mineral resources

Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

ENVIRONMENTAL IMPACT ASSESSMENT REPORT

And

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT FOR THE SPITSVALE CHROME ORE MINING RIGHT APPLICATION AND ASSOCIATED LISTED ACTIVITIES

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

NAME OF APPLICANT: BCR Minerals PTY (LTD)
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FILE REFERENCE NUMBER SAMRAD: LP 30/5/1/2/3/2/1 (10104)

Contents

EXECUTIVE SUMMARY

Environmental Management Assistance (Pty) Ltd has been appointed as the independent EAP to manage the EIA process according to the 2014 EIA regulations (GN R.982) on behalf of the applicant.

BCR Minerals (Pty) Ltd (the applicant) is proposing an opencast chrome mining development, hereafter be referred to the Spitsvale Project, situated on Portions 8 and 22 of the farm Kennedy's Vale 361 KT and Portion 24,25,26 and 28 of the farm Spitskop 333 KT, near the town of Steelpoort (South West), Limpopo.

The submission of this report is in compliance with the EIA regulations stipulated in GN R. 982 of the National Environmental Management Act, 1998 (Act no. 107 of 1998) and the Mineral and Petroleum Resources Development Act, 2002 (Act no. 28 of 2002).

BCR Minerals (PTY) LTD currently operates a prospecting and bulk sample operation and is the registered holder of the rights to chrome and associated minerals on the properties listed. However, BCR Minerals (PTY) LTD is not the registered owner of the surface rights of the abovementioned portions although they are in the process of acquiring a portion of portion 22 of the farm Kennedy's Vale 361 KT. The surface rights on Kennedy's Vale 361 KT are registered in the name of Rhodium Reefs, which are a subsidiary of Eastern Platinum Limited and the relevant portions of the farm Spitskop 333 KT is registered in the name of the Dithamaga Trust. Glencore is the registered owner of Portion 8 of Kennedy's Vale.

The proposed mining activity relates to the mining of the mineral chromite and associated minerals, covering an extend of not more than 355 ha, on the properties mentioned and in particular the MG0, MG1, MG2 Package, MG3 and MG4 Package chromitite seams. Mining will be undertaken by open cut methods (drilling, blasting, and excavating ore material) where after the raw sorted ore be transported in bulk to various markets.

The scope of work requires investigating all potential environmental and social impacts, for various activities, in terms of GN R. 982 of the National Environmental Management Act, Act 107 of 1998 (NEMA); and compiling a required Environmental Impact Assessment Report (EIR) (Part A) and an Environmental Management Programme Report (EMPR)(Part B) in support of the Mining Permit, in terms of the Mineral and Petroleum Resources Development Act, Act 28 of 2002 (MPRDA).

These two part document includes all specialist studies required to identify the potential environmental impacts of the Project and its related activities. This document will be submitted to the Limpopo DMR in support of BCR Minerals (Pty) Ltd Spitsvale Project Mining Permit Application (MPA).

The objectives of this report are as follow:

- Comply with the legal requirements of the MPRDA and NEMA (Chapter 5 of the Act and GN R. 982);
- Describe the proposed Project environmental and socio-economic context;

- Develop a detailed understanding of the baseline environment at the sites proposed for development;
- Determine and assess the impacts to receptors and resources as a result of Project activities;
- Introduce stakeholders to the additional activities of the Project and provide information about the proposed Project in a transparent way;
- Identify and engage with stakeholders to ensure that feedback on the results of the study is provided and that the assessment and management of impacts is identified and concerns considered;
- Develop environmental and social management measures to mitigate negative impacts and enhance positive impacts;
- Consider and assess Project alternatives in terms of environmental impacts; and
- Provide sufficient information to the authorities to inform the mining authorisation decision

No alternatives have been considered for this Project.

A number of specialist investigations were carried out as part of compiling this report. From the reports and the impact assessment of associated activities a number of sensitive environmental and social receptors have been identified.

The following important factors should be considered:

- The location of the proposed mining development is situated within and in close proximity to the Sekhukhune centre of endemism. Therefore conservation of the surrounding terrestrial biodiversity should form part of the decision outcome.
- Location of infrastructure within the proximity of natural water resources.
- Close proximity of the Dithamaga trust and Tubatse residential estate as social sensitive receptors. This would require extensive monitoring of air quality, noise quality, and water quality.
- A number of heritage sites (including homestead sites, informal burial sites, and industrial/infrastructure heritage sites) have been identified that will be affected by the proposed mining development.
- Loss of agricultural land due to opencast mining is a temporary loss which can be mitigated by appropriate backfilling and replacement of stockpiled topsoil. If done correctly, most of the original agricultural potential will be restored.
- When surveying the area to be rehabilitated and generating a digital terrain map, preferential seepage pathways should be identified and contoured to prevent surface runoff creating erosion during a 1:100year rainstorm event with 20mm/h rainfall intensity.

It is clear from the assessment results highlighted in this report that there will be a number of impacts that poses a ***high negative significant*** impact. However if the mitigation measures proposed in Part B (EMPr) of this report are implemented, monitored and audited throughout the life cycle of the Spitsvale Project, the impacts can be mitigated to a ***medium/low negative significant*** impact or avoided all together.

A number of recommendations are made to be included in the Environmental Authorisation. These recommendations include, but are not limited to, the following:

- All comments and concerns raised by the registered I&AP be considered and incorporated into the final EIR and EMPr;
- The Spitsvale Mine Rehabilitation, Closure and Liability plan attached as **Appendix S** should be considered as the ***first draft*** and a living document. A number of assumptions, gaps and uncertainties were identified during the preparation of this report. It is recommended that it be reviewed. As highlighted in **Part A section q)ii)(2),** on granting of the authorisation for the proposed mining activities to proceed a final Annual Rehabilitation plan and a Risk Assessment plan as specified by GNR 1147 must be submitted to the competent authority for approval;
- A final site layout detailing all infrastructure (with specific reference to the storm water management infrastructure, the PCD's designs, and the river crossings) associated to current and future mining activities must be provided to the competent authorities for approval before any activities commence;
- Conditions stipulated in the final EMPr and closure plan be adhered with;
- Conditions stipulated in all other permits or authorisations should be implemented; and
- All recommendations made in the EIR and specialist studies be implemented and considered in the finalisation of the site lay out plan and operational design of the proposed mining development.

1. 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.

2. OBJECTIVE OF THE ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

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

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

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

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

(d) determine the—-

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

(ii) degree to which these impacts—

(aa) can be reversed;

(bb) may cause irreplaceable loss of resources, and

(cc) can be avoided, managed or mitigated;

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

(f) identify, assess, and rank the impacts the activity will impose on the preferred location through the life of the activity;

(g) identify suitable measures to manage, avoid or mitigate identified impacts; and

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

PART A: SCOPE OF ASSSSMENT AND ENVIRONMENTAL IMPACT ASSESSMENT REPORT

3. Contact Person and correspondence address

Environmental Management Assistance (Pty) Ltd has been requested to complete the EIA and EMPr process associated to the application for a mining right in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA) to the Limpopo Department of Minerals and Resources on behalf of BCR Minerals (Pty) Ltd (applicant) for the Spitsvale Chrome Mine situated in the Greater Tubatse Municipality, Limpopo. In addition to the application for a mining right the applicant have also applied for associated activities as listed in Listing notice 1, 2, and 3 of the 2014 EIA regulations (GG38282 GNR 982 of 2014).

a) Details of

i) Details of the EAP

Name of the Practitioner:	Environmental Management Assistance (Pty) Ltd
Contact person:	Anandi Alers
Tel No.:	+27 (0) 72 604 0455
Fax No. :	+27 (0) 86 226 7324
E-mail address:	anandi.alers@emassistance.co.za

ii) Expertise of the EAP

Environmental Management Assistance (Pty) Ltd (EMA) has appointed Mrs. Anandi Alers (Trainee Certified Natural Scientist, level A - 600016/14) as the junior EAP to manage the application process on behalf of BCR Minerals (Pty) Ltd. Mr. Justin Bowers (Pr.Sci.Nat. - 400067/10) has been appointed to fulfil the role of mentor and supervisor to the process and have reviewed and approved all associated documentation.

A detailed portfolio of the team members associated to the management of this project can be found as Appendix A.

(1) The qualifications of the EAP

(with evidence)

Mrs. Anandi Alers recently completed a Master of Science degree in Environmental Management and Geography in 2015 at the North West University (Potchefstroom) under the guidance of Prof. Luke Sandham.

She holds a Bachelors of Science Honours degree in environmental sciences, specialising in Environmental Management and Geography, and a Bachelors of Science degree in Tourism, Zoology, and Geography.

(2) Summary of the EAP's past experience.

(In carrying out the Environmental Impact Assessment Procedure)

Mrs Anandi Alers has extensive knowledge of the South African EIA process and has recently completed her Master of Science degree in Environmental Management on the subject of EIA follow-up. Her practical experience includes, but is not limited to the following:

- Environmental Management of a number of construction related projects;
- Environmental auditing of a number of projects against the approved EMPr's and EA (Environmental Authorisations);
- The development and management of a ISO 14001 EMS (Environmental Management Systems) on a number of construction related projects;
- Development and implementation of policies and procedures managing environmental impacts; and
- Managing applications for a number of permits and licences.

A detailed description of all past experiences is available in **Appendix A**.

b) Description of the property

Farm Name:	Portions 8 and 22 of the farm Kennedy's Vale 361 KT and Portion 24,25,26 and 28 of the farm Spitskop 333 KT
Application area (Ha) :	±2 181
Magisterial district:	Greater Tubatse District Municipality
Distance and direction from nearest town:	±15 km South West from Steelpoort, Limpopo
21 digit Surveyor General Code for each farm portion:	T0KT00000000033300024, T0KT00000000033300025, T0KT00000000033300026, T0KT00000000033300028, T0KT00000000036100025, T0KT00000000036100022.

c) Locality map

(show nearest town, scale not smaller than 1:250000)

Find **Appendix B** indicating the locality of the proposed activity.

d) Description of the scope of the proposed overall activity

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

The detailed site layout plan indicating the location, the area (hectares) of all the main listed activities, and infrastructures to be placed on the associated properties can be found in **Appendix C**.

At the time of submitting this report to the competent authority the following infrastructures did not form part of the site layout:

- Storm water infrastructure;
- Location of PCD's; and
- Detailed infrastructure associated to the Tubatse lay down area.

It is therefore recommended that before authorising the activity a detailed site layout plan be submitted indicating the details of all infrastructure associated to the proposed mining development.

The section to follow will provide a detailed scope on the proposed activity.

i) Listed and specified activities

A number of listed activities in terms of GNR 983 (Listing notice 1), GNR 984 (Listing notice 2), and GNR 985 (Listing notice 3) have been applied for, resulting in this report. These activities are highlighted in Table 1 below.

Table 1: Listed and specified activities associated to the proposed mining operation

NAME OF ACTIVITY (*All activities including activities not listed) (E.g. Excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc…etc…etc.)*	**Aerial extent of the Activity Ha or m²**	**LISTED ACTIVITY Mark with an X where applicable or affected.**	**APPLICABLE LISTING NOTICE** (*GNR 544, GNR 545 or GNR 546)/NOT LISTED*
All infrastructure areas, development footprints and associated activities.	Mineral boundary: 2144,3125 ha Proposed activity area: 1250 ha	X	GNR983 - Activities 22 & 28 GNR984 - Activities 6, 15, 17 and 21 GNR985 - Activities 12 and 14
Opencast excavations	Maximum at any one time:50ha Total proposed area to be affected on completion of mining: 355 ha	X	GNR983 - Activities 22 & 28 GNR984 - Activities 6, 15, 17 and 21 GNR985 - Activities 12 and 14
Topsoil & subsoil stripping	25ha	X	GNR984 - Activity 15

& stockpiling			GNR985 - Activity 12
Residue stockpiles	45ha		GNR984 - Activities 6 & 15 GNR985 - Activity 12 GNR 633 - Activity 11
Blasting	N/A		Not listed
RoM & product stockpiling	19ha		GNR984 - Activity 6 GNR985 - Activity 12
Access and hauling along roads	760m of roads will be upgraded 2 800m of road will be constructed		GNR983 - Activity 24 GNR985 - Activities 4, 14 and 18
Screening plant	20ha		GNR984 - Activities 6, 15, and 21
Water supply (potable & process)	<1ha		GNR983 - Activity 9 GNR985 - Activity 14
Water storage (reservoirs / tanks)			GNR983 - Activity 13 GNR984 - Activity 6 GNR985 - Activity 2
Discard disposal (backfilling)	N/A		GNR983 - Activity 22 GNR984 - Activity 6
Storm water runoff management features			GNR983 - Activity 9 GNR984 - Activity 6 GNR985 - Activity 14
Waste generation & storage	<1ha		Expected waste generation under threshold
Stores, workshops &wash bays	<11ha		Not listed

Ablutions & change house with mobile sewage treatment plant	<1ha		GNR983 - Activities 10 and 25 OR GNR984 - Activities 6 and 25
Fuel storage	<1ha		GNR984 - Activity 4 GNR985 - Activity 10
Rehabilitation	Entire disturbed site		GNR983 - Activity 22 GNR921 - Activities B(7) & B(9)

ii) Description of the activities to be undertaken

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

BCR Minerals (PTY) LTD currently operates a prospecting and bulk sample operation, hereafter referred to as the Spitsvale Project (SPV) and it is situated in the Greater Tubatse Municipality South West of Steelpoort in the Limpopo Province.

BCR Minerals (PTY) LTD is the registered holder of the rights to chrome and associated minerals on portions 24, 25 26 and 28 of the farm Spitskop 333 KT and portions 8 and 22 of the farm Kennedy's Vale 361 KT, as apparent in the registered prospecting rights with DMR reference number LP30/5/1/1/2/10624PR (Kennedy's Vale) and LP30/5/1/1/2/10603PR (Spitskop). However, BCR Minerals (PTY) LTD is not the registered owner of the surface rights of the abovementioned portions although they are in the process of acquiring a portion of portion 22 of the farm Kennedy's Vale 361 KT. The surface rights on Kennedy's Vale 361 KT are registered in the name of Rhodium Reefs, which are a subsidiary of Eastern Platinum Limited and the relevant portions of the farm Spitskop 333 KT is registered in the name of the Dithamaga Trust. Glencore is the registered owner of Portion 8 of Kennedy's Vale.

The proposed mining activity relates to the mining of the mineral chromite and associated minerals, covering an extend of not more than 355 ha, on the properties mentioned and in particular the MG0, MG1, MG2 Package, MG3 and MG4 Package chromitite seams (Table 2).

Table 2: Resource particular associated to the proposed Spitsvale chrome mining operation

ITEM	DETAIL
Associated Minerals related to the proposed mining operation:	Chrome Ore (Cr): Commodity Code B (also referred to as Chromite) is the mineral that will be mined. PGM's (Platinum Group Metals) associated in the Middle and Upper Group (UMG2, UMG1, MG4, MG3, MG2, MG1, and MG0) seams are also found in the

	area applied for. Other related Minerals can be found: Platinum (Pt), Paladium (Pd), Rhodium (Ru), Ruthenium (Re), Osmium (Os), Iridium (Ir)) and base metals Copper (Cu), Nickel(Ni) and Gold(Au).
Depth of the mineral below surface:	From sub outcrop (2m below surface) to in excess of 300m depth below surface.
Geological formation:	Chrome Ore situated in the Middle Group (MG) and Upper Middle Group (UMG) being UMG2, UMG1, and MG4,MG3,MG2,MG1 and MG0 chromite seams which occur in the Upper and Lower Critical zones of the Bushveld Complex. The MG chromitite seams are of particular economic significance. The MG1 chromitite seam is separated from the MG2 chromitite layer above by a pyroxenite unit which is 4-8 m thick. The MG2 and MG3 seams are separated by the anorthosite marker which is the contact between the Upper and Lower Critical Zone. These seams are situated approximately 380 metres below the UG2 platinum bearing seam. The current mineral right excludes Chromite seams associated with the UG2 and Merensky reefs

As part of the authorised prospecting and bulk sampling phase, some infrastructures has already been constructed. The existing infrastructures consist of the following:

- Three stockpile areas;
- A lay down area that includes offices, a workshop, a hazardous substances storage facility, and ablution facilities; and
- Access roads.

The associated activities of the proposed opencast Chrome ore mining operation will entail the following:

Construction Phase

- Establishment of additional associated infrastructure such as access roads, offices, workshops etc;
- Site clearing (topsoil stripping) for additional lay down areas;
- Construction of Pollution Control Dams (PCD's);

- Construction of storm water management features;
- Construction of river crossings;
- Establishment of ablutions & change house facilities with sewage treatment plant; and
- Construction of water storage facilities.

Operational Phase

- Excavation and ground works following a simple roll over method i.e. stripping of topsoil followed by subsoil and preparation of extracting the MG 4 to 1 Package chromite seams;
- Drilling and blasting using a single benching method;
- Stockpiling of residue material;
- Continuous backfilling of residue material in void's created by mining operation;
- Continuous rehabilitation of backfilled areas;
- Processing of ore through screening;
- Stockpiling of ore; and
- Bulk road transport of processed ore.

Decommissioning Phase

- Demolition / removal of portable and related infrastructure;
- Rehabilitation of the lay down areas;
- Demolition of PCD's; and
- Demolition of workshops, waste storage facilities, and fuel storage facilities.

The section to follow will describe the method of mining in more detail.

Basic Overview of mining method

(a) Blasting design

As part of the basic operation proposal, the proposed mining operation will include a blasting design (Figure 1). The blast design is separate from the mine design due to the cost effectiveness of blasting larger benches over a less frequent period.

The proposed blasting design will entail the following:

MG4 Bench:

The blast design will consist of blasting three benches typically the first bench will be drilled to a depth of 10m and blasted, once this bench is mined out after several cuts to the 10m depth the second bench will be drilled and blasted a further 10m deeper. This bench will then be mined out after several cuts to the final bench for the MG4. A safety bench of 3m will be left to protect the MG3 bench below.

MG3 Bench:

Once the MG4 is mined out after several cuts to the 10m depth the second bench will be drilled and blasted a further 18m deeper. This bench will then be mined out after several cuts to the final bench for the MG3. A safety bench of 5m will be left to protect the MG2 bench below

MG2 Bench:

Once the MG3 bench is mined out after several cuts to the 10m depth the second bench will be drilled and blasted another further 18m deeper. As with the previous two benches this bench will be mined out after several cuts to the final bench for the MG2. A safety bench of 5m will be left to protect the MG1 bench below.

MG1 Bench:

The blast design will consist of blasting three benches typically the first bench will be drilled to a depth of 12-14m and blasted, once this bench is mined out after several cuts to the 12-14m depth the second bench will be drilled and blasted a further 16-18m deeper, this bench will be mined out after several cuts to the final bench for the MG1. This bench will be mined lastly after which the opencast will be rehabilitated. A safety bench of 5m has been left to protect the MG1 bench below, based on the high wall slope stability.

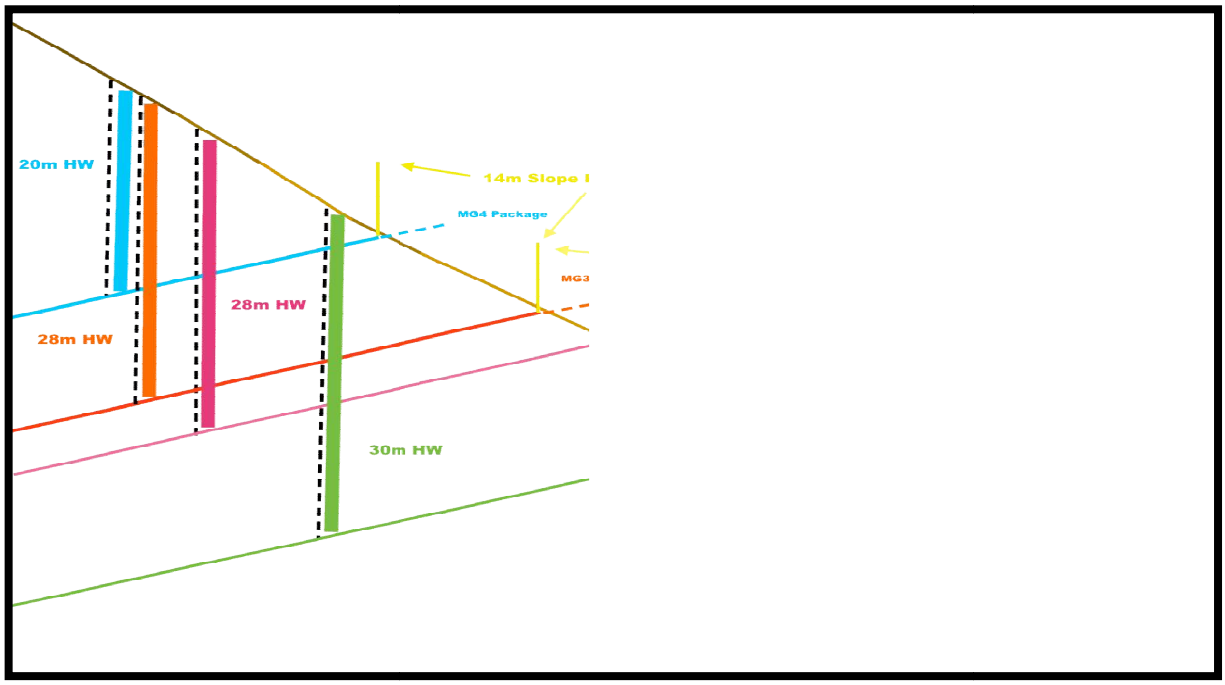

Figure 1: Image showing the mining bench heights from the MG4 to the MG1 bench

(b) Opencast Mine Design:

It has been assumed mining will be done by means of drilling and blasting using the single benching method as defined in the blast design.

The mining bench will be planned at 3- 5m intervals with a catchment berm at 6m intervals making the effective bench stack height 4m.

The first 20m bench will be mined or excavated in five 4m half benches or interim benches, this will depend on the equipment used. The 20m benches will have a pushback of 3m behind the 2nd blasting bench.

There after the second bench of 8m will be mined or excavated in two 4m benches.

The third bench will be 3m and will be mined or excavated in one 3m bench.

The final bench will be 12m and will be mined or excavated in three 4m benches. This would conclude the final footprint and mineable depth of the opencast.

There are two methods that allow for pit highwall protection against blast induced fracturing or damage:

- The first method is pre-split blast holes closely spaced for the first drill line, close to the final highwall.
- The second method is the planning of shorter blast holes (and thus shorter drilling benches 12m vs. 24m) slightly angled away from the highwall (90 Degrees drilling angle).

The 10m blast-hole depth will reduce the explosive gas expansion and ground vibration that influences crack initiation and migration on the final highwall of the pits.

The design criteria can be summarized as follows:

Table 3: Design Parameters

Design Parameter	Parameter Value	Description
Pit Slopes	(From Surface to 80m below = 83 degrees)	Conservative slope assumption
Ramp Design	Inclination of 10% with a ramp width of 15m allowing for two trucks being able to pass at any one time. (1.5 m safety berm on the pit side and 2m toe clearance on the wall side with 9.5m road available.	Standard pit ramp design criteria for trucks up to 50 tonne capacity (Bell B30's, Caterpilar 773's)
Mining Bench Heights	4m total bench height. Not the same as the blasting bench height. Refer to Figure above.	
Waste Dumping	Waste will be moved to the waste dump just on the final pit perimeter, with a lot of waste to be dumped back directly into the pit (Concurrent backfilling whilst mining).	Concurrent backfill mining proved in South Africa and Africa significantly reducing truck cycle time and equipment fleet requirements.
Batter angle	80m pit depth (Batter at 83 degrees),	Standard

Open Pit Mining

Open pit mining is proposed to mine the shallow ore on the Spitsvale project, so as to make ore available as early as possible. A conventional truck and shovel operation is planned. The opencast is proposed to be contiguous and unsterilized along strike, with the chrome ore sub-outcropping at surface.

Factors taken into account in the proposed mine design strategy are as follows:

- Formal and informal settlements in relation to the planned open pit mining area as well as existing mining activities – a mining restriction zone of mainly 600m was used for design purposes, this correlates to the 600m blast radius;
- Residue material to be placed away from chrome sub-outcrop positions, on the highwall side of the maximum highwall position;
- Monthly production of approximately 30,000tpm of RoM ore;

- The weathering profile of the near-surface material;
- Backfilling of mined out areas as soon as possible to minimize dust and aid in rehabilitation, minimize haulage costs and double handling;
- Operating costs – for mining, for processing, and for administration;
- Selling costs - for the MG 4,MG3, MG2, MG1 and MG0 subject to favourable chrome market prices and operating costs;
- Process recoveries - 80% for MG2, MG1,MG0, 65% for MG4 and MG3;
- Mining dilution of 5% and recovery factor of 70% applies after the in-situ resource estimates; and
- Due to surface weathering an overall slope angle of 7° from vertical are proposed to ensure pit stability. The angle could be further steepened in the deeper solid zones, however a safety factor of 7° is preferred with a bench at 20m.

The proposed operation of the mining activities will be done in a phased approach. The section to follow explains this approach in more detail.

(c) A phased approach

There are mainly three areas that are proposed to be mined as part of the Spitsvale project. These areas will be referred to as follows: (1) Klarinet "Koppie" situated South East on portion 22 and 8 of Kennedy's Vale and South West on portion 25, 26, and 28 of Spitskop; (2) Tubatse "Koppie" situated North East on portion 28 of Spitskop; and (3) Flats area situated North West on portion 25 of Spitskop and throughout portion 24 of Spitskop.

The mining operations are proposed to start at mining the Klarinet "Koppie" and progressively move to the Tubatse "Koppie" and then lastly the Flats area.

(d) Ore processing

There will be no beneficiation plant for this application. The process will consist of crushing and screening to produce the various saleable products.

Residue material, if any, will be deposited on waste rock dumps and later backfilled into the opencast void. Shown below is a schematic flow sheet and description of the major items in the proposed Spitsvale Project plant.

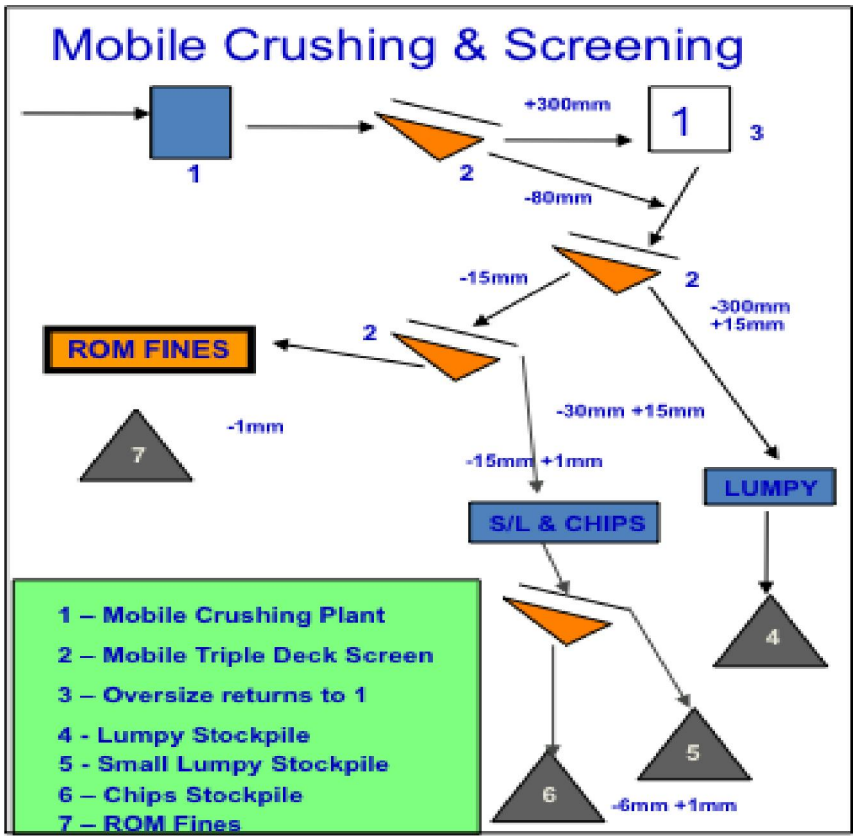

Figure 2: A schematic flow sheet and description of the major items in the proposed Spitsvale project process

The major items of equipment that will be used in the mobile plant are the following:

- A mobile / moveable crushing unit will crush the oversized ROM ore that exceeds +300mm after it has passed over the screen;
- Front loaders and dump trucks will be used to transport the ROM ore and products in the following three main areas;
- ROM ore from opencast to the ROM screening area (Stockpile Area), between the different sizing / screening steps, and final products to the various product stockpiles based on size and quality;
- Front loaders will be used to feed ROM material onto the mobile screen; and
- Mobile Screens will be used to separate the ROM material into different sizes as final product.

Due to the mining method being opencast mining the mining recovery is expected to be between 85 – 95 % with minimal dilution and with there being no gravity / spiral separation required thus a limited amount to no residue material is expected to be generated from the ROM that is screened. This method has been tested and proven successful in a similar type of opencast design neighbouring the application area. Thus at this point of the application no processing plant and facilities, i.e. a tailings dam, are required.

Table 4: Forecast efficiency of the proposed process

Product	Typical size(mm)	Production per Annum(Tons)
Lump	60mm – 300mm	90 000
Small Lump	10mm – 60mm	90 000
Fines	<10mm	180 000

e) Policy and Legislative Context

This section will provide the detailed description of the policy and legislative context associated to the proposed Spitsvale Mine (Table 5).

Table 5: Detailed Policy and legislative context of the proposed Spitsvale Mine

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** **(i.e. Where in this document has it been explained how the development complies with and responds to the legislation and policy context)**	**HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE POLICY AND LEGISLATIVE CONTEXT** **(E.g In terms of the National Water Act:-Water Use Liscence has/has not been applied for).**
National Legislation and regulations		
Section 24 of the Constitution of South Africa Act no. 108 of 1996	Part A: EIA process followed Part B: Requirements included in the EMPr	Adherence with all legislation and regulations that prevents pollution and ecological degradation, promotes conservation, and secures an ecological sustainable development and use of natural resources while promoting justifiable economy and social development.
The Minerals and Petroleum Resources Development Act, 2002 , Act No. 28 of 2002 (MPRDA)	Part A: EIA process followed Part B: Requirements included in the EMPr	• Submission of a mining works programme • Submission of an application to a mining right • Application for Environmental Authorisation in process (purpose of this report) • A Rehabilitation, closure, and liability plan have been developed and are attached as **Appendix S**
National Environmental Management Act 107 of 1998 (NEMA)	Part A: EIA process followed Part B: Requirements included in the	• Development of an EMPr for the proposed activities. • Application for authorisation resulting in the submission of this document.

	EMPr	• Including emergency response procedures within the submitted EMPr. • Ensuring compliance with a monitoring and audit schedule and plan.
The following regulations in terms of NEMA are applicable:		
GN R. 982: National Environmental Management Act (107/1998): Environmental Impact Assessment Regulations, 2014 (2014 EIA regulations)	Part A: EIA process followed Part B: Requirements included in the EMPr	Independent EAP appointed to ensure adherence with the EIA procedure.
GN R. 983 – 985: Listing notices 1 to 3	Part A: EIA process followed Part B: Requirements included in the EMPr	Application for authorisation of listed activities submitted followed by the submission of the EIR, EMPr, and Rehabilitation, closure, and liability plan.
GN R. 1147: Regulations pertaining to the financial provision for prospecting, exploration, mining or production	Part A: EIA process followed Part B: Requirements included in the EMPr	Submission of mine Rehabilitation, closure, and liability plan as **Appendix. S** to this report.
GN R. 549: Regulations to phase-out the use of PCB's materials and PCB's contaminated materials	Part A: EIA process followed Part B: Requirements included in the EMPr	
National Environmental Management: Air Quality Act 39 of 2004 **(NEMAQA)**	Part A: EIA process followed Part B: Requirements included in the EMPr	• Requirements as stipulated in the Act are incorporated with the EMPr submitted for approval. • Recommendations made by the specialist report (**Appendix E**) incorporated into this report as well as the EMPr.
The following regulations in terms of NEMAQA are applicable:		
GN 893: List of activities which result in atmospheric emissions	Part A: EIA process followed Part B: Requirements included in the	No licence required at this time of the proposed activity.

	EMPr	
GN R. 827: National dust control regulations	Part A: EIA process followed Part B: Requirements included in the EMPr	Requirements incorporated in the EMPr.
GN R. 283: National atmospheric emissions reporting regulations	Part A: EIA process followed Part B: Requirements included in the EMPr	Requirements incorporated in the EMPr.
GN R. 1210: National ambient air quality standards	Part A: EIA process followed Part B: Requirements included in the EMPr	Requirements incorporated in the EMPr.
GN R. 351: Regulations regarding the phasing-out and management of ozone-depleting substances	Part A: EIA process followed Part B: Requirements included in the EMPr	In the event that any PCB containing product will be used on site this regulation will be applicable. Requirements incorporated in the EMPr.
Atmospheric Pollution Prevention Act of 1965 **GN R. 1651:** Regulations concerning the control of noxious or offensive gasses emitted by diesel-driven vehicles	Part A: EIA process followed Part B: Requirements included in the EMPr	Requirements incorporated in the EMPr.
National Environmental Management: Waste Act 59 of 208 **(NEMWA)**	Part A: EIA process followed Part B: Requirements included in the EMPr	All waste management activities associated to the proposed mining operation must comply with the requirements set out by the Act. These requirements have been incorporated into the EMPr.
The following regulations in terms of NEMWA are applicable:		

GN R. 634: Waste classification and management regulations	Part A: EIA process followed Part B: Requirements included in the EMPr	Requirements incorporated in the EMPr.
GN R. 921: Activities listed requiring a waste management licence (WML)	Part A: EIA process followed Part B: Requirements included in the EMPr	Listed activity number 11 lists: *"The establishment or reclamation of a residue stockpile or residue deposit resulting from activities which require a mining right in terms of the MPRDA (Act 28 of 2002)"* An application for a WML will be submitted to the DMR as the competent authority.
GN R. 625: National waste information regulations	Part A: EIA process followed Part B: Requirements included in the EMPr	As listed activity 11 of GN R. 921 will be triggered by the proposed mining activities, GN R. 625 will apply. Therefore the Spitsvale Project must register as a waste generator. These requirements will be included in the EMPr associated to the WML.
GN R. 635: National Norms and Standards for the assessment of waste for landfill disposal	Part A: EIA process followed Part B: Requirements included in the EMPr	This regulation stipulates the requirements to assess generated waste for disposal to specific designed landfills. As a result the requirements stipulated in these regulations have been considered in the EMPr.
GN R. 636: National norms and standards for disposal of waste to landfill	Part A: EIA process followed Part B: Requirements included in the EMPr	This regulation stipulates the general principles associated to the disposal of waste to landfill. As a result the requirements stipulated in these regulations have been considered in the EMPr.
GN R. 926: National norms and standards for storage of waste	Part A: EIA process followed Part B: Requirements included in the EMPr	This regulation describes the general requirements for the management and storage of waste. As a result the requirements stipulated in these regulations have been considered in the EMPr.

Environmental Conservation Act of 1989 **(ECA)** **GN R. 425:** Waste tyre regulations **GN R. 341:** Regulations for the prohibition of the use, manufacturing, import and export of asbestos and asbestos containing materials	Part A: EIA process followed Part B: Requirements included in the EMPr	Requirements incorporated in the EMPr.
National Water Act 36 of 1998 (NWA)	Part A: EIA process followed Part B: Requirements included in the EMPr	Application for a Water Use Licence (WUL) is in process. General conditions stipulated in the NWA have been incorporated in the EMPr.
The following regulations in terms of NWA are applicable:		
GN 704: Regulations on use of water for mining and related activities aimed at the protection of water resources	Part B: Requirements included in the EMPr An application for a WUL is in process.	The requirements have been incorporated into the EMPr and final site layout plan.
Explosives Act 26 of 1956 & Regulations	Part A: EIA process followed Part B: Requirements included in the EMPr	• Requirements incorporated into the EMPr. • Requirements to be incorporated into the Spitsvale Health and Safety management plan. • Requirements to be included in the Drilling and Blasting procedure.
Hazardous Substances Act 15 of 1973	Part A: EIA process followed Part B: Requirements included in the EMPr	• Requirements incorporated into the EMPr. • Requirements to be incorporated into the Spitsvale Health and Safety management plan.
Petroleum Products Act of 1977 **GN R. 627:** Regulations regarding petroleum products specification and	Part A: EIA process followed Part B: Requirements included in the	Throughout the construction, operation, and decommissioning phase of the proposed mining activities petroleum products will be used. These

standards	EMPr	requirements have been included in the EMPr.
Mine Health and Safety Act of 1996 **GN R. 1237:** Mines and works regulations **GN R. 911**: Mine health and safety regulations	Part A: EIA process followed Part B: Requirements included in the EMPr	The requirements set out by the listed regulations must be incorporated into the Spitsvale Mine Health and Safety Management plan. Some of the requirements associated to the environmental health have been incorporated into the EMPr. The following specific sections are applicable in this report and the EMPr: • Storage of hazardous substances; • Acquisition of hazardous chemicals; and • Air conditioning and refrigerant equipment.
National Road traffic Act of 1996 **GN R. 225:** National road traffic regulations	Part A: EIA process followed Part B: Requirements included in the EMPr	The requirements set in these regulations have been incorporated into the EMPr. However this should also form part of the Spitsvale Mine Health and Safety Management plan and Traffic management plan. The section specifically considered in the EIR and EMPr are as follows: • Transport of hazardous waste. • Loading and offloading of dangerous goods.
Human Tissue Act 65 of 1983 **GN R. 1935:** **GN R. 2878:** **National Health Act, 2003 – Regulations regarding the general control of human bodies, tissue, blood, blood products and gametes????** **Medicines and related substances**	Part A: EIA process followed Part B: Requirements included in the EMPr	• Requirements incorporated into the EMPr. • Requirements to be incorporated into the Spitsvale Health and Safety management plan. • Requirements to be incorporated in the onsite Clinic management plan.

control Act 101 of 1965 & regulations		
Fertilizers, farm feeds, agricultural remedies and stock remedies Act 36 of 1947	Part A: EIA process followed Part B: Requirements included in the EMPr	The requirements specifically related to the use of herbicides and pesticides have been incorporated into the EMPr.
Conservation of Agricultural Resources Act 43 of 1983 (CARA) **GN R. 1048:** Declared Weeds and Invader plants	Part A: EIA process followed Part B: Requirements included in the EMPr	The requirements have been incorporated into the EMPr and final site layout plan. This act also deals with permitting of land zoned as Agriculture.
National Environmental Management: Biodiversity Act, 2002 **(NEMBA)**	Part A: EIA process followed Part B: Requirements included in the EMPr	Requirements incorporated into the EMPr. However before the commencement of site clearance an application must be lodged for the removal of protected species as identified in the Terrestrial Ecological Assessment (**Appendix G**).
National Veldt and Forest Fire Act 101 of 1998	Part A: EIA process followed Part B: Requirements included in the EMPr	Measures to prevent the spreading of fires are incorporated into the EMPr.
National Forest Act 84 of 1998	Part A: EIA process followed Part B: Requirements included in the EMPr	Requirements incorporated into the EMPr. However before the commencement of site clearance an application must be lodged for the removal of protected species as identified in the Terrestrial ecological assessment (**Appendix G**).
National Heritage Resources Act 25 of 2000	Part A: EIA process followed Part B: Requirements included in the EMPr	The EIR & EMPr document complies with section 38(8) of the NHRA that stipulates that a Heritage Resources Management (HRM) process must be implemented if an evaluation of the impact of a development on heritage resources is required in terms of the NEMA, the integrated environmental management guidelines issued by the Department

		of Environment Affairs (DEA), the MPRDA, or any other legislation. The consenting authority (in this instance the DMR) must ensure that the evaluation fulfils the requirements of the South African Heritage Resources Agency (SAHRA) and / or the Provincial Heritage Resources Authority of Gauteng (PHRA-G) in terms of section 38(3) of the NHRA. The NID, HSR and HIA reports completed for the project complies with the aforementioned section. Any comments and recommendations of SAHRA and / or PRHAG must be taken into account prior to the granting of the consent.
Occupational Health and Safety Act (Act 85 of 1993) **GN R.1248**:	Part A: EIA process followed Part B: Requirements included in the EMPr	Requirements to be incorporated in the Mine Health and Safety plan.
Government Policies		
Waste Management policies	Part A: EIA process followed Part B: Requirements included in the EMPr	In terms of waste management in South Africa, there are two main policies that have been considered in the development of the EMPr. The two main policies considered were regarding the management and disposal of fluorescent tube disposal and the management of sewage sludge. Best practice principles were incorporated into the EMPr.
National Environmental Health Policy	Part A: EIA process followed Part B: Requirements included in the EMPr	This policy document is intended as a 'broad guideline for the effective implementation and rendering of Environmental Health Services in South Africa'. It incorporates the philosophy of Environmental Health includes principles such as primary prevention, transparency, polluter pays, precautionary principle and cradle to grave.
SANS Standards		
Hazardous substances management	Part A: EIA process followed	The following two SANS standards were

	Part B: Requirements included in the EMPr	incorporated into the EMPr: • SANS 10089-1:2008 - Specifications for above-ground storage facilities for petroleum products • SANS 310: 2011 - Storage tank facilities for hazardous chemicals: Above-ground storage tank facilities for flammable, combustible and non-flammable chemicals.
Provincial Legislation		
Limpopo Environmental Management Act No. 7 of 2003	Part A: EIA process followed Part B: Requirements included in the EMPr	Requirements incorporated in the EMPr. The requirements for permitting of protected plants are stipulated and form part of LEMA. **Appendix G** lists the species requiring a permit to be removed.
Limpopo Conservation plan	Part A: EIA process followed Part B: Requirements included in the EMPr	Requirements incorporated in the EMPr. **Appendix G** incorporated the requirements of the Limpopo Conservation plan

f) Need and desirability of the proposed activities

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

The northern part of South Africa is widely known for the location of the Bushveld Complex, a saucer-shaped deposit containing a large percentage of the world's economically mineable Chromitite ore reserves. This complex is the largest known layered ultramafic/mafic intrusion in the world as it stretches some 480km east-west and 240km north-south over the North West and Limpopo Provinces. Chromitite ore is mined along the eastern and western rims of the complex, which has a surface area of about 66,000 km² (Maier *et al*, 2011).

The Chromitite ore and concentrates are used primarily in metallurgical applications such as the production of ferrochrome, which is a major input in the production of stainless steel. Other applications include refractories, foundry sands and chromium chemicals.

Based upon the authorised prospecting activities of the proposed Spitsvale operation approximately 50% of the products from the project are likely to be sold locally and the remaining 50% in the international market. The most likely local customers are the following:

- Samancor Tubatse Ferrochrome
- Glencore Lion Smelter

A large portion of the products is exported internationally through the Durban and Maputo terminals and will be dependent on the international demand. In this regard, despite the current economic crisis in the eurozone and a slowdown in the growth rate of the Chinese economy, the long term outlook for chrome remains good as it is closely linked to stainless steel production, which is expected to experience renewed growth in demand in the medium to long term.

According to the Draft 2015/2016 IDP for the Greater Tubatse Municipality (GTM), the eastern limb of the Bushveld Igneous Complex is emerging as an important structuring element of the municipality's spatial development, which will be increasingly dominant in future. The IDP for GTM also indicates that retail and service businesses will respond to the opening of mines and the development of housing by also locating close to these areas. In time, this may eventually alter the current fragmented spatial pattern by creating few large urban settlements, if the expected scale of mining activities materializes. It is also highlighted by the IDP that the existing resources in the GTM area remains unexploited and that the investment in this sector brings with it important investment in infrastructure development as well as job opportunities and economic spin-off. The lack of economic growth in the region warrants special attention and support to optimize the available opportunities. However, cognizance should be taken of the outflow of money from the mines in Greater Tubatse to other regions.

GTM has developed its Local Economic Development (LED) Strategy in June 2007 and is aligned with the Limpopo Growth and Development Strategy, Provincial Spatial Framework, National Spatial Development Perspectives and ASGISA. The strategy identifies the mining activities taking place in the area as the primary economic activity in GTM. It

also outlines key issues that have to be taped into to unlock the economic potential in GTM. To date, the growing mining sector in the GTM has resulted in GTM being the 7th largest regional economy in South Africa.

In addition to the local and national economic benefits of the proposed mining operation, there will also be socio-economic benefits. The following positive impacts are anticipated:

- Direct economic benefits will be derived from wages, taxes and profits. Indirect economic benefits will be derived from the procurement of goods and services and the increased spending power of employees;
- Local and regional employment opportunities. Although smaller in number than employment creation during the construction phase, these will have a significantly longer duration;
- Increased business opportunities for local entrepreneurs through the supply of goods and services to the mine;
- A positive macro-economic impact at a local, regional and provincial level due to operational expenditure, taxes and royalties; and
- Economic and social benefits associated with Corporate Social Responsibility (CSR) and Local Economic Development (LED) initiatives by the mine (See **Appendix D** For the final Social and Labour plan).

Unemployment is a major problem within the GTM. The proposed Spitsvale Mine operation will have a positive impact on the baseline social-economic conditions of the local communities involved. The mine will create several employment opportunities and preference will be given to the locally unemployed wherever possible. The mine will contribute towards the socio-economic development of the region as a whole through social upliftment and job creation as primary agents.

However, clear policy guidelines and careful management of Project implementation will be required to ensure that benefits for the local population and economy are maximised. For maximising of the positive outcomes, these policy guidelines must be reviewed on a regular basis throughout the entire life cycle of the Spitsval operations.

g) Motivation for the preferred development footprint within the approved site

(Full description of the process followed to reach the proposed development footprint within the approved site. NB!! – This section is about the determination of the specific site layout and the location of infrastructure and activities on site, having taken into consideration the issues raised by interested and affected parties, and the consideration of alternatives to the initially proposed site layout.)

The proposed Spitsvale Project is located within the BCR Minerals (Pty) Ltd prospecting and bulk sampling right area (LP30/5/1/1/2/10624PR (Kennedy's Vale) and LP30/5/1/1/2/10603PR (Spitskop)) and the surrounding area is currently used for mining related activities. The Mining Permit area can only be located within the Prospecting Right area and the mineralised zone is located within the three areas that are proposed to be mined:

- Klarinet "Koppie" situated South East on portion 22 and 8 of Kennedy's Vale and South West on portion 25, 26, and 28 of Spitskop;

- Tubatse "Koppie" situated North East on portion 28 of Spitskop; and
- Flats area situated North West on portion 25 of Spitskop and throughout portion 24 of Spitskop.

i) Details of the development footprint alternatives considered

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

(a) Property on which or location where it is proposed to undertake the activity

No property alternatives have been considered as the envisaged mining operations will occur on properties already utilised for the prospecting and bulk sampling operations and where BCR Minerals (Pty) Ltd has negotiated surface rights.

It may be worth noting the ecological status of the surrounding area that may be more sensitive and less desirable for mining activities, if indeed so.

(b) Type of activity to be undertaken

The proposed mining activity relates to the open cast mining of the mineral chromitite and associated minerals in particular the MG0, MG1, MG2 Package, MG3 and MG4 Package chromitite seams. No alternatives to mining the material listed have been considered.

(c) Design or layout of the activity

The site layout, as attached in **Appendix C**, in terms of the positioning of haul roads, lay down areas, RoM product stockpile areas, workshops, topsoil and subsoil stockpiles, screening plant, and residue stockpiles was determined by considering both spatial and practical mining operation aspects.

The lay down areas and associated infrastructure constructed for the prospecting and bulk sample phase of the Spitsvale project will be utilised as part of the proposed mining activity.

The following factors are considered in planning the lay down area:

- Visual distance from local community i.e. Dithamaga Trust;
- Haul distance; and
- Sensitive environmental and social areas.

At the time of submitting this report to the competent authority the following infrastructures did not form part of the site layout:

- Storm water infrastructure;

- Location of PCD's; and
- Detailed infrastructure associated to the Tubatse lay down area.

It is therefore recommended that before authorising the activity a detailed site layout plan be submitted indicating the details of all infrastructure associated to the proposed mining development.

(d) Technology to be used in the activity

No alternative in terms of the technology to be used have been considered.

(e) Operational aspects of the activity

The proposed activity relates to the open cast mining of Chrome Ore. The operational aspect entails topsoil and subsoil stripping and stockpiling, drilling and blasting, excavations, RoM product hauling and stockpiling, screening, and bulk transport of end product.

The processing of end product may be considered further down in the life cycle of the mine. However at the present time no processing will occur.

Depending on the financial feasibility, underground mining may be considered as a mining alternative.

(f) The option of not implementing the activity

The "no-go" option for implementing the activity has been considered, but due to the fact that operations are about to commence for the bulk sample and that the mining of the resources will lead to job creation, the contribution to the GDP of not only the municipality, but also the Province as a whole, it is advisable that the mining activities be authorised with strict adherence to findings and recommendations in this report and its appendices. Thus the option of not implementing the activity is not advised.

ii) Details of the Public Participation Process followed

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

Environmental Management Assistance (Pty) Ltd (EMA) has appointed Ecoleges as an independent consultant to manage the public participation process.

Although the public participation process (PPP) has not been completed by the time finalising this report, the following steps have been taken to date:

- A Background Information Document (BID), with a registration & commenting sheet, was distributed to all the Potential Interested and Affected Parties (PI&As) on the 9th of December 2015.
- An advertisement was placed in the local newspaper (The Steelburger), on the 11th of December 2015.
- Notices were erected around the site on the 21st of December 2015.
- A public meeting was held on the 28th January 2016.All the PI&A's that made comments, showed interest, attended the meeting and are members of the organs of state automatically become Registered Interested and Affected Parties (RI&APs).

This report will be subjected to a 30 days review period by the I&AP registered on the current data base. All comment will be recorded and considered in the final EIR and EMPr before submitting to the competent authority for review.

iii) Summary of issues raised by I&APs

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

This section will be completed after the revised EIR & EMPr undergone the required 30 days PPP as stipulated by the 2014 EIA regulations.

However, **Appendix T** provides the draft PPP report describing the process followed to date.

Table 6: Summary of comments and issues raised by the I&AP

Interested and Affected Parties *List the names of persons consulted in this column, and* *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 the issues and or response were incorporated.**
AFFECTED PARTIES					
Landowner/s					
Lawful occupier/s of the land					
Landowners or lawful occupiers on adjacent properties					

Municipal councillor					
Municipality					
Organs of state *(Responsible for infrastructure that may be affected Roads Department, Eskom, Telkom, DWA etc.)*					
Communities					
Dept. Land Affairs					
Traditional Leaders					
Dept. Environmental Affairs					
Other Competent Authorities affected					
OTHER AFFECTED PARTIES					

INTERESTED PARTIES				

iv) Environmental attributes associated with the development footprint alternatives

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

The section to follow describes the environmental attributes associated with the development footprint alternatives.

1) Baseline Environment

In order to determine the baseline environment of the proposed location of the Spitsvale Mine, a number of specialist investigations were initiated. The section to follow summarises these findings and recommendations. It should be noted that the detailed reports are attached as appendices to this report. All mitigation measures and recommendations proposed are incorporated into the EMPr to this report.

(a) Type of environment affected by the proposed activity

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

I. Climate

Situated in the Greater Sekhukhune District Municipality (Limpopo), the proposed mining operation is located in the summer rainfall zone of the Republic of South Africa. As a whole the region is considered to be sub-tropical by nature and conductive to agricultural production (Greater Tubatse Municipality, 2015). The summer months (between October and March) tend to be extremely hot and humid with an average maximum temperature of between 32°C and 35°C and an average minimum temperature of between 18°C and 20°C. The winter months (May to July) tends to be warm to cool with an average maximum temperature of between 20°C and 25°C and minimum temperatures between 5°C and 10°C (Figure 3).

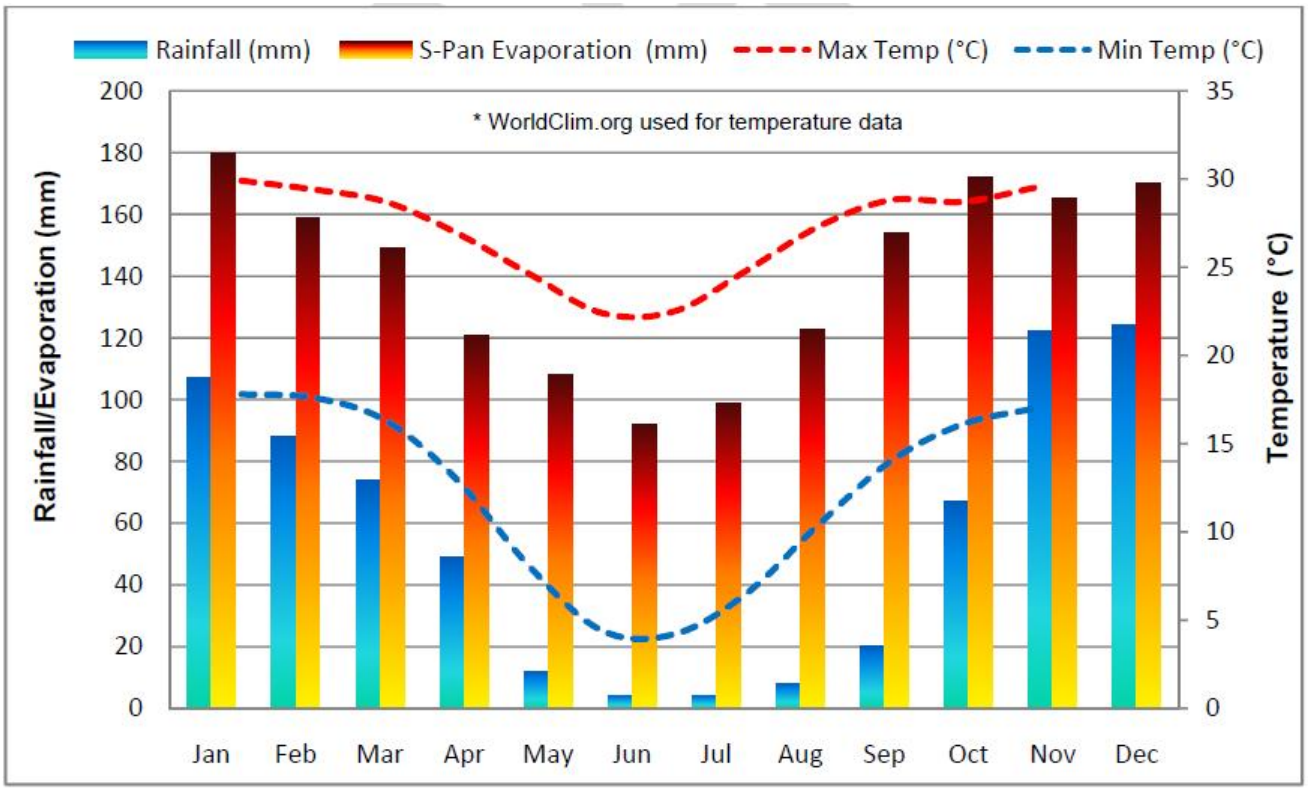

Figure 3: Summary of average climate for site

II. Topography

The proposed Spitsvale Project is situated on portions 24, 25, 26 and 28 of the farm Spitskop 333 KT and portions 8 and 22 of the farm Kennedy's Vale 361 KT in the Sekhukhune District north of Tweefontein Chrome Mine and south of Spitzkop Platinum Mine (Appendix B). The proposed mining area is located approximately 4 km south from the R555 and "Tweefontein" road intersection and approximately 17 km south west from Steelpoort. The project lies on the north-western slopes of the foothills of the Schurinksberg and is situated in the primary catchment of the Olifants River. Locally, the site is drained towards the Steelpoort River through various unnamed tributaries that originates in the surrounding mountains and hills. The relief changes more than 600 m from the Steelpoort River (~ 750 metre above mean sea level) to the edge of the quaternary drainage (B41J) surface water divide (~ 1600 mamsl). These elevated areas slope steeply down to the flatter areas where the proposed Spitskop Mine infrastructure will be located.

III. Geological Environment

The description of the geology is based on the existing knowledge and literature of the region as well as on the BCR Minerals Exploration Geology Report (McQuade, 2015) and Specialist reports.

The proposed mining area is underlain by the Rustenburg Layer Suite / Dwars River rocks of the Archaean age Bushveld Igneous Complex and lies south of the Steelpoort Fault trending in a northeast-southwest direction. The Bushveld

Igneous Complex overlies the Transvaal Supergroup's Pretoria Group. Younger cover rocks (quaternary sedimentary deposits) occur throughout the area (Figure).

Bushveld Igneous Complex (BIC)

The Bushveld Igneous Complex (BIC) formed as massive crustal emplacements of predominantly mafic intrusive and extrusive rocks and comprises of suites of layered mafic complexes and sills that intruded the floor rocks of the Transvaal Supergroup. The BIC is divided into the Rustenburg Layered Suite, Lebowa Granite Suite, Rashoop Granophyre Suite and Rooiberg Group. The Spitsvale Project is underlain by rocks of the Rustenburg Layered Suite (BIC).

Rustenburg Layered Suite

The Rustenburg Layered Suite comprises rock types ranging from dunite, pyroxenite, norite, gabbro and anorthosite to magnetite and appatite rich diorite, demonstrating a complete differentiation sequence for basic magma. The Rustenburg Layered Suite is subdivided into different limbs and(or) zones, i.e. the Eastern Limb, Western Limb and Northern Limb with each limb further sub-divided into the Upper Zone, Main Zone, Critical Zone, Lower Zone and Marginal Zone. The limbs and zones are based on geographical location and stratigraphic /lithology units respectively. The farms associated with the Spitsvale Project are located in the Eastern Limb with associated rock units from the Main Zone and Critical Zone.

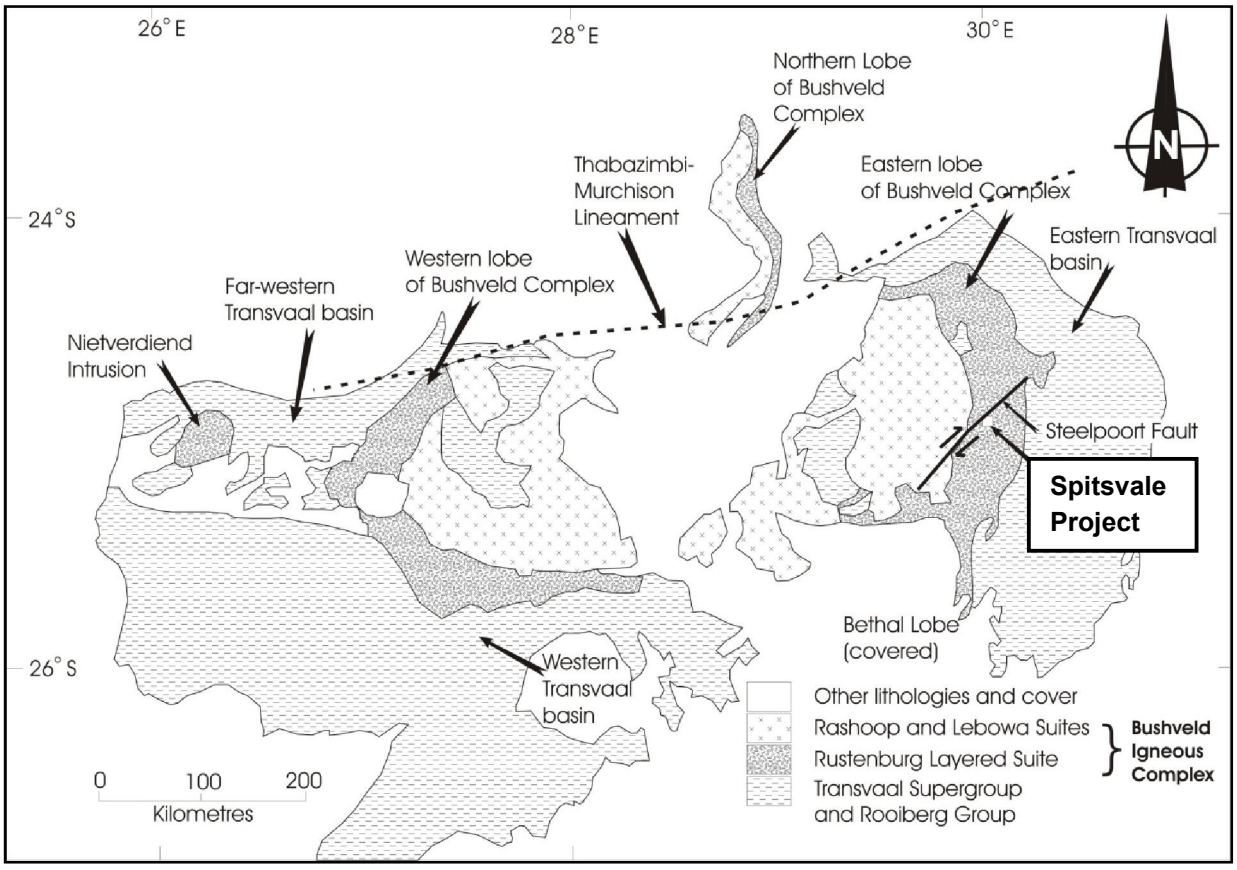

Figure 4: Approximate location of Spitsvale Project and the Steelpoort Fault within the Bushveld Igneous Complex.

The Main Zone consists of medium-grained norite with minor proxenite. The rocks contain variable amounts of quartz and biotite. The Lower Zone consists of pyroxenite and olivine bearing rocks, such as Bronzinite and Harzburgite. The Critical Zone, known for its chromite deposits, consists of layered chromite, pyroxenite, norite and anorthosite. The Main Zone is a thick succession of norite and gabbronorite with minor anorthosite and pyroxenite layers. The proposed mining target area is underlain by rocks of the Lower Critical and Upper Critical Zones within the BIC, consisting of chromitite, pyroxenite, norite, anorthositic notire and mottled anothosite. The local geology associated with the Spitsvale Project ,targeting the Critical Zone dips at 8° to 14° southwest the Rustenburg Layered Suite, is well exposed in the Eastern Limb of the Bushveld Complex and displays a prominent MG1 to MG4, Middle Group Seams. These chromitite seams are hosted in the Mooihoek pyroxenite. The main target horizon for mining at Spitskop and Kennedy's Vale is the MG1 and MG2 Package Chromitite Layers.

The eastern margin of the study area is underlain by steeply dipping (floor) Pretoria Group sediments distributed around a north-south striking Steelpoort anticline. The Dwars River fragment in the southwest corner of the area is a floor inlier characterised by outcropping Steenkampsberg quartzite. The fragment probably represents a horst block of floor rocks with faulted contacts. Folding of quartzites and metamorphosed shale units occur on a variety of scales.

Transvaal Supergroup

The Transvaal Supergroup formed during the late Archaean to early Proterozoic eons and is preserved within three structural basins on the Kaapvaal Craton, one of which is the Transvaal and Griqualand West Basin. As described by Barnard (2000) and Foster (1984) this sequence consists mostly of volcanic rocks such as lava, tuff, andesite, basalt and rhyolite and sedimentary rocks which include quartzite, sandstone, shale, conglomerate and dolomite. Diabase sills and dykes form part of the Transvaal sequence as well. The Transvaal Supergroup underlies the Bushveld Igneous Complex.

Geological structures (faults and dykes)

The Steelpoort Valley is occupied by a large-scale NE-SW to NNE-SSW striking fault zone, known as the Steelpoort Fault, which up to 10 km of apparent right-handed faulting has occurred. The northeast-southwest striking Steelpoort fault running the length of the Steelpoort Valley is found approximately 7 km north of the Spitsvale Project. The fault formed a fault zone ranging from 200-250 m in width and is thus likely to affect groundwater flow. The presence of Steelpoort Fault splays have been interpreted from exploration boreholes, and show that the faults generally strike NE, NW and NNE, which may reflect imposed shear.

The Spitskope and Kennedy's Vale farms are intruded by several dolerite dykes, expected to be of several ages from the Waterberg and Karoo Supergroups. These dykes are generally steeply dipping and have varying thickness but do not seem to exceed 20 metres in thickness.

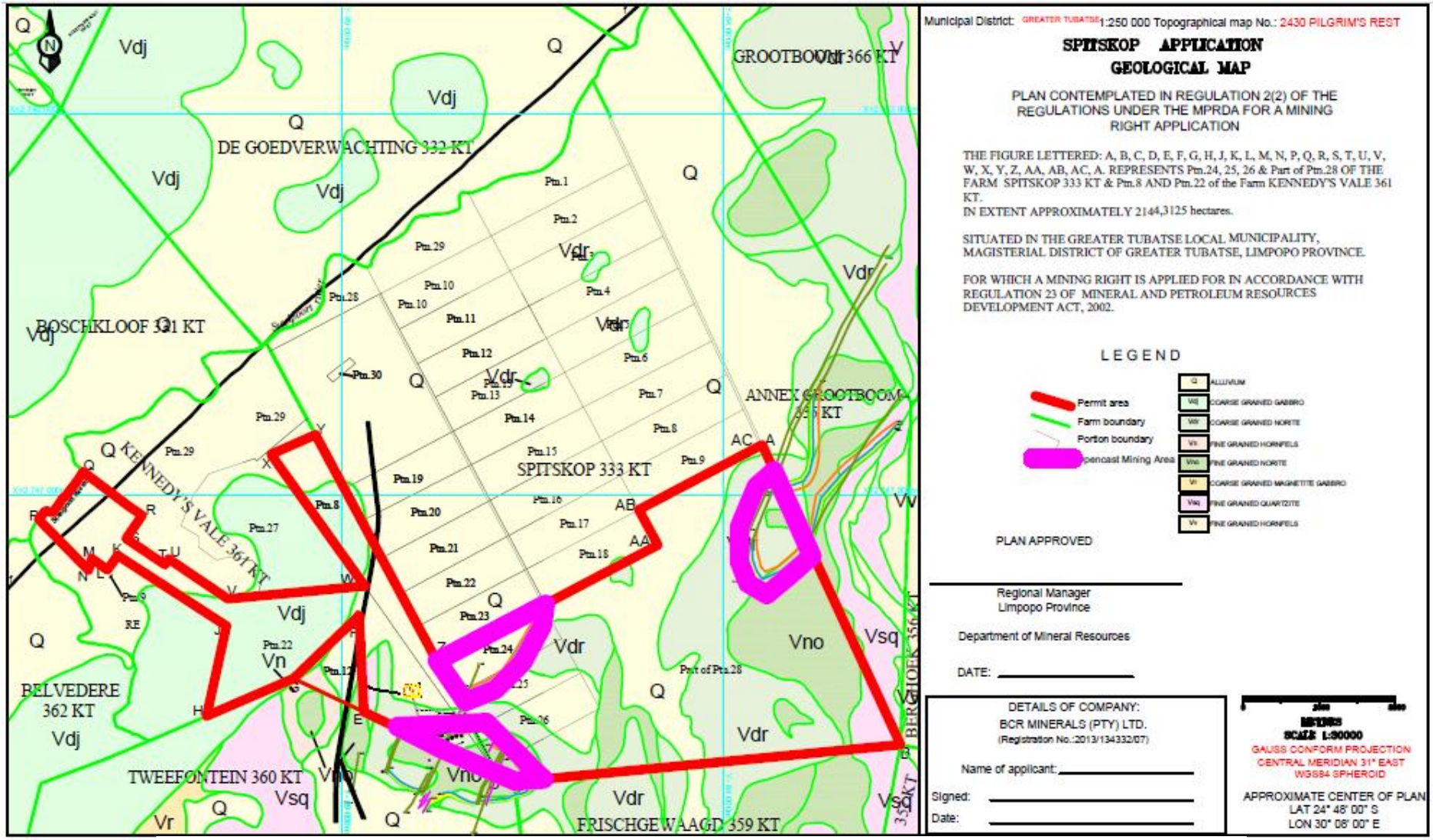

Figure 5: Regional geological map

IV. Air Quality

An Air Quality specialist was appointed by the EAP to investigate and assess the air quality impacts of the proposed activities.

The main objective of the Air Quality Impact Assessment is to determine the potential impact of emissions from the construction and operational activities associated with the proposed Spitsvale mine on ambient air quality.

As part of the Air Quality Impact Assessment, a Baseline Air Quality Assessment was undertaken to determine the prevailing meteorological conditions at the site, establish baseline concentrations of key air pollutants of concern, identify existing sources of emissions and identify key sensitive receptors surrounding the project site. Use was made of modelled MM5 meteorological data for the period 2012 – 2014. Baseline concentrations for dust fallout were analysed with the use of dust fallout monitoring data provided by the client for the period July – September 2015. A comprehensive air quality monitoring dataset was not available. It is recommended that baseline monitoring of dust fallout, PM10 and PM2.5 is conducted at the site for a period of at least 12 months.

The Air Quality Impact Assessment consisted of an emissions inventory and subsequent dispersion modelling simulations to determine TSP (as dust fallout), PM10 and PM2.5 concentrations associated with the construction and operational phases of the proposed Spitsvale mine. Comparison of the modelled concentrations was made with the South African Ambient Air Quality Standards and the South African National Dust Control Regulations in order to determine compliance.

The main conclusions based on the information obtained during the Baseline Assessment can be summarised as follows:

- Based on the prevailing wind fields for the period January 2012 to December 2014, emissions from proposed operations at Spitsvale mine will likely be transported towards the south-west and north-east. During the day time emissions are likely to be transported in a south-westerly direction. In the night time emissions are likely to be transported towards north-east. Moderate to fast wind speeds observed during all time periods may result in effective dispersion and dilution of emissions from Spitsvale mine.

- A comprehensive air quality monitoring dataset for PM10 and PM2.5 concentrations was not available and could not be presented for the study area. Dust fallout concentrations at the proposed mine for the period July to September 2015 were relatively low and did not exceed the residential dust fallout standard of 600 mg/m2/day and ranged from approximately 57 – 569 mg/m2/day. However, a more comprehensive dust fallout monitoring dataset is required to assess the baseline dust fallout rates for the study area.

- Existing sources of emissions surrounding the proposed Spitsvale Mine are mainly associated with exiting mining operations, vehicle dust entrainment on unpaved roads, wind erosion from exposed areas and potentially domestic fuel burning in surrounding residential areas.

- There are residential areas located within close proximity (<10 km) and along the proposed mine's boundary line. These include Steelpoort, Ga-Mampuru, Ga-Manapane and Ga-Matate. There are also a couple of small dwellings and communities located within the mine's boundary line near the centre of the haul route.

The main conclusions of the Impact Assessment for the mine can be summarised as follows for the construction and operational phases:

- Based on the dispersion modelling plots for the construction phase the following conclusions can be made:
  - Predicted incremental dust fallout rates beyond the mine boundary are in compliance with the allowable dust fallout limit of 1200 mg/m2/day for non-residential and 600 mg/m2/day for residential areas.
- Based on the dispersion modelling plots for the operational phase the following conclusions can be made:
  - Predicted incremental dust fallout rates beyond the mine boundary are in compliance with the allowable dust fallout limit of 1200 mg/m2/day for non-residential and 600 mg/m2/day for residential areas.
  - Predicted incremental PM10 concentrations beyond the mine boundary are in compliance with the daily average standard of 75 µg/m3 and the annual average standard of 40 µg/m3.
  - Predicted incremental PM2.5 concentrations outside the mine's boundary are in compliance the daily average standard of 40 µg/m3 and the annual average standard of 20 µg/m3.
- Although the predicted concentrations due to proposed operations are expected to be low beyond the mine boundary, it should be noted that exceedances of the PM10 and PM2.5 standards were observed inside the mine boundary along the main haul route and near the mining areas. There are some small communities and dwellings that reside within the mine's boundary and near to the haul route. Therefore, it is recommended that a detailed dust management plan is developed and incorporated during the design stages of the mine. The plan should focus on sources of dust located in close proximity to the residential receptors within the boundary.

The detailed report is attached as **Appendix E**.

V. Noise

A Noise Impact specialist was appointed by the EAP to investigate and assess the current and predicted noise factors of the baseline environment.

A noise impact assessment (ENIA) was completed for the following reasons:

- The proposed Spitsvale mining activity is situated within 1, 000 m of a noise-sensitive development (SANS 10328:2008);
- It is a controlled activity in terms of the NEMA regulations and a ENIA is required, because it may cause a disturbing noise that is prohibited in terms of section 18(1) of the Government Notice 579 of 2010; and
- It is generally required by the local or district authority as part of the environmental authorization or planning approval in terms of Regulation 2(d) of GN R154 of 1992.

This study included the following:

- A baseline noise assessment;
- Identification of sensitive receptors; and
- Recommendations on managing noise impacts.

The section to follow summarises the determination of baseline findings of the Noise Impact assessment.

Receptors

Residential areas and potential noise-sensitive developments/receptors were identified using tools such as Google Earth ® with the areas up to a distance of 1,000m from closest project boundary. This was supported by a site visit to confirm the status of the identified dwellings. Eight receptors in the study area were numbered from NSD01 to NSD08.

NSD02 to NSD04 are all houses within a community, the numbers represent the closest dwellings to the project footprint (except for NSD03). NSD03 is an educational facility within the community, namely the Dithamaga Primary School. It must be noted that educational facilities have no special Rating Levels, only indoor design levels. This facility is also only in use during daytime hours (06:00 – 22:00, SANS10103:2008 daytime criteria) and is vacant during the night.

NSD05 to NSD06 are dwellings of Mr. Hendrik Mabelane. NSD07 represents a commercial facility (office) of a developer within the study area. NSD01 is a community in the furthermost northern section of the project footprint, namely the Tubatse community.

Measurements

Ambient sound levels were measured at two locations from the 22nd till 26th October 2015. One class-1 SLMs was used for measurements. The sound level meter would measure “average” sound levels over 10 minutes periods, save the data and start with a new 10 minute measurement till the instrument was stopped.

The measurement locations were numbered from BCR01 to BR02. During site investigations three feasible localities were investigated for longer-term measurements. Where longer-term measurements were not feasible (e.g. 12 hours or longer), shorter term measurements were conducted.

Due to safety limitations of equipment it was selected to implement longer term measurement equipment at the more secure dwelling of Mr. Hendrik Mabelane (NSD05). This measured locality is illustrated as BCR01. The selected measurement localities property had only one singular dwelling adjacent to it. Two communities (represented by NSD01 (Tubatse) and NSD02 – NSD04 in this document) was app. 3km and 700m respectively from measurement locality. The measurement locality would likely be representative of the two communities Rating Level without extraneous noises

(community sounds) impacting on measurements. BCR02 was a measured point conducted at the Tubatse community itself.

Summary

Considering the $L_{Aleq,16/8hr}$ daytime and night-time measurements a suburban Rating Level is proposed for the study area. At times during night-time the L_{A90} and impulse setting may have indicated a rural setting, albeit briefly. However considering the entire set of $L_{Aleq,10min}$ set and $L_{Aleq,8hr}$ it is more akin of a suburban area. There is a moderate-high confidence in the ambient sound levels measured and the subsequent Rating Levels determined.

The section to follow summarises the key findings observed during the investigation.

Investigated Scenario

Assessments done in this document are as recommended by the National/International guidelines and regulations SANS 10103, SANS 10328 and GN R154. The report considers a worst-case scenario, evaluating the potential noise impact during peak hours.

Two phases were investigated and modelled. The construction phase, which entails the stripping of topsoil and overburden at open cast pits. The second phase is the operational, which entails the truck and shovel open cast mining, stockpile maintenance as well as new plant operations.

Conclusion

Considering this approach, there is a risk of a noise impact of medium-high significance during peak construction and operational noise levels and at the Tubatse community (NSD01) directly adjacent to the proposed furthermost northern pit. The assessment made use of the SANS 10103:2008 guideline and International Finance Corporation noise limits for residential areas. With proposed mitigation options implemented (see EMP) an acceptable low significance can be achieved.

As a result of the baseline findings and the modelling of the expected impacts, the section to follow summarises the recommendations for the management and mitigation of expected noise impacts.

Mitigation options

The most important mitigation options recommended would be to limit operations on the open cast pits adjacent to the Tubatse community to daytimes only (during all phases). Berms/barriers need to be constructed along either the noise sources or the receivers. In order for the berms/barriers to successfully act as an acoustical screen specifications indicated in this document mitigation section must be adhered to. Communication between the Tubatse community and the developer need to be implemented and maintained, highlighting the outcome of this study.

Measurements and Audit Programme

An annual Acoustical Measurement & Audit Programme is recommended to be conducted during the construction and operational phase. Measurements should be collected in 10-minute bins over a 48 hour measurement period. Variables and measurement recommended settings to be analysed include L_{AMin}, L_{Aeq}, L_{AMax}, L_{AMin}, L_{A10}, L_{A90} and spectral analysis. Noise measurements must be continued as long as there are potential receptors living within 1,000m of the boundaries of the mining operation, or as long as a valid noise complaint is registered.

Feedback regarding noise measurements should be presented to all stakeholders and other Interested and Affected parties in the area. The feedback platform and interval periods should be defined by the developer, with an annual feedback period recommended.

The following recommendations were made by the Noise Specialist:

- Feedback regarding noise measurements should be presented to all stakeholders and other Interested and Affected parties in the area.
- The feedback platform and interval periods should be defined by the developer, with an annual feedback period recommended.
- If the layout of the mine changes significantly (or assumptions change) used in this report, that this Environmental Noise Impact Assessment be reviewed with the appropriate information supplied by the developer, including:
    - Locality of the noise source;
    - Operational time of the noise source; and
    - If possible specifications regarding the noise source

The detailed report is attached as **Appendix F**.

VI. Biodiversity (Terrestrial Ecology)

As part of the investigation of the potential impact associated to the proposed mining activities, a number of specialists were appointed by the EAP. The sections to follow will summarise the findings from the reports.

a. Terrestrial Fauna

The SANBI SIBIS and ADU databases were queried regarding vertebrate fauna and arachnid species historically recorded in the study area and surroundings. The likelihood of such species still occurring in the area was verified according to Apps (2000), and species of conservation concern or that are protected and most likely to occur in the study area listed. Protected and red data species that may be expected to occur on the study area are listed under results in the Biodiversity Assessment report (**Appendix G**).

The following two terrestrial fauna species were found to be of concern in the investigation:

- *Chamaeleo dilepis subsp dilepis* (Common Flap-neck Chameleon) – This species are protected by the Limpopo Environmental Management Act, Act 7 of 2003.
- *Platysaurus orientalis subsp fitzsimonsi* (FitzSimons' Flat Lizard) – This species are considered to be near threatened. Although it was not observed during the investigation it is highly likely that they will be found in this particular habitat.

b. Avi-Fauna

As per instructed by the Department of Mineral Resources in the acceptance letter of the submitted Scoping, an Avifauna survey was conducted.

The objective of the survey was mainly to determine presence or absence of the respective avifaunal species, and made no attempt to estimate numbers (census) of the various species on the site. The emphasis was on determining whether any Red-Data species were present and to what extent any mining activities might threaten such species. The survey was conducted on 18th and 19th January 2016.

A total of 110 species was recorded during this survey. These are listed in the attached detailed report (Table 1 **Appendix H**). High recording rates were obtained for conspicuous and common species which occurred over a wide range of habitats such as European Bee-eater, Dark-capped Bulbul, Long-billed Crombec, Cattle Egret, Grey Go-away-bird, Hadeda Ibis, Red-faced Mousebird, Tawny-flanked Prinia, White-browed Sparrow-weaver, Barn Swallow, Lesser Striped Swallow and Cape Turtle Dove. Totals indicate that Area 1 (with 80 species) yielded the greatest number of species, but this is probably a reflection of the time of day that this area was surveyed – early morning during "dawn chorus".

The Falco Biarmicus (Lanner Falcon), is the only "Vulnerable" species known to potentially occur on the Spitsvale Project development site.

The following mitigation measures were recommended to reduce the possible impacts on the avifauna species, with specific reference to the Lanner Falcon:

- To leave, as far as is possible, as much of the natural indigenous bush undisturbed and in its pristine state.
- Route connecting roads as close as is possible to already developed sites or roads.
- Restrict or prohibit any off-road driving in areas of pristine indigenous bush.
- Route power lines, if applicable, along these connecting roads, or better still, route them underground.

The general conclusion of the avifauna survey, and data acquired from the Southern African Bird Atlas Projects ($SABAP_1$ and $SABAP_2$) have not recorded any species whose Red Data status might compromise the further development of the proposed project. The Lanner Falcon is the only recorded species that is listed as "Vulnerable" in the Red Data List. This record came from the $SABAP_1$ database and is now about 25 years old. It was not recorded during this survey, and no

suitable nesting cliffs are known to be present on the Spitsvale Project area. While Spitsvale may constitute part of the species' foraging range, the area of the site is relatively small (±2 200 ha) and developments here should have minimal adverse consequences for any resident or migrant Lanners.

c. Bat Survey

As per instructed by the Department of Mineral Resources in the acceptance letter of the submitted Scoping, a Bat survey was conducted.

No specialist species of bats were identified during the field study, nonetheless, with additional deterioration to the landscape and the loss of habitat due to vegetation clearing may cause a shift in the species composition within the bat community to a bias towards more hardy species such as the Egyptian free-tailed bat.

Due to the prevailing weather conditions and lunar cycle which were not conducive to active trapping and may not have been favourable to all species foraging (windy, overcast with potential rain and a waxing crescent – gibbous), the transects and trapping night can only provide a baseline indication of the bat species and activity over the site. This baseline report should be followed by annual/biannual surveys to monitor bat activity, species compositions and population trends as mining activities proceed.

The following mitigation measures where suggested:

- Conserve as much of the natural vegetation as possible. Only create haul roads that are absolutely necessary.
- Discourage vehicles from driving through the natural vegetation were mining activities are not taking place.
- Prohibit mining plant and trucks from washing or dumping material near a water course (wet or dry) to prevent the pollution of natural water bodies.
- Prohibit any chemical and/or heavy metal from being released into the environment.
- Manage all waste water and stormwater to prevent pollution to water bodies.
- To erect security lights/spot lights only near infrastructure/where absolutely necessary.
- Mitigate night time noise to as low as possible, particularly during peak foraging times.
- Restrict blasting activities to daytime hours.

Bat activity and trends in population numbers are of particular interest to determine the long-term effects of opencast mining of Spitsvale, it is suggested that a passive recording monitoring system be put in place and maintained by a specialist to determine the impacts of active opencast mining on bat populations in relation to landscape changes, noise pollution, light pollution and water quality.

The detailed report is attached as **Appendix J**.

d. Flora

A field study was conducted from the 2-6th January 2016 as well as a desktop of the associated area based on the data from the POSA SANBI website.

The presence of several species of conservation concern was verified during field observations.

These plant species identified included:

- 10 species endemic to Sekhukhuneland
- 20 further species endemic to RSA
- At least 9 red data species
- At least one NEMA:BA (ToPS) species
- At least 5 NFA protected tree species
- At least 7 LEMA protected plant species, additionally tree-mosses observed

Of all of the above, several will be moderately to severely affected by the proposed mining activities.

The Vegetation Associations identified and delineated in the Biodiversity assessment are as follows (also indicating sensitivity):

- *Themeda triandra – Diheteropogon amplectens* Grasslands ***(Sensitivity: HIGH - Avoid as far as possible)***: These are primarily grass-dominated slopes, with either a relatively sparse shrub cover or only small clumps of higher vegetation.
- *Cyperus sexangularis – Flueggea virosa* Ephemeral Drainage Lines ***(Sensitivity: No Go Area – only suitable crossings permissible):*** These include small rivers on more level areas as well as rocky washes and ravines higher into the mountains.
- *Acacia tortilis – Dichrostachys cinerea* Dry Mixed Bushveld ***(Sensitivity: Medium-Low)***: The extent of this association is relatively limited, found on more level areas and has been variously degraded, often leading to a diminished herb-layer and a heavily encroached shrub layer.
- *Kirkia wilmsii – Terminalia prunioides* variable Bushveld ***(Sensitivity: Medium-High: Avoid large tree clumps and individuals as far as possible):*** This is found mostly on the lower footslopes of mountains and as an ecotone to the plains below, but also on rocky mountain scarps as well as undulating rocky flats
- *Hippobromus pauciflorus – Rhoicissus tridentata* Rock Outcrops ***(Sensitivity: HIGH - Treat as No Go Area as far as possible)***: This vegetation is highly variable, with no two outcrops with the same vegetation. Generally it is found between large boulders – either on mountain plateaus or on mountain slopes. The high niche diversity accounts for a very high biodiversity of these pockets of vegetation.

- *Combretum hereroense - Euclea sekhukhuniensis* low bushveld ***(Sensitivity: No Go, only limited access roads permissible)***: Very variable, this vegetation type is found on more level areas between slopes or on the plains and extensive donga systems within the study area, where *Euclea sekhukhuniensis* can form relatively dense stands. The latter species is a narrow endemic – although currently abundant, its limited distribution makes its populations highly vulnerable to the impacts of open-cast mining and other transformative developments.

From a terrestrial ecological perspective, the proposed mining operations will have a significant local negative impact.

It is recommended that strict mitigation measures are diligently implemented as well as obtaining all necessary authorisations or permits required for any associated activity. Recommendations on the proposed mitigation measures are found in the detailed report attached as **Appendix G** and have been considered in the EMPr.

e. Invasive Plants

As part of the field study conducted from the 2-6th January 2016, a number of listed invasive plants were identified. According GN R. 598 the following alien invasive species have been observed on the associated land portions:

Category 1b:

- *Argemone ochroleuca*
- *Datura stramonium*
- *Lantana camara*
- *Melia azedarach*
- *Pennisetum setaceum*
- *Opuntia* species

Category 2:

- *Agave sisalana*

Category 3:

- *Morus alba*

A detailed alien invasive species management plan will have to be implemented during prospecting, construction, and mining and maintained until decommissioning has been completed. This management plan must also ensure following regulations of NEMA: BA are adhered to:

- Conveying, moving or otherwise translocating any specimen of a listed invasive species
- Spreading or allowing the spread of any specimen of a listed invasive species

Recommendations on the proposed mitigation measures are found in the detailed report attached as **Appendix G** and have been considered in the EMPr.

VII. Soils

A Soil specialist was appointed by the EAP to investigate and assess the current and predicted soil factors of the baseline environment as well as determining the possible impacts of the proposed activities on the soil environment.

The objectives of the investigation included a soil survey and mapping of study area, measurement of the effective depth of the soil(s), assessment of agriculture potential of soils, assessment of the erodibility and misuse of soils, mapping of land use & land capability, formulation of a soil stripping guide and plan, determination of chemical, mineralogical and physical properties of representative soil forms, assessment of suitability of soils for rehabilitation purposes and an impact assessment of topsoil stripping on soils with recommendations to mitigate negative impacts.

From the assessment it is conclusive that the dominant soil forms recorded and identified according to the Taxonomical Soil Classification System of South Africa are Hutton, Oakleaf, Bloemdal, Mispah and Glenrosa soil forms. The effective depth of the Hutton, Oakleaf and Bloemdal soils exceeds 300mm inclusive of the Orthic A, Red Apedalic and Neocutanic B – Horizons. The soils from the study area are weathering products from anorthosite and pyroxenite. Anorthosite rock is characterised by a predominance of plagioclase feldspar and minimal pyroxene, ilmenite and magnetite. Pyroxenite is an ultramafic rock consisting essentially of the minerals of the pyroxene group such as augite, diopside, hypersthene, bronzite or enstatite. Pyroxenites are classified into clinopyroxenites, orthopyroxenites and websterites. The soils are rocky shallow soils on the mountainous areas with an Orthic A – Horizon developed to maximum 300mm on hard rock and/or weathered rock material. In the low laying areas the soil catena is characterised by deep red horizons covered by an Orthic A - Horizon 300mm characterised by high organic material, micro-organisms and seed content representing a delicate micro-habitat overlaying Red Apedalic and Neocutanic B - Horizons >1,2m deep. The Red Apedalic and Neocutanic B-Horizons are characterised by well aerated and drained sandy soil profiles with an average clay content of 10-15% represented by predominantly 1:1 clay minerals, i.e. kaolinite and oxides of Fe and Mn. Signs of a ferricrete layer is present due to the presence of a shallow fluctuating water table causing the precipitation of Fe and Mn under fluctuating aerobic and anaerobic soil moisture conditions.

The agricultural potential (Table 3, p20) of the Hutton, Oakleaf and Bloemdal soils is considered medium to high under dryland (450mm/y rainfall) and irrigation conditions (>10-15mm/week 33-1,500kPa plant available water).

Evidence of natural soil erosion was observed on the soils during the investigation. Careful consideration should be given during mining to minimise impacts on the soil that could enhance soil erosion. It could be considered as contributing to the surrounding environment for the mine to implement artificial measures to minimise natural soil erosion – although the current erosion observed during the assessment is natural and was not caused by the mine.

The current land use includes 4,48% mining & industrial, 87,69% natural veld, 3,75% ploughed land, 3,46% settlement and 0,62% wetlands. Land capability includes 17,42% arable, 0,62% wetland, 76,14% wilderness with 2,36% occupied by mining & industrial and 3,46% settlement of the total study area investigated.

A minimum of topsoil stripping will occur during the mining process due to the fact the mining process will be confined to the steep slopes of the mountainous areas. A soil stripping and stockpiling strategy was compiled and is included in Table 7, p41. From the soil data considering all available topsoil on Portions 8 and 22 of Farm Kennedy's Vale 361KT and Portions 24, 25, 26 and 28 of the Farm Spitskop 333KT an estimated total 3,303ha could potentially be covered 300mm thick at a bulk density of 1,275kgm$_3$ during rehabilitation taking into consideration a 10% loss from the 11,010,000m$_3$ available topsoil due to handling, compaction etc.

The soils are characterised by neutral pH values (5,3 and 7,2) and low electrical conductivity values (<250mS/m). Under these conditions plant available nitrogen (15-20mg/kg), phosphorus (10-15mg/kg) and potassium (>50mg/kg) are readily available for plant uptake and sustainable plant growth. The Orthic A-Horizon is typically characterised by a low dense structure and texture distribution of approximately 65% sand, 20% silt and 15% clay with drainage properties in order of 10mm/h. The dominant clay mineral in the Orthic A – Horizon, Yellow & Neocutanic B – Horizon is kaolinite (1:1 layer silicate), with a low buffer capacity due to the low cation exchange capacity (<10cmol+/kg).

The soil horizons specified in Section 5.1 p17 of the Hutton, Oakleaf and Bloemdal are suitable for rehabilitation purposes. The potential impacts and reasons/activities with proposed mitigation measures on the soil due to mining infrastructure related activities include:

- ***Loss of topsoil***:

Topsoil will be loss due to stripping, handling and placement of the soil associated with the pre-construction land clearing, operational clearing during mining, and during rehabilitation and it is recommended to strip all usable soil within mining rea, irrespective of soil depth. It is imperative that discretion is used during stripping and stockpiling to separate different soil layers for future use. This will be a function of the soil types comprised out of different soil layers, i.e. topsoil (0-300mm) should be stripped and stockpiled separately from all other horizons due to its chemical, mineralogical, mechanical, plant seed and microbiological properties. Some sub-horizons could be stockpiled together and it is recommended that guidelines set out in the soil stripping and stockpiling protocol comprised by a soil scientist with experience in rehabilitation of disturbed land are used.

- ***Change to soil's physical, chemical and biological properties***:

There is a high probability that topsoil will be lost due to wind and water erosion, which will alter the soils properties. Stockpiling and subsequent mixing of soil layers during handling will ultimately have a negative effect on altering the basic soil properties. It is suggested to implement live management and placement of topsoil where possible, improve the organic content of the soils, and maintain fertility levels through fertilisation and to curb topsoil loss as much as possible.

Subsoil should be stockpiled separately from topsoil and managed properly to prevent loss, mixing with topsoil and wetland soils. Wetland soils of pans to be affected should be stripped and stockpiled separately for future use during rehabilitation. These soils can be used to construct wetlands during rehabilitation considering surface water flow and low lying areas to enhance wetland functions and biodiversity.

- ***Cumulative effect of the soil***:

Alteration of the natural surface topography due to reprofiling during construction after stripping will have an accumulation effect on the soils and careful consideration should be given to minimise compaction and ensure free drainage preferential surface water pathways. Stripping, transportation and stockpiling of topsoil and subsoil have an effect on chemical, physical and mechanic properties of the material. The texture (sand, silt, clay content) will be disturbed and ultimately the structure of the material will be changed. The clay content (particles <0,002mm) determines the cation exchange capacity of the material and depending on the type and quantity of the clay present (1:1 layer silicates) the retention capability of the soil material can be changed. This will affect nutrient retention and potentially chemical balances in the diffuse double layer around the clay particles. The major nutrients nitrogen, phosphorus and potassium might become deficient at the time of rehabilitation and will have to be supplemented. Ca:Mg, Mg:K and Ca+Mg/K ratio's need to be monitored and optimised before rehabilitation together with potential pH alterations (acidification and/or alkalinisation) and salinisation that would inhibit plant growth. Permeability, infiltration capacity and water retention will be affected upon disturbance of the texture and structure of top and subsoil and needs to be carefully assessed during rehabilitation. A water balance assessment should be conducted to determine if reconstructed profiles will have the capacity to store plant available water between 33 – 1,500kPa to sustain selected plant growth for rehabilitation purposes. The plasticity index, compaction, settlement, bearing capacity as function of texture and structure will be altered during stripping and stockpiling and will have to be considered addressed and optimised for the purpose to establish free flowing grassed rehabilitated systems.

The detailed report is attached as **Appendix K**.

