land capability because vegetation can be supported and therefore returned to uncategorized. As open cast mining progresses and enough space is available concurrent rehabilitation should be undertaken, this would include backfilling, contouring, re-vegetation of impacted areas and this would typically be done during the operational phase, as concurrent rehabilitation, and during the decommissioning phase.

8 Impact Assessment

The environmental impact assessment is designed to identify impacts related to various mining activities and how to mitigate these impacts. With the correct mitigation measures being put in place these impacts can be reduced. The rating of impacts is based on the type of activity that will be undertaken. Similar activities that will have the same impact to soil, land use and land capability have been grouped together and discussed for particular impacts, such as loss of topsoil as a resource. When the impact rating is significantly different as a result of the activity, a separate rating has been given for those particular activities. The activities, such as mining would potentially have a slightly higher impact on soil, land capability and land use as these areas are less disturbed. For the purpose of this impact assessment activities that are located within relatively undisturbed areas have been rated together and all other activities falling with existing mining related impacted areas have been rated together with respect to the level of the impacts.

8.1 Construction Phase

When topsoil is removed from a soil profile, the profile loses effective rooting depth, water holding capacity and fertility. The largest volumes of topsoil will be removed for the construction of the proposed roads, coal stock yard and soil stockpiles. Foundation excavations will be needed for the proposed fuel storage depot, beneficiation plants and associated infrastructures.

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8.1.1 Impact: loss of topsoil as a resource, erosion, and compaction

Table 6: Impact: loss of topsoil as a resource, erosion, and compaction

Criteria	Details / Discussion
Description of impact	During construction, the land clearance and earthworks of the new mine will have a larger impact. Even though soil will be cleared from most of the areas where infrastructure will be placed, areas that are not disturbed by mining related impacts would have slightly higher impacts as these soils could be considered as virgin soils and have not really been impacted by mining related activities. During clearance of vegetation there is a greater risk that topsoil would be exposed and there are potential risks for increased erosion in these areas during rainfall events, resulting in a potential loss of soil as a resource. In addition, wind erosion would be greater as these areas are exposed as a result of the removal of vegetation.
Mitigation required	❖ The topsoil will be stripped, and loaded onto dump trucks ❖ Topsoil is to be stripped when the soil is dry (as far as practical possible), as to reduce compaction; and ❖ To be stripped according to the stripping guideline and management plan, contained within this report and further recommendations contained within the rehabilitation plan, and stockpiled accordingly. ❖ Stockpiles are to be maintained in a fertile and erosion free state by sampling them annually for macro nutrients and pH ❖ The handling of the stripped topsoil will be minimized to ensure the soil's structure does not deteriorate ❖ Ensure stockpiles are placed on a free draining location so as to limit erosion loss ❖ Berms should be placed around stockpiled soil to prevent soil loss due to erosion ❖ Compaction of the removed topsoil should be avoided by prohibiting traffic on stockpiles ❖ Prevent unauthorized borrowing of stockpiled soil

	❖ Minimise the period of exposure of soil disturbances through a planning schedule ❖ The stockpiles will be vegetated where the natural establishment of vegetation by the natural occurring seed bank is not sufficient (details contained in rehabilitation plan) in order to reduce the risk of erosion, prevent weed growth and to reinstitute the ecological processes within the soil and ❖ Soils will be stripped according to the soil types and recommended depths.				
Disturbed Mining Areas					
Parameters	Spatial	Duration	Severity	Probability	Significant rating
Pre-Mitigation	2 (Limited)	5 (Project Life)	3 (Moderate)	5 (Likely)	50(Medium Low)
Post-Mitigation	2 (Limited)	5 (Project Life)	3(Moderate)	3(Unlikely)	30 (Low)

8.1.2 Impact: Hydrocarbon Pollution

Table 7: Impact: Hydrocarbon Pollution

Criteria	Details / Discussion
Description of impact	Hydrocarbon spills can occur when using heavy machinery, as they all use oils and diesel to run. There is a chance of these breaking down and/or leaking during construction activities of roads, removal of topsoil and digging excavations for building and pit excavation.
Mitigation required	❖ Prevent any spills from occurring ❖ If a spill occurs, it is to be cleaned up immediately and reported to the appropriate authorities ❖ All storage areas (for fuels and lubricants) will be compacted and have bunded containers to prevent soil pollution and appropriate oil separators installed ❖ Water runoff traps should be constructed at the vehicle service sites to prevent polluted water runoff into areas that are not impacted upon ❖ All vehicles are to be serviced regularly in a correctly bunded area ❖ Hydrocarbon management procedure to contain details of emergency cleanup procedures and

	❖ Leaking vehicles will have drip trays placed under them where the leak is occurring				
Disturbed Mining Areas					
Parameters	Spatial	Duration	Severity	Probability	Significant rating
Pre-Mitigation	1 (Very Limited)	7 (Permanent)	5 (Very serious)	4(Probable)	52(Medium -Low)
Post-Mitigation	2 (Limited)	1 (Immediate)	4(Medium serious)	4(Probable)	36 (Medium-Low)

8.1.3 Land capability and Land Use

Table 8: Land capability and Land Use

Criteria	Details / Discussion
Description of impact	Removal of soil layers will impact on the land capability because vegetation can no longer be supported. With respect to land use, impacts associated with areas currently considered as uncategorized land would be impacted upon more as there would be a change in land use to mining related areas.
Mitigation required	No land capability mitigation is possible during this phase because the land use is changed to mining.
Disturbed Mining Areas	
Pre-Mitigation	No change
Post-Mitigation	No change

8.2 Operational Phase

8.2.1 Impact: loss of stockpiled topsoil as a resource, erosion, and compaction

Table 9: Impact: loss of stockpiled topsoil as a resource, erosion, and compaction (operational phase)

Criteria	Details / Discussion
Description of impact	Topsoil losses can occur during the operational phases as a result of rainwater runoff and wind erosion, especially from roads and soil stockpiles where steep slopes are present. Prevention is exceptionally important because the dominant soils in the area are sandy and prone to erosion. The impact from vehicle movement on stockpiles would be a limited impact and can be mitigated against by designating stockpile areas and having these areas as no go areas.
Mitigation required	❖ Stockpiles are to be maintained in a fertile and erosion free state ❖ Ensure proper storm water management designs are in place ❖ If erosion occurs, corrective actions must be taken to minimize any further erosion from taking place ❖ Prepare stockpiles appropriately to ensure vegetation establishes itself ❖ Ensure stockpiles are placed on a free draining location so as to limit erosion loss ❖ Topsoil stockpiles should be maintained for effective rehabilitation following the closure of the mine ❖ Limit stockpile height - a safe height can be regarded as the height at which material can be placed without repeated traffic over already placed material ❖ Topsoil stockpiles should be maintained for effective rehabilitation following the closure of the mine ❖ Limit stockpile height - a safe height can be regarded as the height at which material can be placed without repeated traffic over already placed material and

	❖ Unauthorized borrowing of stockpiled soil materials should be prevented.				
Parameters	Spatial	Duration	Severity	Probability	Significant rating
Pre-Mitigation	2 (Limited)	5 (Project Life)	4(Serious)	7(Certain)	77(Medium-High)
Post-Mitigation	2 (Limited)	5 (Project Life)	3(Moderate)	3(Unlikely)	30 (Low)

8.2.2 Impact: Hydrocarbon Pollution

Table 10: Impact: Hydrocarbon Pollution (operational phase)

Criteria	Details / Discussion
Description of impact	Hydrocarbon spills can occur where heavy machinery is parked such as the hard park area as they contain large volumes of lubricating oils, hydraulic oils and diesel to run. There is always a chance of these breaking down and/or leaking
Mitigation required	❖ Prevent any spills from occurring ❖ Storage and use of fuels and lubricants should be confined to lined and bunded areas and comply with Waste Management Plan. The appropriate oil separators for recycling of hydrocarbons must be installed at these locations ❖ All heavy machinery operators and truck drivers should be instructed to stay in designated areas, such as construction sites and roads ❖ All maintenance should be restricted to appropriately designed workshops, with proper oil separators ❖ If a spill occurs, it is to be cleaned up immediately and reported to the appropriate authorities ❖ All vehicles are to be serviced regularly in a correctly bunded areas ❖ Leaking vehicles will have drip trays place under them where the leak is occurring ❖ Hydrocarbon management procedure to contain details of emergency cleanup procedures and

	❖ Leaking vehicles will have drip trays place under them where the leak is occurring				
Parameters	Spatial	Duration	Severity	Probability	Significant rating
Pre-Mitigation	1 (Very Limited)	7 (Permanent)	5 (Very serious)	4(Probable)	52(Medium -Low)
Post-Mitigation	1 (Very Limited)	1 (Immediate)	4(Medium serious)	4(Probable)	36 (Medium-Low)

8.3 Decommissioning Phase

8.3.1 Impact: Building removals – restoring soil profile.

Table 11: Impact: building removals – restoring soil profile.