VIII. Hydrology

A Hydrology specialist was appointed by the EAP to investigate and assess the hydrological baseline environment.

The scope of works by this study included the following:

- Baseline Assessment - baseline climatic data used in hydrological calculations. This included the sourcing of appropriate rainfall data, site-specific rainfall depth/duration/frequency analysis as well as a regional and local hydrological assessment.
- Site examination – This resulted in a better understanding of the dominant hydrological flow regimes at the site as well as help provide input for flood hydrology calculations.
- Surface Water Sampling - Monitoring of surrounding surface water obtaining an appropriate baseline. This assisted in being able to monitor the potential impact the operation will have on receiving water resources over time.
- Flood Assessment - modelling of flood based on the adoption of the 100m buffers.
- Conceptual Storm water Management Plan - This was developed based on South African best practice guidance and conceptualized through mapping and indicative design drawings.
- Static Water Balance - This was developed for average wet and dry seasons based on monthly input data.

Appropriate baseline information including rainfall data, depth-duration-frequency design rainfall estimates, evaporation data as well as both regional and local hydrological characteristics have been considered for the proposed Spitsvale project. It is recommended that an Automatic Weather Station be installed at the site.

Flooding at the site was investigated but limitations in available site elevation data meant that a reliable flood model (for flood line modelling) could not be built. Instead, a buffer approach (100m) for all non-perennials within the site boundary was adopted. There is a significant amount of infrastructure located within these buffers and intersecting watercourse. These instances will need to be considered during the water use license process (Section 21 c and i). It is recommended that flood lines are modelled (when detailed elevation data becomes available) for streams where flooding of infrastructure are a concern in order to ensure complete compliance with GN704. Peak flows and hydrographs were developed as part of this study for various sub-catchments over the site. These outputs are intended to inform any future flood modelling.

Stream crossings and associated bridge and culvert designs have not been considered in this assessment but in principle, these crossing needs to be sufficiently sized to provide capacity to convey the 1:100 year flood event over the expected life of the structure to minimise impacts and ensure that the natural flow regime can be maintained as far as possible.

The conceptual storm water management plan has been developed based on the requirements of GN 704. This was done by identifying clean and dirty areas and managing them accordingly. Dirty water producing areas have been isolated by diverting upstream clean water around them via clean water diversions and dirty water produced in dirty areas has been

routed to dirty containment facilities via diversions. Stormwater infrastructure has been developed based on the contributing catchment areas and catchment characteristics, and has been sized to contain the 1:50 year flood event. It is recommended that discussions are held with the DWA regarding the lining requirements for storm water management infrastructure, to ensure that the flood hydrology calculations can be revised accordingly during detailed design and prior to construction of infrastructure. The "recommended volumes" of the proposed dirty storm water dams should be investigated further during the detail design phase to accommodate operational storage volumes, without compromising the ability of the dams to contain the "minimum volumes" as per GN 704 compliance. It is recommended that priority is given to the reuse of dirty water within the process water circuit.

Three surface water samples were taken during the site visit. This water quality monitoring is aimed at ensuring baseline water quality can be quantified prior to mining with potential impact subsequently monitored and quantified over time. To this end, additional sampling points have also been recommended. As part of the monitoring program going forward, samples should be taken monthly for at least the first year of operation. This can be revised to quarterly monitoring if no concerns are highlighted. This will however need to be discussed with the DWS as they are the ultimate custodians of the water resources. The monitoring should include the standard analysis of major cations/anions as well as ICP scan for metals. Waterlab in Pretoria has appropriate accreditation for such analysis to be undertaken.

An analysis of mean annual runoff was undertaken as part of the study using the WR2012 dataset. The WR2012 mean annual estimate of runoff for the site was estimated according to the dirty area contained (comprised of stockpiles, opencast areas and containment facilities) and totalled 1.097km2. This accounts for 0.022 million m3 of MAR that will be contained by the site (0.15% of quaternary catchment B41J MAR)

Wet and dry season static water balances have been developed for the project based on monthly input data from various specialists. Based on the model results, there seems to be an excess of approximately 22 527m3/month and 8 065m3/month for the wet and dry seasons respectively. This excess water will need to be appropriately managed and if deemed necessary to discharge, meet the appropriate discharge quality guidelines and associated discharge IWULA conditions. It is recommended that the water balance be updated once more specific domestic and process water reticulation volumes are known and refined annually during the life of the project. Flow meters should be installed in the domestic and process water circuits to provide actual data on water flows so that the water balance can be updated accordingly. A suitable dynamic water balance simulation model could also be developed and used as a decision support tool as mining progresses.

The detailed report is attached as **Appendix L**.

IX. Geo-hydrology

A Geo-hydrological specialist was appointed by the EAP to investigate and assess the geo-hydrology of the baseline environment.

The study included the following:

- Hydrocensus and sampling of selected boreholes aimed at identifying potential groundwater users;
- Baseline assessment of Locality, Topography, and climate;
- Determination the status quo of the groundwater systems prior to mining; and
- Development of a site specific numerical groundwater flow model.

The developed site specific groundwater flow model is based on available and determined aquifer parameters in order to:

- Estimate expected groundwater flow rates into the opencast mine workings during life of mine (to feed into overall water balance for the site).
- Investigate the impacts of mine inflows on the surrounding aquifers.
- Evaluate the potential impacts of mining operations (e.g. stockpiles) on the ambient groundwater quality using a conservative advective-dispersive transport model.

The section to follow summarises the findings and recommendations as a result of the investigation. The detailed report is attached as **Appendix M**.

Summary

The aquifers in the model area were conceptualised as a shallow weathered and alluvial aquifer underlain by a deeper fractured aquifer system within the Bushveld Igneous Complex, dissected by numerous discontinuities (fractures and dykes) in the area. Utilising data from boreholes sampled during a hydrocensus, the site specific groundwater quality is described as a magnesium-bicarbonate water facies, typical of shallow groundwater in the Bushveld Igneous Complex.

Elevated concentrations of chromium and nitrate are noted and could be of natural and/or anthropogenic origin. While elevated chromium concentrations are often related to groundwater contact with the ore body itself, elevated nitrate concentrations might represent blasting residues from upstream mining activities or, as in many cases in the Bushveld Igneous Complex, naturally occurring nitrogen presence in the soil and rock formations. Additional investigations in this regard are recommended.

The conceptual hydrogeological model was converted into a three-dimensional (four-layer) numerical finite-element groundwater model using the modelling software SPRING. Using available data, a satisfactory steady-state calibration of the model was achieved. The proposed BCR open cast mine workings was incorporated into the calibrated groundwater flow model by updating the digital elevation model for the pit area and assigning a free seepage boundary to the pit,

assuming that any groundwater entering the pit is pumped out. The model was then used to estimate the steady-state inflow rates into the fully developed pit based on annual average groundwater recharge rates.

The modelling results confirmed that no groundwater seepage is to be expected into the open cut along the Klarinet and Tubatse Koppie resource areas due to the deeper groundwater levels below the bottom of the proposed pits. However, groundwater flow into the Spitskop Flats open pit have to be dewatered at a rate of around 2.8 l/s The dewatering rates are relatively low because of the low conductivity of the host rocks and small drainage area upstream of the pit. The reduction of groundwater baseflow is predicted to be insignificant (based on the low inflow rates).

No significant impact on the water quality is expected due to the low sulphur content in waste material from other mines in the area and a likely neutral to alkaline leachate quality with slightly elevated mineralisation in comparison to the ambient groundwater. The potential plume emanating from the stockpiles and/or waste rock dumps will be limited in extent and expected to diminish post-closure.

Recommendations

The following recommendations are proposed to monitor and minimise potential impacts on the receiving groundwater environment:

- An environmental monitoring programme should be established in order to monitor groundwater quality and groundwater level changes up- and downstream of the proposed open cast mine workings. Collected monitoring data (quarterly) may be used for future model updates (e.g. every second year).
- A number of geosites (i.e. boreholes, springs and surface water drainages) and newly proposed boreholes were identified (refer to fig) to be included into a monthly/quarterly monitoring programme for the BCR Minerals operation.
- The parameters to be analysed should comprise the following:
  - Physico-chemical parameters (pH, EC, TDS);
  - Major anions (F, Cl, NO3, SO4, HCO3, NH4, PO4,);
  - Major cations (K, Na, Mg, Ca, NH4,); and
  - Other elements/metals (Fe, Mn, Zn, Pb, Co, Cr, Cr (VI),).
- Emphasis should be placed on monitoring of groundwater levels prior mining and during the operation phase as well as to establish the origin of the elevated nitrate concentrations in the project area.
- Recording of pit dewatering rates:
  - Initial monthly (and later quarterly) sampling and analysis (major and trace elements) of pumped water.

X. Human Health

The Environmental Health determinants and associated impacts (both positive and negative) as a result of activities during the three phases of mining may be summarized as follows:

- Social determinants of health
  - Activities associated with different phases include an increase in male job seekers and workers during construction and an increase in women and children (vulnerable age group) during operation.
  - The use of local labour should have a positive impact on local businesses and thus the local economy. Identification of local capacity-building opportunities will be crucial to maximise employment opportunities.
  - The main estimated **negative** impacts associated with issues related to social determinants of health, before mitigation, include a change in social cohesion which has the potential to lead to acts of violence including xenophobia, crime, substance abuse, and interpersonal violence as well as an increase in psychosocial problems such as depression. The influx of jobseekers should thus be managed proactively to minimize social impacts on infrastructure and service delivery.
  - The change in land zoning status for future mining are regarded as **positive** as associated activities would likely ensure long-term social development support for the core communities and will create opportunities for job-creation in the secondary and tertiary economy sectors
  - The overall **nett-rating** for both the construction and operational phases are moderately-negative before mitigation and low-negative after mitigation, while the nett-rating for the decommissioning phase remains moderately-negative. A moderate **positive** impact is expected on the economic development during the construction and operational phases.
- Safety and security
  - Related activities which may have negative impacts on safety and security include an increase in social tension from the employment of outsiders, illegal business practices such as drug-dealing,
  - The overall **nett-rating** for the construction phase is moderately-negative before mitigation and low-negative after mitigation. For the operational phase it is moderately-negative before mitigation and although the rating is lower after mitigation, it remains moderately-negative. The nett-rating for the decommissioning phase is low to moderately-negative.
- Lifestyle
  - Related activities associated with lifestyle impacts an influx of – especially young people; increased trucking traffic; an increase in disposable income.
  - Although positive impacts may also result from increased income, negative impacts include an increased potential for increased substance abuse; sexually transmitted diseases (putting additional strain on the health system); and unhealthy lifestyles resulting in an increase in non-communicable diseases.

- The overall nett-rating for the construction phase is moderately-negative before mitigation and low-negative after mitigation. For the operational phase it is moderately-negative before mitigation and although the rating is lower after mitigation, it remains moderately-negative. The nett-rating for the decommissioning phase is low-negative.

- Physical infrastructure
  - Related activities include again the influx of people, increased traffic loads,.
  - Associated impacts on the physical infrastructure include road deterioration, additional burden on the housing, school, water, sanitation, and electricity infrastructure which already experiences a backlog.
  - The nett-impact rating for this Environmental Health Area is high to moderately-negative before mitigation and after mitigation, moderate to low-negative for construction, and moderate negative for the operational and decommissioning phases.
- Health Management and Infrastructure
  - The main activity of concern again relates to the influx of people, especially those without medical aid. The reliance of the health infrastructure on mobile clinics, combined with an understaffed district hospital will increase the burden on clinics.
  - The nett-impact rating on health services, infrastructure and capacity before mitigation is moderately-negative during both the construction and operational phases. After mitigation the impact decreases to low-negative during construction but remains moderately-negative during the operational phase.
- Food and nutrition
  - Related activities of include the influx of people which will result in an increased demand for food. Unhygienic food practices will increase food-borne illnesses with diarrhoeal disease already being the main cause of death amongst those below 15 years of age. Increased disposal income may contribute to reducing food security and malnutrition but (specifically during the operational phase) for the unskilled and unemployed, food security may increase.
  - The nett impact rating before mitigation for each of the phases is moderately-negative and low-negative after mitigation for the construction and decommissioning phases. For the operational phase the net-rating remains moderately-negative after mitigation. There is also a possible moderate positive impact in the affordability of food during the operational phase.
- Environmental pollution
  - Activities during all three phases will result in the emissions of particulate matter (dust). Although modelled concentrations were only predicted to exceed the standards on site, it must be kept in mind that there are people residing within the site boundaries near the haul road (RES, 2016) and it must be kept in mind that air pollution has no boundaries and small particles my travel far. Mitigation measures are therefore required.
  - Indoor air pollution levels are not currently known. If more people enter the area, informal housing and thus the use of domestic fuels for cooking and heating, are likely to increase.

- Noise levels will be affected to various extents during the three phases. Noise, especially during blasting, during the construction and operation phase in the southern section of the Tubatse mining village may warrant the need for noise barriers.
- Water-related activities include dewatering due to groundwater inflow into the open mine pit, which is not foreseen when the Klarinet and Tubatse koppies will be mined, but when the Spitskop flats are mined, inflow of groundwater is predicted.
- The nett-impact for environmental pollution during construction is moderate-negative before and low-negative after mitigation. During the operational phase the nett-impact is moderately-negative (domestic and operational activities) to high-negative (vehicle emissions and noise). The nett-impact for the decommissioning phase is moderate-negative before mitigation and low-negative after mitigation.

As part of the Human Health assessment carried out by an independent consultant, a Spitsvale Health Action plan was developed.

The detailed Human Health Impact assessment report with the Spitsvale action plan is attached as **Appendix N**.

XI. Socio-economic

A detailed desktop background study on the socio-economic impact of the proposed activity are provided in Section 3 of the Final Submitted social and Labour Plan dated September 2015 compiled by BCR Minerals (Pty) Ltd (find **Appendix D**). The data for the Greater Tubatse Municipality used for this study are based on the latest IDP data for each municipality and data from the 2014/2015 Census as contained in the Municipal Demarcation Board's website, as well as data from the GTM IDP document.

The following socio-economic impacts associated to the proposed activity have been identified in this study:

- **Job Creation, employees and their households:** Spitsvale will employ approximately 60 people (permanent and the Core Contactor), which translate into many more individuals being impacted through direct and indirect income from bread winner support. These employees and their households are impacted positively from salaries and other employment benefits. Considering that Spitsvale has an expected mining life in excess of 20 years, these benefits should be sustainable into the short to long-term future. In order to ensure that these constructive impacts do not become destructive upon closure, it is important for Spitsvale to plan towards their eventual closing and to put mitigating measures in place. These will assist their employees to find alternative sources of income outside of Spitsvale and mining.
- **Surrounding and labour sending communities:** As noted, Spitsvale's workforce will come mainly from the local community, but these people may be representative of other labour sending areas. The future incomes earned by these employees will translate into spending power, benefiting businesses and entrepreneurs not only in the area surrounding the operation where the employees spend their working week, but also in those economies further away. Spitsvale's spending on goods and services can also contribute significantly to the local economy (refer to Procurement Section 3.6).
- **Poverty eradication:** Besides the positive impact the Spitsvale project can have on the livelihoods of the households of its future employees in the neighbouring and labour sending communities, Spitsvale will contribute to the upliftment of the local communities surrounding the operation. In addition to a contribution of the economy, Spitsvale will also pay significant amounts in annual taxes, which will be used by the Government. One of the many uses of taxes is for the distribution of wealth, which alleviates poverty within the poorer communities.

BCR Minerals (Pty) Ltd has identified a number of preliminary Local Economic Development (LED) projects and will undertake feasibility studies on these projects in consultation with the Community Committee Forums and Greater Tubatse Municipality to ensure that these LED projects are acceptable.

XII. Heritage

In accordance with Section 38 of the National Heritage Resources Act, No 25 of 1999 (NHRA), an independent heritage consultant was appointed by the EAP to conduct a cultural heritage assessment to determine if the mining activities would have an impact on any sites, features or objects of cultural heritage significance.

A number of sites were identified and can be summarised as follows (see Appendix 5 for more detail on each identified site):

- Stone tool were found to occur as low density surface scatter in erosion gullies. As the density of artefacts is very low, no further action is required.
- A total of five old homestead sites were identified in the proposed mining area and it is anticipated that it would be impacted on by the mining activities.
- A total of nine informal burial places were identified. All are located inside of or in close proximity to the mining area and it is anticipated that it would be impacted on by the mining activities.
- A single site defined as of industrial/infrastructural heritage was identified.

The appointed heritage consulted recommended the following conditions to be included in the environmental authorisation:

- It is recommended that the homestead sites are retained, and that it should be fenced off for the duration of the mining, leaving a buffer zone of at least ten metres from the outer edge of the stone walling/physical features. If the sites cannot be retained, it should be documented (mapped and excavated) by an archaeologist after obtaining a permit from SAHRA (see Appendix 5 for more detail the proposed mitigation for each identified site). If mining takes place in these areas, the community should be consulted to determine if there are any more graves in the region, especially those of young children who, in many cases, are buried inside the old homestead.
- It is recommended that the burial sites are retained and it should be fenced off for the duration of the mining activities, leaving a buffer zone of at least five metres from the outer edge of the graves. If the graves cannot be retained, it should be relocated, but only on condition of following the correct procedures (see Appendix 5 of the attached Heritage Impact Assessment).
- It is recommended that the industrial/infrastructural heritage feature (irrigation system) should be documented (photographed and mapped) in before mining activities takes place.
- Should archaeological sites or graves be exposed during construction work, it must immediately be reported to a heritage practitioner so that an investigation and evaluation of the finds can be made. According to local inhabitant, Mr Silas Mosethla, old informal burial sites might still be located in some places, but it would be difficult to trace due to “lack of memory” and the current dense vegetation.

The detailed Heritage Impact assessment report is attached as **Appendix O**.

XIII. Traffic Assessment

A Traffic Impact Assessor was appointed by the EAP to investigate the potential impacts the proposed activities would have on the current transportation infrastructure. This assessment was carried out in accordance with the *Manual of Traffic Impact Studies* published by the *Committee of Transport Officials (COTO), 2014.* The operation of the mine will be based east of the D1261 Road and will be accessed from the existing access road on the D1261 Road.

The purpose of this report is to provide findings of the traffic impact investigation conducted to assess the impact of the proposed Chrome mine operations on the existing external road network surrounding the development area. Based on this assessment, mitigation measures are recommended to minimise the potential impact on the existing road network.

The following tasks have been carried out as part of the traffic impact investigation:

- Determination of the trip generation due to the proposed Chrome mine operations activities;
- Assessing the impact of the trips generated by the mine on the road network (capacity analysis of the affected routes including the intersection analysis);
- Safety Statement: an assessment of the access position and safety in terms of geometrical standards and street lighting at sufficient standards;
- Public transport provision for the mine employees; and
- A detailed proposal of site specific mitigations, if and where applicable.

The main phases of the project have been identified as follows: construction phase (2014 to 2016), operational phase (2016 to 2045) and closure and decommissioning phase (2046). The critical impact in terms of the traffic generated is expected to be during the operational phase.

The findings of this investigation can be summarised as follows:

- All the analysed roads are paved and are in a fair condition .i.e the R555, R557 and the D1261.
- The existing access road does not have a traffic sign control but is treated as a two way priority controlled intersection, with priority on the D1261. It is expected that the access intersection will operate at an acceptable Level of Service (LOS) when the proposed development is fully operational, but exclusive turning lanes are proposed for safety purposes. It is further proposed that the access road be paved for at least 400m to prevent weathering of the D1261 as it is currently a gravel road.
- Three phases were analysed and it was determined that the operational phase is the critical one, since it generates the highest volume of additional trips. The trips generated during this phase was estimated at 76 vehicle trips per day and 41 vehicle trips per hour during both the AM and PM peak hours. Therefore the Operational phase was then further analysed to determine the impact that the proposed mine will have on the surrounding road network.
- Four scenarios were analysed, all the intersections operate at an acceptable level of service except for the R555 / D1261 intersection, during the third scenario, where the 2027 background traffic, Latent Rights and the

development traffic volumes are combined. The failure in operation of the intersection is caused by the background traffic not the development traffic. It is proposed that the four way stop controlled intersection be converted to a two way priority stop control intersection with priority on the R555.

- In order to ensure pedestrian safety: the mine will make provision for public transport for their staff. It is therefore proposed that there be no on-street pick up / drop offs at the D1261 / Access road to the proposed mine (drop-offs / pickup should be done on site).
- For safety reasons it is proposed that there be provision of sufficient street lighting in the vicinity of the access intersection.
- Parking provision should be made for trucks to prevent queuing on the national roads and the D1261.
- All of the above mitigation measures should be in place before or in the first to second year of the operational phase.

The detailed Traffic assessment report is attached as **Appendix P**.

(b) Description of current land uses

Land capability classification shows the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management.

Table 7: Criteria for Determination of Land Capability

Summarised Description Of Land Capability Criteria	
Wetlands, Pans, Drainage Lines	Land with organic soils or supporting hygrophilous vegetation where soil and vegetation processes are water determined.
Arable (>600mm)	Land that does not qualify as wetland. Soil is readily permeable to depth of 750mm. Soil has pH value between 4 and 8.4. Soil has low salinity and SAR. Soil has less than 10% (by volume) rocks or pedocrete fragments larger than 100mm in the upper 750mm. Has a slope (%) and erodibility factor (k) such that their product is <2.0. Occurs under a climate of crop yields that are at least equal to the current national average for these crops.
Grazing (250 – 600mm)	Land which does not qualify as wetland or arable land. Has soil, or soil-like material, permeable to roots of native plants, that is more than 250mm thick and contains less than 50% by volume of rocks or pedocrete fragments larger than 100mm. Supports, or is capable of supporting a stand of native or introduced grass species or other forage plants used by domesticated livestock or game animals on a commercial basis.
Wilderness (<250mm)	Land which does not qualify as wetland, arable or grazing land.

Table 8 summarises the ***land use*** of the area investigated. Find **Appendix Q** for the land use map.

Table 8: Land use

Area	Land Use	Surface Area (ha)	% of Total
Portions 8, 22 Farm Kennedy's Vale 361KT & Portions 24, 25, 26 and 28 Farm Spitskop 333KT	Mining & Industrial	97	4,48
	Natural Veld	1,899	87,69
	Ploughed Land	81	3,75
	Settlement	75	3,46
	Wetlands	14	0,62
	Total	**2,166**	**100**

Table 9 summarises the ***land capability*** of the area investigated. Find **Appendix Q** for the land capability map.

Table 9: Land capability

Area	Land Capability	Surface Area (ha)	% of Total
Portions 8, 22 Farm Kennedy's Vale 361KT & Portions 24, 25, 26 and 28 Farm Spitskop 333KT	Arable	377	17,42
	Wilderness	1,649	76,14
	Wetland	14	0,62
	Settlement	75	3,46
	Mining & Industrial	51	2,36
	Total	**2,166**	**100**

The information provided in this section is derived from the site specific soil assessment conducted. The detailed investigation report is attached as **Appendix K.**

(c) Description of specific environmental features and infrastructure on site

Throughout the process of determination the potential environmental impacts, the site layout for the proposed activities were considered.

Infrastructures associated to the proposed Spitsvale Mine are as follows:

- Access roads;
- River crossings;
- Storm water management infrastructures i.e. storm water channels;
- A way bridge;
- Site offices (permanent and temporary);
- Onsite clinic facility;
- Workshops and stores;
- Ablution facilities;
- Mobile sewage treatment facility;
- Pollution Control Dams (PCD's);
- Bulk diesel storage facility;
- Temporary hazardous substance stores;
- RoM and product stockpile lay down areas;
- Screening lay down areas;
- Vehicle/Equipment/Plant parking bay;
- Boreholes;

Apart from the infrastructures associated to the mining development, a number of environmentally and socially sensitive receptors were identified. **Appendix Q** provides the detailed site lay out plan in relation to the sensitive receptors.

(d) Environmental and current land use map

(Show all environmental and current land use features)

Find **Appendix Q**.

v) Environmental impacts and risks

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

This section summarises the potential impacts associated to the three different phases of the proposed mining activities. The potential impacts and risks are explored by investigating each aspect (i.e. air quality, soil quality, water quality etc.) associated to the proposed activities. The significance of each potential impact are then rated by considering the probability, the duration of the impact/activity, the extend of the impact, and the magnitude according to the methodology described in section **vi)** of this document.

For the purpose of this section, the mitigation measures recommended will only summarise the approach taken to manage each risk. A detailed mitigation plan is provided in Part B of this report.

Construction Phase	
Aspect:	**Air Quality**

Activity:	1. Access and hauling along roads i.e. during the construction of roads				
Impact:	**Dust Generation** **Direct Impact:** Road construction involves the removal of rock and earth by grading or digging during construction. Vegetation is removed, grading and paving takes place using a range of road construction equipment. This often leads to the generation of fugitive dust comprising TSP, PM10 and PM2.5 from the dirt roads.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	1	2	6	5	**45**
Post-Mitigation	1	1	4	3	**18**
Mitigation Measures:	Fugitive dust generation can be ***controlled*** in the following ways: (1) Development of a dust fallout monitoring and management plan; (2) Frequent Inspections; and (3) Reporting and recording incidents related to air quality. A number of recommendation resulted from the Air Quality Assessment (**Appendix E**). These recommendations are included in Part B of this report. One of the recommendations is to develop a detailed air quality management plan (focusing on sources of dust located in close proximity to the residential receptors within the project boundary) ensuring adherence to thresholds stipulated in the Baseline Air Quality Impact Assessment report (BAQIAR) (**Appendix E**) prior to the commencement of operations.				

	There are also a number of legislative requirements stipulated in the following regulations: • GN R. 283: National reporting regulations; • GN R. 1210: National Ambient Air quality standards; and • GN R. 897: National dust control regulations.

Activity:	2. Site clearing and topsoil stripping for lay down area and all related mining infrastructure				
Impact:	**Dust Generation** **Direct Impact:** Vegetation is removed, grading and paving to prepare the lay down areas takes place using a range of construction equipment. This often leads to the generation of fugitive dust comprising TSP, PM10 and PM2.5. The generation of dust during these activities will affect the visual environment negatively.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	1	2	6	5	**45**
Post-Mitigation	1	1	6	4	**32**
Mitigation Measures:	Fugitive dust generation can be ***controlled*** in the following ways: (1) Development of a dust fallout monitoring and management plan; (2) Frequent Inspections; and (3) Reporting and recording incidents related to air quality. A number of recommendation resulted from the Air Quality Assessment (**Appendix E**). These recommendations are included in Part B of this report. One of the recommendations is to develop a detailed air quality management plan (focusing on sources of dust located in close proximity to the residential receptors within the project boundary) ensuring adherence to thresholds stipulated in the Baseline Air Quality Impact Assessment report (BAQIAR) (**Appendix E**) prior to the commencement of operations. There are also a number of legislative requirements stipulated in the following regulations: • GN R. 283: National reporting regulations; • GN R. 1210: National Ambient Air quality standards; and • GN R. 897: National dust control regulations.				

Activity:	5. Mining offices (construction and operation) i.e. operation of training centres, offices and kitchen facilities				
Impact:	**Dust Generation** **Direct Impact:** During the construction of infrastructures areas are to be cleared of vegetation. This often leads to the generation of fugitive dust comprising TSP, PM10 and PM2.5.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**

Pre-Mitigation	1	1	6	5	**40**
Post-Mitigation	1	1	6	3	**24**
Mitigation Measures:	Fugitive dust generation can be ***controlled*** in the following ways: (1) Development of a dust fallout monitoring and management plan; (2) Frequent Inspections; and (3) Reporting and recording incidents related to air quality. A number of recommendation resulted from the Air Quality Assessment (**Appendix E**). These recommendations are included in Part B of this report. One of the recommendations is to develop a detailed air quality management plan (focusing on sources of dust located in close proximity to the residential receptors within the project boundary) ensuring adherence to thresholds stipulated in the Baseline Air Quality Impact Assessment report (BAQIAR) (**Appendix E**) prior to the commencement of operations. There are also a number of legislative requirements stipulated in the following regulations: • GN R. 283: National reporting regulations; • GN R. 1210: National Ambient Air quality standards; and • GN R. 897: National dust control regulations.				

Activity:	8. Pollution Control Dams (PCD's) i.e. Construction and operation				
Impact:	**Dust Generation** **Direct Impact:** During the construction of infrastructures areas are to be cleared of vegetation. This often leads to the generation of fugitive dust comprising TSP, PM10 and PM2.5.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	1	1	4	5	**30**
Post-Mitigation	1	1	2	3	**12**
Mitigation Measures:	Fugitive dust generation can be ***controlled*** in the following ways: (1) Development of a dust fallout monitoring and management plan; (2) Frequent Inspections; and (3) Reporting and recording incidents related to air quality. A number of recommendation resulted from the Air Quality Assessment (**Appendix E**). These recommendations are included in Part B of this report. One of the recommendations is to develop a detailed air quality management plan (focusing on sources of dust located in close proximity to the residential receptors within the project boundary) ensuring adherence to thresholds stipulated in the Baseline Air Quality Impact Assessment report (BAQIAR) (**Appendix E**) prior to the commencement of operations. There are also a number of legislative requirements stipulated in the following regulations:				

	• GN R. 283: National reporting regulations; • GN R. 1210: National Ambient Air quality standards; and • GN R. 897: National dust control regulations.

Activity:	9. Stores, workshops &wash bays				
Impact:	**CO_2 emissions and release of noxious** **Direct Impact:** The use of diesel operated construction equipment will cause a contributing factor the BCR Minerals (Pty) Ltd carbon footprint. The storage of diesel poses a risk of releasing noxious gasses.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	1	4	5	**45**
Post-Mitigation	4	1	4	3	**27**
Mitigation Measures:	CO_2 emissions and the release of noxious gasses can be ***controlled*** in the following ways: (1) Develop and maintain a carbon footprint reporting policy; (2) Monitor the carbon footprint throughout the entire life cycle of the Spitsval project; (3) Develop and implement a hazardous substance management plan; and (4) Reporting and recording incidents. A number of recommendation resulted from the Air Quality Assessment (**Appendix E**.). These recommendations are included in Part B of this report. GN R. 1651 published in terms of section 39 of the Atmospheric Pollution Prevention Act of 1965 stipulated a list of requirements in terms of regulating emissions form diesel operated vehicles/plant/equipment.				

Activity:	11. Fuel operating power genenerators				
Impact:	**CO_2 emissions and release of noxious** **Direct Impact:** The use of diesel operated construction equipment will cause a contributing factor the BCR Minerals (Pty) Ltd carbon footprint. The storage of diesel poses a risk of releasing noxious gasses.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	1	4	5	**45**
Post-Mitigation	4	1	4	3	**27**
Mitigation Measures:	CO_2 emissions and the release of noxious gasses can be ***controlled*** in the following ways: (1) Develop and maintain a carbon footprint reporting policy; (2) Monitor the carbon footprint throughout the entire life cycle of the Spitsval project;				

	(3) Develop and implement a hazardous substance management plan; and (4) Reporting and recording incidents. A number of recommendation resulted from the Air Quality Assessment (**Appendix E**.). These recommendations are included in Part B of this report. GN R. 1651 published in terms of section 39 of the Atmospheric Pollution Prevention Act of 1965 stipulated a list of requirements in terms of regulating emissions form diesel operated vehicles/plant/equipment.

Activity:	13. Fuel storage				
Impact:	**Release of noxious gasses** **Direct Impact:** Evaporation of diesel fuel and heavy fuel from temporary tanks and possible spills during loading of fuel from tanks on site that are used for re-fuelling of heavy machinery and trucks poses a risk of releasing noxious gasses. **Indirect Impact:** Over exposure of employees to the noxious gasses may lead to the development of respiratory problems and irritation to eyes.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	1	8	5	**65**
Post-Mitigation	4	1	6	3	**33**
Mitigation Measures:	The release of noxious gasses can be ***avoided*** in the following ways: (1) Develop and implement a Health and Safety management plan addressing the proper storage, management, handling, and transport of hazardous substances; (2) All personnel to be trained in the handling, storage, management, and transport of hazardous substances; and (3) Reporting and recording incidents. Adherence to the following SANS standards will contribute to avoiding the release of noxious gasses: • SANS 10089-1:2008 - Specifications for above-ground storage facilities for petroleum products • SANS 310: 2011 - Storage tank facilities for hazardous chemicals: Above-ground storage tank facilities for flammable, combustible and non-flammable chemicals.				

Activity:	15. Transport of construction material, mobile plant and equipment to the site				
Impact:	**Dust Generation** **Direct Impact:** Continuous use of haul road often leads to the generation of fugitive dust comprising TSP, PM10 and PM2.5 from the dirt roads. The generation of dust during these activities will affect the visual environment negatively. **Indirect Impact:** Continuous exposure to high levels of dust fallout may lead to unhealthy environment for employees and surrounding communities.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	1	1	6	5	**40**
Post-Mitigation	1	1	6	3	**24**
Mitigation Measures:	Fugitive dust generation can be ***controlled*** in the following ways: (1) Development of a dust fallout monitoring and management plan; (2) Frequent Inspections; and (3) Reporting and recording incidents related to air quality. A number of recommendation resulted from the Air Quality Assessment (**Appendix E**). These recommendations are included in Part B of this report. One of the recommendations is to develop a detailed air quality management plan (focusing on sources of dust located in close proximity to the residential receptors within the project boundary) ensuring adherence to thresholds stipulated in the Baseline Air Quality Impact Assessment report (BAQIAR) (**Appendix E**) prior to the commencement of operations. There are also a number of legislative requirements stipulated in the following regulations: • GN R. 283: National reporting regulations; • GN R. 1210: National Ambient Air quality standards; and • GN R. 897: National dust control regulations.				

Aspect:	**Human Health and Safety**

Activity:	1. Access and hauling along roads i.e. during the construction of roads				
Impact:	**Dust generation** **Indirect Impact:** Overexposure to dust comprising of TSP, PM10 and PM2.5 generated from site clearing and from traffic on unpaved roads poses a risk in the health of employees and the surrounding communities.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	2	1	6	5	**45**
Post-Mitigation	1	1	4	3	**18**
Mitigation Measures:	Dust generation can be ***controlled*** in the following ways: (1) Development of a dust fallout monitoring and management plan; (2) Frequent Inspections; and (3) Reporting and recording incidents related to air quality. A number of recommendation resulted from the Air Quality Assessment (**Appendix E**). These recommendations are included in Part B of this report. One of the recommendations is to develop a detailed air quality management plan (focusing on sources of dust located in close proximity to the residential receptors within the project boundary) ensuring adherence to thresholds stipulated in the Baseline Air Quality Impact Assessment report (BAQIAR) (**Appendix E**) prior to the commencement of operations. There are also a number of legislative requirements stipulated in the following regulations: • GN R. 283: National reporting regulations; • GN R. 1210: National Ambient Air quality standards; and • GN R. 897: National dust control regulations.				

Activity:	4. Onsite Clinic				
Impact:	**Medical Waste generation** **Direct Impact:** Improper management of medical waste generated from first aid incidents during the construction and operational phase poses a high risk to human health.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	3	2	6	4	**44**
Post-Mitigation	4	1	4	3	**27**
Mitigation Measures:	The risk to human health from generated medical waste can be ***controlled*** in following ways: (1) Develop and implement a Waste Management plan. (2) Develop and implement a waste recoding procedure.				

	(3) Develop and implement a Health and Safety management plan, including the handling of medical waste.

Activity:	8. Pollution Control Dams (PCD's) i.e. Construction and operation				
Impact:	**Smell nuisance** **Direct Impact:** Lack of maintenance and treatment may result in a smelling environment. May lead to a potential nuisance to local communities and land users in close proximity to the authorised site.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	1	6	5	**55**
Post-Mitigation	1	2	6	3	**27**
Mitigation Measures:	The generation of smell from the PCD's can be ***avoided*** in the following ways: (1) Develop and maintain an Integrated Waste and Water Management Plan (IWWMP). (2) Frequent inspections of areas posing a possible risk of causing smell nuisance. (3) Development and implementation of an incident response plan.				

Activity:	9. Stores, workshops &wash bays				
Impact:	**Chemical fires** **Direct Impact:** The improper storage of hazardous substances poses a risk of chemical fires. In the event of a chemical fire the impact to the surrounding environment is significant. Fires may lead to the loss of ecosystems, damage to properties and fatalities.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	1	2	10	4	**52**
Post-Mitigation	1	1	10	2	**24**
Mitigation Measures:	Chemical fires can be ***avoided*** n the following ways: (1) Develop and implement a Hazardous substances management plan. (2) Develop an emergency procedure addressing in particular the management of chemical fires and spill response. (3) Report and record all incidents related to chemical fires. (4) Employees must be trained on emergency response procedures required to counter the nature and hazards of an accidental release. (5) Employees must be familiar with and have received the appropriate training regarding the handling and storage practices, for all containers with which they will come into contact. (6) Document the types and amounts of hazardous materials present on the project site (including for example the name and description, classification, regulatory reporting threshold,				

	quantities, characteristics, analysis of potential consequence, identification of location, details of responsible persons, detail of availability of spill response equipment etc.). (7) The emergency response procedure should describe response activities in the event of a spill, release, or other chemical emergency and include the internal and external notification procedure, specific responsibilities of individuals or groups, decision process for assessing severity of the release, and determining appropriate actions, facility evacuation routes, and post event activities such as clean-up and disposal, incident investigation, employee re-entry, and restoration of spill response equipment. (8) Procedures should be prepared for informing the public and emergency response agencies, documenting first aid and emergency medical treatment, taking emergency response actions, reviewing and updating the emergency response plan to reflect changes, and using, inspecting, testing, and maintaining the emergency response equipment.

Activity:	10. Ablutions & change house with mobile sewage treatment plant				
Impact:	**Smell nuisance** **Direct Impact:** Lack of maintenance and treatment may result in a smelling environment. May lead to a potential nuisance to local communities and land users in close proximity to the authorised site.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	6	5	**60**
Post-Mitigation	1	1	4	4	**24**
Mitigation Measures:	The generation of smell from the PCD's can be ***avoided*** in the following ways: (1) Develop and maintain an Integrated Waste and Water Management Plan (IWWMP). (2) Frequent inspections of areas posing a possible risk of causing smell nuisance. (3) Development and implementation of an incident response plan.				

Activity:	11. Fuel operating power generators				
Impact:	**Chemical fires** **Direct Impact:** The improper storage of hazardous substances poses a risk of chemical fires. In the event of a chemical fire the impact to the surrounding environment is significant. Fires may lead to the loss of ecosystems, damage to properties and fatalities.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	1	2	10	5	**65**
Post-Mitigation	1	1	10	2	**24**
Mitigation Measures:	Chemical fires can be ***avoided*** n the following ways:				

	(1) Develop and implement a Hazardous substances management plan. (2) Develop an emergency procedure addressing in particular the management of chemical fires and spill response. (3) Report and record all incidents related to chemical fires. (4) Employees must be trained on emergency response procedures required to counter the nature and hazards of an accidental release. (5) Employees must be familiar with and have received the appropriate training regarding the handling and storage practices, for all containers with which they will come into contact. (6) Document the types and amounts of hazardous materials present on the project site (including for example the name and description, classification, regulatory reporting threshold, quantities, characteristics, analysis of potential consequence, identification of location, details of responsible persons, detail of availability of spill response equipment etc.). (7) The emergency response procedure should describe response activities in the event of a spill, release, or other chemical emergency and include the internal and external notification procedure, specific responsibilities of individuals or groups, decision process for assessing severity of the release, and determining appropriate actions, facility evacuation routes, and post event activities such as clean-up and disposal, incident investigation, employee re-entry, and restoration of spill response equipment. (8) Procedures should be prepared for informing the public and emergency response agencies, documenting first aid and emergency medical treatment, taking emergency response actions, reviewing and updating the emergency response plan to reflect changes, and using, inspecting, testing, and maintaining the emergency response equipment.

Activity:	13. Fuel storage				
Impact:	**Emission of noxious fumes** **Indirect Impact:** Over exposure of employees to the noxious gasses may lead to the development of respiratory problems and irritation to eyes.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	1	1	8	5	**50**
Post-Mitigation	1	1	6	3	**24**
Mitigation Measures:	The release of noxious gasses can be ***avoided*** in the following ways: (1) Develop and implement a Health and Safety management plan addressing the proper storage, management, handling, and transport of hazardous substances; (2) All personnel to be trained in the handling, storage, management, and transport of				

<table>
<tr><td></td><td colspan="5">hazardous substances; and
(3) Reporting and recording incidents.

Adherence to the following SANS standards will contribute to avoiding the release of noxious gasses:

• SANS 10089-1:2008 - Specifications for above-ground storage facilities for petroleum products
• SANS 310: 2011 - Storage tank facilities for hazardous chemicals: Above-ground storage tank facilities for flammable, combustible and non-flammable chemicals.</td></tr>
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<tr><td>Pre-Mitigation</td><td>1</td><td>2</td><td>10</td><td>5</td><td>65</td></tr>
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(3) Report and record all incidents related to chemical fires.
(4) Employees must be trained on emergency response procedures required to counter the nature and hazards of an accidental release.
(5) Employees must be familiar with and have received the appropriate training regarding the handling and storage practices, for all containers with which they will come into contact.
(6) Document the types and amounts of hazardous materials present on the project site (including for example the name and description, classification, regulatory reporting threshold, quantities, characteristics, analysis of potential consequence, identification of location, details of responsible persons, detail of availability of spill response equipment etc.).
(7) The emergency response procedure should describe response activities in the event of a spill, release, or other chemical emergency and include the internal and external notification procedure, specific responsibilities of individuals or groups, decision process for assessing severity of the release, and determining appropriate actions, facility evacuation routes, and post event activities such as clean-up and disposal, incident investigation, employee re-entry, and restoration of spill response equipment.</td></tr>
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	(8) Procedures should be prepared for informing the public and emergency response agencies, documenting first aid and emergency medical treatment, taking emergency response actions, reviewing and updating the emergency response plan to reflect changes, and using, inspecting, testing, and maintaining the emergency response equipment.

Activity:	14. Employment of workers and procurement of construction materials				
Impact:	**Health and Safety of employees** **Direct Impact:** Increased demand for labour and employees from different cultures may pose the risk to the lack of knowledge and skills on health and safety in the work place. Different human behaviours deals with different situations and if there is not a simplified system of managing health and safety risk, situations resulting loss or injury of human life may be a end result.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	1	6	5	**55**
Post-Mitigation	4	1	6	3	**33**
Mitigation Measures:	The health and safety of employees can be ***controlled*** in the following ways: (1) Develop and implement a Health and Safety plan. (2) All employees to be trained in health and safety in the work place. (3) Develop and implement an employee training program. (4) Keep and maintain a record of all training of employees.				

Activity:	15. Transport of construction material, mobile plant and equipment to the site				
Impact:	**Dust Generation** **Indirect Impact:** Overexposure to dust comprising of TSP, PM10 and PM2.5 generated from traffic on unpaved roads poses a risk in the health of employees and the surrounding communities.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	1	1	8	5	**50**
Post-Mitigation	1	1	6	3	**24**
Mitigation Measures:	Dust generation can be ***controlled*** in the following ways: (1) Development of a dust fallout monitoring and management plan; (2) Frequent Inspections; and (3) Reporting and recording incidents related to air quality. A number of recommendation resulted from the Air Quality Assessment (**Appendix E**). These recommendations are included in Part B of this report. One of the recommendations is to				

	develop a detailed air quality management plan (focusing on sources of dust located in close proximity to the residential receptors within the project boundary) ensuring adherence to thresholds stipulated in the Baseline Air Quality Impact Assessment report (BAQIAR) (**Appendix E**) prior to the commencement of operations. There are also a number of legislative requirements stipulated in the following regulations: • GN R. 283: National reporting regulations; • GN R. 1210: National Ambient Air quality standards; and • GN R. 897: National dust control regulations.

Aspect:	**Topography and Visual Environment**

Activity:	1. Access and hauling along roads i.e. during the construction of roads				
Impact:	**Dust generation** **Direct Impact:** Road construction involves the removal of rock and earth by grading or digging during construction. Vegetation is removed, grading and paving takes place using a range of road construction equipment. This often leads to the generation of fugitive dust comprising TSP, PM10 and PM2.5 from the dirt roads.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	1	1	6	5	**40**
Post-Mitigation	1	1	4	3	**18**
Mitigation Measures:	Dust generation can be ***controlled*** in the following ways: (1) Development of a dust fallout monitoring and management plan; (2) Frequent Inspections; and (3) Reporting and recording incidents related to air quality. A number of recommendation resulted from the Air Quality Assessment (**Appendix E**). These recommendations are included in Part B of this report. One of the recommendations is to develop a detailed air quality management plan (focusing on sources of dust located in close proximity to the residential receptors within the project boundary) ensuring adherence to thresholds stipulated in the Baseline Air Quality Impact Assessment report (BAQIAR) (**Appendix E**) prior to the commencement of operations. There are also a number of legislative requirements stipulated in the following regulations: • GN R. 283: National reporting regulations; • GN R. 1210: National Ambient Air quality standards; and • GN R. 897: National dust control regulations.				

Activity:	2. Site clearing and topsoil stripping for lay down area and all related mining infrastructure				
Impact:	**Alteration of topography** **Direct Impact:** Vegetation stripping during site clearing and topsoil removal activities will alter the visual environment and topography.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	3	2	6	5	**55**
Post-Mitigation	1	1	6	3	**24**
Mitigation Measures:	The affects of altering the topography caused by vegetation clearance and topsoil stripping can be ***remedied*** in the following ways: (1) Record keeping of the topography and environmental state before the commencement of any activities. (2) Development of rehabilitation plan.				

Activity:	5. Mining offices i.e. operation of training centres, offices and kitchen facilities				
Impact:	**Alteration of topography** **Direct Impact:** Construction of mining facilities will alter the topography and visual environment.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	1	6	5	**55**
Post-Mitigation	2	1	4	3	**21**
Mitigation Measures:	The affects of altering the topography caused by vegetation clearance and topsoil stripping can be ***remedied*** in the following ways: (1) Record keeping of the topography and environmental state before the commencement of any activities. (2) Development of rehabilitation plan.				

Activity:	15. Transport of construction material, mobile plant and equipment to the site				
Impact:	**Dust generation** **Direct Impact:** Road construction involves the removal of rock and earth by grading or digging during construction. Vegetation is removed, grading and paving takes place using a range of road construction equipment. This often leads to the generation of fugitive dust comprising TSP, PM10 and PM2.5 from the dirt roads.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	3	1	6	5	**50**
Post-Mitigation	1	1	6	3	**24**

Mitigation Measures:	Dust generation can be ***controlled*** in the following ways: (1) Development of a dust fallout monitoring and management plan; (2) Frequent Inspections; and (3) Reporting and recording incidents related to air quality. A number of recommendation resulted from the Air Quality Assessment (**Appendix E**). These recommendations are included in Part B of this report. One of the recommendations is to develop a detailed air quality management plan (focusing on sources of dust located in close proximity to the residential receptors within the project boundary) ensuring adherence to thresholds stipulated in the Baseline Air Quality Impact Assessment report (BAQIAR) (**Appendix E**) prior to the commencement of operations. There are also a number of legislative requirements stipulated in the following regulations: • GN R. 283: National reporting regulations; • GN R. 1210: National Ambient Air quality standards; and • GN R. 897: National dust control regulations.

Aspect:	**Surface Water quality**

Activity:	1. Access and hauling along roads i.e. during the construction of roads				
Impact:	**Hydrocarbon Contamination** **Direct Impact:** Throughout the construction phase construction equipment are used. This poses a risk of hydrocarbon spills if equipment is not maintained. Depending on the size of the spill the level of contamination may vary from insignificant to significant and may affect the surrounding water quality (both surface and sub-surface) as well as the soil quality.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	1	1	6	4	**32**
Post-Mitigation	1	1	6	3	**24**
Mitigation Measures:	Potential impact resulting from hydrocarbon contamination can be ***controlled*** in the following ways: (1) Develop and implement a Hazardous substances management plan specifically addressing handling, storage, and transport of hazardous substances. (2) Develop and implement an emergency response procedure addressing the procedure in case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure.				
Impact:	**Sedimentation and siltation of watercourses**				

	Direct Impact: Constructing access roads through drainage lines may cause sedimentation and siltation of watercourses if not managed properly. **Indirect Impact:** Storm water runoff of dirt roads may cause sedimentation and siltation of nearby watercourses.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	2	2	8	5	**60**
Post-Mitigation	2	1	6	4	**36**
Mitigation Measures:	Surface water quality can be ***controlled*** in the following ways: 1) Development and implementation of water quality monitoring plan. (2) Reporting and recording incidents.				
Impact:	**Alteration of drainage patterns** **Direct Impact:** The construction of access roads through drainage lines may lead to the siltation of streams as well as lead to erosion along the river banks that will affect the surface water quality negatively.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	2	2	6	5	**50**
Post-Mitigation	1	1	6	3	**24**
Mitigation Measures:	The effects on surface water quality resulting from the alteration in drainage patterns can be ***remedied*** in the following ways: (1) Develop a water monitoring management plan. (2) Record and report all incidents related to affecting water quality. (3) Develop a rehabilitation plan specifically addressing the rehabilitation measures related to reinstatement of drainage lines.				
Impact:	**Destruction of upstream tributaries and reduction in water in the catchment** **Direct Impact:** The destruction of tributaries may lead to a limited volume of water available to the downstream users. The reduction in water in the catchment may cause the degradation of surface water quality				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	2	2	6	4	**40**
Post-Mitigation	1	1	6	3	**24**
Mitigation Measures:	The effects on surface water quality resulting from the destruction of upstream tributaries and reduction in water in the catchment can be ***remedied*** in the following ways: (1) Develop a water monitoring management plan. (2) Record and report all incidents related to affecting water quality. (3) Develop a rehabilitation plan specifically addressing the rehabilitation measures related to				

	reinstatement of drainage lines.

Activity:	2. Site clearing and topsoil stripping for lay down area and all related mining infrastructure				
Impact:	**Hydrocarbon Contamination** **Direct Impact:** Throughout the construction phase construction equipment are used. This poses a risk of hydrocarbon spills if equipment is not maintained. Depending on the size of the spill the level of contamination may vary from insignificant to significant and may affect the surrounding water quality (both surface and sub-surface) as well as the soil quality.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	3	1	6	5	**50**
Post-Mitigation	1	1	6	4	**32**
Mitigation Measures:	Potential impact resulting from hydrocarbon contamination can be ***controlled*** in the following ways: (1) Develop and implement a Hazardous substances management plan specifically addressing handling, storage, and transport of hazardous substances. (2) Develop and implement an emergency response procedure addressing the procedure in case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure.				
Impact:	**Sedimentation and siltation of watercourses** **Direct Impact:** Constructing access roads through drainage lines may cause sedimentation and siltation of watercourses if not managed properly. **Indirect Impact:** Storm water runoff of dirt roads may cause sedimentation and siltation of nearby watercourses.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	3	2	6	5	**55**
Post-Mitigation	1	1	6	4	**32**
Mitigation Measures:	Surface water quality can be ***controlled*** in the following ways: 1) Development and implementation of water quality monitoring plan. (2) Reporting and recording incidents.				
Impact:	**Water level reduction and contamination** **Direct Impact:** The reduction in water levels as well as contamination of the water resource that may be caused by alternating the topography during site clearing and topsoil stripping poses a risk to affecting the surface and sub-surface water quality as well as the downstream users.				

Significance rating:	Duration	Extent	Magnitude	Probability	Significance
Pre-Mitigation	2	1	6	5	**45**
Post-Mitigation	1	1	6	3	**24**
Mitigation Measures:	Water level reduction and contamination affecting the surface water quality can be controlled in following ways: (1) Development and implementation of water quality monitoring plan. (2) Development of a storm water management plan. (3) Reporting and recording incidents. (4) Create awareness of water conservation.				
Impact:	**Alteration of drainage patterns** **Direct Impact:** The construction of access roads through drainage lines may lead to the siltation of streams as well as lead to erosion along the river banks that will affect the surface water quality negatively.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	4	2	6	3	**36**
Mitigation Measures:	The effects on surface water quality resulting from the alteration in drainage patterns can be ***remedied*** in the following ways: (1) Develop a water monitoring management plan. (2) Record and report all incidents related to affecting water quality. (3) Develop a rehabilitation plan specifically addressing the rehabilitation measures related to reinstatement of drainage lines.				

Activity:	3. Weigh bridge				
Impact:	**Hydrocarbon Contamination** **Direct Impact:** Throughout the operational phase hauling vehicles poses a risk of hydrocarbon spills if not maintained. Depending on the size of the spill the level of contamination may vary from insignificant to significant and may affect the surrounding water quality (both surface and sub-surface) as well as the soil quality.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	1	1	8	5	**50**
Post-Mitigation	1	1	6	3	**24**
Mitigation Measures:	Potential impact resulting from hydrocarbon contamination can be ***controlled*** in the following ways: (1) Develop and implement a Hazardous substances management plan specifically addressing				

	handling, storage, and transport of hazardous substances. (2) Develop and implement an emergency response procedure addressing the procedure in case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure.

Activity:	5. Mining offices i.e. operation of training centres, offices and kitchen facilities				
Impact:	**General waste generation & Littering - Surface Water quality due to leachates** **Direct Impact**: Littering throughout the construction and operational phase poses the risk of the visual environment to be affected negatively. The storing of waste onsite for an extended time may cause the formation of leachate that will affect the soil and water quality of the surrounding environment in a negative way. **Indirect Impact:** Exposure of leachate to the natural environment poses a health risk to the surrounding fauna and flora habitats as well as human health.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	1	6	3	**27**
Post-Mitigation	4	1	2	2	**14**
Mitigation Measures:	Surface Water quality due to leachates can be ***controlled*** in the following ways: (1) Develop and implement as waste management plan with the focus on reuse, reduce, recycle, or avoid. (2) Development and maintenance of a waste disposal record keeping system.				

Activity:	6. Storm water runoff management features				
Impact:	**Sedimentation and siltation of watercourses** **Direct Impact:** Improper or ineffective storm water runoff management features poses a risk of contributing to the sedimentation and siltation of watercourses.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	4	1	6	3	**33**
Mitigation Measures:	Surface water quality can be ***controlled*** in the following ways: 1) Development and implementation of water quality monitoring plan. (2) Reporting and recording incidents.				
Impact:	**Hydrocarbon Contamination** **Direct Impact:** Storm water from dirty areas such as the mining area, lay down areas, workshops, stores, wash bays etc. poses a risk to hydrocarbon containing effluent to				

	contaminate water resources. Depending on the level of contamination the risk may vary from insignificant to significant and may affect the surrounding water quality (both surface and sub-surface) as well as the soil quality.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	2	1	6	2	**18**
Mitigation Measures:	Potential impact resulting from hydrocarbon contamination can be ***controlled*** in the following ways: (1) Develop and implement a Hazardous substances management plan specifically addressing handling, storage, and transport of hazardous substances. (2) Develop and implement an emergency response procedure addressing the procedure in case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure.				
Impact:	**Alteration of drainage patterns** **Indirect Impact:** Alteration of the drainage patterns may lead to the degradation of downstream or surrounding Wetlands which in its turn may affect the aquatic micro and macro ecology. **Direct Impact:** Site clearing and topsoil stripping through drainage lines may lead to the siltation of streams as well as lead to erosion along the river banks that will affect the surface water quality negatively.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	6	5	**60**
Post-Mitigation	4	1	6	3	**33**
Mitigation Measures:	The effects on surface water quality resulting from the alteration in drainage patterns can be ***remedied*** in the following ways: (1) Develop a water monitoring management plan. (2) Record and report all incidents related to affecting water quality. (3) Develop a rehabilitation plan specifically addressing the rehabilitation measures related to reinstatement of drainage lines.				

Activity:	8. Pollution Control Dams (PCD's) i.e. Construction and operation
Impact:	**Contamination of water resources**

	Direct Impact: In the event that PCD's are not constructed in a way to avoid seepage to the surrounding environment or if not maintained, it poses a risk of contaminating water resources within close proximity to the facility.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	5	2	8	5	**75**
Post-Mitigation	1	1	6	2	**16**
Mitigation Measures:	Contamination of water resources can be ***avoided*** in the following ways: (1) Development and implementation of a water monitoring program. (2) Development and implementation of an Integrated Water and Waste Management Plan (IWWMP). (3)Development and implementation of a storm water management plan. (4) Reporting and recording all related incidents according to a developed procedure. (5) Develop and implement an emergency preparedness plan.				
Impact:	**Hydrocarbon Contamination** **Direct Impact:** The lack of inspections or regular maintenance of facilities such as water pumps poses a risk to contaminating the surface and sub-surface water resource.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	1	6	5	**55**
Post-Mitigation	4	1	2	3	**21**
Mitigation Measures:	Potential impact resulting from hydrocarbon contamination can be ***controlled*** in the following ways: (1) Develop and implement a Hazardous substances management plan specifically addressing handling, storage, and transport of hazardous substances. (2) Develop and implement an emergency response procedure addressing the procedure in case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure.				

Activity:	9.Stores, workshops &wash bays
Impact:	**Hydrocarbon Contamination** **Direct Impact:** Throughout the construction & operation phase equipment and plant are used. This poses a risk of hydrocarbon spills if equipment/plant are not maintained. Depending on the size of the spill the level of contamination may vary from insignificant to significant and may affect the surrounding water quality (both surface and sub-surface) as well as the soil quality. The improper management of oil separators/sumps may also lead to the contamination of the

	surrounding environment.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	4	1	6	3	**33**
Mitigation Measures:	Potential impact resulting from hydrocarbon contamination can be ***controlled*** in the following ways: (1) Develop and implement a Hazardous substances management plan specifically addressing handling, storage, and transport of hazardous substances. (2) Develop and implement an emergency response procedure addressing the procedure in case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure.				
Impact:	**Contamination of water resources** **Direct Impact:** Improper management of effluent from store, workshops, and wash bays poses a high risk to contaminating water resources. **Indirect Impact:** Over an extended period of time the exposure to contamination will cause the degradation of fauna and flora habitats as well as affect the surface and sub-surface water quality.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	4	1	6	3	**33**
Mitigation Measures:	Contamination of water resources can be ***avoided*** in the following ways: (1) Development and implementation of a water monitoring program. (2) Development and implementation of an Integrated Water and Waste Management Plan (IWWMP). (3)Development and implementation of a storm water management plan. (4) Reporting and recording all related incidents according to a developed procedure. (5) Develop and implement an emergency preparedness plan.				

Activity:	10. Ablutions & change house with sewage treatment plant
Impact:	**Contamination of water resources** **Direct Impact**: Improper management of effluent from ablution facilities, change houses, and sewage treatment plant poses a high risk to contaminating water resources. **Indirect Impact:** Over an extended period of time the exposure to contamination will cause the degradation of fauna and flora habitats as well as affect the surface and sub-surface water

	quality.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	4	1	6	3	**33**
Mitigation Measures:	Contamination of water resources can be ***avoided*** in the following ways: (1) Development and implementation of a water monitoring program. (2) Development and implementation of an Integrated Water and Waste Management Plan (IWWMP). (3)Development and implementation of a storm water management plan. (4) Reporting and recording all related incidents according to a developed procedure. (5) Develop and implement an emergency preparedness plan.				

Activity:	11. Fuel operating power generators				
Impact:	**Hydrocarbon Contamination** **Direct Impact:** The construction of improper generator facilities poses a risk of the surrounding environment to be exposes to continuous leaking of hydrocarbons leading possibly contaminating surface and sub-surface water sources as well as the soils surrounding the facility.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	4	1	6	3	**33**
Mitigation Measures:	Potential impact resulting from hydrocarbon contamination can be ***controlled*** in the following ways: (1) Develop and implement a Hazardous substances management plan specifically addressing handling, storage, and transport of hazardous substances. (2) Develop and implement an emergency response procedure addressing the procedure in case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure.				
Impact:	**Contamination of water resources** **Direct Impact:** The construction of improper generator facilities poses a risk of the surrounding environment to be exposes to continuous leaking of hydrocarbons leading possibly contaminating surface and sub-surface water sources as well as the soils surrounding the facility.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**

Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	4	1	6	3	**33**
Mitigation Measures:	Contamination of water resources can be ***avoided*** in the following ways: (1) Development and implementation of a water monitoring program. (2) Development and implementation of an Integrated Water and Waste Management Plan (IWWMP). (3)Development and implementation of a storm water management plan. (4) Reporting and recording all related incidents according to a developed procedure. (5) Develop and implement an emergency preparedness plan.				

Activity:	13. Fuel storage				
Impact:	**Hydrocarbon Contamination** **Direct Impact:** The construction of improper storage facilities poses a risk of the surrounding environment to be exposes to continuous leaking of hydrocarbons leading possibly contaminating surface and sub-surface water sources as well as the soils surrounding the facility.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	4	1	6	3	**33**
Mitigation Measures:	Potential impact resulting from hydrocarbon contamination can be ***controlled*** in the following ways: (1) Develop and implement a Hazardous substances management plan specifically addressing handling, storage, and transport of hazardous substances. (2) Develop and implement an emergency response procedure addressing the procedure in case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure.				
Impact:	**Contamination of water resources** **Direct Impact:** The construction of improper storage facilities poses a risk of the surrounding environment to be exposes to continuous leaking of hydrocarbons leading possibly contaminating surface and sub-surface water sources as well as the soils surrounding the facility.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	4	1	6	3	**33**

Mitigation Measures:	Contamination of water resources can be ***avoided*** in the following ways: (1) Development and implementation of a water monitoring program. (2) Development and implementation of an Integrated Water and Waste Management Plan (IWWMP). (3)Development and implementation of a storm water management plan. (4) Reporting and recording all related incidents according to a developed procedure. (5) Develop and implement an emergency preparedness plan.

Activity:	15. Transport of construction material, mobile plant and equipment to the site				
Impact:	**Hydrocarbon Contamination** **Direct Impact:** Throughout the construction phase construction equipment are used. This poses a risk of hydrocarbon spills if equipment is not maintained. Depending on the size of the spill the level of contamination may vary from insignificant to significant and may affect the surrounding water quality (both surface and sub-surface) as well as the soil quality.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	1	1	8	5	**50**
Post-Mitigation	1	1	6	3	**24**
Mitigation Measures:	Potential impact resulting from hydrocarbon contamination can be ***controlled*** in the following ways: (1) Develop and implement a Hazardous substances management plan specifically addressing handling, storage, and transport of hazardous substances. (2) Develop and implement an emergency response procedure addressing the procedure in case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure.				
Impact:	**Sedimentation and siltation of watercourses** **Direct Impact:** Constructing access roads through drainage lines may cause sedimentation and siltation of watercourses if not managed properly. **Indirect Impact:** Storm water runoff of dirt roads may cause sedimentation and siltation of nearby watercourses.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	2	2	8	5	**60**
Post-Mitigation	1	1	6	3	**24**
Mitigation Measures:	Surface water quality can be ***controlled*** in the following ways: 1) Development and implementation of water quality monitoring plan.				

	(2) Reporting and recording incidents.

Activity:	16. Use of existing drilled / new boreholes				
Impact:	**Hydrocarbon Contamination** **Direct Impact:** The lack of inspections or regular maintenance of facilities such as water pumps poses a risk to contaminating the surface and sub-surface water resource.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	1	1	8	5	**50**
Post-Mitigation	1	1	6	3	**24**
Mitigation Measures:	Potential impact resulting from hydrocarbon contamination can be ***controlled*** in the following ways: (1) Develop and implement a Hazardous substances management plan specifically addressing handling, storage, and transport of hazardous substances. (2) Develop and implement an emergency response procedure addressing the procedure in case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure.				
Impact:	**Water level reduction and contamination** **Direct Impact:** Improper management of boreholes i.e. Pumping rates exceeding yield thresholds poses a risk to boreholes being pumped dry. **Indirect Impact:** Exposed boreholes may result in both sub-surface and surface water quality to be affected. Over exposing for an extended time may lead to water shortages and poses a negative effect to the downstream users.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	6	5	**60**
Post-Mitigation	4	1	4	3	**27**
Mitigation Measures:	Water level reduction and contamination affecting the surface water quality can be ***controlled*** in following ways: (1) Development and implementation of water quality monitoring plan. (2) Development of a storm water management plan. (3) Reporting and recording incidents. (4) Create awareness of water conservation.				

Aspect:	**Ground Water Quality**

Activity:	1. Access and hauling along roads i.e. during the construction of roads				
Impact:	**Hydrocarbon Contamination** **Direct Impact:** Throughout the construction phase construction equipment are used. This poses a risk of hydrocarbon spills if equipment is not maintained. Depending on the size of the spill the level of contamination may vary from insignificant to significant and may affect the surrounding water quality (both surface and sub-surface) as well as the soil quality.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	1	1	6	4	**32**
Post-Mitigation	1	1	6	3	**24**
Mitigation Measures:	Potential impact resulting from hydrocarbon contamination can be ***controlled*** in the following ways: (1) Develop and implement a Hazardous substances management plan specifically addressing handling, storage, and transport of hazardous substances. (2) Develop and implement an emergency response procedure addressing the procedure in case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure.				

Activity:	2. Site clearing and topsoil stripping for lay down area and all related mining infrastructure				
Impact:	**Hydrocarbon Contamination** **Direct Impact:** Throughout the construction phase construction equipment are used. This poses a risk of hydrocarbon spills if equipment is not maintained. Depending on the size of the spill the level of contamination may vary from insignificant to significant and may affect the surrounding water quality (both surface and sub-surface) as well as the soil quality.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	2	1	6	4	**36**
Post-Mitigation	1	1	6	3	**24**
Mitigation Measures:	Potential impact resulting from hydrocarbon contamination can be ***controlled*** in the following ways: (1) Develop and implement a Hazardous substances management plan specifically addressing handling, storage, and transport of hazardous substances. (2) Develop and implement an emergency response procedure addressing the procedure in case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure.				

Impact:	**Water level reduction and contamination** **Direct Impact:** The reduction in water levels as well as contamination of the water resource that may be caused by alternating the topography during site clearing and topsoil stripping poses a risk to affecting the surface and sub-surface water quality as well as the downstream users.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	2	1	6	5	**45**
Post-Mitigation	1	1	6	3	**24**
Mitigation Measures:	Water level reduction and contamination affecting the surface water quality can be ***controlled*** in following ways: (1) Development and implementation of water quality monitoring plan. (2) Development of a storm water management plan. (3) Reporting and recording incidents. (4) Create awareness of water conservation.				

Activity:	3. Weigh bridge				
Impact:	**Hydrocarbon Contamination** **Direct Impact:** Throughout the operational phase hauling vehicles poses a risk of hydrocarbon spills if not maintained. Depending on the size of the spill the level of contamination may vary from insignificant to significant and may affect the surrounding water quality (both surface and sub-surface) as well as the soil quality.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	3	1	4	3	**24**
Post-Mitigation	1	1	4	2	**12**
Mitigation Measures:	Potential impact resulting from hydrocarbon contamination can be ***controlled*** in the following ways: (1) Develop and implement a Hazardous substances management plan specifically addressing handling, storage, and transport of hazardous substances. (2) Develop and implement an emergency response procedure addressing the procedure in case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure.				

Activity:	6. Storm water runoff management features
Impact:	**Hydrocarbon Contamination**

	Direct Impact: Storm water from dirty areas such as the mining area, lay down areas, workshops, stores, wash bays etc. poses a risk to hydrocarbon containing effluent to contaminate water resources. Depending on the level of contamination the risk may vary from insignificant to significant and may affect the surrounding water quality (both surface and sub-surface) as well as the soil quality.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	4	**56**
Post-Mitigation	2	1	4	2	**14**
Mitigation Measures:	Potential impact resulting from hydrocarbon contamination can be ***controlled*** in the following ways: (1) Develop and implement a Hazardous substances management plan specifically addressing handling, storage, and transport of hazardous substances. (2) Develop and implement an emergency response procedure addressing the procedure in case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure.				

Activity:	8. Pollution Control Dams (PCD's) i.e. Construction and operation				
Impact:	**Contamination of water resources** **Direct Impact:** In the event that PCD's are not constructed in a way to avoid seepage to the surrounding environment or if not maintained, it poses a risk of contaminating water resources within close proximity to the facility.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	5	2	8	5	**75**
Post-Mitigation	1	1	6	2	**16**
Mitigation Measures:	Contamination of water resources can be ***avoided*** in the following ways: (1) Development and implementation of a water monitoring program. (2) Development and implementation of an Integrated Water and Waste Management Plan (IWWMP). (3)Development and implementation of a storm water management plan. (4) Reporting and recording all related incidents according to a developed procedure. (5) Develop and implement an emergency preparedness plan.				
Impact:	**Hydrocarbon Contamination i.e. Usage of diesel operating pumps** **Direct Impact:** The lack of inspections or regular maintenance of facilities such as water pumps poses a risk to contaminating the surface and sub-surface water resource.				

Significance rating:	Duration	Extent	Magnitude	Probability	Significance
Pre-Mitigation	4	1	6	3	**33**
Post-Mitigation	4	1	6	1	**11**
Mitigation Measures:	Potential impact resulting from hydrocarbon contamination can be ***controlled*** in the following ways: (1) Develop and implement a Hazardous substances management plan specifically addressing handling, storage, and transport of hazardous substances. (2) Develop and implement an emergency response procedure addressing the procedure in case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure.				

Activity:	9.Stores, workshops &wash bays				
Impact:	**Hydrocarbon Contamination** **Direct Impact:** Throughout the construction & operation phase equipment and plant are used. This poses a risk of hydrocarbon spills if equipment/plant are not maintained. Depending on the size of the spill the level of contamination may vary from insignificant to significant and may affect the surrounding water quality (both surface and sub-surface) as well as the soil quality. The improper management of oil separators/sumps may also lead to the contamination of the surrounding environment.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	4	1	6	2	**22**
Mitigation Measures:	Potential impact resulting from hydrocarbon contamination can be ***controlled*** in the following ways: (1) Develop and implement a Hazardous substances management plan specifically addressing handling, storage, and transport of hazardous substances. (2) Develop and implement an emergency response procedure addressing the procedure in case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure.				
Impact:	**Contamination of water resources** **Direct Impact:** Improper management of effluent from store, workshops, and wash bays poses a high risk to contaminating water resources. **Indirect Impact:** Over an extended period of time the exposure to contamination will cause the				

	degradation of fauna and flora habitats as well as affect the surface and sub-surface water quality.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	4	1	6	2	**22**
Mitigation Measures:	Contamination of water resources can be ***avoided*** in the following ways: (1) Development and implementation of a water monitoring program. (2) Development and implementation of an Integrated Water and Waste Management Plan (IWWMP). (3)Development and implementation of a storm water management plan. (4) Reporting and recording all related incidents according to a developed procedure. (5) Develop and implement an emergency preparedness plan.				

Activity:	10. Ablutions & change house with sewage treatment plant				
Impact:	**Contamination of water resources** **Direct Impact:** Improper management of effluent from ablution facilities, change houses, and sewage treatment plant poses a high risk to contaminating water resources. **Indirect Impact:** Over an extended period of time the exposure to contamination will cause the degradation of fauna and flora habitats as well as affect the surface and sub-surface water quality.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	4	**56**
Post-Mitigation	4	1	6	2	**22**
Mitigation Measures:	Contamination of water resources can be ***avoided*** in the following ways: (1) Development and implementation of a water monitoring program. (2) Development and implementation of an Integrated Water and Waste Management Plan (IWWMP). (3)Development and implementation of a storm water management plan. (4) Reporting and recording all related incidents according to a developed procedure. (5) Develop and implement an emergency preparedness plan.				

Activity:	11. Fuel operating power generators
Impact:	**Hydrocarbon Contamination**

	Direct Impact: The construction of improper generator facilities poses a risk of the surrounding environment to be exposes to continuous leaking of hydrocarbons leading possibly contaminating surface and sub-surface water sources as well as the soils surrounding the facility.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	4	1	6	2	**22**
Mitigation Measures:	Potential impact resulting from hydrocarbon contamination can be ***controlled*** in the following ways: (1) Develop and implement a Hazardous substances management plan specifically addressing handling, storage, and transport of hazardous substances. (2) Develop and implement an emergency response procedure addressing the procedure in case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure.				
Impact:	**Contamination of water resources** **Direct Impact:** The construction of improper generator facilities poses a risk of the surrounding environment to be exposes to continuous leaking of hydrocarbons leading possibly contaminating surface and sub-surface water sources as well as the soils surrounding the facility.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	4	**56**
Post-Mitigation	4	1	6	2	**22**
Mitigation Measures:	Contamination of water resources can be ***avoided*** in the following ways: (1) Development and implementation of a water monitoring program. (2) Development and implementation of an Integrated Water and Waste Management Plan (IWWMP). (3)Development and implementation of a storm water management plan. (4) Reporting and recording all related incidents according to a developed procedure. (5) Develop and implement an emergency preparedness plan.				

Activity:	13. Fuel storage

Impact:	**Hydrocarbon Contamination** **Direct Impact:** The construction of improper storage facilities poses a risk of the surrounding environment to be exposes to continuous leaking of hydrocarbons leading possibly contaminating surface and sub-surface water sources as well as the soils surrounding the facility.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	4	1	6	2	**22**
Mitigation Measures:	Potential impact resulting from hydrocarbon contamination can be ***controlled*** in the following ways: (1) Develop and implement a Hazardous substances management plan specifically addressing handling, storage, and transport of hazardous substances. (2) Develop and implement an emergency response procedure addressing the procedure in case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure.				
Impact:	**Contamination of water resources** **Direct Impact:** The construction of improper storage facilities poses a risk of the surrounding environment to be exposes to continuous leaking of hydrocarbons leading possibly contaminating surface and sub-surface water sources as well as the soils surrounding the facility.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	4	**56**
Post-Mitigation	4	1	6	2	**22**
Mitigation Measures:	Contamination of water resources can be ***avoided*** in the following ways: (1) Development and implementation of a water monitoring program. (2) Development and implementation of an Integrated Water and Waste Management Plan (IWWMP). (3)Development and implementation of a storm water management plan. (4) Reporting and recording all related incidents according to a developed procedure. (5) Develop and implement an emergency preparedness plan.				

Activity:	15. Transport of construction material, mobile plant and equipment to the site

Impact:	**Hydrocarbon Contamination** **Direct Impact:** Throughout the construction phase construction equipment are used. This poses a risk of hydrocarbon spills if equipment are not maintained. Depending on the size of the spill the level of contamination may vary from insignificant to significant and may affect the surrounding water quality (both surface and sub-surface) as well as the soil quality.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	1	1	8	5	**50**
Post-Mitigation	1	1	4	2	**12**
Mitigation Measures:	Potential impact resulting from hydrocarbon contamination can be ***controlled*** in the following ways: (1) Develop and implement a Hazardous substances management plan specifically addressing handling, storage, and transport of hazardous substances. (2) Develop and implement an emergency response procedure addressing the procedure in case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure.				

Activity:	16. Use of existing drilled / new boreholes				
Impact:	**Hydrocarbon Contamination** **Direct Impact:** The lack of inspections or regular maintenance of facilities such as water pumps poses a risk to contaminating the surface and sub-surface water resource.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	1	2	6	5	**45**
Post-Mitigation	4	1	4	2	**18**
Mitigation Measures:	Potential impact resulting from hydrocarbon contamination can be ***controlled*** in the following ways: (1) Develop and implement a Hazardous substances management plan specifically addressing handling, storage, and transport of hazardous substances. (2) Develop and implement an emergency response procedure addressing the procedure in case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure.				
Impact:	**Water level reduction and contamination** **Direct Impact:** Improper management of boreholes i.e. Pumping rates exceeding yield thresholds poses a risk to boreholes being pumped dry.				

	Indirect Impact: Exposed boreholes may result in both sub-surface and surface water quality to be affected. Over exposing for an extended time may lead to water shortages and poses a negative effect to the downstream users.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	6	5	**60**
Post-Mitigation	4	1	4	3	**27**
Mitigation Measures:	Water level reduction and contamination affecting the surface water quality can be ***controlled*** in following ways: (1) Development and implementation of water quality monitoring plan. (2) Development of a storm water management plan. (3) Reporting and recording incidents. (4) Create awareness of water conservation.				

Aspect:	**Wetlands and Aquatic Ecology**

Activity:	1. Access and hauling along roads i.e. during the construction of roads				
Impact:	**Sedimentation and siltation of watercourses** **Direct Impact:** Constructing access roads through drainage lines may cause sedimentation and siltation of watercourses if not managed properly. **Indirect Impact**: Storm water runoff of dirt roads may cause sedimentation and siltation of nearby watercourses.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	1	2	6	5	**45**
Post-Mitigation	4	1	4	2	**18**
Mitigation Measures:	Surface water quality can be ***controlled*** in the following ways: 1) Development and implementation of water quality monitoring plan. (2) Reporting and recording incidents.				
Impact:	**Alteration of drainage patterns** **Indirect Impact:** Alteration of the drainage patterns may lead to the degradation of downstream or surrounding Wetlands which in its turn may affect the aquatic micro and macro ecology. **Direct Impact:** The construction of access roads through drainage lines may lead to the siltation of streams as well as lead to erosion along the river banks that will affect the surface water quality negatively.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**

Pre-Mitigation	4	2	6	5	**60**
Post-Mitigation	4	1	4	3	**27**
Mitigation Measures:	The effects on surface water quality resulting from the alteration in drainage patterns can be ***remedied*** in the following ways: (1) Develop a water monitoring management plan. (2) Record and report all incidents related to affecting water quality. (3) Develop a rehabilitation plan specifically addressing the rehabilitation measures related to reinstatement of drainage lines.				
Impact:	**Destruction of upstream tributaries and reduction in water in the catchment** **Indirect Impact:** Alteration of the upstream drainage lines may lead to the degradation of downstream or surrounding Wetlands which in its turn may affect the aquatic micro and macro ecology. **Direct Impact:** The destruction of tributaries may lead to a limited volume of water available to the downstream users. The reduction in water in the catchment may cause the degradation of surface water quality.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	6	5	**60**
Post-Mitigation	4	1	4	3	**27**
Mitigation Measures:	The effects on surface water quality resulting from the destruction of upstream tributaries and reduction in water in the catchment can be ***remedied*** in the following ways: (1) Develop a water monitoring management plan. (2) Record and report all incidents related to affecting water quality. (3) Develop a rehabilitation plan specifically addressing the rehabilitation measures related to reinstatement of drainage lines.				

Activity:	2. Site clearing and topsoil stripping for lay down area and all related mining infrastructure				
Impact:	**Destruction of Wetlands** **Direct Impact:** Site clearing and topsoil stripping in Wetlands will cause the loss of micro and macro aquatic species.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	3	2	8	5	**65**
Post-Mitigation	2	1	6	4	**36**
Mitigation Measures:	The potential effects may be ***avoided*** in the following ways: (1) Develop a water monitoring management plan. (2) Record and report all incidents related to affecting water quality.				

	(3) Develop a rehabilitation plan specifically addressing the rehabilitation measures related to reinstatement of wetlands.				
Impact:	**Hydrocarbon Contamination** **Direct Impact:** Throughout the construction phase construction equipment are used. This poses a risk of hydrocarbon spills if equipment is not maintained. Depending on the size of the spill the level of contamination may vary from insignificant to significant and may affect the surrounding water quality (both surface and sub-surface) as well as the soil quality.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	2	1	6	5	**45**
Post-Mitigation	1	1	6	4	**32**
Mitigation Measures:	Potential impact resulting from hydrocarbon contamination can be ***controlled*** in the following ways: (1) Develop and implement a Hazardous substances management plan specifically addressing handling, storage, and transport of hazardous substances. (2) Develop and implement an emergency response procedure addressing the procedure in case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure.				
Impact:	**Sedimentation and siltation of watercourses** **Direct Impact:** Constructing access roads and lay down areas through or in close proximity to drainage lines may cause sedimentation and siltation of watercourses if not managed properly. **Indirect Impact:** Storm water runoff of dirt roads and un-vegetated areas may cause sedimentation and siltation of nearby watercourses.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	3	1	6	5	**50**
Post-Mitigation	3	1	6	5	**50**
Mitigation Measures:	Surface water quality can be ***controlled*** in the following ways: 1) Development and implementation of water quality monitoring plan. (2) Reporting and recording incidents.				
Impact:	**Alteration of drainage patterns** **Indirect Impact:** Alteration of the drainage patterns may lead to the degradation of downstream or surrounding Wetlands which in its turn may affect the aquatic micro and macro ecology. **Direct Impact: S**ite clearing and topsoil stripping through drainage lines may lead to the siltation of streams as well as lead to erosion along the river banks that will affect the surface				

	water quality negatively.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	1	2	6	5	**45**
Post-Mitigation	4	1	4	2	**18**
Mitigation Measures:	The effects on surface water quality resulting from the alteration in drainage patterns can be ***remedied*** in the following ways: (1) Develop a water monitoring management plan. (2) Record and report all incidents related to affecting water quality. (3) Develop a rehabilitation plan specifically addressing the rehabilitation measures related to reinstatement of drainage lines.				

Activity:	6. Storm water runoff management features				
Impact:	**Sedimentation and siltation of watercourses** **Direct Impact:** Improper or ineffective storm water runoff management features poses a risk of contributing to the sedimentation and siltation of watercourses.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	4	2	6	3	**36**
Mitigation Measures:	Surface water quality can be ***controlled*** in the following ways: 1) Development and implementation of water quality monitoring plan. (2) Reporting and recording incidents.				
Impact:	**Hydrocarbon Contamination** **Direct Impact:** Storm water from dirty areas such as the mining area, lay down areas, workshops, stores, wash bays etc. poses a risk to hydrocarbon containing effluent to contaminate water resources. Depending on the level of contamination the risk may vary from insignificant to significant and may affect the surrounding water quality (both surface and sub-surface) as well as the soil quality.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	4	1	6	3	**33**
Mitigation Measures:	Potential impact resulting from hydrocarbon contamination can be ***controlled*** in the following ways: (1) Develop and implement a Hazardous substances management plan specifically addressing handling, storage, and transport of hazardous substances. (2) Develop and implement an emergency response procedure addressing the procedure in				

	case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure.				
Impact:	**Alteration of drainage patterns** **Indirect Impact:** Alteration of the drainage patterns may lead to the degradation of downstream or surrounding Wetlands which in its turn may affect the aquatic micro and macro ecology. **Direct Impact:** Site clearing and topsoil stripping through drainage lines may lead to the siltation of streams as well as lead to erosion along the river banks that will affect the surface water quality negatively.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	4	1	6	3	**33**
Mitigation Measures:	The effects on surface water quality resulting from the alteration in drainage patterns can be ***remedied*** in the following ways: (1) Develop a water monitoring management plan. (2) Record and report all incidents related to affecting water quality. (3) Develop a rehabilitation plan specifically addressing the rehabilitation measures related to reinstatement of drainage lines.				

Activity:	8. Pollution Control Dams (PCD's) i.e. Construction and operation				
Impact:	**Contamination of water resources** **Direct Impact:** In the event that PCD's are not constructed in a way to avoid seepage to the surrounding environment or if not maintained, it poses a risk of contaminating water resources within close proximity to the facility.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	5	2	8	4	**60**
Post-Mitigation	1	1	6	2	**16**
Mitigation Measures:	Contamination of water resources can be ***avoided*** in the following ways: (1) Development and implementation of a water monitoring program. (2) Development and implementation of an Integrated Water and Waste Management Plan (IWWMP). (3)Development and implementation of a storm water management plan. (4) Reporting and recording all related incidents according to a developed procedure. (5) Develop and implement an emergency preparedness plan.				

Activity:	9.Stores, workshops &wash bays				
Impact:	**Contamination of water resources** **Direct Impact:** Improper management of effluent from store, workshops, and wash bays poses a high risk to contaminating water resources. **Indirect Impact:** Over an extended period of time the exposure to contamination will cause the degradation of fauna and flora habitats as well as affect the surface and sub-surface water quality.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	4	1	6	3	**33**
Mitigation Measures:	Contamination of water resources can be ***avoided*** in the following ways: (1) Development and implementation of a water monitoring program. (2) Development and implementation of an Integrated Water and Waste Management Plan (IWWMP). (3)Development and implementation of a storm water management plan. (4) Reporting and recording all related incidents according to a developed procedure. (5) Develop and implement an emergency preparedness plan.				

Activity:	10. Ablutions & change house with sewage treatment plant				
Impact:	**Contamination of water resources** **Direct Impact:** Improper management of effluent from ablution facilities, change houses, and sewage treatment plant poses a high risk to contaminating water resources**.** **Indirect Impact:** Over an extended period of time the exposure to contamination will cause the degradation of fauna and flora habitats as well as affect the surface and sub-surface water quality.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	4	1	6	3	**33**
Mitigation Measures:	Contamination of water resources can be ***avoided*** in the following ways: (1) Development and implementation of a water monitoring program. (2) Development and implementation of an Integrated Water and Waste Management Plan (IWWMP). (3)Development and implementation of a storm water management plan. (4) Reporting and recording all related incidents according to a developed procedure. (5) Develop and implement an emergency preparedness plan.				

Activity:	11. Fuel operating power generators				
Impact:	**Contamination of water resources** **Direct Impact:** The construction of improper generator facilities poses a risk of the surrounding environment to be exposes to continuous leaking of hydrocarbons leading possibly contaminating surface and sub-surface water sources as well as the soils surrounding the facility.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	4	1	6	3	**33**
Mitigation Measures:	Contamination of water resources can be ***avoided*** in the following ways: (1) Development and implementation of a water monitoring program. (2) Development and implementation of an Integrated Water and Waste Management Plan (IWWMP). (3)Development and implementation of a storm water management plan. (4) Reporting and recording all related incidents according to a developed procedure. (5) Develop and implement an emergency preparedness plan.				

Activity:	13. Fuel storage				
Impact:	**Contamination of water resources** **Direct Impact:** The construction of improper storage facilities poses a risk of the surrounding environment to be exposes to continuous leaking of hydrocarbons leading possibly contaminating surface and sub-surface water sources as well as the soils surrounding the facility.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	4	1	6	3	**33**
Mitigation Measures:	Contamination of water resources can be ***avoided*** in the following ways: (1) Development and implementation of a water monitoring program. (2) Development and implementation of an Integrated Water and Waste Management Plan (IWWMP). (3)Development and implementation of a storm water management plan. (4) Reporting and recording all related incidents according to a developed procedure. (5) Develop and implement an emergency preparedness plan.				

Activity:	15. Transport of construction material, mobile plant and equipment to the site

Impact:	**Sedimentation and siltation of watercourses** **Direct Impact:** Constructing access roads through drainage lines may cause sedimentation and siltation of watercourses if not managed properly. **Indirect Impact:** Storm water runoff of dirt roads may cause sedimentation and siltation of nearby watercourses.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	2	2	8	5	**60**
Post-Mitigation	1	1	6	3	**24**
Mitigation Measures:	Surface water quality can be ***controlled*** in the following ways: 1) Development and implementation of water quality monitoring plan. (2) Reporting and recording incidents.				

Aspect:	**Water resource users and management**

Activity:	. Access and hauling along roads i.e. during the construction of roads				
Impact:	**Destruction of upstream tributaries and reduction in water in the catchment** **Indirect Impact:** Alteration of the upstream drainage lines may lead to the degradation of downstream or surrounding Wetlands which in its turn may affect the aquatic micro and macro ecology. **Direct Impact:** The destruction of tributaries may lead to a limited volume of water available to the downstream users. The reduction in water in the catchment may cause the degradation of surface water quality.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	3	2	6	4	**44**
Post-Mitigation	1	1	6	3	**24**
Mitigation Measures:	The effects on surface water quality resulting from the destruction of upstream tributaries and reduction in water in the catchment can be ***remedied*** in the following ways: (1) Develop a water monitoring management plan. (2) Record and report all incidents related to affecting water quality. (3) Develop a rehabilitation plan specifically addressing the rehabilitation measures related to reinstatement of drainage lines.				
Impact:	**Water usage for dust suppression - Wastage of water resource** **Direct Impact:** Improper management of the water used during dust suppression may lead to the wastage of the available water resource.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**

Pre-Mitigation	1	2	4	5	**35**
Post-Mitigation	1	1	4	3	**18**
Mitigation Measures:	The following mitigation measures can be implemented to ***control*** the usage of water resources: (1) Water usage monitoring plan to be developed and implemented. (2) Create awareness of water conservation.				

Activity:	2. Site clearing and topsoil stripping for lay down area and all related mining infrastructure				
Impact:	**Water level reduction and contamination** **Direct Impact:** The reduction in water levels as well as contamination of the water resource that may be caused by alternating the topography during site clearing and topsoil stripping poses a risk to affecting the surface and sub-surface water quality as well as the downstream users.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	2	2	6	5	**50**
Post-Mitigation	1	1	6	3	**24**
Mitigation Measures:	Water level reduction and contamination affecting the surface water quality can be ***controlled*** in following ways: (1) Development and implementation of water quality monitoring plan. (2) Development of a storm water management plan. (3) Reporting and recording incidents. (4) Create awareness of water conservation.				

Activity:	4. Onsite Clinic				
Impact:	**Domestic water usage - Wastage of water resource** **Direct Impact:** The lack of water management and maintenance of taps, toilets, basins etc. poses a risk to wastage of water.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	1	2	5	**35**
Post-Mitigation	4	1	2	3	**21**
Mitigation Measures:	The following mitigation measures can be implemented to ***avoid*** the usage of water resources: (1) Water usage monitoring plan to be developed and implemented. (2) Create awareness of water conservation.				

Activity:	5. Mining offices (construction and operation) i.e. operation of training centres, offices and

	kitchen facilities				
Impact:	**Domestic water usage - Wastage of water resource** **Direct Impact:** The lack of water management and maintenance of taps, toilets, basins etc. poses a risk to wastage of water.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	1	4	5	**45**
Post-Mitigation	4	1	2	3	**21**
Mitigation Measures:	The following mitigation measures can be implemented to ***avoid*** the usage of water resources: (1) Water usage monitoring plan to be developed and implemented. (2) Create awareness of water conservation.				

Activity:	7. Water storage facilities				
Impact:	**Improper water storage management** **Direct Impact:** Improper management of water storage facilities i.e. Not inspecting or regularly maintaining the storage tanks pose a risk of leaks and contamination.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	1	6	4	**44**
Post-Mitigation	4	1	2	3	**21**
Mitigation Measures:	The following mitigation measures can be implemented to ***avoid*** the usage of water resources: (1) Water usage monitoring plan to be developed and implemented. (2) Create awareness of water conservation.				

Activity:	16. Use of existing drilled / new boreholes				
Impact:	**Water level reduction and contamination** **Direct Impact:** Improper management of boreholes i.e. Pumping rates exceeding yield thresholds poses a risk to boreholes being pumped dry. **Indirect Impact:** Exposed boreholes may result in both sub-surface and surface water quality to be affected. Over exposing for an extended time may lead to water shortages and poses a negative effect to the downstream users.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	6	5	**60**
Post-Mitigation	4	2	2	3	**24**
Mitigation Measures:	Water level reduction and contamination affecting the surface water quality can be ***controlled*** in following ways: (1) Development and implementation of water quality monitoring plan.				

	(2) Development of a storm water management plan. (3) Reporting and recording incidents. (4) Create awareness of water conservation.

Aspect:	**Soil Quality**

Activity:	1. Access and hauling along roads i.e. during the construction of roads				
Impact:	**Hydrocarbon Contamination** **Direct Impact:** Throughout the construction phase construction equipment are used. This poses a risk of hydrocarbon spills if equipment are not maintained. Depending on the size of the spill the level of contamination may vary from insignificant to significant and may affect the surrounding water quality (both surface and sub-surface) as well as the soil quality.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	2	1	6	4	**36**
Post-Mitigation	4	2	2	3	**24**
Mitigation Measures:	Potential impact resulting from hydrocarbon contamination can be ***controlled*** in the following ways: (1) Develop and implement a Hazardous substances management plan specifically addressing handling, storage, and transport of hazardous substances. (2) Develop and implement an emergency response procedure addressing the procedure in case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure.				
Impact:	**Degradation of soil resources** **Direct Impact:** As part of the construction activity related to roads, valuable topsoil's will be removed. Improper management of topsoil or fertile soil may cause the loss of flora micro-ecosystems and cause the degradation of soil quality.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	1	1	6	5	**40**
Post-Mitigation	4	2	2	3	**24**
Mitigation Measures:	Degradation of soil resources can be ***remedied*** in the following ways: (1) Develop and implement soil conservation and stockpile management plan. (2) Develop and implement a Rehabilitation plan.				
Impact:	**Erosion – Loss of fertile soil** **Indirect Impact:** Improper management of storm water may lead to erosion along the access				

	routes. This may lead to the loss of fertile soil and in its turn affect the micro-ecosystems of the surrounding environment.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	2	1	6	5	**45**
Post-Mitigation	1	1	6	3	**24**
Mitigation Measures:	Erosion can be ***controlled*** in the following ways: (1) Development and implementation of a storm water management plan. (2) Regular inspection of erosion prone areas for signs of erosion. (3) A soil conservation and stockpiling plan to be developed and implemented. (4) Monthly monitoring of water quality (as per recommendation of specialist study).				