Criteria	Details / Discussion				
Description of impact	Decommissioning entails scaling down all operations to stop operation of the coal and pseudocoal mine. Building foundations will be backfilled using stockpiled materials. Backfilled sites need to be fertilized and revegetated using site specific best practices.				
Mitigation required	❖ Remove buildings to foundation level. All rubble to be relocated to a specified approved rubble dump ❖ Backfill foundations using stockpiled soil material ❖ Rip all roads and ❖ Re-vegetate the entire site (refer to rehabilitation plan for seed mixture).				
Parameters	Spatial	Duration	Severity	Probability	Significant rating
Pre-Mitigation	1 (Very Limited)	7 (Permanent)	5 (Very serious)	6(highly likely)	90(Medium -High)
Post-Mitigation	1 (Very Limited)	3 (Medium Term)	3(Moderate)	4(Probable)	28(Low)

8.3.2 Impact: Land use and land capability

Table 12: Impact: Land use and land capability

Criteria	Details / Discussion				
Description of impact	Backfilling of soil layers will impact on the land capability by restoring the land capability because vegetation can be supported and therefore returned to uncategorized				
Mitigation required	Mitigation is possible because the land use is changed from mining back to the pre-mining land use, if possible (Positive Impact).				
Parameters	Spatial	Duration	Severity	Probability	Significant rating
Pre-Mitigation	1 (Very Limited)	5(Project life)	6 (Significant)	7 (Definite)	84(Medium -High)
Post-Mitigation	1 (Very Limited)	5 (Project life))	4 (Serious medium term)	6 (almost certain)	60 (medium-low)

9 Soil Management Plan

9.1 Background

Sothaba Capital (Pty) Ltd mining permit landscape is dominated by a relatively flat and steep topography. Based on the basic classification of soils, the permit area is characterized by Association of classes 1-4: undifferentiated structureless soil. This type of soil within the mining has few limitations that restrict its use; it may be used safely and profitably. Suitable land with negligible limitations and is highly productive requiring only simple management practices. When it used for crops it need ordinary management practice to maintain productivity. They are easily worked and are also fairly well supplied with plant nutrients or are highly responsive to inputs of fertilizer.

Topsoil should be stored separately from subsoil because it contains more nutrients and microbes than subsoil. The topsoil stockpiles can also not be higher than 4-5 m in height (current practice is 2 m) because aeration is then compromised which in turn influences microbial activity.

Normally topsoil and subsoil should be kept separately at all times. Allowing subsoil to contaminate topsoil dilutes the nutrient and organic matter content causing soil infertility. Infertility imbalances then have to be reclaimed by using costly fertilizers. However, in the case of this coal mine the top and subsoil cannot be stripped and stockpiled together due to the high inherent fertility status and high clay content of the dominating soils present within the

project sites. In terms of stripping, topsoil will be stripped to a minimum of 300 mm down to a maximum of 1.5 m and will be stockpiled together. Anything deeper that may be required to be stripped (deeper than 1.5 m) will be removed and stockpiled separately from the initial stripping that will be undertaken.

More important than chemical imbalances which can be easily restored at cost, is soil compaction and volumes of replacement during soil reclamation. Heavy mining equipment used during soil reclamation, soil is compacted beyond agricultural reclamation leaving behind areas of low soil and land capabilities. Such areas have limited land use options and specialized management needs.

9.2 Physical mitigation

Post mining soil reclamation is exceedingly difficult or near impossible if the stockpiled topsoil and subsoil materials are of inferior quality due to mismanagement during storage. Good quantity and quality topsoil are an essential ingredient in the process of soil reclamation. Factors leading to decay in soil quality are:

- ❖ Contamination impacts on soil quality
- ❖ Erosion impacts on soil volume
- ❖ Indiscriminate storage impacts on soil quality and
- ❖ Indiscriminate use impacts on soil volume.

Therefore, care must be taken during the reclamation process to prevent compaction on the one hand and to replace soil volumes back to a representative pre-mining soil and land capability while emulating the pre mining landscape.

An important factor in the management of stockpiles impacting on soil quality is the storage height of topsoil. The topsoil and subsoil stockpile should be constructed with great care to keep within accepted limits for example:

- ❖ The sides should be angled ensuring stability at 1:3 (18.5 degrees from horizontal)
- ❖ The location of the stockpile should be indicated within the rehabilitation plan document
- ❖ The stockpile area should be clearly demarcated, and strict access control practiced preventing vehicles driving on the stockpile as well as unwanted borrowing of soil material for other purposes than rehabilitation and
- ❖ Stockpile height should be limited to 4 - 5 m (current practice for stockpile height is 2 m).