Activity:	2. Site clearing and topsoil stripping for lay down area and all related mining infrastructure				
Impact:	**Degradation of soil resources** **Direct Impact:** If not managed properly, fertile soil will be lost during site clearance and topsoil striping. Loss of fertile soil will cause the degradation of habitat for flora micro- and macro organisms.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	2	1	6	5	**45**
Post-Mitigation	1	1	6	3	**24**
Mitigation Measures:	Degradation of soil resources can be ***remedied*** in the following ways: (1) Develop and implement soil conservation and stockpile management plan. (2) Develop and implement a Rehabilitation plan.				
Impact:	**Erosion – Loss of fertile soil** **Direct Impact:** Un-vegetated areas exposed to weathering for an extended period of time will lead to erosion. Erosion prone areas have a high risk of losing fertile soil caused by flash floods. The loss of fertile soil will result in the loss of important micro ecosystems.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	1	1	6	3	**24**
Mitigation Measures:	Erosion can be ***controlled*** in the following ways: (1) Development and implementation of a storm water management plan. (2) Regular inspection of erosion prone areas for signs of erosion. (3) A soil conservation and stockpiling plan to be developed and implemented. (4) Monthly monitoring of water quality (as per recommendation of specialist study).				

Activity:	5. Mining offices i.e. operation of training centres, offices and kitchen facilities				
Impact:	**General waste generation & Littering - Soils quality due to leachates** **Direct Impact:** Littering throughout the construction and operational phase poses the risk of the visual environment to be affected negatively. The storing of waste onsite for an extended time may cause the formation of leachate that will affect the soil and water quality of the surrounding environment in a negative way. **Indirect Impact:** Exposure of leachate to the natural environment poses a health risk to the surrounding fauna and flora habitats as well as human health.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	3	1	6	5	**50**
Post-Mitigation	4	1	2	4	**28**
Mitigation Measures:	Surface Water quality due to leachates can be ***controlled*** in the following ways: (1) Develop and implement as waste management plan with the focus on reuse, reduce, recycle, or avoid. (2) Development and maintenance of a waste disposal record keeping system.				

Activity:	6. Storm water runoff management features				
Impact:	**Erosion – Loss of fertile soil** **Direct Impact:** Improper management of storm water runoff poses a high risk to erosion. Un-vegetated or degraded areas exposed to weathering for an extended period of time are a contributing factor. Erosion prone areas have a high risk of losing fertile soil caused by flash floods. The loss of fertile soil will result in the loss of important micro ecosystems.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	6	5	**60**
Post-Mitigation	4	2	4	3	**30**
Mitigation Measures:	Erosion can be ***controlled*** in the following ways: (1) Development and implementation of a storm water management plan. (2) Regular inspection of erosion prone areas for signs of erosion. (3) A soil conservation and stockpiling plan to be developed and implemented. (4) Monthly monitoring of water quality (as per recommendation of specialist study).				

Activity:	9.Stores, workshops &wash bays
Impact:	**Hydrocarbon Contamination** **Direct Impact:** Throughout the construction & operation phase equipment and plant are used. This poses a risk of hydrocarbon spills if equipment/plant is not maintained. Depending on the

	size of the spill the level of contamination may vary from insignificant to significant and may affect the surrounding water quality (both surface and sub-surface) as well as the soil quality. The improper management of oil separators/sumps may also lead to the contamination of the surrounding environment.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	4	1	6	3	**33**
Mitigation Measures:	Potential impact resulting from hydrocarbon contamination can be ***controlled*** in the following ways: (1) Develop and implement a Hazardous substances management plan specifically addressing handling, storage, and transport of hazardous substances. (2) Develop and implement an emergency response procedure addressing the procedure in case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure.				
Impact:	**Degradation of soil resources** **Direct Impact:** The continuous spills of hydrocarbons and hazardous substances pose a environmental risk to the surrounding soil quality. The degradation of the soil quality will cause the loss of habitat or healthy environment for micro ecosystems.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	1	6	5	**55**
Post-Mitigation	4	1	6	3	**33**
Mitigation Measures:	Degradation of soil resources can be ***remedied*** in the following ways: (1) Develop and implement soil conservation and stockpile management plan. (2) Develop and implement a Rehabilitation plan.				

Activity:	10. Ablutions & change house with sewage treatment plant				
Impact:	**Degradation of soil resources** **Direct Impact:** Continuous leaking or lack of maintenance poses a risk to contaminating the surrounding soils and degrading the soil quality. This will affect the micro-ecosystems in a negative manner.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	1	6	5	**55**
Post-Mitigation	4	1	6	3	**33**
Mitigation Measures:	Degradation of soil resources can be ***remedied*** in the following ways:				

	(1) Develop and implement soil conservation and stockpile management plan. (2) Develop and implement a Rehabilitation plan.

Activity:	11. Fuel operating power generators				
Impact:	**Hydrocarbon Contamination** **Direct Impact:** The construction of improper generator facilities poses a risk of the surrounding environment to be exposes to continuous leaking of hydrocarbons leading possibly contaminating surface and sub-surface water sources as well as the soils surrounding the facility.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	1	6	5	**55**
Post-Mitigation	4	1	6	3	**33**
Mitigation Measures:	Potential impact resulting from hydrocarbon contamination can be ***controlled*** in the following ways: (1) Develop and implement a Hazardous substances management plan specifically addressing handling, storage, and transport of hazardous substances. (2) Develop and implement an emergency response procedure addressing the procedure in case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure.				
Impact:	**Degradation of soil resources** **Direct Impact:** Continuous exposure to hydrocarbon leaks poses a risk to the degradation of the surrounding soil resources.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	1	6	5	**55**
Post-Mitigation	4	1	6	3	**33**
Mitigation Measures:	Degradation of soil resources can be ***remedied*** in the following ways: (1) Develop and implement soil conservation and stockpile management plan. (2) Develop and implement a Rehabilitation plan.				

Activity:	13. Fuel storage
Impact:	**Hydrocarbon Contamination** **Direct Impact:** The construction of improper storage facilities poses a risk of the surrounding environment to be exposes to continuous leaking of hydrocarbons leading possibly contaminating surface and sub-surface water sources as well as the soils surrounding the

	facility.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	6	5	**60**
Post-Mitigation	4	1	6	3	**33**
Mitigation Measures:	Potential impact resulting from hydrocarbon contamination can be ***controlled*** in the following ways: (1) Develop and implement a Hazardous substances management plan specifically addressing handling, storage, and transport of hazardous substances. (2) Develop and implement an emergency response procedure addressing the procedure in case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure.				
Impact:	**Degradation of soil resources** **Direct Impact:** Continuous exposure to hydrocarbon leaks poses a risk to the degradation of the surrounding soil resources.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	1	6	5	**55**
Post-Mitigation	4	1	6	3	**33**
Mitigation Measures:	Degradation of soil resources can be ***remedied*** in the following ways: (1) Develop and implement soil conservation and stockpile management plan. (2) Develop and implement a Rehabilitation plan.				

Activity:	15. Transport of construction material, mobile plant and equipment to the site				
Impact:	**Hydrocarbon Contamination** **Direct Impact:** Throughout the construction phase construction equipment are used. This poses a risk of hydrocarbon spills if equipment is not maintained. Depending on the size of the spill the level of contamination may vary from insignificant to significant and may affect the surrounding water quality (both surface and sub-surface) as well as the soil quality.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	1	1	8	5	**50**
Post-Mitigation	1	1	4	3	**18**
Mitigation Measures:	Potential impact resulting from hydrocarbon contamination can be ***controlled*** in the following ways: (1) Develop and implement a Hazardous substances management plan specifically addressing handling, storage, and transport of hazardous substances.				

	(2) Develop and implement an emergency response procedure addressing the procedure in case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure.				
Impact:	**Erosion – Loss of fertile soil** **Indirect Impact:** Improper management of storm water may lead to erosion along the access routes. This may lead to the loss of fertile soil and in its turn affect the micro-ecosystems of the surrounding environment.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	2	1	6	5	**45**
Post-Mitigation	1	1	6	3	**24**
Mitigation Measures:	Erosion can be ***controlled*** in the following ways: (1) Development and implementation of a storm water management plan. (2) Regular inspection of erosion prone areas for signs of erosion. (3) A soil conservation and stockpiling plan to be developed and implemented. (4) Monthly monitoring of water quality (as per recommendation of specialist study).				

Activity:	16. Use of existing drilled / new boreholes				
Impact:	**Hydrocarbon Contamination** **Direct Impact:** The lack of inspections or regular maintenance of facilities such as water pumps poses a risk to contaminating the surface and sub-surface water resource.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	1	2	6	5	**45**
Post-Mitigation	4	1	4	3	**18**
Mitigation Measures:	Potential impact resulting from hydrocarbon contamination can be ***controlled*** in the following ways: (1) Develop and implement a Hazardous substances management plan specifically addressing handling, storage, and transport of hazardous substances. (2) Develop and implement an emergency response procedure addressing the procedure in case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure.				

Aspect:	**Terrestrial Ecosystems**

Activity:	1. Access and hauling along roads i.e. during the construction of roads				
Impact:	**Vegetation and habitat loss** **Direct Impact:** Clearing the area to construct the access roads leads to the loss of vegetation and habitats of macro and micro organisms. Loss of vegetation, increase in runoff and erosion, possible distribution and increased establishment of alien invasive species, possible disturbance and reduction of habitat, injury or death to terrestrial fauna, possible change of natural runoff and drainage patterns causing accelerated erosion, possible loss of protected species, possible permanent loss of re-vegetation potential of soil surface, increase in dust levels, interference with fauna behavioural activities, possible exposure of fauna and flora to contaminants – especially hydrocarbons and increased dust levels				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	4	5	**50**
Post-Mitigation	4	1	2	4	**28**
Mitigation Measures:	The loss of vegetation can be ***remedied*** in the following ways: (1) Development and implementation of a rehabilitation plan. (2) Develop and implement a plant species search and rescue management plan.				
Impact:	**Influx of alien invasive vegetation** **Direct Impact:** Site clearing for roads, lay down areas, and mining area exposes the un-vegetated area to the influx of alien invasive vegetation causing Irreversible damage to the native fauna and flora species and loss of habitats.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	3	2	6	5	**55**
Post-Mitigation	2	1	4	4	**28**
Mitigation Measures:	The influx of alien invasive vegetation can be ***controlled*** in the following ways: (1) Development and implementation of an alien and invasive control plan. (2) Awareness training on the identification of weeds and alien species to employees responsible for the management of these species.				

Activity:	2. Site clearing and topsoil stripping for lay down area and all related mining infrastructure
Impact:	**Vegetation and habitat loss** **Direct Impact:** Clearing of site and stripping of topsoil leads to the loss of vegetation and habitats of macro and micro organisms. Loss of vegetation, increase in runoff and erosion, possible distribution and increased establishment of alien invasive species, possible

	disturbance and reduction of habitat, injury or death to terrestrial fauna, possible change of natural runoff and drainage patterns causing accelerated erosion, possible loss of protected species, possible permanent loss of re-vegetation potential of soil surface, increase in dust levels, interference with fauna behavioural activities, possible exposure of fauna and flora to contaminants – especially hydrocarbons and increased dust levels				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	3	1	10	5	**70**
Post-Mitigation	2	1	6	4	**36**
Mitigation Measures:	The loss of vegetation can be ***remedied*** in the following ways: (1) Development and implementation of a rehabilitation plan. (2) Develop and implement a plant species search and rescue management plan.				
Impact:	**Influx of alien invasive vegetation** **Direct Impact:** Site clearing for roads, lay down areas, and mining area exposes the un-vegetated area to the influx of alien invasive vegetation causing Irreversible damage to the native fauna and flora species and loss of habitats.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	6	5	**60**
Post-Mitigation	2	1	4	4	**28**
Mitigation Measures:	The influx of alien invasive vegetation can be ***controlled*** in the following ways: (1) Development and implementation of an alien and invasive control plan. (2) Awareness training on the identification of weeds and alien species to employees responsible for the management of these species.				

Activity:	5. Mining offices i.e. operation of training centres, offices and kitchen facilities				
Impact:	**Influx of alien invasive vegetation** **Direct Impact:** If areas remain un-vegetated, this poses the risk of alien and invasive species instating and spreading to the surrounded areas.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	6	5	**60**
Post-Mitigation	2	1	4	3	**21**
Mitigation Measures:	The influx of alien invasive vegetation can be ***controlled*** in the following ways: (1) Development and implementation of an alien and invasive control plan. (2) Awareness training on the identification of weeds and alien species to employees responsible for the management of these species.				

Activity:	6. Storm water runoff management features				
Impact:	**Vegetation and habitat loss** **Direct Impact:** Clearing of site and stripping of topsoil during the construction of storm water runoff management features poses a risk to the loss of vegetation and habitats of macro and micro organisms. Loss of vegetation, increase in runoff and erosion, possible distribution and increased establishment of alien invasive species, possible disturbance and reduction of habitat, injury or death to terrestrial fauna, possible change of natural runoff and drainage patterns causing accelerated erosion, possible loss of protected species, possible permanent loss of re-vegetation potential of soil surface, increase in dust levels, interference with fauna behavioural activities, possible exposure of fauna and flora to contaminants – especially hydrocarbons and increased dust levels **Indirect Impact:** If areas surrounding the storm water features are not rehabilitated properly or features installed are not constructed according to the storm water management model, these areas are prone to erosion.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	6	5	**60**
Post-Mitigation	2	1	4	3	**18**
Mitigation Measures:	The loss of vegetation can be ***remedied*** in the following ways: (1) Development and implementation of a rehabilitation plan. (2) Develop and implement a plant species search and rescue management plan.				

Activity:	9.Stores, workshops & wash bays				
Impact:	**Chemical Fires – Loss of ecosystems** **Direct Impact:** The improper storage of hazardous substances poses a risk of chemical fires. In the event of a chemical fire the impact to the surrounding environment is significant. Fires may lead to the loss of ecosystems, damage to properties and fatalities.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	2	1	10	5	**65**
Post-Mitigation	1	1	8	3	**30**
Mitigation Measures:	Chemical fires can be ***avoided*** n the following ways: (1) Develop and implement a Hazardous substances management plan. (2) Develop an emergency procedure addressing in particular the management of chemical fires and spill response. (3) Report and record all incidents related to chemical fires. (4) Employees must be trained on emergency response procedures required to counter the				

	nature and hazards of an accidental release. (5) Employees must be familiar with and have received the appropriate training regarding the handling and storage practices, for all containers with which they will come into contact. (6) Document the types and amounts of hazardous materials present on the project site (including for example the name and description, classification, regulatory reporting threshold, quantities, characteristics, analysis of potential consequence, identification of location, details of responsible persons, detail of availability of spill response equipment etc.). (7) The emergency response procedure should describe response activities in the event of a spill, release, or other chemical emergency and include the internal and external notification procedure, specific responsibilities of individuals or groups, decision process for assessing severity of the release, and determining appropriate actions, facility evacuation routes, and post event activities such as clean-up and disposal, incident investigation, employee re-entry, and restoration of spill response equipment. (8) Procedures should be prepared for informing the public and emergency response agencies, documenting first aid and emergency medical treatment, taking emergency response actions, reviewing and updating the emergency response plan to reflect changes, and using, inspecting, testing, and maintaining the emergency response equipment.

Activity:	11. Fuel operating power generators				
Impact:	**Chemical Fires – Loss of ecosystems** **Direct Impact:** The improper storage of hazardous substances poses a risk of chemical fires. In the event of a chemical fire the impact to the surrounding environment is significant. Fires may lead to the loss of ecosystems, damage to properties and fatalities.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	1	2	10	5	**65**
Post-Mitigation	1	1	8	2	**20**
Mitigation Measures:	Chemical fires can be ***avoided*** n the following ways: (1) Develop and implement a Hazardous substances management plan. (2) Develop an emergency procedure addressing in particular the management of chemical fires and spill response. (3) Report and record all incidents related to chemical fires. (4) Employees must be trained on emergency response procedures required to counter the nature and hazards of an accidental release. (5) Employees must be familiar with and have received the appropriate training regarding the handling and storage practices, for all containers with which they will come into contact.				

	(6) Document the types and amounts of hazardous materials present on the project site (including for example the name and description, classification, regulatory reporting threshold, quantities, characteristics, analysis of potential consequence, identification of location, details of responsible persons, detail of availability of spill response equipment etc.). (7) The emergency response procedure should describe response activities in the event of a spill, release, or other chemical emergency and include the internal and external notification procedure, specific responsibilities of individuals or groups, decision process for assessing severity of the release, and determining appropriate actions, facility evacuation routes, and post event activities such as clean-up and disposal, incident investigation, employee re-entry, and restoration of spill response equipment. (8) Procedures should be prepared for informing the public and emergency response agencies, documenting first aid and emergency medical treatment, taking emergency response actions, reviewing and updating the emergency response plan to reflect changes, and using, inspecting, testing, and maintaining the emergency response equipment.

Activity:	13. Fuel storage				
Impact:	**Chemical Fires – Loss of ecosystems** **Direct Impact:** The improper storage of hazardous substances poses a risk of chemical fires. In the event of a chemical fire the impact to the surrounding environment is significant. Fires may lead to the loss of ecosystems, damage to properties and fatalities.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	1	2	10	5	**65**
Post-Mitigation	1	1	8	2	**20**
Mitigation Measures:	Chemical fires can be ***avoided*** n the following ways: (1) Develop and implement a Hazardous substances management plan. (2) Develop an emergency procedure addressing in particular the management of chemical fires and spill response. (3) Report and record all incidents related to chemical fires. (4) Employees must be trained on emergency response procedures required to counter the nature and hazards of an accidental release. (5) Employees must be familiar with and have received the appropriate training regarding the handling and storage practices, for all containers with which they will come into contact. (6) Document the types and amounts of hazardous materials present on the project site (including for example the name and description, classification, regulatory reporting threshold, quantities, characteristics, analysis of potential consequence, identification of location, details				

	of responsible persons, detail of availability of spill response equipment etc.). (7) The emergency response procedure should describe response activities in the event of a spill, release, or other chemical emergency and include the internal and external notification procedure, specific responsibilities of individuals or groups, decision process for assessing severity of the release, and determining appropriate actions, facility evacuation routes, and post event activities such as clean-up and disposal, incident investigation, employee re-entry, and restoration of spill response equipment. (8) Procedures should be prepared for informing the public and emergency response agencies, documenting first aid and emergency medical treatment, taking emergency response actions, reviewing and updating the emergency response plan to reflect changes, and using, inspecting, testing, and maintaining the emergency response equipment.

Aspect:	**Noise Quality**

Activity:	1. Access and hauling along roads i.e. during the construction of roads				
Impact:	**Noise Generation** **Direct Impact:** Increased noise levels at potentially sensitive receptors exceeding criteria of the Noise Control Regulations legislation (NCR) and SANS guidelines; Changing ambient sound levels could change the acceptable land use capability; Changing ambient sound levels could increase annoyance and potential complaints; and Disturbing character of sound.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	1	1	6	4	**32**
Post-Mitigation	1	1	4	3	**18**
Mitigation Measures:	Noise generation can be ***controlled*** in the following ways: (1) Development and implementation of an Acoustical Measurement & Audit Programme as part of the EMS. A monitoring program to be developed based on the specialist recommendations (**Appendix F**). (2) Recording, reporting, and remediating incidents related to noise. (3) Regular inspections of vehicles/equipment/plant.				

Activity:	2. Site clearing and topsoil stripping for lay down area and all related mining infrastructure
Impact:	**Noise Generation** **Direct Impact:** The use of construction equipment during site clearing and topsoil stripping may cause noise during the construction phase. If equipment is not maintained and serviced

	regularly high levels of noise may result throughout the construction and operational phase.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	3	1	6	5	**50**
Post-Mitigation	1	1	4	3	**18**
Mitigation Measures:	Noise generation can be ***controlled*** in the following ways: (1) Development and implementation of an Acoustical Measurement & Audit Programme as part of the EMS. A monitoring program to be developed based on the specialist recommendations (**Appendix F**). (2) Recording, reporting, and remediating incidents related to noise. (3) Regular inspections of vehicles/equipment/plant.				

Activity:	5. Mining offices (construction and operation) i.e. operation of training centres, offices and kitchen facilities				
Impact:	**Noise Generation** **Direct Impact:** The use of construction equipment may cause noise during the construction phase. If equipment is not maintained and serviced regularly high levels of noise may result throughout the construction and operational phase.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	1	1	4	5	**30**
Post-Mitigation	1	1	4	3	**18**
Mitigation Measures:	Noise generation can be ***controlled*** in the following ways: (1) Development and implementation of an Acoustical Measurement & Audit Programme as part of the EMS. A monitoring program to be developed based on the specialist recommendations (**Appendix F**). (2) Recording, reporting, and remediating incidents related to noise. (3) Regular inspections of vehicles/equipment/plant.				

Activity:	9.Stores, workshops &wash bays				
Impact:	**Noise Generation** **Direct Impact:** The use of equipment may cause noise during the operation of workshops. If equipment is not maintained and serviced regularly high levels of noise may result throughout the construction and operational phase.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	1	1	4	5	**30**

Post-Mitigation	1	1	4	3	**18**
Mitigation Measures:	Noise generation can be ***controlled*** in the following ways: (1) Development and implementation of an Acoustical Measurement & Audit Programme as part of the EMS. A monitoring program to be developed based on the specialist recommendations (**Appendix F**). (2) Recording, reporting, and remediating incidents related to noise. (3) Regular inspections of vehicles/equipment/plant.				

Activity:	11. Fuel operating power generators				
Impact:	**Noise Generation** **Direct Impact:** The use of generators to produce electricity may result in noise generation if equipment is not maintained.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	1	1	4	5	**30**
Post-Mitigation	1	1	4	3	**18**
Mitigation Measures:	Noise generation can be ***controlled*** in the following ways: (1) Development and implementation of an Acoustical Measurement & Audit Programme as part of the EMS. A monitoring program to be developed based on the specialist recommendations (**Appendix F**). (2) Recording, reporting, and remediating incidents related to noise. (3) Regular inspections of vehicles/equipment/plant.				

Aspect:	**Socio-economic**

Activity:	14. Employment of workers and procurement of construction materials				
Impact:	**Loss of farm labour** **Direct Impact:** Increased demand of labour force poses a risk of the local farmers losing farm labour due to competing financial income.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	4	5	**50**
Post-Mitigation	4	2	2	4	**32**
Impact:	**Population Influx – Pressure on Resources** **Direct Impact:** Increased demand for labour force poses a risk of a population influx in the local district municipality. The increasing population will put pressure on the local municipality to provide services such as sewage, drinking water, waste management, electricity etc.				

Significance rating:	Duration	Extent	Magnitude	Probability	Significance
Pre-Mitigation	4	2	4	5	50
Post-Mitigation	4	2	2	4	32
Impact:	**Population Influx – Social Pathologies** **Direct Impact:** Increased demand for labour force poses a risk of a population influx. The increased population influx may lead to conflicting social pathologies in the surrounding local community.				
Significance rating:	Duration	Extent	Magnitude	Probability	Significance
Pre-Mitigation	4	2	4	5	50
Post-Mitigation	4	2	2	4	32
Impact:	**Job Creation and Skills Training** **Direct Impact:** As positive, local employed labour force will form part of a skills and training development programme. The proposed mining operation will create a job opportunity for at least a total of 60 people.				
Significance rating:	Duration	Extent	Magnitude	Probability	Significance
Pre-Mitigation	4	2	0	4	24
Post-Mitigation	4	2	0	4	24
Impact:	**Job Creation (Multiplier affect) and Population Influx** **Direct Impact:** Social projects forming part of the proposed mining project will create additional job opportunities for the local communities.				
Significance rating:	Duration	Extent	Magnitude	Probability	Significance
Pre-Mitigation	4	3	0	5	35
Post-Mitigation	4	2	0	4	24
Mitigation Measures:	The social-economic impacts can be ***controlled*** in the following ways: (1) Develop and implement a social labour plan. (2) Develop and implement a social development plan. (3) Develop and implement a skills development program.				

Aspect:	Heritage and cultural resources

Activity:	2. Site clearing and topsoil stripping for lay down
Impact:	**Destruction of graves** **Direct Impact:** Proposed activities in close proximity to identified graves poses the risk of destructing graves of great cultural and heritage importance.

	Indirect Impact: Loss of heritage and history for the future generation of the affected community.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	5	2	6	5	**65**
Post-Mitigation	5	2	6	3	**39**
Mitigation Measures:	The destruction of graves can be ***avoided*** in the following ways: (1) Develop and implement an awareness campaign on the protection of social heritage impacts. (2) Clear marking of graves discovered by the Heritage Impact Assessment Report (**Appendix O**)				
Impact:	**Degradation of cultural significance heritage sites** **Direct Impact:** Proposed mining activities in close proximity to cultural significant heritage sites pose the risk of degrading or loss of these sites. **Indirect Impact**: Loss of heritage and history for the future generation of the affected community.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	5	2	6	5	**65**
Post-Mitigation	5	2	6	3	**39**
Mitigation Measures:	The degradation of cultural significant heritage sites can be ***avoided*** in the following ways: (1) Develop and implement an awareness campaign on the protection of social heritage impacts. (2) Clear marking of identified heritage sites discovered by the Heritage Impact Assessment Report (**Appendix O**)				

Operational Phase	
Aspect:	**Air Quality**

Activity:	18.Topsoil and subsoil stripping & stockpiling for mining operation area				
Impact:	**Dust Generation** **Direct Impact:** Clearing of vegetation for topsoil and subsoil stripping exposes the mining operation area to dust generation. High levels of dust fallout will affect the overall air quality. The generation of dust during these activities will affect the visual environment negatively. **Indirect Impact:** Continuous exposure to high levels of dust fallout may lead to unhealthy environment for employees and surrounding communities.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	6	5	**60**
Post-Mitigation	2	1	6	3	**27**
Mitigation Measures:	Fugitive dust generation can be ***controlled*** in the following ways: (1) Development of a dust fallout monitoring and management plan; (2) Frequent Inspections; and (3) Reporting and recording incidents related to air quality. A number of recommendation resulted from the Air Quality Assessment (**Appendix E**). These recommendations are included in Part B of this report. One of the recommendations is to develop a detailed air quality management plan (focusing on sources of dust located in close proximity to the residential receptors within the project boundary) ensuring adherence to thresholds stipulated in the Baseline Air Quality Impact Assessment report (BAQIAR) (**Appendix E**) prior to the commencement of operations. There are also a number of legislative requirements stipulated in the following regulations: • GN R. 283: National reporting regulations; • GN R. 1210: National Ambient Air quality standards; and • GN R. 897: National dust control regulations.				
Impact:	**CO_2 emissions** **Direct Impact:** The use of diesel operated construction equipment will cause a contributing factor the BCR Minerals (Pty) Ltd carbon footprint.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	1	4	5	**45**
Post-Mitigation	4	1	2	4	**28**
Mitigation Measures:	CO_2 emissions and the release of noxious gasses can be ***controlled*** in the following ways: (1) Develop and maintain a carbon footprint reporting policy;				

	(2) Monitor the carbon footprint throughout the entire life cycle of the Spitsvale project; (3) Develop and implement a hazardous substance management plan; and (4) Reporting and recording incidents. A number of recommendation resulted from the Air Quality Assessment (**Appendix E)**. These recommendations are included in Part B of this report. GN R. 1651 published in terms of section 39 of the Atmospheric Pollution Prevention Act of 1965 stipulated a list of requirements in terms of regulating emissions form diesel operated vehicles/plant/equipment.

Activity:	19.Opencast mining excavations				
Impact:	**Dust Generation** **Direct Impact:** Exposed un-vegetated mining areas may lead to high levels of dust fallout and will affect the overall air quality. The generation of dust during these activities will affect the visual environment negatively. **Indirect Impact:** Continuous exposure to high levels of dust fallout may lead to unhealthy environment for employees and surrounding communities.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	6	5	**60**
Post-Mitigation	4	2	4	4	**40**
Mitigation Measures:	Fugitive dust generation can be ***controlled*** in the following ways: (1) Development of a dust fallout monitoring and management plan; (2) Frequent Inspections; and (3) Reporting and recording incidents related to air quality. A number of recommendation resulted from the Air Quality Assessment (**Appendix E**). These recommendations are included in Part B of this report. One of the recommendations is to develop a detailed air quality management plan (focusing on sources of dust located in close proximity to the residential receptors within the project boundary) ensuring adherence to thresholds stipulated in the Baseline Air Quality Impact Assessment report (BAQIAR) (**Appendix E**) prior to the commencement of operations. There are also a number of legislative requirements stipulated in the following regulations: • GN R. 283: National reporting regulations; • GN R. 1210: National Ambient Air quality standards; and • GN R. 897: National dust control regulations.				
Impact:	**CO_2 emissions** **Direct Impact:** The use of diesel operated construction equipment will cause a contributing				

	factor the BCR Minerals (Pty) Ltd carbon footprint.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	4	5	**50**
Post-Mitigation	4	1	2	4	**28**
Mitigation Measures:	CO_2 emissions and the release of noxious gasses can be ***controlled*** in the following ways: (1) Develop and maintain a carbon footprint reporting policy; (2) Monitor the carbon footprint throughout the entire life cycle of the Spitsvale project; (3) Develop and implement a hazardous substance management plan; and (4) Reporting and recording incidents. A number of recommendation resulted from the Air Quality Assessment (**Appendix E**). These recommendations are included in Part B of this report. GN R. 1651 published in terms of section 39 of the Atmospheric Pollution Prevention Act of 1965 stipulated a list of requirements in terms of regulating emissions form diesel operated vehicles/plant/equipment.				

Activity:	20.Drilling & Blasting				
Impact:	**Dust Generation** **Direct Impact:** Dust being generated form drilling and blasting activities poses the risk of affecting the ambient air quality. This also affects the visual environment. **Indirect Impact:** Continuous exposure to high levels of dust fallout may lead to unhealthy environment for employees and surrounding communities.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	3	2	6	5	**55**
Post-Mitigation	4	1	4	4	**36**
Mitigation Measures:	Fugitive dust generation can be ***controlled*** in the following ways: (1) Development of a dust fallout monitoring and management plan; (2) Frequent Inspections; and (3) Reporting and recording incidents related to air quality. A number of recommendation resulted from the Air Quality Assessment (**Appendix E**). These recommendations are included in Part B of this report. One of the recommendations is to develop a detailed air quality management plan (focusing on sources of dust located in close proximity to the residential receptors within the project boundary) ensuring adherence to thresholds stipulated in the Baseline Air Quality Impact Assessment report (BAQIAR) (**Appendix E**.) prior to the commencement of operations. There are also a number of legislative requirements stipulated in the following regulations:				

	• GN R. 283: National reporting regulations; • GN R. 1210: National Ambient Air quality standards; and • GN R. 897: National dust control regulations.

Activity:	22. RoM & product stockpiling				
Impact:	**Dust Generation** **Direct Impact:** Continuous use of haul road often leads to the generation of fugitive dust comprising TSP, PM10 and PM2.5 from the dirt roads. Stockpiled RoM and product are continuously exposed to weathering leading the generation of fine dust particles. The generation of dust during these activities will affect the visual environment negatively. **Indirect Impact:** Continuous exposure to high levels of dust fallout may lead to unhealthy environment for employees and surrounding communities.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	6	5	**60**
Post-Mitigation	4	1	4	4	**36**
Mitigation Measures:	Fugitive dust generation can be ***controlled*** in the following ways: (1) Development of a dust fallout monitoring and management plan; (2) Frequent Inspections; and (3) Reporting and recording incidents related to air quality. A number of recommendation resulted from the Air Quality Assessment (**Appendix E**). These recommendations are included in Part B of this report. One of the recommendations is to develop a detailed air quality management plan (focusing on sources of dust located in close proximity to the residential receptors within the project boundary) ensuring adherence to thresholds stipulated in the Baseline Air Quality Impact Assessment report (BAQIAR) (**Appendix E**) prior to the commencement of operations. There are also a number of legislative requirements stipulated in the following regulations: • GN R. 283: National reporting regulations; • GN R. 1210: National Ambient Air quality standards; and • GN R. 897: National dust control regulations.				
Impact:	**CO_2 emissions** **Direct Impact:** The use of diesel operated construction equipment will cause a contributing factor the BCR Minerals (Pty) Ltd carbon footprint.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	4	5	**50**
Post-Mitigation	4	1	2	4	**28**

Mitigation Measures:	CO_2 emissions and the release of noxious gasses can be ***controlled*** in the following ways: (1) Develop and maintain a carbon footprint reporting policy; (2) Monitor the carbon footprint throughout the entire life cycle of the Spitsvale project; (3) Develop and implement a hazardous substance management plan; and (4) Reporting and recording incidents. A number of recommendation resulted from the Air Quality Assessment (**Appendix E**). These recommendations are included in Part B of this report. GN R. 1651 published in terms of section 39 of the Atmospheric Pollution Prevention Act of 1965 stipulated a list of requirements in terms of regulating emissions form diesel operated vehicles/plant/equipment.

Activity:	23. Residue stockpiles				
Impact:	**Dust Generation** **Direct Impact:** Continuous use of haul roads often leads to the generation of fugitive dust comprising TSP, PM10 and PM2.5 from the dirt roads. Stockpiled residue is continuously exposed to weathering leading the generation of fine dust particles. The generation of dust during these activities will affect the visual environment negatively. **Indirect Impact:** Continuous exposure to high levels of dust fallout may lead to unhealthy environment for employees and surrounding communities.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	6	5	**60**
Post-Mitigation	4	1	4	4	**36**
Mitigation Measures:	Fugitive dust generation can be ***controlled*** in the following ways: (1) Development of a dust fallout monitoring and management plan; (2) Frequent Inspections; and (3) Reporting and recording incidents related to air quality. A number of recommendation resulted from the Air Quality Assessment (**Appendix E**). These recommendations are included in Part B of this report. One of the recommendations is to develop a detailed air quality management plan (focusing on sources of dust located in close proximity to the residential receptors within the project boundary) ensuring adherence to thresholds stipulated in the Baseline Air Quality Impact Assessment report (BAQIAR) (**Appendix E**) prior to the commencement of operations. There are also a number of legislative requirements stipulated in the following regulations: • GN R. 283: National reporting regulations; • GN R. 1210: National Ambient Air quality standards; and				

	• GN R. 897: National dust control regulations.

Activity:	24. Screening Operations				
Impact:	**Dust Generation** **Direct Impact:** Screening operations poses a high risk to the generation of fugitive dust comprising TSP, PM10 and PM2.5. The generation of dust during these activities affects the visual environment negatively.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	6	5	**60**
Post-Mitigation	4	1	6	4	**44**
Mitigation Measures:	Fugitive dust generation can be ***controlled*** in the following ways: (1) Development of a dust fallout monitoring and management plan; (2) Frequent Inspections; and (3) Reporting and recording incidents related to air quality. A number of recommendation resulted from the Air Quality Assessment (**Appendix E**). These recommendations are included in Part B of this report. One of the recommendations is to develop a detailed air quality management plan (focusing on sources of dust located in close proximity to the residential receptors within the project boundary) ensuring adherence to thresholds stipulated in the Baseline Air Quality Impact Assessment report (BAQIAR) (**Appendix E)** prior to the commencement of operations. There are also a number of legislative requirements stipulated in the following regulations: • GN R. 283: National reporting regulations; • GN R. 1210: National Ambient Air quality standards; and • GN R. 897: National dust control regulations.				
Impact:	**CO_2 emissions** **Direct Impact:** The use of diesel operated construction equipment will cause a contributing factor the BCR Minerals (Pty) Ltd carbon footprint.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	4	5	**50**
Post-Mitigation	4	1	2	4	**28**
Mitigation Measures:	CO_2 emissions and the release of noxious gasses can be ***controlled*** in the following ways: (1) Develop and maintain a carbon footprint reporting policy; (2) Monitor the carbon footprint throughout the entire life cycle of the Spitsvale project; (3) Develop and implement a hazardous substance management plan; and (4) Reporting and recording incidents.				

	A number of recommendation resulted from the Air Quality Assessment (**Appendix E**). These recommendations are included in Part B of this report. GN R. 1651 published in terms of section 39 of the Atmospheric Pollution Prevention Act of 1965 stipulated a list of requirements in terms of regulating emissions form diesel operated vehicles/plant/equipment.

Activity:	25. Discard disposal (backfilling of mining area)				
Impact:	**Dust Generation** **Direct Impact:** Continuous use of haul roads and backfilling of material often leads to the generation of fugitive dust comprising TSP, PM10 and PM2.5 from the dirt roads. Un-vegetated area is continuously exposed to weathering leading the generation of fine dust particles. Backfilling of material in windy conditions also contribute to dust generation. The generation of dust during these activities will affect the visual environment negatively. **Indirect Impact:** Continuous exposure to high levels of dust fallout may lead to unhealthy environment for employees and surrounding communities.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	2	2	6	5	**50**
Post-Mitigation	1	1	6	4	**40**
Mitigation Measures:	Fugitive dust generation can be ***controlled*** in the following ways: (1) Development of a dust fallout monitoring and management plan; (2) Frequent Inspections; and (3) Reporting and recording incidents related to air quality. A number of recommendation resulted from the Air Quality Assessment (**Appendix E**). These recommendations are included in Part B of this report. One of the recommendations is to develop a detailed air quality management plan (focusing on sources of dust located in close proximity to the residential receptors within the project boundary) ensuring adherence to thresholds stipulated in the Baseline Air Quality Impact Assessment report (BAQIAR) (**Appendix E**) prior to the commencement of operations. There are also a number of legislative requirements stipulated in the following regulations: • GN R. 283: National reporting regulations; • GN R. 1210: National Ambient Air quality standards; and • GN R. 897: National dust control regulations.				

Activity:	31. Vehicular activity on haul roads; and operation of mining equipment				
Impact:	**Dust Generation** **Direct Impact:** Continuous use of haul road often leads to the generation of fugitive dust comprising TSP, PM10 and PM2.5 from the dirt roads. The generation of dust during these activities will affect the visual environment negatively. **Indirect Impact:** Continuous exposure to high levels of dust fallout may lead to unhealthy environment for employees and surrounding communities.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	6	5	**60**
Post-Mitigation	4	1	4	4	**45**
Mitigation Measures:	Fugitive dust generation can be ***controlled*** in the following ways: (1) Development of a dust fallout monitoring and management plan; (2) Frequent Inspections; and (3) Reporting and recording incidents related to air quality. A number of recommendation resulted from the Air Quality Assessment (**Appendix E**). These recommendations are included in Part B of this report. One of the recommendations is to develop a detailed air quality management plan (focusing on sources of dust located in close proximity to the residential receptors within the project boundary) ensuring adherence to thresholds stipulated in the Baseline Air Quality Impact Assessment report (BAQIAR) (**Appendix E**) prior to the commencement of operations. There are also a number of legislative requirements stipulated in the following regulations: • GN R. 283: National reporting regulations; • GN R. 1210: National Ambient Air quality standards; and • GN R. 897: National dust control regulations.				
Impact:	**CO_2 emissions** **Direct Impact:** The use of diesel operated construction equipment will cause a contributing factor the BCR Minerals (Pty) Ltd carbon footprint.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	4	5	**50**
Post-Mitigation	4	1	2	4	**28**
Mitigation Measures:	CO_2 emissions and the release of noxious gasses can be ***controlled*** in the following ways: (1) Develop and maintain a carbon footprint reporting policy; (2) Monitor the carbon footprint throughout the entire life cycle of the Spitsvale project; (3) Develop and implement a hazardous substance management plan; and (4) Reporting and recording incidents.				

	A number of recommendation resulted from the Air Quality Assessment (**Appendix E**). These recommendations are included in Part B of this report. GN R. 1651 published in terms of section 39 of the Atmospheric Pollution Prevention Act of 1965 stipulated a list of requirements in terms of regulating emissions form diesel operated vehicles/plant/equipment.

Activity:	32. Bulk transporting of Ore to market on Public roads				
Impact:	**Dust Generation** **Direct Impact:** The use of public roads without covering loads with tarpaulin may result in fly rock generating dust and causing damages to other road users. **Indirect Impact:** Continuous exposure to high levels of dust fallout may lead to unhealthy environment for employees and surrounding communities.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	3	4	5	**55**
Post-Mitigation	4	1	4	3	**27**
Mitigation Measures:	Fugitive dust generation can be ***controlled*** in the following ways: (1) Development of a dust fallout monitoring and management plan; (2) Frequent Inspections; and (3) Reporting and recording incidents related to air quality. A number of recommendation resulted from the Air Quality Assessment (**Appendix E**). These recommendations are included in Part B of this report. One of the recommendations is to develop a detailed air quality management plan (focusing on sources of dust located in close proximity to the residential receptors within the project boundary) ensuring adherence to thresholds stipulated in the Baseline Air Quality Impact Assessment report (BAQIAR) (**Appendix E**) prior to the commencement of operations. There are also a number of legislative requirements stipulated in the following regulations: • GN R. 283: National reporting regulations; • GN R. 1210: National Ambient Air quality standards; and • GN R. 897: National dust control regulations.				
Impact:	**CO_2 emissions** **Direct Impact:** The use of diesel operated construction equipment will cause a contributing factor the BCR Minerals (Pty) Ltd carbon footprint.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	3	4	5	**55**
Post-Mitigation	4	1	2	4	**28**

Mitigation Measures:	CO_2 emissions and the release of noxious gasses can be ***controlled*** in the following ways: (1) Develop and maintain a carbon footprint reporting policy; (2) Monitor the carbon footprint throughout the entire life cycle of the Spitsvale project; (3) Develop and implement a hazardous substance management plan; and (4) Reporting and recording incidents. A number of recommendation resulted from the Air Quality Assessment (**Appendix E**). These recommendations are included in Part B of this report. GN R. 1651 published in terms of section 39 of the Atmospheric Pollution Prevention Act of 1965 stipulated a list of requirements in terms of regulating emissions form diesel operated vehicles/plant/equipment.

Aspect:	**Human Health and Safety**

Activity:	17. Employment of workers				
Impact:	**Health and Safety of employees** **Direct Impact:** Increased demand for labour and employees from different cultures may pose the risk to the lack of knowledge and skills on health and safety in the work place. Different human behaviours deals with different situations and if there is not a simplified system of managing health and safety risk, situations resulting loss or injury of human life may be a end result.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	1	6	5	**55**
Post-Mitigation	4	1	6	3	**33**
Mitigation Measures:	The health and safety of employees can be ***controlled*** in the following ways: (1) Develop and implement a Health and Safety plan. (2) All employees to be trained in health and safety in the work place. (3) Develop and implement an employee training program. (4) Keep and maintain a record of all training of employees.				

Activity:	19.Opencast mining excavations
Impact:	**Dust Generation** **Direct Impact:** Exposed un-vegetated mining areas may lead to high levels of dust fallout and will affect the overall air quality. The generation of dust during these activities will affect the visual environment negatively. **Indirect Impact:** Continuous exposure to high levels of dust fallout may lead to unhealthy

	environment for employees and surrounding communities.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	1	6	5	**55**
Post-Mitigation	4	1	4	4	**36**
Mitigation Measures:	Fugitive dust generation can be ***controlled*** in the following ways: (1) Development of a dust fallout monitoring and management plan; (2) Frequent Inspections; and (3) Reporting and recording incidents related to air quality. A number of recommendation resulted from the Air Quality Assessment (**Appendix E**). These recommendations are included in Part B of this report. One of the recommendations is to develop a detailed air quality management plan (focusing on sources of dust located in close proximity to the residential receptors within the project boundary) ensuring adherence to thresholds stipulated in the Baseline Air Quality Impact Assessment report (BAQIAR) (**Appendix E**) prior to the commencement of operations. There are also a number of legislative requirements stipulated in the following regulations: • GN R. 283: National reporting regulations; • GN R. 1210: National Ambient Air quality standards; and GN R. 897: National dust control regulations.				

Activity:	20.Drilling & Blasting				
Impact:	**Dust Generation** **Direct Impact:** Dust being generated form drilling and blasting activities poses the risk of affecting the ambient air quality. This also affects the visual environment. **Indirect Impact:** Continuous exposure to high levels of dust fallout may lead to unhealthy environment for employees and surrounding communities.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	3	2	6	5	**55**
Post-Mitigation	3	1	4	4	**32**
Mitigation Measures:	Fugitive dust generation can be ***controlled*** in the following ways: (1) Development of a dust fallout monitoring and management plan; (2) Frequent Inspections; and (3) Reporting and recording incidents related to air quality. A number of recommendation resulted from the Air Quality Assessment (**Appendix E**). These recommendations are included in Part B of this report. One of the recommendations is to develop a detailed air quality management plan (focusing on sources of dust located in close				

	proximity to the residential receptors within the project boundary) ensuring adherence to thresholds stipulated in the Baseline Air Quality Impact Assessment report (BAQIAR) (**Appendix E**) prior to the commencement of operations. There are also a number of legislative requirements stipulated in the following regulations: • GN R. 283: National reporting regulations; • GN R. 1210: National Ambient Air quality standards; and GN R. 897: National dust control regulations.
Impact:	**Damage to surrounding landowner properties** **Direct Impact:** Blasting outside the safe zones or in areas within close proximity to properties of landowner's poses a risk of damaging properties. Fly rock poses a human health and safety risk.

Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	6	5	**60**
Post-Mitigation	4	2	6	3	**36**

Mitigation Measures:	Damages to surrounding landowners properties and personnel can be ***avoided*** in the following ways: (1) Develop and implement a Drilling and Blasting procedure. (2) Develop and implement a drilling and blasting monitoring plan. (3) Pre and post inspections of possible affected properties. (4) Record keeping of all drilling and blasting activities, clearly indicating time and date of blast.

Activity:	22. RoM & product stockpiling
Impact:	**Dust Generation** **Direct Impact:** Continuous use of haul road often leads to the generation of fugitive dust comprising TSP, PM10 and PM2.5 from the dirt roads. Stockpiled RoM and product are continuously exposed to weathering leading the generation of fine dust particles. The generation of dust during these activities will affect the visual environment negatively. **Indirect Impact:** Continuous exposure to high levels of dust fallout may lead to unhealthy environment for employees and surrounding communities.

Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	4	1	6	4	**44**

Mitigation Measures:	Fugitive dust generation can be ***controlled*** in the following ways: (1) Development of a dust fallout monitoring and management plan; (2) Frequent Inspections; and

	(3) Reporting and recording incidents related to air quality. A number of recommendation resulted from the Air Quality Assessment (**Appendix E**). These recommendations are included in Part B of this report. One of the recommendations is to develop a detailed air quality management plan (focusing on sources of dust located in close proximity to the residential receptors within the project boundary) ensuring adherence to thresholds stipulated in the Baseline Air Quality Impact Assessment report (BAQIAR) (**Appendix E**.) prior to the commencement of operations. There are also a number of legislative requirements stipulated in the following regulations: • GN R. 283: National reporting regulations; • GN R. 1210: National Ambient Air quality standards; and • GN R. 897: National dust control regulations.

Activity:	23. Residue stockpiles				
Impact:	**Dust Generation** **Direct Impact:** Continuous use of haul roads often leads to the generation of fugitive dust comprising TSP, PM10 and PM2.5 from the dirt roads. Stockpiled residue is continuously exposed to weathering leading the generation of fine dust particles. The generation of dust during these activities will affect the visual environment negatively. **Indirect Impact:** Continuous exposure to high levels of dust fallout may lead to unhealthy environment for employees and surrounding communities.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	4	1	4	4	**36**
Mitigation Measures:	Fugitive dust generation can be ***controlled*** in the following ways: (1) Development of a dust fallout monitoring and management plan; (2) Frequent Inspections; and (3) Reporting and recording incidents related to air quality. A number of recommendation resulted from the Air Quality Assessment (**Appendix E**). These recommendations are included in Part B of this report. One of the recommendations is to develop a detailed air quality management plan (focusing on sources of dust located in close proximity to the residential receptors within the project boundary) ensuring adherence to thresholds stipulated in the Baseline Air Quality Impact Assessment report (BAQIAR) (**Appendix E**.) prior to the commencement of operations. There are also a number of legislative requirements stipulated in the following regulations: • GN R. 283: National reporting regulations;				

	• GN R. 1210: National Ambient Air quality standards; and • GN R. 897: National dust control regulations.

Activity:	24. Screening Operations				
Impact:	**Dust Generation** **Direct Impact:** Screening operations poses a high risk to the generation of fugitive dust comprising TSP, PM10 and PM2.5. The generation of dust during these activities affects the visual environment negatively.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	4	1	4	4	**36**
Mitigation Measures:	Fugitive dust generation can be ***controlled*** in the following ways: (1) Development of a dust fallout monitoring and management plan; (2) Frequent Inspections; and (3) Reporting and recording incidents related to air quality. A number of recommendation resulted from the Air Quality Assessment (**Appendix E**). These recommendations are included in Part B of this report. One of the recommendations is to develop a detailed air quality management plan (focusing on sources of dust located in close proximity to the residential receptors within the project boundary) ensuring adherence to thresholds stipulated in the Baseline Air Quality Impact Assessment report (BAQIAR) (**Appendix E**.) prior to the commencement of operations. There are also a number of legislative requirements stipulated in the following regulations: • GN R. 283: National reporting regulations; • GN R. 1210: National Ambient Air quality standards; and • GN R. 897: National dust control regulations.				

Activity:	25. Discard disposal (backfilling of mining area)
Impact:	**Dust Generation** **Direct Impact:** Continuous use of haul roads and backfilling of material often leads to the generation of fugitive dust comprising TSP, PM10 and PM2.5 from the dirt roads. Un-vegetated areas are continuously exposed to weathering leading the generation of fine dust particles. Backfilling of material in windy conditions also contribute to dust generation. The generation of dust during these activities will affect the visual environment negatively. **Indirect Impact:** Continuous exposure to high levels of dust fallout may lead to unhealthy environment for employees and surrounding communities.

Significance rating:	Duration	Extent	Magnitude	Probability	Significance
Pre-Mitigation	3	2	8	5	**65**
Post-Mitigation	1	1	4	4	**24**
Mitigation Measures:	Fugitive dust generation can be ***controlled*** in the following ways: (1) Development of a dust fallout monitoring and management plan; (2) Frequent Inspections; and (3) Reporting and recording incidents related to air quality. A number of recommendation resulted from the Air Quality Assessment (**Appendix E**). These recommendations are included in Part B of this report. One of the recommendations is to develop a detailed air quality management plan (focusing on sources of dust located in close proximity to the residential receptors within the project boundary) ensuring adherence to thresholds stipulated in the Baseline Air Quality Impact Assessment report (BAQIAR) (**Appendix E**.) prior to the commencement of operations. There are also a number of legislative requirements stipulated in the following regulations: • GN R. 283: National reporting regulations; • GN R. 1210: National Ambient Air quality standards; and • GN R. 897: National dust control regulations.				

Activity:	26. Waste generation, storage and disposal				
Impact:	**Illegal dumping** **Direct Impact:** Dumping of generated water in areas other than is approved by the authorisation or EMP poses a high risk of polluting numerous sources i.e. Water and soil. The dumping of general waste poses a choking risk to grazing animals. Hazardous Leachates from illegal dumps also poses a risk to the health of surrounding communities. **Indirect Impact:** The hazardous leachate from the waste storage facilities poses a risk of contaminating both surface and sub-surface water as well as soil resources. This may lead to the degradation of conditions for the aquatic ecology to thrive.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	4	1	4	3	**27**
Mitigation Measures:	Illegal dumping can be ***avoided*** in the following ways: (1) Develop and implement as waste management plan with the focus on reuse, reduce, recycle, or avoid. (2) Development and maintenance of a waste disposal record keeping system.				

Activity:	27. Chemical Toilets				
Impact:	**Smell nuisance** **Direct Impact:** Lack of maintenance and treatment may result in a smelling environment.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	1	1	6	5	**40**
Post-Mitigation	1	1	4	4	**24**
Mitigation Measures:	The generation of smell from the PCD's can be ***avoided*** in the following ways: (1) Develop and maintain an Integrated Waste and Water Management Plan (IWWMP). (2) Frequent inspections of areas posing a possible risk of causing smell nuisance. (3) Development and implementation of an incident response plan.				

Activity:	31. Vehicular activity on haul roads; and operation of mining equipment				
Impact:	**Dust Generation** **Direct Impact:** Continuous use of haul road often leads to the generation of fugitive dust comprising TSP, PM10 and PM2.5 from the dirt roads. The generation of dust during these activities will affect the visual environment negatively. **Indirect Impact:** Continuous exposure to high levels of dust fallout may lead to unhealthy environment for employees and surrounding communities.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	6	5	**60**
Post-Mitigation	4	1	4	4	**36**
Mitigation Measures:	Fugitive dust generation can be ***controlled*** in the following ways: (1) Development of a dust fallout monitoring and management plan; (2) Frequent Inspections; and (3) Reporting and recording incidents related to air quality. A number of recommendation resulted from the Air Quality Assessment (**Appendix E**). These recommendations are included in Part B of this report. One of the recommendations is to develop a detailed air quality management plan (focusing on sources of dust located in close proximity to the residential receptors within the project boundary) ensuring adherence to thresholds stipulated in the Baseline Air Quality Impact Assessment report (BAQIAR) (**Appendix E**.) prior to the commencement of operations. There are also a number of legislative requirements stipulated in the following regulations: • GN R. 283: National reporting regulations; • GN R. 1210: National Ambient Air quality standards; and • GN R. 897: National dust control regulations.				

Activity:	32. Bulk transporting of Ore to market on Public roads				
Impact:	**Dust Generation** **Direct Impact:** The use of public roads without covering loads with tarpaulin may result in fly rock generating dust and causing damages to other road users. **Indirect Impact:** Continuous exposure to high levels of dust fallout may lead to unhealthy environment for employees and surrounding communities.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	3	8	5	**75**
Post-Mitigation	4	1	4	3	**27**
Mitigation Measures:	Fugitive dust generation can be ***controlled*** in the following ways: (1) Development of a dust fallout monitoring and management plan; (2) Frequent Inspections; and (3) Reporting and recording incidents related to air quality. A number of recommendation resulted from the Air Quality Assessment (**Appendix E**). These recommendations are included in Part B of this report. One of the recommendations is to develop a detailed air quality management plan (focusing on sources of dust located in close proximity to the residential receptors within the project boundary) ensuring adherence to thresholds stipulated in the Baseline Air Quality Impact Assessment report (BAQIAR) (**Appendix E**.) prior to the commencement of operations. There are also a number of legislative requirements stipulated in the following regulations: • GN R. 283: National reporting regulations; • GN R. 1210: National Ambient Air quality standards; and • GN R. 897: National dust control regulations.				

Aspect:	**Topography and Visual Environment**

Activity:	18.Topsoil and subsoil stripping & stockpiling for mining operation area				
Impact:	**Dust generation** **Direct Impact:** Clearing of vegetation for topsoil and subsoil stripping exposes the mining operation area to dust generation. High levels of dust fallout will affect the overall air quality. The generation of dust during these activities will affect the visual environment negatively. **Indirect Impact:** Continuous exposure to high levels of dust fallout may lead to unhealthy environment for employees and surrounding communities.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	4	5	**50**

Post-Mitigation	2	1	4	3	**21**
Mitigation Measures:	Fugitive dust generation can be ***controlled*** in the following ways: (1) Development of a dust fallout monitoring and management plan; (2) Frequent Inspections; and (3) Reporting and recording incidents related to air quality. A number of recommendation resulted from the Air Quality Assessment (**Appendix E**). These recommendations are included in Part B of this report. One of the recommendations is to develop a detailed air quality management plan (focusing on sources of dust located in close proximity to the residential receptors within the project boundary) ensuring adherence to thresholds stipulated in the Baseline Air Quality Impact Assessment report (BAQIAR) (**Appendix E**.) prior to the commencement of operations. There are also a number of legislative requirements stipulated in the following regulations: • GN R. 283: National reporting regulations; • GN R. 1210: National Ambient Air quality standards; and • GN R. 897: National dust control regulations.				
Impact:	**Alteration of the visual environment and topography** **Direct Impact:** Topsoil and subsoil stripping will alter the topography and visual environment throughout the mining operation.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	4	5	**50**
Post-Mitigation	4	1	4	4	**36**
Mitigation Measures:	The affects of altering the topography caused by vegetation clearance and topsoil stripping can be ***remedied*** in the following ways: (1) Record keeping of the topography and environmental state before the commencement of any activities. (2) Development of rehabilitation plan.				

Activity:	19.Opencast mining excavations				
Impact:	**Dust generation** **Direct Impact:** Exposed un-vegetated mining areas may lead to high levels of dust fallout and will affect the overall air quality. The generation of dust during these activities will affect the visual environment negatively. **Indirect Impact:** Continuous exposure to high levels of dust fallout may lead to unhealthy environment for employees and surrounding communities.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**

Pre-Mitigation	4	2	6	5	**60**
Post-Mitigation	4	2	4	4	**40**
Mitigation Measures:	Fugitive dust generation can be ***controlled*** in the following ways: (1) Development of a dust fallout monitoring and management plan; (2) Frequent Inspections; and (3) Reporting and recording incidents related to air quality. A number of recommendation resulted from the Air Quality Assessment (**Appendix E**). These recommendations are included in Part B of this report. One of the recommendations is to develop a detailed air quality management plan (focusing on sources of dust located in close proximity to the residential receptors within the project boundary) ensuring adherence to thresholds stipulated in the Baseline Air Quality Impact Assessment report (BAQIAR) (**Appendix E**.) prior to the commencement of operations. There are also a number of legislative requirements stipulated in the following regulations: • GN R. 283: National reporting regulations; • GN R. 1210: National Ambient Air quality standards; and • GN R. 897: National dust control regulations.				
Impact:	**Alteration of the visual environment and topography** **Direct Impact:** Open cast mining will alter the topography and visual environment throughout the mining operation in a significant way.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	10	5	**80**
Post-Mitigation	4	1	6	5	**55**
Mitigation Measures:	The affects of altering the topography caused by vegetation clearance and topsoil stripping can be ***remedied*** in the following ways: (1) Record keeping of the topography and environmental state before the commencement of any activities. (2) Development of rehabilitation plan.				

Activity:	20.Drilling & Blasting				
Impact:	**Dust generation** **Direct Impact**: Dust being generated form drilling and blasting activities poses the risk of affecting the ambient air quality. This also affects the visual environment. **Indirect Impact:** Continuous exposure to high levels of dust fallout may lead to unhealthy environment for employees and surrounding communities.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**

Pre-Mitigation	3	2	4	5	**45**
Post-Mitigation	3	1	4	4	**32**
Mitigation Measures:	Fugitive dust generation can be ***controlled*** in the following ways: (1) Development of a dust fallout monitoring and management plan; (2) Frequent Inspections; and (3) Reporting and recording incidents related to air quality. A number of recommendation resulted from the Air Quality Assessment (**Appendix E**). These recommendations are included in Part B of this report. One of the recommendations is to develop a detailed air quality management plan (focusing on sources of dust located in close proximity to the residential receptors within the project boundary) ensuring adherence to thresholds stipulated in the Baseline Air Quality Impact Assessment report (BAQIAR) (**Appendix E**.) prior to the commencement of operations. There are also a number of legislative requirements stipulated in the following regulations: • GN R. 283: National reporting regulations; • GN R. 1210: National Ambient Air quality standards; and • GN R. 897: National dust control regulations.				

Activity:	22. RoM & product stockpiling				
Impact:	**Dust generation** **Direct Impact:** Continuous use of haul road often leads to the generation of fugitive dust comprising TSP, PM10 and PM2.5 from the dirt roads. Stockpiled RoM and product are continuously exposed to weathering leading the generation of fine dust particles. The generation of dust during these activities will affect the visual environment negatively**.** **Indirect Impact:** Continuous exposure to high levels of dust fallout may lead to unhealthy environment for employees and surrounding communities.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	6	5	**60**
Post-Mitigation	4	1	4	4	**36**
Mitigation Measures:	Fugitive dust generation can be ***controlled*** in the following ways: (1) Development of a dust fallout monitoring and management plan; (2) Frequent Inspections; and (3) Reporting and recording incidents related to air quality. A number of recommendation resulted from the Air Quality Assessment (**Appendix E**). These recommendations are included in Part B of this report. One of the recommendations is to develop a detailed air quality management plan (focusing on sources of dust located in close				

	proximity to the residential receptors within the project boundary) ensuring adherence to thresholds stipulated in the Baseline Air Quality Impact Assessment report (BAQIAR) (**Appendix E**.) prior to the commencement of operations. There are also a number of legislative requirements stipulated in the following regulations: • GN R. 283: National reporting regulations; • GN R. 1210: National Ambient Air quality standards; and • GN R. 897: National dust control regulations.				
Impact:	**Alteration of the visual environment and topography** **Direct Impact:** Stockpiles of RoM and product material over an extended time potentially alters the topography and visual environment.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	10	5	**80**
Post-Mitigation	4	1	6	5	**55**
Mitigation Measures:	The affects of altering the topography caused by vegetation clearance and topsoil stripping can be ***remedied*** in the following ways: (1) Record keeping of the topography and environmental state before the commencement of any activities. (2) Development of rehabilitation plan.				

Activity:	23. Residue stockpiles				
Impact:	**Dust generation** **Direct Impact:** Continuous use of haul roads often leads to the generation of fugitive dust comprising TSP, PM10 and PM2.5 from the dirt roads. Stockpiled residue is continuously exposed to weathering leading the generation of fine dust particles. The generation of dust during these activities will affect the visual environment negatively. **Indirect Impact:** Continuous exposure to high levels of dust fallout may lead to unhealthy environment for employees and surrounding communities.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	6	5	**60**
Post-Mitigation	4	1	4	4	**36**
Mitigation Measures:	Fugitive dust generation can be ***controlled*** in the following ways: (1) Development of a dust fallout monitoring and management plan; (2) Frequent Inspections; and (3) Reporting and recording incidents related to air quality. A number of recommendation resulted from the Air Quality Assessment (**Appendix E**). These				

	recommendations are included in Part B of this report. One of the recommendations is to develop a detailed air quality management plan (focusing on sources of dust located in close proximity to the residential receptors within the project boundary) ensuring adherence to thresholds stipulated in the Baseline Air Quality Impact Assessment report (BAQIAR) (**Appendix E**.) prior to the commencement of operations. There are also a number of legislative requirements stipulated in the following regulations: • GN R. 283: National reporting regulations; • GN R. 1210: National Ambient Air quality standards; and • GN R. 897: National dust control regulations.
Impact:	**Alteration of the visual environment and topography** **Direct Impact:** Stockpiles of residue material over an extended time potentially alters the topography and visual environment.

Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	10	5	**80**
Post-Mitigation	4	1	6	5	**55**

Mitigation Measures:	The affects of altering the topography caused by vegetation clearance and topsoil stripping can be ***remedied*** in the following ways: (1) Record keeping of the topography and environmental state before the commencement of any activities. (2) Development of rehabilitation plan.

Activity:	24. Screening Operations
Impact:	**Dust generation** **Direct Impact:** Screening operations poses a high risk to the generation of fugitive dust comprising TSP, PM10 and PM2.5. The generation of dust during these activities affects the visual environment negatively.

Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	6	5	**60**
Post-Mitigation	4	1	4	4	**36**

Mitigation Measures:	Fugitive dust generation can be ***controlled*** in the following ways: (1) Development of a dust fallout monitoring and management plan; (2) Frequent Inspections; and (3) Reporting and recording incidents related to air quality. A number of recommendation resulted from the Air Quality Assessment (**Appendix E**). These recommendations are included in Part B of this report. One of the recommendations is to

	develop a detailed air quality management plan (focusing on sources of dust located in close proximity to the residential receptors within the project boundary) ensuring adherence to thresholds stipulated in the Baseline Air Quality Impact Assessment report (BAQIAR) (**Appendix E**.) prior to the commencement of operations. There are also a number of legislative requirements stipulated in the following regulations: • GN R. 283: National reporting regulations; • GN R. 1210: National Ambient Air quality standards; and • GN R. 897: National dust control regulations.

Activity:	25. Discard disposal (backfilling of mining area)				
Impact:	**Dust generation** **Direct Impact:** Continuous use of haul roads and backfilling of material often leads to the generation of fugitive dust comprising TSP, PM10 and PM2.5 from the dirt roads. Un-vegetated areas are continuously exposed to weathering leading the generation of fine dust particles. Backfilling of material in windy conditions also contribute to dust generation. The generation of dust during these activities will affect the visual environment negatively. **Indirect Impact**: Continuous exposure to high levels of dust fallout may lead to unhealthy environment for employees and surrounding communities.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	5	2	6	5	**65**
Post-Mitigation	1	1	4	4	**24**
Mitigation Measures:	Fugitive dust generation can be ***controlled*** in the following ways: (1) Development of a dust fallout monitoring and management plan; (2) Frequent Inspections; and (3) Reporting and recording incidents related to air quality. A number of recommendation resulted from the Air Quality Assessment (**Appendix E**). These recommendations are included in Part B of this report. One of the recommendations is to develop a detailed air quality management plan (focusing on sources of dust located in close proximity to the residential receptors within the project boundary) ensuring adherence to thresholds stipulated in the Baseline Air Quality Impact Assessment report (BAQIAR) (**Appendix E**.) prior to the commencement of operations. There are also a number of legislative requirements stipulated in the following regulations: • GN R. 283: National reporting regulations; • GN R. 1210: National Ambient Air quality standards; and • GN R. 897: National dust control regulations.				

Activity:	31. Vehicular activity on haul roads; and operation				
Impact:	**Dust generation** **Direct Impact:** Continuous use of haul road often leads to the generation of fugitive dust comprising TSP, PM10 and PM2.5 from the dirt roads. The generation of dust during these activities will affect the visual environment negatively. **Indirect Impact:** Continuous exposure to high levels of dust fallout may lead to unhealthy environment for employees and surrounding communities.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	6	5	**60**
Post-Mitigation	4	1	4	5	**45**
Mitigation Measures:	Fugitive dust generation can be ***controlled*** in the following ways: (1) Development of a dust fallout monitoring and management plan; (2) Frequent Inspections; and (3) Reporting and recording incidents related to air quality. A number of recommendation resulted from the Air Quality Assessment (**Appendix E**). These recommendations are included in Part B of this report. One of the recommendations is to develop a detailed air quality management plan (focusing on sources of dust located in close proximity to the residential receptors within the project boundary) ensuring adherence to thresholds stipulated in the Baseline Air Quality Impact Assessment report (BAQIAR) (**Appendix E**.) prior to the commencement of operations. There are also a number of legislative requirements stipulated in the following regulations: • GN R. 283: National reporting regulations; • GN R. 1210: National Ambient Air quality standards; and • GN R. 897: National dust control regulations.				

Activity:	32. Bulk transporting of Ore to market on Public				
Impact:	**Dust generation** **Direct Impact:** The use of public roads without covering loads with tarpaulin may result in fly rock generating dust and causing damages to other road users. **Indirect Impact:** Continuous exposure to high levels of dust fallout may lead to unhealthy environment for employees and surrounding communities.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	3	4	5	**55**
Post-Mitigation	4	1	2	4	**28**
Mitigation Measures:	Fugitive dust generation can be ***controlled*** in the following ways:				

	(1) Development of a dust fallout monitoring and management plan; (2) Frequent Inspections; and (3) Reporting and recording incidents related to air quality. A number of recommendation resulted from the Air Quality Assessment (**Appendix E**). These recommendations are included in Part B of this report. One of the recommendations is to develop a detailed air quality management plan (focusing on sources of dust located in close proximity to the residential receptors within the project boundary) ensuring adherence to thresholds stipulated in the Baseline Air Quality Impact Assessment report (BAQIAR) (**Appendix E**.) prior to the commencement of operations. There are also a number of legislative requirements stipulated in the following regulations: • GN R. 283: National reporting regulations; • GN R. 1210: National Ambient Air quality standards; and • GN R. 897: National dust control regulations.

Aspect:	**Surface Water quality**

Activity:	18.Topsoil and subsoil stripping & stockpiling for mining operation area				
Impact:	**Hydrocarbon Contamination** **Direct Impact:** Throughout the operational phase construction equipment are used. This poses a risk of hydrocarbon spills if equipment are not maintained. Depending on the size of the spill the level of contamination may vary from insignificant to significant and may affect the surrounding water quality (both surface and sub-surface) as well as the soil quality.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	4	2	6	3	**36**
Mitigation Measures:	Potential impact resulting from hydrocarbon contamination can be ***controlled*** in the following ways: (1) Develop and implement a Hazardous substances management plan specifically addressing handling, storage, and transport of hazardous substances. (2) Develop and implement an emergency response procedure addressing the procedure in case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure.				
Impact:	**Sedimentation and siltation of watercourses** **Direct Impact:** Stripping topsoil and subsoil or stockpiling material through or in close proximity				

	to drainage lines may cause sedimentation and siltation of watercourses if not managed properly. **Indirect Impact:** Storm water runoff of dirt roads and un-vegetated areas may cause sedimentation and siltation of nearby watercourses.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	4	2	6	3	**36**
Mitigation Measures:	Surface water quality can be ***controlled*** in the following ways: 1) Development and implementation of water quality monitoring plan. (2) Reporting and recording incidents.				
Impact:	**Water level reduction and contamination** **Direct Impact:** The reduction in water levels as well as contamination of the water resource that may be caused by alternating the topography during site clearing and topsoil stripping poses a risk to affecting the surface and sub-surface water quality as well as the downstream users.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	3	6	5	**65**
Post-Mitigation	4	1	4	4	**36**
Mitigation Measures:	Water level reduction and contamination affecting the surface water quality can be controlled in following ways: (1) Development and implementation of water quality monitoring plan. (2) Development of a storm water management plan. (3) Reporting and recording incidents. (4) Create awareness of water conservation.				
Impact:	**Alteration of drainage patterns** **Indirect Impact:** Alteration of the drainage patterns may lead to the degradation of downstream or surrounding Wetlands which in its turn may affect the aquatic micro and macro ecology. **Direct Impact:** Site clearing and topsoil stripping through drainage lines may lead to the siltation of streams as well as lead to erosion along the river banks that will affect the surface water quality negatively.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	5	3	8	5	**80**
Post-Mitigation	4	2	6	4	**48**
Mitigation Measures:	The effects on surface water quality resulting from the alteration in drainage patterns can be				

	remedied in the following ways: (1) Develop a water monitoring management plan. (2) Record and report all incidents related to affecting water quality. (3) Develop a rehabilitation plan specifically addressing the rehabilitation measures related to reinstatement of drainage lines.
Impact:	**Destruction of upstream tributaries and reduction in water in the catchment** **Indirect Impact:** Alteration of the upstream drainage lines may lead to the degradation of downstream or surrounding Wetlands which in its turn may affect the aquatic micro and macro ecology. **Direct Impact:** The destruction of tributaries may lead to a limited volume of water available to the downstream users. The reduction in water in the catchment may cause the degradation of surface water quality.

Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	5	3	6	5	**70**
Post-Mitigation	4	1	4	4	**36**

Mitigation Measures:	The effects on surface water quality resulting from the destruction of upstream tributaries and reduction in water in the catchment can be ***remedied*** in the following ways: (1) Develop a water monitoring management plan. (2) Record and report all incidents related to affecting water quality. (3) Develop a rehabilitation plan specifically addressing the rehabilitation measures related to reinstatement of drainage lines.

Activity:	19.Opencast mining excavations
Impact:	**Hydrocarbon Contamination** **Direct Impact:** Throughout the operational phase construction equipment are used. This poses a risk of hydrocarbon spills if equipment is not maintained. Depending on the size of the spill the level of contamination may vary from insignificant to significant and may affect the surrounding water quality (both surface and sub-surface) as well as the soil quality.

Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	4	1	4	3	**27**

Mitigation Measures:	Potential impact resulting from hydrocarbon contamination can be ***controlled*** in the following ways: (1) Develop and implement a Hazardous substances management plan specifically addressing handling, storage, and transport of hazardous substances.

	(2) Develop and implement an emergency response procedure addressing the procedure in case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure.				
Impact:	**Sedimentation and siltation of watercourses** **Direct Impact:** Stripping topsoil and subsoil or stockpiling material through or in close proximity to drainage lines may cause sedimentation and siltation of watercourses if not managed properly. **Indirect Impact:** Storm water runoff of dirt roads and un-vegetated areas may cause sedimentation and siltation of nearby watercourses.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	3	8	5	**75**
Post-Mitigation	4	2	6	4	**48**
Mitigation Measures:	Surface water quality can be ***controlled*** in the following ways: 1) Development and implementation of water quality monitoring plan. (2) Reporting and recording incidents.				
Impact:	**Contamination of water resource** **Direct Impact:** Throughout the operational phase of the mining operations, potential pollutants are used such as high levels of nitrates. Improper management of potential pollutants may lead to the degradation of water quality (both surface and sub-surface). Polluted water resources may affect the aquatic environment in a detrimental manner.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	4	1	6	3	**33**
Mitigation Measures:	Contamination of water resources can be ***avoided*** in the following ways: (1) Development and implementation of a water monitoring program. (2) Development and implementation of an Integrated Water and Waste Management Plan (IWWMP). (3)Development and implementation of a storm water management plan. (4) Reporting and recording all related incidents according to a developed procedure. (5) Develop and implement an emergency preparedness plan.				
Impact:	**Alteration of drainage patterns** **Indirect Impact:** Alteration of the drainage patterns may lead to the degradation of downstream or surrounding Wetlands which in its turn may affect the aquatic micro and macro ecology.				

	Direct Impact: Site clearing and topsoil stripping through drainage lines may lead to the siltation of streams as well as lead to erosion along the river banks that will affect the surface water quality negatively.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	5	3	8	5	**80**
Post-Mitigation	4	2	6	5	**60**
Mitigation Measures:	The effects on surface water quality resulting from the alteration in drainage patterns can be ***remedied*** in the following ways: (1) Develop a water monitoring management plan. (2) Record and report all incidents related to affecting water quality. (3) Develop a rehabilitation plan specifically addressing the rehabilitation measures related to reinstatement of drainage lines.				
Impact:	**Destruction of upstream tributaries and reduction in water in the catchment** **Indirect Impact:** Alteration of the upstream drainage lines may lead to the degradation of downstream or surrounding Wetlands which in its turn may affect the aquatic micro and macro ecology. **Direct Impact:** The destruction of tributaries may lead to a limited volume of water available to the downstream users. The reduction in water in the catchment may cause the degradation of surface water quality.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	3	6	5	**65**
Post-Mitigation	4	1	6	4	**44**
Mitigation Measures:	The effects on surface water quality resulting from the destruction of upstream tributaries and reduction in water in the catchment can be ***remedied*** in the following ways: (1) Develop a water monitoring management plan. (2) Record and report all incidents related to affecting water quality. (3) Develop a rehabilitation plan specifically addressing the rehabilitation measures related to reinstatement of drainage lines.				

Activity:	20.Drilling & Blasting
Impact:	**Hydrocarbon Contamination** **Direct Impact:** Throughout the operational phase construction equipment are used. This poses a risk of hydrocarbon spills if equipment is not maintained. Depending on the size of the spill the level of contamination may vary from insignificant to significant and may affect the surrounding water quality (both surface and sub-surface) as well as the soil quality.

Significance rating:	Duration	Extent	Magnitude	Probability	Significance
Pre-Mitigation	4	2	8	5	70
Post-Mitigation	4	1	4	3	27
Mitigation Measures:	Potential impact resulting from hydrocarbon contamination can be ***controlled*** in the following ways: (1) Develop and implement a Hazardous substances management plan specifically addressing handling, storage, and transport of hazardous substances. (2) Develop and implement an emergency response procedure addressing the procedure in case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure.				
Impact:	**Contamination of water resource** **Direct Impact:** Throughout the operational phase of the mining operations, potential pollutants are used such as high levels of nitrates. Improper management of potential pollutants may lead to the degradation of water quality (both surface and sub-surface). Polluted water resources may affect the aquatic environment in a detrimental manner.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	70
Post-Mitigation	4	1	6	3	33
Mitigation Measures:	Contamination of water resources can be ***avoided*** in the following ways: (1) Development and implementation of a water monitoring program. (2) Development and implementation of an Integrated Water and Waste Management Plan (IWWMP). (3)Development and implementation of a storm water management plan. (4) Reporting and recording all related incidents according to a developed procedure. (5) Develop and implement an emergency preparedness plan.				

Activity:	21. RoM & product stockpiling				
Impact:	**Hydrocarbon Contamination** **Direct Impact:** Throughout the operational phase equipment and plant are used to transport and stockpile RoM and product. This poses a risk of hydrocarbon spills if equipment are not maintained. Depending on the size of the spill the level of contamination may vary from insignificant to significant and may affect the surrounding water quality (both surface and sub-surface) as well as the soil quality.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**

Pre-Mitigation	4	1	8	5	**65**
Post-Mitigation	4	1	6	3	**33**
Mitigation Measures:	Potential impact resulting from hydrocarbon contamination can be ***controlled*** in the following ways: (1) Develop and implement a Hazardous substances management plan specifically addressing handling, storage, and transport of hazardous substances. (2) Develop and implement an emergency response procedure addressing the procedure in case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure.				
Impact:	**Contamination of water resource** **Direct Impact:** Throughout the operational phase of the mining operations, potential pollutants are used such as high levels of nitrates. Improper management of potential pollutants may lead to the degradation of water quality (both surface and sub-surface). Polluted water resources may affect the aquatic environment in a detrimental manner. **Indirect Impact**: Sub-surface material and ore exposed to weathering may release pollutants to the water resources.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	4	1	6	3	**33**
Mitigation Measures:	Contamination of water resources can be ***avoided*** in the following ways: (1) Development and implementation of a water monitoring program. (2) Development and implementation of an Integrated Water and Waste Management Plan (IWWMP). (3)Development and implementation of a storm water management plan. (4) Reporting and recording all related incidents according to a developed procedure. (5) Develop and implement an emergency preparedness plan.				
Impact:	**Sedimentation and siltation of watercourses** **Direct Impact:** Stockpiling RoM and product material through or in close proximity to drainage lines may cause sedimentation and siltation of watercourses if not managed properly. **Indirect Impact**: Storm water runoff of dirt roads and un-vegetated areas may cause sedimentation and siltation of nearby watercourses.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	4	1	6	3	**33**

Mitigation Measures:	Surface water quality can be ***controlled*** in the following ways: 1) Development and implementation of water quality monitoring plan. (2) Reporting and recording incidents.

Activity:	22. Residue stockpiles				
Impact:	**Alteration of drainage patterns** **Indirect Impact:** Alteration of the drainage patterns may lead to the degradation of downstream or surrounding Wetlands which in its turn may affect the aquatic micro and macro ecology. **Direct Impact:** Site clearing and topsoil stripping through drainage lines may lead to the siltation of streams as well as lead to erosion along the river banks that will affect the surface water quality negatively.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	5	3	8	5	**80**
Post-Mitigation	4	1	6	4	**44**
Mitigation Measures:	The effects on surface water quality resulting from the alteration in drainage patterns can be ***remedied*** in the following ways: (1) Develop a water monitoring management plan. (2) Record and report all incidents related to affecting water quality. (3) Develop a rehabilitation plan specifically addressing the rehabilitation measures related to reinstatement of drainage lines.				
Impact:	**Contamination of water resource** **Direct Impact:** Throughout the operational phase of the mining operations, potential pollutants are used such as high levels of nitrates. Improper management of potential pollutants may lead to the degradation of water quality (both surface and sub-surface). Polluted water resources may affect the aquatic environment in a detrimental manner. **Indirect Impact**: Sub-surface material and ore exposed to weathering may release pollutants to the water resources.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	4	1	6	3	**33**
Mitigation Measures:	Contamination of water resources can be ***avoided*** in the following ways: (1) Development and implementation of a water monitoring program. (2) Development and implementation of an Integrated Water and Waste Management Plan (IWWMP).				

	(3)Development and implementation of a storm water management plan. (4) Reporting and recording all related incidents according to a developed procedure. (5) Develop and implement an emergency preparedness plan.				
Impact:	**Sedimentation and siltation of watercourses** **Direct Impact:** Stockpiling RoM and product material through or in close proximity to drainage lines may cause sedimentation and siltation of watercourses if not managed properly. **Indirect Impact**: Storm water runoff of dirt roads and un-vegetated areas may cause sedimentation and siltation of nearby watercourses.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	4	1	6	3	**33**
Mitigation Measures:	Surface water quality can be ***controlled*** in the following ways: 1) Development and implementation of water quality monitoring plan. (2) Reporting and recording incidents.				

Activity:	23. Screening Operations				
Impact:	**Hydrocarbon Contamination** **Direct Impact:** Hydrocarbon spills can occur where heavy machinery such as the screening plant and hauling vehicles are parked because they contain large volumes of lubricating oils, hydraulic oils, and diesel to run. This poses a risk of hydrocarbon spills if equipment is not maintained. Depending on the size of the spill the level of contamination may vary from insignificant to significant and may affect the surrounding water quality (both surface and sub-surface) as well as the soil quality.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	1	8	5	**65**
Post-Mitigation	4	1	2	3	**21**
Mitigation Measures:	Potential impact resulting from hydrocarbon contamination can be ***controlled*** in the following ways: (1) Develop and implement a Hazardous substances management plan specifically addressing handling, storage, and transport of hazardous substances. (2) Develop and implement an emergency response procedure addressing the procedure in case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure.				
Impact:	**Contamination of water resource**				

	Direct Impact: Water seeping from stockpiles poses a risk of leading to elevated concentrations of heavy metals and other elements in the groundwater environment, and can potentially be acidic. When this water reaches surface water bodies or the groundwater it can negatively affect the water quality. **Indirect Impact**: Alteration to the conditions of the water resources may negatively affect the aquatic ecology.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	3	8	5	**75**
Post-Mitigation	4	1	6	3	**33**
Mitigation Measures:	Contamination of water resources can be ***avoided*** in the following ways: (1) Development and implementation of a water monitoring program. (2) Development and implementation of an Integrated Water and Waste Management Plan (IWWMP). (3)Development and implementation of a storm water management plan. (4) Reporting and recording all related incidents according to a developed procedure. (5) Develop and implement an emergency preparedness plan.				
Impact:	**Sedimentation and siltation of watercourses** **Direct Impact:** Stockpiling screened material through or in close proximity to drainage lines may cause sedimentation and siltation of watercourses if not managed properly. **Indirect Impact**: Storm water runoff of dirt roads and un-vegetated areas may cause sedimentation and siltation of nearby watercourses.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	4	1	6	3	**33**
Mitigation Measures:	Surface water quality can be ***controlled*** in the following ways: 1) Development and implementation of water quality monitoring plan. (2) Reporting and recording incidents.				

Activity:	24. Discard disposal (backfilling of mining area)
Impact:	**Hydrocarbon Contamination** **Direct Impact:** During backfilling activities equipment and plant are used. This poses a risk of hydrocarbon spills if equipment is not maintained. Depending on the size of the spill the level of contamination may vary from insignificant to significant and may affect the surrounding water quality (both surface and sub-surface) as well as the soil quality. **Indirect Impact:** The degradation of water quality and soil quality poses a risk of negatively

	affecting the conditions for micro and macro organisms to thrive.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	2	1	6	3	**27**
Mitigation Measures:	Potential impact resulting from hydrocarbon contamination can be ***controlled*** in the following ways: (1) Develop and implement a Hazardous substances management plan specifically addressing handling, storage, and transport of hazardous substances. (2) Develop and implement an emergency response procedure addressing the procedure in case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure.				
Impact:	**Contamination of water resource** **Direct Impact:** Throughout the operational phase of the mining operations, potential pollutants are used such as high levels of nitrates. Improper management of potential pollutants may lead to the degradation of water quality (both surface and sub-surface). Polluted water resources may affect the aquatic environment in a detrimental manner. **Indirect Impact**: Sub-surface material and ore exposed to weathering may release pollutants to the water resources.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	4	1	6	3	**33**
Mitigation Measures:	Contamination of water resources can be ***avoided*** in the following ways: (1) Development and implementation of a water monitoring program. (2) Development and implementation of an Integrated Water and Waste Management Plan (IWWMP). (3)Development and implementation of a storm water management plan. (4) Reporting and recording all related incidents according to a developed procedure. (5) Develop and implement an emergency preparedness plan.				
Impact:	**Sedimentation and siltation of watercourses** **Direct Impact:** Backfilling material through or in close proximity to drainage lines may cause sedimentation and siltation of watercourses if not managed properly. **Indirect Impact**: Storm water runoff of dirt roads and un-vegetated areas may cause sedimentation and siltation of nearby watercourses.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**

Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	4	1	6	3	**33**
Mitigation Measures:	Surface water quality can be ***controlled*** in the following ways: 1) Development and implementation of water quality monitoring plan. (2) Reporting and recording incidents.				

Activity:	25. Waste generation, storage and disposal				
Impact:	**Contamination of water resource** **Direct Impact:** The storage of large amounts of waste over an extended time in a area not lined or bunded poses a risk of forming potentially hazardous leachates. **Indirect Impact**: The hazardous leachate from the waste storage facilities poses a risk of contaminating both surface and sub-surface water resources. This may lead to the degradation of conditions for the aquatic ecology to thrive.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	1	8	5	**65**
Post-Mitigation	4	1	4	3	**37**
Mitigation Measures:	Contamination of water resources can be ***avoided*** in the following ways: (1) Development and implementation of a water monitoring program. (2) Development and implementation of an Integrated Water and Waste Management Plan (IWWMP). (3)Development and implementation of a storm water management plan. (4) Reporting and recording all related incidents according to a developed procedure. (5) Develop and implement an emergency preparedness plan.				
Impact:	**Illegal dumping** **Direct Impact:** Dumping of generated water in areas other than is approved by the authorisation or EMP poses a high risk of polluting numerous sources i.e. Water and soil. The dumping of general waste poses a choking risk to grazing animals. Hazardous Leachates from illegal dumps also poses a risk to the health of surrounding communities. **Indirect Impact**: The hazardous leachate from the waste storage facilities poses a risk of contaminating both surface and sub-surface water as well as soil resources. This may lead to the degradation of conditions for the aquatic ecology to thrive.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	4	1	6	3	**33**
Mitigation Measures:	Illegal dumping can be ***avoided*** in the following ways:				

	(1) Develop and implement as waste management plan with the focus on reuse, reduce, recycle, or avoid. (2) Development and maintenance of a waste disposal record keeping system.

Activity:	26. Chemical Toilets				
Impact:	**Contamination of water resource** **Direct Impact:** Improper management of effluent from chemical toilets poses a high risk to contaminating water resources. **Indirect Impact**: Over an extended period of time the exposure to contamination will cause the degradation of fauna and flora habitats as well as affect the surface and sub-surface water quality.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	1	1	6	5	**40**
Post-Mitigation	1	1	6	3	**24**
Mitigation Measures:	Contamination of water resources can be ***avoided*** in the following ways: (1) Development and implementation of a water monitoring program. (2) Development and implementation of an Integrated Water and Waste Management Plan (IWWMP). (3)Development and implementation of a storm water management plan. (4) Reporting and recording all related incidents according to a developed procedure. (5) Develop and implement an emergency preparedness plan.				

Activity:	27. River crossings				
Impact:	**Hydrocarbon Contamination** **Direct Impact:** Throughout the construction and operational phase construction equipment are used. This poses a risk of hydrocarbon spills if equipment are not maintained. Depending on the size of the spill the level of contamination may vary from insignificant to significant and may affect the surrounding water quality (both surface and sub-surface) as well as the soil quality.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	3	2	6	5	**55**
Post-Mitigation	4	1	4	3	**27**
Mitigation Measures:	Potential impact resulting from hydrocarbon contamination can be ***controlled*** in the following ways: (1) Develop and implement a Hazardous substances management plan specifically addressing handling, storage, and transport of hazardous substances.				

	(2) Develop and implement an emergency response procedure addressing the procedure in case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure.				
Impact:	**Sedimentation and siltation of watercourses** **Direct Impact:** Excavating, stockpiling and transport of material through or in close proximity to drainage lines may cause sedimentation and siltation of watercourses if not managed properly. **Indirect Impact:** Storm water runoff of dirt roads and un-vegetated areas may cause sedimentation and siltation of nearby watercourses.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	4	1	6	4	**44**
Mitigation Measures:	Surface water quality can be ***controlled*** in the following ways: 1) Development and implementation of water quality monitoring plan. (2) Reporting and recording incidents.				
Impact:	**Water level reduction and contamination** **Direct Impact:** Improper installation of river crossing infrastructures poses a risk in water level reduction and contamination of downstream water users i.e. through blocking of the natural flow of streams/rivers. **Indirect Impact:** The reduction of water levels of rivers/watercourses poses a risk of affecting both surface and sub-surface water resources.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	6	5	**60**
Post-Mitigation	4	1	2	3	**21**
Mitigation Measures:	Water level reduction and contamination affecting the surface water quality can be controlled in following ways: (1) Development and implementation of water quality monitoring plan. (2) Development of a storm water management plan. (3) Reporting and recording incidents. (4) Create awareness of water conservation.				
Impact:	**Alteration of drainage patterns** **Indirect Impact:** Alteration of the drainage patterns may lead to the degradation of downstream or surrounding Wetlands which in its turn may affect the aquatic micro and macro ecology. **Direct Impact:** Site clearing and topsoil stripping through drainage lines may lead to the				

	siltation of streams as well as lead to erosion along the river banks that will affect the surface water quality negatively.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	5	2	8	5	**75**
Post-Mitigation	4	1	4	3	**27**
Mitigation Measures:	The effects on surface water quality resulting from the alteration in drainage patterns can be ***remedied*** in the following ways: (1) Develop a water monitoring management plan. (2) Record and report all incidents related to affecting water quality. (3) Develop a rehabilitation plan specifically addressing the rehabilitation measures related to reinstatement of drainage lines.				
Impact:	**Contamination of water resource** **Direct Impact:** Storm water run-off from river crossing structures containing pollutants poses a risk in contaminating the surrounding water resources. **Indirect Impact**: Pollutants poses a risk in altering the conditions of the aquatic ecology to thrive.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	6	5	**60**
Post-Mitigation	4	1	4	3	**27**
Mitigation Measures:	Contamination of water resources can be ***avoided*** in the following ways: (1) Development and implementation of a water monitoring program. (2) Development and implementation of an Integrated Water and Waste Management Plan (IWWMP). (3)Development and implementation of a storm water management plan. (4) Reporting and recording all related incidents according to a developed procedure. (5) Develop and implement an emergency preparedness plan.				

Activity:	28. Water supply (potable & process)				
Impact:	**Water level reduction and contamination** **Direct Impact:** Water wastage and over exploitation of water resources poses a risk in water level reduction. **Indirect Impact:** The reduction of water levels of rivers/watercourses/underground water tables poses a risk of affecting both surface and sub-surface water resources.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	6	5	**60**

Post-Mitigation	4	1	2	3	**21**
Mitigation Measures:	Water level reduction and contamination affecting the surface water quality can be controlled in following ways: (1) Development and implementation of water quality monitoring plan. (2) Development of a storm water management plan. (3) Reporting and recording incidents. (4) Create awareness of water conservation.				
Impact:	**Contamination of water resource** **Direct Impact:** Leaks and breaks of water supply infrastructure poses a risk of contaminating water resources. **Indirect Impact**: Pollutants poses a risk in altering the conditions of the aquatic ecology to thrive.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	6	5	**60**
Post-Mitigation	4	1	2	2	**14**
Mitigation Measures:	Contamination of water resources can be ***avoided*** in the following ways: (1) Development and implementation of a water monitoring program. (2) Development and implementation of an Integrated Water and Waste Management Plan (IWWMP). (3)Development and implementation of a storm water management plan. (4) Reporting and recording all related incidents according to a developed procedure. (5) Develop and implement an emergency preparedness plan.				

Activity:	29. Storage of fuel and lubricants in temporary				
Impact:	**Hydrocarbon Contamination** **Direct Impact:** The construction of improper storage facilities poses a risk of the surrounding environment to be exposes to continuous leaking of hydrocarbons leading possibly contaminating surface and sub-surface water sources as well as the soils surrounding the facility.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	2	2	8	5	**60**
Post-Mitigation	1	1	6	3	**24**
Mitigation Measures:	Potential impact resulting from hydrocarbon contamination can be ***controlled*** in the following ways: (1) Develop and implement a Hazardous substances management plan specifically addressing				

	handling, storage, and transport of hazardous substances. (2) Develop and implement an emergency response procedure addressing the procedure in case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure.				
Impact:	**Contamination of water resource** **Direct Impact:** The use of improper storage facilities poses a risk of the surrounding environment to be exposes to continuous leaking of hydrocarbons leading possibly contaminating surface and sub-surface water sources as well as the soils surrounding the facility.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	2	1	8	5	**55**
Post-Mitigation	1	1	6	3	**24**
Mitigation Measures:	Contamination of water resources can be ***avoided*** in the following ways: (1) Development and implementation of a water monitoring program. (2) Development and implementation of an Integrated Water and Waste Management Plan (IWWMP). (3)Development and implementation of a storm water management plan. (4) Reporting and recording all related incidents according to a developed procedure. (5) Develop and implement an emergency preparedness plan.				

Activity:	30. Vehicular activity on haul roads; and operation of mining equipment				
Impact:	**Hydrocarbon Contamination** **Direct Impact:** The use of vehicles on haul roads throughout the operational phase poses a risk of hydrocarbon spills if equipment are not maintained. Depending on the size of the spill the level of contamination may vary from insignificant to significant and may affect the surrounding water quality (both surface and sub-surface) as well as the soil quality.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	1	8	5	**65**
Post-Mitigation	1	1	4	4	**24**
Mitigation Measures:	Potential impact resulting from hydrocarbon contamination can be ***controlled*** in the following ways: (1) Develop and implement a Hazardous substances management plan specifically addressing handling, storage, and transport of hazardous substances. (2) Develop and implement an emergency response procedure addressing the procedure in				

	case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure.				
Impact:	**Sedimentation and siltation of watercourses** **Direct Impact:** Constructing access roads through drainage lines may cause sedimentation and siltation of watercourses if not managed properly. . **Indirect Impact:** Storm water runoff of dirt roads may cause sedimentation and siltation of nearby watercourses.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	1	1	4	4	**24**
Mitigation Measures:	Surface water quality can be ***controlled*** in the following ways: 1) Development and implementation of water quality monitoring plan. (2) Reporting and recording incidents.				

Activity:	32. Water Management				
Impact:	**Destruction of upstream tributaries and reduction in water in the catchment** **Indirect Impact:** Alteration of the upstream drainage lines may lead to the degradation of downstream or surrounding Wetlands which in its turn may affect the aquatic micro and macro ecology. **Direct Impact:** The destruction of tributaries may lead to a limited volume of water available to the downstream users. The reduction in water in the catchment may cause the degradation of surface water quality.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	4	1	4	3	**27**
Mitigation Measures:	The effects on surface water quality resulting from the destruction of upstream tributaries and reduction in water in the catchment can be ***remedied*** in the following ways: (1) Develop a water monitoring management plan. (2) Record and report all incidents related to affecting water quality. (3) Develop a rehabilitation plan specifically addressing the rehabilitation measures related to reinstatement of drainage lines.				
Impact:	**Sedimentation and siltation of watercourses** **Direct Impact:** Runoff from lay down areas, construction areas, mining areas, stockpile areas, roads etc. potentially contain sediment and silt that poses a risk of affecting surrounding water				

	courses and drainage lines.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	4	1	4	4	**27**
Mitigation Measures:	Surface water quality can be ***controlled*** in the following ways: 1) Development and implementation of water quality monitoring plan. (2) Reporting and recording incidents.				
Impact:	**Water level reduction and contamination** **Direct Impact:** Improper management of water usage and installation of improper storm water features and infrastructure poses a risk of reducing the water levels for downstream users. **Indirect Impact:** The reduction of water levels of rivers/watercourses/underground water tables poses a risk of affecting both surface and sub-surface water resources.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	4	1	2	3	**21**
Mitigation Measures:	Water level reduction and contamination affecting the surface water quality can be controlled in following ways: (1) Development and implementation of water quality monitoring plan. (2) Development of a storm water management plan. (3) Reporting and recording incidents. (4) Create awareness of water conservation.				
Impact:	**Alteration of drainage patterns** **Indirect Impact:** Alteration of the drainage patterns may lead to the degradation of downstream or surrounding Wetlands which in its turn may affect the aquatic micro and macro ecology. **Direct Impact:** Site clearing and topsoil stripping through drainage lines may lead to the siltation of streams as well as lead to erosion along the river banks that will affect the surface water quality negatively.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	5	2	8	5	**75**
Post-Mitigation	4	1	4	4	**36**
Mitigation Measures:	The effects on surface water quality resulting from the alteration in drainage patterns can be ***remedied*** in the following ways: (1) Develop a water monitoring management plan. (2) Record and report all incidents related to affecting water quality.				

	(3) Develop a rehabilitation plan specifically addressing the rehabilitation measures related to reinstatement of drainage lines.				
Impact:	**Contamination of water resource** **Direct Impact:** The poor management of onsite water i.e. Storm water, process water, effluent, and potable water etc. may lead to the contamination of water resources.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	3	8	5	**75**
Post-Mitigation	4	1	4	3	**27**
Mitigation Measures:	Contamination of water resources can be ***avoided*** in the following ways: (1) Development and implementation of a water monitoring program. (2) Development and implementation of an Integrated Water and Waste Management Plan (IWWMP). (3)Development and implementation of a storm water management plan. (4) Reporting and recording all related incidents according to a developed procedure. (5) Develop and implement an emergency preparedness plan.				

Activity:	33. Rehabilitation of mining areas				
Impact:	**Sedimentation and siltation of watercourses** **Direct Impact:** Runoff from exposed un-vegetated areas poses a risk in contaminating nearby streams, rivers, and drainage lines.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	4	1	4	4	**27**
Mitigation Measures:	Surface water quality can be ***controlled*** in the following ways: 1) Development and implementation of water quality monitoring plan. (2) Reporting and recording incidents.				

Aspect:	**Ground Water Quality**

Activity:	18.Topsoil and subsoil stripping & stockpiling for mining operation area
Impact:	**Hydrocarbon Contamination** **Direct Impact:** Throughout the operational phase construction equipment are used. This poses a risk of hydrocarbon spills if equipment are not maintained. Depending on the size of the spill the level of contamination may vary from insignificant to significant and may affect the surrounding water quality (both surface and sub-surface) as well as the soil quality.

Significance rating:	Duration	Extent	Magnitude	Probability	Significance
Pre-Mitigation	4	2	8	5	70
Post-Mitigation	4	2	6	2	24
Mitigation Measures:	Potential impact resulting from hydrocarbon contamination can be ***controlled*** in the following ways: (1) Develop and implement a Hazardous substances management plan specifically addressing handling, storage, and transport of hazardous substances. (2) Develop and implement an emergency response procedure addressing the procedure in case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure.				
Impact:	**Water level reduction and contamination** **Direct Impact:** The reduction in water levels as well as contamination of the water resource that may be caused by alternating the topography during site clearing and topsoil stripping poses a risk to affecting the surface and sub-surface water quality as well as the downstream users..				
Significance rating:	Duration	Extent	Magnitude	Probability	Significance
Pre-Mitigation	4	2	6	5	60
Post-Mitigation	4	1	4	3	27
Mitigation Measures:	Water level reduction and contamination affecting the surface water quality can be controlled in following ways: (1) Development and implementation of water quality monitoring plan. (2) Development of a storm water management plan. (3) Reporting and recording incidents. (4) Create awareness of water conservation.				

Activity:	19.Opencast mining excavations				
Impact:	**Hydrocarbon Contamination** **Direct Impact:** Throughout the operational phase construction equipment are used. This poses a risk of hydrocarbon spills if equipment is not maintained. Depending on the size of the spill the level of contamination may vary from insignificant to significant and may affect the surrounding water quality (both surface and sub-surface) as well as the soil quality.				
Significance rating:	Duration	Extent	Magnitude	Probability	Significance
Pre-Mitigation	4	2	8	5	70
Post-Mitigation	4	2	6	3	36

Mitigation Measures:	Potential impact resulting from hydrocarbon contamination can be ***controlled*** in the following ways: (1) Develop and implement a Hazardous substances management plan specifically addressing handling, storage, and transport of hazardous substances. (2) Develop and implement an emergency response procedure addressing the procedure in case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure.				
Impact:	**Contamination of water resources** **Direct Impact:** Throughout the operational phase of the mining operations, potential pollutants are used such as high levels of nitrates. Improper management of potential pollutants may lead to the degradation of water quality (both surface and sub-surface). Polluted water resources may affect the aquatic environment in a detrimental manner.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	4	1	6	3	**33**
Mitigation Measures:	Contamination of water resources can be ***avoided*** in the following ways: (1) Development and implementation of a water monitoring program. (2) Development and implementation of an Integrated Water and Waste Management Plan (IWWMP). (3)Development and implementation of a storm water management plan. (4) Reporting and recording all related incidents according to a developed procedure. (5) Develop and implement an emergency preparedness plan.				

Activity:	20.Drilling & Blasting				
Impact:	**Hydrocarbon Contamination** **Direct Impact:** The use of drill Riggs poses a high risk of hydrocarbon spills. Depending on the size of the spill the level of contamination may vary from insignificant to significant and may affect the surrounding water quality (both surface and sub-surface) as well as the soil quality.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	4	1	6	3	**33**
Mitigation Measures:	Potential impact resulting from hydrocarbon contamination can be ***controlled*** in the following ways: (1) Develop and implement a Hazardous substances management plan specifically addressing				

	handling, storage, and transport of hazardous substances. (2) Develop and implement an emergency response procedure addressing the procedure in case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure.				
Impact:	**Contamination of water resources** **Direct Impact:** Improper management of blasting activities poses the risk of contaminating water resources with pollutants such as high content of Nitrates. The presence of pollutants in the water resources poses a risk of degrading the conditions for the aquatic ecology to thrive.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	3	8	5	**75**
Post-Mitigation	4	1	6	3	**33**
Mitigation Measures:	Contamination of water resources can be ***avoided*** in the following ways: (1) Development and implementation of a water monitoring program. (2) Development and implementation of an Integrated Water and Waste Management Plan (IWWMP). (3)Development and implementation of a storm water management plan. (4) Reporting and recording all related incidents according to a developed procedure. (5) Develop and implement an emergency preparedness plan.				

Activity:	22. Residue stockpiles				
Impact:	**Contamination of water resources** **Direct Impact:** Throughout the operational phase of the mining operations, potential pollutants are used such as high levels of nitrates. Improper management of potential pollutants may lead to the degradation of water quality (both surface and sub-surface). Polluted water resources may affect the aquatic environment in a detrimental manner. **Indirect Impact**: Sub-surface material and ore exposed to weathering may release pollutants to the water resources.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	4	1	6	3	**33**
Mitigation Measures:	Contamination of water resources can be ***avoided*** in the following ways: (1) Development and implementation of a water monitoring program. (2) Development and implementation of an Integrated Water and Waste Management Plan (IWWMP).				

	(3)Development and implementation of a storm water management plan. (4) Reporting and recording all related incidents according to a developed procedure. (5) Develop and implement an emergency preparedness plan.				
Impact:	**Hazardous Leachate** **Direct Impact:** Potential pollutant in the residue material resulting from mining operation may lead to the formation of leachate. The leachate may contain toxins that are hazardous to the aquatic ecology and water resources.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	5	2	8	5	**75**
Post-Mitigation	4	1	6	3	**33**
Mitigation Measures:	Formed hazardous leachate can be ***controlled*** in the following ways: (1) Design and implement a Integrated Waste Water Management Plan (IWWMP). (2) Develop and implement a water quality management plan. (3) Report and record any incidents related to hazardous leachates.				

Activity:	23. Screening Operations				
Impact:	**Hydrocarbon Contamination** **Direct Impact:** Hydrocarbon spills can occur where heavy machinery such as the screening plant and hauling vehicles are parked because they contain large volumes of lubricating oils, hydraulic oils, and diesel to run. This poses a risk of hydrocarbon spills if equipment is not maintained. Depending on the size of the spill the level of contamination may vary from insignificant to significant and may affect the surrounding water quality (both surface and sub-surface) as well as the soil quality.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	1	8	5	**65**
Post-Mitigation	4	1	2	3	**21**
Mitigation Measures:	Potential impact resulting from hydrocarbon contamination can be ***controlled*** in the following ways: (1) Develop and implement a Hazardous substances management plan specifically addressing handling, storage, and transport of hazardous substances. (2) Develop and implement an emergency response procedure addressing the procedure in case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure.				
Impact:	**Contamination of water resources**				

	Direct Impact: Water seeping from stockpiles poses a risk of leading to elevated concentrations of heavy metals and other elements in the groundwater environment, and can potentially be acidic. When this water reaches surface water bodies or the groundwater it can negatively affect the water quality. **Indirect Impact**: Alteration to the conditions of the water resources may negatively affect the aquatic ecology.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	3	8	5	**75**
Post-Mitigation	4	1	6	2	**22**
Mitigation Measures:	Contamination of water resources can be ***avoided*** in the following ways: (1) Development and implementation of a water monitoring program. (2) Development and implementation of an Integrated Water and Waste Management Plan (IWWMP). (3)Development and implementation of a storm water management plan. (4) Reporting and recording all related incidents according to a developed procedure. (5) Develop and implement an emergency preparedness plan.				

Activity:	24. Discard disposal (backfilling of mining area)				
Impact:	**Hydrocarbon Contamination** **Direct Impact:** During backfilling activities equipment and plant are used. This poses a risk of hydrocarbon spills if equipment is not maintained. Depending on the size of the spill the level of contamination may vary from insignificant to significant and may affect the surrounding water quality (both surface and sub-surface) as well as the soil quality. **Indirect Impact**: The degradation of water quality and soil quality poses a risk of negatively affecting the conditions for micro and macro organisms to thrive.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	6	5	**60**
Post-Mitigation	3	1	4	2	**16**
Mitigation Measures:	Potential impact resulting from hydrocarbon contamination can be ***controlled*** in the following ways: (1) Develop and implement a Hazardous substances management plan specifically addressing handling, storage, and transport of hazardous substances. (2) Develop and implement an emergency response procedure addressing the procedure in case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or accidents as well as addressing remediation procedures.				

	(3) Development and implementation of an incident reporting procedure.				
Impact:	**Contamination of water resources** **Direct Impact:** Throughout the operational phase of the mining operations, potential pollutants are used such as high levels of nitrates. Improper management of potential pollutants may lead to the degradation of water quality (both surface and sub-surface). Polluted water resources may affect the aquatic environment in a detrimental manner. **Indirect Impact**: Sub-surface material and ore exposed to weathering may release pollutants to the water resources.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	4	1	4	2	**18**
Mitigation Measures:	Contamination of water resources can be ***avoided*** in the following ways: (1) Development and implementation of a water monitoring program. (2) Development and implementation of an Integrated Water and Waste Management Plan (IWWMP). (3)Development and implementation of a storm water management plan. (4) Reporting and recording all related incidents according to a developed procedure. (5) Develop and implement an emergency preparedness plan.				

Activity:	25. Waste generation, storage and disposal				
Impact:	**Contamination of water resources** **Direct Impact:** The storage of large amounts of waste over an extended time in a area not lined or bunded poses a risk of forming potentially hazardous leachates. **Indirect Impact**: The hazardous leachate from the waste storage facilities poses a risk of contaminating both surface and sub-surface water resources. This may lead to the degradation of conditions for the aquatic ecology to thrive.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	1	8	5	**65**
Post-Mitigation	4	1	4	2	**18**
Mitigation Measures:	Contamination of water resources can be ***avoided*** in the following ways: (1) Development and implementation of a water monitoring program. (2) Development and implementation of an Integrated Water and Waste Management Plan (IWWMP). (3)Development and implementation of a storm water management plan. (4) Reporting and recording all related incidents according to a developed procedure.				

	(5) Develop and implement an emergency preparedness plan.				
Impact:	**Hazardous Leachate** **Direct Impact:** The hazardous leachate from the waste storage facilities poses a risk of contaminating both surface and sub-surface water as well as soil resources. This may lead to the degradation of conditions for the aquatic ecology to thrive.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	4	1	4	3	**27**
Mitigation Measures:	Formed hazardous leachate can be ***controlled*** in the following ways: (1) Design and implement a Integrated Waste Water Management Plan (IWWMP). (2) Develop and implement a water quality management plan. (3) Report and record any incidents related to hazardous leachates.				

Activity:	26. Chemical Toilets				
Impact:	**Contamination of water resources** **Direct Impact:** Improper management of effluent from chemical toilets poses a high risk to contaminating water resources. **Indirect Impact**: Over an extended period of time the exposure to contamination will cause the degradation of fauna and flora habitats as well as affect the surface and sub-surface water quality.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	1	1	6	5	**40**
Post-Mitigation	1	1	4	2	**12**
Mitigation Measures:	Contamination of water resources can be ***avoided*** in the following ways: (1) Development and implementation of a water monitoring program. (2) Development and implementation of an Integrated Water and Waste Management Plan (IWWMP). (3)Development and implementation of a storm water management plan. (4) Reporting and recording all related incidents according to a developed procedure. (5) Develop and implement an emergency preparedness plan.				

Activity:	27. River crossings
Impact:	**Hydrocarbon Contamination** **Direct Impact:** Throughout the construction and operational phase construction equipment are used. This poses a risk of hydrocarbon spills if equipment are not maintained. Depending on

	the size of the spill the level of contamination may vary from insignificant to significant and may affect the surrounding water quality (both surface and sub-surface) as well as the soil quality.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	1	6	5	**55**
Post-Mitigation	4	1	4	3	**27**
Mitigation Measures:	Potential impact resulting from hydrocarbon contamination can be ***controlled*** in the following ways: (1) Develop and implement a Hazardous substances management plan specifically addressing handling, storage, and transport of hazardous substances. (2) Develop and implement an emergency response procedure addressing the procedure in case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure.				
Impact:	**Water level reduction and contamination** **Direct Impact**: Improper installation of river crossing infrastructures poses a risk in water level reduction and contamination of downstream water users i.e. through blocking of the natural flow of streams/rivers. **Indirect Impact:** The reduction of water levels of rivers/watercourses poses a risk of affecting both surface and sub-surface water resources.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	6	5	**60**
Post-Mitigation	4	1	2	3	**21**
Mitigation Measures:	Water level reduction and contamination affecting the surface water quality can be controlled in following ways: (1) Development and implementation of water quality monitoring plan. (2) Development of a storm water management plan. (3) Reporting and recording incidents. (4) Create awareness of water conservation.				
Impact:	**Contamination of water resources** **Direct Impact:** Storm water run-off from river crossing structures containing pollutants poses a risk in contaminating the surrounding water resources. **Indirect Impact**: Pollutants poses a risk in altering the conditions of the aquatic ecology to thrive.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	6	5	**60**

Post-Mitigation	4	1	4	3	**27**
Mitigation Measures:	Contamination of water resources can be ***avoided*** in the following ways: (1) Development and implementation of a water monitoring program. (2) Development and implementation of an Integrated Water and Waste Management Plan (IWWMP). (3)Development and implementation of a storm water management plan. (4) Reporting and recording all related incidents according to a developed procedure. (5) Develop and implement an emergency preparedness plan.				

Activity:	28. Water supply (potable & process)				
Impact:	**Water level reduction and contamination** **Direct Impact**: Water wastage and over exploitation of water resources poses a risk in water level reduction. **Indirect Impact**: The reduction of water levels of rivers/watercourses/underground water tables poses a risk of affecting both surface and sub-surface water resources.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	6	5	**60**
Post-Mitigation	4	1	2	3	**21**
Mitigation Measures:	Water level reduction and contamination affecting the surface water quality can be controlled in following ways: (1) Development and implementation of water quality monitoring plan. (2) Development of a storm water management plan. (3) Reporting and recording incidents. (4) Create awareness of water conservation.				
Impact:	**Contamination of water resources** **Direct Impact:** Leaks and breaks of water supply infrastructure poses a risk of contaminating water resources. **Indirect Impact**: Pollutants poses a risk in altering the conditions of the aquatic ecology to thrive.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	6	4	**48**
Post-Mitigation	4	1	4	1	**9**
Mitigation Measures:	Contamination of water resources can be ***avoided*** in the following ways: (1) Development and implementation of a water monitoring program. (2) Development and implementation of an Integrated Water and Waste Management Plan				

	(IWWMP). (3)Development and implementation of a storm water management plan. (4) Reporting and recording all related incidents according to a developed procedure. (5) Develop and implement an emergency preparedness plan.

Activity:	29. Storage of fuel and lubricants in temporary facilities				
Impact:	**Hydrocarbon Contamination** **Direct Impact:** The construction of improper storage facilities poses a risk of the surrounding environment to be exposes to continuous leaking of hydrocarbons leading possibly contaminating surface and sub-surface water sources as well as the soils surrounding the facility.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	2	1	8	5	**55**
Post-Mitigation	1	1	6	3	**24**
Mitigation Measures:	Potential impact resulting from hydrocarbon contamination can be ***controlled*** in the following ways: (1) Develop and implement a Hazardous substances management plan specifically addressing handling, storage, and transport of hazardous substances. (2) Develop and implement an emergency response procedure addressing the procedure in case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure.				
Impact:	**Contamination of water resources** **Direct Impact:** The use of improper storage facilities poses a risk of the surrounding environment to be exposes to continuous leaking of hydrocarbons leading possibly contaminating surface and sub-surface water sources as well as the soils surrounding the facility.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	2	1	8	5	**55**
Post-Mitigation	1	1	4	3	**18**
Mitigation Measures:	Contamination of water resources can be ***avoided*** in the following ways: (1) Development and implementation of a water monitoring program. (2) Development and implementation of an Integrated Water and Waste Management Plan (IWWMP). (3)Development and implementation of a storm water management plan.				

	(4) Reporting and recording all related incidents according to a developed procedure. (5) Develop and implement an emergency preparedness plan.

Activity:	30. Vehicular activity on haul roads; and operation				
Impact:	**Hydrocarbon Contamination** **Direct Impact:** The use of vehicles on haul roads throughout the operational phase poses a risk of hydrocarbon spills if equipment is not maintained. Depending on the size of the spill the level of contamination may vary from insignificant to significant and may affect the surrounding water quality (both surface and sub-surface) as well as the soil quality.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	1	8	5	**65**
Post-Mitigation	4	1	4	3	**27**
Mitigation Measures:	Potential impact resulting from hydrocarbon contamination can be ***controlled*** in the following ways: (1) Develop and implement a Hazardous substances management plan specifically addressing handling, storage, and transport of hazardous substances. (2) Develop and implement an emergency response procedure addressing the procedure in case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure.				

Activity:	32. Water Management				
Impact:	**Water level reduction and contamination** **Direct Impact**: Improper management of water usage and installation of improper storm water features and infrastructure poses a risk of reducing the water levels for downstream users. **Indirect Impact**: The reduction of water levels of rivers/watercourses/underground water tables poses a risk of affecting both surface and sub-surface water resources.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	4	1	4	3	**27**
Mitigation Measures:	Water level reduction and contamination affecting the surface water quality can be controlled in following ways: (1) Development and implementation of water quality monitoring plan. (2) Development of a storm water management plan. (3) Reporting and recording incidents.				

	(4) Create awareness of water conservation.				
Impact:	**Contamination of water resources** **Direct Impact:** The poor management of onsite water i.e. Storm water, process water, effluent, potable water etc. may lead to the contamination of water resources.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	4	1	6	3	**33**
Mitigation Measures:	Contamination of water resources can be ***avoided*** in the following ways: (1) Development and implementation of a water monitoring program. (2) Development and implementation of an Integrated Water and Waste Management Plan (IWWMP). (3)Development and implementation of a storm water management plan. (4) Reporting and recording all related incidents according to a developed procedure. (5) Develop and implement an emergency preparedness plan.				

Aspect:	**Wetlands and Aquatic Ecology**

Activity:	18.Topsoil and subsoil stripping & stockpiling for mining operation area				
Impact:	**Destruction of Wetlands** **Direct Impact:** Site clearing and topsoil stripping in Wetlands will cause the loss of micro and macro aquatic species.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	5	2	8	5	**75**
Post-Mitigation	3	1	6	4	**40**
Mitigation Measures:	The potential effects may be ***avoided*** in the following ways: (1) Develop a water monitoring management plan. (2) Record and report all incidents related to affecting water quality. (3) Develop a rehabilitation plan specifically addressing the rehabilitation measures related to reinstatement of wetlands.				
Impact:	**Hydrocarbon Contamination** **Direct Impact:** Throughout the operational phase construction equipment are used. This poses a risk of hydrocarbon spills if equipment is not maintained. Depending on the size of the spill the level of contamination may vary from insignificant to significant and may affect the surrounding water quality (both surface and sub-surface) as well as the soil quality.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**

Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	4	2	6	2	**24**
Mitigation Measures:	Potential impact resulting from hydrocarbon contamination can be ***controlled*** in the following ways: (1) Develop and implement a Hazardous substances management plan specifically addressing handling, storage, and transport of hazardous substances. (2) Develop and implement an emergency response procedure addressing the procedure in case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure.				
Impact:	**Sedimentation and siltation of watercourses** **Direct Impact:** Stripping topsoil and subsoil or stockpiling material through or in close proximity to drainage lines may cause sedimentation and siltation of watercourses if not managed properly. **Indirect Impact**: Storm water runoff of dirt roads and un-vegetated areas may cause sedimentation and siltation of nearby watercourses.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	6	5	**60**
Post-Mitigation	4	2	4	3	**30**
Mitigation Measures:	Surface water quality can be ***controlled*** in the following ways: 1) Development and implementation of water quality monitoring plan. (2) Reporting and recording incidents.				
Impact:	**Alteration of drainage patterns** **Indirect Impact:** Alteration of the drainage patterns may lead to the degradation of downstream or surrounding Wetlands which in its turn may affect the aquatic micro and macro ecology. **Direct Impact**: Site clearing and topsoil stripping through drainage lines may lead to the siltation of streams as well as lead to erosion along the river banks that will affect the surface water quality negatively.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	5	2	8	5	**75**
Post-Mitigation	4	1	6	3	**33**
Mitigation Measures:	The effects on surface water quality resulting from the alteration in drainage patterns can be ***remedied*** in the following ways: (1) Develop a water monitoring management plan.				

	(2) Record and report all incidents related to affecting water quality. (3) Develop a rehabilitation plan specifically addressing the rehabilitation measures related to reinstatement of drainage lines.				
Impact:	**Destruction of upstream tributaries and reduction in water in the catchment** **Indirect Impact:** Alteration of the upstream drainage lines may lead to the degradation of downstream or surrounding Wetlands which in its turn may affect the aquatic micro and macro ecology. **Direct Impact:** The destruction of tributaries may lead to a limited volume of water available to the downstream users. The reduction in water in the catchment may cause the degradation of surface water quality.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	5	2	6	5	**65**
Post-Mitigation	4	1	4	3	**27**
Mitigation Measures:	The effects on surface water quality resulting from the destruction of upstream tributaries and reduction in water in the catchment can be ***remedied*** in the following ways: (1) Develop a water monitoring management plan. (2) Record and report all incidents related to affecting water quality. (3) Develop a rehabilitation plan specifically addressing the rehabilitation measures related to reinstatement of drainage lines.				

Activity:	19.Opencast mining excavations				
Impact:	**Contamination of water resources** **Direct Impact:** Throughout the operational phase of the mining operations, potential pollutants are used such as high levels of nitrates. Improper management of potential pollutants may lead to the degradation of water quality (both surface and sub-surface). Polluted water resources may affect the aquatic environment in a detrimental manner.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	4	1	6	3	**33**
Mitigation Measures:	Contamination of water resources can be ***avoided*** in the following ways: (1) Development and implementation of a water monitoring program. (2) Development and implementation of an Integrated Water and Waste Management Plan (IWWMP). (3)Development and implementation of a storm water management plan. (4) Reporting and recording all related incidents according to a developed procedure.				

	(5) Develop and implement an emergency preparedness plan.				
Impact:	**Sedimentation and siltation of watercourses** **Direct Impact:** Stockpiling excavated material through or in close proximity to drainage lines may cause sedimentation and siltation of watercourses if not managed properly. **Indirect Impact**: Storm water runoff of dirt roads and un-vegetated areas may cause sedimentation and siltation of nearby watercourses.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	4	1	6	3	**33**
Mitigation Measures:	Surface water quality can be ***controlled*** in the following ways: 1) Development and implementation of water quality monitoring plan. (2) Reporting and recording incidents.				
Impact:	**Alteration of drainage patterns** **Indirect Impact:** Alteration of the drainage patterns may lead to the degradation of downstream or surrounding Wetlands which in its turn may affect the aquatic micro and macro ecology. **Direct Impact**: Site clearing and topsoil stripping through drainage lines may lead to the siltation of streams as well as lead to erosion along the river banks that will affect the surface water quality negatively.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	5	2	8	5	**75**
Post-Mitigation	4	1	6	3	**33**
Mitigation Measures:	The effects on surface water quality resulting from the alteration in drainage patterns can be ***remedied*** in the following ways: (1) Develop a water monitoring management plan. (2) Record and report all incidents related to affecting water quality. (3) Develop a rehabilitation plan specifically addressing the rehabilitation measures related to reinstatement of drainage lines.				
Impact:	**Destruction of upstream tributaries and reduction in water in the catchment** **Indirect Impact:** Alteration of the upstream drainage lines may lead to the degradation of downstream or surrounding Wetlands which in its turn may affect the aquatic micro and macro ecology. **Direct Impact:** The destruction of tributaries may lead to a limited volume of water available to the downstream users. The reduction in water in the catchment may cause the degradation of surface water quality.				

Significance rating:	Duration	Extent	Magnitude	Probability	Significance
Pre-Mitigation	4	2	6	5	60
Post-Mitigation	4	1	4	3	27
Mitigation Measures:	The effects on surface water quality resulting from the destruction of upstream tributaries and reduction in water in the catchment can be ***remedied*** in the following ways: (1) Develop a water monitoring management plan. (2) Record and report all incidents related to affecting water quality. (3) Develop a rehabilitation plan specifically addressing the rehabilitation measures related to reinstatement of drainage lines.				

Activity:	20.Drilling & Blasting				
Impact:	**Contamination of water resources** **Direct Impact:** Improper management of blasting activities poses the risk of contaminating water resources with pollutants such as high content of Nitrates. The presence of pollutants in the water resources poses a risk of degrading the conditions for the aquatic ecology to thrive.				
Significance rating:	Duration	Extent	Magnitude	Probability	Significance
Pre-Mitigation	4	2	8	5	70
Post-Mitigation	4	1	4	3	27
Mitigation Measures:	Contamination of water resources can be ***avoided*** in the following ways: (1) Development and implementation of a water monitoring program. (2) Development and implementation of an Integrated Water and Waste Management Plan (IWWMP). (3)Development and implementation of a storm water management plan. (4) Reporting and recording all related incidents according to a developed procedure. (5) Develop and implement an emergency preparedness plan.				

Activity:	21. RoM & product stockpiling				
Impact:	**Contamination of water resources** **Direct Impact:** Throughout the operational phase of the mining operations, potential pollutants are used such as high levels of nitrates. Improper management of potential pollutants may lead to the degradation of water quality (both surface and sub-surface). Polluted water resources may affect the aquatic environment in a detrimental manner. **Indirect Impact**: Sub-surface material and ore exposed to weathering may release pollutants to the water resources.				
Significance rating:	Duration	Extent	Magnitude	Probability	Significance

Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	4	1	6	3	**33**
Mitigation Measures:	Contamination of water resources can be ***avoided*** in the following ways: (1) Development and implementation of a water monitoring program. (2) Development and implementation of an Integrated Water and Waste Management Plan (IWWMP). (3)Development and implementation of a storm water management plan. (4) Reporting and recording all related incidents according to a developed procedure. (5) Develop and implement an emergency preparedness plan.				
Impact:	**Sedimentation and siltation of watercourses** **Direct Impact:** Stockpiling RoM and product material through or in close proximity to drainage lines may cause sedimentation and siltation of watercourses if not managed properly. **Indirect Impact**: Storm water runoff of dirt roads and un-vegetated areas may cause sedimentation and siltation of nearby watercourses.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	4	1	6	3	**33**
Mitigation Measures:	Surface water quality can be ***controlled*** in the following ways: 1) Development and implementation of water quality monitoring plan. (2) Reporting and recording incidents.				

Activity:	22. Residue stockpiles				
Impact:	**Contamination of water resources** **Direct Impact:** Throughout the operational phase of the mining operations, potential pollutants are used such as high levels of nitrates. Improper management of potential pollutants may lead to the degradation of water quality (both surface and sub-surface). Polluted water resources may affect the aquatic environment in a detrimental manner. **Indirect Impact**: Sub-surface material and ore exposed to weathering may release pollutants to the water resources.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	4	1	6	3	**33**
Mitigation Measures:	Contamination of water resources can be ***avoided*** in the following ways: (1) Development and implementation of a water monitoring program. (2) Development and implementation of an Integrated Water and Waste Management Plan				

	(IWWMP). (3)Development and implementation of a storm water management plan. (4) Reporting and recording all related incidents according to a developed procedure. (5) Develop and implement an emergency preparedness plan.				
Impact:	**Sedimentation and siltation of watercourses** **Direct Impact:** Stockpiling residue material through or in close proximity to drainage lines may cause sedimentation and siltation of watercourses if not managed properly. **Indirect Impact**: Storm water runoff of dirt roads and un-vegetated areas may cause sedimentation and siltation of nearby watercourses.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	4	1	6	3	**33**
Mitigation Measures:	Surface water quality can be ***controlled*** in the following ways: 1) Development and implementation of water quality monitoring plan. (2) Reporting and recording incidents.				
Impact:	**Alteration of drainage patterns** **Indirect Impact:** Alteration of the drainage patterns may lead to the degradation of downstream or surrounding Wetlands which in its turn may affect the aquatic micro and macro ecology. **Direct Impact**: Site clearing and topsoil stripping through drainage lines may lead to the siltation of streams as well as lead to erosion along the river banks that will affect the surface water quality negatively.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	5	2	8	5	**75**
Post-Mitigation	4	1	6	3	**33**
Mitigation Measures:	The effects on surface water quality resulting from the alteration in drainage patterns can be ***remedied*** in the following ways: (1) Develop a water monitoring management plan. (2) Record and report all incidents related to affecting water quality. (3) Develop a rehabilitation plan specifically addressing the rehabilitation measures related to reinstatement of drainage lines.				
Impact:	**Hazardous Leachate** **Direct Impact:** Potential pollutant in the residue material resulting from mining operation may lead to the formation of leachate. The leachate may contain toxins that are hazardous to the aquatic ecology and water resources.				

Significance rating:	Duration	Extent	Magnitude	Probability	Significance
Pre-Mitigation	5	2	8	5	75
Post-Mitigation	4	1	4	3	27
Mitigation Measures:	Formed hazardous leachate can be ***controlled*** in the following ways: (1) Design and implement a Integrated Waste Water Management Plan (IWWMP). (2) Develop and implement a water quality management plan. (3) Report and record any incidents related to hazardous leachates.				

Activity:	23. Screening Operations				
Impact:	**Contamination of water resources** **Direct Impact:** Water seeping from stockpiles poses a risk of leading to elevated concentrations of heavy metals and other elements in the groundwater environment, and can potentially be acidic. When this water reaches surface water bodies or the groundwater it can negatively affect the water quality. **Indirect Impact**: Alteration to the conditions of the water resources may negatively affect the aquatic ecology.				
Significance rating:	Duration	Extent	Magnitude	Probability	Significance
Pre-Mitigation	4	2	8	5	70
Post-Mitigation	4	1	6	3	33
Mitigation Measures:	Contamination of water resources can be ***avoided*** in the following ways: (1) Development and implementation of a water monitoring program. (2) Development and implementation of an Integrated Water and Waste Management Plan (IWWMP). (3)Development and implementation of a storm water management plan. (4) Reporting and recording all related incidents according to a developed procedure. (5) Develop and implement an emergency preparedness plan.				
Impact:	**Sedimentation and siltation of watercourses** **Direct Impact:** Stockpiling screened material through or in close proximity to drainage lines may cause sedimentation and siltation of watercourses if not managed properly. **Indirect Impact**: Storm water runoff of dirt roads and un-vegetated areas may cause sedimentation and siltation of nearby watercourses.				
Significance rating:	Duration	Extent	Magnitude	Probability	Significance
Pre-Mitigation	4	2	8	5	70
Post-Mitigation	4	1	6	3	33
Mitigation Measures:	Surface water quality can be ***controlled*** in the following ways:				

	1) Development and implementation of water quality monitoring plan. (2) Reporting and recording incidents.

Activity:	24. Discard disposal (backfilling of mining area)				
Impact:	**Contamination of water resources** **Direct Impact:** Throughout the operational phase of the mining operations, potential pollutants are used such as high levels of nitrates. Improper management of potential pollutants may lead to the degradation of water quality (both surface and sub-surface). Polluted water resources may affect the aquatic environment in a detrimental manner. **Indirect Impact**: Sub-surface material and ore exposed to weathering may release pollutants to the water resources.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	4	1	4	3	**27**
Mitigation Measures:	Contamination of water resources can be ***avoided*** in the following ways: (1) Development and implementation of a water monitoring program. (2) Development and implementation of an Integrated Water and Waste Management Plan (IWWMP). (3)Development and implementation of a storm water management plan. (4) Reporting and recording all related incidents according to a developed procedure. (5) Develop and implement an emergency preparedness plan.				
Impact:	**Sedimentation and siltation of watercourses** **Direct Impact:** Backfilling material through or in close proximity to drainage lines may cause sedimentation and siltation of watercourses if not managed properly. **Indirect Impact**: Storm water runoff of dirt roads and un-vegetated areas may cause sedimentation and siltation of nearby watercourses.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	4	1	6	3	**33**
Mitigation Measures:	Surface water quality can be ***controlled*** in the following ways: 1) Development and implementation of water quality monitoring plan. (2) Reporting and recording incidents.				

Activity:	25. Waste generation, storage and disposal				
Impact:	**Contamination of water resources** **Direct Impact:** The storage of large amounts of waste over an extended time in a area not lined or bunded poses a risk of forming potentially hazardous leachates. **Indirect Impact**: The hazardous leachate from the waste storage facilities poses a risk of contaminating both surface and sub-surface water resources. This may lead to the degradation of conditions for the aquatic ecology to thrive.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	1	8	5	**70**
Post-Mitigation	4	1	4	3	**27**
Mitigation Measures:	Contamination of water resources can be ***avoided*** in the following ways: (1) Development and implementation of a water monitoring program. (2) Development and implementation of an Integrated Water and Waste Management Plan (IWWMP). (3)Development and implementation of a storm water management plan. (4) Reporting and recording all related incidents according to a developed procedure. (5) Develop and implement an emergency preparedness plan.				
Impact:	**Hazardous Leachate** **Direct Impact:** The hazardous leachate from the waste storage facilities poses a risk of contaminating both surface and sub-surface water as well as soil resources. This may lead to the degradation of conditions for the aquatic ecology to thrive.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	5	2	8	5	**75**
Post-Mitigation	4	1	4	2	**18**
Mitigation Measures:	Formed hazardous leachate can be ***controlled*** in the following ways: (1) Design and implement a Integrated Waste Water Management Plan (IWWMP). (2) Develop and implement a water quality management plan. (3) Report and record any incidents related to hazardous leachates.				

Activity:	26. Chemical Toilets
Impact:	**Contamination of water resources** **Direct Impact:** Improper management of effluent from chemical toilets poses a high risk to contaminating water resources. **Indirect Impact**: Over an extended period of time the exposure to contamination will cause the degradation of fauna and flora habitats as well as affect the surface and sub-surface water

	quality.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	1	1	6	5	**40**
Post-Mitigation	1	1	4	2	**12**
Mitigation Measures:	Contamination of water resources can be ***avoided*** in the following ways: (1) Development and implementation of a water monitoring program. (2) Development and implementation of an Integrated Water and Waste Management Plan (IWWMP). (3)Development and implementation of a storm water management plan. (4) Reporting and recording all related incidents according to a developed procedure. (5) Develop and implement an emergency preparedness plan.				

Activity:	27. River crossings				
Impact:	**Contamination of water resources** **Direct Impact:** Storm water run-off from river crossing structures containing pollutants poses a risk in contaminating the surrounding water resources. **Indirect Impact**: Pollutants poses a risk in altering the conditions of the aquatic ecology to thrive.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	6	5	**60**
Post-Mitigation	4	1	4	3	**27**
Mitigation Measures:	Contamination of water resources can be ***avoided*** in the following ways: (1) Development and implementation of a water monitoring program. (2) Development and implementation of an Integrated Water and Waste Management Plan (IWWMP). (3)Development and implementation of a storm water management plan. (4) Reporting and recording all related incidents according to a developed procedure. (5) Develop and implement an emergency preparedness plan.				
Impact:	**Sedimentation and siltation of watercourses** **Direct Impact:** Excavating, stockpiling and transport of material through or in close proximity to drainage lines may cause sedimentation and siltation of watercourses if not managed properly. **Indirect Impact**: Storm water runoff of dirt roads and un-vegetated areas may cause sedimentation and siltation of nearby watercourses.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	**70**

Post-Mitigation	4	1	6	3	**33**
Mitigation Measures:	Surface water quality can be ***controlled*** in the following ways: 1) Development and implementation of water quality monitoring plan. (2) Reporting and recording incidents.				
Impact:	**Alteration of drainage patterns** **Indirect Impact:** Alteration of the drainage patterns may lead to the degradation of downstream or surrounding Wetlands which in its turn may affect the aquatic micro and macro ecology. **Direct Impact**: Site clearing and topsoil stripping through drainage lines may lead to the siltation of streams as well as lead to erosion along the river banks that will affect the surface water quality negatively.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	5	2	8	5	**75**
Post-Mitigation	4	1	6	3	**33**
Mitigation Measures:	The effects on surface water quality resulting from the alteration in drainage patterns can be ***remedied*** in the following ways: (1) Develop a water monitoring management plan. (2) Record and report all incidents related to affecting water quality. (3) Develop a rehabilitation plan specifically addressing the rehabilitation measures related to reinstatement of drainage lines.				

Activity:	28. Water supply (potable & process)				
Impact:	**Contamination of water resources** **Direct Impact:** Leaks and breaks of water supply infrastructure poses a risk of contaminating water resources. **Indirect Impact**: Pollutants poses a risk in altering the conditions of the aquatic ecology to thrive.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	4	1	2	2	**14**
Mitigation Measures:	Contamination of water resources can be ***avoided*** in the following ways: (1) Development and implementation of a water monitoring program. (2) Development and implementation of an Integrated Water and Waste Management Plan (IWWMP). (3)Development and implementation of a storm water management plan.				

	(4) Reporting and recording all related incidents according to a developed procedure. (5) Develop and implement an emergency preparedness plan.

Activity:	29. Storage of fuel and lubricants in temporary facilities				
Impact:	**Contamination of water resources** **Direct Impact:** The use of improper storage facilities poses a risk of the surrounding environment to be exposes to continuous leaking of hydrocarbons leading possibly contaminating surface and sub-surface water sources as well as the soils surrounding the facility.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	2	1	8	5	**55**
Post-Mitigation	1	1	6	2	**16**
Mitigation Measures:	Contamination of water resources can be ***avoided*** in the following ways: (1) Development and implementation of a water monitoring program. (2) Development and implementation of an Integrated Water and Waste Management Plan (IWWMP). (3)Development and implementation of a storm water management plan. (4) Reporting and recording all related incidents according to a developed procedure. (5) Develop and implement an emergency preparedness plan.				

Activity:	30. Vehicular activity on haul roads; and operation of mining equipment				
Impact:	**Sedimentation and siltation of watercourses** **Direct Impact:** Constructing access roads through drainage lines may cause sedimentation and siltation of watercourses if not managed properly. **Indirect Impact**: Storm water runoff of dirt roads may cause sedimentation and siltation of nearby watercourses.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	4	1	6	3	**33**
Mitigation Measures:	Surface water quality can be ***controlled*** in the following ways: 1) Development and implementation of water quality monitoring plan. (2) Reporting and recording incidents.				

Activity:	32. Water Management				
Impact:	**Contamination of water resources** **Direct Impact:** The poor management of onsite water i.e. Storm water, process water, effluent, potable water etc. may lead to the contamination of water resources.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	4	1	6	3	**33**
Mitigation Measures:	Contamination of water resources can be ***avoided*** in the following ways: (1) Development and implementation of a water monitoring program. (2) Development and implementation of an Integrated Water and Waste Management Plan (IWWMP). (3)Development and implementation of a storm water management plan. (4) Reporting and recording all related incidents according to a developed procedure. (5) Develop and implement an emergency preparedness plan.				
Impact:	**Sedimentation and siltation of watercourses** **Direct Impact:** Runoff from lay down areas, construction areas, mining areas, stockpile areas, roads etc. potentially contain sediment and silt that poses a risk of affecting surrounding water courses and drainage lines.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	4	1	6	3	**33**
Mitigation Measures:	Surface water quality can be ***controlled*** in the following ways: 1) Development and implementation of water quality monitoring plan. (2) Reporting and recording incidents.				
Impact:	**Alteration of drainage patterns** **Indirect Impact:** Alteration of the drainage patterns may lead to the degradation of downstream or surrounding Wetlands which in its turn may affect the aquatic micro and macro ecology. **Direct Impact**: Site clearing and topsoil stripping through drainage lines may lead to the siltation of streams as well as lead to erosion along the river banks that will affect the surface water quality negatively.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	5	2	8	5	**75**
Post-Mitigation	4	1	6	3	**33**
Mitigation Measures:	The effects on surface water quality resulting from the alteration in drainage patterns can be				

	remedied in the following ways: (1) Develop a water monitoring management plan. (2) Record and report all incidents related to affecting water quality. (3) Develop a rehabilitation plan specifically addressing the rehabilitation measures related to reinstatement of drainage lines.				
Impact:	**Destruction of upstream tributaries and reduction in water in the catchment** **Indirect Impact:** Alteration of the upstream drainage lines may lead to the degradation of downstream or surrounding Wetlands which in its turn may affect the aquatic micro and macro ecology. **Direct Impact:** The destruction of tributaries may lead to a limited volume of water available to the downstream users. The reduction in water in the catchment may cause the degradation of surface water quality.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	4	1	4	3	**27**
Mitigation Measures:	The effects on surface water quality resulting from the destruction of upstream tributaries and reduction in water in the catchment can be ***remedied*** in the following ways: (1) Develop a water monitoring management plan. (2) Record and report all incidents related to affecting water quality. (3) Develop a rehabilitation plan specifically addressing the rehabilitation measures related to reinstatement of drainage lines.				

Activity:	33. Rehabilitation of mining areas				
Impact:	**Sedimentation and siltation of watercourses** **Direct Impact:** Runoff from exposed un-vegetated areas poses a risk in contaminating nearby streams, rivers, and drainage lines.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	4	1	6	3	**33**
Mitigation Measures:	Surface water quality can be ***controlled*** in the following ways: 1) Development and implementation of water quality monitoring plan. (2) Reporting and recording incidents.				

Aspect:	Water resource users and management

Activity:	18.Topsoil and subsoil stripping & stockpiling for mining operation area				
Impact:	**Water level reduction and contamination** **Direct Impact**: The reduction in water levels as well as contamination of the water resource that may be caused by alternating the topography during site clearing and topsoil stripping poses a risk to affecting the surface and sub-surface water quality as well as the downstream users.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	6	5	**60**
Post-Mitigation	4	1	4	2	**18**
Mitigation Measures:	Water level reduction and contamination affecting the surface water quality can be controlled in following ways: (1) Development and implementation of water quality monitoring plan. (2) Development of a storm water management plan. (3) Reporting and recording incidents. (4) Create awareness of water conservation.				
Impact:	**Destruction of upstream tributaries and reduction in water in the catchment** **Indirect Impact:** Alteration of the upstream drainage lines may lead to the degradation of downstream or surrounding Wetlands which in its turn may affect the aquatic micro and macro ecology. **Direct Impact:** The destruction of tributaries may lead to a limited volume of water available to the downstream users. The reduction in water in the catchment may cause the degradation of surface water quality.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	5	2	6	5	**65**
Post-Mitigation	4	1	4	2	**18**
Mitigation Measures:	The effects on surface water quality resulting from the destruction of upstream tributaries and reduction in water in the catchment can be ***remedied*** in the following ways: (1) Develop a water monitoring management plan. (2) Record and report all incidents related to affecting water quality. (3) Develop a rehabilitation plan specifically addressing the rehabilitation measures related to reinstatement of drainage lines.				

Activity:	19.Opencast mining excavations				
Impact:	**Destruction of upstream tributaries and reduction in water in the catchment** **Indirect Impact:** Alteration of the upstream drainage lines may lead to the degradation of downstream or surrounding Wetlands which in its turn may affect the aquatic micro and macro ecology. **Direct Impact:** The destruction of tributaries may lead to a limited volume of water available to the downstream users. The reduction in water in the catchment may cause the degradation of surface water quality.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	5	2	6	5	**65**
Post-Mitigation	4	1	4	2	**18**
Mitigation Measures:	The effects on surface water quality resulting from the destruction of upstream tributaries and reduction in water in the catchment can be ***remedied*** in the following ways: (1) Develop a water monitoring management plan. (2) Record and report all incidents related to affecting water quality. (3) Develop a rehabilitation plan specifically addressing the rehabilitation measures related to reinstatement of drainage lines.				

Activity:	27. River crossings				
Impact:	**Water level reduction and contamination** **Direct Impact**: Improper installation of river crossing infrastructures poses a risk in water level reduction and contamination of downstream water users i.e. through blocking of the natural flow of streams/rivers. **Indirect Impact**: The reduction of water levels of rivers/watercourses poses a risk of affecting both surface and sub-surface water resources.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	6	5	**60**
Post-Mitigation	4	1	2	2	**14**
Mitigation Measures:	Water level reduction and contamination affecting the surface water quality can be controlled in following ways: (1) Development and implementation of water quality monitoring plan. (2) Development of a storm water management plan. (3) Reporting and recording incidents. (4) Create awareness of water conservation.				

Activity:	28. Water supply (potable & process)				
Impact:	**Water level reduction and contamination** **Direct Impact**: Water wastage and over exploitation of water resources poses a risk in water level reduction. **Indirect Impact**: The reduction of water levels of rivers/watercourses/underground water tables poses a risk of affecting both surface and sub-surface water resources.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	6	5	**60**
Post-Mitigation	4	1	2	2	**14**
Mitigation Measures:	Water level reduction and contamination affecting the surface water quality can be controlled in following ways: (1) Development and implementation of water quality monitoring plan. (2) Development of a storm water management plan. (3) Reporting and recording incidents. (4) Create awareness of water conservation.				

Activity:	32. Water Management				
Impact:	**Improper water storage management** **Direct Impact**: Improper management of water storage facilities i.e. Not inspecting or regularly maintaining the storage tanks pose a risk of leaks and contamination.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	1	6	5	**55**
Post-Mitigation	4	1	4	3	**27**
Mitigation Measures:	The following mitigation measures can be implemented to ***avoid*** the usage of water resources: (1) Water usage monitoring plan to be developed and implemented. (2) Create awareness of water conservation.				
Impact:	**Water level reduction and contamination** **Direct Impact**: Improper management of water usage and installation of improper storm water features and infrastructure poses a risk of reducing the water levels for downstream users. **Indirect Impact**: The reduction of water levels of rivers/watercourses/underground water tables poses a risk of affecting both surface and sub-surface water resources.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	4	1	4	3	**27**
Mitigation Measures:	Water level reduction and contamination affecting the surface water quality can be controlled in				

	following ways: (1) Development and implementation of water quality monitoring plan. (2) Development of a storm water management plan. (3) Reporting and recording incidents. (4) Create awareness of water conservation.
Impact:	**Destruction of upstream tributaries and reduction in water in the catchment** **Indirect Impact:** Alteration of the upstream drainage lines may lead to the degradation of downstream or surrounding Wetlands which in its turn may affect the aquatic micro and macro ecology. **Direct Impact:** The destruction of tributaries may lead to a limited volume of water available to the downstream users. The reduction in water in the catchment may cause the degradation of surface water quality.

Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	4	1	4	3	**27**

Mitigation Measures:	The effects on surface water quality resulting from the destruction of upstream tributaries and reduction in water in the catchment can be ***remedied*** in the following ways: (1) Develop a water monitoring management plan. (2) Record and report all incidents related to affecting water quality. (3) Develop a rehabilitation plan specifically addressing the rehabilitation measures related to reinstatement of drainage lines.

Aspect:	**Soil Quality**

Activity:	18.Topsoil and subsoil stripping & stockpiling for mining operation area
Impact:	**Degradation of soil resources** **Direct Impact:** If not managed properly, fertile soil will be lost during site clearance, topsoil striping and stockpiling. Loss of fertile soil will cause the degradation of habitat for flora micro- and macro organisms.

Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	3	1	6	5	**50**
Post-Mitigation	3	1	4	3	**24**

Mitigation Measures:	Degradation of soil resources can be ***remedied*** in the following ways: (1) Develop and implement soil conservation and stockpile management plan. (2) Develop and implement a Rehabilitation plan.

Activity:	19.Opencast mining excavations				
Impact:	**Hydrocarbon Contamination** **Direct Impact:** Throughout the operational phase construction equipment are used. This poses a risk of hydrocarbon spills if equipment is not maintained. Depending on the size of the spill the level of contamination may vary from insignificant to significant and may affect the surrounding water quality (both surface and sub-surface) as well as the soil quality.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	1	8	5	**65**
Post-Mitigation	4	1	4	3	**27**
Mitigation Measures:	Potential impact resulting from hydrocarbon contamination can be ***controlled*** in the following ways: (1) Develop and implement a Hazardous substances management plan specifically addressing handling, storage, and transport of hazardous substances. (2) Develop and implement an emergency response procedure addressing the procedure in case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure.				
Impact:	**Degradation of soil resources** **Direct Impact:** If not managed properly, fertile soil will be lost during site clearance, topsoil striping and stockpiling. Loss of fertile soil will cause the degradation of habitat for flora micro- and macro organisms.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	5	1	6	5	**60**
Post-Mitigation	4	1	4	3	**27**
Mitigation Measures:	Degradation of soil resources can be ***remedied*** in the following ways: (1) Develop and implement soil conservation and stockpile management plan. (2) Develop and implement a Rehabilitation plan.				
Impact:	**Erosion – Loss of fertile soil** **Indirect Impact:** Un-vegetated areas exposed to weathering for an extended period of time will lead to erosion. Erosion prone areas have a high risk of losing fertile soil caused by flash floods. The loss of fertile soil will result in the loss of important micro ecosystems.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	4	1	6	3	**33**
Mitigation Measures:	Erosion can be ***controlled*** in the following ways:				

	(1) Development and implementation of a storm water management plan. (2) Regular inspection of erosion prone areas for signs of erosion. (3) A soil conservation and stockpiling plan to be developed and implemented. (4) Monthly monitoring of water quality (as per recommendation of specialist study).

Activity:	20.Drilling & Blasting				
Impact:	**Hydrocarbon Contamination** **Direct Impact:** The use of drill Riggs poses a high risk of hydrocarbon spills. Depending on the size of the spill the level of contamination may vary from insignificant to significant and may affect the surrounding water quality (both surface and sub-surface) as well as the soil quality.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	1	8	5	**65**
Post-Mitigation	4	1	4	3	**27**
Mitigation Measures:	Potential impact resulting from hydrocarbon contamination can be ***controlled*** in the following ways: (1) Develop and implement a Hazardous substances management plan specifically addressing handling, storage, and transport of hazardous substances. (2) Develop and implement an emergency response procedure addressing the procedure in case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure.				
Impact:	**Degradation of soil resources** **Direct Impact:** Improper management of blasting activities poses the risk of contaminating soil resources with pollutants such as a high content of Nitrates. The presence of pollutant in the soils results in the degradation of the quality. **Indirect Impact**: The degradation of soil quality poses the risk of degrading the conditions for flora and fauna micro ecosystems.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	1	8	5	**65**
Post-Mitigation	4	1	4	3	**27**
Mitigation Measures:	Degradation of soil resources can be ***remedied*** in the following ways: (1) Develop and implement soil conservation and stockpile management plan. (2) Develop and implement a Rehabilitation plan.				

Activity:	21. RoM & product stockpiling				
Impact:	**Hydrocarbon Contamination** **Direct Impact:** Throughout the operational phase equipment and plant are used to transport and stockpile RoM and product. This poses a risk of hydrocarbon spills if equipment are not maintained. Depending on the size of the spill the level of contamination may vary from insignificant to significant and may affect the surrounding water quality (both surface and sub-surface) as well as the soil quality.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	1	8	5	**65**
Post-Mitigation	4	1	4	3	**27**
Mitigation Measures:	Potential impact resulting from hydrocarbon contamination can be ***controlled*** in the following ways: (1) Develop and implement a Hazardous substances management plan specifically addressing handling, storage, and transport of hazardous substances. (2) Develop and implement an emergency response procedure addressing the procedure in case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure.				
Impact:	**Degradation of soil resources** **Direct Impact:** If not managed properly, fertile soil will be lost during site clearance, topsoil striping and stockpiling. Loss of fertile soil will cause the degradation of habitat for flora micro- and macro organisms.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	5	1	6	5	**60**
Post-Mitigation	4	1	4	3	**27**
Mitigation Measures:	Degradation of soil resources can be ***remedied*** in the following ways: (1) Develop and implement soil conservation and stockpile management plan. (2) Develop and implement a Rehabilitation plan.				
Impact:	**Erosion – Loss of fertile soil** **Indirect Impact:** Un-vegetated areas exposed to weathering for an extended period of time will lead to erosion. Erosion prone areas have a high risk of losing fertile soil caused by flash floods. The loss of fertile soil will result in the loss of important micro ecosystems.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	4	1	6	3	**33**

Mitigation Measures:	Erosion can be ***controlled*** in the following ways: (1) Development and implementation of a storm water management plan. (2) Regular inspection of erosion prone areas for signs of erosion. (3) A soil conservation and stockpiling plan to be developed and implemented. (4) Monthly monitoring of water quality (as per recommendation of specialist study).

Activity:	22. Residue stockpiles				
Impact:	**Degradation of soil resources** **Direct Impact:** If not managed properly, fertile soil will be lost during site clearance, topsoil striping and stockpiling. Loss of fertile soil will cause the degradation of habitat for flora micro- and macro organisms.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	5	1	8	5	**70**
Post-Mitigation	4	1	4	3	**27**
Mitigation Measures:	Degradation of soil resources can be ***remedied*** in the following ways: (1) Develop and implement soil conservation and stockpile management plan. (2) Develop and implement a Rehabilitation plan.				

Activity:	23. Screening Operations				
Impact:	**Hydrocarbon Contamination** **Direct Impact:** Hydrocarbon spills can occur where heavy machinery such as the screening plant and hauling vehicles are parked because they contain large volumes of lubricating oils, hydraulic oils, and diesel to run. This poses a risk of hydrocarbon spills if equipment is not maintained. Depending on the size of the spill the level of contamination may vary from insignificant to significant and may affect the surrounding water quality (both surface and sub-surface) as well as the soil quality.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	1	8	5	**65**
Post-Mitigation	4	1	2	3	**21**
Mitigation Measures:	Potential impact resulting from hydrocarbon contamination can be ***controlled*** in the following ways: (1) Develop and implement a Hazardous substances management plan specifically addressing handling, storage, and transport of hazardous substances. (2) Develop and implement an emergency response procedure addressing the procedure in case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or				

	accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure.				
Impact:	**Degradation of soil resources** **Direct Impact:** Improper management of stockpile area i.e. mixing of topsoil and fertile soils with subsoil or RoM product poses a risk of degrading of soil quality. **Indirect Impact**: The degradation of soil quality poses the risk of degrading the conditions for flora micro organism to thrive.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	5	1	8	5	**70**
Post-Mitigation	4	1	4	3	**27**
Mitigation Measures:	Degradation of soil resources can be ***remedied*** in the following ways: (1) Develop and implement soil conservation and stockpile management plan. (2) Develop and implement a Rehabilitation plan.				

Activity:	24. Discard disposal (backfilling of mining area)				
Impact:	**Hydrocarbon Contamination** **Direct Impact:** During backfilling activities equipment and plant are used. This poses a risk of hydrocarbon spills if equipment is not maintained. Depending on the size of the spill the level of contamination may vary from insignificant to significant and may affect the surrounding water quality (both surface and sub-surface) as well as the soil quality. **Indirect Impact**: The degradation of water quality and soil quality poses a risk of negatively affecting the conditions for micro and macro organisms to thrive.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	5	2	6	5	**65**
Post-Mitigation	3	1	4	3	**27**
Mitigation Measures:	Potential impact resulting from hydrocarbon contamination can be ***controlled*** in the following ways: (1) Develop and implement a Hazardous substances management plan specifically addressing handling, storage, and transport of hazardous substances. (2) Develop and implement an emergency response procedure addressing the procedure in case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure.				
Impact:	**Degradation of soil resources** **Direct Impact:** Backfilling of soil layers will impact on the land capability by restoring the land				

	capability to some extent because vegetation will be supported and therefore returned to the planned post mining land capability such as arable land or grazing. However if not done incorrectly, the conditions for fauna and flora to reinstate the area will be negatively affected.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	5	1	8	5	**70**
Post-Mitigation	4	1	6	3	**33**
Mitigation Measures:	Degradation of soil resources can be ***remedied*** in the following ways: (1) Develop and implement soil conservation and stockpile management plan. (2) Develop and implement a Rehabilitation plan.				
Impact:	**Erosion – Loss of fertile soil** **Indirect Impact:** Un-vegetated areas exposed to weathering for an extended period of time will lead to erosion. Erosion prone areas have a high risk of losing fertile soil caused by flash floods. The loss of fertile soil will result in the loss of important micro ecosystems.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	8	5	**70**
Post-Mitigation	4	1	6	3	**33**
Mitigation Measures:	Erosion can be ***controlled*** in the following ways: (1) Development and implementation of a storm water management plan. (2) Regular inspection of erosion prone areas for signs of erosion. (3) A soil conservation and stockpiling plan to be developed and implemented. (4) Monthly monitoring of water quality (as per recommendation of specialist study).				

Activity:	25. Waste generation, storage and disposal				
Impact:	**Degradation of soil resources** **Direct Impact:** The storage of large amounts of waste over an extended time in a area not lined or bunded poses a risk of forming potentially hazardous leachates. Indirect Impact: The hazardous leachate potentially poses a risk in contaminating the soil causing the degradation of conditions for flora micro organisms to thrive.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	1	6	5	**55**
Post-Mitigation	4	1	2	3	**21**
Mitigation Measures:	Degradation of soil resources can be ***remedied*** in the following ways: (1) Develop and implement soil conservation and stockpile management plan. (2) Develop and implement a Rehabilitation plan.				
Impact:	**Illegal dumping**				

	Indirect Impact: Dumping of generated water in areas other than is approved by the authorisation or EMP poses a high risk of polluting numerous sources i.e. Water and soil. The dumping of general waste poses a choking risk to grazing animals. Hazardous Leachates from illegal dumps also poses a risk to the health of surrounding communities. **Indirect Impact**: The hazardous leachate from the waste storage facilities poses a risk of contaminating both surface and sub-surface water as well as soil resources. This may lead to the degradation of conditions for the aquatic ecology to thrive.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	5	2	8	5	**75**
Post-Mitigation	4	1	4	3	**27**
Mitigation Measures:	Illegal dumping can be ***avoided*** in the following ways: (1) Develop and implement as waste management plan with the focus on reuse, reduce, recycle, or avoid. (2) Development and maintenance of a waste disposal record keeping system.				

Activity:	25. Waste generation, storage and disposal				
Impact:	**Degradation of soil resources** **Direct Impact:** Continuous leaking, spills or lack of maintenance poses a risk to contaminating the surrounding soils and degrading the soil quality. This will affect the micro-ecosystems in a negative manner.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	1	1	6	5	**40**
Post-Mitigation	1	1	4	3	**18**
Mitigation Measures:	Degradation of soil resources can be ***remedied*** in the following ways: (1) Develop and implement soil conservation and stockpile management plan. (2) Develop and implement a Rehabilitation plan.				

Activity:	27. River crossings				
Impact:	**Hydrocarbon Contamination** **Direct Impact:** Throughout the construction and operational phase construction equipment are used. This poses a risk of hydrocarbon spills if equipment are not maintained. Depending on the size of the spill the level of contamination may vary from insignificant to significant and may affect the surrounding water quality (both surface and sub-surface) as well as the soil quality.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	3	2	8	5	**65**
Post-Mitigation	2	1	6	3	**27**
Mitigation Measures:	Potential impact resulting from hydrocarbon contamination can be ***controlled*** in the following ways: (1) Develop and implement a Hazardous substances management plan specifically addressing handling, storage, and transport of hazardous substances. (2) Develop and implement an emergency response procedure addressing the procedure in case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure.				
Impact:	**Erosion – Loss of fertile soil** **Indirect Impact:** Improper installation of river crossing infrastructure poses the risk of contributing to the conditions causing erosion i.e. Un-vegetated and exposed river/watercourse banks. **Indirect Impact**: Erosion poses a risk of contributing to sedimentation and siltation of rivers/watercourses. Pollutants may affect the conditions for the aquatic ecology to thrive.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	1	8	5	**65**
Post-Mitigation	4	1	4	4	**36**
Mitigation Measures:	Erosion can be ***controlled*** in the following ways: (1) Development and implementation of a storm water management plan. (2) Regular inspection of erosion prone areas for signs of erosion. (3) A soil conservation and stockpiling plan to be developed and implemented. (4) Monthly monitoring of water quality (as per recommendation of specialist study).				

Activity:	29. Storage of fuel and lubricants in temporary				
Impact:	**Hydrocarbon Contamination** **Direct Impact:** The construction of improper storage facilities poses a risk of the surrounding environment to be exposes to continuous leaking of hydrocarbons leading possibly contaminating surface and sub-surface water sources as well as the soils surrounding the facility.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	5	1	8	5	**70**
Post-Mitigation	1	1	6	3	**24**
Mitigation Measures:	Potential impact resulting from hydrocarbon contamination can be ***controlled*** in the following ways: (1) Develop and implement a Hazardous substances management plan specifically addressing handling, storage, and transport of hazardous substances. (2) Develop and implement an emergency response procedure addressing the procedure in case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure.				
Impact:	**Degradation of soil resources** **Direct Impact:** Continuous exposure to hydrocarbon leaks poses a risk to the degradation of the surrounding soil resources.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	2	1	8	5	**55**
Post-Mitigation	1	1	6	3	**24**
Mitigation Measures:	Degradation of soil resources can be ***remedied*** in the following ways: (1) Develop and implement soil conservation and stockpile management plan. (2) Develop and implement a Rehabilitation plan.				

Activity:	30. Vehicular activity on haul roads; and operation of mining equipment				
Impact:	**Hydrocarbon Contamination** **Direct Impact:** The use of vehicles on haul roads throughout the operational phase poses a risk of hydrocarbon spills if equipment is not maintained. Depending on the size of the spill the level of contamination may vary from insignificant to significant and may affect the surrounding water quality (both surface and sub-surface) as well as the soil quality.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	5	1	8	5	**70**

Post-Mitigation	4	1	4	3	**27**
Mitigation Measures:	Potential impact resulting from hydrocarbon contamination can be ***controlled*** in the following ways: (1) Develop and implement a Hazardous substances management plan specifically addressing handling, storage, and transport of hazardous substances. (2) Develop and implement an emergency response procedure addressing the procedure in case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure.				
Impact:	**Erosion – Loss of fertile soil** **Indirect Impact:** Improper management of storm water may lead to erosion along the access routes. This may lead to the loss of fertile soil and in its turn affect the micro-ecosystems of the surrounding environment.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	1	8	5	**65**
Post-Mitigation	4	1	6	3	**33**
Mitigation Measures:	Erosion can be ***controlled*** in the following ways: (1) Development and implementation of a storm water management plan. (2) Regular inspection of erosion prone areas for signs of erosion. (3) A soil conservation and stockpiling plan to be developed and implemented. (4) Monthly monitoring of water quality (as per recommendation of specialist study).				
Impact:	**Degradation of soil resources** **Direct Impact:** As part of the maintenance related to roads, valuable topsoil's may be removed. Improper management of topsoil or fertile soil may cause the loss of flora micro-ecosystems and cause the degradation of soil quality.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	5	1	8	5	**70**
Post-Mitigation	4	1	6	2	**22**
Mitigation Measures:	Degradation of soil resources can be ***remedied*** in the following ways: (1) Develop and implement soil conservation and stockpile management plan. (2) Develop and implement a Rehabilitation plan.				

Activity:	32. Water Management				
Impact:	**Erosion – Loss of fertile soil** **Indirect Impact:** Poor management of storm water throughout the construction, operational, and decommissioning phase poses a high risk for erosion. This may lead to the loss of fertile soil and in its turn affect the micro-ecosystems of the surrounding environment.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	1	8	5	**65**
Post-Mitigation	4	1	4	3	**27**
Mitigation Measures:	Erosion can be ***controlled*** in the following ways: (1) Development and implementation of a storm water management plan. (2) Regular inspection of erosion prone areas for signs of erosion. (3) A soil conservation and stockpiling plan to be developed and implemented. (4) Monthly monitoring of water quality (as per recommendation of specialist study).				

Activity:	33. Rehabilitation of mining areas				
Impact:	**Erosion – Loss of fertile soil** **Indirect Impact:** Exposed un-vegetated rehabilitated areas pose a high risk of erosion. This may lead to the loss of fertile soil and in its turn affect the micro-ecosystems of the surrounding environment.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	5	1	8	5	**70**
Post-Mitigation	4	1	4	3	**27**
Mitigation Measures:	Erosion can be ***controlled*** in the following ways: (1) Development and implementation of a storm water management plan. (2) Regular inspection of erosion prone areas for signs of erosion. (3) A soil conservation and stockpiling plan to be developed and implemented. (4) Monthly monitoring of water quality (as per recommendation of specialist study).				
Impact:	**Degradation of soil resources** **Direct Impact:** Poor management of topsoil and subsoil poses a risk to degradation of soil resources.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	5	1	10	5	**80**
Post-Mitigation	1	1	6	3	**24**
Mitigation Measures:	Degradation of soil resources can be ***remedied*** in the following ways: (1) Develop and implement soil conservation and stockpile management plan.				

	(2) Develop and implement a Rehabilitation plan.

Aspect:	**Terrestrial Ecosystems**

Activity:	18.Topsoil and subsoil stripping & stockpiling for mining operation area				
Impact:	**Vegetation and habitat loss** **Direct Impact:** Clearing of site and stripping of topsoil leads to the loss of vegetation and habitats of macro and micro organisms Loss of vegetation, increase in runoff and erosion, possible distribution and increased establishment of alien invasive species, possible disturbance and reduction of habitat, injury or death to terrestrial fauna, possible change of natural runoff and drainage patterns causing accelerated erosion, possible loss of protected species, possible permanent loss of re-vegetation potential of soil surface, increase in dust levels, interference with fauna behavioural activities, possible exposure of fauna and flora to contaminants – especially hydrocarbons and increased dust levels.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	5	2	10	5	**85**
Post-Mitigation	4	1	6	5	**55**
Mitigation Measures:	The loss of vegetation can be ***remedied*** in the following ways: (1) Development and implementation of a rehabilitation plan. (2) Develop and implement a plant species search and rescue management plan.				
Impact:	**Influx of alien invasive vegetation** **Direct Impact:** Site clearing for roads, lay down areas, and mining area exposes the un-vegetated area to the influx of alien invasive vegetation causing Irreversible damage to the native fauna and flora species and loss of habitats.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	6	5	**60**
Post-Mitigation	4	1	4	4	**36**
Mitigation Measures:	The influx of alien invasive vegetation can be ***controlled*** in the following ways: (1) Development and implementation of an alien and invasive control plan. (2) Awareness training on the identification of weeds and alien species to employees responsible for the management of these species.				

Activity:	19.Opencast mining excavations

Impact:	**Vegetation and habitat loss** **Direct Impact:** Clearing of site and stripping of topsoil leads to the loss of vegetation and habitats of macro and micro organisms Loss of vegetation, increase in runoff and erosion, possible distribution and increased establishment of alien invasive species, possible disturbance and reduction of habitat, injury or death to terrestrial fauna, possible change of natural runoff and drainage patterns causing accelerated erosion, possible loss of protected species, possible permanent loss of re-vegetation potential of soil surface, increase in dust levels, interference with fauna behavioural activities, possible exposure of fauna and flora to contaminants – especially hydrocarbons and increased dust levels.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	5	2	10	5	**85**
Post-Mitigation	4	1	6	5	**55**
Mitigation Measures:	The loss of vegetation can be ***remedied*** in the following ways: (1) Development and implementation of a rehabilitation plan. (2) Develop and implement a plant species search and rescue management plan.				
Impact:	**Influx of alien invasive vegetation** **Direct Impact:** Site clearing for roads, lay down areas, and mining area exposes the un-vegetated area to the influx of alien invasive vegetation causing Irreversible damage to the native fauna and flora species and loss of habitats.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	6	5	**60**
Post-Mitigation	4	1	4	4	**36**
Mitigation Measures:	The influx of alien invasive vegetation can be ***controlled*** in the following ways: (1) Development and implementation of an alien and invasive control plan. (2) Awareness training on the identification of weeds and alien species to employees responsible for the management of these species.				

Activity:	21. RoM & product stockpiling
Impact:	**Vegetation and habitat loss** **Direct Impact:** Clearing of site and stripping of topsoil leads to the loss of vegetation and habitats of macro and micro organisms Loss of vegetation, increase in runoff and erosion, possible distribution and increased establishment of alien invasive species, possible disturbance and reduction of habitat, injury or death to terrestrial fauna, possible change of natural runoff and drainage patterns causing accelerated erosion, possible loss of protected species, possible permanent loss of re-vegetation potential of soil surface, increase in dust

	levels, interference with fauna behavioural activities, possible exposure of fauna and flora to contaminants – especially hydrocarbons and increased dust levels.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	5	1	8	5	**70**
Post-Mitigation	4	1	6	5	**55**
Mitigation Measures:	The loss of vegetation can be ***remedied*** in the following ways: (1) Development and implementation of a rehabilitation plan. (2) Develop and implement a plant species search and rescue management plan.				
Impact:	**Influx of alien invasive vegetation** **Direct Impact:** Site clearing for roads, lay down areas, and mining area exposes the un-vegetated area to the influx of alien invasive vegetation causing Irreversible damage to the native fauna and flora species and loss of habitats.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	6	5	**60**
Post-Mitigation	4	1	4	4	**36**
Mitigation Measures:	The influx of alien invasive vegetation can be ***controlled*** in the following ways: (1) Development and implementation of an alien and invasive control plan. (2) Awareness training on the identification of weeds and alien species to employees responsible for the management of these species.				

Activity:	22. Residue stockpiles				
Impact:	**Vegetation and habitat loss** **Direct Impact:** Clearing of site and stripping of topsoil leads to the loss of vegetation and habitats of macro and micro organisms Loss of vegetation, increase in runoff and erosion, possible distribution and increased establishment of alien invasive species, possible disturbance and reduction of habitat, injury or death to terrestrial fauna, possible change of natural runoff and drainage patterns causing accelerated erosion, possible loss of protected species, possible permanent loss of re-vegetation potential of soil surface, increase in dust levels, interference with fauna behavioural activities, possible exposure of fauna and flora to contaminants – especially hydrocarbons and increased dust levels.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	5	1	8	5	**70**
Post-Mitigation	4	1	6	5	**55**
Mitigation Measures:	The loss of vegetation can be ***remedied*** in the following ways: (1) Development and implementation of a rehabilitation plan.				

	(2) Develop and implement a plant species search and rescue management plan.

Activity:	33. Rehabilitation of mining areas				
Impact:	**Vegetation and habitat loss** **Direct Impact:** Improper rehabilitation measures implemented poses a risk of vegetation and habitat loss. The conditions for macro and micro organisms need to be suitable for reinstatement of the ecosystem. Loss of vegetation, increase in runoff and erosion, possible distribution and increased establishment of alien invasive species, possible disturbance and reduction of habitat, injury or death to terrestrial fauna, possible change of natural runoff and drainage patterns causing accelerated erosion, possible loss of protected species, possible permanent loss of re-vegetation potential of soil surface, increase in dust levels, interference with fauna behavioural activities, possible exposure of fauna and flora to contaminants – especially hydrocarbons and increased dust levels.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	5	1	10	5	**80**
Post-Mitigation	1	1	6	4	**32**
Mitigation Measures:	The loss of vegetation can be ***remedied*** in the following ways: (1) Development and implementation of a rehabilitation plan. (2) Develop and implement a plant species search and rescue management plan.				
Impact:	**Influx of alien invasive vegetation** **Direct Impact:** Site clearing for roads, lay down areas, and mining area exposes the un-vegetated area to the influx of alien invasive vegetation causing Irreversible damage to the native fauna and flora species and loss of habitats.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	6	5	**60**
Post-Mitigation	1	1	4	4	**24**
Mitigation Measures:	The influx of alien invasive vegetation can be ***controlled*** in the following ways: (1) Development and implementation of an alien and invasive control plan. (2) Awareness training on the identification of weeds and alien species to employees responsible for the management of these species.				
Aspect:	**Noise Quality**				

Activity:	18.Topsoil and subsoil stripping & stockpiling for mining operation area
Impact:	**Noise Generation** **Direct Impact:** The use of construction equipment during site clearing and topsoil stripping

	may cause noise during the construction phase. If equipment are not maintained and serviced regularly high levels of noise may result throughout the construction and operational phase.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	1	6	5	**55**
Post-Mitigation	4	1	4	3	**27**
Mitigation Measures:	Noise generation can be ***controlled*** in the following ways: (1) Development and implementation of an Acoustical Measurement & Audit Programme as part of the EMS. A monitoring program to be developed based on the specialist recommendations (**Appendix F**). (2) Recording, reporting, and remediating incidents related to noise. (3) Regular inspections of vehicles/equipment/plant.				

Activity:	19.Opencast mining excavations				
Impact:	**Noise Generation** **Direct Impact:** The use of construction equipment during site clearing and topsoil stripping may cause noise during the construction phase. If equipment are not maintained and serviced regularly high levels of noise may result throughout the construction and operational phase.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	6	5	**60**
Post-Mitigation	4	1	4	3	**27**
Mitigation Measures:	Noise generation can be ***controlled*** in the following ways: (1) Development and implementation of an Acoustical Measurement & Audit Programme as part of the EMS. A monitoring program to be developed based on the specialist recommendations (**Appendix F**). (2) Recording, reporting, and remediating incidents related to noise. (3) Regular inspections of vehicles/equipment/plant.				

Activity:	20.Drilling & Blasting
Impact:	**Noise Generation** **Direct Impact:** The use of drill Riggs and blasting activities itself will result in the generation of noise. If equipment is not maintained and serviced regularly high levels of noise may result throughout the operational phase.

Significance rating:	Duration	Extent	Magnitude	Probability	Significance
Pre-Mitigation	4	2	6	5	**60**
Post-Mitigation	4	2	4	3	**30**
Mitigation Measures:	Noise generation can be ***controlled*** in the following ways: (1) Development and implementation of an Acoustical Measurement & Audit Programme as part of the EMS. A monitoring program to be developed based on the specialist recommendations (**Appendix F**). (2) Recording, reporting, and remediating incidents related to noise. (3) Regular inspections of vehicles/equipment/plant.				

Activity:	21. RoM & product stockpiling				
Impact:	**Noise Generation** **Direct Impact:** The use of construction equipment during the hauling and stockpiling of RoM and product may cause noise during the operational phase. If equipment are not maintained and serviced regularly high levels of noise may result throughout the construction and operational phase.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	4	5	**50**
Post-Mitigation	4	1	2	3	**21**
Mitigation Measures:	Noise generation can be ***controlled*** in the following ways: (1) Development and implementation of an Acoustical Measurement & Audit Programme as part of the EMS. A monitoring program to be developed based on the specialist recommendations (**Appendix F**). (2) Recording, reporting, and remediating incidents related to noise. (3) Regular inspections of vehicles/equipment/plant.				

Activity:	23. Screening Operations				
Impact:	**Noise Generation** **Direct Impact:** Operation of the screening plant poses a risk of increasing the ambient noise levels at surrounding sensitive receptors.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**

Pre-Mitigation	4	1	6	5	**55**
Post-Mitigation	4	1	4	3	**27**
Mitigation Measures:	Noise generation can be ***controlled*** in the following ways: (1) Development and implementation of an Acoustical Measurement & Audit Programme as part of the EMS. A monitoring program to be developed based on the specialist recommendations (**Appendix F**). (2) Recording, reporting, and remediating incidents related to noise. (3) Regular inspections of vehicles/equipment/plant.				

Activity:	23. Screening Operations				
Impact:	**Noise Generation** **Direct Impact:** The use of construction equipment during backfilling may cause noise during the construction phase. If equipment are not maintained and serviced regularly high levels of noise may result throughout the operational phase.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	3	2	6	5	**55**
Post-Mitigation	1	1	4	3	**18**
Mitigation Measures:	Noise generation can be ***controlled*** in the following ways: (1) Development and implementation of an Acoustical Measurement & Audit Programme as part of the EMS. A monitoring program to be developed based on the specialist recommendations (**Appendix F**). (2) Recording, reporting, and remediating incidents related to noise. (3) Regular inspections of vehicles/equipment/plant.				

Activity:	30. Vehicular activity on haul roads; and operation of mining equipment				
Impact:	**Noise Generation** **Direct Impact:** The use of construction equipment during backfilling may cause noise during the construction phase. If equipment are not maintained and serviced regularly high levels of noise may result throughout the operational phase.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	6	5	**60**
Post-Mitigation	4	1	4	3	**27**
Mitigation Measures:	Noise generation can be ***controlled*** in the following ways:				

	(1) Development and implementation of an Acoustical Measurement & Audit Programme as part of the EMS. A monitoring program to be developed based on the specialist recommendations (**Appendix F**). (2) Recording, reporting, and remediating incidents related to noise. (3) Regular inspections of vehicles/equipment/plant.

Activity:	33. Rehabilitation of mining areas				
Impact:	**Noise Generation** **Direct Impact:** The use of unmaintained equipment and plant throughout the rehabilitation phase poses a risk of generating noise.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	2	2	6	5	**50**
Post-Mitigation	1	1	4	3	**18**
Mitigation Measures:	Noise generation can be ***controlled*** in the following ways: (1) Development and implementation of an Acoustical Measurement & Audit Programme as part of the EMS. A monitoring program to be developed based on the specialist recommendations (**Appendix F**). (2) Recording, reporting, and remediating incidents related to noise. (3) Regular inspections of vehicles/equipment/plant.				

Aspect:	Socio-economic

Activity:	14. Employment of workers and procurement of construction materials				
Impact:	**Loss of farm labour** **Direct Impact:** Increased demand of labour force poses a risk of the local farmers losing farm labour due to competing financial income.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	4	5	**50**
Post-Mitigation	4	2	2	4	**32**
Impact:	**Population Influx – Pressure on Resources** **Direct Impact:** Increased demand for labour force poses a risk of a population influx in the local district municipality. The increasing population will put pressure on the local municipality to provide services such as sewage, drinking water, waste management, electricity etc.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	4	5	**50**
Post-Mitigation	4	2	2	4	**32**
Impact:	**Population Influx – Social Pathologies** **Direct Impact:** Increased demand for labour force poses a risk of a population influx. The increased population influx may lead to conflicting social pathologies in the surrounding local community.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	4	5	**50**
Post-Mitigation	4	2	2	4	**32**
Impact:	**Job Creation and Skills Training** **Direct Impact:** As positive, local employed labour force will form part of a skills and training development programme. The proposed mining operation will create a job opportunity for at least a total of 60 people.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	2	0	4	**24**
Post-Mitigation	4	2	0	4	**24**
Impact:	**Job Creation (Multiplier affect) and Population Influx** **Direct Impact:** Social projects forming part of the proposed mining project will create additional job opportunities for the local communities.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	4	3	0	5	**35**

Post-Mitigation	4	2	0	4	**24**
Mitigation Measures:	The social-economic impacts can be ***controlled*** in the following ways: (1) Develop and implement a social labour plan. (2) Develop and implement a social development plan. (3) Develop and implement a skills development program.				

Aspect:	**Heritage and cultural resources**

Activity:	2. Site clearing and topsoil stripping for lay down				
Impact:	**Destruction of graves** **Direct Impact:** Proposed activities in close proximity to identified graves poses the risk of destructing graves of great cultural and heritage importance. **Indirect Impact**: Loss of heritage and history for the future generation of the affected community.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	5	2	6	5	**65**
Post-Mitigation	5	2	6	3	**39**
Mitigation Measures:	The destruction of graves can be ***avoided*** in the following ways: (1) Develop and implement an awareness campaign on the protection of social heritage impacts. (2) Clear marking of graves discovered by the Heritage Impact Assessment Report (**Appendix O**)				
Impact:	**Degradation of cultural significance heritage sites** **Direct Impact:** Proposed mining activities in close proximity to cultural significant heritage sites pose the risk of degrading or loss of these sites. **Indirect Impact**: Loss of heritage and history for the future generation of the affected community.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	5	2	6	5	**65**
Post-Mitigation	5	2	6	3	**39**
Mitigation Measures:	The degradation of cultural significant heritage sites can be ***avoided*** in the following ways: (1) Develop and implement an awareness campaign on the protection of social heritage impacts. (2) Clear marking of identified heritage sites discovered by the Heritage Impact Assessment Report (**Appendix O**)				

Decommissioning	
Aspect:	**Air Quality**

Activity:	35. Demolition / removal of portable and related infrastructure				
Impact:	**Dust Generation** **Direct Impact:** Dismantling and demolition of existing infrastructure, transporting and handling of topsoil on unpaved roads in order to bring the site to state suitable for alternative land uses poses potential impacts on the atmospheric environment. Demolition and removal of all infrastructures will cause fugitive dust emissions. Any implication this activity will have on ambient air quality will be short-term and localised. **Indirect Impact**: Continuous exposure to high levels of dust fallout may lead to unhealthy environment for employees and surrounding communities.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	1	2	6	5	**45**
Post-Mitigation	1	1	4	4	**24**
Mitigation Measures:	Fugitive dust generation can be ***controlled*** in the following ways: (1) Development of a dust fallout monitoring and management plan; (2) Frequent Inspections; and (3) Reporting and recording incidents related to air quality. A number of recommendation resulted from the Air Quality Assessment (**Appendix E**). These recommendations are included in Part B of this report. One of the recommendations is to develop a detailed air quality management plan (focusing on sources of dust located in close proximity to the residential receptors within the project boundary) ensuring adherence to thresholds stipulated in the Baseline Air Quality Impact Assessment report (BAQIAR) (**Appendix E**) prior to the commencement of operations. There are also a number of legislative requirements stipulated in the following regulations: • GN R. 283: National reporting regulations; • GN R. 1210: National Ambient Air quality standards; and • GN R. 897: National dust control regulations.				

Activity:	36. Vehicular activity: removal of mobile plant / equipment and vehicles
Impact:	**Dust Generation** **Direct Impact:** Transportation of mobile plants / equipment and other materials from site can lead to the generation of fugitive dust comprising TSP, PM10 and PM2.5. This activity will be short-term, localised, and will have low impacts on the atmospheric environment once the

	demolition ceases. **Indirect Impact**: Continuous exposure to high levels of dust fallout may lead to unhealthy environment for employees and surrounding communities.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	1	2	6	5	**45**
Post-Mitigation	1	1	4	4	**24**
Mitigation Measures:	Fugitive dust generation can be ***controlled*** in the following ways: (1) Development of a dust fallout monitoring and management plan; (2) Frequent Inspections; and (3) Reporting and recording incidents related to air quality. A number of recommendation resulted from the Air Quality Assessment (**Appendix E**). These recommendations are included in Part B of this report. One of the recommendations is to develop a detailed air quality management plan (focusing on sources of dust located in close proximity to the residential receptors within the project boundary) ensuring adherence to thresholds stipulated in the Baseline Air Quality Impact Assessment report (BAQIAR) (**Appendix E**) prior to the commencement of operations. There are also a number of legislative requirements stipulated in the following regulations: • GN R. 283: National reporting regulations; • GN R. 1210: National Ambient Air quality standards; and • GN R. 897: National dust control regulations.				
Impact:	**CO_2 emissions** **Direct Impact:** The use of diesel operated construction equipment will cause a contributing factor the BCR Minerals (Pty) Ltd carbon footprint.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	1	1	6	5	**40**
Post-Mitigation	1	1	2	3	**12**
Mitigation Measures:	CO_2 emissions and the release of noxious gasses can be ***controlled*** in the following ways: (1) Develop and maintain a carbon footprint reporting policy; (2) Monitor the carbon footprint throughout the entire life cycle of the Spitsvale project; (3) Develop and implement a hazardous substance management plan; and (4) Reporting and recording incidents. A number of recommendation resulted from the Air Quality Assessment (**Appendix E**). These recommendations are included in Part B of this report. GN R. 1651 published in terms of section 39 of the Atmospheric Pollution Prevention Act of 1965 stipulated a list of requirements in terms of regulating emissions form diesel operated				

	vehicles/plant/equipment.

Activity:	37. Rehabilitation of the lay down areas				
Impact:	**Dust Generation** **Direct Impact:** Re-vegetation of the remaining footprint of the mine must be done after the reclamation. The impacts on the atmospheric environment during rehabilitation will be limited to the vehicular activity, spreading of soil and profiling/contouring. The impact will be medium-term, very limited on spatial scale, with limited implication on ambient air quality.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	1	2	6	5	**45**
Post-Mitigation	1	1	4	4	**24**
Mitigation Measures:	Fugitive dust generation can be ***controlled*** in the following ways: (1) Development of a dust fallout monitoring and management plan; (2) Frequent Inspections; and (3) Reporting and recording incidents related to air quality. A number of recommendation resulted from the Air Quality Assessment (**Appendix E**). These recommendations are included in Part B of this report. One of the recommendations is to develop a detailed air quality management plan (focusing on sources of dust located in close proximity to the residential receptors within the project boundary) ensuring adherence to thresholds stipulated in the Baseline Air Quality Impact Assessment report (BAQIAR) (**Appendix E**) prior to the commencement of operations. There are also a number of legislative requirements stipulated in the following regulations: • GN R. 283: National reporting regulations; • GN R. 1210: National Ambient Air quality standards; and • GN R. 897: National dust control regulations.				

Activity:	38. Demolition of PCD's
Impact:	**Dust Generation** **Direct Impact:** Dismantling and demolition of existing infrastructure, transporting and handling of topsoil on unpaved roads in order to bring the site to state suitable for alternative land uses poses potential impacts on the atmospheric environment. Demolition and removal of all infrastructures will cause fugitive dust emissions. Any implication this activity will have on ambient air quality will be short-term and localised. **Indirect Impact**: Continuous exposure to high levels of dust fallout may lead to unhealthy environment for employees and surrounding communities.

Significance rating:	Duration	Extent	Magnitude	Probability	Significance
Pre-Mitigation	1	1	6	5	**40**
Post-Mitigation	1	1	2	3	**12**
Mitigation Measures:	Fugitive dust generation can be ***controlled*** in the following ways: (1) Development of a dust fallout monitoring and management plan; (2) Frequent Inspections; and (3) Reporting and recording incidents related to air quality. A number of recommendation resulted from the Air Quality Assessment (**Appendix E**). These recommendations are included in Part B of this report. One of the recommendations is to develop a detailed air quality management plan (focusing on sources of dust located in close proximity to the residential receptors within the project boundary) ensuring adherence to thresholds stipulated in the Baseline Air Quality Impact Assessment report (BAQIAR) (**Appendix E**) prior to the commencement of operations. There are also a number of legislative requirements stipulated in the following regulations: • GN R. 283: National reporting regulations; • GN R. 1210: National Ambient Air quality standards; and • GN R. 897: National dust control regulations.				

Activity:	39. Demolition of workshops, waste storage facilities, fuel storage facilities etc.				
Impact:	**Dust Generation** **Direct Impact:** Dismantling and demolition of existing infrastructure, transporting and handling of topsoil on unpaved roads in order to bring the site to state suitable for alternative land uses poses potential impacts on the atmospheric environment. Demolition and removal of all infrastructures will cause fugitive dust emissions. Any implication this activity will have on ambient air quality will be short-term and localised. **Indirect Impact**: Continuous exposure to high levels of dust fallout may lead to unhealthy environment for employees and surrounding communities.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	1	1	6	5	**40**
Post-Mitigation	1	1	2	3	**12**
Mitigation Measures:	Fugitive dust generation can be ***controlled*** in the following ways: (1) Development of a dust fallout monitoring and management plan; (2) Frequent Inspections; and (3) Reporting and recording incidents related to air quality. A number of recommendation resulted from the Air Quality Assessment (**Appendix E**). These				

	recommendations are included in Part B of this report. One of the recommendations is to develop a detailed air quality management plan (focusing on sources of dust located in close proximity to the residential receptors within the project boundary) ensuring adherence to thresholds stipulated in the Baseline Air Quality Impact Assessment report (BAQIAR) (**Appendix E**) prior to the commencement of operations. There are also a number of legislative requirements stipulated in the following regulations: • GN R. 283: National reporting regulations; • GN R. 1210: National Ambient Air quality standards; and • GN R. 897: National dust control regulations.

Aspect:	**Human Health and Safety**

Activity:	35. Demolition / removal of portable and related infrastructure				
Impact:	**Dust Generation** **Direct Impact:** Dismantling and demolition of existing infrastructure, transporting and handling of topsoil on unpaved roads in order to bring the site to state suitable for alternative land uses poses potential impacts on the atmospheric environment. Demolition and removal of all infrastructures will cause fugitive dust emissions. Any implication this activity will have on ambient air quality will be short-term and localised. **Indirect Impact**: Continuous exposure to high levels of dust fallout may lead to unhealthy environment for employees and surrounding communities.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	1	2	6	5	**45**
Post-Mitigation	1	1	4	4	**24**
Mitigation Measures:	Fugitive dust generation can be ***controlled*** in the following ways: (1) Development of a dust fallout monitoring and management plan; (2) Frequent Inspections; and (3) Reporting and recording incidents related to air quality. A number of recommendation resulted from the Air Quality Assessment (**Appendix E**). These recommendations are included in Part B of this report. One of the recommendations is to develop a detailed air quality management plan (focusing on sources of dust located in close proximity to the residential receptors within the project boundary) ensuring adherence to thresholds stipulated in the Baseline Air Quality Impact Assessment report (BAQIAR) (**Appendix E**) prior to the commencement of operations. There are also a number of legislative requirements stipulated in the following regulations:				

	• GN R. 283: National reporting regulations; • GN R. 1210: National Ambient Air quality standards; and • GN R. 897: National dust control regulations.