No striping or redistribution of top or subsoil if the condition of the soil is too wet should occur. A stick test must be used to determine if soil is too wet to redistribute. A sharpened broom sized stick must be pushed into and removed from the soil surface. If soil sticks to the stick, then the soil is too wet. Serious compaction may result if machine handling of wet soil continuous.

9.3 Soil quality indicators

Deciding on and monitoring soil quality indicators during soil impacts and reclamation can greatly improve the chances of reclaiming soil to a sustainable resource. The following actions should form part of monitoring soil quality and rehabilitation sustainability:

- ❖ Visual soil assessment by a specialist
- ❖ Soil quality monitoring system
- ❖ Visual assessment should include specialist scoring of water ponding, plant vigor, yield, tilth, earthworms, runoff, ease of tillage, soil colour, soil aroma, soil structure and cloddiness.
- ❖ Soil quality monitoring should include, bulk density, infiltration rate, water holding capacity, electrical conductivity, pH, soil nitrate and microbial activity.

To ensure sustainability from agricultural soil potential point of view soil reclamation should be reclaimed back to grazing land capability. The defined land classified as high agricultural potential can be reclaimed back to crop farming land capability. Crop farming land can be reclaimed to a total soil depth of 300 – 600 mm.

If the soil losses its current status due to leaching caused by erosion and compaction, organic matter must be added into the soil. The soil should be pre-mixed with organic material and placed back last to a depth of at least 300 mm. Continuous visual and soil quality monitoring as mentioned under soil quality indicators above should ensure that the best possible soil reclamation procedure is followed. Vehicle movements must be restricted on freshly dumped soil to prevent compaction as much as possible.

9.4 Soil Types for Stripping and Stockpiling

The Hutton and Villa Fontes soil forms found can all be stripped and stockpiled together because the inherent soil properties are similar. The soil types are dominated by deep well drained red and grey sandy soils. In terms of stripping, topsoil will be stripped to a minimum of 300 mm down to a maximum of 1.5 m and will be stockpiled together. Anything deeper that may be required to be stripped (deeper than 1.5 m) will be removed and stockpiled separately from the initial stripping that will be undertaken.

10 Conclusion and Recommendations

10.1 Conclusions

The soils present in the proposed project sites are represented freely drained, structureless soil. This type of soil within the mining permit is characterized by sand, red soil that is less productive due to the dominance of sand soils that has severe limitations which minimize crop selection or require special management practices: soils and diverse areas have limitations that restrict commercial plant production and restrict their use to recreational, wildlife or esthetic purposes. Some of the depicted structureless soils are, red apedal soil, yellow brown apedal soils as well as plinthic soils. Large volumes of soil need to be stripped and stockpiled for later use in mine site rehabilitation especially from the stockyards.

Note: The use of stripped stockpiled soil for rehabilitation purposes needs to include detailed post rehabilitation but pre-vegetation soil analysis as well as detailed liming and fertilizer recommendations based on the soil analytical results, as well as the type of vegetation to be established.

The listed project activities are:

- Access & Haul roads (with necessary security) including the upgrading of the access point to the gravel road
- Contractor's Yard with septic/chemical ablution facilities.
- Offices.
- Workshop, and stores (with septic/chemical ablution facilities).
- Diesel facilities and a hardstand.
- Boxcut.
- Stockpiles (topsoil, overburden, subsoil/softs, ROM).
- Surface water management measures (storm water diversion berms and trenches, pollution control dams, tailings dam etc.

These project activities will change the land capability for the life of mine while land use will be changed to mining within the mine site. However, rehabilitation and mitigation can change the land capability at best back to uncategorized land use enabling the land use to also change to crop farming.

10.2 Recommendations

- ❖ The proposed mining land should be returned to its origin as before mining activities and the rehabilitation performance assessment in the proposed land must be done concurrently during the operational phase by a soil specialist.
- ❖ Final surface rehabilitation of all disturbed areas during mine activities and Rehabilitation of unnecessary water management facilities once appropriate to do so.
- ❖ A post-mining soil depth and land capability evaluation should be done by a soil specialist registered at the Council for Natural Scientific Professions (SACNASP). A post-mining land capability map should be compiled and submitted for closure purposes.
- ❖ Limit impacts to the footprints to keep physical impacts as small as possible. Areas for road, site lay-out should be minimized, dust generation.
- ❖ No striping or redistribution of top or subsoil if too wet should occur. A stick test must be used to determine if soil is too wet to redistribute. A sharpened broom sized stick must be pushed into and removed from the soil surface.
- ❖ Soil monitoring should be implemented during the life of the mine.

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