Activity:	36. Vehicular activity: removal of mobile plant / equipment and vehicles				
Impact:	**Dust Generation** **Direct Impact:** Transportation of mobile plants / equipment and other materials from site can lead to the generation of fugitive dust comprising TSP, PM10 and PM2.5. This activity will be short-term, localised, and will have low impacts on the atmospheric environment once the demolition ceases. **Indirect Impact**: Continuous exposure to high levels of dust fallout may lead to unhealthy environment for employees and surrounding communities.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	1	2	6	5	**45**
Post-Mitigation	1	1	4	4	**24**
Mitigation Measures:	Fugitive dust generation can be ***controlled*** in the following ways: (1) Development of a dust fallout monitoring and management plan; (2) Frequent Inspections; and (3) Reporting and recording incidents related to air quality. A number of recommendation resulted from the Air Quality Assessment (**Appendix E**). These recommendations are included in Part B of this report. One of the recommendations is to develop a detailed air quality management plan (focusing on sources of dust located in close proximity to the residential receptors within the project boundary) ensuring adherence to thresholds stipulated in the Baseline Air Quality Impact Assessment report (BAQIAR) (**Appendix E**) prior to the commencement of operations. There are also a number of legislative requirements stipulated in the following regulations: • GN R. 283: National reporting regulations; • GN R. 1210: National Ambient Air quality standards; and • GN R. 897: National dust control regulations.				

Activity:	37. Rehabilitation of the lay down areas
Impact:	**Dust Generation** **Direct Impact:** Re-vegetation of the remaining footprint of the mine must be done after the reclamation. The impacts on the atmospheric environment during rehabilitation will be limited to the vehicular activity, spreading of soil and profiling/contouring. The impact will be medium-

	term, very limited on spatial scale, with limited implication on ambient air quality.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	2	2	6	5	**50**
Post-Mitigation	1	1	4	4	**24**
Mitigation Measures:	Fugitive dust generation can be ***controlled*** in the following ways: (1) Development of a dust fallout monitoring and management plan; (2) Frequent Inspections; and (3) Reporting and recording incidents related to air quality. A number of recommendation resulted from the Air Quality Assessment (**Appendix E**). These recommendations are included in Part B of this report. One of the recommendations is to develop a detailed air quality management plan (focusing on sources of dust located in close proximity to the residential receptors within the project boundary) ensuring adherence to thresholds stipulated in the Baseline Air Quality Impact Assessment report (BAQIAR) (**Appendix E**) prior to the commencement of operations. There are also a number of legislative requirements stipulated in the following regulations: • GN R. 283: National reporting regulations; • GN R. 1210: National Ambient Air quality standards; and • GN R. 897: National dust control regulations.				

Activity:	38. Demolition of PCD's				
Impact:	**Dust Generation** **Direct Impact:** Dismantling and demolition of existing infrastructure, transporting and handling of topsoil on unpaved roads in order to bring the site to state suitable for alternative land uses poses potential impacts on the atmospheric environment. Demolition and removal of all infrastructures will cause fugitive dust emissions. Any implication this activity will have on ambient air quality will be short-term and localised. **Indirect Impact**: Continuous exposure to high levels of dust fallout may lead to unhealthy environment for employees and surrounding communities.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	1	1	6	5	**40**
Post-Mitigation	1	1	2	4	**16**
Mitigation Measures:	Fugitive dust generation can be ***controlled*** in the following ways: (1) Development of a dust fallout monitoring and management plan; (2) Frequent Inspections; and (3) Reporting and recording incidents related to air quality.				

	A number of recommendation resulted from the Air Quality Assessment (**Appendix E**). These recommendations are included in Part B of this report. One of the recommendations is to develop a detailed air quality management plan (focusing on sources of dust located in close proximity to the residential receptors within the project boundary) ensuring adherence to thresholds stipulated in the Baseline Air Quality Impact Assessment report (BAQIAR) (**Appendix E**) prior to the commencement of operations. There are also a number of legislative requirements stipulated in the following regulations: • GN R. 283: National reporting regulations; • GN R. 1210: National Ambient Air quality standards; and • GN R. 897: National dust control regulations.

Activity:	39. Demolition of workshops, waste storage				
Impact:	**Dust Generation** **Direct Impact:** Dismantling and demolition of existing infrastructure, transporting and handling of topsoil on unpaved roads in order to bring the site to state suitable for alternative land uses poses potential impacts on the atmospheric environment. Demolition and removal of all infrastructures will cause fugitive dust emissions. Any implication this activity will have on ambient air quality will be short-term and localised. **Indirect Impact**: Continuous exposure to high levels of dust fallout may lead to unhealthy environment for employees and surrounding communities.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	1	1	6	5	**40**
Post-Mitigation	1	1	2	4	**16**
Mitigation Measures:	Fugitive dust generation can be ***controlled*** in the following ways: (1) Development of a dust fallout monitoring and management plan; (2) Frequent Inspections; and (3) Reporting and recording incidents related to air quality. A number of recommendation resulted from the Air Quality Assessment (**Appendix E**). These recommendations are included in Part B of this report. One of the recommendations is to develop a detailed air quality management plan (focusing on sources of dust located in close proximity to the residential receptors within the project boundary) ensuring adherence to thresholds stipulated in the Baseline Air Quality Impact Assessment report (BAQIAR) (**Appendix E**) prior to the commencement of operations. There are also a number of legislative requirements stipulated in the following regulations: • GN R. 283: National reporting regulations;				

	• GN R. 1210: National Ambient Air quality standards; and • GN R. 897: National dust control regulations.

Aspect:	**Topography and Visual Environment**

Activity:	35. Demolition / removal of portable and related infrastructure				
Impact:	**Dust generation** **Direct Impact:** Clearing of vegetation for topsoil and subsoil stripping exposes the mining operation area to dust generation. High levels of dust fallout will affect the overall air quality. The generation of dust during these activities will affect the visual environment negatively. **Indirect Impact:** Continuous exposure to high levels of dust fallout may lead to unhealthy environment for employees and surrounding communities.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	1	2	4	5	**45**
Post-Mitigation	1	1	4	3	**18**
Mitigation Measures:	Fugitive dust generation can be ***controlled*** in the following ways: (1) Development of a dust fallout monitoring and management plan; (2) Frequent Inspections; and (3) Reporting and recording incidents related to air quality. A number of recommendation resulted from the Air Quality Assessment (**Appendix E**). These recommendations are included in Part B of this report. One of the recommendations is to develop a detailed air quality management plan (focusing on sources of dust located in close proximity to the residential receptors within the project boundary) ensuring adherence to thresholds stipulated in the Baseline Air Quality Impact Assessment report (BAQIAR) (**Appendix E**) prior to the commencement of operations. There are also a number of legislative requirements stipulated in the following regulations: • GN R. 283: National reporting regulations; • GN R. 1210: National Ambient Air quality standards; and • GN R. 897: National dust control regulations.				

Activity:	36. Vehicular activity: removal of mobile plant / equipment and vehicles
Impact:	**Dust Generation** **Direct Impact:** Transportation of mobile plants / equipment and other materials from site can lead to the generation of fugitive dust comprising TSP, PM10 and PM2.5. This activity will be short-term, localised, and will have low impacts on the atmospheric environment once the

	demolition ceases. **Indirect Impact**: Continuous exposure to high levels of dust fallout may lead to unhealthy environment for employees and surrounding communities.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	1	2	6	5	**45**
Post-Mitigation	1	1	4	4	**24**
Mitigation Measures:	Fugitive dust generation can be ***controlled*** in the following ways: (1) Development of a dust fallout monitoring and management plan; (2) Frequent Inspections; and (3) Reporting and recording incidents related to air quality. A number of recommendation resulted from the Air Quality Assessment (**Appendix E**). These recommendations are included in Part B of this report. One of the recommendations is to develop a detailed air quality management plan (focusing on sources of dust located in close proximity to the residential receptors within the project boundary) ensuring adherence to thresholds stipulated in the Baseline Air Quality Impact Assessment report (BAQIAR) (**Appendix E**) prior to the commencement of operations. There are also a number of legislative requirements stipulated in the following regulations: • GN R. 283: National reporting regulations; • GN R. 1210: National Ambient Air quality standards; and • GN R. 897: National dust control regulations.				

Activity:	37. Rehabilitation of the lay down areas				
Impact:	**Dust Generation** **Direct Impact:** Re-vegetation of the remaining footprint of the mine must be done after the reclamation. The impacts on the atmospheric environment during rehabilitation will be limited to the vehicular activity, spreading of soil and profiling/contouring. The impact will be medium-term, very limited on spatial scale, with limited implication on ambient air quality.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	2	2	4	5	**40**
Post-Mitigation	1	1	4	4	**24**
Mitigation Measures:	Fugitive dust generation can be ***controlled*** in the following ways: (1) Development of a dust fallout monitoring and management plan; (2) Frequent Inspections; and (3) Reporting and recording incidents related to air quality. A number of recommendation resulted from the Air Quality Assessment (**Appendix E**). These				

	recommendations are included in Part B of this report. One of the recommendations is to develop a detailed air quality management plan (focusing on sources of dust located in close proximity to the residential receptors within the project boundary) ensuring adherence to thresholds stipulated in the Baseline Air Quality Impact Assessment report (BAQIAR) (**Appendix E**) prior to the commencement of operations. There are also a number of legislative requirements stipulated in the following regulations: • GN R. 283: National reporting regulations; • GN R. 1210: National Ambient Air quality standards; and • GN R. 897: National dust control regulations.

Activity:	38. Demolition of PCD's				
Impact:	**Dust Generation** **Direct Impact:** Dismantling and demolition of existing infrastructure, transporting and handling of topsoil on unpaved roads in order to bring the site to state suitable for alternative land uses poses potential impacts on the atmospheric environment. Demolition and removal of all infrastructures will cause fugitive dust emissions. Any implication this activity will have on ambient air quality will be short-term and localised. **Indirect Impact**: Continuous exposure to high levels of dust fallout may lead to unhealthy environment for employees and surrounding communities.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	1	1	6	5	**40**
Post-Mitigation	1	1	2	4	**16**
Mitigation Measures:	Fugitive dust generation can be ***controlled*** in the following ways: (1) Development of a dust fallout monitoring and management plan; (2) Frequent Inspections; and (3) Reporting and recording incidents related to air quality. A number of recommendation resulted from the Air Quality Assessment (**Appendix E**). These recommendations are included in Part B of this report. One of the recommendations is to develop a detailed air quality management plan (focusing on sources of dust located in close proximity to the residential receptors within the project boundary) ensuring adherence to thresholds stipulated in the Baseline Air Quality Impact Assessment report (BAQIAR) (**Appendix E**) prior to the commencement of operations. There are also a number of legislative requirements stipulated in the following regulations: • GN R. 283: National reporting regulations; • GN R. 1210: National Ambient Air quality standards; and				

	• GN R. 897: National dust control regulations.

Activity:	39. Demolition of workshops, waste storage				
Impact:	**Dust Generation** **Direct Impact:** Dismantling and demolition of existing infrastructure, transporting and handling of topsoil on unpaved roads in order to bring the site to state suitable for alternative land uses poses potential impacts on the atmospheric environment. Demolition and removal of all infrastructures will cause fugitive dust emissions. Any implication this activity will have on ambient air quality will be short-term and localised. **Indirect Impact**: Continuous exposure to high levels of dust fallout may lead to unhealthy environment for employees and surrounding communities.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	1	1	6	5	**40**
Post-Mitigation	1	1	2	4	**16**
Mitigation Measures:	Fugitive dust generation can be ***controlled*** in the following ways: (1) Development of a dust fallout monitoring and management plan; (2) Frequent Inspections; and (3) Reporting and recording incidents related to air quality. A number of recommendation resulted from the Air Quality Assessment (**Appendix E**). These recommendations are included in Part B of this report. One of the recommendations is to develop a detailed air quality management plan (focusing on sources of dust located in close proximity to the residential receptors within the project boundary) ensuring adherence to thresholds stipulated in the Baseline Air Quality Impact Assessment report (BAQIAR) (**Appendix E**) prior to the commencement of operations. There are also a number of legislative requirements stipulated in the following regulations: • GN R. 283: National reporting regulations; • GN R. 1210: National Ambient Air quality standards; and • GN R. 897: National dust control regulations.				

Aspect:	Surface Water quality

Activity:	35. Demolition / removal of portable and related infrastructure				
Impact:	**Hydrocarbon Contamination** **Direct Impact:** The potential impact will arise during demolition of infrastructure, where mobilisation of contaminants such as fuels containing hydrocarbons, waste, explosives, PCD material to the surface water resources resulting in the contamination of those resources.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	2	2	8	5	**60**
Post-Mitigation	1	1	6	3	**24**
Mitigation Measures:	Potential impact resulting from hydrocarbon contamination can be ***controlled*** in the following ways: (1) Develop and implement a Hazardous substances management plan specifically addressing handling, storage, and transport of hazardous substances. (2) Develop and implement an emergency response procedure addressing the procedure in case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure.				
Impact:	**General waste generation & Littering** **Direct Impact:** Throughout the decommissioning phase of the project large amounts of waste (general and hazardous waste) will be generated putting strain on local landfill sites. The storage of large amounts of waste over an extended time in a area not lined or bunded poses a risk of forming potentially hazardous leachates. **Indirect Impact**: The hazardous leachate from the waste storage facilities poses a risk of contaminating both surface and sub-surface water resources. This may lead to the degradation of conditions for the aquatic ecology to thrive.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	3	2	8	5	**65**
Post-Mitigation	1	1	6	3	**24**
Mitigation Measures:	Negative impacts of waste generation can be ***controlled*** in the following ways: (1) Develop and implement as waste management plan with the focus on reuse, reduce, recycle, or avoid. (2) Development and maintenance of a waste disposal record keeping system.				

Activity:	36. Vehicular activity: removal of mobile plant / equipment and vehicles				
Impact:	**Hydrocarbon Contamination** **Direct Impact:** Heavy vehicle activity used during the decommissioning phase is poses a risk of leaking or spilling contaminants such as fuels containing hydrocarbons, waste, explosives, PCD material to the surface water resources resulting in the contamination of those resources.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	2	1	8	5	**55**
Post-Mitigation	1	1	6	3	**24**
Mitigation Measures:	Potential impact resulting from hydrocarbon contamination can be ***controlled*** in the following ways: (1) Develop and implement a Hazardous substances management plan specifically addressing handling, storage, and transport of hazardous substances. (2) Develop and implement an emergency response procedure addressing the procedure in case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure.				
Impact:	**Sedimentation and siltation of watercourses** **Direct Impact:** Constructing and the use of access roads through drainage lines may cause sedimentation and siltation of watercourses if not managed properly. **Indirect Impact:** Storm water runoff of dirt roads and un-vegetated areas may cause sedimentation and siltation of nearby watercourses.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	1	1	8	5	**50**
Post-Mitigation	1	1	4	3	**18**
Mitigation Measures:	Surface water quality can be ***controlled*** in the following ways: 1) Development and implementation of water quality monitoring plan. (2) Reporting and recording incidents.				

Activity:	37. Rehabilitation of the lay down areas				
Impact:	**Sedimentation and siltation of watercourses** **Direct Impact:** If areas remain un-vegetated and exposed run-off from these areas may contain sediment and silt posing the risk of contaminating watercourses/rivers in close proximity.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	5	2	8	5	**75**

Post-Mitigation	1	1	4	3	**18**
Mitigation Measures:	Surface water quality can be ***controlled*** in the following ways: 1) Development and implementation of water quality monitoring plan. (2) Reporting and recording incidents.				

Activity:	38. Demolition of PCD's				
Impact:	**Hydrocarbon Contamination** **Direct Impact:** Heavy vehicle activity used during the decommissioning phase is poses a risk of leaking or spilling contaminants such as fuels containing hydrocarbons, waste, explosives, PCD material to the surface water resources resulting in the contamination of those resources.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	1	2	8	5	**55**
Post-Mitigation	1	1	6	3	**24**
Mitigation Measures:	Potential impact resulting from hydrocarbon contamination can be ***controlled*** in the following ways: (1) Develop and implement a Hazardous substances management plan specifically addressing handling, storage, and transport of hazardous substances. (2) Develop and implement an emergency response procedure addressing the procedure in case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure.				
Impact:	**Contamination of water resource** **Direct Impact:** Discharge, spills and leakage of effluent containing pollutants poses a risk of contaminating water resources within close proximity. **Indirect Impact**: Pollutants poses a risk in altering the conditions of the aquatic ecology to thrive.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	2	2	8	5	**60**
Post-Mitigation	1	1	6	3	**24**
Mitigation Measures:	Contamination of water resources can be ***avoided*** in the following ways: (1) Development and implementation of a water monitoring program. (2) Development and implementation of an Integrated Water and Waste Management Plan (IWWMP). (3)Development and implementation of a storm water management plan. (4) Reporting and recording all related incidents according to a developed procedure.				

	(5) Develop and implement an emergency preparedness plan.				
Impact:	**General waste generation & Littering** **Direct Impact:** Throughout the decommissioning phase of the project large amounts of waste (general and hazardous waste) will be generated putting strain on local landfill sites. The storage of large amounts of waste over an extended time in a area not lined or bunded poses a risk of forming potentially hazardous leachates. **Indirect Impact**: The hazardous leachate from the waste storage facilities poses a risk of contaminating both surface and sub-surface water resources. This may lead to the degradation of conditions for the aquatic ecology to thrive.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	3	1	8	5	**60**
Post-Mitigation	1	1	4	3	**18**
Mitigation Measures:	Negative impacts of waste generation can be ***controlled*** in the following ways: (1) Develop and implement as waste management plan with the focus on reuse, reduce, recycle, or avoid. (2) Development and maintenance of a waste disposal record keeping system.				

Activity:	39. Demolition of workshops, waste storage facilities, fuel storage facilities etc.				
Impact:	**Hydrocarbon Contamination** **Direct Impact:** Heavy vehicle activity used during the decommissioning phase is poses a risk of leaking or spilling contaminants such as fuels containing hydrocarbons, waste, explosives, PCD material to the surface water resources resulting in the contamination of those resources.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	2	2	8	5	**55**
Post-Mitigation	1	1	6	3	**24**
Mitigation Measures:	Potential impact resulting from hydrocarbon contamination can be ***controlled*** in the following ways: (1) Develop and implement a Hazardous substances management plan specifically addressing handling, storage, and transport of hazardous substances. (2) Develop and implement an emergency response procedure addressing the procedure in case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure.				
Impact:	**Contamination of water resource** **Direct Impact:** Discharge, spills and leakage of effluent containing pollutants poses a risk of				

	contaminating water resources within close proximity. **Indirect Impact**: Pollutants poses a risk in altering the conditions of the aquatic ecology to thrive.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	2	2	8	5	**60**
Post-Mitigation	1	1	6	3	**24**
Mitigation Measures:	Contamination of water resources can be ***avoided*** in the following ways: (1) Development and implementation of a water monitoring program. (2) Development and implementation of an Integrated Water and Waste Management Plan (IWWMP). (3)Development and implementation of a storm water management plan. (4) Reporting and recording all related incidents according to a developed procedure. (5) Develop and implement an emergency preparedness plan.				
Impact:	**General waste generation & Littering** **Direct Impact:** Throughout the decommissioning phase of the project large amounts of waste (general and hazardous waste) will be generated putting strain on local landfill sites. The storage of large amounts of waste over an extended time in a area not lined or bunded poses a risk of forming potentially hazardous leachates. **Indirect Impact**: The hazardous leachate from the waste storage facilities poses a risk of contaminating both surface and sub-surface water resources. This may lead to the degradation of conditions for the aquatic ecology to thrive.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	3	2	8	5	**65**
Post-Mitigation	1	1	6	3	**24**
Mitigation Measures:	Negative impacts of waste generation can be ***controlled*** in the following ways: (1) Develop and implement as waste management plan with the focus on reuse, reduce, recycle, or avoid. (2) Development and maintenance of a waste disposal record keeping system.				

Aspect:	**Ground Water Quality**

Activity:	35. Demolition / removal of portable and related infrastructure
Impact:	**Hydrocarbon Contamination** **Direct Impact:** The potential impact will arise during demolition of infrastructure, where mobilisation of contaminants such as fuels containing hydrocarbons, waste, explosives, PCD

	material to the surface water resources resulting in the contamination of those resources.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	2	2	8	5	**60**
Post-Mitigation	1	1	6	1	**8**
Mitigation Measures:	Potential impact resulting from hydrocarbon contamination can be ***controlled*** in the following ways: (1) Develop and implement a Hazardous substances management plan specifically addressing handling, storage, and transport of hazardous substances. (2) Develop and implement an emergency response procedure addressing the procedure in case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure.				

Activity:	36. Vehicular activity: removal of mobile plant / equipment and vehicles				
Impact:	**Hydrocarbon Contamination** **Direct Impact:** Heavy vehicle activity used during the decommissioning phase is poses a risk of leaking or spilling contaminants such as fuels containing hydrocarbons, waste, explosives, PCD material to the surface water resources resulting in the contamination of those resources.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	2	1	8	5	**55**
Post-Mitigation	1	1	6	1	**8**
Mitigation Measures:	Potential impact resulting from hydrocarbon contamination can be ***controlled*** in the following ways: (1) Develop and implement a Hazardous substances management plan specifically addressing handling, storage, and transport of hazardous substances. (2) Develop and implement an emergency response procedure addressing the procedure in case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure.				

Activity:	38. Demolition of PCD's
Impact:	**Hydrocarbon Contamination** **Direct Impact:** Heavy vehicle activity used during the decommissioning phase is poses a risk of leaking or spilling contaminants such as fuels containing hydrocarbons, waste, explosives, PCD material to the surface water resources resulting in the contamination of those resources.

Significance rating:	Duration	Extent	Magnitude	Probability	Significance
Pre-Mitigation	2	1	8	5	55
Post-Mitigation	1	1	6	1	8
Mitigation Measures:	Potential impact resulting from hydrocarbon contamination can be ***controlled*** in the following ways: (1) Develop and implement a Hazardous substances management plan specifically addressing handling, storage, and transport of hazardous substances. (2) Develop and implement an emergency response procedure addressing the procedure in case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure.				
Impact:	**Contamination of water resource** **Direct Impact:** Discharge, spills and leakage of effluent containing pollutants poses a risk of contaminating water resources within close proximity. **Indirect Impact**: Pollutants poses a risk in altering the conditions of the aquatic ecology to thrive.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	2	2	8	5	**60**
Post-Mitigation	1	1	6	2	**16**
Mitigation Measures:	Contamination of water resources can be ***avoided*** in the following ways: (1) Development and implementation of a water monitoring program. (2) Development and implementation of an Integrated Water and Waste Management Plan (IWWMP). (3)Development and implementation of a storm water management plan. (4) Reporting and recording all related incidents according to a developed procedure. (5) Develop and implement an emergency preparedness plan.				

Activity:	39. Demolition of workshops, waste storage facilities, fuel storage facilities etc.				
Impact:	**Hydrocarbon Contamination** **Direct Impact:** Heavy vehicle activity used during the decommissioning phase is poses a risk of leaking or spilling contaminants such as fuels containing hydrocarbons, waste, explosives, PCD material to the surface water resources resulting in the contamination of those resources.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	2	1	8	5	**55**
Post-Mitigation	1	1	6	2	**16**

Mitigation Measures:	Potential impact resulting from hydrocarbon contamination can be ***controlled*** in the following ways: (1) Develop and implement a Hazardous substances management plan specifically addressing handling, storage, and transport of hazardous substances. (2) Develop and implement an emergency response procedure addressing the procedure in case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure.				
Impact:	**Contamination of water resource** **Direct Impact:** Discharge, spills and leakage of effluent containing pollutants poses a risk of contaminating water resources within close proximity. **Indirect Impact**: Pollutants poses a risk in altering the conditions of the aquatic ecology to thrive.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	2	2	8	5	**60**
Post-Mitigation	1	1	6	2	**16**
Mitigation Measures:	Contamination of water resources can be ***avoided*** in the following ways: (1) Development and implementation of a water monitoring program. (2) Development and implementation of an Integrated Water and Waste Management Plan (IWWMP). (3)Development and implementation of a storm water management plan. (4) Reporting and recording all related incidents according to a developed procedure. (5) Develop and implement an emergency preparedness plan.				

Aspect:	**Wetlands and Aquatic Ecology**

Activity:	36. Vehicular activity: removal of mobile plant / equipment and vehicles				
Impact:	**Sedimentation and siltation of watercourses** **Direct Impact:** Constructing and the use of access roads through drainage lines may cause sedimentation and siltation of watercourses if not managed properly. **Indirect Impact:** Storm water runoff of dirt roads and un-vegetated areas may cause sedimentation and siltation of nearby watercourses.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	1	1	8	5	**50**
Post-Mitigation	1	1	4	2	**12**

Mitigation Measures:	Surface water quality can be ***controlled*** in the following ways: 1) Development and implementation of water quality monitoring plan. (2) Reporting and recording incidents.

Activity:	37. Rehabilitation of the lay down areas				
Impact:	**Sedimentation and siltation of watercourses** **Direct Impact:** If areas remain un-vegetated and exposed run-off from these areas may contain sediment and silt posing the risk of contaminating watercourses/rivers in close proximity.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	3	2	8	5	**65**
Post-Mitigation	1	1	4	2	**12**
Mitigation Measures:	Surface water quality can be ***controlled*** in the following ways: 1) Development and implementation of water quality monitoring plan. (2) Reporting and recording incidents.				

Activity:	38. Demolition of PCD's				
Impact:	**Contamination of water resource** **Direct Impact:** Discharge, spills and leakage of effluent containing pollutants poses a risk of contaminating water resources within close proximity. **Indirect Impact**: Pollutants poses a risk in altering the conditions of the aquatic ecology to thrive.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	2	2	8	5	**60**
Post-Mitigation	1	1	6	3	**24**
Mitigation Measures:	Contamination of water resources can be ***avoided*** in the following ways: (1) Development and implementation of a water monitoring program. (2) Development and implementation of an Integrated Water and Waste Management Plan (IWWMP). (3)Development and implementation of a storm water management plan. (4) Reporting and recording all related incidents according to a developed procedure. (5) Develop and implement an emergency preparedness plan.				

Activity:	39. Demolition of workshops, waste storage facilities, fuel storage facilities etc.
Impact:	**Contamination of water resource**

	Direct Impact: Discharge, spills and leakage of effluent containing pollutants poses a risk of contaminating water resources within close proximity. **Indirect Impact**: Pollutants poses a risk in altering the conditions of the aquatic ecology to thrive.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	2	2	8	5	**60**
Post-Mitigation	1	1	6	3	**24**
Mitigation Measures:	Contamination of water resources can be ***avoided*** in the following ways: (1) Development and implementation of a water monitoring program. (2) Development and implementation of an Integrated Water and Waste Management Plan (IWWMP). (3)Development and implementation of a storm water management plan. (4) Reporting and recording all related incidents according to a developed procedure. (5) Develop and implement an emergency preparedness plan.				

Aspect:	**Soil Quality**

Activity:	35. Demolition / removal of portable and related infrastructure				
Impact:	**Hydrocarbon Contamination** **Direct Impact:** The potential impact will arise during demolition of infrastructure, where mobilisation of contaminants such as fuels containing hydrocarbons, waste, explosives, PCD material to the surface water resources resulting in the contamination of those resources.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	2	2	8	5	**60**
Post-Mitigation	1	1	6	3	**24**
Mitigation Measures:	Potential impact resulting from hydrocarbon contamination can be ***controlled*** in the following ways: (1) Develop and implement a Hazardous substances management plan specifically addressing handling, storage, and transport of hazardous substances. (2) Develop and implement an emergency response procedure addressing the procedure in case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure.				
Impact:	**Degradation of soil resources** **Direct Impact:** Poor management of topsoil and subsoil poses a risk to degradation of soil				

	resources. **Indirect Impact**: Degradation of soil resources poses a risk in altering the conditions for micro organisms to thrive in.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	5	1	6	5	**60**
Post-Mitigation	1	1	4	3	**18**
Mitigation Measures:	Degradation of soil resources can be ***remedied*** in the following ways: (1) Develop and implement soil conservation and stockpile management plan. (2) Develop and implement a Rehabilitation plan.				
Impact:	**Erosion – Loss of fertile soil** **Indirect Impact:** Exposed un-vegetated rehabilitated areas pose a high risk of erosion. This may lead to the loss of fertile soil and in its turn affect the micro-ecosystems of the surrounding environment.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	5	2	8	5	**75**
Post-Mitigation	1	1	4	4	**24**
Mitigation Measures:	Erosion can be ***controlled*** in the following ways: (1) Development and implementation of a storm water management plan. (2) Regular inspection of erosion prone areas for signs of erosion. (3) A soil conservation and stockpiling plan to be developed and implemented. (4) Monthly monitoring of water quality (as per recommendation of specialist study).				
Impact:	**General waste generation & Littering** **Direct Impact:** Throughout the decommissioning phase of the project large amounts of waste (general and hazardous waste) will be generated putting strain on local landfill sites. The storage of large amounts of waste over an extended time in a area not lined or bunded poses a risk of forming potentially hazardous leachates. **Indirect Impact**: The hazardous leachate from the waste storage facilities poses a risk of contaminating both surface and sub-surface water resources. This may lead to the degradation of conditions for the aquatic ecology to thrive.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	3	2	8	5	**65**
Post-Mitigation	1	1	6	3	**24**
Mitigation Measures:	Negative impacts of waste generation can be ***controlled*** in the following ways: (1) Develop and implement as waste management plan with the focus on reuse, reduce, recycle, or avoid.				

	(2) Development and maintenance of a waste disposal record keeping system.

Activity:	36. Vehicular activity: removal of mobile plant / equipment and vehicles				
Impact:	**Hydrocarbon Contamination** **Direct Impact:** Heavy vehicle activity used during the decommissioning phase is poses a risk of leaking or spilling contaminants such as fuels containing hydrocarbons, waste, explosives, PCD material to the surface water resources resulting in the contamination of those resources.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	2	1	8	5	**55**
Post-Mitigation	1	1	6	3	**24**
Mitigation Measures:	Potential impact resulting from hydrocarbon contamination can be ***controlled*** in the following ways: (1) Develop and implement a Hazardous substances management plan specifically addressing handling, storage, and transport of hazardous substances. (2) Develop and implement an emergency response procedure addressing the procedure in case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure.				
Impact:	**Erosion – Loss of fertile soil** **Indirect Impact:** Exposed un-vegetated rehabilitated areas pose a high risk of erosion. This may lead to the loss of fertile soil and in its turn affect the micro-ecosystems of the surrounding environment.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	1	1	8	5	**50**
Post-Mitigation	1	1	4	4	**24**
Mitigation Measures:	Erosion can be ***controlled*** in the following ways: (1) Development and implementation of a storm water management plan. (2) Regular inspection of erosion prone areas for signs of erosion. (3) A soil conservation and stockpiling plan to be developed and implemented. (4) Monthly monitoring of water quality (as per recommendation of specialist study).				

Activity:	37. Rehabilitation of the lay down areas
Impact:	**Erosion – Loss of fertile soil** **Indirect Impact:** Exposed un-vegetated rehabilitated areas pose a high risk of erosion. This may lead to the loss of fertile soil and in its turn affect the micro-ecosystems of the surrounding

	environment.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	3	2	8	5	**65**
Post-Mitigation	1	1	4	4	**24**
Mitigation Measures:	Erosion can be ***controlled*** in the following ways: (1) Development and implementation of a storm water management plan. (2) Regular inspection of erosion prone areas for signs of erosion. (3) A soil conservation and stockpiling plan to be developed and implemented. (4) Monthly monitoring of water quality (as per recommendation of specialist study).				
Impact:	**Degradation of soil resources** **Direct Impact:** Poor management of topsoil and subsoil poses a risk to degradation of soil resources. **Indirect Impact**: Degradation of soil resources poses a risk in altering the conditions for micro organisms to thrive in.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	5	1	8	5	**70**
Post-Mitigation	1	1	4	3	**18**
Mitigation Measures:	Degradation of soil resources can be ***remedied*** in the following ways: (1) Develop and implement soil conservation and stockpile management plan. (2) Develop and implement a Rehabilitation plan.				

Activity:	38. Demolition of PCD's				
Impact:	**Hydrocarbon Contamination** **Direct Impact:** Heavy vehicle activity used during the decommissioning phase is poses a risk of leaking or spilling contaminants such as fuels containing hydrocarbons, waste, explosives, PCD material to the surface water resources resulting in the contamination of those resources.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	2	2	8	5	**60**
Post-Mitigation	1	1	6	3	**24**
Mitigation Measures:	Potential impact resulting from hydrocarbon contamination can be ***controlled*** in the following ways: (1) Develop and implement a Hazardous substances management plan specifically addressing handling, storage, and transport of hazardous substances. (2) Develop and implement an emergency response procedure addressing the procedure in case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or				

	accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure.				
Impact:	**Degradation of soil resources** **Direct Impact:** Poor management of topsoil and subsoil poses a risk to degradation of soil resources. **Indirect Impact**: Degradation of soil resources poses a risk in altering the conditions for micro organisms to thrive in.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	5	1	8	5	**70**
Post-Mitigation	1	1	4	3	**18**
Mitigation Measures:	Degradation of soil resources can be ***remedied*** in the following ways: (1) Develop and implement soil conservation and stockpile management plan. (2) Develop and implement a Rehabilitation plan.				
Impact:	**Erosion – Loss of fertile soil** **Indirect Impact:** Exposed un-vegetated rehabilitated areas pose a high risk of erosion. This may lead to the loss of fertile soil and in its turn affect the micro-ecosystems of the surrounding environment.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	3	2	8	5	**65**
Post-Mitigation	1	1	4	4	**24**
Mitigation Measures:	Erosion can be ***controlled*** in the following ways: (1) Development and implementation of a storm water management plan. (2) Regular inspection of erosion prone areas for signs of erosion. (3) A soil conservation and stockpiling plan to be developed and implemented. (4) Monthly monitoring of water quality (as per recommendation of specialist study).				
Impact:	**General waste generation & Littering** **Direct Impact:** Throughout the decommissioning phase of the project large amounts of waste (general and hazardous waste) will be generated putting strain on local landfill sites. The storage of large amounts of waste over an extended time in a area not lined or bunded poses a risk of forming potentially hazardous leachates. **Indirect Impact**: The hazardous leachate from the waste storage facilities poses a risk of contaminating both surface and sub-surface water resources. This may lead to the degradation of conditions for the aquatic ecology to thrive.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	3	1	8	5	**60**

Post-Mitigation	1	1	4	3	**18**
Mitigation Measures:	Negative impacts of waste generation can be ***controlled*** in the following ways: (1) Develop and implement as waste management plan with the focus on reuse, reduce, recycle, or avoid. (2) Development and maintenance of a waste disposal record keeping system.				

Activity:	39. Demolition of workshops, waste storage facilities, fuel storage facilities etc.				
Impact:	**Hydrocarbon Contamination** **Direct Impact:** Heavy vehicle activity used during the decommissioning phase is poses a risk of leaking or spilling contaminants such as fuels containing hydrocarbons, waste, explosives, PCD material to the surface water resources resulting in the contamination of those resources.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	5	1	8	5	**70**
Post-Mitigation	1	1	6	3	**24**
Mitigation Measures:	Potential impact resulting from hydrocarbon contamination can be ***controlled*** in the following ways: (1) Develop and implement a Hazardous substances management plan specifically addressing handling, storage, and transport of hazardous substances. (2) Develop and implement an emergency response procedure addressing the procedure in case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure.				
Impact:	**Degradation of soil resources** **Direct Impact:** Poor management of topsoil and subsoil poses a risk to degradation of soil resources. **Indirect Impact**: Degradation of soil resources poses a risk in altering the conditions for micro organisms to thrive in.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	5	1	8	5	**70**
Post-Mitigation	1	1	4	3	**18**
Mitigation Measures:	Degradation of soil resources can be ***remedied*** in the following ways: (1) Develop and implement soil conservation and stockpile management plan. (2) Develop and implement a Rehabilitation plan.				
Impact:	**Erosion – Loss of fertile soil** **Indirect Impact:** Exposed un-vegetated rehabilitated areas pose a high risk of erosion. This				

	may lead to the loss of fertile soil and in its turn affect the micro-ecosystems of the surrounding environment.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	3	2	8	5	**65**
Post-Mitigation	1	1	4	4	**24**
Mitigation Measures:	Erosion can be ***controlled*** in the following ways: (1) Development and implementation of a storm water management plan. (2) Regular inspection of erosion prone areas for signs of erosion. (3) A soil conservation and stockpiling plan to be developed and implemented. (4) Monthly monitoring of water quality (as per recommendation of specialist study).				
Impact:	**General waste generation & Littering** **Direct Impact:** Throughout the decommissioning phase of the project large amounts of waste (general and hazardous waste) will be generated putting strain on local landfill sites. The storage of large amounts of waste over an extended time in a area not lined or bunded poses a risk of forming potentially hazardous leachates. **Indirect Impact**: The hazardous leachate from the waste storage facilities poses a risk of contaminating both surface and sub-surface water resources. This may lead to the degradation of conditions for the aquatic ecology to thrive.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	5	1	8	5	**70**
Post-Mitigation	1	1	6	3	**24**
Mitigation Measures:	Negative impacts of waste generation can be ***controlled*** in the following ways: (1) Develop and implement as waste management plan with the focus on reuse, reduce, recycle, or avoid. (2) Development and maintenance of a waste disposal record keeping system.				

Aspect:	**Terrestrial Ecosystems**

Activity:	37. Rehabilitation of the lay down areas
Impact:	**Vegetation and habitat loss** **Direct Impact:** Improper rehabilitation measures implemented poses a risk of permanently degraded areas void of vegetation and causing further degradation of adjacent vegetation and possible increased habitat loss. The conditions for macro and micro organisms needs to be suitable for reinstatement of the ecosystem. Loss of indigenous vegetation, increase in runoff and erosion, possible permanent degradation and increased establishment of alien invasive

	species, possible disturbance and reduction of habitat, injury or death to terrestrial fauna, possible change of natural runoff and drainage patterns causing accelerated erosion, possible loss of protected species, possible permanent loss of re-vegetation potential of soil surface, increase in dust levels, interference with fauna behavioural activities, possible exposure of fauna and flora to contaminants – especially hydrocarbons and increased dust levels				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	5	2	10	5	**85**
Post-Mitigation	1	1	6	4	**32**
Mitigation Measures:	The loss of vegetation can be ***remedied*** in the following ways: (1) Development and implementation of a rehabilitation plan. (2) Develop and implement a plant species search and rescue management plan.				
Impact:	**Influx of alien invasive vegetation** **Direct Impact:** Site clearing for roads, lay down areas, and mining area exposes the un-vegetated area to the influx of alien invasive vegetation causing irreversible damage to the native fauna and flora species degradation and/or and loss of habitats.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	3	2	8	5	**65**
Post-Mitigation	1	1	4	3	**18**
Mitigation Measures:	The influx of alien invasive vegetation can be ***controlled*** in the following ways: (1) Development and implementation of an alien and invasive control plan. (2) Awareness training on the identification of weeds and alien species to employees responsible for the management of these species.				

Aspect:	**Noise Quality**

Activity:	35. Demolition / removal of portable and related infrastructure				
Impact:	**Noise Generation** **Direct Impact:** The use of unmaintained equipment and plant throughout the decommissioning phase poses a risk of generating noise.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	1	2	6	5	**45**
Post-Mitigation	1	1	4	3	**18**
Mitigation Measures:	Noise generation can be ***controlled*** in the following ways: (1) Development and implementation of an Acoustical Measurement & Audit Programme as part of the EMS. A monitoring program to be developed based on the specialist				

	recommendations (**Appendix F**). (2) Recording, reporting, and remediating incidents related to noise. (3) Regular inspections of vehicles/equipment/plant.

Activity:	36. Vehicular activity: removal of mobile plant / equipment and vehicles				
Impact:	**Noise Generation** **Direct Impact:** The use of unmaintained equipment and plant throughout the decommissioning phase poses a risk of generating noise.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	1	1	6	5	**40**
Post-Mitigation	1	1	4	3	**18**
Mitigation Measures:	Noise generation can be ***controlled*** in the following ways: (1) Development and implementation of an Acoustical Measurement & Audit Programme as part of the EMS. A monitoring program to be developed based on the specialist recommendations (**Appendix F**). (2) Recording, reporting, and remediating incidents related to noise. (3) Regular inspections of vehicles/equipment/plant.				

Activity:	38. Demolition of PCD's				
Impact:	**Noise Generation** **Direct Impact:** The use of unmaintained equipment and plant throughout the decommissioning phase poses a risk of generating noise.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	1	1	4	5	**30**
Post-Mitigation	1	1	4	3	**18**
Mitigation Measures:	Noise generation can be ***controlled*** in the following ways: (1) Development and implementation of an Acoustical Measurement & Audit Programme as part of the EMS. A monitoring program to be developed based on the specialist recommendations (**Appendix F**). (2) Recording, reporting, and remediating incidents related to noise. (3) Regular inspections of vehicles/equipment/plant.				

Activity:	39. Demolition of workshops, waste storage				
Impact:	**Noise Generation** **Direct Impact:** If vehicles used to demolish these areas are not maintained and serviced regularly high levels of noise may result throughout the construction and operational phase.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	1	1	6	5	**40**
Post-Mitigation	1	1	4	3	**18**
Mitigation Measures:	Noise generation can be ***controlled*** in the following ways: (1) Development and implementation of an Acoustical Measurement & Audit Programme as part of the EMS. A monitoring program to be developed based on the specialist recommendations (**Appendix F**). (2) Recording, reporting, and remediating incidents related to noise. (3) Regular inspections of vehicles/equipment/plant.				

A detailed impact assessment can be found in **Appendix R**.

vi) Methodology used in determining and ranking the impacts and risks

(Rank the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks. 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)

The significance (quantification) of potential environmental impacts identified during the Basic Assessment have been determined using a ranking scale, based on the following (terminology has been taken from the Guideline Documentation on EIA Regulations, of the Department of Environmental Affairs and Tourism, April 1998):

Occurrence

- Probability of occurrence (how likely is it that the impact may occur?)
- Duration of occurrence (how long may it last?)

Severity

- Magnitude (severity) of impact (will the impact be of high, moderate or low severity?)
- Scale/extent of impact (will the impact affect the national, regional or local environment, or only that of the site?)

Each of these factors has been assessed for each potential impact using the ranking scales represented by Table 10.

Table 10: Ranking scale of the four factors considered to determine significance rating

Probability	Duration
1 - very improbable (probably will not happen 2 - improbable (some possibility, but low likelihood) 3 - probable (distinct possibility) 4 - highly probable (most likely) 5 - definite (impact will occur regardless of any prevention measures)	1 - of a very short duration (0–1 years) 2 - of a short duration (2-5 years) 3 - medium-term (5–15 years) 4 - long term (> 15 years) 5 - permanent
Extent	Magnitude
1 - limited to the site 2 - limited to the local area 3 - limited to the region 4 - will be national 5 - will be international	0 - small and will have no effect on the environment 2 - minor and will not result in an impact on processes 4 - low and will cause a slight impact on processes 6 - moderate and will result in processes continuing but in a modified way 8 - high (processes are altered to the extent that they temporarily cease) 10 - very high and results in complete destruction of patterns and permanent cessation of processes

The environmental significance of each potential impact is assessed using the following formula:

Significance Points (SP) = (Magnitude + Duration + Extent) x Probability

The maximum value is 100 Significance Points (SP). Potential environmental impacts were rated as high, moderate or low significance on the following basis:

- < 30 significance points = **LOW** environmental significance.
- 31- 60 significance points = **MODERATE** environmental significance
- 60 significance points = **HIGH** environmental significance

vii) Positive and negative impacts of the proposed activity and alternatives on environment and affected communities

(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 advantages and disadvantages of the site layout have been discussed in the various specialist Reports. For the reasons specified in section **i)** (Part A) of this report there are no Project related alternatives.

The following recommendations regarding the current site layout have been made by the specialist reports:

Biodiversity Assessment

The following could proceed if all mitigation measures are diligently implemented with all the necessary authorisations – including permits for protected species removal:

- The creation of additional internal access roads is discouraged, but it is anticipated that existing tracks will be upgraded and possibly doubled in width
- Phase 1: Klarinet Koppie mining near the discontinued Clarinet Mine could proceed
- Phase 3: Tubatse Koppie mining could proceed but with caution
- The sites for the main office and workshop complex as well as stockpiles 1 and 2 already exist from the prospecting phase, but are anticipated to be expanded
- The laydown area for Phase 3 should be restricted to temporary offices and an ore stockpile, together not exceeding 3-4 ha in total and not closer than 50 m (preferably 100 m) from the bank of any riparian area/drainage line

The following is considered ecologically unacceptable and should not proceed:

- Workshops within the Tubatse laydown area, except small storage areas for every-day maintenance of machinery, larger repairs should be done at the existing office complex;
- Phase 3: Spitsvale Flats mining should not be allowed within the erosion plains (about half the area of the mapped ore) – the permanent impacts anticipated there will influence areas beyond the affected land portions and totally seize current landscape functionality (amongst other impacts), which cannot be justified.

Hydrological assessment

Flooding at the site was investigated but limitations in available site elevation data meant that a reliable flood model (for flood line modelling) could not be built. Instead, a buffer approach (100m) for all non-perennials within the site boundary was adopted. There is a significant amount of infrastructure located within these buffers and intersecting watercourse. These instances will need to be considered during the water use license process (Section 21 c and i). It is recommended

that flood lines are modelled (when detailed elevation data becomes available) for streams where flooding of infrastructure are a concern in order to ensure complete compliance with GN704.

Stream crossings and associated bridge and culvert designs have not been considered in this assessment but in principle, these crossing needs to be sufficiently sized to provide capacity to convey the 1:100 year flood event over the expected life of the structure to minimise impacts and ensure that the natural flow regime can be maintained as far as possible.

Wet and dry season static water balances have been developed for the project based on monthly input data from various specialists. Based on the model results, there seems to be an excess of approximately 22 527m3/month and 8 065m3/month for the wet and dry seasons respectively. This excess water will need to be appropriately managed and if deemed necessary to discharge, meet the appropriate discharge quality guidelines and associated discharge IWULA conditions.

Soil Assessment

In order to provide sufficient topsoil material for rehabilitation purposes and to optimise soil recovery, the following aspects are recommended:

- Stockpiles to be located outside proposed mine disturbance area(s);
- Construction site is confined to demarcated boundaries and buffer zones.
- No transgression is allowed outside the set boundaries and protocol of the set specifications

Loss of agricultural land due to establishment of infrastructure is a long term loss and no mitigation measures exist. Mitigation is restricted to limitation of extent of impact to the immediate area of impact and minimisation of off-site impacts.

As discussed in previous sections, the EAP recommends that this report be revised to include the comments received after the 30 days public participation process as required by GN R. 982. It is expected that comments received after the required PPP that a number of concerns may alter the final site layout of the proposed mining development.

Refer in addition to Table 10 (section **j)** to this report) for the list of specialist studies.

viii) Possible mitigation measures

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

Part B of this document provides the detailed management plan of each impact and risks. The management plan addresses mitigation measures in detail.

All concerns raised by the I&AP as part of the PPP listed in the previous section will be incorporated and addressed and will form part of the consideration of mitigation measures.

ix) Motivation where no alternative sites were considered

As discussed in section ***g)*** of this report, no property alternatives have been considered as the proposed activities will occur on properties forming part of the existing prospecting rights. However a number of alternatives regarding the placement of infrastructure within the property boundaries have been considered throughout this process.

The current site layout (**Appendix C**) has been determined by considering both environmental and social sensitive receptors as well as considering operational feasibility.

At the time of submitting this report to the competent authority the following infrastructures did not form part of the site layout:

- Storm water infrastructure;
- Location of PCD's; and
- Detailed infrastructure associated to the Tubatse lay down area.

It is therefore recommended that before authorising the activity a detailed site layout plan be submitted indicating the details of all infrastructure associated to the proposed mining development.

x) Statement motivating the alternative development location within the overall site

(Provide a statement motivating the final site layout that is proposed)

As discussed in the previous sections, both environmental and social sensitive receptors where considered in the site layout attached as **Appendix C**.

In terms of the actual mining areas, there are no alternative sections to be mined as the prospecting results indicated that these areas would be most feasible. A number of the infrastructure has been established during the prospecting phase of the Spitsvale project and will be utilised as part of the proposed activities highlighted in this report. The site layout (**Appendix C**) clearly indicates existing and "new" infrastructure.

h) Full description of the process undertaken to identify, assess and rank the impacts and risks 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.)

Environmental Management Assistance (Pty) Ltd as the appointed EAP took an [1]Integrated Environmental Management (IEM) approach. However, the adoption of an IEM approach should not be interpreted as an Environmental Impact Assessment (EIA) in its self. It should rather be seen as an underlying philosophy and set of principles, supported by an EIA and management tools that are aimed at promoting sustainability (DEAT, 2004).

Together with the requirements stipulated in GN R. 982 (2014 EIA regulations) the principles set out in the IEM Guideline series published by the Department of Environmental Affairs (DEA, 1992) were considered throughout the assessment process.

Table 12 firstly provides a full description of all environmental issues and risks identified during the EIA process. Secondly it provides the assessment of the significance of each issue and risk according to the methodology discussed in section **vi)** of this report. Lastly, it provides with an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures.

The supporting Impact Assessment conducted is attached as **Appendix R** to this report.

[1] Definition of IEM according to DEAT (2004): *IEM provides a holistic framework that can be embraced by all sectors of society for the assessment and management of environmental impacts and aspects associated with an activity for each stage of the activity life cycle, taking into consideration a broad definition of environment and with the overall aim of promoting sustainable development.*

i) Assessment of each identified potentially significant impact and risk

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

This section identifies all potential impacts associated to the proposed activities associated with the construction, operation, and decommissioning phase of the proposed mining project. Each possible impact have been rates according to the methodology described in section ***vi)***. Pre- and Post- significance ratings were established and are represented in Table 12. Each score rating indicates the significance of the potential impacts and risks and is colour coded according to Table 11.

Table 11: Explanation of colour indicator

Colour	Significance Points	Explanation
	≤ 30	**LOW** environmental significance
	31 - 60	**MODERATE** environmental significance
	> 60	**HIGH** environmental significance

To avoid replication of information, only the mitigation type will be summarised. The detailed mitigation measures are found in section B to this report.

Table 12: Potential environmental impacts and the assessment thereof

ACTIVITY whether listed or not listed. **(E.g. Excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc…etc…etc.).**	**POTENTIAL IMPACT** **(e.g. dust, noise, drainage surface disturbance, fly rock, surface water contamination, groundwater contamination, air pollution etc….etc…)**	**ASPECTS AFFECTED**	**PHASE** In which impact is anticipated **(e.g. Construction, commissioning, operational Decommissioning, closure, post-closure)**	**SIGNIFICANCE** if not mitigated	**MITIGATION TYPE** **(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. etc) E.g. Modify through alternative method. Control through noise control Control through management and monitoring through rehabilitation..**	**SIGNIFICANCE** if mitigated
Construction Phase						
	Dust generation	Air Quality	Construction & Operational	45	**Control**	18
		Human Health	Construction & Operational	45		18

1. Access and hauling along roads i.e. during the construction of roads		Topography and Visual Environment	Construction & Operational	40		27
	Hydrocarbon Contamination	Surface Water quality	Construction & Operational	32	**Control**	24
		Groundwater quality	Construction & Operational	27		18
		Soil quality	Construction & Operational	36		24
	Degradation of soil resources	Soil quality	Construction & Operational	24	**Remedy**	24
		Flora micro-ecosystems	Construction & Operational	24		24
	Erosion	Loss of fertile soil	Construction & Operational	45	**Control**	30
		Micro-ecosystems	Construction & Operational	33		24
	Vegetation and habitat loss	Macro and Micro organisms	Construction & Operational	65	**Remedy**	36
		Fauna and Flora	Construction & Operational	65		36
	Sedimentation and siltation of watercourses	Wetland and Aquatic Ecology	Construction & Operational	45	**Control**	27
		Surface Water	Construction & Operational	45		36
		Surrounding noise	Construction &	32	**Control**	18

	Noise generation	quality	Operational			
	Alteration of drainage patterns	Wetland and Aquatic Ecology	Construction & Operational	50	**Remedy**	18
		Surface Water quality	Construction & Operational	50		24
	Destruction of upstream tributaries and reduction in water in the catchment	Wetland and Aquatic Ecology	Construction & Operational	33	**Remedy**	24
		Downstream water users	Construction & Operational	44		24
		Surface Water quality	Construction & Operational	40		24
	Water usage for dust suppression	Wastage of water resource	Construction & Operational	35	**Control**	18
	Influx of alien invasive vegetation	Fauna and Flora micro and macro ecosystems	Construction	65	**Control**	40
	CO_2 emissions	Air Quality	Construction & Operational	50	**Control**	12
	Fugitive dust generation	Air Quality	Construction	45	**Control**	32
		Visual Environment	Construction	55		32
	Alteration of the visual environment and topography	Topography and Visual Environment	Construction	55	**Remedy**	36
		Soil quality	Construction & Operational	45	**Remedy**	24

2. Site clearing and topsoil stripping for lay down area and all related mining infrastructure	Degradation of soil resources	Flora micro-ecosystems	Construction & Operational	45		24
	Vegetation and habitat loss	Macro and Micro organisms	Construction & Operational	70	**Remedy**	36
		Fauna and Flora	Construction & Operational	70		36
	Destruction of Wetlands	Wetlands and Aquatic Ecology	Construction & Operational	65	**Avoid**	36
	Hydrocarbon Contamination	Surface Water quality	Construction & Operational	50	**Control**	32
		Groundwater quality	Construction & Operational	36		24
		Soil quality	Construction & Operational	45		32
	Sedimentation and siltation of watercourses	Wetland and Aquatic Ecology	Construction & Operational	50	**Control**	32
		Surface Water	Construction & Operational	55		32
	Water level reduction and contamination	Groundwater quality	Construction & Operational	45	**Control**	24
		Downstream water users	Construction & Operational	50		24
		Surface Water quality	Construction & Operational	45		24

	Noise generation	Surrounding noise quality	Construction & Operational	50	**Control**	24
	Destruction of graves	Loss of heritage resources	Construction & Operational	65	**Avoid**	39
	Degradation of cultural significance heritage sites	Loss of heritage resources	Construction & Operational	65	**Avoid**	39
	Erosion	Loss of fertile soil	Construction & Operational	70	**Control**	24
		Micro-ecosystems	Construction & Operational	70		24
	CO_2 emissions	Air Quality	Construction & Operational	44	**Control**	12
	Alteration of drainage patterns	Wetland and Aquatic Ecology	Construction & Operational	70	**Remedy**	36
		Surface Water quality	Construction & Operational	70		36
	Influx of alien invasive vegetation	Fauna and Flora micro and macro ecosystems	Construction	60	**Control**	36
3. Weigh bridge	Hydrocarbon Contamination	Surface Water quality	Operational	55	**Control**	12
		Groundwater quality	Operational	24		12
4. Onsite Clinic	Medical Waste generation	Human Health	Construction & Operational	44	**Control**	27
	Electricity usage	CO_2 emissions	Operational	50	**Control**	21
	Domestic water usage	Wastage of water	Operational	30	**Avoid**	21

		resource				
5. Mining offices i.e. operation of training centres, offices and kitchen facilities	Fugitive dust generation	Air Quality	Construction	40	**Control**	24
	Topography and visual alteration	Topography and Visual Environment	Construction	55	**Remedy**	21
	Influx of alien invasive vegetation	Fauna and Flora micro and macro ecosystems	Construction & Operational	60	**Control**	27
	Noise generation	Surrounding noise quality	Construction & Operational	30	**Control**	18
	General waste generation & Littering	Visual Environment	Construction & Operational	55	**Control**	36
		Soils quality due to leachates	Construction & Operational	50		28
		Surface Water quality due to leachates	Construction & Operational	27		28
	Electricity usage	CO_2 emissions	Operational	40	**Control**	21
	Domestic water usage	Wastage of water resource	Operational	40	**Avoid**	21
6. Storm water runoff management features	Erosion	Loss of fertile soil	Construction & Operational	60	**Control**	30
		Micro-ecosystems	Construction & Operational	60		30
	Vegetation and habitat loss	Macro and Micro organisms	Construction & Operational	50	**Remedy**	27
		Fauna and Flora	Construction & Operational	50		27

	Sedimentation and siltation of watercourses	Wetland and Aquatic Ecology	Construction & Operational	70	**Control**	36
		Surface Water	Construction & Operational	70		36
	Hydrocarbon Contamination	Surface Water quality	Construction & Operational	70	**Control**	18
		Groundwater quality	Construction & Operational	56		14
		Soil quality	Construction & Operational	70		18
	Alteration of drainage patterns	Wetland and Aquatic Ecology	Construction & Operational	70	**Remedy**	33
		Surface Water quality	Construction & Operational	60		33
7. Water storage facilities	Improper water storage management	Wastage of water resource	Operational	44	**Avoid**	21
		Water contamination	Operational	52		16
8. Pollution Control Dams (PCD's) i.e. Construction and operation	Contamination of water resources	Wetlands and Aquatic Ecology	Operational	60	**Avoid**	16
		Surface Water quality	Operational	75		16
		Groundwater quality	Operational	75		16
	Fugitive dust generation	Air Quality	Construction	30	**Control**	12
	Hydrocarbon Contamination i.e. Usage of diesel operating pumps	Surface Water quality	Construction & Operational	55	**Control**	21
		Groundwater quality	Construction & Operational	33		11
	Smell nuisance	Human health and safety environment	Construction & Operational	55	**Avoid**	27

9.Stores, workshops &wash bays	Hydrocarbon Contamination	Surface Water quality	Construction & Operational	70	**Control**	33
		Groundwater quality	Construction & Operational	70		22
		Soil quality	Construction & Operational	70		33
	Degradation of soil resources	Soil quality	Construction & Operational	55	**Remedy**	33
		Fauna & Flora micro-ecosystems	Construction & Operational	65		33
	Contamination of water resources	Wetlands and Aquatic Ecology	Construction & Operational	70	**Avoid**	33
		Surface Water quality	Construction & Operational	70		33
		Groundwater quality	Construction & Operational	70		22
	CO_2 emissions & Release of noxious gasses	Air Quality	Construction & Operational	45	**Control**	27
	Chemical Fires	Human health and safety environment	Construction & Operational	52	**Avoid**	24
		Loss of ecosystems	Construction & Operational	65		30
		Damage to property	Construction & Operational	56		33
	Noise generation	Surrounding noise quality	Construction & Operational	30	**Control**	18
10. Ablutions & change house with sewage treatment plant	Degradation of soil resources	Soil quality	Construction & Operational	55	**Remedy**	33
		Flora micro-ecosystems	Construction & Operational	55		33
	Contamination of water resources	Wetlands and Aquatic Ecology	Construction & Operational	70	**Avoid**	33
		Surface Water quality	Construction & Operational	70		33
		Groundwater quality	Construction & Operational	56		22

	Smell nuisance	Human health and safety environment	Construction & Operational	60	**Avoid**	24
11. Fuel operating power generators	Hydrocarbon Contamination	Surface Water quality	Construction & Operational	70	**Control**	33
		Groundwater quality	Construction & Operational	70		22
		Soil quality	Construction & Operational	55		33
	Degradation of soil resources	Soil quality	Construction & Operational	55	**Remedy**	33
		Flora micro-ecosystems	Construction & Operational	65		33
	Contamination of water resources	Wetlands and Aquatic Ecology	Construction & Operational	70	**Avoid**	33
		Surface Water quality	Construction & Operational	70		33
		Groundwater quality	Construction & Operational	56		22
	CO_2 emissions & Release of noxious gasses	Air Quality	Construction & Operational	45	**Control**	27
	Chemical Fires	Human health and safety environment	Construction & Operational	65	**Avoid**	24
		Loss of ecosystems	Construction & Operational	65		20
		Damage to property	Construction & Operational	70		24
	Noise generation	Surrounding noise quality	Construction & Operational	30	**Control**	18
12. Lighting	Electricity usage	CO_2 emissions	Construction & Operational	45	**Control**	21
	Light pollution	Disruption in ecosystem especially nocturnal fauna species	Construction & Operational	27	**Control**	7

13. Fuel storage	Emission of noxious fumes	Air Quality	Construction & Operational	65	**Avoid**	33
		Human Helath	Construction & Operational	50		24
	Hydrocarbon Contamination	Surface Water quality	Construction & Operational	70	**Control**	33
		Groundwater quality	Construction & Operational	70		22
		Soil quality	Construction & Operational	60		33
	Degradation of soil resources	Soil quality	Construction & Operational	55	**Remedy**	33
		Flora micro-ecosystems	Construction & Operational	65		22
	Contamination of water resources	Wetlands and Aquatic Ecology	Construction & Operational	70	**Avoid**	33
		Surface Water quality	Construction & Operational	70		33
		Groundwater quality	Construction & Operational	56		22
	Chemical Fires	Human health and safety environment	Construction & Operational	65	**Avoid**	24
		Loss of ecosystems	Construction & Operational	65		20
		Damage to property	Construction & Operational	70		24
14. Employment of workers and procurement of construction materials.	Loss of farm labour	Socio-economic	Construction & Operational	50	**Control**	32
	Population Influx – Pressure on Resources	Socio-economic	Construction & Operational	50	**Control**	32
	Population Influx – Social Pathologies	Socio-economic	Construction & Operational	50	**Control**	32
	Population Influx – Community Conflict	Socio-economic	Construction & Operational	65	**Control**	32
	Health and Safety of employees	Human health and safety environment	Construction & Operational	55	**Control**	33
	Job Creation and Skills Training	Socio-economic	Construction & Operational	24	**Control**	24

	Job Creation (Multiplier affect) and Population Influx	Socio-economic	Construction & Operational	35	**Control**	24
15. Transport of construction material, mobile plant and equipment to the site	Hydrocarbon Contamination	Surface Water quality	Construction & Operational	50	**Control**	18
		Groundwater quality	Construction & Operational	50		12
		Soil quality	Construction & Operational	50		18
	Dust generation	Air Quality	Construction & Operational	40	**Control**	24
		Human Health	Construction & Operational	50		24
		Topography and Visual Environment	Construction & Operational	50		24
	Erosion	Loss of fertile soil	Construction & Operational	45	**Control**	24
		Micro-ecosystems	Construction & Operational	55		24
	CO_2 emissions	Air Quality	Construction & Operational	30	**Control**	20
	Sedimentation and siltation of watercourses	Wetland and Aquatic Ecology	Construction & Operational	60	**Control**	24
16. Use of existing drilled / new boreholes	Hydrocarbon Contamination	Surface Water quality	Construction & Operational	45	**Control**	27
		Groundwater quality	Construction & Operational	45		18
		Soil quality	Construction & Operational	45		18
	Water level reduction and contamination	Groundwater quality	Construction & Operational	60	**Control**	27
		Downstream water users	Construction & Operational	60		24
		Surface Water quality	Construction & Operational	60		27

Operational Phase						
17. Employment of workers	Loss of farm labour	Socio-economic	Construction & Operational	55	**Control**	24
	Population Influx – Pressure on Resources	Socio-economic	Construction & Operational	50	**Control**	30
	Population Influx – Social Pathologies	Socio-economic	Construction & Operational	40	**Control**	24
	Population Influx – Community Conflict	Socio-economic	Construction & Operational	65	**Control**	24
	Health and Safety of employees	Human health and safety environment	Construction & Operational	55	**Control**	33
	Job Creation and Skills Training	Socio-economic	Construction & Operational	25	**Control**	25
18.Topsoil and subsoil stripping & stockpiling for	Dust generation	Air Quality	Construction	60	**Control**	27
		Visual Environment	Construction	50		21
	Alteration of the visual environment and topography	Topography and Visual Environment	Construction	50	**Remedy**	36
	Degradation of soil resources	Soil quality	Construction & Operational	50	**Remedy**	24
		Flora micro-ecosystems	Construction & Operational	50		30
	Vegetation and habitat loss	Macro and Micro organisms	Construction & Operational	85	**Remedy**	55
		Fauna and Flora	Construction & Operational	85		55
	Destruction of Wetlands	Wetlands and Aquatic Ecology	Construction & Operational	75	**Avoid**	40
	Hydrocarbon Contamination	Surface Water quality	Construction & Operational	70	**Control**	36
		Groundwater quality	Construction & Operational	70		24
		Wetlands and Aquatic Ecology	Construction & Operational	70		36
	Sedimentation and siltation of watercourses	Wetland and Aquatic Ecology	Construction & Operational	60	**Control**	30

		Surface Water quality	Construction & Operational	70		36
	Water level reduction and contamination	Groundwater quality	Construction & Operational	60	**Control**	27
		Downstream water users	Construction & Operational	60		18
		Surface Water quality	Construction & Operational	65		36
	Noise generation	Surrounding noise quality	Construction & Operational	55	**Control**	27
	Destruction of graves	Loss of heritage resources	Construction & Operational	65	**Avoid**	36
	Degradation of cultural significance heritage sites	Loss of heritage resources	Construction & Operational	65	**Avoid**	36
	Erosion	Loss of fertile soil	Construction & Operational	55	**Control**	33
		Micro-ecosystems	Construction & Operational	70		33
	CO_2 emissions	Air Quality	Construction & Operational	45	**Control**	28
	Alteration of drainage patterns	Wetland and Aquatic Ecology	Construction & Operational	75	**Remedy**	33
		Surface Water quality	Construction & Operational	80		48
	Destruction of upstream tributaries and reduction in water in the catchment	Wetland and Aquatic Ecology	Construction & Operational	65	**Remedy**	27
		Downstream water users	Construction & Operational	65		18
		Surface Water quality	Construction & Operational	70		36
	Influx of alien invasive vegetation	Fauna and Flora micro and macro ecosystems	Construction & Operational	60	**Control**	36
19.Opencast mining excavations	Hydrocarbon Contamination	Surface Water quality	Construction & Operational	70	**Control**	27
		Groundwater quality	Construction & Operational	70		36

		Soil quality	Construction & Operational	65		27
	Dust generation	Air Quality	Construction & Operational	60	**Control**	40
		Human Health	Construction & Operational	55		36
		Topography and Visual Environment	Construction & Operational	60		40
	Degradation of soil resources	Soil quality	Construction & Operational	60	**Remedy**	27
		Flora micro-ecosystems	Construction & Operational	70		55
	Erosion	Loss of fertile soil	Construction & Operational	70	**Control**	33
		Micro-ecosystems	Construction & Operational	65		44
	Vegetation and habitat loss	Macro and Micro organisms	Construction & Operational	85	**Remedy**	55
		Fauna and Flora	Construction & Operational	85		55
	Noise generation	Surrounding noise quality	Construction & Operational	60	**Control**	27
	CO_2 emissions	Air Quality	Construction & Operational	50	**Control**	28
	Contamination of water resources	Wetlands and Aquatic Ecology	Construction & Operational	70	**Avoid**	33
		Surface Water quality	Construction & Operational	70		33
		Groundwater quality	Construction & Operational	70		33
	Sedimentation and siltation of watercourses	Wetland and Aquatic Ecology	Construction & Operational	70	**Control**	33
		Surface Water quality	Construction & Operational	75		48
	Alteration of drainage patterns	Wetland and Aquatic Ecology	Construction & Operational	75	**Remedy**	33
		Surface Water quality	Construction & Operational	80		60

	Destruction of upstream tributaries and reduction in water in the catchment	Wetland and Aquatic Ecology	Construction & Operational	60	**Remedy**	27
		Downstream water users	Construction & Operational	65		18
		Surface Water quality	Construction & Operational	65		44
	Alteration of the visual environment and topography	Topography and Visual Environment	Construction	80	**Remedy**	55
	Influx of alien invasive vegetation	Fauna and Flora micro and macro ecosystems	Construction & Operational	60	**Control**	36
20.Drilling & Blasting	Dust generation	Air Quality	Construction & Operational	55	**Control**	32
		Human Health	Construction & Operational	55		36
		Topography and Visual Environment	Construction & Operational	45		32
	Degradation of soil resources	Soil quality	Construction & Operational	65	**Remedy**	27
		Flora micro-ecosystems	Construction & Operational	70		55
	Contamination of water resources	Wetlands and Aquatic Ecology	Construction & Operational	70	**Avoid**	27
		Surface Water quality	Construction & Operational	75		33
		Groundwater quality	Construction & Operational	70		33
	Hydrocarbon Contamination	Surface Water quality	Construction & Operational	70	**Control**	44
		Groundwater quality	Construction & Operational	70		33
		Soil quality	Construction & Operational	65		27
	Noise generation	Surrounding noise quality	Construction & Operational	60	**Control**	30
	Damage to surrounding landowner properties	Socio-economic	Construction & Operational	65	**Avoid**	36

		Human health and safety environment	Construction & Operational	60		36
21. RoM & product stockpiling	Hydrocarbon Contamination	Surface Water quality	Construction & Operational	65	**Control**	33
		Groundwater quality	Construction & Operational	65		33
		Soil quality	Construction & Operational	65		27
	Dust generation	Air Quality	Construction & Operational	60	**Control**	36
		Human Health	Construction & Operational	70		44
		Topography and Visual Environment	Construction & Operational	60		36
	Degradation of soil resources	Soil quality	Construction & Operational	60	**Remedy**	27
		Flora micro-ecosystems	Construction & Operational	60		55
	Erosion	Loss of fertile soil	Construction & Operational	70	**Control**	33
		Micro-ecosystems	Construction & Operational	65		44
	Contamination of water resources	Wetlands and Aquatic Ecology	Construction & Operational	70	**Avoid**	33
		Surface Water quality	Construction & Operational	70		33
		Groundwater quality	Construction & Operational	70		33
	Vegetation and habitat loss	Macro and Micro organisms	Construction & Operational	70	**Remedy**	55
		Fauna and Flora	Construction & Operational	70		55
	Noise generation	Surrounding noise quality	Construction & Operational	50	**Control**	21
	CO_2 emissions	Air Quality	Construction & Operational	50	**Control**	28
	Sedimentation and siltation of watercourses	Wetland and Aquatic Ecology	Construction & Operational	70	**Control**	33

		Surface Water quality	Construction & Operational	70		33
	Influx of alien invasive vegetation	Fauna and Flora micro and macro ecosystems	Construction & Operational	60	**Control**	36
22. Residue stockpiles	Dust generation	Air Quality	Construction & Operational	60	**Control**	36
		Human Health	Construction & Operational	70		36
		Topography and Visual Environment	Construction & Operational	60		36
	Degradation of soil resources	Soil quality	Construction & Operational	70	**Remedy**	27
		Flora micro-ecosystems	Construction & Operational	70		55
	Sedimentation and siltation of watercourses	Wetland and Aquatic Ecology	Construction & Operational	70	**Control**	33
		Surface Water quality	Construction & Operational	70		33
	Contamination of water resources	Wetlands and Aquatic Ecology	Construction & Operational	70	**Avoid**	33
		Surface Water quality	Construction & Operational	70		33
		Groundwater quality	Construction & Operational	70		33
	Vegetation and habitat loss	Macro and Micro organisms	Construction & Operational	70	**Remedy**	55
		Fauna and Flora	Construction & Operational	70		55
	Alteration of the visual environment and topography	Topography and Visual Environment	Construction & Operational	55	**Remedy**	36
	Alteration of drainage patterns	Wetland and Aquatic Ecology	Construction & Operational	75	**Remedy**	33
		Surface Water quality	Construction & Operational	80		44
	Hazardous Leachate	Groundwater quality	Operational	75	**Control**	33

		Aquatic ecology	Operational	75		27
23. Screening Operations	Hydrocarbon Contamination	Surface Water quality	Construction & Operational	65	**Control**	21
		Groundwater quality	Construction & Operational	65		21
		Soil quality	Construction & Operational	65		21
	Dust generation	Air Quality	Construction & Operational	60	**Control**	44
		Human Health	Construction & Operational	70		36
		Topography and Visual Environment	Construction & Operational	60		36
	Degradation of soil resources	Soil quality	Construction & Operational	70	**Remedy**	27
		Flora micro-ecosystems	Construction & Operational	70		33
	CO_2 emissions	Air Quality	Construction & Operational	50	**Control**	28
	Contamination of water resources	Wetlands and Aquatic Ecology	Construction & Operational	70	**Avoid**	33
		Surface Water quality	Construction & Operational	75		33
		Groundwater quality	Construction & Operational	75		22
	Sedimentation and siltation of watercourses	Wetland and Aquatic Ecology	Construction & Operational	70	**Control**	33
		Surface Water quality	Construction & Operational	70		33
	Noise generation	Surrounding noise quality	Construction & Operational	55	**Control**	27
	Hydrocarbon Contamination	Surface Water quality	Construction & Operational	70	**Control**	27
		Groundwater quality	Construction & Operational	60		16
		Soil quality	Construction &	65		24

24. Discard disposal (backfilling of mining area)			Operational			
	Dust generation	Air Quality	Construction & Operational	50	**Control**	40
		Human Health	Construction & Operational	65		24
		Topography and Visual Environment	Construction & Operational	65		24
	Degradation of soil resources	Soil quality	Construction & Operational	70	**Remedy**	33
		Flora micro-ecosystems	Construction & Operational	70		44
	Erosion	Loss of fertile soil	Construction & Operational	70	**Control**	33
		Micro-ecosystems	Construction & Operational	70		36
	Contamination of water resources	Wetlands and Aquatic Ecology	Construction & Operational	70	**Avoid**	27
		Surface Water quality	Construction & Operational	70		33
		Groundwater quality	Construction & Operational	70		18
	Sedimentation and siltation of watercourses	Wetland and Aquatic Ecology	Construction & Operational	70	**Control**	33
		Surface Water quality	Construction & Operational	70		33
	Noise generation	Surrounding noise quality	Construction & Operational	55	**Control**	18
25. Waste generation, storage and disposal	Degradation of soil resources	Soil quality	Construction & Operational	55	**Remedy**	21
		Flora micro-ecosystems	Construction & Operational	55		27
	Contamination of water resources	Wetlands and Aquatic Ecology	Construction & Operational	65	**Avoid**	27
		Surface Water quality	Construction & Operational	65		27
		Groundwater quality	Construction & Operational	65		18

	Illegal dumping	Surface water contamination	Construction & Operational	70	**Avoid**	27
		Human health and safety environment	Construction & Operational	70		27
		Soil Contamination	Construction & Operational	75		27
	Hazardous Leachate	Groundwater quality	Operational	70	**Control**	27
		Aquatic ecology	Operational	75		18
26. Chemical Toilets	Degradation of soil resources	Soil quality	Construction & Operational	40	**Remedy**	18
		Flora micro-ecosystems	Construction & Operational	40		18
	Contamination of water resources	Wetlands and Aquatic Ecology	Construction & Operational	40	**Avoid**	12
		Surface Water quality	Construction & Operational	40		24
		Groundwater quality	Construction & Operational	40		12
	Smell nuisance	Human health and safety environment	Construction & Operational	40	**Avoid**	24
27. River crossings	Hydrocarbon Contamination	Surface Water quality	Construction & Operational	55	**Control**	27
		Groundwater quality	Construction & Operational	55		27
		Soil quality	Construction & Operational	65		27
	Erosion	Loss of fertile soil	Construction & Operational	65	**Control**	36
		Micro-ecosystems	Construction & Operational	65		36
	Water level reduction and contamination	Groundwater quality	Construction & Operational	60	**Control**	21
		Downstream water users	Construction & Operational	60		14
		Surface Water quality	Construction & Operational	60		21

	Contamination of water resources	Wetlands and Aquatic Ecology	Construction & Operational	60	**Avoid**	27
		Surface Water quality	Construction & Operational	60		27
		Groundwater quality	Construction & Operational	60		27
	Sedimentation and siltation of watercourses	Wetland and Aquatic Ecology	Construction & Operational	70	**Control**	33
		Surface Water quality	Construction & Operational	70		44
	Alteration of drainage patterns	Wetland and Aquatic Ecology	Construction & Operational	75	**Remedy**	33
		Surface Water quality	Construction & Operational	75		27
28. Water supply (potable & process)	CO_2 emissions	Air Quality	Construction & Operational	55	**Control**	45
	Water level reduction and contamination	Groundwater quality	Construction & Operational	60	**Control**	21
		Downstream water users	Construction & Operational	60		14
		Surface Water quality	Construction & Operational	60		21
	Improper water storage management	Wastage of water resource	Construction & Operational	60	**Avoid**	27
		Water contamination	Construction & Operational	70		18
	Contamination of water resources	Wetlands and Aquatic Ecology	Construction & Operational	70	**Avoid**	14
		Surface Water quality	Construction & Operational	60		14
		Groundwater quality	Construction & Operational	48		9
	Hydrocarbon Contamination	Surface Water quality	Construction & Operational	60	**Control**	24
		Groundwater quality	Construction & Operational	55		24
		Soil quality	Construction & Operational	70		24

29. Storage of fuel and lubricants in temporary facilities	Degradation of soil resources	Soil quality	Construction & Operational	55	**Remedy**	24
		Flora micro-ecosystems	Construction & Operational	55		24
	Contamination of water resources	Wetlands and Aquatic Ecology	Construction & Operational	55	**Avoid**	16
		Surface Water quality	Construction & Operational	55		24
		Groundwater quality	Construction & Operational	55		18
	Chemical Fires	Human health and safety environment	Construction & Operational	60	**Avoid**	24
		Loss of ecosystems	Construction & Operational	80		16
		Damage to property	Construction & Operational	80		16
30. Vehicular activity on haul roads; and operation of mining equipment	Hydrocarbon Contamination	Surface Water quality	Construction & Operational	65	**Control**	24
		Groundwater quality	Construction & Operational	65		27
		Soil quality	Construction & Operational	70		27
	Dust generation	Air Quality	Construction & Operational	60	**Control**	36
		Human Health	Construction & Operational	60		36
		Topography and Visual Environment	Construction & Operational	60		45
	Degradation of soil resources	Soil quality	Construction & Operational	70	**Remedy**	33
		Flora micro-ecosystems	Construction & Operational	70		22
	Erosion	Loss of fertile soil	Construction & Operational	65	**Control**	33
		Micro-ecosystems	Construction & Operational	65		33
	CO_2 emissions	Air Quality	Construction & Operational	50	**Control**	28

	Sedimentation and siltation of watercourses	Wetland and Aquatic Ecology	Construction & Operational	70	**Control**	33
		Surface Water quality	Construction & Operational	70		24
	Noise generation	Surrounding noise quality	Construction & Operational	60	**Control**	27
31. Bulk transporting of Ore to market on Public roads	Dust generation	Air Quality	Construction & Operational	55	**Control**	27
		Human Health	Construction & Operational	75		27
		Topography and Visual Environment	Construction & Operational	55		27
	CO_2 emissions	Air Quality	Construction & Operational	55	**Control**	28
	Pressure on public transport infrastructure	Socio-economic	Construction & Operational	65	**Control**	50
32. Water Management	Erosion	Loss of fertile soil	Construction & Operational	65	**Control**	27
		Micro-ecosystems	Construction & Operational	65		36
	Improper water storage management	Wastage of water resource	Construction & Operational	55	**Avoid**	27
		Water contamination	Construction & Operational	65		27
	Contamination of water resources	Wetlands and Aquatic Ecology	Construction & Operational	70	**Avoid**	33
		Surface Water quality	Construction & Operational	75		27
		Groundwater quality	Construction & Operational	70		33
	Sedimentation and siltation of watercourses	Wetland and Aquatic Ecology	Construction & Operational	70	**Control**	33
		Surface Water quality	Construction & Operational	70		27
	Alteration of drainage patterns	Wetland and Aquatic Ecology	Construction & Operational	75	**Remedy**	33
		Surface Water quality	Construction & Operational	75		36

	Water level reduction and contamination	Groundwater quality	Construction & Operational	70	**Control**	27
		Downstream water users	Construction & Operational	70		27
		Surface Water quality	Construction & Operational	70		21
	Destruction of upstream tributaries and reduction in water in the catchment	Wetland and Aquatic Ecology	Construction & Operational	70	**Remedy**	27
		Downstream water users	Construction & Operational	70		27
		Surface Water quality	Construction & Operational	70		27
33. Rehabilitation of mining areas	Erosion	Loss of fertile soil	Operational	70	**Control**	27
		Micro-ecosystems	Operational	70		36
	Sedimentation and siltation of watercourses	Wetland and Aquatic Ecology	Operational	70	**Control**	33
		Surface Water quality	Operational	70		36
	Noise generation	Surrounding noise quality	Operational	50	**Control**	18
	Influx of alien invasive vegetation	Fauna and Flora micro and macro ecosystems	Operational	60	**Control**	24
	Degradation of soil resources	Soil quality	Operational	80	**Remedy**	24
		Flora micro-ecosystems	Operational	80		24
	Vegetation and habitat loss	Macro and Micro organisms	Operational	80	**Remedy**	30
		Fauna and Flora	Operational	80		32
Decommissioning						
35. Demolition / removal of portable and related infrastructure	Hydrocarbon Contamination	Surface Water quality	Decommissioning	60	**Control**	24
		Groundwater quality	Decommissioning	60		8
		Soil quality	Decommissioning	60		24

	Dust generation	Air Quality	Decommissioning	45	**Control**	24
		Human Health	Decommissioning	45		24
		Topography and Visual Environment	Decommissioning	45		18
	Degradation of soil resources	Soil quality	Decommissioning	60	**Remedy**	18
		Flora micro-ecosystems	Decommissioning	60		18
	Erosion	Loss of fertile soil	Decommissioning	75	**Control**	24
		Micro-ecosystems	Decommissioning	70		24
	Noise generation	Surrounding noise quality	Decommissioning	45	**Control**	18
	General waste generation & Littering	Soils quality due to leachates	Decommissioning	65		24
		Surface Water quality due to leachates	Decommissioning	65		24
36. Vehicular activity: removal of mobile plant / equipment and vehicles	Hydrocarbon Contamination	Surface Water quality	Decommissioning	55	**Control**	24
		Groundwater quality	Decommissioning	55		8
		Soil quality	Decommissioning	55		24
	Dust generation	Air Quality	Decommissioning	45	**Control**	24
		Human Health	Decommissioning	45		24
		Topography and Visual Environment	Decommissioning	45		24
	Erosion	Loss of fertile soil	Decommissioning	50	**Control**	24
		Micro-ecosystems	Decommissioning	50		24
	CO_2 emissions	Air Quality	Decommissioning	40	**Control**	12
	Sedimentation and siltation of watercourses	Wetland and Aquatic Ecology	Decommissioning	50	**Control**	12
		Surface Water quality	Decommissioning	50		18

	Noise generation	Surrounding noise quality	Decommissioning	40	**Control**	18
37. Rehabilitation of the lay down areas	Dust generation	Air Quality	Decommissioning	45	**Control**	24
		Human Health	Decommissioning	50		24
		Topography and Visual Environment	Decommissioning	40		24
	Erosion	Loss of fertile soil	Decommissioning	65	**Control**	24
		Micro-ecosystems	Decommissioning	60		18
	Sedimentation and siltation of watercourses	Wetland and Aquatic Ecology	Decommissioning	65	**Control**	12
		Surface Water quality	Decommissioning	75		18
	Influx of alien invasive vegetation	Fauna and Flora micro and macro ecosystems	Decommissioning	65	**Control**	18
	Degradation of soil resources	Soil quality	Decommissioning	70	**Remedy**	18
		Flora micro-ecosystems	Decommissioning	70		18
	Vegetation and habitat loss	Macro and Micro organisms	Decommissioning	85	**Remedy**	32
		Fauna and Flora	Decommissioning	75		24
38. Demolition of PCD's	Hydrocarbon Contamination	Surface Water quality	Decommissioning	55	**Control**	24
		Groundwater quality	Decommissioning	55		8
		Soil quality	Decommissioning	60		24
	Dust generation	Air Quality	Decommissioning	40	**Control**	12
		Human Health	Decommissioning	40		16
		Topography and Visual Environment	Decommissioning	40		16
	Degradation of soil resources	Soil quality	Decommissioning	70	**Remedy**	18
		Flora micro-ecosystems	Decommissioning	70		24

	Erosion	Loss of fertile soil	Decommissioning	65	**Control**	24
		Micro-ecosystems	Decommissioning	60		18
	Contamination of water resources	Wetlands and Aquatic Ecology	Decommissioning	60	**Avoid**	24
		Surface Water quality	Decommissioning	60		24
		Groundwater quality	Decommissioning	60		16
	Noise generation	Surrounding noise quality	Decommissioning	30	**Control**	18
	General waste generation & Littering	Soils quality due to leachates	Decommissioning	60	**Control**	18
		Surface Water quality due to leachates	Decommissioning	60		18
39. Demolition of workshops, waste storage facilities, fuel storage facilities etc.	Hydrocarbon Contamination	Surface Water quality	Decommissioning	55	**Control**	24
		Groundwater quality	Decommissioning	55		16
		Soil quality	Decommissioning	70		24
	Dust generation	Air Quality	Decommissioning	40	**Control**	12
		Human Health	Decommissioning	40		24
		Topography and Visual Environment	Decommissioning	40		16
	Degradation of soil resources	Soil quality	Decommissioning	70	**Remedy**	18
		Flora micro-ecosystems	Decommissioning	75		18
	Erosion	Loss of fertile soil	Decommissioning	65	**Control**	24
		Micro-ecosystems	Decommissioning	60		18
	Contamination of water resources	Wetlands and Aquatic Ecology	Decommissioning	60	**Avoid**	24
		Surface Water quality	Decommissioning	60		16
		Groundwater quality	Decommissioning	65		16

	Noise generation	Surrounding noise quality	Decommissioning	40	**Control**	18
	General waste generation & Littering	Soils quality due to leachates	Decommissioning	70	**Control**	24
		Surface Water quality due to leachates	Decommissioning	65		24

The supporting impact assessment conducted by the EAP must be attached as an appendix, marked **Appendix R.**

j) Summary of specialist reports

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

Table 13: Summary of inclusion of specialist recommendations

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMEN-DATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT (Mark with an X where applicable)	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED
1. **Appendix E**: Air Quality Impact Assessment	A detailed air quality management plan, using the recommendations provided as a tool, would need to be developed and compiled specifically for the project prior to the commencement of operations. Summary of recommendations and monitoring requirements: • A fugitive dust management plan to be developed prior to the commencement of any onsite activities. • Dust control measures need to be assessed in detail and incorporated into the design. • The plan must include appropriate mitigation measures as described in Table 6-1	**X**	Part B: EMPr

	for all dust emission sources. • The plan should be implemented once operations commence. • Designated areas for the storage of overburden should be considered and incorporated into the design. • All main hauling roads should be treated for dust suppression to maintain at least 65% emission reduction efficiency. • Regular cleaning and maintenance of hauling routes. • Immediate clean-up of any spillage. • All material that is being transported should be covered during transport (where possible). • Control the number of trucks on the road, weight of trucks and the travelling speed. • Conduct regular maintenance and checks for haul road surfaces. • Implement strict vehicle speed limits. • Conduct regular maintenance and quality checks (engines/tires) for all heavy mobile equipment/trucks. • Consider use of cleaner fuel types and fuel efficient vehicles/mobile equipment/trucks.		
2. **Appendix G**: Biodiversity Impact Assessment	From a terrestrial ecological perspective, the proposed development has been rated as follows: The following could proceed if all mitigation measure are diligently implemented with	**X**	Part A: consideration for final site layout Part B: EMPr

(Terrestrial Ecology)	all the necessary authorisations – including permits for protected species removal: • The creation of additional internal access roads is discouraged, but it is anticipated that existing tracks will be upgraded and possibly doubled in width • Phase 1: Klarinet Koppie mining near the discontinued Clarinet Mine could proceed • Phase 3: Tubatse Koppie mining could proceed but with caution • The sites for the main office and workshop complex as well as stockpiles 1 and 2 already exist from the prospecting phase, but are anticipated to be expanded • The laydown area for Phase 3 should be restricted to temporary offices and an ore stockpile, together not exceeding 3-4 ha in total and not closer than 50 m (preferably 100 m) from the bank of any riparian area/drainage line The following is considered ecologically unacceptable and should not proceed: • Workshops within the Tubatse laydown area, except small storage areas for every-day maintenance of machinery, larger repairs should be done at the existing office complex • Phase 3: Spitsvale Flats mining should not be allowed within the erosion plains (about half the area of the mapped ore) – the permanent impacts anticipated there will influence areas beyond the affected land portions and totally seize current landscape functionality (amongst other impacts), which cannot be justified.		

3. **Appendix H**: Avifauna Survey and Impact Assessment	The only real mitigation would be to limit the area of the above-ground development (and its impacts) as far as is possible. These measures would include: • To leave, as far as is possible, as much of the natural indigenous bush undisturbed and in its pristine state. • Route connecting roads as close as is possible to already developed sites or roads. • Restrict or prohibit any off-road driving in areas of pristine indigenous bush. • Route powerlines along these connecting roads, or better still, route them underground.	**X**	Part B: EMPr
4. **Appendix J**: Bat Survey	The focus for mitigation measures in relation to vegetation removal/habitat degradation would be: • Conserve as much of the natural vegetation as possible. Only create haul roads that are absolutely necessary. • Discourage vehicles from driving through the natural vegetation were mining activities are not taking place. • Prohibit mining plant and trucks from washing or dumping material near a water course (wet or dry) to prevent the pollution of natural water bodies. • Prohibit any chemical and/or heavy metal from being released into the environment. • Manage all waste water and stormwater to prevent pollution to water bodies.	**X**	Part B: EMPr

	The focus for mitigation measures in relation to light and noise pollution would be; • To erect security lights/spot lights only near infrastructure/where absolutely necessary. • Mitigate night time noise to as low as possible, particularly during peak foraging times. • Restrict blasting activities to daytime hours.		
5. **Appendix M**: Geo-hydrological Impact Assessment	The following recommendations are proposed to monitor and minimise potential impacts on the receiving groundwater environment: • An environmental monitoring programme should be established in order to monitor groundwater quality and groundwater level changes up- and downstream of the proposed open cast mine workings. Collected monitoring data (quarterly) may be used for future model updates (e.g. every second year). • A number of geosites (i.e. boreholes, springs and surface water drainages) and newly proposed boreholes were identified (refer to fig) to be included into a monthly/quarterly monitoring programme for the BCR Minerals operation. • The parameters to be analysed should comprise the following: ➢ Physico-chemical parameters (pH, EC, TDS); ➢ Major anions (F, Cl, NO3, SO4, HCO3, NH4, PO4,); ➢ Major cations (K, Na, Mg, Ca, NH4,); and ➢ Other elements/metals (Fe, Mn, Zn, Pb, Co, Cr, Cr (VI),). • Emphasis should be placed on monitoring of groundwater levels prior mining and during the operation phase as well as to establish the origin of the elevated	**X**	Part B: EMPr

	nitrate concentrations in the project area. • Recording of pit dewatering rates. Initial monthly (and later quarterly) sampling and analysis (major and trace elements) of pumped water.		
6. **Appendix L**: Hydrological Assessment	The following summarises the recommendations as a result from the Hydrological Assessment: • It is recommended that an Automatic Weather Station be installed at the site. • There is a significant amount of infrastructure located within these buffers and intersecting watercourse. These instances will need to be considered during the water use license process (Section 21 c and i). It is recommended that floodlines are modelled (when detailed elevation data becomes available) for streams where flooding of infrastructure is a concern in order to ensure complete compliance with GN704. Peak flows and hydrographs were developed as part of this study for various sub catchments over the site. These outputs are intended to inform any future flood modelling. • Stream crossings and associated bridge and culvert designs have not been considered in this assessment but in principle, these crossing need to be sufficiently sized to provide capacity to convey the 1:100 year flood event over the expected life of the structure to minimise impacts and ensure that the natural flow regime can be maintained as far as possible. • The conceptual storm water management plan has been developed based on the requirements of GN 704. This was done by identifying clean and dirty areas and managing them accordingly. Dirty water producing areas have been isolated by	**X**	Part A: consideration for final site layout Part B: EMPr

	diverting upstream clean water around them via clean water diversions and dirty water produced in dirty areas has been routed to dirty containment facilities via diversions. Stormwater infrastructure has been developed based on the contributing catchment areas and catchment characteristics, and has been sized to contain the 1:50 year flood event. It is recommended that discussions are held with the DWA regarding the lining requirements for storm water management infrastructure, to ensure that the flood hydrology calculations can be revised accordingly during detailed design and prior to construction of infrastructure. The "recommended volumes" of the proposed dirty storm water dams should be investigated further during the detail design phase to accommodate operational storage volumes, without compromising the ability of the dams to contain the "minimum volumes" as per GN 704 compliance. It is recommended that priority is given to the reuse of dirty water within the process water circuit. • As part of the monitoring program going forward, samples should be taken monthly for at least the first year of operation. This can be revised to quarterly monitoring if no concerns are highlighted. This will however need to be discussed with the DWS as they are the ultimate custodians of the water resources. The monitoring should include the standard analysis of major cations/anions as well as ICP scan for metals. Waterlab in Pretoria has appropriate accreditation for such analysis to be undertaken. • The WR2012 mean annual estimate of runoff for the site was estimated according to the dirty area contained (comprised of stockpiles, opencast areas and containment facilities) and totalled 1.097km2. This accounts for 0.022 million		

	m3 of MAR that will be contained by the site (0.15% of quaternary catchment B41J MAR) • Based on the model results, there seems to be an excess of approximately 22 527m3/month and 8 065m3/month for the wet and dry seasons respectively. This excess water will need to be appropriately managed and if deemed necessary to discharge, meet the appropriate discharge quality guidelines and associated discharge IWULA conditions. It is recommended that the water balance be updated once more specific domestic and process water reticulation volumes are known and refined annually during the life of the project. Flow meters should be installed in the domestic and process water circuits to provide actual data on water flows so that the water balance can be updated accordingly. A suitable dynamic water balance simulation model could also be developed and used as a decision support tool as mining progresses.		
7. **Appendix O**: Heritage Impact Assessment	Conditions for inclusion in the environmental authorisation: • It is recommended that the homestead sites are retained, and that it should be fenced off for the duration of the mining, leaving a buffer zone of at least ten metres from the outer edge of the stone walling/physical features. If the sites cannot be retained, it should be documented (mapped and excavated) by an archaeologist after obtaining a permit from SAHRA (see Appendix 5 for more detail the proposed mitigation for each identified site). • If mining takes place in these areas, the community should be consulted to determine if there are any more graves in the region, especially those of young children who, in many cases, are buried inside the old homestead.	**X**	Part A: consideration for final site layout Part B: EMPr

	• It is recommended that the burial sites are retained and it should be fenced off for the duration of the mining activities, leaving a buffer zone of at least five metres from the outer edge of the graves. If the graves cannot be retained, it should be relocated, but only on condition of following the correct procedures (see Appendix 5 for more detail on each identified site). • It is recommended that the industrial/infrastructural heritage feature (irrigation system) should be documented (photographed and mapped) in before mining activities takes place. • Should archaeological sites or graves be exposed during construction work, it must immediately be reported to a heritage practitioner so that an investigation and evaluation of the finds can be made. According to local inhabitant, Mr Silas Mosethla, old informal burial sites might still be located in some places, but it would be difficult to trace due to "lack of memory" and the current dense vegetation.		
8. **Appendix F**: Noise Impact Assessment	The most important mitigation options recommended would be to limit operations on the open cast pits adjacent to the Tubatse community to daytimes only (during all phases). Berms/barriers need to be constructed along either the noise sources or the receivers. In order for the berms/barriers to successfully act as an acoustical screen specifications indicated in this document mitigation section must be adhered to. Communication between the Tubatse community and the developer need to be implemented and maintained, highlighting the outcome of this study.	**X**	Part B: EMPr

	An annual Acoustical Measurement & Audit Programme is recommended to be conducted during the construction and operational phase. Measurements should be collected in 10-minute bins over a 48 hour measurement period. Variables and measurement recommended settings to be analysed include L_{AMin}, L_{Aeq}, L_{AMax}, L_{AMin} L_{A10}, L_{A90} and spectral analysis. Noise measurements must be continued as long as there are potential receptors living within 1,000m of the boundaries of the mining operation, or as long as a valid noise complaint is registered. Feedback regarding noise measurements should be presented to all stakeholders and other Interested and Affected parties in the area. The feedback platform and interval periods should be defined by the developer, with an annual feedback period recommended. If the layout of the mine changes significantly (or assumptions change) used in this report, that this Environmental Noise Impact Assessment be reviewed with the appropriate information supplied by the developer, including: • Locality of the noise source; • Operational time of the noise source; and • If possible specifications regarding the noise source		
9. **Appendix K**: Soil Impact Assessment	The results of the Impact Assessment for the proposed mine on Portions 8, 22 Farm Kennedy's Vale 361KT & Portions 24, 25, 26 and 28 Farm Spitskop 333KT find the proposed activity will have a medium to low impact on the immediate and surrounding soil systems. Implementation and management of proposed mitigation measures will minimize loss of topsoil, prevent contamination of topsoil and stockpiled soil and	**X**	Part B: EMPr

	prevent overall soil erosion. It is recommended that the proposed project be approved subjected to the mitigation measures stipulated in the Impact Assessment and Environmental Management Programme The following mitigation measures are recommended to prevent the change of soil's physical, chemical and biological properties due to loss of topsoil: • due to erosion, stockpiling, mixing of deep and surface soils during handling, stockpiling and subsequent placement; • Implement live placement of soil where possible, improve organic status of soils, maintain fertility levels and curb topsoil loss. • Implement surface digital terrain mapping to ensure surface water control measures are implemented to ensure free draining system with minimal soil erosion Loss of agricultural land due to establishment of infrastructure is a long term loss and no mitigation measures exist. Mitigation is restricted to limitation of extent of impact to the immediate area of impact and minimisation of site impacts. Loss of agricultural land due to opencast mining is a temporary loss which can be mitigated by appropriate backfilling and replacement of stockpiled topsoil. If done correctly, most of the original agricultural potential will be restored. When stockpiled soils have been replaced during rehabilitation, the soil fertility should		

	be assessed to determine the level of fertilisation required to sustain normal plant growth. The fertility remediation requirements need to be verified at the time of rehabilitation. The topsoil should be uniformly spread onto the rehabilitated areas and care should be taken to minimise compaction that would result in soil loss and poor root penetration. When returning the soil to the rehabilitation site care should be taken to place soil in a manner that will allow for levelling of soil to take place in a single pass. The soil profile should not be built up by using a repeated tipping and levelling action to increase the soil depth. Proper water control measures should be implemented to ensure a free draining rehabilitated landscape. When surveying the area to be rehabilitated and generating a digital terrain map, preferential seepage pathways should be identified and contoured to prevent surface runoff creating erosion during a 1:100year rainstorm event with 20mm/h rainfall intensity. A soil scientist with remediation and rehabilitation experience should be consulted to assess water retention and storage abilities of soil types to utilise the net cascading		

	effect of water storage under saturated and unsaturated flow conditions. A scientific assessment should be conducted to assess what grass species occur at baseline conditions in close proximity to the stockpile area.		
10. **Appendix N**: Human Health Impact Assessment	The baseline assessment of the community's health and wellbeing provides a baseline from which the monitoring programme can judge whether the project or other factors are causing beneficial or harmful effects on local communities (ICMM, 2010). The IFC guidelines suggest that a company's mitigation strategy and health action plan should include both a long term community health monitoring (surveillance) and evaluation plan, as well as a verification programme (IFC, 2009). Such programmes are designed to 1) review progress on the project; 2) provide early warning of population level problems, whether at the single or cumulative effects levels, by identifying problems in planning and/or implementation; and 3) make adjustments in order to address unanticipated effects. As a result, an M&E programme requires clear key performance indicators in order to capture early unanticipated consequences, to institute remedial actions and to evaluate progress made on the objectives of the Health Action Plan. It will be of value to form a group of different stakeholders that have the potential to be involved in establishing a coordinated data collection process. Inclusion of local government departments such as environment, health and others will help to understand and assist with improving the status of the local health information systems, including the reliability of the data accessibility in a timely manner so that	**X**	Part B: EMPr

	early warnings of population-level issues may be raised. Community organisations should be included and community members could be employed as infopreneurs (an entrepreneur who specialises in information, thereby providing, promoting, and distributing knowledge) (Van Rensburg, 2008). Inclusion of other industries is important in order to avoid duplication of monitoring efforts. Such a group may also be able to provide more frequent informal data, even though it may be more qualitative assessments.		
11. **Appendix P**: Traffic Impact Assessment	The findings of the traffic impact assessment for proposed BCR Chrome Mine, the Spitsvale Project in Steelpoort conclude that the proposed development will not have a negative impact on the existing road networks within the project area. However, certain mitigation measures have been recommended to accommodate the background traffic demand, Latent Rights and the proposed mine's development traffic and also to ensure traffic safety principles are adhered to. Based on the conclusions of this assessment, it is recommended that the proposed development should be favourably considered from a traffic engineering point of view by the relevant authorities.	**X**	Part B: EMPr
12. **Appendix S**: Mine Rehabilitation, closure, and Liability plan	It is assumed that approximately 80 – 100 ha of land will be disturbed during the current exploration and planned mining operations. An assessment was conducted of all the infrastructure and activities taking place on site that fall within the properties associated to the mining right application. The infrastructure was classified in accordance with the tariffs list and the surface areas of	**X**	Final EMPr

	the infrastructure were calculated to determine the volume or surface requiring rehabilitation or demolition. A supplementary calculation was done to incorporate Phase 2 & 3 and a second laydown area. These extensions are planned as part of the next phases of the project and will only commence once phase 1 mining operations have ceased. The premature quantum was calculated using the demolition and rehabilitation rates and has been calculated as **R 90 452 381.83 (including P&G, contingency and excluding VAT)** for the physical and biophysical components associated with the current activities and infrastructure on the site. This related to Open pit 1, Laydown area 1, Ore stockpile area, ROM stockpile area and roads. It is evident that the biophysical component of rehabilitation makes for 98% of the liability cost. The physical rehabilitation (demolition and removal of structures) amounts to 2% (**R 1 636 330.71**) of the liability cost. A focussed rehabilitation and closure strategy can minimise the liability of both components. A cost estimate has been included for the current and future activities. The assumption made with regards to placement of waste rock in the future activities is that a starter waste rock dump will be constructed and as soon as mining allows it, the waste rock will be backfilled into the pit area. This will be done as part of operational cost. Thus no waste rock dumps will remain subsequent to mining operations ceasing. The quantum calculated for all activities and infrastructure associated with the entire Spitsvale Project (including mining of phase 2 and 3 and the associated infrastructure)		

	was calculated as **R106 671 605.22** (**including P&G, contingency and excluding VAT).** Allowance has been made for the creation of a free-draining topography, replacement of soil, re-vegetation, and for the general surface rehabilitation of the disturbed area and the liability figures will be updated on an annual basis as required by the DMR.		
13. **Appendix T**: Public Participation Report	To be finalised after the completion of the required 30 days PPP.	**X**	Final EMPr

(Attach copies of Specialist Reports as appendices.)

k) Environmental Impact Statement

In accordance with the Appendix 3 section 3 (q) of the EIA Regulations GN R982, the EAP must provide an opinion as to whether the activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation must be stated.

An impact assessment has been undertaken, which has incorporated extensive consultation with appointed independent specialist, and resulted in this report.

It is the EAP's opinion that due process has been followed in terms of identifying impacts found to be potentially significant. Various mitigation measures to manage and monitor the impacts of the Project have been proposed. **Appendix S** provides for addressing the requirements stipulated in GNR 1147 dealing with the financial provisions for the proposed mining operation as well as commitment to rehabilitation measures that will be implemented once authorisation has been granted.

Although the procedures stipulated in GN R982 was not followed during the initial Scoping phase of the proposed activities, in Environmental Management Assistance (Pty) Ltd's professional opinion, all anticipated construction and operational impacts for the proposed Project have been considered. The draft Spitsvale Mine Rehabilitation, closure and liability plan has been completed during the time of finalising this document. However, this document is considered to be a living document and is subject to an annual review.

Therefore, in consideration of all facts presented by this final EIR, the proposed activities may only commence with the following conditions:

- The findings and recommendations stipulated in the Spitsvale Mine Rehabilitation, closure, and liability plan (Appendix S) be implemented;
- A annual rehabilitation be developed and reviewed as per the requirements stipulated by GNR 1147;
- The comments received by the registered I&AP be incorporated into the final EIR and EMPr; and
- That the recommended mitigation measures must be strictly implemented and compliance be monitored and reported in order to minimise the impacts and ensuring compliance with current legislative requirements.

It is recommended that the proposed Project is allowed to proceed on the assumption that the environmental and social management commitments are adhered to, the Project description remains as per the description provided in the final EIR & EMPr and considering the positive social impacts associated with the Project.

i) Summary of the key findings of the EIA

A number of significant impacts associated to the proposed activities have been identified in previous section in this report as part of the EIA process. In the review of the specialist assessment reports highlighted in section ***j)*** specific environmental and social sensitive receptors were identified. Table 14 summarises the high significant potential impacts associated to the proposed activities.

Table 14: Summary of high significant potential impacts

Construction Phase			
Activity	**Possible Impacts**	**Significance Pre-mitigation**	**Significance Post-mitigation**
1. Access and hauling along roads i.e. during the construction of roads	Vegetation and habitat loss	65	36
2. Site clearing and topsoil stripping for lay down area and all related mining infrastructure	Vegetation and habitat loss	70	36
	Destruction of Wetlands	65	36
	Destruction of graves	65	39
	Degradation of cultural significance heritage sites	65	39
	Erosion	70	24
	Alteration of drainage patterns	70	36
6. Storm water runoff management features	Sedimentation and siltation of watercourses	70	33
	Hydrocarbon Contamination	70	18
	Alteration of drainage patterns	70	33
8. Pollution Control Dams (PCD's) i.e. Construction and operation	Contamination of water resources	75	16
9.Stores, workshops &wash bays	Hydrocarbon Contamination	70	33
	Degradation of soil resources	65	33
	Contamination of water resources	70	33
	Chemical Fires	65	22
10. Ablutions & change house with mobile sewage treatment plant	Contamination of water resources	70	33
11. Fuel operating power generators	Hydrocarbon Contamination	70	33
	Degradation of soil resources	65	33
	Contamination of water resources	70	33
	Chemical Fires	65	24
13. Fuel storage	Emission of noxious fumes	65	33
	Hydrocarbon Contamination	70	33

	Degradation of soil resources	64	22
	Contamination of water resources	70	33
	Chemical Fires	65	24
14. Employment of workers and procurement of construction materials.	Population Influx – Community Conflict	65	32
Operational Phase			
17. Employment of workers	Population Influx – Community Conflict	65	32
18.Topsoil and subsoil stripping & stockpiling for mining operation area	Vegetation and habitat loss	85	55
	Destruction of Wetlands	75	40
	Hydrocarbon Contamination	70	36
	Sedimentation and siltation of watercourses	70	36
	Water level reduction and contamination	65	36
	Destruction of graves	65	36
	Degradation of cultural significance heritage sites	65	33
	Erosion	70	33
	Alteration of drainage patterns	75	48
	Destruction of upstream tributaries and reduction in water in the catchment	65	36
19.Opencast mining excavations	Hydrocarbon Contamination	70	27
	Degradation of soil resources	70	55
	Erosion	70	44
	Vegetation and habitat loss	85	55
	Contamination of water resource	70	33
	Sedimentation and siltation of watercourses	75	48
	Alteration of drainage patterns	80	60
	Destruction of upstream tributaries and reduction in water in the catchment	65	44
	Alteration of the visual environment and topography	85	55
20.Drilling & Blasting	Degradation of soil resources	70	55
	Contamination of water resource	70	33
	Hydrocarbon contamination	70	44
	Damage to surrounding landowner properties	65	36
21. RoM & product stockpiling	Hydrocarbon contamination	65	33
	Dust generation	70	44

	Erosion	70	44
	Contamination of water resource	70	33
	Vegetation and habitat loss	70	55
	Sedimentation and siltation of watercourses	70	33
	Alteration of the visual environment and topography	80	55
22. Residue stockpiles	Dust generation	70	36
	Degradation f soil resources	70	55
	Sedimentation and siltation of watercourses	70	33
	Contamination of water resources	70	33
	Vegetation and habitat loss	70	55
	Alteration of drainage patterns	80	44
	Hazardous Leachate	75	33
23. Screening Operations	Hydrocarbon contamination	65	21
	Dust generation	70	36
	Degradation of soil resources	70	33
	Contamination of water resources	70	33
	Sedimentation and siltation of watercourses	70	33
24. Discard disposal (backfilling of mining area)	Hydrocarbon contamination	70	27
	Dust generation	65	24
	Degradation of soil resources	70	44
	Erosion	70	36
	Contamination of water resource	70	33
	Sedimentation and siltation of watercourses	70	33
25. Waste generation, storage, and disposal	Contamination of water resources	65	27
	Illegal dumping	75	27
	Hazardous Leachate	75	27
27. River crossings	Hydrocarbon contamination	65	27
	Erosion	65	36
	Sedimentation and siltation of watercourses	70	44
	Alteration of drainage patterns	75	33
28. Water supply (potable & process)	Improper water storage management	70	18
	Contamination of water resource	70	14
29. Storage of fuel and lubricants in temporary	Hydrocarbon contamination	70	24
	Chemical fires	80	16

facilities			
30. Vehicular activity on haul roads; and operation of mining equipment	Hydrocarbon contamination	65	27
	Degradation of soil resources	70	33
	Erosion	65	33
	Sedimentation and siltation of watercourses	70	33
31. Bulk transporting of Ore to market on Public	Dust generation	75	27
	Pressure on public transport infrastructure	65	50
32. Water Management	Erosion	65	36
	Improper water storage management	65	27
	Contamination of water resources	70	33
	Sedimentation and siltation of watercourses	70	33
	Alteration of drainage patterns	75	36
	Water level reduction and contamination	70	27
	Destruction of upstream tributaries and reduction in water in the water catchment	70	27
33. Rehabilitation of mining areas	Erosion	70	36
	Sedimentation and siltation of watercourses	70	36
	Degradation of soil resources	80	24
	Vegetation and habitat loss	80	30
Decommissioning Phase			
35. Demolition / removal of portable and related infrastructure	Erosion	75	24
	General Waste generation & Littering	65	24
37. Rehabilitation of the lay down areas	Erosion	65	24
	Sedimentation and siltation of watercourses	75	18
	Influx of alien invasive vegetation	65	18
	Degradation of soil resources	70	18
	Vegetation and habitat loss	85	32
38. Demolition of PCD's	Degradation of soil resources	70	24
	Erosion	65	24
39. Demolition of workshops, waste storage facilities, fuel storage facilities etc.	Hydrocarbon contamination	70	24
	Degradation of soil resources	70	18
	Erosion	65	24
	Contamination of water resources	70	16
	General waste generation & Littering	65	24

It is clear from the assessment listed above that there will be a number of impacts that poses a ***high negative significant*** impact. However if the mitigation measures proposed in Part B (EMPr) of this report are implemented, monitored and audited throughout the life cycle of the Spitsvale Project, the impacts can be mitigated to a ***medium/low negative significant*** impact or avoided all together.

Resulting from the specialist studies as well as the assessment of possible impacts, the following areas of concern would require attention throughout the life cycle of the proposed Spitsvale Project:

- Terrestrial ecological status of the areas affected by the proposed mining activities as the Spitsvale Project is within the Sekhukhune centre of endemism;
- Control and management of alien invasive species;
- Ambient air quality affecting surrounding landowners, communities, the public, and personnel;
- Noise quality affecting surrounding landowners, communities, the public, and personnel;
- Protection of water bodies, i.e. rivers, streams, drainage lines, wetlands, and storm water channels;
- Water quality as per the authorised water use licence;
- Identified heritage sites as listed in **Appendix O**;
- Storm water management and erosion prevention;
- Ensuring proper Waste Management activities throughout each phase of the project;
- Management of hazardous substances and maintenance of mining plant/vehicles/equipment;
- Protection of topsoil and fertile soil throughout the entire life cycle of the Spitsvale project; and
- Rehabilitation measures to ensure post-mining land capability;
- Relationships with the I&AP throughout the entire life cycle of the project; and
- The human health of the surrounding communities.

ii) Final site map

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

See **Appendix C**.

At the time of finalising this report the following infrastructures did not form part of the site layout:

- Storm water infrastructure;
- Location of PCD's; and
- Detailed infrastructure associated to the Tubatse lay down area.

It is therefore recommended that before authorising the activity a detailed site layout plan be submitted indicating the details of all infrastructure associated to the proposed mining development.

iii) Summary of the positive and negative implications and risks of the proposed activity and identified alternatives

Throughout this report a number of positive and negative implications and risk associated to the proposed Spitsvale Project (Table 15) have been identified. As discussed in the previous sections there are no Project related alternatives.

Table 15: Summary of positive and negative implications and risks associated to the Spitsvale Project

Positive Implications	Negative Implication and risk
• Job creation • Positive contribution to social economic development • Contribute to the national GDP • Open communication with the I&AP of environmental findings and performance will contribute the learning opportunity of the surrounding communities. Implementing recommendations made in **Appendix N** will result in the following positive implications: • Possibly stimulate the increase in household income • Increase the ability to afford healthier food and associated improved nutritional and health status • Raise awareness within the community on all associated human health risks. Implementing the recommendations made in **Appendix G** regarding the management of alien invasive species may result in the following positive outcomes: • Promote the knowledge and need for the eradication of alien species within the surrounding communities	• Loss of vegetation and habitat • Degradation of soil resources • Degradation of ambient air quality due to dust generation • Noise generation • Hydrocarbon contamination and pollution • Erosion • Contamination of water resources • Sedimentation and siltation of watercourses • Alteration of drainage patterns • Influx of alien invasive vegetation • Alteration of the visual environment and topography • Destruction or degradation of significant heritage sites and graves • Waste generation (hazardous and general waste) • Health and safety of employees • Community conflict caused by population influx

I) Proposed impact management objectives and the impact management outcomes for inclusion in the EMPr

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

Part B of this report provides the proposed EMPr. The purpose of the EMPr is to achieve a required end state and describes how activities that have, or could have, an adverse impact on the environment will be mitigated, controlled and

monitored. It also addresses the environmental impacts during the Construction, Operational, Decommissioning and Post-Closure Phases of the proposed activities.

The main focus of the EMPr is environmental protection throughout the life cycle of the proposed mining project. A number of environmental recommendations are therefore made to achieve environmental protection.

The environmental and social objectives are set to allow the mining of the chromite and all associated mineral resources in an environmental and socially responsible fashion while ensuring that sustainable closure can be achieved. To achieve closure the correct decisions need to be taken during the planning phase.

The following Environmental Objectives and goals formed the baseline for the development of the EMPr in Part B of this report:

- Protect the biophysical environment from any impacts that cannot be mitigated and that will negatively impact on biodiversity on a regional scale;
- Reserve the water resources in line with the objectives of the integrated catchment management and thereby ensure that the limited available resources are utilised to the maximum benefit of the country and its inhabitants;
- Ensure that activities are carried out so as to aid rehabilitation;
- Ensure a safe and healthy environment for people to live in as is stipulated in the constitution; and
- Ensuring compliance to legislation, regulations, and national standards throughout the life cycle of the project.

The following socio–economic objectives should be attained during the entire life cycle of the proposed activities:

- Adhere to an open and transparent communication procedure with stakeholders at all times.
- Ensure that accurate and regular information is communicated to I&APs in a manner which is understandable and accessible.
- Mitigate negative impacts.
- Enhance Project benefits and minimise negative impacts through intensive consultation with stakeholders.
- Assemble adequate, accurate, appropriate, and relevant socio-economic information relating to the context of the operation.
- Ensure that recruitment strategies for the mine, prioritise the sourcing of local labour, and share in gender equality.
- Ensure an atmosphere of equality and non-discrimination among the workforce.
- Contribute to the development of functional literacy and numeracy among employees.
- Empower the workforce to develop skills that will equip them to obtain employment in other sectors of the economy.
- Contribute to the development of a self-reliant (not dependent on the mine) community surrounding the area of operation.

- Ensure that decommissioning and retrenchments take place in a legally compliant and humane manner.

The overall rehabilitation objectives for this project are as follows:

- Maintain and minimise impacts to the ecosystem within the project area.
- Re-establishment of the pre-development land capability to allow for a desirable post mining land use.
- Prevent excessive losses of soil resources, including soil seed banks, by adequately managing stormwater and accelerated erosion.
- Prevent soil, surface water and groundwater contamination.
- Comply with the relevant local and national regulatory requirements.
- Maintain and monitor the rehabilitated areas until they have reached a stable state in which a gradual natural succession to an optimal natural species composition can progress.

The closure objectives which will drive the closure criteria, **Appendix S**, and which have been developed to support the closure vision are:

- Adhere to all statutory and other legal requirements.
- To develop landforms supporting stable and functioning ecosystems, are aesthetically acceptable on closure and will gradually sustain the desired land-uses post closure.
- Ensure safety & health of all stakeholders during closure and post closure and that communities using the site after closure are not exposed to unacceptable risks.
- Ensure that closure supports productive uses considering pre-mining conditions and are in agreement with commitments to stakeholders.
- Physically and chemically stabilise remaining structures to minimise residual risks.
- Promote bio-diversity and biological sustainability to the maximum extent practicable.
- Utilize closure strategies that promote a self-sustaining condition with little or no need for ongoing care and maintenance.
- To achieve agreed quality targets set by the Catchment Management Authority (CMA) and the Department of Water and Sanitation (DWS) as far as practical relative to impacts and reasonability to achieve.

m) Final proposed alternatives

(Provide an explanation for the final layout of the infrastructure and activities on the overall site as shown on the final site map together with the reasons why they are the final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment)

As discussed in the previous sections no alternatives where considered regarding the properties proposed for the activities.

The site layout (**Appendix C**) indicates existing infrastructure resulting from the prospecting phase of the Spitsvale Project that will be utilised as part of the proposed mining activities. The location of additional required infrastructure within the authorised properties in terms of the prospecting right has been carefully considered with regards to sensitive environmental and social receptors.

At the time of finalising this report for the PPP the following infrastructures did not form part of the site layout:

- Storm water infrastructure;
- Location of PCD's; and
- Detailed infrastructure associated to the Tubatse lay down area.

It is therefore recommended that before authorising the activity a detailed site layout plan be submitted indicating the details of all infrastructure associated to the proposed mining development.

n) Aspects for inclusion as conditions of Authorisation

(Any aspects which have not formed part of the EMPr that must be made conditions of the Environmental Authorisation)

This document has been finalised for the required 30 days PPP as required by GNR 982 and includes the Spitsvale Mine Rehabilitation, Closure and Liability plan developed according to GNR 1147. This report will be finalised to include any comments received from the registered I&AP.

In addition to the requirements to review the EIR and EMPr the conditions for authorisation are recommended to include the following:

- All comments and concerns raised by the registered I&AP be considered and incorporated into the final EIR and EMPr;
- The Spitsvale Mine Rehabilitation, Closure and Liability plan attached as **Appendix S** should be considered as the ***first draft*** and a living document. A number of assumptions, gaps and uncertainties were identified during the preparation of this report. It is recommended that it be reviewed. As highlighted in **Part A section q)ii)(2),** on granting of the authorisation for the proposed mining activities to proceed a final Annual Rehabilitation plan and a Risk Assessment plan as specified by GNR 1147 must be submitted to the competent authority for approval;
- A final site layout detailing all infrastructure (with specific reference to the storm water management infrastructure, the PCD's designs, and the river crossings) associated to current and future mining activities must be provided to the competent authorities for approval before any activities commence;
- Conditions stipulated in the final EMPr and closure plan be adhered with;
- Conditions stipulated in all other permits or authorisations should be implemented; and
- All recommendations made in the EIR and specialist studies be implemented and considered in the finalisation of the site lay out plan and operational design of the proposed mining development.

o) Description of any assumptions, uncertainties, and gaps in knowledge

(Which relate to the assessment and mitigation measures proposed)

All conclusions, findings, and recommendation were made on the assumption that information provided by the applicant to the appointed EAP and specialists were accurate.

With reference to the development of the Spitsvale Mine Rehabilitation, closure and liability plan (**Appendix S**) the following assumptions, uncertainties, and gaps were highlighted:

- The areas and components included in the current assessment were supplied to EMA by BCR and the EIA specialist reports at the time of this report. These areas were assumed to be all that BCR will be liable for and no investigation was conducted to determine whether BCR is responsible for any additional areas.
- In the absence of exact measurements of infrastructure and proposed mining activity footprints, these were determined roughly from Google-Earth imagery.
- For future annual reviews, all infrastructure and mining footprint drawings will be updated to reflect the current on-site situation, as well as reference all infrastructure and photograph where deemed necessary by the reviewers to be able to provide more detailed reference maps and compilations of a bill of quantities.
- It is assumed that upon a premature closure of the mine, the same liability will arise as at Life of Mine Closure, but at that stage total area affected and hence cost may be reduced.
- Life of Mine Closure operations also include the necessary monitoring and mitigation of possible residual and/or latent impacts post mining closure operations.
- The Rehabilitation and Closure Plan is considered a 'living document' that will be reviewed and updated annually to ensure that all new insights and developments are adequately covered.
- Closure commences once the final stages of ore extractions commence.
- BCR Minerals will ensure final revegetation will take place on all exposed disturbed areas.
- Security will be required during the closure period to limit access of unauthorized people. Once the closure activities are complete and the operation enters the care, maintenance and monitoring period, security will be withdrawn from the site.
- Water management will be required to limit sediment load releases until such time as the vegetation is established and limits erosion potential on the disturbed rehabilitated areas.
- Water management infrastructure will be retained until such time as contact water can be released to the environment to prevent soil erosion.
- Prior to closure the leachate and runoff from the surface of the rehabilitated areas will be monitored to determine if the quality will meet the WUL requirements for discharge or requires management on site.
- The sediments in the various rehabilitated areas are not likely to be classified as hazardous.
- Salvageable equipment will be removed and transported offsite prior to the commencement of demolition.

- The water and power reticulation and associated infrastructure will be retained until such time as water and power are no longer needed on site.
- At closure all temporary portable ablution facilities and a conservancy tank will be removed on completion of the construction phase. All waste generated during the construction phase will be stored at existing storage facilities and disposed of appropriately, as per the mine's current waste management procedures.
- BCR Minerals (Pty) Ltd assume that the effluent released from the ablution facilities during the operational period will not have had a significant impact on the soils and groundwater. Therefore no remedial measures for soil and groundwater contamination are considered in this plan. It is important that the validity of these assumptions is re-visited with each revision of the closure plan to ensure that the final decommissioning and closure plan is based on a sound baseline description.

It has also been pointed out in previous section that the EIR and EMPr be reviewed to include the findings and recommendations stipulated in the closure plan. This revised report must then be subjected to the stipulated 30 days PPP as required in the 2014 EIA regulations. Any comments or concerns received after the 30 days PPP period should be considered in the final EIR and EMPr.

p) Reasoned opinion as to whether the proposed activity should or should not be authorised

i) Reasons why activity should be authorised or not

Environmental Management Assistance (Pty) Ltd as the appointed EAP recommends that on the conditions that all the requirements, conditions, and measures listed in this document and associated appendices be adhered to, that there is no reason why this activity should not be authorised.

Authorisation should be subjected to the completion of all requirements stipulated by GN R. 982 and GN R. 1142.

ii) Conditions that must be included in the authorisation

A number of conditions have been highlighted in previous sections of this report.

To summarise, the following conditions must be subjected to authorising the proposed mining development:

- The revised EIR and EMPr, together with the finalised Spitsvale Mine Rehabilitation, closure and liability plan as regulated under GN R. 1142, be subjected to the required 30 days PPP as regulated by the 2014 EIA regulations;
- All comments and concerns raised by the registered I&AP be considered and incorporated into the final EIR and EMPr;
- Conditions stipulated in the final EMPr and closure plan be adhered with;
- Conditions stipulated in all other permits or authorisations should be implemented; and

- All recommendations made in the EIR and specialist studies be implemented and considered in the finalisation of the site lay out plan and operational design of the proposed mining development.

(1) Specific conditions to be included into the compilation and approval of EMPr

All requirements stipulated by the final EIR, as well as the developed Spitsvale Mine Rehabilitation Closure and Liability plan and comments received by the I&AP be incorporated into the final EMPr.

(2) Rehabilitation requirements

The Spitsvale Mine Rehabilitation Closure and Liability plan has been developed according to GNR 1147 published under the National Environmental Management Act (Act No. 107 of 1998) (NEMA).

The purpose of these regulations is to regulate the determine and making of financial provision as contemplated in NEMA for the cost associated with the undertaking of management, rehabilitation and remediation of environmental impacts from prospecting and mining operations through the lifespan of such operations and latent or residual environmental impacts that may become known in the future.

This regulation requires the following documents:

- Annual rehabilitation, as reflected in an annual rehabilitation plan;
- Final rehabilitation, decommissioning and closure of the prospecting or mining operations at the end of the life of operations, as reflected in a final rehabilitation, decommissioning and mine closure plan; and
- Remediation of latent or residual environmental impacts which may become known in the future, including the pumping and treatment of polluted or extraneous water, as reflected in an environmental risk assessment report.

The required documents listed above has been combined and incorporated into the first ***draft*** Spitsvale Mine Rehabilitation closure and Liability plan attached as **Appendix S**.

Annual rehabilitation

GNR 1147 stipulates the requirements of the annual rehabilitation plan. The annual rehabilitation plan will be relevant for a period of 1 year, after which the plan will be updated by BCR Minerals (Pty) Ltd to reflect progress relating to rehabilitation and remediation activities in the preceding 12 months and to establish a plan, schedule and budget for the forth coming 12 months. The purpose of this document is to explain the following:

- Definition of concurrent rehabilitation and remediation activities for the forthcoming 12 months;
- how these relate to the operations' closure vision, as detailed in the final rehabilitation, decommissioning, and mine closure plan;
- indicate what closure objectives and criteria are being achieved through the implementation of the plan; and
- Must be measurable and auditable.

As explained in **Appendix S**, a detailed annual rehabilitation plan for mining related activities cannot be devised at this stage of the process. However, general expectations on annual rehabilitation have been defined in the ***draft*** report and will be required to be reviewed and updated on an annual basis. Therefore, as soon as the proposed mining activity has been granted authorisation the final annual rehabilitation plan will have to be developed in detail.

Final rehabilitation, decommissioning and closure plan

GNR 1147 list a number of requirements for the final rehabilitation, decommissioning and closure plan. This plan must include or describe the following:

- Must be measurable and auditable;
- Must take into consideration the proposed post-mining end use of the affected area;
- Must contain information that is necessary for the definition of the closure vision, objectives, design, and relinquishment criteria;
- Indicate what infrastructure and activities will ultimately be decommissioned, closed, removed and remediated;
- The risk drivers determining actions, indicating how the closure actions will be implemented to achieve closure relinquishment criteria; and
- Indicate monitoring, auditing and reporting requirements.

The Spitsvale Mine Rehabilitation closure and Liability plan addresses the requirements stipulated above. However, as soon as the final site layout detailing all infrastructures associated to the mining activities have been defined and finalised (**Appendix S**), it is recommended that this report be reviewed.

Risk assessment Report

The environmental risk assessment report must contain information that is necessary to determine the potential financial liability associated with the management of latent environmental liabilities post closure, keeping in mind the proposed post-mining end use, once the initial relinquishment criteria has been achieved.

Although the potential impacts associated to the proposed mining activities has been identified throughout the EIA process, the identification of latent risks without the initiation of full mining activity and monitoring of the implementation of the relevant mitigation strategies remains hypothetical at this stage and thus is not possible to assess.

In an effort to prevent any possible latent impacts/risks from the proposed mining activities during operation AND post closure, the following knowledge gaps have been identified in **Appendix S** to be addressed annually during operation and/or upon closure where applicable:

- Slope water management.

- Stability and seepage analyses.
- Closure material characterisation.
- Vegetation trials on blended growth media.
- Closure water balance.

After initiation of full mining activities, on an annual basis, the anticipated impacts identified by the various specialists and their mitigation recommendations in the EIR and EMPr is recommended to be reviewed and form part of the Risk Assessment report to:

- Determine any impacts that have not been accounted for that need to be either mitigated or managed. This may also include a socio-economic analysis, if deemed necessary, and possible related post-closure liabilities that may arise from the mining activities or abandonment thereof.
- Determine the possible extent of residual and/or latent impacts that may arise and that will have to be managed.
- Monitor and verify the effectiveness of the annual rehabilitation and final closure plan to address especially the following:
  - Sources and degree of accelerated erosion due to anthropogenic influence
  - Effectiveness of storm water control
  - Sources of pollution
  - Extent and possible sources of alien invasive infestation
  - Effectiveness of re-vegetation methods implemented
  - Effectiveness of mitigation measures prescribed in the Environmental Management Programmes

q) Period for which the Environmental Authorisation is required

The expected life of mine has been determined to be 30 years. However, should the proposed mine development exceed this period, it is recommended that the environmental authorisation be revised.

r) Undertaking

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

See Part B of this report and **Appendix U**.

s) Financial Provision

(State the amount that is required to both manage and rehabilitate the environment in respect of rehabilitation.)

As part of the Spitsvale Mine Rehabilitation closure and Liability plan (attached as **Appendix S),** the financial provision for the mining operations were determined based on information currently available.

An assessment was conducted of all the infrastructure and activities taking place on site that fall within the properties associated to the mining right application. The infrastructure was classified in accordance with the tariffs list and the surface areas of the infrastructure were calculated to determine the volume or surface requiring rehabilitation or demolition. A supplementary calculation was done to incorporate Phase 2 & 3 and a second laydown area. These extensions are planned as part of the next phases of the project and will only commence once phase 1 mining operations have ceased.

The premature quantum was calculated using the demolition and rehabilitation rates and has been calculated as **R 90 452 381.83 (including P&G, contingency and excluding VAT)** for the physical and biophysical components associated with the current activities and infrastructure on the site. This related to Open pit 1, Laydown area 1, Ore stockpile area, ROM stockpile area and roads.

It is evident that the biophysical component of rehabilitation makes for 98% of the liability cost. The physical rehabilitation (demolition and removal of structures) amounts to 2% (**R 1 636 330.71**) of the liability cost. A focussed rehabilitation and closure strategy can minimise the liability of both components.

A cost estimate has been included for the current and future activities. The assumption made with regards to placement of waste rock in the future activities is that a starter waste rock dump will be constructed and as soon as mining allows it, the waste rock will be backfilled into the pit area. This will be done as part of operational cost. Thus no waste rock dumps will remain subsequent to mining operations ceasing.

The quantum calculated for all activities and infrastructure associated with the entire Spitsvale Project (including mining of phase 2 and 3 and the associated infrastructure) was calculated as **R106 671 605.22** (**including P&G, contingency and excluding VAT).**

The increase in biophysical costs can be attributed to the addition of two opencast pits, with their associated infrastructure, in the future.

The costing sheets have been reviewed externally by a registered financial institution for correctness regarding the calculations.

Based on the current information it is estimated that the accuracy level of the phase 1 calculation is 90% and the accuracy level of the calculation of the future mining development is 50%.

The detailed mine closure cost assessment report is attached as an Appendix C to **Appendix S**.

i) Explanation of deriving provisions

The CES Group was contracted by Shangoni (appointed by the EAP) to acquire rates for demolition and rehabilitation of mining activities. Procurement of budget pricing approached by identifying reputable demolition companies, various sites of varying sizes at various locations and identifying local companies in the study area with ability to work on similar scale project. A bill of quantities (BoQ) was distributed to the various companies.

The prices received from contractors were reviewed by the CES Group, after which average and meridian rates were drawn rates to correctly establish a baseline rate. The following methods to establish the baseline rates were followed:

- Price A - Average if priced – across the board average of rates received per category;
- Price B - Median pricing – “middle” rate of all rates in series per category;
- Price C - Average between Price A & B;
- Price D - Average rate excluding top and bottom rates per category.
- Price D - rate category that was used in the closure cost calculation, unless otherwise indicated in the closure cost spreadsheet “Rate” sheet.

The closure budget consists of the following areas:

- Physical - Demolition of infrastructure where infrastructure does not form part of end land use. Potential to transfer to third party was identified.
- Biophysical - Actions to safeguard (making safe and stable) and re-establish the biophysical to ensure a sustainable landform and mitigate identified risks. This includes levelling of the dumps, seeding of the trees and grass.

The detailed mine closure cost assessment report is attached as an Appendix C to **Appendix S**.

ii) Confirmation that amount can be provided for from the operating expenditure

(Confirm that the amount, is anticipated to be an operating cost and is provided for as such in the Mining work programme, Financial and Technical Competence Report or Prospecting Work Programme as the case may be)

t) Deviations from the approved scoping report and plan of study

There have been a number of deviations and additional information added compared to the initial accepted Scoping report. The following sections will highlight the deviations in detail.

Appointment of EAP

During the initial Scoping phase of the EIA process as stipulated by GN R. 982, no independent EAP was appointed by the applicant. Although the regulations provides for the report to be compiled by in house EAP (section 13 (2)), it still requires to be reviewed by an independent EAP before the commencement of the public participation process.

Environmental Management Assistance (Pty) Ltd (EMA) was appointed by the applicant in September 2015. The acceptance letter of the submitted Scoping report was received on the 20th of October 2015.

Listed and specified activities

GN R. 983 to GN R. 985 lists a number of activities that requires either a Basic Impact Assessment (BAR) or a Scoping & EIA process to be followed. Additional listed activities were included in the EIA and EMPr that were not included in the approved Scoping report.

The following listed activities, according to Listing notice 3 (GN R. 985) were assessed as part of this EIR and EMPr report:

- *Listed activity 4*: "The development of a road wider than 4 metres with a reserve less than 13,5 metres. (a) In Free State, Limpopo, Mpumalanga and Northern Cape provinces: ii. Outside urban areas, in: (bb) National Protected Area Expansion Strategy Focus areas; (cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;
- *Listed activity 10*: "The development of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres. (e) In Limpopo: i. All areas."
- *Listed activity 12*: "The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan. (a) In Eastern Cape Free State, Gauteng, Limpopo, North West and Western Cape provinces: i. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in

the National Spatial Biodiversity Assessment 2004; ii. Within critical biodiversity areas identified in bioregional plans"

Also note that listed activity 12, as listed in GNR 984, are excluded as no railways will be constructed as part of the proposed mining activity.

Determination of the final site layout

As the Scoping report pointed out, alternatives were being considered and that the inputs from the I&AP's and specialist studies the layout plan may still change.

At the time of providing this report to the authority I&AP for the required 30 days PPP, the following infrastructures does not form part of the site layout:

- Storm water infrastructure;
- Location of PDD; and
- Detailed infrastructure associated to the Tubatse lay down area.

It is therefore recommended that before authorising the activity a detailed site layout plan be submitted indicating the details of all infrastructure associated to the proposed mining development.

Public Participation Process (PPP)

From the information provided to the EAP regarding the PPP, it is unclear to verify whether or not the procedure highlighted by the 2014 EIA regulations (GN R. 982) was followed. No I&AP register were provided to indicate all the I&AP contacted.

It has however been pointed out by the report submitted as an Appendix to the Scoping report that the following communities were consulted:

- Dithamaga trust;
- Dithamaga Community;
- Mamphuru Community;
- Ga Pasha Community;
- Eerstegeluk Community;
- Bengonyama Community;
- Steelpoort Bridge Business Forum;
- Glencore; Samancor; and
- Eastern Platinum Limited.

Proof of the above interactions was provided in form of the following:

- Meeting minutes;
- Attendance registers;
- Agreement letters (however it pertained to the Prospecting phase of the project); and
- Advertisement in local news paper (however it pertained to the Prospecting phase of the project).

During the time of the PPP on the Scoping report it is unclear whether or not concerns were raised by the I&AP.

In addition to the I&AP listed above the following groups were contacted, however it is unclear who the representative is:

- Landowners/s;
- Landowners or lawful occupiers on adjacent properties;
- Municipal councillor; and
- Municipality.

On the appointment of EMA as the EAP, Ecoleges Environmental Consultants were appointed as an independent consultant to manage the Public Participation Process on behalf of EMA. The details to the process followed are highlighted in section **g)ii)** of this report.

See **Appendix T** for the comments and response register for the process to date. However note that all the comments in this register and in the final PPP report will be incorporated in the revised EIR and EMPr.

Environmental Attributes associated with the sites

Although background information was provided on the Climate, Topography, Geology, and Surface water, no baseline information was provided on the following areas of concern:

- Surface and groundwater quality;
- Soil quality;
- Air quality;
- Human Health impact;
- Noise quality

The information provided regarding the information on the Biodiversity were fatally flawed, as the attached Biodiversity Impact Assessment (**Appendix G**) pointed out. There are a number of sensitive floral features and some of the proposed infrastructure falls within Critical biodiversity areas and Ecological support areas as defined by the Limpopo Conservation Plan (LCP). In addition to the areas defined by the LCP the National Mining and Biodiversity Guidelines define a number of biodiversity priority areas. A large portion of the site layout and associated infrastructures are situated within a Category B

(Highest biodiversity importance) priority area (refer to **Appendix G** for the detailed report). Considering the close proximity to the Sekhukhune Centre of Endemism, this poses the highest environmental risk and must be addressed accordingly.

Description of specific environmental features and infrastructure on site

From the Scoping report it is unclear as to what specific infrastructures will be associated to the proposed activity. These infrastructures has been defined in section **1)(c)**.

At the time of the Scoping report an inadequate amount of specialist baseline studies were conducted to determine specific environmental features. As part of the EIA and development of the EMPr a number of sensitive environmental and social features have been identified. **Appendix Q** provides the detailed site lay out plan in relation to the sensitive receptors.

Plan of study (PoS) for the EIA process

Chapter 2 of GN R. 982 (2014 EIA regulations) requires the applicant to submit within 106 days from the acceptance of the Scoping report the final EIR, EMPr, and Mine rehabilitation, closure, and liability plan. Within the 106 days, the registered I&AP should be provided with the opportunity to access and comment on the reports for at least 30 days. The applicant received the acceptance letter on the 22nd of October 2015. Section 3(2) of Chapter 2 of the 2014 EIA regulations stipulate that for any actions contemplated in terms of the regulations for which a timeframe is prescribed, the period of 15 December to 5 January must be excluded. Therefore the appointed EAP determined the final submission date as the 29th of February 2016.

Although the PoS in the accepted Scoping report indicated that specialist studies were going to be conducted, the lack of baseline information required the scope of the specialist studies to include a baseline assessment as well as an impact assessment of the associated fields of expertise. In addition to the inadequate specialist studies provided in the Scoping report, the provision of a Mine Rehabilitation, closure, and liability plan as per GN R. 1147 were not included in the initial PoS.

In addition to the specialist studies highlighted by the initial PoS, the acceptance letter of the Scoping report requested a total of two additional Specialist studies, namely a Avifauna survey and a Bat Survey.

The Spitsvale Mine Rehabilitation closure and liability plan has been completed after the submission of a draft EIR and EMPr to the DMR on the 29th of February 2016. This report complies with requirements set in GN R. 1142. The findings and recommendations made were incorporated into this revised EIR and EMPr and are now subjected to a 30 days PPP as required by GN R. 982.

i) Deviation from the methodology used in determining the significance of potential environmental impacts and risks

(Provide a list of activities in respect of which the approved scoping report was deviated from, the reference in this report identifying where the deviation was made, and a brief description of the extent of the deviation)

The methodological approach in determining the significance of the potential environmental impacts and risks are described in section **1) vi)**.

Due to the lack in a detailed description of the methodology used to determine the potential significant environmental risk, it is unclear to verify whether or not there is a deviation from the Scoping report in this regard.

ii) Motivation for deviation

Methodological approach of the EAP according to International Best Practice as well as the principles set by the IEM guidelines.

u) Other information required by the competent Authority

The following additional information was requested by the Department of Minerals and Resources:

- Details of the EAP who prepared the report together with his/her expertise.
- Full description of activities to be taken.
- Specialist reports should be signed off by an independent specialist if it was prepared by the in-house specialist(s).
- Details of the future land use for the site and infrastructure after decommissioning in 20 – 30 years.
- The total footprint of the proposed development should be indicated.
- Should a Water Use License be required, proof of such application should be submitted.
- Possible impacts and effects of the development on the vegetation ecology with regard to lowland-highland interface in the locality should be indicated.
- The impacts of the proposed facility on avifauna and bats must be assessed in the EIA phase.
- Possible impacts and effects of the development on the surrounding industrial area.
- Information on services required on the site, e.g. sewage, refuge removal, water and electricity should be submitted. Furthermore, information on who will supply these services, agreement thereof and confirmation of the capacity to deliver such services should be submitted.
- A construction and operational phase in the EMPr should include mitigation and monitoring measures.
- Should blasting be required, appropriate mitigation measures should be provided.

i) Compliance with the provisions of sections 24 (4)(a) and (b) read with section 24 (3)(a) and (7) of NEMA

Section 24 (4)(a) and (b) of NEMA states the following:

"Procedures for the investigation, assessment and communication of the potential consequences or impacts of the activities on the environment – (a) must ensure, with respect to every application for an environmental authorisation –

- *(i) Coordination and cooperation between organs of state in the consideration of assessments where an activity falls under the jurisdiction of more than one organ of state;*
- *(ii) that the findings and recommendations flowing from an investigation, the general objectives of integrated environmental management laid down in this Act and the principles of environmental management set out in section 2 are taken into account in any decision made by an organ of state in relation to any proposed policy, programme, process, plan or project;*
- *(iii) that a description of the environment likely to be significantly affected by the proposed activity is contained in such application;*
- *(iv) investigation of the potential consequences for or impacts on the environment of the activity and assessment of the significance of those potential consequences or impacts; and*
- *(v) public information and participation procedures which provide all interested and affected parties, including all organs of state in all spheres of government that may have jurisdiction over any aspect of the activity, with a reasonable opportunity to participate in those information and participation procedures; and*

(b) must include, with respect to every application for an environmental authorisation and where applicable –

- *(i) investigation of the potential consequences or impacts of the alternatives to the activity on the environment and assessment of the significance of those potential consequences or impacts, including the option of not implementing the activity;*
- *(ii) investigation of mitigation measures to keep adverse consequences or impacts to a minimum;*
- *(iii) investigation, assessment and evaluation of the impact of any proposed listed or specified activity on any national estate referred to in section 3(2) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999), excluding the national estate contemplated in section 3(2)(i)(vi) and (vii) of that Act;*
- *(iv) reporting on gaps in knowledge, the adequacy of predictive methods and underlying assumptions, and uncertainties encountered in compiling the required information;*
- *(v) investigation and formulation of arrangements for the monitoring and management of consequences for or impacts on the environment, and the assessment of the effectiveness of such arrangements after their implementation;*
- *(vi) consideration of environmental attributes identified in the compilation of information and maps contemplated in subsection (3); and*
- *(vii) provision for the adherence to requirements that are prescribed in a specific environmental management Act relevant to the listed or specified activity in question."*

Section 24 (3)(a) and (7) of NEMA states the following:

"24 (3) The Minister, or an MEC with the concurrence of the Minister, may compile information and maps that specify the attributes of the environment in particular geographical areas, including the sensitivity, extent, interrelationship and significance of such attributes which must be taken into account by every competent authority."

"24 (7) Compliance with the procedures laid down by the Minister or an MEC in terms of subsection (4) does not absolve a person from complying with any other statutory requirement to obtain authorization from any organ of state charged by law with authorising, permitting or otherwise allowing the implementation of the activity in question."

The purpose of Part A and Part B of this report fulfils the requirements stipulated in section 24 of NEMA. This report resulted with the outcomes of the detailed impact assessment carried out and provides recommendations from a broad spectrum of expertise.

(1) Impact on the socio-economic conditions of any affected persons

(Provide the results of Investigation, assessment, and evaluation of the impact of the mining, bulk sampling or alluvial diamond prospecting on any directly affected person including the landowner, lawful occupier, or, where applicable, potential beneficiaries of any land restitution claim, attach the investigation report as Appendix 2.19.1 and confirm that the applicable mitigation is reflected in 2.5.3; 2.11.6.and 2.12.herein)

The Spitsvale social and labour plan (**Appendix D**) and the Human health impact assessment (**Appendix N**) addresses the associated impacts on the socio-economic conditions.

(2) Impact on any national estate referred to in section (3)2 of the National Heritage Resource act

(Provide the results of Investigation, assessment, and evaluation of the impact of the mining, bulk sampling or alluvial diamond prospecting on any national estate referred to in section 3(2) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) with the exception of the national estate contemplated in section 3(2)(i)(vi) and (vii) of that Act, attach the investigation report as Appendix 2.19.2 and confirm that the applicable mitigation is reflected in 2.5.3; 2.11.6.and 2.12.herein)

A detailed Heritage Impact Assessment is attached as **Appendix O** Section **1)(a)XII** summarises the findings and recommendations made by the specialist investigation.

v) Other matters required in terms of sections 24(4)(a) and (b) of the Act

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

As discussed in previous sections in this report, no alternatives were considered. The proposed Spitsvale Project is located within the BCR Minerals (Pty) Ltd prospecting and bulk sampling right area (LP30/5/1/1/2/10624PR (Kennedy's Vale) and LP30/5/1/1/2/10603PR (Spitskop)) and the surrounding area is currently used for mining related activities. The Mining Permit area can only be located within the Prospecting Right area.

PART B: ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

The purpose of this section is to provide a baseline Environmental Management Programme (EMPr) to essentially form part of the Spitsvale Project Environmental Management System (EMS). The information provided in this section describes guidelines, operating procedures and rehabilitation/pollution control requirements which will be a legal binding document which the holder of the authorisation, upon granting the Mining right, will be held accountable for implementation.

The recommendations and procedures stipulated in the EMPr are based on the findings discussed in Part A of this report. It is therefore essential that this portion be carefully studied, understood, implemented and adhered to at all times.

Part B of this report should be considered as a "living" document, to be reviewed and amended as deemed necessary.

The reasons for review and/or amendments may be the following:

- Failure to identify certain risk or impacts during the initial EIA process; and
- The ability of the EMPr to sufficiently provide for the avoidance, management, and mitigation of environmental impacts associated with the undertaking of authorised activities.

In the event that additional activities not specified in the EIR and EMPr is to take place, the impacts associated to these activities should be assessed according to the requirements stipulated by GN R. 982. Therefore this EMPr is only applicable to the listed authorising activities as stipulated ***Part A section d)i)***.

1) Draft environmental management programme.

Part B of this report is considered to be the first draft EMPr and is subject to the approval of the Department of Minerals and Resources (DMR). Once approved this report should be finalised as the legal binding EMPr read together with the Environmental Authorisation.

a) Details of the EAP

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

As stipulated in Part A section 1 (a).

b) Description of the Aspects of the Activity

(Confirm that the requirement to describe the aspects of the activity that are covered by the draft environmental management programme is already included in PART A, section (1)(h) herein as required)

As stipulated in Part A, section (1) (h).

c) Composite Map

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

Find **Appendix C**

d) Description of Impact management objectives including management statements

Throughout Part A and Part B of this report, a number of possible environmental and social impacts/risks have been identified. The sections to follow will provide the management approach related to each potential impact/risk by defining management and outcome based objectives.

i) Determination of closure objectives

(Ensure that the closure objectives are informed by the type of environment described in 2.4 herein)

In compliance to GN R. 1147 of 20 November 2015, a number of closure objectives have been determined. The closure objectives, identified in the Spitsval Mine Rehabilitation, Closure and Liability plan (**Appendix S**), which will drive the closure criteria and which have been developed to support the closure vision are:

- Adhere to all statutory and other legal requirements.
- To develop landforms supporting stable and functioning ecosystems, are aesthetically acceptable on closure and will gradually sustain the desired land-uses post closure.
- Ensure safety & health of all stakeholders during closure and post closure and that communities using the site after closure are not exposed to unacceptable risks.
- Ensure that closure supports productive uses considering pre-mining conditions and are in agreement with commitments to stakeholders.
- Physically and chemically stabilise remaining structures to minimise residual risks.
- Promote bio-diversity and biological sustainability to the maximum extent practicable.
- Utilize closure strategies that promote a self-sustaining condition with little or no need for ongoing care and maintenance.
- To achieve agreed quality targets set by the Catchment Management Authority (CMA) and the Department of Water and Sanitation (DWS) as far as practical relative to impacts and reasonability to achieve.

The objectives and targets set in Part B of this report will aid in reaching the objectives stipulated in the documents listed above.

ii) The process for managing any environmental damage, pollution, pumping and treatment of extraneous water or ecological degradation as a result of undertaking a listed activity

This section describes the approach taken by the EAP in preparation of Part B of this report.

Environmental Management Approach

Globally, there are a number of tools or guideline documents available to assist or describe environmental management. The purpose of an EMPr (Part B of this report) is to describe the process of managing the identified potential environmental impacts or risks described in Part A of this report (EIR) throughout the entire life cycle (from design, to implementation, operation, and decommissioning) of the proposed Spitsvale project. The IEM (Integrated Environmental Management) tool used for managing the identified environmental impacts by the EAP in this document is the Environmental Management System (EMS). This approach will assist the Spitsvale project to achieve continual improvement in environmental performance.

The EMPr in essence will be adopting the approach of the internationally recognised ISO 14001 Environmental Management System (EMS) standard that is essentially based on the Deming Cycle rationale which is a simplified continuous improvement model consisting of four main iterative steps.

These steps are described as follows:

- Plan – Establish objectives and processes necessary to deliver results in accordance with the developed organisational environmental policy.
- Do – Implement the process.
- Check – Monitor and measure processes against environmental policy, objectives, legal and other requirements and report the results.
- Act – Take action to continually improve environmental performance.

Continual improvement is achieved by periodically monitoring and reviewing the EMPr and the subsequent implementation of corrective actions when required. Therefore this document should be considered as a living document which should be continuously updated and possibly improved.

This approach taken in the development of the EMPr is in line with the requirements stipulated in GN R. 982 (2014 EIA regulations).

Legislative compliance

Throughout the development of management measures all legislative and other requirements associated to the proposed Spitsvale Project activities were considered and highlighted.

Specialist recommendations

A number of specialist investigations formed part of the EIA process and resulted in a number of findings and recommendations (Part A section **1)j)** summarises the findings). These reports provided specific mitigation and management measures as a recommendation. These findings have been considered throughout the development of the EMPr.

iii) Potential risk of Acid Mine Drainage

(Indicate whether or not the mining can result in acid mine drainage)

The potential risk for acid mine drainage was not determined as the proposed Chrome related mining activities are not expected to be afflicted by acid-producing wastes.

iv) Steps taken to investigate, assess, and evaluate the impact of acid mine drainage.

No steps were taken to investigate, assess, and evaluate the impact of acid mine drainage, as this potential risk is not foreseen as part of Chrome related mining activities.

v) Engineering or mine design solutions to be implemented to avoid or remedy acid mine drainage.

Not a potential risk.

vi) Measures that will be put in place to remedy any residual or cumulative impact that may result from acid mine drainage.

Not a potential risk.

vii) Volumes and rate of water use required for the mining, trenching or bulk sampling operation.

The permitted volume and rate of water use required for the mining, trenching or bulk sampling operations will be confirmed in the Water Use Licence. However an annual volume of 2.28 mega litre has been estimated at the time of this report.

The main uses for the abstracted water, at the time of this study, will be as follows:

- Dust suppression on the access roads, stockpile areas, and pit areas; and
- Domestic purposes such as the ablution facilities.

viii) Has a water use licence been applied for?

An integrated application approach has been taken by BCR Minerals (Pty) Ltd. Therefore an application for a water use licence will be submitted to the Department of Water Affairs and sanitation.

The following water uses are included in the submitted application:

- Section 21 (a) - taking water from a water resource (water will be sourced via a borehole);
- Section 21 (c) - Impeding or diverting the flow of water in a watercourse
- Section 21 (g) - disposing of waste in a manner which may detrimentally impact on a water resource
- Section 21 (j) - altering the bed, banks, course or characteristics of a watercourse

- Section 21 (i) - removing, discharging, or disposing of water found underground if it is necessary for efficient continuation of an activity or for the safety of people

As part of the application for a water use licence an Integrated Waste Water Management Plan (IWWMP) will be developed and should form part of the final construction and operational EMPr for implementation.

ix) Impacts to be mitigated in their respective phases

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

In Part A of this report a number of potential environmental and social risks and or impacts was assessed. Table 16 identifies and describes the measures to be taken to ensure a sustainable outcome.

Table 16: Recommended measures to control, avoid, mitigate, and remediate potential environmental and social risks identified in Part A of this report

ACTIVITIES *(as listed in 2.11.1)*	**POTENTIAL IMPACT (e.g. dust, noise, drainage surface disturbance, fly rock, surface water contamination, groundwater contamination, air pollution etc….etc…)**	**PHASE** *of operation in which activity will take place. State; Planning and design, Pre-Construction' Construction, Operational, Rehabilitation, Closure, Post closure.*	**SIZE AND SCALE of disturbance** *(volumes, tonnages and hectares or m²)*	**MITIGATION MEASURES** ***(describe how each of the recommendations in herein will remedy the cause of pollution or degradation and migration of pollutants)***	**COMPLIANCE WITH STANDARDS** *(A description of how each of the recommendations herein will comply with any prescribed environmental management standards or practices that have been identified by Competent Authorities)*	**TIME PERIOD FOR IMPLEMENTATION** *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.*
Construction Phase						
1. Access and hauling along roads i.e. during the construction of roads **2. Site clearing and topsoil stripping for lay down area and all related mining infrastructure**	**Dust generation**	Construction & Operational		***Implementation of EMS:*** (1) Development of a dust fallout monitoring plan. (2) Frequent Inspections of areas prone to dust generation. (3) Reporting and recording incidents related to air quality. (4) Ensuring corrective and preventative actions are taken to address nonconformities. (5) Communicating findings of concern to I&AP. ***On-site mitigation measures:*** (1) Construction activities to take place under the supervision of an environmental representative (2) Set the on-site speed limit to 40km/h for gravel roads and 50km/h for tar roads. (3) Develop and implement a dust suppression schedule. (4) Biodegradable and environmentally friendly flocculent (approved by the environmental control	(1) Development and implementation of a Dust management plan as part of an Air quality management plan to including the monitoring and prevention programme. (2) Ensuring compliance with the National Environmental Management: Air Quality Act (NEMAQA), No. 39 of 2004 as amended by Act no 20 of 2014. (3) Ensure activities remain under the thresholds stipulated in GNR 893 (in terms of section 21 of NEMAQA.	Entire Life cycle of project

5. Mining offices (construction and operation) i.e. operation of training centres, offices and kitchen facilities **8. Pollution Control Dams (PCD's) i.e. Construction and operation**				officer/environmental officer/ SHEQ officer) may be used as dust suppressant. (5) Wetting of stockpile areas. (6) Covering loads with tarpaulin when transporting ROM, product, or any material in order to prevent dust generation. (7) Disturbed areas no longer used for mining related activities shall be re-vegetated immediately. (8) Areas having to be stripped of topsoil for construction purposes must be kept to a minimum and only stripped when work is about to take place. ***Legal requirements:*** (1) Register online to the National Atmospheric Emissions Inventory System (NAEIS) in terms of the National Reporting Regulations (GNR 283) as Group C emitters. (2) Ensuring compliance with the National Ambient Air Quality Standards (GNR 1210 of 24 December 2009). (3) Ensuring compliance with the National Dust Control regulations (GNR 897 of November 2013). (4) Section 39 of the Atmospheric Pollution Prevention Act of 1965 and GN R. 1651 specifies requirements regarding the control of emissions from diesel vehicles used on public roads. These requirements should form part of the Air quality Management Plan and the Vehicle/Plant/Equipment maintenance plan.. ***Specialist recommendations:*** (1) Development of a detailed air quality management plan (focusing on sources of dust located in close proximity to the residential receptors within the project boundary) ensuring adherence to thresholds stipulated in the Baseline Air Quality Impact Assessment report (BAQIAR) (**Appendix E**) prior to the commencement of operations. (2) Implementation of recommended dust control methods as stipulated in Table 6-1 of the BAQIAR (**Appendix E**). (3) Dust generated from material handling operations and mining operations can be significantly reduced by wet suppression with the use of water sprays. (4) The combined use of water sprays with chemical surfactants provide more extensive wetting making it a more affective technique than water suppression alone. (5) The loading, transfer, and discharge of materials should take place with a minimum height of fall and be shielded against the wind. (6) Controls to reduce emissions from unpaved roads can include vehicle restrictions which limit the speed, weight and number of vehicles on the road, surface improvements (paving or adding gravel to the road), and surface treatments (wet suppression or surface treatments). (7) All positive and negative effects of the different methods of dust suppression should be considered and the best feasible and successful option must be implemented. (8) Wind erosion from stockpiles and open areas can be minimised through the use of water sprays, wind breaks, vegetation and enclosures. (9) Implement strict vehicle restrictions such as speed limits, weight and number of trucks on the road per given time	(4) Register online to the National Atmospheric Emissions Inventory System (NAEIS) in terms of the National Reporting Regulations (GNR 283) as Group C emitters. (5) Ensuring compliance with the National Ambient Air Quality Standards (GNR 1210 of 24 December 2009). (6) Ensuring compliance with the National Dust Control regulations (GNR 897 of November 2013)	

				(10) Hauling activities should be strictly restricted to designated hauling routes. (11) Regular maintenance of the vehicles/trucks (engines) should be undertaken to ensure optimal efficiency of the engine. (12) Regular maintenance of hauling routes and surface improvements (where necessary) should be undertaken. (13) Regular sweeping and cleaning of tarred/paved road surfaces to prevent the accumulation of dust (14) Immediate clean-up of any spillage of material on the hauling routes. (15) Regular inspections should be carried out on the vehicles/trucks (engines, tyres, etc.) and the route to ensure both are in good quality. (16) All material transported should be covered, where possible, and not left exposed during transportation. (17) Engines of the trucks should not be left running whilst not in use. (18) Clean fuels and fuel efficient vehicles/trucks/mobile equipment should be considered for use where possible. (19) Designated areas for the storage of overburden should be considered and incorporated into the design. (20) Monthly dust fallout monitoring as per the National Dust Control Regulations (2013) and reporting. (21) Monthly PM10 and PM2.5 ambient monitoring and reporting. This is also recommended to obtain baseline concentrations. (22) All main hauling roads should be treated for dust suppression to maintain at least 65% emission reduction efficiency.		
1. Access and hauling along roads i.e. during the construction of roads **2. Site clearing and topsoil stripping for lay down area and all related mining infrastructure** **3. Weigh bridge** **6. Storm water runoff management features** **9.Stores, workshops &wash bays**	**Hydrocarbon Contamination**	Construction & Operational		***Implementation of EMS***: (1) Develop and implement a Hazardous substances management plan addressing handling, storage, and transport of hazardous substances. (2) Develop and implement an emergency response procedure addressing the procedure in case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure. (4) Ensuring corrective and preventative actions are taken to address nonconformities. (5) Communicating findings of concern to I&AP. ***On-site mitigation measures***: (1) Fuel to be stored in above ground storage tanks or sealed containers. (2) Hazardous substances to be stored within a bund area with a sump drainage. (3) Bunded areas to be designed to contain at least 110% of the storing capacity. (4) All spills (minor and major) must be cleaned and remediated to the satisfaction of the appointed environmental representative or the Department within 24 hours. (5) Any spillages on site to be excavated to the visible depth of impact and disposed of for removal to a registered hazardous waste disposal site. Alternative in-situ remediation techniques may be used.	(1) Development of water management plan addressing monitoring and management requirements. (2) Development of a storm water management plan addressing the separation of "dirty" and clean "areas" (3) Development of emergency response plan with specific reference to spill prevention and remediation. (4) Development and implementation of vehicle/plant/equipment maintenance plan with specific reference to daily inspections of plant/vehicles/equipment for leaks or breakages. (5) Development and implementation of a Hazardous substances management plan.	Entire Life cycle of project

11. Fuel operating power generators **13. Fuel storage** **15. Transport of construction material, mobile plant and equipment to the site** **16. Use of existing drilled / new boreholes**				(6) On site spill kits or absorbent materials must be readily available. These kits must include materials to absorb, breakdown, and where possible encapsulate minor material spillages. (7) Where possible and practical all maintenance of vehicles and equipment shall take place in the workshop areas. Should emergency repairs be necessary, drip trays or tarpaulins must be utilised to ensure the collection of any hydrocarbons. (8) All vehicles, plant, and equipment must be inspected on a daily basis. Records to be made available for these inspections. (9) Drip trays or any form of oil absorbent material must be placed underneath vehicles and equipment (where possible leaks may occur) when not in use. (10) All vehicles, plant, and equipment must be well maintained to minimise the risk of fuel and oil leakages. (11) Leaking equipment shall be removed and repaired immediately from site to facility designated for repairs. ***Legal requirements***: (1) Section 30 of the National Environmental Management Act (NEMA), Act 107 of 1998 describes measures to be taken to control emergency incidents. These requirements should be included in the development of the Emergency Response procedure. (2) Section 20 of the National Water Act 36 of 1998 describes the procedure for the control of incidents involving Hazardous substances. These requirements should also be included in the Emergency response procedure. (3) GN R. 1237 published under the Mine Health and Safety Act of 1996 describes the requirements for the storage of hazardous substances. These requirements should be incorporated into the Hazardous substances management plan. (4) Section 21 of the Mine Health and safety Act of 1996 describes the requirements for the acquisition of Hazardous chemicals. These requirements should be considered as part of the mine acquisition process. (5) Regulation 277, 273, and 279 of GN R. 225 of the National Road traffic Act of 1996 describes the requirements of transporting hazardous waste. These requirements should be incorporated in both the Hazardous substances management plan and the Waste Management plan. (6) Regulation 277 and 273 of GN R. 225 of the National Road traffic Act of 1996 describes the Loading and offloading of dangerous goods. These requirements should be addressed in the Hazardous substances management plan. (7) All requirements described in the Hazardous substance Act of 1973 should be included in the Hazardous substances management plan. (8) The storage of hazardous substances must be in compliance with regulation 4 of GN R. 704 of the National Environmental Management Act. ***Specialist recommendations***: ***Geohydrology –*** (1) Development of an environmental monitoring programme in order to monitor the groundwater		

				quality and groundwater level changes up- and downstream of the proposed open cast mine workings. (2) Collected monitoring data (quarterly) may be used for future model updates (e.g. every second year). (3) A number of geosites (i.e. boreholes, springs and surface water drainages) and newly proposed boreholes were identified (refer to the Geohydrological report in **Appendix M**) to be included into a monthly/quarterly monitoring programme. (4) The parameters to be analysed should comprise the following: Physical-chemical parameters (pH, EC, TDS);Major anions (F, Cl, NO3, SO4, HCO3, NH4, PO4,);Major cations (K, Na, Mg, Ca, NH4,); and Other elements/metals (Fe, Mn, Zn, Pb, Co, Cr, Cr (VI),). ***Hydrology –*** (1) A number of monitoring sample points have been identified in the Hydrological report (**Appendix L**). Additional sampling points have been recommended and should be included in the final water monitoring plan. (2) As part of the monitoring program going forward, samples should be taken monthly for at least the first year of operation. This can be revised to quarterly monitoring if no concerns are highlighted with the approval of DWAS. (3) The monitoring should include the standard analysis of major cations/anions as well as ICP scan for metals.		
1. Access and hauling along roads i.e. during the construction of roads **2. Site clearing and topsoil stripping for lay down area and all related mining infrastructure** **9.Stores, workshops &wash bays** **10. Ablutions & change house with sewage treatment plant** **11. Fuel operating power generators** **13. Fuel storage**	**Degradation of soil resources**	Construction & Operational		***Implementation of EMS***: (1) Develop and implement a soil conservation and stockpile management plan. (2) Frequent Inspections of areas prone to degradation. (3) Reporting and recording incidents related to degradation of soil resources. (4) Ensuring corrective and preventative actions are taken to address nonconformities. (5) Communicating findings of concern to I&AP. (6) Development of Mine Rehabilitation, decommissioning and mine closure liability Plan in compliance with GN R. 1147 of NEMA. ***On-site mitigation measures***: (1) All areas to be stripped firstly of topsoil and fertile soils and stockpiled in a designated area. (2) Do not mix sub-soil with topsoil and fertile soils. (3) Topsoil and fertile soil to be protected from contamination (i.e. hydrocarbons or infertile material). (4) Topsoil and fertile soil stockpiles to be protected from weathering conditions such as covering the stockpiles with indigenous, non-invasive vegetation. (5) Avoid stockpiling topsoil and fertile soil stockpiles within drainage lines or within the 1:10 year flood lines. (6) Implement storm water control measures on topsoil and fertile soil stockpiles. (7) Exposed areas to be re-vegetated with indigenous or non-invasive species or protected from erosion. (8) Rehabilitation of areas after the completion of works to take place as soon as possible.	(1) Development of a soil conservation management plan. (2) Development of a storm water management plan. (3) Development and implementation of vehicle/plant/equipment maintenance plan with specific reference to daily inspections of plant/vehicles/equipment for leaks or breakages.	Entire Life cycle of project

				(9) Avoid over exposing un-vegetated areas as far as possible. ***Legal requirements:*** (1) Section 28 of NEMA relates to the duty of care and remediation of environmental damage. (2) The Conservation of Agriculture Resources Act (Act no. 107 of 1998) requires the protection of land against soil erosion and the prevention of water logging and silinization of soils by means of suitable soil conservation works to be constructed and maintained. These requirements should form part of the Soil Conservation and Stockpile management plan. ***Specialist recommendations****:* (1) Strip all usable soil, irrespective of soil depth. (2) Implement live placement of soil where possible, improve organic status of soils, maintain fertility levels and curb topsoil loss. (3) Implement surface digital terrain mapping to ensure surface water control measures are implemented to ensure free draining system with minimal soil erosion. (4) Loss of agricultural land due to establishment of infrastructure is a long term loss and no mitigation measures exist. Mitigation is restricted to limitation of extent of impact to the immediate area of impact and minimisation of off-site impacts. (5) Loss of agricultural land due to opencast mining is a temporary loss which can be mitigated by appropriate backfilling and re-placement of stockpiled topsoil. If done correctly, most of the original agricultural potential will be restored. (6) An Environmental Coordinator must manage environmental impacts in coordination with construction and operation schedule. (7) In the event that contractors are to be appointed these contractors to sign and undertake environmental compliance. (8) Keep disturbed areas and stockpiles to minimum to prevent soil loss. (9) Identify suitable areas to stockpile stripped soil. (10) Prevent surface runoff and seepage on site from contaminating stockpiled soils and stripped areas. (11) Minimise soil erosion through wind and water (12) Remediate and rehabilitate disturbed areas in accordance with development plan		
1. Access and hauling along roads i.e. during the construction of roads **2. Site clearing and topsoil stripping for lay down area and all related mining**	**Erosion**	Construction & Operational		***Implementation of EMS***: (1) Development and implementation of a storm water management plan. (2) Regular inspection of erosion prone areas for signs of erosion. (3) A soil conservation and stockpiling plan to be developed and implemented. (4) Monthly monitoring of water quality (as per recommendation of specialist study). (5) Reporting and recording incidents related to erosion. (6) Ensuring corrective and preventative actions are taken to address nonconformities. (7) Communicating findings of concern to I&AP. ***On-site mitigation measures***:	(1) Development and implementation of a storm water management plan. (2) Development of a soil conservation management plan. (3) Development of Mine Rehabilitation, decommissioning and mine closure liability Plan in compliance with GN R. 1147 of NEMA.	Entire Life cycle of project

infrastructure **6. Storm water runoff management features** **15. Transport of construction material, mobile plant and equipment to the site**				(1) Soil conservation measures to be implemented on stockpiles to prevent erosion. This could include the use of erosion control fabric or non-invasive grass seeding. (2) All areas susceptible to erosion must be identified and protection measures be implemented. (3) Retain natural trees, shrubbery and grass species where possible. (4) In areas within close proximity to wetlands, rivers and streams, sedimentation control measures to be implemented, specifically when excavations or disturbances takes place within river banks, or the river bed. (5) Formation of erosion channels ("dongas") to be prevented by applying soil erosion control and bank stabilisation procedures as specified by a qualified environmental specialist. (6) Erosion formation beyond rills must be avoided. (7) Erosion damages to be repaired as soon as possible and no later than the target set by the Management team. (8) Slopes steeper than 1(V):4(H) or slopes where soils are by nature dispersive or erodible must be stabilised. (9) Where berms are installed on severe slopes the outflow shall be suitably stone pitched to prevent erosion from starting on berms. (10) Access routes should not traverse slopes with gradients in excess of 8%. (11) Wherever possible, access routes should avoid crossing drainage lines and riparian zones. (12) Drainage lines should not be altered and should be level with the surrounding land once subsistence has occurred. (13) Run-off from roads must be managed in a way to avoid erosion and prevent pollution. ***Legal requirements***: (1) Section 28 of NEMA relates to the duty of care and remediation of environmental damage. (2) The Conservation of Agriculture Resources Act (Act no. 107 of 1998) requires the protection of land against soil erosion and the prevention of water logging and silinization of soils by means of suitable soil conservation works to be constructed and maintained. These requirements should form part of the Soil Conservation and Stockpile management plan. ***Specialist recommendations***: ***Hydrology –*** (1) A conceptual storm water management plan (**Appendix L**) has been developed based on the requirements of GN R. 704 of the National Water Act of 1998. (2) Implementation of the guidance provided by the South African National Roads Agency Limited (SANRAL) drainage manual. This document provides guidance on maximum permissible velocities for grass covers to avoid erosion and should be consulted during the detailed design phase. ***Soil –*** (1) Disturbance areas to be stripped progressively as required reducing erosion and sediment generation, to reduce the extent of topsoil and utilise stripped topsoil as soon as possible for rehabilitation. (2) The surface of the completed stockpile must be left in a rough condition to promote water		

				infiltration and minimise erosion prior to vegetation establishment; (3) Topsoil stockpiles to have an embankment grade of approximately 1m vertical:4m horizontal (to limit the potential for erosion of the outer pile face); (4) Implement surface digital terrain mapping to ensure surface water control measures are implemented to ensure free draining system with minimal soil erosion. (5) Minimise soil erosion through wind and water ***Biodiversity – Also see Vegetation and Habitat loss*** (1) Limit the complete removal of vegetation. (2) Limit work outside the proposed footprint. (3) Reinforce portions of existing access routes that are prone to erosion or seasonal inundation, create structures or low banks to drain the access road rapidly during rainfall events, yet preventing erosion of the track and surrounding areas. Ensure that water flows are never concentrated in any way as soils are highly erodible. (4) Ensure that runoff from compacted or sealed surfaces is slowed down and dispersed sufficiently to prevent accelerated erosion from being initiated (erosion management plan required).		
1. Access and hauling along roads i.e. during the construction of roads **2. Site clearing and topsoil stripping for lay down area and all related mining infrastructure** **6. Storm water runoff management features**	**Vegetation and habitat loss**	Construction & Operational		***Implementation of EMS***: (1) Development of Mine Rehabilitation, decommissioning and mine closure liability Plan in compliance with GN R. 1147 of NEMA. (2) Develop and implement a plant species search and rescue management plan. (3) Regular inspection of sensitive areas. (4) A soil conservation and stockpiling plan to be developed and implemented. (5) Reporting and recording incidents related to unnecessary clearance of vegetation. (6) Ensuring corrective and preventative actions are taken to address nonconformities. (7) Communicating findings of concern to I&AP. (8) Record keeping of all removed/relocated species. ***On-site mitigation measures***: (1) Avoid clearing areas outside the development footprint. (2) Avoid development in sensitive environments such as areas within pristine or valuable ecological significance. (3) Before the commencement of any vegetation clearance, a search and rescue operation should take place identifying possible protected species as well as indigenous species. (4) An area should be identified to re-instate protected and indigenous areas. (5) If feasible an onsite nursery should be established and maintained. ***Legal requirements***: (1) Section 28 of NEMA describes the duty of care and remediation of environmental damage. (2) A number of the proposed activities fall within or within close proximity to the Sekhukhune Centre of Endemism. Working outside the authorised footprints would require additional authorisation in terms of NEMA and The National Environmental Management: Biodiversity Act (NEMBA) of 2002.	(1) Develop a plant species search and rescue management plan. (2) Development of Mine Rehabilitation, decommissioning and mine closure liability Plan in compliance with GN R. 1147 of NEMA. (3) Develop and implement a soil conservation management plan. (4) Apply for permits to remove protected species (provincial and national).	Entire Life cycle of project

				(3) The removal or disturbance of listed protected species in terms of NEMBA, the Limpopo Environmental Management Act of 2003, and the National Forest Act of 1998 would require a permit. ***<u>Specialist recommendations</u>:*** ***Terrestrial Ecology –*** (1) Prior to any new area being impacted by the mine, that area and a suitable buffer will have to be delineated and activities have to be preceded by a very thorough walkthrough, conducted between January and April, followed by the necessary plant Search and Rescue operations where applicable. (2) ***Themeda triandra – Diheteropogon amplectens Grasslands*** ***(High sensitivity rating – Avoid as far possible)*** (2.1) Development in Grasslands should be limited to the absolute minimum, aiming for minimal to no alteration of the habitat configuration. (2.2) If some of these habitats are impacted or will be altered by the proposed development, all development must be preceded by a thorough footprint investigation followed by a Search and Rescue operation for all plants of conservation concern. (2.3) Components of the proposed development that should under no circumstance be located in this vegetation would include: (2.3.1) Buildings and/or ablution facilities; (2.3.2) Any form of waste/soil/overburden disposal or stockpiling (2.3.3) Tailings dams or processing plants; and (2.3.4) Any form of storage of materials or machinery. (3) ***Cyperus sexangularis – Flueggea virosa Riparian Vegetation*** ***(No Go Area – only suitable crossings permissible)*** (3.1) Development in this vegetation/habitat and at least 50 m beyond should be limited to crossings of access roads only, aiming for minimal to no alteration of the habitat configuration. (3.2) Mining/development in this vegetation/habitat is strongly discouraged. (3.3) Where upstream vegetation will be obliterated or severely denuded, adequate storm water and erosion control measures must be put in place to slow down and disperse runoff volumes and prevent the degradation of other channels and riparian vegetation. (3.4) Where road crossings are necessary, channels may under no circumstance be sealed with any impermeable material, as this will lead to a loss of runoff- and related retention/replenishment of soil moisture reserves, nutrients and seeds. (3.5) Culverts must be designed in a way that water will never be concentrated to a width narrower than the actual channel, causing accelerated erosion during heavy downpours. (3.6) Components of the proposed development that may under no circumstance be located in or within 100 m of any drainage would include: (3.6.1) Buildings and/or ablution facilities; (3.6.2) Any form of waste/soil/overburden disposal or stockpile; (3.6.3) Tailings dams or processing plants; and (3.6.4) Any form of storage of materials or machinery		

				(4) ***Acacia tortilis – Dichrostachys cinerea Dry Mixed Bushveld*** ***(Medium Low sensitivity)*** (4.1) It is recommended that if additional space is required in future for any additional infrastructure, this will be situated on the more disturbed sections of this vegetation. (4.2) Community members should be engaged to clear out as much wood as possible from areas to be developed to alleviate the wood-clearing of more valuable large trees in the area. (4.3) Runoff from any sealed or bare surface must be contained to prevent the erosion of the donga areas and drainage lines below these plains. (4.4) Mine management of the Spitsvale Project has indicated that they will attempt, where possible, to create more grazing for the Dithamaga community by trying to clear some of the encroached bush to allow perennial grasses to become re-established. For this, it was strongly advised against removing all vegetation with a bulldozer. Rather, the following should be done to break the sealed upper surface and reduce sheet erosion: (4.4.1) With a Ripper only, rip sections of up to 5 m wide along the contour, alternating with ± 5 m of bushveld as it is; (4.4.2) Rips should be at least 500 mm deep, and invasive thorn bushes uprooted to that depth as well to ensure their resprouting capacity from the below-ground lignotuber is also eradicated; (4.4.3) If possible, hand-collected seeds from surrounding areas should be re-introduced to the rips; (4.4.4) Use the cleared thorn bushes to loosely brush-pack the area - with the branching side facing upslope (5) ***Kirkia wilmsii – Terminalia prunioides variable Bushveld*** ***(Medium-High sensitivity – Avoid as far possible)*** (5.1) Mining/development in this vegetation/habitat should be limited to the absolute minimum, aiming for minimal alteration of the habitat configuration. (5.2) This is most important within 100 m of any mountain streams and drainages, to prevent the accelerated erosion of lower-lying plains and fluvial systems. (5.3) If some of these habitats are impacted or will be altered by the proposed development, newly created slopes should preferably be shallower than the original slopes, but never steeper to enable a gradual re-establishment of the woody and herbaceous layer. (5.4) After decommissioning, it will be important to facilitate the re-establishment of a diverse vegetation layer as soon as possible. (6) ***Hippobromus pauciflorus – Rhoicissus tridentata Rock Outcrops*** ***(High sensitivity – Treat as No Go Areas as far possible)*** (6.1) Same requirements as stipulated under (5). (7) ***Combretum hereroense – Euclea sekhukhuniensis low bushveld*** ***(No Go, only limited access roads permissible)*** (7.1) Mining/development in this vegetation/habitat is strongly discouraged, aiming for no alteration of the habitat. (7.2) Adjacent (upstream) areas also need to be cleared with care, ensuring that no excessive runoff is directed toward the donga plains.		

				(7.3) Although current dongas may be relatively old and stable, new and accelerated erosion must be monitored and mitigated at all times. (7.4) After decommissioning, it will be important to facilitate the re-establishment of a dense herbaceous vegetation layer as soon as possible where these plains have been impacted. (8) Rehabilitate and re-vegetate all areas that have been disturbed as soon as practically possible. (9) Continually monitor the progress/success of rehabilitation efforts and adapt if rehabilitation targets are not met in acceptable timeframes (10) As part of decommissioning, all stockpiles must be entirely obliterated and landscaped to merge into the surroundings. (11) Keep main internal access route as planned along existing gravel roads. (12) After the final layout of mining operation components has been approved, conduct a thorough footprint investigation to determine any protected or red data plant species population location and size, and animal burrows: (12.1) Map (by GPS) as far as possible larger concentrations of large trees and protected species that could be avoided or must be relocated; (12.2) Protected trees, succulents and geophytes: must be relocated (trees as far as feasible); (12.3) Animal burrows: must be monitored by EO/ECO prior to ground clearing for activity/presence of animal species. If detected, such animals must be removed and relocated by a qualified professional/contractor. (13) Strictly restrict all movement of vehicles and heavy machinery to permissible areas, these being designated access roads, maintenance roads, turning points and parking areas. No off-road driving beyond designated areas may be allowed. (14) Animals accidentally injured by moving vehicles or machinery must be taken to a local veterinarian to be treated or put down in a humane manner. (15) Create designated turning areas and strictly prohibit any off-road driving or parking of vehicles and machinery outside designated areas. (16) Keep the clearing of natural veldt to a minimum. (19) It is desirable that community members be engaged to remove wood suitable for their purposes from areas to be cleared to alleviate the pressure of wood-harvesting currently on other areas of the land portions. (20) All remaining material of cleared shrubs and trees must be shredded and used as mulch. (21) Topsoil (the upper 25 cm of soil) is an important natural resource as it contains most of the geophytic storage organs as well as valuable soil seed resources necessary for re-vegetation; where it can (and then must) be stripped, never mix it with subsoil or any other material, store and protect it separately until it can be re-applied, minimise handling of topsoil. (21) Adherence to the comprehensive Plant Search and rescue, Re-vegetation and Alien Invasive Management plan (Appendix E of the Biodiversity Impact Report (**Appendix G** to this report)). ***Avifauna –*** (1) Leave, as far as possible, as much of the natural indigenous bush undisturbed and in its pristine		

				sate. (2) Route connecting roads as close as is possible to already developed sites or roads. (3) Restrict or prohibit any off-road driving in areas of pristine indigenous bush. (4) Route power lines along these connecting roads, or if possible route them underground. ***Bat Survey –*** (1) Conserve as much of the natural vegetation as possible. Only create haul roads that are absolutely necessary. (2) Discourage vehicles from driving through the natural vegetation were mining activities are not taking place. (3) Prohibit mining plant and trucks from washing or dumping material near a water course (wet or dry) to prevent the pollution of natural water bodies. (4) Prohibit any chemical and/or heavy metal from being released into the environment. (5) Manage all waste water and stormwater to prevent pollution to water bodies.		
1. Access and hauling along roads i.e. during the construction of roads **2. Site clearing and topsoil stripping for lay down area and all related mining infrastructure** **6. Storm water runoff management features** **15. Transport of construction material, mobile plant and equipment to the site**	**Sedimentation and siltation of watercourses**	Construction & Operational		***Implementation of EMS:*** (1) Development and implementation of water quality monitoring plan. (2) Development and implementation of an incident reporting procedure. (3) Ensuring corrective and preventative actions are taken to address nonconformities. (4) Communicating findings of concern to I&AP. (5) Development and implementation of a storm water management plan. (6) Regular inspection of erosion prone areas for signs of erosion. (7) A soil conservation and stockpiling plan to be developed and implemented. ***On-site mitigation measures:*** (1) Avoid stockpiling material within drainage lines or in the 1:10 year flood line. (2) Ensure erosion control measures or sediment control measures on stockpiles or in stockpile areas. (3) Prevent the discharge of water containing polluting matter or visible suspended materials directly into drainage lines or streams. (4) Deflect any unpolluted water/runoff away from any dirty areas i.e. stockpile areas, mining areas, workshops, lay down areas etc. (5) Water from excavations or mining areas either through seepage or collection to be pumped and discharge into a pollution control dam. (6) Before any water is permitted to enter natural drainage lines, the quality of water must comply with the standards contained in the Water Use Licence conditions. (7) River crossings shall be designed by a registered civil engineer. (8) Measures to avoid or prevent erosion formation must be incorporated into the designs of the infrastructure associated with the river crossings. (9) During construction through drainage lines, the majority of the flow must be allowed to pass down the stream. In stream diversions should be used rather than the construction of new channels. ***Legal requirements:***	(1) Develop a storm water management plan. (2) Develop and implement a water management plan and specifically include water monitoring and pollution prevention strategies.	Entire Life cycle of project

				(1) A Water Use Licence to be obtained for all river crossings or development of infrastructure within or within close proximity to a watercourse as defined by the National Water Act, act no of 1996. (2) Requirements stipulated by GN R. 704 to be considered in the final site layout plan by the appointed engineers. ***<u>Specialist recommendations:</u>*** ***Geohydrology –*** (1) Development of an environmental monitoring programme in order to monitor the groundwater quality and groundwater level changes up- and downstream of the proposed open cast mine workings. (2) Collected monitoring data (quarterly) may be used for future model updates (e.g. every second year). (3) A number of geosites (i.e. boreholes, springs and surface water drainages) and newly proposed boreholes were identified (refer to the Geohydrological report in **Appendix M**) to be included into a monthly/quarterly monitoring programme. (4) The parameters to be analysed should comprise the following: Physical-chemical parameters (pH, EC, TDS);Major anions (F, Cl, NO3, SO4, HCO3, NH4, PO4,);Major cations (K, Na, Mg, Ca, NH4,); and Other elements/metals (Fe, Mn, Zn, Pb, Co, Cr, Cr (VI),). ***Hydrology –*** (1) A number of monitoring sample points have been identified in the Hydrological report (**Appendix L**). Additional sampling points have been recommended and should be included in the final water monitoring plan. (2) As part of the monitoring program going forward, samples should be taken monthly for at least the first year of operation. This can be revised to quarterly monitoring if no concerns are highlighted with the approval of DWAS. (3) The monitoring should include the standard analysis of major cations/anions as well as ICP scan for metals. (4) A conceptual storm water management plan (**Appendix L**) has been developed based on the requirements of GN R. 704 of the National Water Act of 1998. (5) Implementation of the guidance provided by the South African National Roads Agency Limited (SANRAL) drainage manual. This document provides guidance on maximum permissible velocities for grass covers to avoid erosion and should be consulted during the detailed design phase.		
1. Access and hauling along roads i.e. during the construction of roads **2. Site clearing and topsoil stripping for lay down area and all**	**Noise generation**	Construction & Operational		***<u>Implementation of EMS</u>:*** (1) Development and implementation of a Acoustical Measurement & Audit Programme as part of the EMS. A monitoring program to be developed based on the specialist recommendations (**Appendix F**). (2) Recording, reporting, and remediating incidents related to noise. (3) Regular inspections of plant. (4) Ensuring corrective and preventative actions are taken to address nonconformities. (5) Communicating findings of concern to I&AP. ***<u>On-site mitigation measures</u>:***	(1) Develop and implement a noise monitoring programme to ensure compliance with the National Noise Control Regulations and SANS10103:2008 guidelines. (2) Develop and implement a vehicle/plant/equipment management plan to specifically include routine inspections and testing of sound frequencies.	Before and during all phases on a quarterly basis.

related mining infrastructure **5. Mining offices (construction and operation) i.e. operation of training centres, offices and kitchen facilities** **9.Stores, workshops &wash bays** **11. Fuel operating power generators**				(1) Limit the maximum speed on the haul roads to 60 km/h or less. Road speeds should be kept as consistent as is feasibly possible (i.e. no speed bumps to reduce noise or stop junctions). This will help minimise the use of air brakes as well as reduce required maximum capacity of heavy vehicles during pull off. (2) Roads should be planned so as to reduce heavy vehicles reversing when collecting or dumping at stockpiles/tips etc. (E.g. use of a loop instead of a dead-end road). This will minimise the use of reverse alarms on vehicles. (3) Regular inspections and servicing of plant. ***Legal requirements****:* (1) *Compliance with the National Noise control regulations.* ***Specialist recommendations:*** (1) Design an Acoustical Measurement & Audit Programme. Note: If there are no noise-sensitive receptors within 1,000m from any mining activities no routine noise monitoring will be required. (2) If feasible the road should be paved or asphalted (e.g. continuous graded asphalt). From an acoustical perspective paver bricks should not be considered. It is likely that routes will be unpaved. The developer should consider maintain these unpaved routes regularly smoothing out irregularities on the routes.		

1. Access and hauling along roads i.e. during the construction of roads **2. Site clearing and topsoil stripping for lay down area and all related mining infrastructure** **6. Storm water runoff management features**	**Alteration of drainage patterns**	Construction & Operational		**Implementation of EMS:** (1) Develop a water monitoring management plan. (2) Record and report all incidents related to affecting water quality. (3) Development of Mine Rehabilitation, decommissioning and mine closure liability Plan in compliance with GN R. 1147 of NEMA. (4) Ensuring corrective and preventative actions are taken to address nonconformities. (5) Communicating findings of concern to I&AP. (6) Development and implementation of a storm water management plan. (7) Regular inspection of erosion prone areas for signs of erosion. (8) A soil conservation and stockpiling plan to be developed and implemented. **On-site mitigation measures:** (1) Plan the final site layout in a manner as to reduce alteration of drainage patterns. (2) In the event that drainage patterns will be altered, the natural flow to be diverted. (3) Any diversions to be in such a manner as to avoid erosion formation or pollution through siltation and sedimentation. (4) Ensure water quality complies with the requirements stipulated by the Water Use Licence conditions. (5) Channels and drainage systems required to divert the flow of drainage lines to be designed by a civil engineer, taking into consideration the peak volumes and flow. (6) Ensure rehabilitation measures are according to rehabilitation plan and that measures are taken to prevent the formation of erosion dongas or rills. **Legal requirements:** (1) A Water Use Licence to be obtained for all river crossings or development of infrastructure within or within close proximity to a watercourse as defined by the National Water Act, act no of 1996. (2) Requirements stipulated by GN R. 704 to be considered in the final site layout plan by the appointed engineers. **Specialist recommendations:** ***Geohydrology –*** (1) Development of an environmental monitoring programme in order to monitor the groundwater quality and groundwater level changes up- and downstream of the proposed open cast mine workings. (2) Collected monitoring data (quarterly) may be used for future model updates (e.g. every second year). (3) A number of geosites (i.e. boreholes, springs and surface water drainages) and newly proposed boreholes were identified (refer to the Geohydrological report in **Appendix M**) to be included into a monthly/quarterly monitoring programme. (4) The parameters to be analysed should comprise the following: Physical-chemical parameters (pH, EC, TDS);Major anions (F, Cl, NO3, SO4, HCO3, NH4, PO4,);Major cations (K, Na, Mg, Ca, NH4,); and Other elements/metals (Fe, Mn, Zn, Pb, Co, Cr, Cr (VI),).	(1) Develop and implement a storm water management plan. (2) Develop and implement a water management plan specifically including a strategy for the management of alterations to drainage patterns.	Entire Life cycle of project

				(5) Emphasis should be placed on monitoring of groundwater levels prior mining and during the operation phase as well as to establish the origin of the elevated nitrate concentrations in the project area. (6) Recording of pit dewatering rates. Initial monthly (and later quarterly) sampling and analysis (major and trace elements) of pumped water. ***Hydrology –*** (1) A number of monitoring sample points have been identified in the Hydrological report (**Appendix L**). Additional sampling points have been recommended and should be included in the final water monitoring plan. (2) As part of the monitoring program going forward, samples should be taken monthly for at least the first year of operation. This can be revised to quarterly monitoring if no concerns are highlighted with the approval of DWAS. (3) The monitoring should include the standard analysis of major cations/anions as well as ICP scan for metals. (4) A conceptual storm water management plan (**Appendix L**) has been developed based on the requirements of GN R. 704 of the National Water Act of 1998. (5) Implementation of the guidance provided by the South African National Roads Agency Limited (SANRAL) drainage manual. This document provides guidance on maximum permissible velocities for grass covers to avoid erosion and should be consulted during the detailed design phase.		

1. Access and hauling along roads i.e. during the construction of roads	**Destruction of upstream tributaries and reduction in water in the catchment**	Construction & Operational		***Implementation of EMS***: (1) Develop a water monitoring management plan. (2) Record and report all incidents related to affecting water quality. (3) Development of Mine Rehabilitation, decommissioning and mine closure liability Plan in compliance with GN R. 1147 of NEMA, addressing the rehabilitation measures related to reinstatement of drainage lines. (4) Ensuring corrective and preventative actions are taken to address nonconformities. (5) Communicating findings of concern to I&AP. (6) Development and implementation of a storm water management plan. (7) Regular inspection of erosion prone areas for signs of erosion. (8) A soil conservation and stockpiling plan to be developed and implemented. ***On-site mitigation measures:*** (1) Plan the final site layout in a manner as to reduce the destruction of upstream tributaries. (2) In the event that drainage patterns will be altered, the natural flow to be diverted as to prevent reduction of water in the catchment. (3) Any diversions to be in such a manner as to avoid erosion formation or pollution through siltation and sedimentation. (4) Ensure water quality complies with the requirements stipulated by the Water Use Licence conditions. (5) Channels and drainage systems required to divert the flow of drainage lines to be designed by a civil engineer, taking into consideration the peak volumes and flow. (6) Ensure rehabilitation measures are according to rehabilitation plan and that measures are taken to prevent the formation of erosion dongas or rills. **Legal requirements:** (1) A Water Use Licence to be obtained for all river crossings or development of infrastructure within or within close proximity to a watercourse as defined by the National Water Act, act no of 1996. (2) Requirements stipulated by GN R. 704 to be considered in the final site layout plan by the appointed engineers. **Specialist recommendations:** ***Geohydrology –*** (1) Development of an environmental monitoring programme in order to monitor the groundwater quality and groundwater level changes up- and downstream of the proposed open cast mine workings. (2) Collected monitoring data (quarterly) may be used for future model updates (e.g. every second year). (3) A number of geosites (i.e. boreholes, springs and surface water drainages) and newly proposed boreholes were identified (refer to the Geohydrological report in **Appendix M**) to be included into a monthly/quarterly monitoring programme. (4) The parameters to be analysed should comprise the following: Physical-chemical parameters (pH,	(1) Develop and implement a storm water management plan. (2) Develop and implement a water management plan specifically including a strategy for the management of alterations to drainage patterns.	Entire Life cycle of project

				EC, TDS);Major anions (F, Cl, NO3, SO4, HCO3, NH4, PO4,);Major cations (K, Na, Mg, Ca, NH4,); and Other elements/metals (Fe, Mn, Zn, Pb, Co, Cr, Cr (VI),). (5) Emphasis should be placed on monitoring of groundwater levels prior mining and during the operation phase as well as to establish the origin of the elevated nitrate concentrations in the project area. (6) Recording of pit dewatering rates. Initial monthly (and later quarterly) sampling and analysis (major and trace elements) of pumped water. ***Hydrology –*** (1) A number of monitoring sample points have been identified in the Hydrological report (**Appendix L**). Additional sampling points have been recommended and should be included in the final water monitoring plan. (2) As part of the monitoring program going forward, samples should be taken monthly for at least the first year of operation. This can be revised to quarterly monitoring if no concerns are highlighted with the approval of DWAS. (3) The monitoring should include the standard analysis of major cations/anions as well as ICP scan for metals. (4) A conceptual storm water management plan (**Appendix L**) has been developed based on the requirements of GN R. 704 of the National Water Act of 1998. (5) Implementation of the guidance provided by the South African National Roads Agency Limited (SANRAL) drainage manual. This document provides guidance on maximum permissible velocities for grass covers to avoid erosion and should be consulted during the detailed design phase.		
1. Access and hauling along roads i.e. during the construction of roads	**Water usage for dust suppression**	Construction & Operational		***Implementation of EMS:*** **(1)** Water usage monitoring plan to be developed and implemented. **(2)** Create awareness of water conservation. ***On-site mitigation measures:*** **(1)** Filtered or treated water from PCD's may be used for dust suppression should they conform to the sediment load requirements or other quality requirements as specified by the Water Use Licence issued by the Department of Water Affairs and sanitation. **(2)** Monitor water usage and ensure that areas of waste are identified and minimised. **(3)** Where possible, reuse water from the PCD's for dust suppression on the roads. ***Legal requirements:*** **(1)** A Water Use Licence to be obtained for all river crossings or development of infrastructure within or within close proximity to a watercourse as defined by the National Water Act, act no of 1996.	(1) Development and implementation of a Dust management plan including the monitoring and prevention programme. (2) Develop and implement a water usage record keeping procedure.	Entire Life cycle of project
1. Access and hauling along roads i.e. during the construction of roads	**Influx of alien invasive vegetation**	Construction		***Implementation of EMS:*** (1) Development and implementation of an alien and invasive control plan (2) Awareness training on the identification of weeds and alien species to employees responsible for the management of these species.	(1) Develop and implement an alien eradication and control management plan.	Entire Life cycle of project

2. Site clearing and topsoil stripping for lay down area and all related mining infrastructure **5. Mining offices (construction and operation) i.e. operation of training centres, offices and kitchen facilities**				***On-site mitigation measures:*** (1) Alien vegetation growing on topsoil stockpiles must be removed immediately in a manner as to prevent re-growth. (2) All disturbed areas to be monitored on a regular basis for exotic or invasive plant species and weeds. (3) Chemical removal shall be used in accordance with the manufacturer's specification for weeds where mechanical eradication/control is no longer affective. (4) The type of chemical to be utilised must be determined in consultation with a herbicide consultant and the Environmental Control Officer/Environmental Officer/SHEQ Officer. (5) Those exotic/invasive plant or weed which cannot be eradicated by means of herbicides, needs to be manually removed from site. (6) The herbicide consultant must have a Pest Control Operators licence. (7) Control the type of material imported to site to ensure that soil contamination, in terms of weed and alien invasive plants does not occur. ***Legal requirements:*** (1) Adherence to requirements stipulated by GN R. 598 of NEMBA. (2) ***Section 3: Category 1b Listed Invasive Species*** ***(A total number of 6 species were identified – Appendix G):*** (2.1) Category 1b Listed Invasive Species are those species listed as such by notice in terms of section 70(1)(a) of the Act as species which must be controlled. (2.2) A person in control of a Category 1 b Listed Invasive Species must control the listed invasive species in compliance with sections 75(1), (2) and (3) of the Act. (2.3) If an Invasive Species Management Programme has been developed in terms of section 75(4) of the Act, a person must control the listed invasive species in accordance with such programme. (2.4) A person contemplated in sub-regulation (2) must allow an authorised official from the Department to enter onto the land to monitor, assist with or implement the control of the listed invasive species, or compliance with the Invasive Species Management Programme contemplated in section 75(4) of the Act. (3) ***Section 4. Category 2 Listed Invasive Species*** ***(One specie has been identified – Agave sisalana):*** (3.1) Category 2 Listed Invasive Species are those species listed by notice in terms of section 70(1)(a) of the Act as species which require a permit to carry out a restricted activity within an area specified in the Notice or an area specified in the permit, as the case may be. (3.2) Unless otherwise indicated in the Notice, no person may carry out a restricted activity in respect of a Category 2 Listed Invasive Species without a permit. (3.3) A landowner on whose land a Category 2 Listed Invasive Species occurs or person in possession of a permit, must ensure that the specimens of the species do not spread outside of the land or the area specified in the Notice or permit. (3.4) If an Invasive Species Management Programme has been developed in terms of section 75(4) of		

				the Act, a person must control the listed invasive species in accordance with such programme. (3.5) Unless otherwise specified in the Notice, any species listed as a Category 2 Listed Invasive Species that occurs outside the specified area contemplated in sub-regulation (1), must, for purposes of these regulations, be considered to be a Category 1 b Listed Invasive Species and must be managed according to Regulation 3. (3.6) Notwithstanding the specific exemptions relating to existing plantations in respect of Listed Invasive Plant Species published in Government Gazette No. 37886, Notice 599 of 1 August 2014 (as amended), any person or organ of state must ensure that the specimens of such Listed Invasive Plant Species do not spread outside of the land over which they have control. (4) ***Section 5. Category 3 Listed Invasive Species (One specie has been identified – Morus alba):*** (4.1) Category 3 Listed Invasive Species are species that are listed by notice in terms of section 70(1)(a) of the Act, as species which are subject to exemptions in terms of section 71(3) and prohibitions in terms of section 71A of Act, as specified in the Notice. (4.2) Any plant species identified as a Category 3 Listed Invasive Species that occurs in riparian areas, must, for the purposes of these regulations, be considered to be a Category 1b Listed Invasive Species and must be managed according to regulation 3. (4.3) If an Invasive Species Management Programme has been developed in terms of section 75(4) of the Act, a person must control the listed invasive species in accordance with such programme. (5) When using herbicides and pesticides, requirements stipulated in section 7(2)(a)i) of the Fertilizers, farm feeds, agricultural remedies, and stock remedies Act of 1947 must be considered. (6) Requirements for the prohibition of spreading weeds stipulated in section 5 of the Conservation of Agricultural Resources Act (CARA) of 43 must be adhered with. (7) Regulation 15 of GN R.1048 published under CARA must be adhered with and considered as part of the alien invasive species management plan. ***Specialist recommendations:*** (1) Wheels of large machinery should be checked prior to entering the site and cleared of seed material of alien invasive plants if transport routes go through infested areas (especially of species with spiny or bur-like seeds). Such seed must be destroyed. (3) If filling material is to be used, this should be sourced from areas free of invasive species (4) Monitor the establishment of (alien) invasive species and remove as soon as detected, whenever possible before flowers or other regenerative material can be produced. Destruction of regenerative material by burning in a protected area is encouraged. (5) Adherence to the comprehensive Plant Search and rescue, Re-vegetation and Alien Invasive Management plan (Appendix E of the Biodiversity Impact Report (**Appendix G** to this report)).		
1. Access and hauling along roads i.e. during the construction of	**CO_2 emissions & Release of noxious**	Construction & Operational		**Implementation of EMS:** (1) Develop and maintain a carbon footprint reporting policy. (2) Develop and maintain a Vehicle/Plant/Equipment maintenance plant.	(1) Develop and maintain a Carbon footprint reporting policy. (2) Develop and maintain a	Entire Life cycle of project

roads **2. Site clearing and topsoil stripping for lay down area and all related mining infrastructure** **9.Stores, workshops &wash bays** **11. Fuel operating power generators** **15. Transport of construction material, mobile plant and equipment to the site**	**gasses**			**<u>On-site mitigation measures</u>:** (1) Plant and equipment to function at an optimal level. (2) Where possible lead replacement petrol to be used. (3) Where possible low sulphur containing diesel to be used. (4) All vehicles and equipment must be maintained and serviced according to the manufacturer's specification. (5) Any vehicle, plant or equipment emitting visible emissions from their exhaust systems must be serviced or repaired immediately. **<u>Legal requirements:</u>** (1) Section 39 of the Atmospheric Pollution Prevention Act of 1965 and GN R. 1651 specifies requirements regarding the control of emissions from diesel vehicles used on public roads. These requirements should form part of the Air quality Management Plan and the Vehicle/Plant/Equipment maintenance plan.	Vehicle/Plant/Equipment maintenance plant.	
2. Site clearing and topsoil stripping for lay down area and all related mining infrastructure **5. Mining offices (construction and operation) i.e. operation of training centres, offices and kitchen facilities**	**Topography and visual alteration**	Construction		***<u>Implementation of EMS</u>***: (1) Record keeping of the topography and environmental state before the commencement of any activities. (2) Development of Mine Rehabilitation, decommissioning and mine closure liability Plan in compliance with GN R. 1147 of NEMA. ***<u>On-site mitigation measures</u>***: (1) Limit site clearance to approved areas. (2) Re-vegetate, with indigenous and non-invasive species, all cleared or rehabilitated areas immediately. (3) During rehabilitation ensure that the topography is reinstated as close as possible to the state before commencement of any activities. **<u>Legal requirements</u>**: (1) GN R. 1147 of NEMA requires the following documents as part of the authorisation process: (1.1) A annual rehabilitation plan; (1.2) A final rehabilitation, decommissioning and mine closure plan; and (1.3) An environmental risk assessment report.	(1) Mine plan in accordance with the MPRDA Regulation 56 section (1) to (8). (2) Adherence to the finalised approved lay out plan. (3) Development of Mine Rehabilitation, decommissioning and mine closure liability Plan in compliance with GN R. 1147 of NEMA.	Rehabilitation and Decommissioning
2. Site clearing and topsoil stripping for lay down area and all	**Water level reduction and contamination**	Construction & Operational		***<u>Implementation of EMS:</u>*** (1) Develop a water monitoring management plan. (2) Record and report all incidents related to affecting water quality.	(1) Develop and implement a water management plan and specifically include measures to be implemented to reduce the impact on surface and	Entire Life cycle of project

related mining infrastructure **16. Use of existing drilled / new boreholes**				(3) Development of Mine Rehabilitation, decommissioning and mine closure liability Plan in compliance with GN R. 1147 of NEMA, addressing the rehabilitation measures related to reinstatement of drainage lines. (4) Ensuring corrective and preventative actions are taken to address nonconformities. (5) Communicating findings of concern to I&AP. (6) Development and implementation of a storm water management plan. (7) Regular inspection of erosion prone areas for signs of erosion. (8) A soil conservation and stockpiling plan to be developed and implemented. (9) Create awareness of water conservation. ***<u>On-site mitigation measures</u>***: (1) River crossings or storm water channels shall be designed by a registered civil engineer. (2) Measures to avoid or prevent erosion formation must be incorporated into the designs of the infrastructure associated with the river crossings. (3) During construction through drainage lines, the majority of the flow must be allowed to pass down the stream. In stream diversions should be used rather than the construction of new channels. (4) Filtered or treated water from PCD's may be used for dust suppression should they conform to the sediment load requirements or other quality requirements as specified by the Water Use Licence issued by the Department of Water Affairs and sanitation. (5) Monitor water usage and ensure that areas of waste are identified and minimised. (6) Where possible, reuse water from the PCD's for dust suppression on the roads. (7) in the event that RoM product materials requires the usage of water during processing, the holder of the environmental authorisation must ensure that these activities complies with the current authorisation and ensure that a WUL are obtained. ***<u>Legal requirements:</u>*** **(1)** A Water Use Licence to be obtained for all river crossings or development of infrastructure within or within close proximity to a watercourse as defined by the National Water Act, act no of 1996. (2) Requirements stipulated by GN R. 704 to be considered in the final site layout plan by the appointed engineers. **<u>Specialist recommendations:</u>** ***Geohydrology –*** (1) Development of an environmental monitoring programme in order to monitor the groundwater quality and groundwater level changes up- and downstream of the proposed open cast mine workings. (2) Collected monitoring data (quarterly) may be used for future model updates (e.g. every second year). (3) A number of geosites (i.e. boreholes, springs and surface water drainages) and newly proposed boreholes were identified (refer to the Geohydrological report in **Appendix M**) to be included into a monthly/quarterly monitoring programme. (4) The parameters to be analysed should comprise the following: Physical-chemical parameters (pH, EC, TDS);Major anions (F, Cl, NO3, SO4, HCO3, NH4, PO4,);Major cations (K, Na, Mg, Ca, NH4,);	groundwater reduction. (2) Ensure compliance with the issued WUL requirements. (3) Develop and implement a storm water management plan and specifically address the diversion of "clean" water into the natural drainage lines.	

				and Other elements/metals (Fe, Mn, Zn, Pb, Co, Cr, Cr (VI),). (5) Emphasis should be placed on monitoring of groundwater levels prior mining and during the operation phase as well as to establish the origin of the elevated nitrate concentrations in the project area. (6) Recording of pit dewatering rates. Initial monthly (and later quarterly) sampling and analysis (major and trace elements) of pumped water. ***Hydrology –*** (1) A number of monitoring sample points have been identified in the Hydrological report (**Appendix L**). Additional sampling points have been recommended and should be included in the final water monitoring plan. (2) As part of the monitoring program going forward, samples should be taken monthly for at least the first year of operation. This can be revised to quarterly monitoring if no concerns are highlighted with the approval of DWAS. (3) The monitoring should include the standard analysis of major cations/anions as well as ICP scan for metals. (4) A conceptual storm water management plan (**Appendix L**) has been developed based on the requirements of GN R. 704 of the National Water Act of 1998. (5) Implementation of the guidance provided by the South African National Roads Agency Limited (SANRAL) drainage manual. This document provides guidance on maximum permissible velocities for grass covers to avoid erosion and should be consulted during the detailed design phase.		
2. Site clearing and topsoil stripping for lay down area and all related mining infrastructure	**Destruction of graves**	Construction & Operational		***Implementation of EMS:*** (1) Develop and implement an awareness campaign on the protection of social heritage impacts. ***On-site mitigation measures:*** (1) If human remains are uncovered during the course of authorised activities or archaeological work, the excavations affecting the burial must be stopped. (2) SAHRA should then be consulted and depending on the situation, the remains are either covered and left in situ, exposed (but not removed) and studies in situ, or fully excavated and studied with the consent and participation of the interested parties. (3) It is, therefore, advisable that if it is foreseen that any archaeological research will uncover human remains an agreement with the interested and affected parties and a permit for burials be obtained beforehand. (4) A suitable accredited archaeologist must be appointed on a watching brief to monitor the excavation of any grave sites. (5) At the onset of construction or mining operations, all graves that might be affected should be clearly demarcated and if possible fenced off to protect them from any accidental damage, whether they are earmarked for relocation, or not. (6) Should the decision be taken to propose the relocation of the affected graves, a suitably accredited	(1) Ensure compliance with the National Heritage Resources Act (NHRA), No. 25 of 1999. (2) Ensure compliance with the Human Tissue Act, 1983 (Act no. 65 of 1983.	Entire Life cycle of project

				and experienced service provider must be appointed to undertake relocation. (7) Relocation of grave relocation is dependent on permission for the action by the close relatives and interested and affected parties from the community, and the requirement is that the developer must assist this community to fulfil their cultural and religious requirements during the process. ***Legal requirements:*** **(1)** Obtain a permit or authorisation to disturb, deface, destroy, or remove protected features and sites in terms of Section 27 (18) of the National Heritage Resources Act (NHRA), No. 25 of 1999 from the South African Heritage Resources Agency (SAHRA). ***Specialist recommendations:*** (1) Identified heritage resource sites must be avoided as far as possible (see Table 2 in the Heritage Impact Assessment (HIA) report attached as **Appendix O**). (2) Should archaeological sites or graves be exposed during construction work, it must immediately be reported to a heritage practitioner so that an investigation and evaluation of the finds can be made. ***Homestead sites –*** (3) A total of five old homestead sites were identified in the proposed mining area and it is anticipated that it would be impacted on by the mining activities. (4) It is recommended that the sites are retained, and that it should be fenced off with danger tape for the duration of the mining, leaving a buffer zone of at least ten metres from the outer edge of the stone walling/physical features. (5) If the sites cannot be retained, it should be documented (mapped and excavated) by an archaeologists after obtaining a permit from SAHRA. (6) If mining takes place in these areas, the community should be consulted to determine if there are any more graves in the region, especially those of young children who, in many cases, are buried inside the old homestead. ***Informal burial sites –*** (7) A total of nine informal burial sites were identified. All are located inside of or in close proximity to the mining area and it is anticipated that it would be impacted on by the mining activities. (8) If the burial places are retained, it should be fenced off with danger tape for the duration of the mining, leaving a buffer zone of at least ten metres from the outer edge of the graves. (9) If the graves cannot be retained, it should be relocated, but only on condition of following the correct procedures (see Appendix 3 of the HIA attached as **Appendix O**).		
2. Site clearing and topsoil stripping for lay down area and all related mining infrastructure	**Degradation of cultural significance heritage sites**	Construction & Operational		***Implementation of EMS:*** (1) Develop and implement an awareness campaign on the protection of social heritage impacts. ***On-site mitigation measures:*** (1) The position of known sites, as identified by the heritage impact assessment, must be clearly identified and marked and considered in the final site lay out. (2) Such areas shall be market as no-go areas. (3) Artefacts may not be removed under any circumstances.	(1) Ensure compliance with the National Heritage Resources Act (NHRA), No. 25 of 1999. (2) Ensure compliance with the Human Tissue Act, 1983 (Act no. 65 of 1983.	Entire Life cycle of project

				(4) Do not disturb, deface, destroy or remove protected features and sites, whether fenced or not for the duration of the authorised activity, unless on the approval of the competent authority. (5) Permits shall be obtained from South African Heritage Resource Agency (SAHRA) should any authorised activities affect any world heritage sites or if any areas are to be destroyed or altered. (6) Works must be stopped immediately should any elements of cultural or heritage significance be found. (7) Do not resume works in the area in question without the required permits or authorisation from the competent authority. (8) A qualified and registered archaeologist must be appointed and consulted at such finding to appropriately excavate any artefacts in agreement with the Limpopo Heritage Resource Agency (LPHRA) and the SAHRA. ***Legal requirements:*** (1) Obtain a permit or authorisation to disturb, deface, destroy, or remove protected features and sites from the South African Heritage Resource Agency (SAHRA) and Limpopo Heritage Resource Agency (LPHRA). ***Specialist recommendations:*** (1) Identified heritage resource sites must be avoided as far as possible (see Table 2 in the Heritage Impact Assessment (HIA) report attached as **Appendix O**). (2) Should archaeological sites or graves be exposed during construction work, it must immediately be reported to a heritage practitioner so that an investigation and evaluation of the finds can be made. ***Homestead sites –*** (3) A total of five old homestead sites were identified in the proposed mining area and it is anticipated that it would be impacted on by the mining activities. (4) It is recommended that the sites are retained, and that it should be fenced off with danger tape for the duration of the mining, leaving a buffer zone of at least ten metres from the outer edge of the stone walling/physical features. (5) If the sites cannot be retained, it should be documented (mapped and excavated) by an archaeologists after obtaining a permit from SAHRA. (6) If mining takes place in these areas, the community should be consulted to determine if there are any more graves in the region, especially those of young children who, in many cases, are buried inside the old homestead. ***Industrial/Infrastructural heritage –*** (7) A single site defined as of industrial/infrastructural heritage was identified. (8) It is recommended that the irrigation system should be documented (photographed and mapped) in before mining activities takes place.		
4. Onsite Clinic	**Medical Waste generation**	Construction & Operational		**Implementation of EMS**: (1) Develop and implement a Waste Management plan. (2) Develop and implement a waste recoding procedure.	(1) Development of a Health and Safety management plan specifically addressing the management of medical waste.	Entire Life cycle of project

				(3) Develop and implement a Health and Safety management plan, including the handling of medical waste. (4) Regular inspections of designated waste management area and/or facilities. (5) Reporting and recording of waste related incidents. (6) Continuous awareness training on Recycling, Reduction, Re-use, and avoidance of waste. ***<u>On-site mitigation measures:</u>*** (1) Ensure that all first aid facilities are equipped with specialised medical waste disposal bins. (2) Appoint a specialised and suitably accredited medical waste service provider. (3) Ensure that at no circumstance any medical waste generated from an first aid incident are mixed into general or hydrocarbon contaminated waste. (4) Ensure all personnel are made aware of the dangers of medical waste. (5) Record must be kept of all medical waste generated throughout the entire life cycle of the project. (6) Safe disposal certificates to be obtained and kept on record. (7) All appointed first aid personnel must be trained in management of medical waste. ***<u>Legal requirements</u>***: (1) Requirements for management of blood products stipulated in GN R. 1935 of the Human Tissue Act of 1983, must be incorporated into the Spitsvale Mine Health and Safety management plan. (2) Requirements for the disposal of bodies and tissue as stipulated in GN R. 2878 of the Human tissue Act of 1983, must be incorporated into the Spitsvale Mine Health and Safety management plan. (3) Requirements for the destruction of medicines as stipulated in GN R. 1965 of the Medicines and related substances control Act, must be incorporated into the Spitsvale Mine Health and Safety management plan	(2) Development of a management plan for the operation of the on-site Clinic. (3) Development and implementation of a detailed Waste management plan.	
4. Onsite Clinic **5. Mining offices (construction and operation) i.e. operation of training centres, offices and kitchen facilities** **12. Lighting**	**Electricity usage**	Operational		**<u>Implementation of EMS:</u>** (1) Calculate and record the carbon emissions that may arise from the authorised activities. (2) Monitor the carbon footprint of the project throughout the entire life cycle. (3) Develop an awareness campaign on power saving and electricity usage. **<u>On-site mitigation measures:</u>** (1) Keep record of the carbon emissions produced on site to monitor the carbon footprint of the project. (2) Ensure that all unnecessary office equipment, air cons, and lights are switched off at the end of each shift. (3) If feasible, the use of solar powered geysers will allow for the reduction in contributing to the carbon footprint of the project. (4) Consider and investigate the feasibility of switching to "green" energy options.	(1) Develop and implement a electricity usage monitoring programme. (2) Develop and implement a carbon footprint reporting policy.	Entire Life cycle of project
4. Onsite Clinic **5. Mining offices (construction and**	**Domestic water usage**	Operational		**<u>Implementation of EMS</u>**: (1) Development and implementation of water quality monitoring plan. (2) Create awareness of water conservation.	(1) Develop and implement a water usage record keeping procedure. (2) Develop and implement a infrastructure	Entire Life cycle of project

operation) i.e. operation of training centres, offices and kitchen facilities				**<u>On-site mitigation measures:</u>** (1) Ensure that all taps and pipes are maintained to avoid spills or leaks. (2) Monitor water use and ensure that areas of waste are identified and minimised. (3) Repair identified leaks and address issues of water wastage as soon as these are identified. (4) Where possible reuse water on site for dust suppression.	maintenance programme to include frequent inspections of water pipes and taps.	
5. Mining offices (construction and operation) i.e. operation of training centres, offices and kitchen facilities	**General waste generation & Littering**	Construction & Operational		**<u>Implementation of EMS</u>**: (1) Develop and implement as waste management plan with the focus on reuse, reduce, recycle, or avoid. (2) Development and maintenance of a waste disposal record keeping system. (3) Regular inspections of designated waste management area and/or facilities. (4) Reporting and recording of waste related incidents. (5) Continuous awareness training on Recycling, Reduction, Re-use, and avoidance of waste. **<u>On-site mitigation measures:</u>** (1) Characterise and quantify all waste streams associated to the authorised activities in terms of quantity, hazard, generation frequency and recyclability and define and implement disposal options as specified in the waste management plan. (2) As part of the characterisation define opportunities for source reduction, as well as reuse and recycling as opposed to simply disposing waste. (3) Ensure segregation of hazardous wastes from non-hazardous. (4) Sealable bins and containers must be made available for the storage of all streams of waste. (5) During the construction phase, temporary storage of construction waste to be stored in a bunded designated area. (6) Waste will not be stored longer than specified by the waste regulations. If storage exceeds the threshold stipulated by the regulations a waste management licence must be obtained. (7) All waste materials must be removed off site by a suitable and registered waste service provider. (8) All waste to be disposed off at a suitably registered waste disposal facility. (9) Proof of disposal to be obtained and kept on record. (10) Maintain a waste register for materials removed from site, indicating type, quantity, date, haulage contractor, delivery point, and safe disposal certificates. (11) All waste receptacles to be clearly labelled according to type. (12) Where possible, recyclable waste including glass, paper, and plastic must be separated, stored and recycled where possible. (13) Waste oil and scrap metal should also be recycled if possible. (14) All employees or contractors must be informed about the necessity of using waste drums. (15) No littering will be allowed and a daily site clean-up will be initiated. (16) All domestic refuge generated by staff and sub-contractors must be disposed at a registered waste disposal facility by a suitably registered service provider on a regular basis (i.e. weekly). (17) Measures to ensure that solid waste is transported as to avoid waste spills *enroute* must be	(1) Compliance with the National Environmental Management: Waste Act, act no 59 of 2008 and associated regulations.	Entire Life cycle of project

				implemented. (18) Waste bins must be emptied on a regular basis as to ensure bins do not overflow. (19) Site should be kept clean and free of rubbish that could potentially attract animal pests and that bins are scavenger proof. (20) DO not dump waste of any nature, or any foreign material into any drainage line or stream. A strict no dumping policy must be communicated to all staff and sub-contractors. (21) During transportation of waste, all waste service providers must comply with the codes of practice and guidelines for licensing of waste transport vehicles and the regulation and monitoring of transport operations. **Legal requirements**: (1) Ensure requirements stipulated in the National Environmental Management: Waste Act (NEMWA) of 2008 are incorporated in the Waste Management Plan. (2) GN R. 634 list a number of requirements related to Waste classification and management. These requirements as stipulated in the regulations must be incorporated into the Waste Management Plan. (3) GN R. 921 list a number activities that requires a Waste Management Licence in terms of NEMWA. Listed activity number 11 ("The establishment or reclamation of a residue stockpile or residue deposit resulting from activities which require a mining right in terms of the MPRDA (Act 28 of 2002)") will require a waste management licence in terms of the regulations. (4) GN R. 625 sets requirements for a waste producer to register and report waste quantity of the National Waste Information System. (5) GN R. 635 sets the National norms and standards for the assessment of waste for landfill. The procedures for determining the class of waste for landfill must be incorporated into the Waste Management plan. (6) GN R. 636 sets the National norms and standards for the disposal of waste for landfill. These requirements should be considered when disposing waste to landfill. (7) GN R. 926 stipulates the norms and standards associated to the storage of waste. These requirements must be incorporated in the Waste Management Plan. (8) All waste tyres generated on site must be managed according to the Waste tyre regulations published under the Environment Conservation Act of 1989.		
7. Water storage facilities	**Improper water storage management**	Operational		**Implementation of EMS:** (1) Water usage monitoring plan to be developed and implemented. (2) Create awareness of water conservation. (3) Regular inspections of water storage facilities. (4) Reporting and recording of water management related incidents. **On-site mitigation measures:** (1) Filtered or treated water from PCD's may be used for dust suppression should they conform to the sediment load requirements or other quality requirements as specified by the Water Use Licence issued by the Department of Water Affairs and sanitation.	(1) Develop and implement a water management plan specifically addressing the storage of water as well as the frequent inspections of storage facilities.	Entire Life cycle of project

				(2) Monitor water usage and ensure that areas of waste are identified and minimised. (3) Where possible, reuse water from the PCD's for dust suppression on the roads. (4) Water may only be abstracted from the approved abstraction points once all grey water or run-off water complying with the quality requirements has been utilised for the purposes of dust suppression. (5) The volume of water abstracted may not exceed the limits stipulated by DWAS by more than 5% on an annual basis. (6) Water storage facilities to be inspected on a weekly basis to ensure no leaks or contamination of water source. (7) Water storage facilities and infrastructures to be maintained to a good working condition at all times. **Legal requirements:** (1) A Water Use Licence to be obtained for all river crossings or development of infrastructure within or within close proximity to a watercourse as defined by the National Water Act, act no of 1996.		
8. Pollution Control Dams (PCD's) i.e. Construction and operation **9.Stores, workshops &wash bays** **10. Ablutions & change house with sewage treatment plant** **11. Fuel operating power generators** **13. Fuel storage**	**Contamination of water resources**	Operational		**Implementation of EMS:** (1) Development and implementation of a water monitoring program. (2) Development and implementation of an Integrated Water and Waste Management Plan (IWWMP) (3) Development and implementation of a storm water management plan. (4) Regular inspections of all areas posing a risk of contaminating water resources. (5) Reporting and recording all related incidents according to a developed procedure. (6) Develop and implement an emergency preparedness plan. (7) Ensuring corrective and preventative actions are taken to address nonconformities. (8) Communicating findings of concern to I&AP. **On-site mitigation measures:** (1) All sources of process water must be identified and quantified for the life cycle of the authorised activities. (2) A wastewater management system must be installed complying with regal requirements. (3) A water use licence for waste water storage facilities to be obtained. (4) All waste water management facilities to be designed by a qualified engineer. (5) Wash bays, service areas, and fuel storage areas may not be located within the 1:100 year flood line or horizontal distance of 100 m (whichever is greater) of a watercourse or drainage line. (6) No environmentally harmful detergents may be used. (7) Workshops, refuelling depots and washing areas shall be bunded. (8) All bunded areas to be constructed in a way as to avoid seepage to the surrounding environment as well as be able to contain its content to a capacity of 110%. (9) Water from wash bays, service areas and fuel storage areas must be discharged into oil separators and sumps. (10) Oils collected in this manner should be retained in a safe holding tank and removed from site by specialist oil recycling company or disposal at approved waste disposal sites.	(1) Develop and implement an Integrated Waste Water Management Plan (IWWMP). (2) Develop and implement a water monitoring schedule according to the water management plan. (3) Ensure compliance with the WUL conditions. (4) Develop an emergency preparedness plan addressing the prevention and management of incidents related to water contamination.	Entire Life cycle of project

				(11) No drainage from fuel storage areas to be permitted. (12)Never hose oil or fuel spills into storm water drain or sewer, or into the surrounding natural environment. (13) Any contaminated storm water and other run-off from dirty areas to be disposed off in the suitably designed PCD's. (14) Any spill which may contaminate water must be treated according to the approved spill management procedure. (15) Contain oil or fuel spills in water using an approved oil absorbent fibre. (16) Grey water not deemed suitable for dust suppression must be disposed of with other waste water in the designated and suitably designed PCD. (17) Waste water as well as spilled fuel collected within bunded areas and refuelling areas shall be disposed of or treated as hazardous waste. (18) Avoid unnecessary alteration of drainage lines. (19) Avoid locating lay down areas, wash bays, workshops etc. within the 1:50 year flood line or within horizontal distance of 100 m (whichever is greater) of a water course. (20) Contain contaminated runoff from dirty areas (i.e. lay down areas, RoM and product stockpile areas, workshops, fuelling bays etc.) in suitable designed PCD's. (21) Contaminated runoff to be treated and re-used for processing water or dust suppression in dirty areas only when complying with legal requirements or water quality standards specified in the Water Use Licence. (22) Do not locate any ablution facilities, chemical toilets, sanitary convenience, septic tanks, or French drains within the 1:100 year flood line, or within a horizontal distance of 100 m (whichever is greater) of any watercourses. (23) Do not allow the use of any drainage line or wetland for swimming, bathing, or cleaning of clothing, tools or equipment. (24) Prevent the discharge of water containing polluting matter or visible suspended materials directly into drainage lines or streams. (25) Deflect any unpolluted water/runoff away from any dirty area. (26) Ensure that no storm water is allowed to enter any drainage installation for the reception, conveyance, storage, and or treatment of sewage. (27) Before any water is permitted to enter natural drainage lines, the quality of the water must comply with the standards contained within the Water Use Licensing conditions authorised by the DWAS. (28) Ensure water passing trough vehicle wash bays and workshops pass through oil separators before passing into conservancy tank. (29) Avoid unnecessary cutting roads through river, stream banks as this may lead to erosion causing siltation of streams and downstream dams. **Legal requirements:** (1) Obtain a Water Use Licence from the DWAS. **Specialist recommendations:**		

				Geohydrology – (1) Development of an environmental monitoring programme in order to monitor the groundwater quality and groundwater level changes up- and downstream of the proposed open cast mine workings. (2) Collected monitoring data (quarterly) may be used for future model updates (e.g. every second year). (3) A number of geosites (i.e. boreholes, springs and surface water drainages) and newly proposed boreholes were identified (refer to the Geohydrological report in **Appendix M**) to be included into a monthly/quarterly monitoring programme. (4) The parameters to be analysed should comprise the following: Physical-chemical parameters (pH, EC, TDS);Major anions (F, Cl, NO3, SO4, HCO3, NH4, PO4,);Major cations (K, Na, Mg, Ca, NH4,); and Other elements/metals (Fe, Mn, Zn, Pb, Co, Cr, Cr (VI),). (5) Emphasis should be placed on monitoring of groundwater levels prior mining and during the operation phase as well as to establish the origin of the elevated nitrate concentrations in the project area. (6) Recording of pit dewatering rates. Initial monthly (and later quarterly) sampling and analysis (major and trace elements) of pumped water. ***Hydrology –*** (1) A number of monitoring sample points have been identified in the Hydrological report (**Appendix L**). Additional sampling points have been recommended and should be included in the final water monitoring plan. (2) As part of the monitoring program going forward, samples should be taken monthly for at least the first year of operation. This can be revised to quarterly monitoring if no concerns are highlighted with the approval of DWAS. (3) The monitoring should include the standard analysis of major cations/anions as well as ICP scan for metals. (4) A conceptual storm water management plan (**Appendix L**) has been developed based on the requirements of GN R. 704 of the National Water Act of 1998. (5) Implementation of the guidance provided by the South African National Roads Agency Limited (SANRAL) drainage manual. This document provides guidance on maximum permissible velocities for grass covers to avoid erosion and should be consulted during the detailed design phase.		
8. Pollution Control Dams (PCD's) i.e. Construction and operation **10. Ablutions & change house with sewage treatment plant**	**Smell nuisance**	Construction & Operational		/***<u>Implementation of EMS</u>***: (1) Develop and maintain an Integrated Waste and Water Management Plan (IWWMP). (2) Frequent inspections of areas posing a possible risk of causing smell nuisance. (3) Development and implementation of an incident response plan. (4) Reporting and recording all related incidents according to a developed procedure. (5) Develop and implement an emergency preparedness plan. (6) Ensuring corrective and preventative actions are taken to address nonconformities. (7) Communicating findings of concern to I&AP.	(1) Develop and implement an Integrated Waste Water Management plan specifically addressing the management of sewage or chemical toilets. (2) Develop and implement a Infrastructure inspection programme to ensure no leaks or spillages of sewerage or waste. (3) Develop and implement a Waste Management plan.	Entire Life cycle of project

				On-site mitigation measures: (1) Putrescible waste must be handled, stored, and disposed of before the probability of it generating odours. (2) Chemical toilets must be emptied/ serviced on a regular basis. Proof of this must be obtained and kept on record. (3) Sewage tanks must be emptied on a regular basis. Proof of this must be obtained and kept on record.		
9.Stores, workshops &wash bays **11. Fuel operating power generators** **13. Fuel storage**	**Chemical Fires**	Construction & Operational		***Implementation of EMS***: (1) Develop and implement a Hazardous substances management plan. (2) Develop an emergency procedure addressing in particular the management of chemical fires and spill response. (3) Report and record all incidents related to chemical fires. (4) Employees must be trained on emergency response procedures required to counter the nature and hazards of an accidental release. (5) Employees must be familiar with and have received the appropriate training regarding the handling and storage practices, for all containers with which they will come into contact. (6) Document the types and amounts of hazardous materials present on the project site (including for example the name and description, classification, regulatory reporting threshold, quantities, characteristics, analysis of potential consequence, identification of location, details of responsible persons, detail of availability of spill response equipment etc.). (7) The emergency response procedure should describe response activities in the event of a spill, release, or other chemical emergency and include the internal and external notification procedure, specific responsibilities of individuals or groups, decision process for assessing severity of the release, and determining appropriate actions, facility evacuation routes, and post event activities such as clean-up and disposal, incident investigation, employee re-entry, and restoration of spill response equipment. (8) Procedures should be prepared for informing the public and emergency response agencies, documenting first aid and emergency medical treatment, taking emergency response actions, reviewing and updating the emergency response plan to reflect changes, and using, inspecting, testing, and maintaining the emergency response equipment. (9) Ensuring corrective and preventative actions are taken to address nonconformities. (10) Communicating findings of concern to I&AP. ***On-site mitigation measures:*** (1) Reactive, flammable, and explosive materials must be managed to avoid uncontrolled reactions or conditions resulting in fire or explosion. (2) Ensure storage of incompatible materials (acids, basis, flammables, oxidisers, reactive chemical) in separate areas, and with containment facilities separating material storage areas. (3) Ensure the provision of material-specific storage for extremely hazardous or reactive materials.	(1) Develop and implement a fire prevention plan that includes measures of prevention and response to chemical fires. (2) Develop an emergency preparedness procedure and include the process to be followed in case of a chemical fire. (3) Develop a Hazardous substances management plan. (4) Develop a frequent inspection programme to include inspections of hazardous substances storage facilities.	Entire Life cycle of project

				(4) Ensure the use of flame arresting devices on vents from flammable storage containers. (5) Ensure the provision of grounding and lightning protection. (6) Ensure the storage of hazardous materials in an area of the facility separated from the main authorised activities. (7) Ensure that all personnel that use or handle hazardous materials are trained in the use and potential dangers of the materials. (8) Implement all measures detailed in the spill prevention procedure in the event of a spill. (9) Prevent uncontrolled releases of hazardous materials to the environment or uncontrolled reactions that might result in fire or explosion using engineering controls (containment, automatic alarms, and shut-off systems) commensurate with the nature of hazard. (10) Implement management controls (procedures, inspections, communications, training, and drills) to address residual risks that have not been prevented or controlled through engineering measures. (11) Store all hazardous (reactive, flammable, corrosive and toxic) materials in clearly identified, fit-for-purpose containers or vessels. (12) Chemical products must be secured when not needed to prevent tampering and vandalism. (13) Provide warning notices, fire fighting facilities and protection from weather damage. (14) Each shift supervisor or safety officer is to report on the integrity of the hazardous material storage. (15) Keep products in their original container (unless they are not re-sealable) with all stored products and containers being labelled, and original labels and MSDS retained. (16) Label containers so that the hazard nature of the material is clear. (17) Obtain Material Safety Data Sheets (MSDS) for all chemicals before use and all materials must be handled according to the instructions. (18) Transporters of hazardous materials must ensure that the vehicle is suitable and registered for the purpose it is being used. (19) Transport vehicles must display clear markings in English indicating the nature of the materials being carried, what to do in the event of an emergency, and an emergency telephone number (24 hour) of a responsible person who can provide advice in the event of an emergency. (20) No combustible material (e.g. wood, rags, carton boxes, etc.) are to be kept in the presence of flammable liquids. (21) "No Open Flames" and "No smoking" symbolic signs are to be displayed in the vicinity of the flammable liquid storage areas. (22) Flammable liquids are to be issued only on a need-to-use-basis and strict control is to be exercised to ensure that persons do not draw more than what is needed for the specific job. (23) All cables are to be grounded as appropriate. (24) An adequate number (according to safety regulations) and type of fire fighting equipment is to be available in the close vicinity of the flammable liquid store. (25) Flammable liquid stores are to be well ventilated and free of explosive vapours. (26) Flammable liquid containers in stores are to be clearly marked or labelled as to their contents.		

				(27) Locations are to support MSDS information and handling/storage instructions. (28) Flammable liquid tanks are to be properly earthed in order to prevent static electricity accumulating. (29) Drainage points on flammable liquid tanks are to be provided with threaded caps or blanking plates. (30) Bund walls are to surround storage tanks containing flammable liquids and these must be able to contain the entire volume of the contents plus 10% in case of spillage. (31) Earting is to be tested regularly (according to safety regulations). ***Legal requirements***: (1) Bulk storage facilities of flammable liquids to be approved by the provincial fire inspector. (2) Section 30 of the National Environmental Management Act (NEMA), Act 107 of 1998 describes measures to be taken to control emergency incidents. These requirements should be included in the development of the Emergency Response procedure. (3) Section 20 of the National Water Act 36 of 1998 describes the procedure for the control of incidents involving Hazardous substances. These requirements should also be included in the Emergency response procedure. (4) GN R. 1237 published under the Mine Health and Safety Act of 1996 describes the requirements for the storage of hazardous substances. These requirements should be incorporated into the Hazardous substances management plan. (5) Section 21 of the Mine Health and safety Act of 1996 describes the requirements for the acquisition of Hazardous chemicals. These requirements should be considered as part of the mine acquisition process. (6) Regulation 277, 273, and 279 of GN R. 225 of the National Road traffic Act of 1996 describes the requirements of transporting hazardous waste. These requirements should be incorporated in both the Hazardous substances management plan and the Waste Management plan. (7) Regulation 277 and 273 of GN R. 225 of the National Road traffic Act of 1996 describes the Loading and offloading of dangerous goods. These requirements should be addressed in the Hazardous substances management plan. (8) All requirements described in the Hazardous substance Act of 1973 should be included in the Hazardous substances management plan. (9) The storage of hazardous substances must be in compliance with regulation 4 of GN R. 704 of the National Environmental Management Act. (10) Requirements stipulated in SANS 10089-1:2008 (above ground storage facilities for petroleum products) must be incorporated into the Hazardous Substance Management plan and be implemented on site. (11) Requirements stipulated by SANS 301: 2011 (Storage tank facilities for hazardous chemicals) must be incorporated into the Hazardous Substance Management plan and be implemented.		
12. Lighting	**Light pollution**	Construction &		***Implementation of EMS:***	(1) Biennial investigation of the impact of Light	Entire Life cycle of project

		Operational		(1) Monitor the affects of possible light pollution. ***On-site mitigation measures:*** (1) Promote the usage of light sources with a high luminous effectiveness. (2) Promoting the usage of full cut-off lighting fixtures. (3) On-site lights to be spaced appropriately for maximum efficiency. (4) Ensure that the number of luminaries being used as well as the wattage of each laminar match the needs of the particular application (based on local lighting design standards). (5) Ensure that during nighttimes only essential lights are switched on. ***Specialist recommendations:*** ***Bat survey -*** (1) Erect security lights/spot lights only near infrastructure/where absolutely necessary. (2) Mitigate night time noise to as low as possible, particularly during peak foraging times. (3) Restrict blasting activities to daytime hours.	pollution to nocturnal species.	
13. Fuel storage	**Emission of noxious fumes**	Construction & Operational		***Implementation of EMS***: (1) Develop and implement a Health and Safety management plan addressing the proper storage, management, handling, and transport of hazardous substances. **(2)** All personnel to be trained in the handling, storage, management, and transport of hazardous substances. ***On-site mitigation measures:*** **(1)** All personnel should wear issued PPE at all times as indicated by safety signs. **(2)** Fuel storage facilities should be inspected on a regular basis. **(3)** Facilities should be well ventilated. **(4)** Spill prevention measures to be implemented at all times. **(5)** Fire fighting equipment such as fire extinguishers should be made available and be inspected on a regular basis. **(6)** A spill kit should be made available at all time. **(7)** All spills to be cleaned immediately. **8)** Storage facilities should be inspected on a regular basis. **(9)** All leaks to be repaired immediately. ***Legal requirements***: (1) Bulk storage facilities of flammable liquids to be approved by the provincial fire inspector. (2) Section 30 of the National Environmental Management Act (NEMA), Act 107 of 1998 describes measures to be taken to control emergency incidents. These requirements should be included in the development of the Emergency Response procedure. (3) Section 20 of the National Water Act 36 of 1998 describes the procedure for the control of incidents involving Hazardous substances. These requirements should also be included in the Emergency response procedure. (4) GN R. 1237 published under the Mine Health and Safety Act of 1996 describes the requirements	(1) Develop and implement a Hazardous substance management plan addressing adherence to applicable SANS standards for the storage of fuel. (2) Develop and implement a infrastructure inspection schedule and programme and include the inspections of fuel storage facilities. (3) Develop and implement a Health and Safety Management plan. (4) Develop an Emergency preparedness plan addressing prevention and mitigation of incidents.	Entire Life cycle of project

				for the storage of hazardous substances. These requirements should be incorporated into the Hazardous substances management plan. (5) Section 21 of the Mine Health and safety Act of 1996 describes the requirements for the acquisition of Hazardous chemicals. These requirements should be considered as part of the mine acquisition process. (6) Regulation 277, 273, and 279 of GN R. 225 of the National Road traffic Act of 1996 describes the requirements of transporting hazardous waste. These requirements should be incorporated in both the Hazardous substances management plan and the Waste Management plan. (7) Regulation 277 and 273 of GN R. 225 of the National Road traffic Act of 1996 describes the Loading and offloading of dangerous goods. These requirements should be addressed in the Hazardous substances management plan. (8) All requirements described in the Hazardous substance Act of 1973 should be included in the Hazardous substances management plan. (9) The storage of hazardous substances must be in compliance with regulation 4 of GN R. 704 of the National Environmental Management Act. (10) Requirements stipulated in SANS 10089-1:2008 (above ground storage facilities for petroleum products) must be incorporated into the Hazardous Substance Management plan and be implemented on site. (11) Requirements stipulated by SANS 301: 2011 (Storage tank facilities for hazardous chemicals) must be incorporated into the Hazardous Substance Management plan and be implemented. ***Specialist recommendations***: (1) Development of a detailed air quality management plan (focusing on sources of dust located in close proximity to the residential receptors within the project boundary) ensuring adherence to thresholds stipulated in the Baseline Air Quality Impact Assessment report (BAQIAR) (**Appendix E**) prior to the commencement of operations. (2) Controls to reduce emissions from unpaved roads can include vehicle restrictions which limit the speed, weight and number of vehicles on the road, surface improvements (paving or adding gravel to the road), and surface treatments (wet suppression or surface treatments). (3) Implement strict vehicle restrictions such as speed limits, weight and number of trucks on the road per given time (4) Hauling activities should be strictly restricted to designated hauling routes. (5) Regular maintenance of the vehicles/trucks (engines) should be undertaken to ensure optimal efficiency of the engine. (6) Regular inspections should be carried out on the vehicles/trucks (engines, tyres, etc.) and the route to ensure both are in good quality. (7) Engines of the trucks should not be left running whilst not in use. (8) Clean fuels and fuel efficient vehicles/trucks/mobile equipment should be considered for use where possible.		

14. Employment of workers and procurement of construction materials.	**Loss of farm labour**	Construction & Operational		***Implementation of EMS:*** (1) Develop and implement a social labour plan. ***On-site mitigation measures:*** (1) During community engagement/information dissemination, emphasis must be placed on the fact that permanent employment is directly related to the feasibility of the mine operations. (2) Strict adherence to Labour legislation (in terms of the employment of minors etc.) must at all times be made. ***Legal requirements:*** (1) Adherence with the South African Employment act of 2002.	(1) Develop and implement a Social Labour plan as defined by the MRPDA. (2) Develop and implement a grievance lodging procedure.	Entire Life cycle of project
	Population Influx – Pressure on Resources	Construction & Operational		***Implementation of EMS***: (1) Develop and implement a social labour plan. ***On-site mitigation measures:*** (1) The employment of local labour to be promoted. (2) Ensure housing of employees on existing infrastructures. ***Specialist recommendations***: (1) Reduce overcrowding by collaborating with relevant departments on housing requirements i.e. total square meters v.s number of rooms, indoor cooking practices, etc. (2) Improve vaccination coverage by collaborating with the relevant departments on awareness creation around vaccination to communicable diseases for vulnerable sub-populations such as children and old people. (3) Reduce the prevalence of communicable diseases by collaborating with relevant departments, schools for awareness creation and improved understanding of factors exacerbating communicable diseases, including coping strategies that result in behaviour change. (4) Improve capacity of health services by: (4.1) collaborating with clinics to identify opportunities for assisting with health services, specifically in terms of resources and maintenance issues; (4.2) On-site health facility operational at the onset of construction; (4.3) Assisting with the development of health-effect prevention plan to increase community resilience by improving coping capability reducing exposure and reducing susceptibility of vulnerable sub-populations.	(1) Develop and implement a Social Labour plan as defined by the MRPDA. (2) Develop and implement a grievance lodging procedure.	Entire Life cycle of project
	Population Influx – Social Pathologies	Construction & Operational		**Implementation of EMS**: (1) Develop and implement a social labour plan. (2) Develop a grievance reporting procedure. **On-site mitigation measures:** (1) Implement HIV/AIDS and substance abuse awareness. (2) Make HIV/AIDS/STD prevention programmes a condition of contract for suppliers/sub-contractors. (3) Control access at site to prevent the presence of sex workers.	(1) Develop and implement a Social Labour plan as defined by the MRPDA. (2) Develop and implement a grievance lodging procedure.	Entire Life cycle of project

				(4) Establish clear rules and regulations for access to the mine site. (5) Work with local health service providers to provide services and health surveys also on substance abuse. (6) Establish liaison structures with local police and local community policing forums. **Specialist recommendations**: (1) Reduce substance abuse and bad moral choices by conducting substance-abuse prevention education programmes. (2) Establish appropriate recreation facilities, taking special cognisance of workers without families. (3) Prevent transmission, reduce prevalence and mitigate the effects of STD's by developing an awareness and prevention campaign targeting the work force. Include requirements for case finding and treatment of curable STI's. (4) Develop a peer educator's programme that includes the distribution of condoms and provision of Voluntary Counselling and testing. (5) Increase awareness about lifestyle diseases by providing educational hand-outs for use in local clinics and schools. (6) Reduce the adverse impacts of non-communicable diseases in the workforce by providing programmes to support the psychosocial, emotional and mental health of the workforce. These programmes to include the screening for cancer, diabetes, and high blood pressure. (7) Develop an awareness programme on lifestyle behaviours including eating habits, exercise, and responsible social choices.		
	Population Influx – Community Conflict	Construction & Operational		***Implementation of EMS:*** (1) Develop and implement a social labour plan. (2) Develop and implement a social development plan. (3) Develop and implement a skills development program. ***On-site mitigation measures:*** (1) Promote an open and honest relationship with the local community. (2) Ensure the employment of local labour force and service providers or sub-contractors. (3) Promote community involvement through supporting local development projects. ***Specialist recommendations:*** (1) Improve social cohesion in the community by collaborating with the authorities to establish a system to monitor violence and assess community cohesion related to project activities. (2) Conduct violence-prevention education programmes.	(1) Develop and implement a Social Labour plan as defined by the MRPDA. (2) Develop and implement a grievance lodging procedure.	Entire Life cycle of project
	Health and Safety of employees	Construction & Operational		**Implementation of EMS:** (1) Develop and implement a Health and Safety plan. (2) All employees to be trained in health and safety in the work place. (3) Develop and implement an employee training program. (4) Keep and maintain a record of all training of employees.	(1) Develop and implement a Health and Safety Management plan.	Entire Life cycle of project

				<u>On-site mitigation measures:</u> (1) Ensure compliance to the relevant Occupational Health and safety act and regulations. (2) All employees or sub-contractors entering site must be inducted to ensure the awareness of the developed health and safety plan. (3) A health and safety representatives to be appointed. (4) Regular inspections and observations of on-site activities shall take place. (5) All incidents to be reported, recorded, investigated, and mitigated. (6) Where required, adequate safety requirements for all areas to be clearly indicated. (7) Employees or sub-contractors must be informed as to what required PPE is applicable in working sections. (8) All site personnel and cub-contractors to be fully equipped with appropriate PPE at all times. (9) Safety signs to be provided in areas considered as high risk zones. (10) Adequate first aid services must be provided. (11) Ongoing health and safety awareness campaigns must be promoted. **<u>Legal requirements:</u>** (1) Development of a Mine Health and Safety Management plan in accordance with the following legislation: • Occupational Health and Safety Act of 2004; and • Mine Health and safety Act of 1996. **<u>Specialist recommendations:</u>** (1) Increase awareness on safety by presenting Awareness training and education on safety risks potentially experienced by employees that are associated with overcrowding including, paraffin poisoning, fires, burns, road safety. (2) Involvement in awareness campaigns at schools about traffic safety, paraffin, pesticide and domestic fuel-use safety. (3) Reduce injuries on site by managing access control to site. (4) All personnel or visitors to be trained on safety issues before entering site. (5) Reduce occupational sources of injuries and accidents by providing training and regular refresher courses for employees on safety issues. (6) Adhere to the Occupational and Mine Health and safety acts. (7) Form a Safety and health forum to discuss success and failure. These forums meetings to be held on a regular basis.		
	Job Creation and Skills Training	Construction & Operational		***<u>Implementation of EMS</u>***: (1) Develop and implement a social labour plan. (2) Develop a grievance reporting procedure. ***<u>On-site mitigation measures:</u>*** (1) Maximise and monitor local recruitment where required. (2) Consult local labour recruitment offices.	(1) Develop and implement a Social Labour plan as defined by the MRPDA. (2) Develop and implement a grievance lodging procedure.	Entire Life cycle of project

				(3) Prevent nepotism/corruption in local recruitment structures. (4) Promote employment of women and youth. (5) Train locally-recruited construction workers for longer-term employment where possible. (6) Development of a register of local SMMEs. (7) Linkages with skills development/ SMME development institutions. (8) Explore opportunities for collaboration with other mining/electricity enterprises on LED/CSR projects. (9) Support economic diversification through development of alternative markets. (10) Collaborate with adjacent mining companies to develop and implement sustainable community projects. ***Specialist recommendations***: (1) Improving financial skills in employees and extended families, and community by conducting socio-economic education programmes and teaching financial skills.		
	Job Creation (Multiplier affect) and Population Influx	Construction & Operational		***Implementation of EMS***: (1) Develop and implement a social labour plan. (2) Develop a grievance reporting procedure. ***On-site mitigation measures:*** (1) Maximise and monitor local recruitment where required. (2) Consult local labour recruitment offices. (3) Prevent nepotism/corruption in local recruitment structures. (4) Promote employment of women and youth. (5) Train locally-recruited construction workers for longer-term employment where possible. (6) Development of a register of local SMMEs. (7) Linkages with skills development/ SMME development institutions. (8) Explore opportunities for collaboration with other mining/electricity enterprises on LED/CSR projects. (9) Support economic diversification through development of alternative markets. (10) Collaborate with adjacent mining companies to develop and implement sustainable community projects.	(1) Develop and implement a Social Labour plan as defined by the MRPDA. (2) Develop and implement a grievance lodging procedure.	Entire Life cycle of project
Operational Phase						
17. Employment of workers	**Loss of farm labour**	Construction & Operational		***Implementation of EMS:*** (1) Develop and implement a social labour plan. ***On-site mitigation measures:*** (1) During community engagement/information dissemination, emphasis must be placed on the fact that permanent employment is directly related to the feasibility of the mine operations. (2) Strict adherence to Labour legislation (in terms of the employment of minors etc.) must at all times be made.	(1) Develop and implement a Social Labour plan as defined by the MRPDA. (2) Develop and implement a grievance lodging procedure.	Entire Life cycle of project

				Legal requirements: (1) Adherence with the South African Employment act of 2002.		
	Population Influx – Pressure on Resources	Construction & Operational		***Implementation of EMS****:* (1) Develop and implement a social labour plan. ***On-site mitigation measures:*** (1) The employment of local labour to be promoted. (2) Ensure housing of employees on existing infrastructures. ***Specialist recommendations****:* (1) Reduce overcrowding by collaborating with relevant departments on housing requirements i.e. total square meters v.s number of rooms, indoor cooking practices, etc. (2) Improve vaccination coverage by collaborating with the relevant departments on awareness creation around vaccination to communicable diseases for vulnerable sub-populations such as children and old people. (3) Reduce the prevalence of communicable diseases by collaborating with relevant departments, schools for awareness creation and improved understanding of factors exacerbating communicable diseases, including coping strategies that result in behaviour change. (4) Improve capacity of health services by: (4.1) collaborating with clinics to identify opportunities for assisting with health services, specifically in terms of resources and maintenance issues; (4.2) On-site health facility operational at the onset of construction; (4.3) Assisting with the development of health-effect prevention plan to increase community resilience by improving coping capability reducing exposure and reducing susceptibility of vulnerable sub-populations.	(1) Develop and implement a Social Labour plan as defined by the MRPDA. (2) Develop and implement a grievance lodging procedure.	Entire Life cycle of project
	Population Influx – Social Pathologies	Construction & Operational		**Implementation of EMS**: (1) Develop and implement a social labour plan. (2) Develop a grievance reporting procedure. **On-site mitigation measures:** (1) Implement HIV/AIDS and substance abuse awareness. (2) Make HIV/AIDS/STD prevention programmes a condition of contract for suppliers/sub-contractors. (3) Control access at site to prevent the presence of sex workers. (4) Establish clear rules and regulations for access to the mine site. (5) Work with local health service providers to provide services and health surveys also on substance abuse. (6) Establish liaison structures with local police and local community policing forums. **Specialist recommendations**: (1) Reduce substance abuse and bad moral choices by conducting substance-abuse prevention education programmes.	(1) Develop and implement a Social Labour plan as defined by the MRPDA. (2) Develop and implement a grievance lodging procedure.	Entire Life cycle of project

				(2) Establish appropriate recreation facilities, taking special cognisance of workers without families. (3) Prevent transmission, reduce prevalence and mitigate the effects of STD's by developing an awareness and prevention campaign targeting the work force. Include requirements for case finding and treatment of curable STI's. (4) Develop a peer educator's programme that includes the distribution of condoms and provision of Voluntary Counselling and testing. (5) Increase awareness about lifestyle diseases by providing educational hand-outs for use in local clinics and schools. (6) Reduce the adverse impacts of non-communicable diseases in the workforce by providing programmes to support the psychosocial, emotional and mental health of the workforce. These programmes to include the screening for cancer, diabetes, and high blood pressure. (7) Develop an awareness programme on lifestyle behaviours including eating habits, exercise, and responsible social choices.		
	Population Influx – Community Conflict	Construction & Operational		***Implementation of EMS:*** (1) Develop and implement a social labour plan. (2) Develop and implement a social development plan. (3) Develop and implement a skills development program. ***On-site mitigation measures:*** (1) Promote an open and honest relationship with the local community. (2) Ensure the employment of local labour force and service providers or sub-contractors. (3) Promote community involvement through supporting local development projects. ***Specialist recommendations:*** (1) Improve social cohesion in the community by collaborating with the authorities to establish a system to monitor violence and assess community cohesion related to project activities. (2) Conduct violence-prevention education programmes.	(1) Develop and implement a Social Labour plan as defined by the MRPDA. (2) Develop and implement a grievance lodging procedure.	Entire Life cycle of project
	Health and Safety of employees	Construction & Operational		**Implementation of EMS:** (1) Develop and implement a Health and Safety plan. (2) All employees to be trained in health and safety in the work place. (3) Develop and implement a employee training program. (4) Keep and maintain a record of all training of employees. **On-site mitigation measures:** (1) Ensure compliance to the relevant Occupational Health and safety act and regulations. (2) All employees or sub-contractors entering site must be inducted to ensure the awareness of the developed health and safety plan. (3) A health and safety representatives to be appointed. (4) Regular inspections and observations of on-site activities shall take place. (5) All incidents to be reported, recorded, investigated, and mitigated.	(1) Develop and implement a Health and Safety Management plan.	Entire Life cycle of project

				(6) Where required, adequate safety requirements for all areas to be clearly indicated. (7) Employees or sub-contractors must be informed as to what required PPE is applicable in working sections. (8) All site personnel and cub-contractors to be fully equipped with appropriate PPE at all times. (9) Safety signs to be provided in areas considered as high risk zones. (10) Adequate first aid services must be provided. (11) Ongoing health and safety awareness campaigns must be promoted. **Legal requirements:** (1) Development of a Mine Health and Safety Management plan in accordance with the following legislation: • Occupational Health and Safety Act of 2004; and • Mine Health and safety Act of 1996. **Specialist recommendations:** (1) Increase awareness on safety by presenting Awareness training and education on safety risks potentially experienced by employees that are associated with overcrowding including, paraffin poisoning, fires, burns, road safety. (2) Involvement in awareness campaigns at schools about traffic safety, paraffin, pesticide and domestic fuel-use safety. (3) Reduce injuries on site by managing access control to site. (4) All personnel or visitors to be trained on safety issues before entering site. (5) Reduce occupational sources of injuries and accidents by providing training and regular refresher courses for employees on safety issues. (6) Adhere to the Occupational and Mine Health and safety acts. (7) Form a Safety and health forum to discuss success and failure. These forums meetings to be held on a regular basis.		
	Job Creation and Skills Training	Construction & Operational		***Implementation of EMS***: (1) Develop and implement a social labour plan. (2) Develop a grievance reporting procedure. ***On-site mitigation measures:*** (1) Maximise and monitor local recruitment where required. (2) Consult local labour recruitment offices. (3) Prevent nepotism/corruption in local recruitment structures. (4) Promote employment of women and youth. (5) Train locally-recruited construction workers for longer-term employment where possible. (6) Development of a register of local SMMEs. (7) Linkages with skills development/ SMME development institutions. (8) Explore opportunities for collaboration with other mining/electricity enterprises on LED/CSR projects.	(1) Develop and implement a Social Labour plan as defined by the MRPDA. (2) Develop and implement a grievance lodging procedure.	Entire Life cycle of project

				(9) Support economic diversification through development of alternative markets. (10) Collaborate with adjacent mining companies to develop and implement sustainable community projects. ***Specialist recommendations***: (1) Improving financial skills in employees and extended families, and community by conducting socio-economic education programmes and teaching financial skills.		
	Job Creation (Multiplier affect) and Population Influx	Construction & Operational		***Implementation of EMS***: (1) Develop and implement a social labour plan. (2) Develop a grievance reporting procedure. ***On-site mitigation measures:*** (1) Maximise and monitor local recruitment where required. (2) Consult local labour recruitment offices. (3) Prevent nepotism/corruption in local recruitment structures. (4) Promote employment of women and youth. (5) Train locally-recruited construction workers for longer-term employment where possible. (6) Development of a register of local SMMEs. (7) Linkages with skills development/ SMME development institutions. (8) Explore opportunities for collaboration with other mining/electricity enterprises on LED/CSR projects. (9) Support economic diversification through development of alternative markets. (10) Collaborate with adjacent mining companies to develop and implement sustainable community projects.		Entire Life cycle of project
18.Topsoil and subsoil stripping & stockpiling for mining operation area **19.Opencast mining excavations** **20.Drilling & Blasting** **21. RoM & product stockpiling** **22. Residue stockpiles** **23. Screening Operations**	**Dust generation**	Construction		***Implementation of EMS:*** (1) Development of a dust fallout monitoring plan. (2) Frequent Inspections of areas prone to dust generation. (3) Reporting and recording incidents related to air quality. (4) Ensuring corrective and preventative actions are taken to address nonconformities. (5) Communicating findings of concern to I&AP. ***On-site mitigation measures:*** (1) Construction activities to take place under the supervision of an environmental representative (2) Set the on-site speed limit to 40km/h for gravel roads and 50km/h for tar roads. (3) Develop and implement a dust suppression schedule. (4) Biodegradable and environmentally friendly flocculent (approved by the environmental control officer/environmental officer/ SHEQ officer) may be used as dust suppressant. (5) Wetting of stockpile areas. (6) Covering loads with tarpaulin when transporting ROM, product, or any material in order to prevent dust generation.	(1) Development and implementation of a Dust management plan as part of a Air quality management plan to including the monitoring and prevention programme. (2) Ensuring compliance with the National Environmental Management: Air Quality Act (NEMAQA), No. 39 of 2004 as amended by Act no 20 of 2014. (3) Ensure activities remain under the thresholds stipulated in GNR 893 (in terms of section 21 of NEMAQA. (4) Register online to the National Atmospheric Emissions Inventory System (NAEIS) in terms of the National Reporting Regulations (GNR 283) as Group C emitters.	Entire Life cycle of project

24. Discard disposal (backfilling of mining area) **30. Vehicular activity on haul roads; and operation of mining equipment** **31. Bulk transporting of Ore to market on Public roads**				(7) Disturbed areas no longer used for mining related activities shall be re-vegetated immediately. (8) Areas having to be stripped of topsoil for construction purposes must be kept to a minimum and only stripped when work is about to take place. ***Legal requirements:*** (1) Register online to the National Atmospheric Emissions Inventory System (NAEIS) in terms of the National Reporting Regulations (GNR 283) as Group C emitters. (2) Ensuring compliance with the National Ambient Air Quality Standards (GNR 1210 of 24 December 2009). (3) Ensuring compliance with the National Dust Control regulations (GNR 897 of November 2013). (4) Section 39 of the Atmospheric Pollution Prevention Act of 1965 and GN R. 1651 specifies requirements regarding the control of emissions from diesel vehicles used on public roads. These requirements should form part of the Air quality Management Plan and the Vehicle/Plant/Equipment maintenance plan.. ***Specialist recommendations:*** (1) Development of a detailed air quality management plan (focusing on sources of dust located in close proximity to the residential receptors within the project boundary) ensuring adherence to thresholds stipulated in the Baseline Air Quality Impact Assessment report (BAQIAR) (**Appendix E**) prior to the commencement of operations. (2) Implementation of recommended dust control methods as stipulated in Table 6-1 of the BAQIAR (**Appendix E**). (3) Dust generated from material handling operations and mining operations can be significantly reduced by wet suppression with the use of water sprays. (4) The combined use of water sprays with chemical surfactants provide more extensive wetting making it a more affective technique than water suppression alone. (5) The loading, transfer, and discharge of materials should take place with a minimum height of fall and be shielded against the wind. (6) Controls to reduce emissions from unpaved roads can include vehicle restrictions which limit the speed, weight and number of vehicles on the road, surface improvements (paving or adding gravel to the road), and surface treatments (wet suppression or surface treatments). (7) All positive and negative effects of the different methods of dust suppression should be considered and the best feasible and successful option must be implemented. (8) Wind erosion from stockpiles and open areas can be minimised through the use of water sprays, wind breaks, vegetation and enclosures. (9) Implement strict vehicle restrictions such as speed limits, weight and number of trucks on the road per given time (10) Hauling activities should be strictly restricted to designated hauling routes. (11) Regular maintenance of the vehicles/trucks (engines) should be undertaken to ensure optimal efficiency of the engine. (12) Regular maintenance of hauling routes and surface improvements (where necessary) should be	(5) Ensuring compliance with the National Ambient Air Quality Standards (GNR 1210 of 24 December 2009) (6) Ensuring compliance with the National Dust Control regulations (GNR 897 of November 2013)	

				undertaken. (13) Regular sweeping and cleaning of tarred/paved road surfaces to prevent the accumulation of dust (14) Immediate clean-up of any spillage of material on the hauling routes. (15) Regular inspections should be carried out on the vehicles/trucks (engines, tyres, etc.) and the route to ensure both are in good quality. (16) All material transported should be covered, where possible, and not left exposed during transportation. (17) Engines of the trucks should not be left running whilst not in use. (18) Clean fuels and fuel efficient vehicles/trucks/mobile equipment should be considered for use where possible. (19) Designated areas for the storage of overburden should be considered and incorporated into the design. (20) Monthly dust fallout monitoring as per the National Dust Control Regulations (2013) and reporting. (21) Monthly PM10 and PM2.5 ambient monitoring and reporting. This is also recommended to obtain baseline concentrations. (22) All main hauling roads should be treated for dust suppression to maintain at least 65% emission reduction efficiency.		
18.Topsoil and subsoil stripping & stockpiling for mining operation area **19.Opencast mining excavations** **21. RoM & product stockpiling** **22. Residue stockpiles**	**Alteration of the visual environment and topography**	Construction		***Implementation of EMS***: (1) Record keeping of the topography and environmental state before the commencement of any activities. (2) Development of Mine Rehabilitation, decommissioning and mine closure liability Plan in compliance with GN R. 1147 of NEMA. ***On-site mitigation measures***: (1) Limit site clearance to approved areas. (2) Re-vegetate, with indigenous and non-invasive species, all cleared or rehabilitated areas immediately. (3) During rehabilitation ensure that the topography is reinstated as close as possible to the state before commencement of any activities. **Legal requirements**: (1) GN R. 1147 of NEMA requires the following documents as part of the authorisation process: (1.1) A annual rehabilitation plan; (1.2) A final rehabilitation, decommissioning and mine closure plan; and (1.3) An environmental risk assessment report.	(1) Mine plan in accordance with the MPRDA Regulation 56 section (1) to (8). (2) Adherence to the finalised approved lay out plan. (3) Development of Mine Rehabilitation, decommissioning and mine closure liability Plan in compliance with GN R. 1147 of NEMA.	Rehabilitation and Decommissioning
18.Topsoil and subsoil stripping & stockpiling for mining operation	**Degradation of soil resources**	Construction & Operational		***Implementation of EMS***: (1) Develop and implement a soil conservation and stockpile management plan. (2) Frequent Inspections of areas prone to degradation.	(1) Development of a soil conservation management plan. (2) Development of a storm water management	Entire Life cycle of project

area **19.Opencast mining excavations** **20.Drilling & Blasting** **21. RoM & product stockpiling** **22. Residue stockpiles** **23. Screening Operations** **24. Discard disposal (backfilling of mining area)** **25. Waste generation, storage and disposal** **26. Chemical Toilets** **29. Storage of fuel and lubricants in temporary facilities** **33. Rehabilitation of mining areas**				(3) Reporting and recording incidents related to degradation of soil resources. (4) Ensuring corrective and preventative actions are taken to address nonconformities. (5) Communicating findings of concern to I&AP. (6) Development of Mine Rehabilitation, decommissioning and mine closure liability Plan in compliance with GN R. 1147 of NEMA. ***<u>On-site mitigation measures</u>***: (1) All areas to be stripped firstly of topsoil and fertile soils and stockpiled in a designated area. (2) Do not mix sub-soil with topsoil and fertile soils. (3) Topsoil and fertile soil to be protected from contamination (i.e. hydrocarbons or infertile material). (4) Topsoil and fertile soil stockpiles to be protected from weathering conditions such as covering the stockpiles with indigenous, non-invasive vegetation. (5) Avoid stockpiling topsoil and fertile soil stockpiles within drainage lines or within the 1:10 year flood lines. (6) Implement storm water control measures on topsoil and fertile soil stockpiles. (7) Exposed areas to be re-vegetated with indigenous or non-invasive species or protected from erosion. (8) Rehabilitation of areas after the completion of works to take place as soon as possible. (9) Avoid over exposing un-vegetated areas as far as possible. ***<u>Legal requirements:</u>*** (1) Section 28 of NEMA relates to the duty of care and remediation of environmental damage. (2) The Conservation of Agriculture Resources Act (Act no. 107 of 1998) requires the protection of land against soil erosion and the prevention of water logging and silinization of soils by means of suitable soil conservation works to be constructed and maintained. These requirements should form part of the Soil Conservation and Stockpile management plan. ***<u>Specialist recommendations</u>***: (1) Strip all usable soil, irrespective of soil depth. (2) Implement live placement of soil where possible, improve organic status of soils, maintain fertility levels and curb topsoil loss. (3) Implement surface digital terrain mapping to ensure surface water control measures are implemented to ensure free draining system with minimal soil erosion. (4) Loss of agricultural land due to establishment of infrastructure is a long term loss and no mitigation measures exist. Mitigation is restricted to limitation of extent of impact to the immediate area of impact and minimisation of off-site impacts. (5) Loss of agricultural land due to opencast mining is a temporary loss which can be mitigated by appropriate backfilling and re-placement of stockpiled topsoil. If done correctly, most of the original agricultural potential will be restored. (6) An Environmental Coordinator must manage environmental impacts in coordination with construction and operation schedule. (7) In the event that contractors are to be appointed these contractors to sign and undertake	plan. (3) Development and implementation of vehicle/plant/equipment maintenance plan with specific reference to daily inspections of plant/vehicles/equipment for leaks or breakages.	

				environmental compliance. (8) Keep disturbed areas and stockpiles to minimum to prevent soil loss. (9) Identify suitable areas to stockpile stripped soil. (10) Prevent surface runoff and seepage on site from contaminating stockpiled soils and stripped areas. (11) Minimise soil erosion through wind and water (12) Remediate and rehabilitate disturbed areas in accordance with development plan		
18.Topsoil and subsoil stripping & stockpiling for mining operation area **19.Opencast mining excavations** **21. RoM & product stockpiling** **22. Residue stockpiles** **33. Rehabilitation of mining areas**	**Vegetation and habitat loss**	Construction & Operational		***Implementation of EMS***: (1) Development of Mine Rehabilitation, decommissioning and mine closure liability Plan in compliance with GN R. 1147 of NEMA. (2) Develop and implement a plant species search and rescue management plan. (3) Regular inspection of sensitive areas. (4) A soil conservation and stockpiling plan to be developed and implemented. (5) Reporting and recording incidents related to unnecessary clearance of vegetation. (6) Ensuring corrective and preventative actions are taken to address nonconformities. (7) Communicating findings of concern to I&AP. (8) Record keeping of all removed/relocated species. ***On-site mitigation measures***: (1) Avoid clearing areas outside the development footprint. (2) Avoid development in sensitive environments such as areas within pristine or valuable ecological significance. (3) Before the commencement of any vegetation clearance, a search and rescue operation should take place identifying possible protected species as well as indigenous species. (4) An area should be identified to re-instate protected and indigenous areas. (5) If feasible an onsite nursery should be established and maintained. ***Legal requirements***: (1) Section 28 of NEMA describes the duty of care and remediation of environmental damage. (2) A number of the proposed activities fall within or within close proximity to the Sekhukhune Centre of Endemism. Working outside the authorised footprints would require additional authorisation in terms of NEMA and The National Environmental Management: Biodiversity Act (NEMBA) of 2002. (3) The removal or disturbance of listed protected species in terms of NEMBA, the Limpopo Environmental Management Act of 2003, and the National Forest Act of 1998 would require a permit. ***Specialist recommendations:*** ***Terrestrial Ecology –*** (1) Prior to any new area being impacted by the mine, that area and a suitable buffer will have to be delineated and activities have to be preceded by a very thorough walkthrough, conducted between January and April, followed by the necessary plant Search and Rescue operations where applicable. (2) ***Themeda triandra – Diheteropogon amplectens Grasslands*** ***(High sensitivity rating – Avoid***	(1) Develop a plant species search and rescue management plan. (2) Development of Mine Rehabilitation, decommissioning and mine closure liability Plan in compliance with GN R. 1147 of NEMA. (3) Develop and implement a soil conservation management plan. (4) Apply for permits to remove protected species (provincial and national).	Entire Life cycle of project

				as far possible) (2.1) Development in Grasslands should be limited to the absolute minimum, aiming for minimal to no alteration of the habitat configuration. (2.2) If some of these habitats are impacted or will be altered by the proposed development, all development must be preceded by a thorough footprint investigation followed by a Search and Rescue operation for all plants of conservation concern. (2.3) Components of the proposed development that should under no circumstance be located in this vegetation would include: (2.3.1) Buildings and/or ablution facilities; (2.3.2) Any form of waste/soil/overburden disposal or stockpiling (2.3.3) Tailings dams or processing plants; and (2.3.4) Any form of storage of materials or machinery. (3) ***Cyperus sexangularis – Flueggea virosa Riparian Vegetation*** ***(No Go Area – only suitable crossings permissible)*** (3.1) Development in this vegetation/habitat and at least 50 m beyond should be limited to crossings of access roads only, aiming for minimal to no alteration of the habitat configuration. (3.2) Mining/development in this vegetation/habitat is strongly discouraged. (3.3) Where upstream vegetation will be obliterated or severely denuded, adequate storm water and erosion control measures must be put in place to slow down and disperse runoff volumes and prevent the degradation of other channels and riparian vegetation. (3.4) Where road crossings are necessary, channels may under no circumstance be sealed with any impermeable material, as this will lead to a loss of runoff- and related retention/replenishment of soil moisture reserves, nutrients and seeds. (3.5) Culverts must be designed in a way that water will never be concentrated to a width narrower than the actual channel, causing accelerated erosion during heavy downpours. (3.6) Components of the proposed development that may under no circumstance be located in or within 100 m of any drainage would include: (3.6.1) Buildings and/or ablution facilities; (3.6.2) Any form of waste/soil/overburden disposal or stockpile; (3.6.3) Tailings dams or processing plants; and (3.6.4) Any form of storage of materials or machinery (4) ***Acacia tortilis – Dichrostachys cinerea Dry Mixed Bushveld*** ***(Medium Low sensitivity)*** (4.1) It is recommended that if additional space is required in future for any additional infrastructure, this will be situated on the more disturbed sections of this vegetation. (4.2) Community members should be engaged to clear out as much wood as possible from areas to be developed to alleviate the wood-clearing of more valuable large trees in the area. (4.3) Runoff from any sealed or bare surface must be contained to prevent the erosion of the donga areas and drainage lines below these plains. (4.4) Mine management of the Spitsvale Project has indicated that they will attempt, where possible, to		

				create more grazing for the Dithamaga community by trying to clear some of the encroached bush to allow perennial grasses to become re-established. For this, it was strongly advised against removing all vegetation with a bulldozer. Rather, the following should be done to break the sealed upper surface and reduce sheet erosion: (4.4.1) With a Ripper only, rip sections of up to 5 m wide along the contour, alternating with ± 5 m of bushveld as it is; (4.4.2) Rips should be at least 500 mm deep, and invasive thorn bushes uprooted to that depth as well to ensure their resprouting capacity from the below-ground lignotuber is also eradicated; (4.4.3) If possible, hand-collected seeds from surrounding areas should be re-introduced to the rips; (4.4.4) Use the cleared thorn bushes to loosely brush-pack the area - with the branching side facing upslope (5) ***Kirkia wilmsii – Terminalia prunioides variable Bushveld*** ***(Medium-High sensitivity – Avoid as far possible)*** (5.1) Mining/development in this vegetation/habitat should be limited to the absolute minimum, aiming for minimal alteration of the habitat configuration. (5.2) This is most important within 100 m of any mountain streams and drainages, to prevent the accelerated erosion of lower-lying plains and fluvial systems. (5.3) If some of these habitats are impacted or will be altered by the proposed development, newly created slopes should preferably be shallower than the original slopes, but never steeper to enable a gradual re-establishment of the woody and herbaceous layer. (5.4) After decommissioning, it will be important to facilitate the re-establishment of a diverse vegetation layer as soon as possible. (6) ***Hippobromus pauciflorus – Rhoicissus tridentata Rock Outcrops*** ***(High sensitivity – Treat as No Go Areas as far possible)*** (6.1) Same requirements as stipulated under (5). (7) ***Combretum hereroense – Euclea sekhukhuniensis low bushveld*** ***(No Go, only limited access roads permissible)*** (7.1) Mining/development in this vegetation/habitat is strongly discouraged, aiming for no alteration of the habitat. (7.2) Adjacent (upstream) areas also need to be cleared with care, ensuring that no excessive runoff is directed toward the donga plains. (7.3) Although current dongas may be relatively old and stable, new and accelerated erosion must be monitored and mitigated at all times. (7.4) After decommissioning, it will be important to facilitate the re-establishment of a dense herbaceous vegetation layer as soon as possible where these plains have been impacted. (8) Rehabilitate and re-vegetate all areas that have been disturbed as soon as practically possible. (9) Continually monitor the progress/success of rehabilitation efforts and adapt if rehabilitation targets are not met in acceptable timeframes (10) As part of decommissioning, all stockpiles must be entirely obliterated and landscaped to merge		

				into the surroundings. (11) Keep main internal access route as planned along existing gravel roads. (12) After the final layout of mining operation components has been approved, conduct a thorough footprint investigation to determine any protected or red data plant species population location and size, and animal burrows: (12.1) Map (by GPS) as far as possible larger concentrations of large trees and protected species that could be avoided or must be relocated; (12.2) Protected trees, succulents and geophytes: must be relocated (trees as far as feasible); (12.3) Animal burrows: must be monitored by EO/ECO prior to ground clearing for activity/presence of animal species. If detected, such animals must be removed and relocated by a qualified professional/contractor. (13) Strictly restrict all movement of vehicles and heavy machinery to permissible areas, these being designated access roads, maintenance roads, turning points and parking areas. No off-road driving beyond designated areas may be allowed. (14) Animals accidentally injured by moving vehicles or machinery must be taken to a local veterinarian to be treated or put down in a humane manner. (15) Create designated turning areas and strictly prohibit any off-road driving or parking of vehicles and machinery outside designated areas. (16) Keep the clearing of natural veldt to a minimum. (19) It is desirable that community members be engaged to remove wood suitable for their purposes from areas to be cleared to alleviate the pressure of wood-harvesting currently on other areas of the land portions. (20) All remaining material of cleared shrubs and trees must be shredded and used as mulch. (21) Topsoil (the upper 25 cm of soil) is an important natural resource as it contains most of the geophytic storage organs as well as valuable soil seed resources necessary for re-vegetation; where it can (and then must) be stripped, never mix it with subsoil or any other material, store and protect it separately until it can be re-applied, minimise handling of topsoil. (21) Adherence to the comprehensive Plant Search and rescue, Re-vegetation and Alien Invasive Management plan (Appendix E of the Biodiversity Impact Report (**Appendix G** to this report)). ***Avifauna –*** (1) Leave, as far as possible, as much of the natural indigenous bush undisturbed and in its pristine sate. (2) Route connecting roads as close as is possible to already developed sites or roads. (3) Restrict or prohibit any off-road driving in areas of pristine indigenous bush. (4) Route power lines along these connecting roads, or if possible route them underground. ***Bat Survey –*** (1) Conserve as much of the natural vegetation as possible. Only create haul roads that are absolutely necessary. (2) Discourage vehicles from driving through the natural vegetation were mining activities are not		

				taking place. (3) Prohibit mining plant and trucks from washing or dumping material near a water course (wet or dry) to prevent the pollution of natural water bodies. (4) Prohibit any chemical and/or heavy metal from being released into the environment. (5) Manage all waste water and stormwater to prevent pollution to water bodies.		
18.Topsoil and subsoil stripping & stockpiling for mining operation area	**Destruction of Wetlands**	Construction & Operational		***Implementation of EMS:*** (1) Develop a water monitoring management plan. (2) Record and report all incidents related to affecting water quality. (3) Development of Mine Rehabilitation, decommissioning and mine closure liability Plan in compliance with GN R. 1147 of NEMA. (4) Ensuring corrective and preventative actions are taken to address nonconformities. (5) Communicating findings of concern to I&AP. (6) Development and implementation of a storm water management plan. (7) Regular inspection of erosion prone areas for signs of erosion. (8) Create awareness of water conservation and protection of wetlands. ***On-site mitigation measures:*** (1) Plan the final site layout in a manner as to reduce the destruction of wetlands, if possible avoid working within a wetland. A wetland delineation will be required before the commencement of any activities within a wetland. (2) In the event that a wetland will be altered, mitigation measures to reduce the impact on the wetland must be strictly monitored. (3) Ensure water quality complies with the requirements stipulated by the Water Use Licence conditions. (4) Channels and drainage systems required to divert the flow of drainage lines to be designed by a civil engineer, taking into consideration the peak volumes and flow. (5) Ensure rehabilitation measures are according to rehabilitation plan and that measures are taken to prevent the formation of erosion dongas or rills. (6) Species of ecological importance to be searched and rescued and reinstated during rehabilitation. ***Legal requirements:*** **(1)** A Water Use Licence to be obtained for all river crossings or development of infrastructure within or within close proximity to a watercourse as defined by the National Water Act, act no of 1996. (2) Requirements stipulated by GN R. 704 to be considered in the final site layout plan by the appointed engineers. **Specialist recommendations:** ***Geohydrology –*** (1) Development of an environmental monitoring programme in order to monitor the groundwater quality and groundwater level changes up- and downstream of the proposed open cast mine workings. (2) Collected monitoring data (quarterly) may be used for future model updates (e.g. every second	(1) Develop and implement a water management plan and specifically include the conservation measures to be implemented in wetland areas. (2) Ensure compliance with the issued WUL requirements.	Entire Life cycle of project

				year). (3) A number of geosites (i.e. boreholes, springs and surface water drainages) and newly proposed boreholes were identified (refer to the Geohydrological report in **Appendix M**) to be included into a monthly/quarterly monitoring programme. (4) The parameters to be analysed should comprise the following: Physical-chemical parameters (pH, EC, TDS);Major anions (F, Cl, NO3, SO4, HCO3, NH4, PO4,);Major cations (K, Na, Mg, Ca, NH4,); and Other elements/metals (Fe, Mn, Zn, Pb, Co, Cr, Cr (VI),). (5) Emphasis should be placed on monitoring of groundwater levels prior mining and during the operation phase as well as to establish the origin of the elevated nitrate concentrations in the project area. (6) Recording of pit dewatering rates. Initial monthly (and later quarterly) sampling and analysis (major and trace elements) of pumped water. ***Hydrology –*** (1) A number of monitoring sample points have been identified in the Hydrological report (**Appendix L**). Additional sampling points have been recommended and should be included in the final water monitoring plan. (2) As part of the monitoring program going forward, samples should be taken monthly for at least the first year of operation. This can be revised to quarterly monitoring if no concerns are highlighted with the approval of DWAS. (3) The monitoring should include the standard analysis of major cations/anions as well as ICP scan for metals. (4) A conceptual storm water management plan (**Appendix L**) has been developed based on the requirements of GN R. 704 of the National Water Act of 1998. (5) Implementation of the guidance provided by the South African National Roads Agency Limited (SANRAL) drainage manual. This document provides guidance on maximum permissible velocities for grass covers to avoid erosion and should be consulted during the detailed design phase.		
18.Topsoil and subsoil stripping & stockpiling for mining operation area **19.Opencast mining excavations** **20.Drilling & Blasting** **21. RoM & product stockpiling**	**Hydrocarbon Contamination**	Construction & Operational		***Implementation of EMS***: (1) Develop and implement a Hazardous substances management plan addressing handling, storage, and transport of hazardous substances. (2) Develop and implement an emergency response procedure addressing the procedure in case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure. (4) Ensuring corrective and preventative actions are taken to address nonconformities. (5) Communicating findings of concern to I&AP. ***On-site mitigation measures***: (1) Fuel to be stored in above ground storage tanks or sealed containers. (2) Hazardous substances to be stored within a bund area with a sump drainage.	(1) Development of water management plan addressing monitoring and management requirements. (2) Development of a storm water management plan addressing the separation of "dirty" and clean "areas" (3) Development of emergency response plan with specific reference to spill prevention and remediation. (4) Development and implementation of vehicle/plant/equipment maintenance plan with specific reference to daily inspections of	Entire Life cycle of project

23. Screening Operations **24. Discard disposal (backfilling of mining area)** **27. River crossings** **29. Storage of fuel and lubricants in temporary facilities** **30. Vehicular activity on haul roads; and operation of mining equipment**				(3) Bunded areas to be designed to contain at least 110% of the storing capacity. (4) All spills (minor and major) must be cleaned and remediated to the satisfaction of the appointed environmental representative or the Department within 24 hours. (5) Any spillages on site to be excavated to the visible depth of impact and disposed of for removal to a registered hazardous waste disposal site. Alternative in-situ remediation techniques may be used. (6) On site spill kits or absorbent materials must be readily available. These kits must include materials to absorb, breakdown, and where possible encapsulate minor material spillages. (7) Where possible and practical all maintenance of vehicles and equipment shall take place in the workshop areas. Should emergency repairs be necessary, drip trays or tarpaulins must be utilised to ensure the collection of any hydrocarbons. (8) All vehicles, plant, and equipment must be inspected on a daily basis. Records to be made available for these inspections. (9) Drip trays or any form of oil absorbent material must be placed underneath vehicles and equipment (where possible leaks may occur) when not in use. (10) All vehicles, plant, and equipment must be well maintained to minimise the risk of fuel and oil leakages. (11) Leaking equipment shall be removed and repaired immediately from site to facility designated for repairs. ***Legal requirements***: (1) Section 30 of the National Environmental Management Act (NEMA), Act 107 of 1998 describes measures to be taken to control emergency incidents. These requirements should be included in the development of the Emergency Response procedure. (2) Section 20 of the National Water Act 36 of 1998 describes the procedure for the control of incidents involving Hazardous substances. These requirements should also be included in the Emergency response procedure. (3) GN R. 1237 published under the Mine Health and Safety Act of 1996 describes the requirements for the storage of hazardous substances. These requirements should be incorporated into the Hazardous substances management plan. (4) Section 21 of the Mine Health and safety Act of 1996 describes the requirements for the acquisition of Hazardous chemicals. These requirements should be considered as part of the mine acquisition process. (5) Regulation 277, 273, and 279 of GN R. 225 of the National Road traffic Act of 1996 describes the requirements of transporting hazardous waste. These requirements should be incorporated in both the Hazardous substances management plan and the Waste Management plan. (6) Regulation 277 and 273 of GN R. 225 of the National Road traffic Act of 1996 describes the Loading and offloading of dangerous goods. These requirements should be addressed in the Hazardous substances management plan. (7) All requirements described in the Hazardous substance Act of 1973 should be included in the Hazardous substances management plan.	plant/vehicles/equipment for leaks or breakages. (5) Development and implementation of a Hazardous substances management plan.	

				(8) The storage of hazardous substances must be in compliance with regulation 4 of GN R. 704 of the National Environmental Management Act. ***Specialist recommendations***: ***Geohydrology –*** (1) Development of an environmental monitoring programme in order to monitor the groundwater quality and groundwater level changes up- and downstream of the proposed open cast mine workings. (2) Collected monitoring data (quarterly) may be used for future model updates (e.g. every second year). (3) A number of geosites (i.e. boreholes, springs and surface water drainages) and newly proposed boreholes were identified (refer to the Geohydrological report in **Appendix M**) to be included into a monthly/quarterly monitoring programme. (4) The parameters to be analysed should comprise the following: Physical-chemical parameters (pH, EC, TDS);Major anions (F, Cl, NO3, SO4, HCO3, NH4, PO4,);Major cations (K, Na, Mg, Ca, NH4,); and Other elements/metals (Fe, Mn, Zn, Pb, Co, Cr, Cr (VI),). ***Hydrology –*** (1) A number of monitoring sample points have been identified in the Hydrological report (**Appendix L**). Additional sampling points have been recommended and should be included in the final water monitoring plan. (2) As part of the monitoring program going forward, samples should be taken monthly for at least the first year of operation. This can be revised to quarterly monitoring if no concerns are highlighted with the approval of DWAS. (3) The monitoring should include the standard analysis of major cations/anions as well as ICP scan for metals.		
18.Topsoil and subsoil stripping & stockpiling for mining operation area **19.Opencast mining excavations** **21. RoM & product stockpiling** **22. Residue stockpiles** **23. Screening Operations** **24. Discard disposal**	**Sedimentation and siltation of watercourses**	Construction & Operational		***Implementation of EMS:*** (1) Development and implementation of water quality monitoring plan. (2) Development and implementation of an incident reporting procedure. (3) Ensuring corrective and preventative actions are taken to address nonconformities. (4) Communicating findings of concern to I&AP. (5) Development and implementation of a storm water management plan. (6) Regular inspection of erosion prone areas for signs of erosion. (7) A soil conservation and stockpiling plan to be developed and implemented. ***On-site mitigation measures:*** (1) Avoid stockpiling material within drainage lines or in the 1:10 year flood line. (2) Ensure erosion control measures or sediment control measures on stockpiles or in stockpile areas. (3) Prevent the discharge of water containing polluting matter or visible suspended materials directly into drainage lines or streams. (4) Deflect any unpolluted water/runoff away from any dirty areas i.e. stockpile areas, mining areas, workshops, lay down areas etc.	(1) Develop a storm water management plan. (2) Develop and implement a water management plan and specifically include water monitoring and pollution prevention strategies.	Entire Life cycle of project

(backfilling of mining area) **27. River crossings** **30. Vehicular activity on haul roads; and operation of mining equipment** **32. Water Management** **33. Rehabilitation of mining areas**				(5) Water from excavations or mining areas either through seepage or collection to be pumped and discharge into a pollution control dam. (6) Before any water is permitted to enter natural drainage lines, the quality of water must comply with the standards contained in the Water Use Licence conditions. (7) River crossings shall be designed by a registered civil engineer. (8) Measures to avoid or prevent erosion formation must be incorporated into the designs of the infrastructure associated with the river crossings. (9) During construction through drainage lines, the majority of the flow must be allowed to pass down the stream. In stream diversions should be used rather than the construction of new channels. ***Legal requirements:*** (1) A Water Use Licence to be obtained for all river crossings or development of infrastructure within or within close proximity to a watercourse as defined by the National Water Act, act no of 1996. (2) Requirements stipulated by GN R. 704 to be considered in the final site layout plan by the appointed engineers. ***Specialist recommendations:*** ***Geohydrology –*** (1) Development of an environmental monitoring programme in order to monitor the groundwater quality and groundwater level changes up- and downstream of the proposed open cast mine workings. (2) Collected monitoring data (quarterly) may be used for future model updates (e.g. every second year). (3) A number of geosites (i.e. boreholes, springs and surface water drainages) and newly proposed boreholes were identified (refer to the Geohydrological report in **Appendix M**) to be included into a monthly/quarterly monitoring programme. (4) The parameters to be analysed should comprise the following: Physical-chemical parameters (pH, EC, TDS);Major anions (F, Cl, NO3, SO4, HCO3, NH4, PO4,);Major cations (K, Na, Mg, Ca, NH4,); and Other elements/metals (Fe, Mn, Zn, Pb, Co, Cr, Cr (VI),). ***Hydrology –*** (1) A number of monitoring sample points have been identified in the Hydrological report (**Appendix L**). Additional sampling points have been recommended and should be included in the final water monitoring plan. (2) As part of the monitoring program going forward, samples should be taken monthly for at least the first year of operation. This can be revised to quarterly monitoring if no concerns are highlighted with the approval of DWAS. (3) The monitoring should include the standard analysis of major cations/anions as well as ICP scan for metals. (4) A conceptual storm water management plan (**Appendix L**) has been developed based on the requirements of GN R. 704 of the National Water Act of 1998. (5) Implementation of the guidance provided by the South African National Roads Agency Limited (SANRAL) drainage manual. This document provides guidance on maximum permissible velocities for		

				grass covers to avoid erosion and should be consulted during the detailed design phase.		
18.Topsoil and subsoil stripping & stockpiling for mining operation area **27. River crossings** **28. Water supply (potable & process)** **32. Water Management**	**Water level reduction and contamination**	Construction & Operational		***Implementation of EMS:*** (1) Develop a water monitoring management plan. (2) Record and report all incidents related to affecting water quality. (3) Development of Mine Rehabilitation, decommissioning and mine closure liability Plan in compliance with GN R. 1147 of NEMA, addressing the rehabilitation measures related to reinstatement of drainage lines. (4) Ensuring corrective and preventative actions are taken to address nonconformities. (5) Communicating findings of concern to I&AP. (6) Development and implementation of a storm water management plan. (7) Regular inspection of erosion prone areas for signs of erosion. (8) A soil conservation and stockpiling plan to be developed and implemented. (9) Create awareness of water conservation. ***On-site mitigation measures****:* (1) River crossings or storm water channels shall be designed by a registered civil engineer. (2) Measures to avoid or prevent erosion formation must be incorporated into the designs of the infrastructure associated with the river crossings. (3) During construction through drainage lines, the majority of the flow must be allowed to pass down the stream. In stream diversions should be used rather than the construction of new channels. (4) Filtered or treated water from PCD's may be used for dust suppression should they conform to the sediment load requirements or other quality requirements as specified by the Water Use Licence issued by the Department of Water Affairs and sanitation. (5) Monitor water usage and ensure that areas of waste are identified and minimised. (6) Where possible, reuse water from the PCD's for dust suppression on the roads. (7) in the event that RoM product materials requires the usage of water during processing, the holder of the environmental authorisation must ensure that these activities complies with the current authorisation and ensure that a WUL are obtained. ***Legal requirements:*** **(1)** A Water Use Licence to be obtained for all river crossings or development of infrastructure within or within close proximity to a watercourse as defined by the National Water Act, act no of 1996. (2) Requirements stipulated by GN R. 704 to be considered in the final site layout plan by the appointed engineers. **Specialist recommendations:** ***Geohydrology –*** (1) Development of an environmental monitoring programme in order to monitor the groundwater quality and groundwater level changes up- and downstream of the proposed open cast mine workings. (2) Collected monitoring data (quarterly) may be used for future model updates (e.g. every second year).	(1) Develop and implement a water management plan and specifically include measures to be implemented to reduce the impact on surface and groundwater reduction. (2) Ensure compliance with the issued WUL requirements. (3) Develop and implement a storm water management plan and specifically address the diversion of "clean" water into the natural drainage lines.	Entire Life cycle of project

				(3) A number of geosites (i.e. boreholes, springs and surface water drainages) and newly proposed boreholes were identified (refer to the Geohydrological report in **Appendix M**) to be included into a monthly/quarterly monitoring programme. (4) The parameters to be analysed should comprise the following: Physical-chemical parameters (pH, EC, TDS);Major anions (F, Cl, NO3, SO4, HCO3, NH4, PO4,);Major cations (K, Na, Mg, Ca, NH4,); and Other elements/metals (Fe, Mn, Zn, Pb, Co, Cr, Cr (VI),). (5) Emphasis should be placed on monitoring of groundwater levels prior mining and during the operation phase as well as to establish the origin of the elevated nitrate concentrations in the project area. (6) Recording of pit dewatering rates. Initial monthly (and later quarterly) sampling and analysis (major and trace elements) of pumped water. ***Hydrology –*** (1) A number of monitoring sample points have been identified in the Hydrological report (**Appendix L**). Additional sampling points have been recommended and should be included in the final water monitoring plan. (2) As part of the monitoring program going forward, samples should be taken monthly for at least the first year of operation. This can be revised to quarterly monitoring if no concerns are highlighted with the approval of DWAS. (3) The monitoring should include the standard analysis of major cations/anions as well as ICP scan for metals. (4) A conceptual storm water management plan (**Appendix L**) has been developed based on the requirements of GN R. 704 of the National Water Act of 1998. (5) Implementation of the guidance provided by the South African National Roads Agency Limited (SANRAL) drainage manual. This document provides guidance on maximum permissible velocities for grass covers to avoid erosion and should be consulted during the detailed design phase.		
18.Topsoil and subsoil stripping & stockpiling for mining operation area **19.Opencast mining excavations** **20.Drilling & Blasting** **21. RoM & product stockpiling** **23. Screening**	**Noise generation**	Construction & Operational		***Implementation of EMS***: (1) Development and implementation of a Acoustical Measurement & Audit Programme as part of the EMS. A monitoring program to be developed based on the specialist recommendations (**Appendix F**). (2) Recording, reporting, and remediating incidents related to noise. (3) Regular inspections of plant. (4) Ensuring corrective and preventative actions are taken to address nonconformities. (5) Communicating findings of concern to I&AP. ***On-site mitigation measures***: (1) Limit the maximum speed on the haul roads to 60 km/h or less. Road speeds should be kept as consistent as is feasibly possible (i.e. no speed bumps to reduce noise or stop junctions). This will help minimise the use of air brakes as well as reduce required maximum capacity of heavy vehicles during pull off. (2) Roads should be planned so as to reduce heavy vehicles reversing when collecting or dumping at	(1) Develop and implement a noise monitoring programme to ensure compliance with the National Noise Control Regulations and SANS10103:2008 guidelines. (2) Develop and implement a vehicle/plant/equipment management plan to specifically include routine inspections and testing of sound frequencies.	Before and during all phases on a quarterly basis.

Operations **24. Discard disposal (backfilling of mining area)** **30. Vehicular activity on haul roads; and operation of mining equipment** **33. Rehabilitation of mining areas**				stockpiles/tips etc. (E.g. use of a loop instead of a dead-end road). This will minimise the use of reverse alarms on vehicles. (3) Regular inspections and servicing of plant. ***Legal requirements***: (1) *Compliance with the National Noise control regulations.* ***Specialist recommendations:*** (1) Design an Acoustical Measurement & Audit Programme. Note: If there are no noise-sensitive receptors within 1,000m from any mining activities no routine noise monitoring will be required. (2) If feasible the road should be paved or asphalted (e.g. continuous graded asphalt). From an acoustical perspective paver bricks should not be considered. It is likely that routes will be unpaved. The developer should consider maintain these unpaved routes regularly smoothing out irregularities on the routes.		
18.Topsoil and subsoil stripping & stockpiling for mining operation area	**Destruction of graves**	Construction & Operational		***Implementation of EMS:*** (1) Develop and implement an awareness campaign on the protection of social heritage impacts. ***On-site mitigation measures:*** (1) If human remains are uncovered during the course of authorised activities or archaeological work, the excavations affecting the burial must be stopped. (2) SAHRA should then be consulted and depending on the situation, the remains are either covered and left in situ, exposed (but not removed) and studies in situ, or fully excavated and studied with the consent and participation of the interested parties. (3) It is, therefore, advisable that if it is foreseen that any archaeological research will uncover human remains an agreement with the interested and affected parties and a permit for burials be obtained beforehand. (4) A suitable accredited archaeologist must be appointed on a watching brief to monitor the excavation of any grave sites. (5) At the onset of construction or mining operations, all graves that might be affected should be clearly demarcated and if possible fenced off to protect them from any accidental damage, whether they are earmarked for relocation, or not. (6) Should the decision be taken to propose the relocation of the affected graves, a suitably accredited and experienced service provider must be appointed to undertake relocation. (7) Relocation of grave relocation is dependent on permission for the action by the close relatives and interested and affected parties from the community, and the requirement is that the developer must assist this community to fulfil their cultural and religious requirements during the process. ***Legal requirements:*** **(1)** Obtain a permit or authorisation to disturb, deface, destroy, or remove protected features and sites in terms of Section 27 (18) of the National Heritage Resources Act (NHRA), No. 25 of 1999 from the South African Heritage Resources Agency (SAHRA). ***Specialist recommendations:***	(1) Ensure compliance with the National Heritage Resources Act (NHRA), No. 25 of 1999. (2) Ensure compliance with the Human Tissue Act, 1983 (Act no. 65 of 1983.	Entire Life cycle of project

				(1) Identified heritage resource sites must be avoided as far as possible (see Table 2 in the Heritage Impact Assessment (HIA) report attached as **Appendix O**). (2) Should archaeological sites or graves be exposed during construction work, it must immediately be reported to a heritage practitioner so that an investigation and evaluation of the finds can be made. ***Homestead sites –*** (3) A total of five old homestead sites were identified in the proposed mining area and it is anticipated that it would be impacted on by the mining activities. (4) It is recommended that the sites are retained, and that it should be fenced off with danger tape for the duration of the mining, leaving a buffer zone of at least ten metres from the outer edge of the stone walling/physical features. (5) If the sites cannot be retained, it should be documented (mapped and excavated) by an archaeologists after obtaining a permit from SAHRA. (6) If mining takes place in these areas, the community should be consulted to determine if there are any more graves in the region, especially those of young children who, in many cases, are buried inside the old homestead. ***Informal burial sites –*** (7) A total of nine informal burial sites were identified. All are located inside of or in close proximity to the mining area and it is anticipated that it would be impacted on by the mining activities. (8) If the burial places are retained, it should be fenced off with danger tape for the duration of the mining, leaving a buffer zone of at least ten metres from the outer edge of the graves. (9) If the graves cannot be retained, it should be relocated, but only on condition of following the correct procedures (see Appendix 3 of the HIA attached as **Appendix O**).		
18.Topsoil and subsoil stripping & stockpiling for mining operation area	**Degradation of cultural significance heritage sites**	Construction & Operational		***<u>Implementation of EMS:</u>*** (1) Develop and implement an awareness campaign on the protection of social heritage impacts. ***<u>On-site mitigation measures:</u>*** (1) The position of known sites, as identified by the heritage impact assessment, must be clearly identified and marked and considered in the final site lay out. (2) Such areas shall be market as no-go areas. (3) Artefacts may not be removed under any circumstances. (4) Do not disturb, deface, destroy or remove protected features and sites, whether fenced or not for the duration of the authorised activity, unless on the approval of the competent authority. (5) Permits shall be obtained from South African Heritage Resource Agency (SAHRA) should any authorised activities affect any world heritage sites or if any areas are to be destroyed or altered. (6) Works must be stopped immediately should any elements of cultural or heritage significance be found. (7) Do not resume works in the area in question without the required permits or authorisation from the competent authority. (8) A qualified and registered archaeologist must be appointed and consulted at such finding to	(1) Ensure compliance with the National Heritage Resources Act (NHRA), No. 25 of 1999. (2) Ensure compliance with the Human Tissue Act, 1983 (Act no. 65 of 1983.	Entire Life cycle of project

				appropriately excavate any artefacts in agreement with the Limpopo Heritage Resource Agency (LPHRA) and the SAHRA. ***Legal requirements:*** (1) Obtain a permit or authorisation to disturb, deface, destroy, or remove protected features and sites from the South African Heritage Resource Agency (SAHRA) and Limpopo Heritage Resource Agency (LPHRA). ***Specialist recommendations:*** (1) Identified heritage resource sites must be avoided as far as possible (see Table 2 in the Heritage Impact Assessment (HIA) report attached as **Appendix O**). (2) Should archaeological sites or graves be exposed during construction work, it must immediately be reported to a heritage practitioner so that an investigation and evaluation of the finds can be made. ***Homestead sites –*** (3) A total of five old homestead sites were identified in the proposed mining area and it is anticipated that it would be impacted on by the mining activities. (4) It is recommended that the sites are retained, and that it should be fenced off with danger tape for the duration of the mining, leaving a buffer zone of at least ten metres from the outer edge of the stone walling/physical features. (5) If the sites cannot be retained, it should be documented (mapped and excavated) by an archaeologists after obtaining a permit from SAHRA. (6) If mining takes place in these areas, the community should be consulted to determine if there are any more graves in the region, especially those of young children who, in many cases, are buried inside the old homestead. ***Industrial/Infrastructural heritage –*** (7) A single site defined as of industrial/infrastructural heritage was identified. (8) It is recommended that the irrigation system should be documented (photographed and mapped) in before mining activities takes place.		
18.Topsoil and subsoil stripping & stockpiling for mining operation area **19.Opencast mining excavations** **21. RoM & product stockpiling** **24. Discard disposal (backfilling of mining**	**Erosion**	Construction & Operational		***Implementation of EMS***: (1) Development and implementation of a storm water management plan. (2) Regular inspection of erosion prone areas for signs of erosion. (3) A soil conservation and stockpiling plan to be developed and implemented. (4) Monthly monitoring of water quality (as per recommendation of specialist study). (5) Reporting and recording incidents related to erosion. (6) Ensuring corrective and preventative actions are taken to address nonconformities. (7) Communicating findings of concern to I&AP. ***On-site mitigation measures***: (1) Soil conservation measures to be implemented on stockpiles to prevent erosion. This could include the use of erosion control fabric or non-invasive grass seeding. (2) All areas susceptible to erosion must be identified and protection measures be implemented.	(1) Development and implementation of a storm water management plan. (2) Development of a soil conservation management plan. (3) Development of Mine Rehabilitation, decommissioning and mine closure liability Plan in compliance with GN R. 1147 of NEMA.	Entire Life cycle of project

area) **27. River crossings** **30. Vehicular activity on haul roads; and operation of mining equipment** **32. Water Management** **33. Rehabilitation of mining areas**				(3) Retain natural trees, shrubbery and grass species where possible. (4) In areas within close proximity to wetlands, rivers and streams, sedimentation control measures to be implemented, specifically when excavations or disturbances takes place within river banks, or the river bed. (5) Formation of erosion channels ("dongas") to be prevented by applying soil erosion control and bank stabilisation procedures as specified by a qualified environmental specialist. (6) Erosion formation beyond rills must be avoided. (7) Erosion damages to be repaired as soon as possible and no later than the target set by the Management team. (8) Slopes steeper than 1(V):4(H) or slopes where soils are by nature dispersive or erodible must be stabilised. (9) Where berms are installed on severe slopes the outflow shall be suitably stone pitched to prevent erosion from starting on berms. (10) Access routes should not traverse slopes with gradients in excess of 8%. (11) Wherever possible, access routes should avoid crossing drainage lines and riparian zones. (12) Drainage lines should not be altered and should be level with the surrounding land once subsistence has occurred. (13) Run-off from roads must be managed in a way to avoid erosion and prevent pollution. ***Legal requirements***: (1) Section 28 of NEMA relates to the duty of care and remediation of environmental damage. (2) The Conservation of Agriculture Resources Act (Act no. 107 of 1998) requires the protection of land against soil erosion and the prevention of water logging and silinization of soils by means of suitable soil conservation works to be constructed and maintained. These requirements should form part of the Soil Conservation and Stockpile management plan. ***Specialist recommendations***: ***Hydrology –*** (1) A conceptual storm water management plan (**Appendix L**) has been developed based on the requirements of GN R. 704 of the National Water Act of 1998. (2) Implementation of the guidance provided by the South African National Roads Agency Limited (SANRAL) drainage manual. This document provides guidance on maximum permissible velocities for grass covers to avoid erosion and should be consulted during the detailed design phase. ***Soil –*** (1) Disturbance areas to be stripped progressively as required reducing erosion and sediment generation, to reduce the extent of topsoil and utilise stripped topsoil as soon as possible for rehabilitation. (2) The surface of the completed stockpile must be left in a rough condition to promote water infiltration and minimise erosion prior to vegetation establishment; (3) Topsoil stockpiles to have an embankment grade of approximately 1m vertical:4m horizontal (to limit the potential for erosion of the outer pile face);		

				(4) Implement surface digital terrain mapping to ensure surface water control measures are implemented to ensure free draining system with minimal soil erosion. (5) Minimise soil erosion through wind and water ***Biodiversity – Also see Vegetation and Habitat loss*** (1) Limit the complete removal of vegetation. (2) Limit work outside the proposed footprint. (3) Reinforce portions of existing access routes that are prone to erosion or seasonal inundation, create structures or low banks to drain the access road rapidly during rainfall events, yet preventing erosion of the track and surrounding areas. Ensure that water flows are never concentrated in any way as soils are highly erodible. (4) Ensure that runoff from compacted or sealed surfaces is slowed down and dispersed sufficiently to prevent accelerated erosion from being initiated (erosion management plan required).		
18.Topsoil and subsoil stripping & stockpiling for mining operation area **19.Opencast mining excavations** **21. RoM & product stockpiling** **23. Screening Operations** **28. Water supply (potable & process)** **30. Vehicular activity on haul roads; and operation of mining equipment** **31. Bulk transporting of Ore to market on Public roads**	**CO_2 emissions**	Construction & Operational		**<u>Implementation of EMS:</u>** (1) Develop and maintain a carbon footprint reporting policy. (2) Develop and maintain a Vehicle/Plant/Equipment maintenance plant. **<u>On-site mitigation measures</u>:** (1) Plant and equipment to function at an optimal level. (2) Where possible lead replacement petrol to be used. (3) Where possible low sulphur containing diesel to be used. (4) All vehicles and equipment must be maintained and serviced according to the manufacturer's specification. (5) Any vehicle, plant or equipment emitting visible emissions from their exhaust systems must be serviced or repaired immediately. **<u>Legal requirements:</u>** (1) Section 39 of the Atmospheric Pollution Prevention Act of 1965 and GN R. 1651 specifies requirements regarding the control of emissions from diesel vehicles used on public roads. These requirements should form part of the Air quality Management Plan and the Vehicle/Plant/Equipment maintenance plan.	(1) Develop and maintain a Carbon footprint reporting policy. (2) Develop and maintain a Vehicle/Plant/Equipment maintenance plant.	Entire Life cycle of project
18.Topsoil and subsoil stripping & stockpiling	**Alteration of drainage**	Construction & Operational		**<u>Implementation of EMS:</u>** (1) Develop a water monitoring management plan.	(1) Develop and implement a storm water management plan.	Entire Life cycle of project

for mining operation area **19.Opencast mining excavations** **22. Residue stockpiles** **27. River crossings** **32. Water Management**	**patterns**			(2) Record and report all incidents related to affecting water quality. (3) Development of Mine Rehabilitation, decommissioning and mine closure liability Plan in compliance with GN R. 1147 of NEMA. (4) Ensuring corrective and preventative actions are taken to address nonconformities. (5) Communicating findings of concern to I&AP. (6) Development and implementation of a storm water management plan. (7) Regular inspection of erosion prone areas for signs of erosion. (8) A soil conservation and stockpiling plan to be developed and implemented. **<u>On-site mitigation measures:</u>** (1) Plan the final site layout in a manner as to reduce alteration of drainage patterns. (2) In the event that drainage patterns will be altered, the natural flow to be diverted. (3) Any diversions to be in such a manner as to avoid erosion formation or pollution through siltation and sedimentation. (4) Ensure water quality complies with the requirements stipulated by the Water Use Licence conditions. (5) Channels and drainage systems required to divert the flow of drainage lines to be designed by a civil engineer, taking into consideration the peak volumes and flow. (6) Ensure rehabilitation measures are according to rehabilitation plan and that measures are taken to prevent the formation of erosion dongas or rills. **<u>Legal requirements:</u>** (1) A Water Use Licence to be obtained for all river crossings or development of infrastructure within or within close proximity to a watercourse as defined by the National Water Act, act no of 1996. (2) Requirements stipulated by GN R. 704 to be considered in the final site layout plan by the appointed engineers. **<u>Specialist recommendations:</u>** ***Geohydrology –*** (1) Development of an environmental monitoring programme in order to monitor the groundwater quality and groundwater level changes up- and downstream of the proposed open cast mine workings. (2) Collected monitoring data (quarterly) may be used for future model updates (e.g. every second year). (3) A number of geosites (i.e. boreholes, springs and surface water drainages) and newly proposed boreholes were identified (refer to the Geohydrological report in **Appendix M**) to be included into a monthly/quarterly monitoring programme. (4) The parameters to be analysed should comprise the following: Physical-chemical parameters (pH, EC, TDS);Major anions (F, Cl, NO3, SO4, HCO3, NH4, PO4,);Major cations (K, Na, Mg, Ca, NH4,); and Other elements/metals (Fe, Mn, Zn, Pb, Co, Cr, Cr (VI),). (5) Emphasis should be placed on monitoring of groundwater levels prior mining and during the operation phase as well as to establish the origin of the elevated nitrate concentrations in the project area.	(2) Develop and implement a water management plan specifically including a strategy for the management of alterations to drainage patterns.	

				(6) Recording of pit dewatering rates. Initial monthly (and later quarterly) sampling and analysis (major and trace elements) of pumped water. ***Hydrology –*** (1) A number of monitoring sample points have been identified in the Hydrological report (**Appendix L**). Additional sampling points have been recommended and should be included in the final water monitoring plan. (2) As part of the monitoring program going forward, samples should be taken monthly for at least the first year of operation. This can be revised to quarterly monitoring if no concerns are highlighted with the approval of DWAS. (3) The monitoring should include the standard analysis of major cations/anions as well as ICP scan for metals. (4) A conceptual storm water management plan (**Appendix L**) has been developed based on the requirements of GN R. 704 of the National Water Act of 1998. (5) Implementation of the guidance provided by the South African National Roads Agency Limited (SANRAL) drainage manual. This document provides guidance on maximum permissible velocities for grass covers to avoid erosion and should be consulted during the detailed design phase.		
18.Topsoil and subsoil stripping & stockpiling for mining operation area **19.Opencast mining excavations** **32. Water Management**	**Destruction of upstream tributaries and reduction in water in the catchment**	Construction & Operational		***Implementation of EMS***: (1) Develop a water monitoring management plan. (2) Record and report all incidents related to affecting water quality. (3) Development of Mine Rehabilitation, decommissioning and mine closure liability Plan in compliance with GN R. 1147 of NEMA, addressing the rehabilitation measures related to reinstatement of drainage lines. (4) Ensuring corrective and preventative actions are taken to address nonconformities. (5) Communicating findings of concern to I&AP. (6) Development and implementation of a storm water management plan. (7) Regular inspection of erosion prone areas for signs of erosion. (8) A soil conservation and stockpiling plan to be developed and implemented. ***On-site mitigation measures:*** (1) Plan the final site layout in a manner as to reduce the destruction of upstream tributaries. (2) In the event that drainage patterns will be altered, the natural flow to be diverted as to prevent reduction of water in the catchment. (3) Any diversions to be in such a manner as to avoid erosion formation or pollution through siltation and sedimentation. (4) Ensure water quality complies with the requirements stipulated by the Water Use Licence conditions. (5) Channels and drainage systems required to divert the flow of drainage lines to be designed by a civil engineer, taking into consideration the peak volumes and flow. (6) Ensure rehabilitation measures are according to rehabilitation plan and that measures are taken to	(1) Develop and implement a storm water management plan. (2) Develop and implement a water management plan specifically including a strategy for the management of alterations to drainage patterns.	Entire Life cycle of project

				prevent the formation of erosion dongas or rills. **Legal requirements:** (1) A Water Use Licence to be obtained for all river crossings or development of infrastructure within or within close proximity to a watercourse as defined by the National Water Act, act no of 1996. (2) Requirements stipulated by GN R. 704 to be considered in the final site layout plan by the appointed engineers. **Specialist recommendations:** ***Geohydrology –*** (1) Development of an environmental monitoring programme in order to monitor the groundwater quality and groundwater level changes up- and downstream of the proposed open cast mine workings. (2) Collected monitoring data (quarterly) may be used for future model updates (e.g. every second year). (3) A number of geosites (i.e. boreholes, springs and surface water drainages) and newly proposed boreholes were identified (refer to the Geohydrological report in **Appendix M**) to be included into a monthly/quarterly monitoring programme. (4) The parameters to be analysed should comprise the following: Physical-chemical parameters (pH, EC, TDS);Major anions (F, Cl, NO3, SO4, HCO3, NH4, PO4,);Major cations (K, Na, Mg, Ca, NH4,); and Other elements/metals (Fe, Mn, Zn, Pb, Co, Cr, Cr (VI),). (5) Emphasis should be placed on monitoring of groundwater levels prior mining and during the operation phase as well as to establish the origin of the elevated nitrate concentrations in the project area. (6) Recording of pit dewatering rates. Initial monthly (and later quarterly) sampling and analysis (major and trace elements) of pumped water. ***Hydrology –*** (1) A number of monitoring sample points have been identified in the Hydrological report (**Appendix L**). Additional sampling points have been recommended and should be included in the final water monitoring plan. (2) As part of the monitoring program going forward, samples should be taken monthly for at least the first year of operation. This can be revised to quarterly monitoring if no concerns are highlighted with the approval of DWAS. (3) The monitoring should include the standard analysis of major cations/anions as well as ICP scan for metals. (4) A conceptual storm water management plan (**Appendix L**) has been developed based on the requirements of GN R. 704 of the National Water Act of 1998. (5) Implementation of the guidance provided by the South African National Roads Agency Limited (SANRAL) drainage manual. This document provides guidance on maximum permissible velocities for grass covers to avoid erosion and should be consulted during the detailed design phase.		
18.Topsoil and subsoil	**Influx of alien**	Construction &		***Implementation of EMS:***	(1) Develop and implement an alien eradication	Entire Life cycle of project

stripping & stockpiling for mining operation area **19.Opencast mining excavations** **21. RoM & product stockpiling** **33. Rehabilitation of mining areas**	**invasive vegetation**	Operational		(1) Development and implementation of an alien and invasive control plan (2) Awareness training on the identification of weeds and alien species to employees responsible for the management of these species. ***On-site mitigation measures:*** (1) Alien vegetation growing on topsoil stockpiles must be removed immediately in a manner as to prevent re-growth. (2) All disturbed areas to be monitored on a regular basis for exotic or invasive plant species and weeds. (3) Chemical removal shall be used in accordance with the manufacturer's specification for weeds where mechanical eradication/control is no longer affective. (4) The type of chemical to be utilised must be determined in consultation with a herbicide consultant and the Environmental Control Officer/Environmental Officer/SHEQ Officer. (5) Those exotic/invasive plant or weed which cannot be eradicated by means of herbicides, needs to be manually removed from site. (6) The herbicide consultant must have a Pest Control Operators licence. (7) Control the type of material imported to site to ensure that soil contamination, in terms of weed and alien invasive plants does not occur. ***Legal requirements:*** (1) Adherence to requirements stipulated by GN R. 598 of NEMBA. (2) ***Section 3: Category 1b Listed Invasive Species*** ***(A total number of 6 species were identified – Appendix G):*** (2.1) Category 1b Listed Invasive Species are those species listed as such by notice in terms of section 70(1)(a) of the Act as species which must be controlled. (2.2) A person in control of a Category 1 b Listed Invasive Species must control the listed invasive species in compliance with sections 75(1), (2) and (3) of the Act. (2.3) If an Invasive Species Management Programme has been developed in terms of section 75(4) of the Act, a person must control the listed invasive species in accordance with such programme. (2.4) A person contemplated in sub-regulation (2) must allow an authorised official from the Department to enter onto the land to monitor, assist with or implement the control of the listed invasive species, or compliance with the Invasive Species Management Programme contemplated in section 75(4) of the Act. (3) ***Section 4. Category 2 Listed Invasive Species*** ***(One specie has been identified – Agave sisalana):*** (3.1) Category 2 Listed Invasive Species are those species listed by notice in terms of section 70(1)(a) of the Act as species which require a permit to carry out a restricted activity within an area specified in the Notice or an area specified in the permit, as the case may be. (3.2) Unless otherwise indicated in the Notice, no person may carry out a restricted activity in respect of a Category 2 Listed Invasive Species without a permit. (3.3) A landowner on whose land a Category 2 Listed Invasive Species occurs or person in	and control management plan.	

				possession of a permit, must ensure that the specimens of the species do not spread outside of the land or the area specified in the Notice or permit. (3.4) If an Invasive Species Management Programme has been developed in terms of section 75(4) of the Act, a person must control the listed invasive species in accordance with such programme. (3.5) Unless otherwise specified in the Notice, any species listed as a Category 2 Listed Invasive Species that occurs outside the specified area contemplated in sub-regulation (1), must, for purposes of these regulations, be considered to be a Category 1 b Listed Invasive Species and must be managed according to Regulation 3. (3.6) Notwithstanding the specific exemptions relating to existing plantations in respect of Listed Invasive Plant Species published in Government Gazette No. 37886, Notice 599 of 1 August 2014 (as amended), any person or organ of state must ensure that the specimens of such Listed Invasive Plant Species do not spread outside of the land over which they have control. (4) ***Section 5. Category 3 Listed Invasive Species (One specie has been identified – Morus alba):*** (4.1) Category 3 Listed Invasive Species are species that are listed by notice in terms of section 70(1)(a) of the Act, as species which are subject to exemptions in terms of section 71(3) and prohibitions in terms of section 71A of Act, as specified in the Notice. (4.2) Any plant species identified as a Category 3 Listed Invasive Species that occurs in riparian areas, must, for the purposes of these regulations, be considered to be a Category 1b Listed Invasive Species and must be managed according to regulation 3. (4.3) If an Invasive Species Management Programme has been developed in terms of section 75(4) of the Act, a person must control the listed invasive species in accordance with such programme. (5) When using herbicides and pesticides, requirements stipulated in section 7(2)(a)i) of the Fertilizers, farm feeds, agricultural remedies, and stock remedies Act of 1947 must be considered. (6) Requirements for the prohibition of spreading weeds stipulated in section 5 of the Conservation of Agricultural Resources Act (CARA) of 43 must be adhered with. (7) Regulation 15 of GN R.1048 published under CARA must be adhered with and considered as part of the alien invasive species management plan. ***Specialist recommendations:*** (1) Wheels of large machinery should be checked prior to entering the site and cleared of seed material of alien invasive plants if transport routes go through infested areas (especially of species with spiny or bur-like seeds). Such seed must be destroyed. (3) If filling material is to be used, this should be sourced from areas free of invasive species (4) Monitor the establishment of (alien) invasive species and remove as soon as detected, whenever possible before flowers or other regenerative material can be produced. Destruction of regenerative material by burning in a protected area is encouraged. (5) Adherence to the comprehensive Plant Search and rescue, Re-vegetation and Alien Invasive Management plan (Appendix E of the Biodiversity Impact Report (**Appendix G** to this report)).		

19.Opencast mining excavations **20.Drilling & Blasting** **21. RoM & product stockpiling** **22. Residue stockpiles** **23. Screening Operations** **24. Discard disposal (backfilling of mining area)** **25. Waste generation, storage and disposal** **26. Chemical Toilets** **27. River crossings** **28. Water supply (potable & process)** **29. Storage of fuel and lubricants in temporary facilities** **32. Water Management**	**Contamination of water resources**	Construction & Operational		**<u>Implementation of EMS:</u>** (1) Development and implementation of a water monitoring program. (2) Development and implementation of an Integrated Water and Waste Management Plan (IWWMP) (3) Development and implementation of a storm water management plan. (4) Regular inspections of all areas posing a risk of contaminating water resources. (5) Reporting and recording all related incidents according to a developed procedure. (6) Develop and implement an emergency preparedness plan. (7) Ensuring corrective and preventative actions are taken to address nonconformities. (8) Communicating findings of concern to I&AP. **<u>On-site mitigation measures:</u>** (1) All sources of process water must be identified and quantified for the life cycle of the authorised activities. (2) A wastewater management system must be installed complying with regal requirements. (3) A water use licence for waste water storage facilities to be obtained. (4) All waste water management facilities to be designed by a qualified engineer. (5) Wash bays, service areas, and fuel storage areas may not be located within the 1:100 year flood line or horizontal distance of 100 m (whichever is greater) of a watercourse or drainage line. (6) No environmentally harmful detergents may be used. (7) Workshops, refuelling depots and washing areas shall be bunded. (8) All bunded areas to be constructed in a way as to avoid seepage to the surrounding environment as well as be able to contain its content to a capacity of 110%. (9) Water from wash bays, service areas and fuel storage areas must be discharged into oil separators and sumps. (10) Oils collected in this manner should be retained in a safe holding tank and removed from site by specialist oil recycling company or disposal at approved waste disposal sites. (11) No drainage from fuel storage areas to be permitted. (12)Never hose oil or fuel spills into storm water drain or sewer, or into the surrounding natural environment. (13) Any contaminated storm water and other run-off from dirty areas to be disposed off in the suitably designed PCD's. (14) Any spill which may contaminate water must be treated according to the approved spill management procedure. (15) Contain oil or fuel spills in water using an approved oil absorbent fibre. (16) Grey water not deemed suitable for dust suppression must be disposed of with other waste water in the designated and suitably designed PCD. (17) Waste water as well as spilled fuel collected within bunded areas and refuelling areas shall be disposed of or treated as hazardous waste. (18) Avoid unnecessary alteration of drainage lines.	(1) Develop and implement an Integrated Waste Water Management Plan (IWWMP). (2) Develop and implement a water monitoring schedule according to the water management plan. (3) Ensure compliance with the WUL conditions. (4) Develop an emergency preparedness plan addressing the prevention and management of incidents related to water contamination.	Entire Life cycle of project

				(19) Avoid locating lay down areas, wash bays, workshops etc. within the 1:50 year flood line or within horizontal distance of 100 m (whichever is greater) of a water course. (20) Contain contaminated runoff from dirty areas (i.e. lay down areas, RoM and product stockpile areas, workshops, fuelling bays etc.) in suitable designed PCD's. (21) Contaminated runoff to be treated and re-used for processing water or dust suppression in dirty areas only when complying with legal requirements or water quality standards specified in the Water Use Licence. (22) Do not locate any ablution facilities, chemical toilets, sanitary convenience, septic tanks, or French drains within the 1:100 year flood line, or within a horizontal distance of 100 m (whichever is greater) of any watercourses. (23) Do not allow the use of any drainage line or wetland for swimming, bathing, or cleaning of clothing, tools or equipment. (24) Prevent the discharge of water containing polluting matter or visible suspended materials directly into drainage lines or streams. (25) Deflect any unpolluted water/runoff away from any dirty area. (26) Ensure that no storm water is allowed to enter any drainage installation for the reception, conveyance, storage, and or treatment of sewage. (27) Before any water is permitted to enter natural drainage lines, the quality of the water must comply with the standards contained within the Water Use Licensing conditions authorised by the DWAS. (28) Ensure water passing trough vehicle wash bays and workshops pass through oil separators before passing into conservancy tank. (29) Avoid unnecessary cutting roads through river, stream banks as this may lead to erosion causing siltation of streams and downstream dams. **Legal requirements:** (1) Obtain a Water Use Licence from the DWAS. **Specialist recommendations:** ***Geohydrology –*** (1) Development of an environmental monitoring programme in order to monitor the groundwater quality and groundwater level changes up- and downstream of the proposed open cast mine workings. (2) Collected monitoring data (quarterly) may be used for future model updates (e.g. every second year). (3) A number of geosites (i.e. boreholes, springs and surface water drainages) and newly proposed boreholes were identified (refer to the Geohydrological report in **Appendix M**) to be included into a monthly/quarterly monitoring programme. (4) The parameters to be analysed should comprise the following: Physical-chemical parameters (pH, EC, TDS);Major anions (F, Cl, NO3, SO4, HCO3, NH4, PO4,);Major cations (K, Na, Mg, Ca, NH4,); and Other elements/metals (Fe, Mn, Zn, Pb, Co, Cr, Cr (VI),). (5) Emphasis should be placed on monitoring of groundwater levels prior mining and during the operation phase as well as to establish the origin of the elevated nitrate concentrations in the project		

				area. (6) Recording of pit dewatering rates. Initial monthly (and later quarterly) sampling and analysis (major and trace elements) of pumped water. ***Hydrology –*** (1) A number of monitoring sample points have been identified in the Hydrological report (**Appendix L**). Additional sampling points have been recommended and should be included in the final water monitoring plan. (2) As part of the monitoring program going forward, samples should be taken monthly for at least the first year of operation. This can be revised to quarterly monitoring if no concerns are highlighted with the approval of DWAS. (3) The monitoring should include the standard analysis of major cations/anions as well as ICP scan for metals. (4) A conceptual storm water management plan (**Appendix L**) has been developed based on the requirements of GN R. 704 of the National Water Act of 1998. (5) Implementation of the guidance provided by the South African National Roads Agency Limited (SANRAL) drainage manual. This document provides guidance on maximum permissible velocities for grass covers to avoid erosion and should be consulted during the detailed design phase.		
20.Drilling & Blasting	**Damage to surrounding landowner properties**	Construction & Operational		***Implementation of EMS***: (1) Develop and implement a Drilling and Blasting procedure. (2) Develop and implement a drilling and blasting monitoring plan. (3) Pre and post inspections of possible affected properties. (4) Record keeping of all drilling and blasting activities, clearly indicating time and date of blast. (5) Reporting and recording all related incidents according to a developed procedure. (6) Develop and implement an emergency preparedness plan. (7) Ensuring corrective and preventative actions are taken to address nonconformities. (8) Communicating findings of concern to I&AP. ***On-site mitigation measures:*** (1) Ensure the mitigation measure stipulated by the drilling and blasting procedure are implemented. (2) Ensure the appointment of a suitably qualified blasting supervisor or officer. (3) Before any blasting activity commences a visual inspection of the blasting area or if within 5 metres from the high wall, an inspection of the high wall must be done. (4) Special attention must be paid to visible cracks, fallen ground, overhangs, loose material, boulders, fault lines, water seepage, and slip panes. (5) If the area is declared as safe by the Blasting supervisor/officer, then only may blasting activities proceed. (6) If a specific area is deemed as unsafe, the area must be demarcated and the production manager must be notified of the area. (7) Record must be kept of all the inspection reports.	(1) Develop and implement a Drilling and Blasting procedure. (2) Develop and implement an emergency preparedness plan.	Entire Life cycle of project

				(8) The demarcated area must be made safe before any blasting activities will be allowed to commence. (9) In the event that attempts made to ensure the safety of demarcated areas, alternative measures needs to be implemented or blasting in that specific area should be avoided. (10) Only authorised personnel suitably qualified must be allowed to enter designated blasting zones. (11) These personnel must be equipped with appropriate PPE at all times. (12) The appointed personnel must spend the minimum amount of time to complete their work in danger zones. (13) While the work is continuing within the danger area, a periodical visual inspection must be done by the Blasting supervisor/officer to ensure the safety of any persons or infrastructure. (14) All machines or equipment working closer than 5 m from a high wall must be fitted with a Fall-on-Protection cab. (15) Drilling must be done perpendicular to the high wall with the mast between the cab and the high wall. (16) Drilling closer than 5m from the high wall will be a daylight operation only. (17) Only appointed and certified surface blasters will be allowed to blast on surface. (18) A siren (audible for at least a distance of 500m) must be sounded at least 5 minutes before each blast and must be sounded continually until the danger from blast has passed. (19) Each blast must take place during the hours of daylight and at a time when least disruption or interruption of the activities of other parties is likely to be caused. (20) The firing of explosives charges prepared for each blast will take place either by means of electronic methods, or when necessary an approved shot firing apparatus. (21) In each case where more than one shot hole is to be fired at any one time, the use of electronic methods of initiation for timing and minimal vibration and air blast purposes is used. (22) This aforementioned affords affective and safe blast designs with maximum efficiency in terms of fragmentation and confined peripheral impacts. (23) Charged patterns must be fired from a safe place where the shot firer has the clearest view of the area in the vicinity of the designated blasting site. (24) Consideration must be taken when blasting in overcast conditions or if visibility is poor as a result of mist, smoke, rain etc. or if high wind is blowing. Should such conditions continue past sunset, a "stand down" should be declared and the inspector of explosives must be contacted to request a "sleep over" of the blast. (25) All necessary precautions such as guarding and barricading off must then are implemented. (26) No secondary blasting may be carried out at any time that primary blasting operations are being conducted. (27) No blasting will take place under high-tension electrical cables or near to structures without the necessary risk assessments conducted and approvals granted. (28) Guards to be posted as specified to prevent any unauthorised entry into a blasting area. (29) The person in charge will ensure that there are no persons in the vicinity of the blasting area that		

				could be endangered by the blast. (30) Only authorised persons allowed on the pattern, alternatively permission must be obtained from the blast supervisor/officer. (31) All relevant signs and contraband box to be in place at designated entrance to the pattern. (32) The destruction of any explosives must be done according to the specified procedure. ***Legal requirements:*** (1) Compliance with the Health and Safety Act (Act 29 of 1996). (2) Compliance to the Mine and Explosives Act, Act no 15 of 2003. ***Specialist recommendations:*** (1) Development of a drilling and blasting procedure that complies with the Health and Safety Act (Act 29 of 1996) and the explosives act, act no 15 of 2003.		
22. Residue stockpiles **25. Waste generation, storage and disposal**	**Hazardous Leachate**	Operational		***Implementation of EMS:*** (1) Design and implement an Integrated Waste Water Management Plan (IWWMP). (2) Develop and implement a water quality management plan. (3) Regular inspections of the waste management areas and/or facilities. (4) Reporting and recording all related incidents according to a developed procedure. (5) Develop and implement an emergency preparedness plan. (6) Ensuring corrective and preventative actions are taken to address nonconformities. (7) Communicating findings of concern to I&AP. ***On-site mitigation measures***: (1) Ensure mitigation measures are implemented as to avoid the leachate of hazardous chemicals into the surrounding environment. (2) Implement a ground water monitoring plan and ensure the legal thresholds are not being exceeded. (3) Ensure remediation actions are taken immediately in the formation of hazardous leachates. (4) Ensure compliance with the issued Waste Management Licence. ***Legal requirements***: (1) Ensure requirements stipulated in the National Environmental Management: Waste Act (NEMWA) of 2008 are incorporated in the Waste Management Plan. (2) GN R. 634 list a number of requirements related to Waste classification and management. These requirements as stipulated in the regulations must be incorporated into the Waste Management Plan. (3) GN R. 921 list a number activities that requires a Waste Management Licence in terms of NEMWA. Listed activity number 11 ("The establishment or reclamation of a residue stockpile or residue deposit resulting from activities which require a mining right in terms of the MPRDA (Act 28 of 2002)") will require a waste management licence in terms of the regulations. (4) GN R. 625 sets requirements for a waste producer to register and report waste quantity of the National Waste Information System. (5) GN R. 635 sets the National norms and standards for the assessment of waste for landfill. The	(1) Develop and implement a Waste Management plan. (2) Develop and implement an Integrated Waste Water Management plan.	Entire Life cycle of project

				procedures for determining the class of waste for landfill must be incorporated into the Waste Management plan. (6) GN R. 636 sets the National norms and standards for the disposal of waste for landfill. These requirements should be considered when disposing waste to landfill. (7) GN R. 926 stipulates the norms and standards associated to the storage of waste. These requirements must be incorporated in the Waste Management Plan. (8) All waste tyres generated on site must be managed according to the Waste tyre regulations published under the Environment Conservation Act of 1989. **Specialist recommendations**: ***Geohydrology –*** (1) Development of an environmental monitoring programme in order to monitor the groundwater quality and groundwater level changes up- and downstream of the proposed open cast mine workings. (2) Collected monitoring data (quarterly) may be used for future model updates (e.g. every second year). (3) A number of geosites (i.e. boreholes, springs and surface water drainages) and newly proposed boreholes were identified (refer to the Geohydrological report in **Appendix M**) to be included into a monthly/quarterly monitoring programme. (4) The parameters to be analysed should comprise the following: Physical-chemical parameters (pH, EC, TDS);Major anions (F, Cl, NO3, SO4, HCO3, NH4, PO4,);Major cations (K, Na, Mg, Ca, NH4,); and Other elements/metals (Fe, Mn, Zn, Pb, Co, Cr, Cr (VI),). ***Hydrology –*** (1) A number of monitoring sample points have been identified in the Hydrological report (**Appendix L**). Additional sampling points have been recommended and should be included in the final water monitoring plan. (2) As part of the monitoring program going forward, samples should be taken monthly for at least the first year of operation. This can be revised to quarterly monitoring if no concerns are highlighted with the approval of DWAS. (3) The monitoring should include the standard analysis of major cations/anions as well as ICP scan for metals.		
25. Waste generation, storage and disposal	**Illegal dumping**	Construction & Operational		***Implementation of EMS***: (1) Develop and implement as waste management plan with the focus on reuse, reduce, recycle, or avoid. (2) Development and maintenance of a waste disposal record keeping system. ***On-site mitigation measures:*** (1) Characterise and quantify all waste streams associated to the authorised activities in terms of quantity, hazard, generation frequency and recyclability and define and implement disposal options as specified in the waste management plan. (2)As part of the characterisation define opportunities for source reduction, as well as reuse and	(1) Compliance with the National Environmental Management: Waste Act, act no 59 of 2008 and associated regulations.	Entire Life cycle of project

				recycling as opposed to simply disposing waste. (3) Ensure segregation of hazardous wastes from non-hazardous. (4) Sealable bins and containers must be made available for the storage of all streams of waste. (5) During the construction phase, temporary storage of construction waste to be stored in a bunded designated area. (6) Waste will not be stored longer than specified by the waste regulations. If storage exceeds the threshold stipulated by the regulations a waste management licence must be obtained. (7) All waste materials must be removed off site by a suitable and registered waste service provider. (8) All waste to be disposed off at a suitably registered waste disposal facility. (9) Proof of disposal to be obtained and kept on record. (10) Maintain a waste register for materials removed from site, indicating type, quantity, date, haulage contractor, delivery point, and safe disposal certificates. (11) All waste receptacles to be clearly labelled according to type. (12) Where possible, recyclable waste including glass, paper, and plastic must be separated, stored and recycled where possible. (13) Waste oil and scrap metal should also be recycled if possible. (14) All employees or contractors must be informed about the necessity of using waste drums. (15) No littering will be allowed and a daily site clean-up will be initiated. (16) All domestic refuge generated by staff and sub-contractors must be disposed at a registered waste disposal facility by a suitably registered service provider on a regular basis (i.e. weekly). (17) Measures to ensure that solid waste is transported as to avoid waste spills en-route must be implemented. (18) Waste bins must be emptied on a regular basis as to ensure bins do not overflow. (19) Site should be kept clean and free of rubbish that could potentially attract animal pests and that bins are scavenger proof. (20) DO not dump waste of any nature, or any foreign material into any drainage line or stream. A strict no dumping policy must be communicated to all staff and sub-contractors. (21) During transportation of waste, all waste service providers must comply with the codes of practice and guidelines for licensing of waste transport vehicles and the regulation and monitoring of transport operations. **Legal requirements**: (1) Ensure requirements stipulated in the National Environmental Management: Waste Act (NEMWA) of 2008 are incorporated in the Waste Management Plan. (2) GN R. 634 list a number of requirements related to Waste classification and management. These requirements as stipulated in the regulations must be incorporated into the Waste Management Plan. (3) GN R. 921 list a number activities that requires a Waste Management Licence in terms of NEMWA. Listed activity number 11 ("The establishment or reclamation of a residue stockpile or residue deposit resulting from activities which require a mining right in terms of the MPRDA (Act 28 of 2002)") will require a waste management licence in terms of the regulations.		

				(4) GN R. 625 sets requirements for a waste producer to register and report waste quantity of the National Waste Information System. (5) GN R. 635 sets the National norms and standards for the assessment of waste for landfill. The procedures for determining the class of waste for landfill must be incorporated into the Waste Management plan. (6) GN R. 636 sets the National norms and standards for the disposal of waste for landfill. These requirements should be considered when disposing waste to landfill. (7) GN R. 926 stipulates the norms and standards associated to the storage of waste. These requirements must be incorporated in the Waste Management Plan. (8) All waste tyres generated on site must be managed according to the Waste tyre regulations published under the Environment Conservation Act of 1989.		
26. Chemical Toilets	**Smell nuisance**	Construction & Operational		***Implementation of EMS***: (1) Develop and maintain an Integrated Waste and Water Management Plan (IWWMP). (2) Frequent inspections of areas posing a possible risk of causing smell nuisance. (3) Development and implementation of an incident response plan. (4) Reporting and recording all related incidents according to a developed procedure. (5) Develop and implement an emergency preparedness plan. (6) Ensuring corrective and preventative actions are taken to address nonconformities. (7) Communicating findings of concern to I&AP. ***On-site mitigation measures:*** (1) Putrescible waste must be handled, stored, and disposed of before the probability of it generating odours. (2) Chemical toilets must be emptied/ serviced on a regular basis. Proof of this must be obtained and kept on record. (3) Sewage tanks must be emptied on a regular basis. Proof of this must be obtained and kept on record.	(1) Develop and implement an Integrated Waste Water Management plan specifically addressing the management of sewage or chemical toilets. (2) Develop and implement a Infrastructure inspection programme to ensure no leaks or spillages of sewerage or waste. (3) Develop and implement a Waste Management plan.	Entire Life cycle of project
28. Water supply (potable & process) **32. Water Management**	**Improper water storage management**	Construction & Operational		**Implementation of EMS:** (1) Water usage monitoring plan to be developed and implemented. (2) Create awareness of water conservation. (3) Regular inspections of water storage facilities. (4) Reporting and recording of water management related incidents. **On-site mitigation measures:** (1) Filtered or treated water from PCD's may be used for dust suppression should they conform to the sediment load requirements or other quality requirements as specified by the Water Use Licence issued by the Department of Water Affairs and sanitation. (2) Monitor water usage and ensure that areas of waste are identified and minimised.	(1) Develop and implement a water management plan specifically addressing the storage of water as well as the frequent inspections of storage facilities.	Entire Life cycle of project

				(3) Where possible, reuse water from the PCD's for dust suppression on the roads. (4) Water may only be abstracted from the approved abstraction points once all grey water or run-off water complying with the quality requirements has been utilised for the purposes of dust suppression. (5) The volume of water abstracted may not exceed the limits stipulated by DWAS by more than 5% on an annual basis. (6) Water storage facilities to be inspected on a weekly basis to ensure no leaks or contamination of water source. (7) Water storage facilities and infrastructures to be maintained to a good working condition at all times. **Legal requirements:** (1) A Water Use Licence to be obtained for all river crossings or development of infrastructure within or within close proximity to a watercourse as defined by the National Water Act, act no of 1996.		
29. Storage of fuel and lubricants in temporary facilities	**Chemical Fires**	Construction & Operational		***Implementation of EMS***: (1) Develop and implement a Hazardous substances management plan. (2) Develop an emergency procedure addressing in particular the management of chemical fires and spill response. (3) Report and record all incidents related to chemical fires. (4) Employees must be trained on emergency response procedures required to counter the nature and hazards of an accidental release. (5) Employees must be familiar with and have received the appropriate training regarding the handling and storage practices, for all containers with which they will come into contact. (6) Document the types and amounts of hazardous materials present on the project site (including for example the name and description, classification, regulatory reporting threshold, quantities, characteristics, analysis of potential consequence, identification of location, details of responsible persons, detail of availability of spill response equipment etc.). (7) The emergency response procedure should describe response activities in the event of a spill, release, or other chemical emergency and include the internal and external notification procedure, specific responsibilities of individuals or groups, decision process for assessing severity of the release, and determining appropriate actions, facility evacuation routes, and post event activities such as clean-up and disposal, incident investigation, employee re-entry, and restoration of spill response equipment. (8) Procedures should be prepared for informing the public and emergency response agencies, documenting first aid and emergency medical treatment, taking emergency response actions, reviewing and updating the emergency response plan to reflect changes, and using, inspecting, testing, and maintaining the emergency response equipment. (9) Ensuring corrective and preventative actions are taken to address nonconformities. (10) Communicating findings of concern to I&AP. ***On-site mitigation measures:***	(1) Develop and implement a fire prevention plan that includes measures of prevention and response to chemical fires. (2) Develop an emergency preparedness procedure and include the process to be followed in case of a chemical fire. (3) Develop a Hazardous substances management plan. (4) Develop a frequent inspection programme to include inspections of hazardous substances storage facilities.	Entire Life cycle of project

				(1) Reactive, flammable, and explosive materials must be managed to avoid uncontrolled reactions or conditions resulting in fire or explosion. (2) Ensure storage of incompatible materials (acids, basis, flammables, oxidisers, reactive chemical) in separate areas, and with containment facilities separating material storage areas. (3) Ensure the provision of material-specific storage for extremely hazardous or reactive materials. (4) Ensure the use of flame arresting devices on vents from flammable storage containers. (5) Ensure the provision of grounding and lightning protection. (6) Ensure the storage of hazardous materials in an area of the facility separated from the main authorised activities. (7) Ensure that all personnel that use or handle hazardous materials are trained in the use and potential dangers of the materials. (8) Implement all measures detailed in the spill prevention procedure in the event of a spill. (9) Prevent uncontrolled releases of hazardous materials to the environment or uncontrolled reactions that might result in fire or explosion using engineering controls (containment, automatic alarms, and shut-off systems) commensurate with the nature of hazard. (10) Implement management controls (procedures, inspections, communications, training, and drills) to address residual risks that have not been prevented or controlled through engineering measures. (11) Store all hazardous (reactive, flammable, corrosive and toxic) materials in clearly identified, fit-for-purpose containers or vessels. (12) Chemical products must be secured when not needed to prevent tampering and vandalism. (13) Provide warning notices, fire fighting facilities and protection from weather damage. (14) Each shift supervisor or safety officer is to report on the integrity of the hazardous material storage. (15) Keep products in their original container (unless they are not re-sealable) with all stored products and containers being labelled, and original labels and MSDS retained. (16) Label containers so that the hazard nature of the material is clear. (17) Obtain Material Safety Data Sheets (MSDS) for all chemicals before use and all materials must be handled according to the instructions. (18) Transporters of hazardous materials must ensure that the vehicle is suitable and registered for the purpose it is being used. (19) Transport vehicles must display clear markings in English indicating the nature of the materials being carried, what to do in the event of an emergency, and an emergency telephone number (24 hour) of a responsible person who can provide advice in the event of an emergency. (20) No combustible material (e.g. wood, rags, carton boxes, etc.) are to be kept in the presence of flammable liquids. (21) "No Open Flames" and "No smoking" symbolic signs are to be displayed in the vicinity of the flammable liquid storage areas. (22) Flammable liquids are to be issued only on a need-to-use-basis and strict control is to be exercised to ensure that persons do not draw more than what is needed for the specific job.		

				(23) All cables are to be grounded as appropriate. (24) An adequate number (according to safety regulations) and type of fire fighting equipment is to be available in the close vicinity of the flammable liquid store. (25) Flammable liquid stores are to be well ventilated and free of explosive vapours. (26) Flammable liquid containers in stores are to be clearly marked or labelled as to their contents. (27) Locations are to support MSDS information and handling/storage instructions. (28) Flammable liquid tanks are to be properly earthed in order to prevent static electricity accumulating. (29) Drainage points on flammable liquid tanks are to be provided with threaded caps or blanking plates. (30) Bund walls are to surround storage tanks containing flammable liquids and these must be able to contain the entire volume of the contents plus 10% in case of spillage. (31) Earting is to be tested regularly (according to safety regulations). ***Legal requirements***: (1) Bulk storage facilities of flammable liquids to be approved by the provincial fire inspector. (2) Section 30 of the National Environmental Management Act (NEMA), Act 107 of 1998 describes measures to be taken to control emergency incidents. These requirements should be included in the development of the Emergency Response procedure. (3) Section 20 of the National Water Act 36 of 1998 describes the procedure for the control of incidents involving Hazardous substances. These requirements should also be included in the Emergency response procedure. (4) GN R. 1237 published under the Mine Health and Safety Act of 1996 describes the requirements for the storage of hazardous substances. These requirements should be incorporated into the Hazardous substances management plan. (5) Section 21 of the Mine Health and safety Act of 1996 describes the requirements for the acquisition of Hazardous chemicals. These requirements should be considered as part of the mine acquisition process. (6) Regulation 277, 273, and 279 of GN R. 225 of the National Road traffic Act of 1996 describes the requirements of transporting hazardous waste. These requirements should be incorporated in both the Hazardous substances management plan and the Waste Management plan. (7) Regulation 277 and 273 of GN R. 225 of the National Road traffic Act of 1996 describes the Loading and offloading of dangerous goods. These requirements should be addressed in the Hazardous substances management plan. (8) All requirements described in the Hazardous substance Act of 1973 should be included in the Hazardous substances management plan. (9) The storage of hazardous substances must be in compliance with regulation 4 of GN R. 704 of the National Environmental Management Act. (10) Requirements stipulated in SANS 10089-1:2008 (above ground storage facilities for petroleum products) must be incorporated into the Hazardous Substance Management plan and be implemented		

				on site. (11) Requirements stipulated by SANS 301: 2011 (Storage tank facilities for hazardous chemicals) must be incorporated into the Hazardous Substance Management plan and be implemented.		
31. Bulk transporting of Ore to market on Public roads	**Pressure on public transport infrastructure**	Construction & Operational		***Implementation of EMS***: (1) Develop and implement a traffic management plan. ***On-site mitigation measures:*** (1) Access roads should be planned so that only minimum linear distances are developed. (2) All storm water control mechanisms to be maintained. (3) Clean and repair any damages caused by the haul vehicles to public or private roads. (4) All incidents related to traffic resulting from the authorised activities should be documented and kept in the safety records. (5) Haulage of ROM product should preferably be scheduled off-peak hour traffic times. (6) Allow for safe pedestrian crossings where necessary. (7) Traffic calming measures must be implemented in consultation with the provincial traffic department. (8) Traffic calming measures will be required at points indicated by the Traffic assessment report (Attached as **Appendix P**). (9) Warning signs must be placed on and around the site as per the Occupational, Health and Safety act requirements. (10) Clearly indicate which activities are to be taken place within which areas of the site using demarcation and/or signage. (11) All incidents should be reported to the appointed Health and Safety officer/Manager, investigated, documented, and kept in a safety file (digital or hardcopy). (12) Traffic warning signage must be erected where applicable, along transport routes and access roads. (13) All access roads shall be properly marked. (14) Markers shall show the direction of travel. (15) Roads not being used shall be marked with a "No Entry" sign. (16) Position security lighting so that it does not pose a nuisance to residential properties or tourist facilities or a danger to road users. (17) Warning barricading should be placed around open excavations and should be suitable for varying weather conditions. ***Specialist recommendations***: (1) Turning the R555 / D1261 intersection from a four way stop control to two way priority stop control, with priority on the R555 (refer to the drawings provided as Appendix A Figure 10 in the Traffic Impact Assessment report attached as **Appendix P**). (2) Providing for exclusive turning lanes on the D1261 / Access to the mine intersection. (3) Provision of lighting of sufficient standards at the intersection of the D2161 / Access Road to the	(1) Develop and implement a traffic management plan. (2) Develop and implement a Public Complaints procedure.	Entire Life cycle of project

				BCR Chrome Mine. (4) Construction / paving (at least 400 m) of the existing access road to the proposed BCR Chrome Mine site east of the D1261 to prevent weathering on the edges of the D1261. (5) Provision of road signage and road markings. (6) No on-street pick up/drop offs at the D1261 Road / Access to mine intersection should be allowed (drop-offs / pickup should be done on site). (7) Parking provision should be done for trucks to prevent queuing on the national roads and the D1261. ***Human Health Aspects-*** *The following measures must be taken to improve road safety:* (1) Establish and maintain pictorial road-safety signage in local language and English language (if needed); (2) clearly demarcated pedestrian crossings in appropriate places; (3) descriptions along project roadways directly surrounding project facilities, including conveyor-belt routes if applicable, roadway rerouting areas, heavy equipment crossing areas, etc. (4) Regular vehicle maintenance; (5) adequately trained drivers; and (6) Adherence to speed limit, tracking of vehicles.		
Decommissioning						
35. Demolition / removal of portable and related infrastructure **36. Vehicular activity: removal of mobile plant / equipment and vehicles** **38. Demolition of PCD's** **39. Demolition of workshops, waste storage facilities, fuel storage facilities etc.**	**Hydrocarbon Contamination**	Decommissioning		***Implementation of EMS***: (1) Develop and implement a Hazardous substances management plan addressing handling, storage, and transport of hazardous substances. (2) Develop and implement an emergency response procedure addressing the procedure in case of a chemical spill. This procedure should ensure the fastest possible reaction to spills or accidents as well as addressing remediation procedures. (3) Development and implementation of an incident reporting procedure. (4) Ensuring corrective and preventative actions are taken to address nonconformities. (5) Communicating findings of concern to I&AP. ***On-site mitigation measures***: (1) Fuel to be stored in above ground storage tanks or sealed containers. (2) Hazardous substances to be stored within a bund area with a sump drainage. (3) Bunded areas to be designed to contain at least 110% of the storing capacity. (4) All spills (minor and major) must be cleaned and remediated to the satisfaction of the appointed environmental representative or the Department within 24 hours. (5) Any spillages on site to be excavated to the visible depth of impact and disposed of for removal to a registered hazardous waste disposal site. Alternative in-situ remediation techniques may be used. (6) On site spill kits or absorbent materials must be readily available. These kits must include materials to absorb, breakdown, and where possible encapsulate minor material spillages.	(1) Development of water management plan addressing monitoring and management requirements. (2) Development of a storm water management plan addressing the separation of "dirty" and clean "areas" (3) Development of emergency response plan with specific reference to spill prevention and remediation. (4) Development and implementation of vehicle/plant/equipment maintenance plan with specific reference to daily inspections of plant/vehicles/equipment for leaks or breakages. (5) Development and implementation of a Hazardous substances management plan.	Entire Life cycle of project

				(7) Where possible and practical all maintenance of vehicles and equipment shall take place in the workshop areas. Should emergency repairs be necessary, drip trays or tarpaulins must be utilised to ensure the collection of any hydrocarbons. (8) All vehicles, plant, and equipment must be inspected on a daily basis. Records to be made available for these inspections. (9) Drip trays or any form of oil absorbent material must be placed underneath vehicles and equipment (where possible leaks may occur) when not in use. (10) All vehicles, plant, and equipment must be well maintained to minimise the risk of fuel and oil leakages. (11) Leaking equipment shall be removed and repaired immediately from site to facility designated for repairs. ***Legal requirements***: (1) Section 30 of the National Environmental Management Act (NEMA), Act 107 of 1998 describes measures to be taken to control emergency incidents. These requirements should be included in the development of the Emergency Response procedure. (2) Section 20 of the National Water Act 36 of 1998 describes the procedure for the control of incidents involving Hazardous substances. These requirements should also be included in the Emergency response procedure. (3) GN R. 1237 published under the Mine Health and Safety Act of 1996 describes the requirements for the storage of hazardous substances. These requirements should be incorporated into the Hazardous substances management plan. (4) Section 21 of the Mine Health and safety Act of 1996 describes the requirements for the acquisition of Hazardous chemicals. These requirements should be considered as part of the mine acquisition process. (5) Regulation 277, 273, and 279 of GN R. 225 of the National Road traffic Act of 1996 describes the requirements of transporting hazardous waste. These requirements should be incorporated in both the Hazardous substances management plan and the Waste Management plan. (6) Regulation 277 and 273 of GN R. 225 of the National Road traffic Act of 1996 describes the Loading and offloading of dangerous goods. These requirements should be addressed in the Hazardous substances management plan. (7) All requirements described in the Hazardous substance Act of 1973 should be included in the Hazardous substances management plan. (8) The storage of hazardous substances must be in compliance with regulation 4 of GN R. 704 of the National Environmental Management Act. ***Specialist recommendations***: ***Geohydrology –*** (1) Development of an environmental monitoring programme in order to monitor the groundwater quality and groundwater level changes up- and downstream of the proposed open cast mine workings. (2) Collected monitoring data (quarterly) may be used for future model updates (e.g. every second		

				year). (3) A number of geosites (i.e. boreholes, springs and surface water drainages) and newly proposed boreholes were identified (refer to the Geohydrological report in **Appendix M**) to be included into a monthly/quarterly monitoring programme. (4) The parameters to be analysed should comprise the following: Physical-chemical parameters (pH, EC, TDS);Major anions (F, Cl, NO3, SO4, HCO3, NH4, PO4,);Major cations (K, Na, Mg, Ca, NH4,); and Other elements/metals (Fe, Mn, Zn, Pb, Co, Cr, Cr (VI),). ***Hydrology –*** (1) A number of monitoring sample points have been identified in the Hydrological report (**Appendix L**). Additional sampling points have been recommended and should be included in the final water monitoring plan. (2) As part of the monitoring program going forward, samples should be taken monthly for at least the first year of operation. This can be revised to quarterly monitoring if no concerns are highlighted with the approval of DWAS. (3) The monitoring should include the standard analysis of major cations/anions as well as ICP scan for metals.		
35. Demolition / removal of portable and related infrastructure **36. Vehicular activity: removal of mobile plant / equipment and vehicles** **37. Rehabilitation of the lay down areas** **38. Demolition of PCD's** **39. Demolition of workshops, waste storage facilities, fuel storage facilities etc.**	**Dust generation**	Decommissioning		***Implementation of EMS:*** (1) Development of a dust fallout monitoring plan. (2) Frequent Inspections of areas prone to dust generation. (3) Reporting and recording incidents related to air quality. (4) Ensuring corrective and preventative actions are taken to address nonconformities. (5) Communicating findings of concern to I&AP. ***On-site mitigation measures:*** (1) Construction activities to take place under the supervision of an environmental representative (2) Set the on-site speed limit to 40km/h for gravel roads and 50km/h for tar roads. (3) Develop and implement a dust suppression schedule. (4) Biodegradable and environmentally friendly flocculent (approved by the environmental control officer/environmental officer/ SHEQ officer) may be used as dust suppressant. (5) Wetting of stockpile areas. (6) Covering loads with tarpaulin when transporting ROM, product, or any material in order to prevent dust generation. (7) Disturbed areas no longer used for mining related activities shall be re-vegetated immediately. (8) Areas having to be stripped of topsoil for construction purposes must be kept to a minimum and only stripped when work is about to take place. ***Legal requirements:*** (1) Register online to the National Atmospheric Emissions Inventory System (NAEIS) in terms of the National Reporting Regulations (GNR 283) as Group C emitters. (2) Ensuring compliance with the National Ambient Air Quality Standards (GNR 1210 of 24 December	(1) Development and implementation of a Dust management plan as part of an Air quality management plan to including the monitoring and prevention programme. (2) Ensuring compliance with the National Environmental Management: Air Quality Act (NEMAQA), No. 39 of 2004 as amended by Act no 20 of 2014. (3) Ensure activities remain under the thresholds stipulated in GNR 893 (in terms of section 21 of NEMAQA. (4) Register online to the National Atmospheric Emissions Inventory System (NAEIS) in terms of the National Reporting Regulations (GNR 283) as Group C emitters. (5) Ensuring compliance with the National Ambient Air Quality Standards (GNR 1210 of 24 December 2009). (6) Ensuring compliance with the National Dust Control regulations (GNR 897 of November 2013)	Entire Life cycle of project

				2009). (3) Ensuring compliance with the National Dust Control regulations (GNR 897 of November 2013). (4) Section 39 of the Atmospheric Pollution Prevention Act of 1965 and GN R. 1651 specifies requirements regarding the control of emissions from diesel vehicles used on public roads. These requirements should form part of the Air quality Management Plan and the Vehicle/Plant/Equipment maintenance plan.. ***Specialist recommendations:*** (1) Development of a detailed air quality management plan (focusing on sources of dust located in close proximity to the residential receptors within the project boundary) ensuring adherence to thresholds stipulated in the Baseline Air Quality Impact Assessment report (BAQIAR) (**Appendix E**) prior to the commencement of operations. (2) Implementation of recommended dust control methods as stipulated in Table 6-1 of the BAQIAR (**Appendix E**). (3) Dust generated from material handling operations and mining operations can be significantly reduced by wet suppression with the use of water sprays. (4) The combined use of water sprays with chemical surfactants provide more extensive wetting making it a more affective technique than water suppression alone. (5) The loading, transfer, and discharge of materials should take place with a minimum height of fall and be shielded against the wind. (6) Controls to reduce emissions from unpaved roads can include vehicle restrictions which limit the speed, weight and number of vehicles on the road, surface improvements (paving or adding gravel to the road), and surface treatments (wet suppression or surface treatments). (7) All positive and negative effects of the different methods of dust suppression should be considered and the best feasible and successful option must be implemented. (8) Wind erosion from stockpiles and open areas can be minimised through the use of water sprays, wind breaks, vegetation and enclosures. (9) Implement strict vehicle restrictions such as speed limits, weight and number of trucks on the road per given time (10) Hauling activities should be strictly restricted to designated hauling routes. (11) Regular maintenance of the vehicles/trucks (engines) should be undertaken to ensure optimal efficiency of the engine. (12) Regular maintenance of hauling routes and surface improvements (where necessary) should be undertaken. (13) Regular sweeping and cleaning of tarred/paved road surfaces to prevent the accumulation of dust (14) Immediate clean-up of any spillage of material on the hauling routes. (15) Regular inspections should be carried out on the vehicles/trucks (engines, tyres, etc.) and the route to ensure both are in good quality. (16) All material transported should be covered, where possible, and not left exposed during transportation.		

				(17) Engines of the trucks should not be left running whilst not in use. (18) Clean fuels and fuel efficient vehicles/trucks/mobile equipment should be considered for use where possible. (19) Designated areas for the storage of overburden should be considered and incorporated into the design. (20) Monthly dust fallout monitoring as per the National Dust Control Regulations (2013) and reporting. (21) Monthly PM10 and PM2.5 ambient monitoring and reporting. This is also recommended to obtain baseline concentrations. (22) All main hauling roads should be treated for dust suppression to maintain at least 65% emission reduction efficiency.		
35. Demolition / removal of portable and related infrastructure **37. Rehabilitation of the lay down areas** **38. Demolition of PCD's** **39. Demolition of workshops, waste storage facilities, fuel storage facilities etc.**	**Degradation of soil resources**	Decommissioning		***Implementation of EMS***: (1) Develop and implement a soil conservation and stockpile management plan. (2) Frequent Inspections of areas prone to degradation. (3) Reporting and recording incidents related to degradation of soil resources. (4) Ensuring corrective and preventative actions are taken to address nonconformities. (5) Communicating findings of concern to I&AP. (6) Development of Mine Rehabilitation, decommissioning and mine closure liability Plan in compliance with GN R. 1147 of NEMA. ***On-site mitigation measures***: (1) All areas to be stripped firstly of topsoil and fertile soils and stockpiled in a designated area. (2) Do not mix sub-soil with topsoil and fertile soils. (3) Topsoil and fertile soil to be protected from contamination (i.e. hydrocarbons or infertile material). (4) Topsoil and fertile soil stockpiles to be protected from weathering conditions such as covering the stockpiles with indigenous, non-invasive vegetation. (5) Avoid stockpiling topsoil and fertile soil stockpiles within drainage lines or within the 1:10 year flood lines. (6) Implement storm water control measures on topsoil and fertile soil stockpiles. (7) Exposed areas to be re-vegetated with indigenous or non-invasive species or protected from erosion. (8) Rehabilitation of areas after the completion of works to take place as soon as possible. (9) Avoid over exposing un-vegetated areas as far as possible. ***Legal requirements:*** (1) Section 28 of NEMA relates to the duty of care and remediation of environmental damage. (2) The Conservation of Agriculture Resources Act (Act no. 107 of 1998) requires the protection of land against soil erosion and the prevention of water logging and silinization of soils by means of suitable soil conservation works to be constructed and maintained. These requirements should form part of the Soil Conservation and Stockpile management plan. ***Specialist recommendations***:	(1) Development of a soil conservation management plan. (2) Development of a storm water management plan. (3) Development and implementation of vehicle/plant/equipment maintenance plan with specific reference to daily inspections of plant/vehicles/equipment for leaks or breakages.	Entire Life cycle of project

				(1) Strip all usable soil, irrespective of soil depth. (2) Implement live placement of soil where possible, improve organic status of soils, maintain fertility levels and curb topsoil loss. (3) Implement surface digital terrain mapping to ensure surface water control measures are implemented to ensure free draining system with minimal soil erosion. (4) Loss of agricultural land due to establishment of infrastructure is a long term loss and no mitigation measures exist. Mitigation is restricted to limitation of extent of impact to the immediate area of impact and minimisation of off-site impacts. (5) Loss of agricultural land due to opencast mining is a temporary loss which can be mitigated by appropriate backfilling and re-placement of stockpiled topsoil. If done correctly, most of the original agricultural potential will be restored. (6) An Environmental Coordinator must manage environmental impacts in coordination with construction and operation schedule. (7) In the event that contractors are to be appointed these contractors to sign and undertake environmental compliance. (8) Keep disturbed areas and stockpiles to minimum to prevent soil loss. (9) Identify suitable areas to stockpile stripped soil. (10) Prevent surface runoff and seepage on site from contaminating stockpiled soils and stripped areas. (11) Minimise soil erosion through wind and water (12) Remediate and rehabilitate disturbed areas in accordance with development plan		
35. Demolition / removal of portable and related infrastructure **36. Vehicular activity: removal of mobile plant / equipment and vehicles** **37. Rehabilitation of the lay down areas** **38. Demolition of PCD's** **39. Demolition of workshops, waste storage facilities, fuel storage facilities etc.**	**Erosion**	Decommissioning		***Implementation of EMS***: (1) Development and implementation of a storm water management plan. (2) Regular inspection of erosion prone areas for signs of erosion. (3) A soil conservation and stockpiling plan to be developed and implemented. (4) Monthly monitoring of water quality (as per recommendation of specialist study). (5) Reporting and recording incidents related to erosion. (6) Ensuring corrective and preventative actions are taken to address nonconformities. (7) Communicating findings of concern to I&AP. ***On-site mitigation measures***: (1) Soil conservation measures to be implemented on stockpiles to prevent erosion. This could include the use of erosion control fabric or non-invasive grass seeding. (2) All areas susceptible to erosion must be identified and protection measures be implemented. (3) Retain natural trees, shrubbery and grass species where possible. (4) In areas within close proximity to wetlands, rivers and streams, sedimentation control measures to be implemented, specifically when excavations or disturbances takes place within river banks, or the river bed. (5) Formation of erosion channels ("dongas") to be prevented by applying soil erosion control and	(1) Development and implementation of a storm water management plan. (2) Development of a soil conservation management plan. (3) Development of Mine Rehabilitation, decommissioning and mine closure liability Plan in compliance with GN R. 1147 of NEMA.	Entire Life cycle of project

				bank stabilisation procedures as specified by a qualified environmental specialist. (6) Erosion formation beyond rills must be avoided. (7) Erosion damages to be repaired as soon as possible and no later than the target set by the Management team. (8) Slopes steeper than 1(V):4(H) or slopes where soils are by nature dispersive or erodible must be stabilised. (9) Where berms are installed on severe slopes the outflow shall be suitably stone pitched to prevent erosion from starting on berms. (10) Access routes should not traverse slopes with gradients in excess of 8%. (11) Wherever possible, access routes should avoid crossing drainage lines and riparian zones. (12) Drainage lines should not be altered and should be level with the surrounding land once subsistence has occurred. (13) Run-off from roads must be managed in a way to avoid erosion and prevent pollution. ***Legal requirements***: (1) Section 28 of NEMA relates to the duty of care and remediation of environmental damage. (2) The Conservation of Agriculture Resources Act (Act no. 107 of 1998) requires the protection of land against soil erosion and the prevention of water logging and silinization of soils by means of suitable soil conservation works to be constructed and maintained. These requirements should form part of the Soil Conservation and Stockpile management plan. ***Specialist recommendations***: ***Hydrology –*** (1) A conceptual storm water management plan (**Appendix L**) has been developed based on the requirements of GN R. 704 of the National Water Act of 1998. (2) Implementation of the guidance provided by the South African National Roads Agency Limited (SANRAL) drainage manual. This document provides guidance on maximum permissible velocities for grass covers to avoid erosion and should be consulted during the detailed design phase. ***Soil –*** (1) Disturbance areas to be stripped progressively as required to reduce erosion and sediment generation, to reduce the extent of topsoil and utilise stripped topsoil as soon as possible for rehabilitation. (2) The surface of the completed stockpile must be left in a rough condition to promote water infiltration and minimise erosion prior to vegetation establishment; (3) Topsoil stockpiles to have an embankment grade of approximately 1m vertical:4m horizontal (to limit the potential for erosion of the outer pile face); (4) Implement surface digital terrain mapping to ensure surface water control measures are implemented to ensure free draining system with minimal soil erosion. (5) Minimise soil erosion through wind and water ***Biodiversity – Also see Vegetation and Habitat loss*** (1) Limit the complete removal of vegetation.		

				(2) Limit work outside the proposed footprint. (3) Reinforce portions of existing access routes that are prone to erosion or seasonal inundation, create structures or low banks to drain the access road rapidly during rainfall events, yet preventing erosion of the track and surrounding areas. Ensure that water flows are never concentrated in any way as soils are highly erodible. (4) Ensure that runoff from compacted or sealed surfaces is slowed down and dispersed sufficiently to prevent accelerated erosion from being initiated (erosion management plan required).		
35. Demolition / removal of portable and related infrastructure **36. Vehicular activity: removal of mobile plant / equipment and vehicles** **38. Demolition of PCD's** **39. Demolition of workshops, waste storage facilities, fuel storage facilities etc.**	**Noise generation**	Decommissioning		***Implementation of EMS***: (1) Development and implementation of a Acoustical Measurement & Audit Programme as part of the EMS. A monitoring program to be developed based on the specialist recommendations (**Appendix F**). (2) Recording, reporting, and remediating incidents related to noise. (3) Regular inspections of plant. (4) Ensuring corrective and preventative actions are taken to address nonconformities. (5) Communicating findings of concern to I&AP. ***On-site mitigation measures***: (1) Limit the maximum speed on the haul roads to 60 km/h or less. Road speeds should be kept as consistent as is feasibly possible (i.e. no speed bumps to reduce noise or stop junctions). This will help minimise the use of air brakes as well as reduce required maximum capacity of heavy vehicles during pull off. (2) Roads should be planned so as to reduce heavy vehicles reversing when collecting or dumping at stockpiles/tips etc. (E.g. use of a loop instead of a dead-end road). This will minimise the use of reverse alarms on vehicles. (3) Regular inspections and servicing of plant. ***Legal requirements***: (1) *Compliance with the National Noise control regulations.* ***Specialist recommendations:*** (1) Design an Acoustical Measurement & Audit Programme. Note: If there are no noise-sensitive receptors within 1,000m from any mining activities no routine noise monitoring will be required. (2) If feasible the road should be paved or asphalted (e.g. continuous graded asphalt). From an acoustical perspective paver bricks should not be considered. It is likely that routes will be unpaved. The developer should consider maintain these unpaved routes regularly smoothing out irregularities on the routes.	(1) Develop and implement a noise monitoring programme to ensure compliance with the National Noise Control Regulations and SANS10103:2008 guidelines. (2) Develop and implement a vehicle/plant/equipment management plan to specifically include routine inspections and testing of sound frequencies.	Before and during all phases on a quarterly basis.
35. Demolition / removal of portable and related infrastructure **38. Demolition of PCD's**	**General waste generation & Littering**	Decommissioning		**Implementation of EMS**: (1) Develop and implement as waste management plan with the focus on reuse, reduce, recycle, or avoid. (2) Development and maintenance of a waste disposal record keeping system. (3) Regular inspections of designated waste management area and/or facilities.	(1) Compliance with the National Environmental Management: Waste Act, act no 59 of 2008 and associated regulations.	Entire Life cycle of project

39. Demolition of workshops, waste storage facilities, fuel storage facilities etc.				(4) Reporting and recording of waste related incidents. (5) Continuous awareness training on Recycling, Reduction, Re-use, and avoidance of waste. **<u>On-site mitigation measures:</u>** (1) Characterise and quantify all waste streams associated to the authorised activities in terms of quantity, hazard, generation frequency and recyclability and define and implement disposal options as specified in the waste management plan. (2) As part of the characterisation define opportunities for source reduction, as well as reuse and recycling as opposed to simply disposing waste. (3) Ensure segregation of hazardous wastes from non-hazardous. (4) Sealable bins and containers must be made available for the storage of all streams of waste. (5) During the construction phase, temporary storage of construction waste to be stored in a bunded designated area. (6) Waste will not be stored longer than specified by the waste regulations. If storage exceeds the threshold stipulated by the regulations a waste management licence must be obtained. (7) All waste materials must be removed off site by a suitable and registered waste service provider. (8) All waste to be disposed off at a suitably registered waste disposal facility. (9) Proof of disposal to be obtained and kept on record. (10) Maintain a waste register for materials removed from site, indicating type, quantity, date, haulage contractor, delivery point, and safe disposal certificates. (11) All waste receptacles to be clearly labelled according to type. (12) Where possible, recyclable waste including glass, paper, and plastic must be separated, stored and recycled where possible. (13) Waste oil and scrap metal should also be recycled if possible. (14) All employees or contractors must be informed about the necessity of using waste drums. (15) No littering will be allowed and a daily site clean-up will be initiated. (16) All domestic refuge generated by staff and sub-contractors must be disposed at a registered waste disposal facility by a suitably registered service provider on a regular basis (i.e. weekly). (17) Measures to ensure that solid waste is transported as to avoid waste spills *enroute* must be implemented. (18) Waste bins must be emptied on a regular basis as to ensure bins do not overflow. (19) Site should be kept clean and free of rubbish that could potentially attract animal pests and that bins are scavenger proof. (20) DO not dump waste of any nature, or any foreign material into any drainage line or stream. A strict no dumping policy must be communicated to all staff and sub-contractors. (21) During transportation of waste, all waste service providers must comply with the codes of practice and guidelines for licensing of waste transport vehicles and the regulation and monitoring of transport operations. **<u>Legal requirements</u>**: (1) Ensure requirements stipulated in the National Environmental Management: Waste Act (NEMWA)		

				of 2008 are incorporated in the Waste Management Plan. (2) GN R. 634 list a number of requirements related to Waste classification and management. These requirements as stipulated in the regulations must be incorporated into the Waste Management Plan. (3) GN R. 921 list a number activities that requires a Waste Management Licence in terms of NEMWA. Listed activity number 11 ("The establishment or reclamation of a residue stockpile or residue deposit resulting from activities which require a mining right in terms of the MPRDA (Act 28 of 2002)") will require a waste management licence in terms of the regulations. (4) GN R. 625 sets requirements for a waste producer to register and report waste quantity of the National Waste Information System. (5) GN R. 635 sets the National norms and standards for the assessment of waste for landfill. The procedures for determining the class of waste for landfill must be incorporated into the Waste Management plan. (6) GN R. 636 sets the National norms and standards for the disposal of waste for landfill. These requirements should be considered when disposing waste to landfill. (7) GN R. 926 stipulates the norms and standards associated to the storage of waste. These requirements must be incorporated in the Waste Management Plan. (8) All waste tyres generated on site must be managed according to the Waste tyre regulations published under the Environment Conservation Act of 1989.		
36. Vehicular activity: removal of mobile plant / equipment and vehicles	**CO_2 emissions**	Decommissioning		**Implementation of EMS:** (1) Develop and maintain a carbon footprint reporting policy. (2) Develop and maintain a Vehicle/Plant/Equipment maintenance plant. **On-site mitigation measures:** (1) Plant and equipment to function at an optimal level. (2) Where possible lead replacement petrol to be used. (3) Where possible low sulphur containing diesel to be used. (4) All vehicles and equipment must be maintained and serviced according to the manufacturer's specification. (5) Any vehicle, plant or equipment emitting visible emissions from their exhaust systems must be serviced or repaired immediately. **Legal requirements:** (1) Section 39 of the Atmospheric Pollution Prevention Act of 1965 and GN R. 1651 specifies requirements regarding the control of emissions from diesel vehicles used on public roads. These requirements should form part of the Air quality Management Plan and the Vehicle/Plant/Equipment maintenance plan.	(1) Develop and maintain a Carbon footprint reporting policy. (2) Develop and maintain a Vehicle/Plant/Equipment maintenance plant.	Entire Life cycle of project
36. Vehicular activity: removal of mobile plant	**Sedimentation and siltation of**	Decommissioning		***Implementation of EMS:*** (1) Development and implementation of water quality monitoring plan.	(1) Develop a storm water management plan. (2) Develop and implement a water management	Entire Life cycle of project

/ equipment and vehicles **37. Rehabilitation of the lay down areas**	**watercourses**			(2) Development and implementation of an incident reporting procedure. (3) Ensuring corrective and preventative actions are taken to address nonconformities. (4) Communicating findings of concern to I&AP. (5) Development and implementation of a storm water management plan. (6) Regular inspection of erosion prone areas for signs of erosion. (7) A soil conservation and stockpiling plan to be developed and implemented. ***<u>On-site mitigation measures:</u>*** (1) Avoid stockpiling material within drainage lines or in the 1:10 year flood line. (2) Ensure erosion control measures or sediment control measures on stockpiles or in stockpile areas. (3) Prevent the discharge of water containing polluting matter or visible suspended materials directly into drainage lines or streams. (4) Deflect any unpolluted water/runoff away from any dirty areas i.e. stockpile areas, mining areas, workshops, lay down areas etc. (5) Water from excavations or mining areas either through seepage or collection to be pumped and discharge into a pollution control dam. (6) Before any water is permitted to enter natural drainage lines, the quality of water must comply with the standards contained in the Water Use Licence conditions. (7) River crossings shall be designed by a registered civil engineer. (8) Measures to avoid or prevent erosion formation must be incorporated into the designs of the infrastructure associated with the river crossings. (9) During construction through drainage lines, the majority of the flow must be allowed to pass down the stream. In stream diversions should be used rather than the construction of new channels. ***<u>Legal requirements:</u>*** (1) A Water Use Licence to be obtained for all river crossings or development of infrastructure within or within close proximity to a watercourse as defined by the National Water Act, act no of 1996. (2) Requirements stipulated by GN R. 704 to be considered in the final site layout plan by the appointed engineers. ***<u>Specialist recommendations:</u>*** ***Geohydrology –*** (1) Development of an environmental monitoring programme in order to monitor the groundwater quality and groundwater level changes up- and downstream of the proposed open cast mine workings. (2) Collected monitoring data (quarterly) may be used for future model updates (e.g. every second year). (3) A number of geosites (i.e. boreholes, springs and surface water drainages) and newly proposed boreholes were identified (refer to the Geohydrological report in **Appendix M**) to be included into a monthly/quarterly monitoring programme. (4) The parameters to be analysed should comprise the following: Physical-chemical parameters (pH, EC, TDS);Major anions (F, Cl, NO3, SO4, HCO3, NH4, PO4,);Major cations (K, Na, Mg, Ca, NH4,); and Other elements/metals (Fe, Mn, Zn, Pb, Co, Cr, Cr (VI),).	plan and specifically include water monitoring and pollution prevention strategies.	

				Hydrology – (1) A number of monitoring sample points have been identified in the Hydrological report (**Appendix..**). Additional sampling points have been recommended and should be included in the final water monitoring plan. (2) As part of the monitoring program going forward, samples should be taken monthly for at least the first year of operation. This can be revised to quarterly monitoring if no concerns are highlighted with the approval of DWAS. (3) The monitoring should include the standard analysis of major cations/anions as well as ICP scan for metals. (4) A conceptual storm water management plan (**Appendix L)** has been developed based on the requirements of GN R. 704 of the National Water Act of 1998. (5) Implementation of the guidance provided by the South African National Roads Agency Limited (SANRAL) drainage manual. This document provides guidance on maximum permissible velocities for grass covers to avoid erosion and should be consulted during the detailed design phase.		
37. Rehabilitation of the lay down areas	**Influx of alien invasive vegetation**	Decommissioning		***Implementation of EMS:*** (1) Development and implementation of an alien and invasive control plan (2) Awareness training on the identification of weeds and alien species to employees responsible for the management of these species. ***On-site mitigation measures:*** (1) Alien vegetation growing on topsoil stockpiles must be removed immediately in a manner as to prevent re-growth. (2) All disturbed areas to be monitored on a regular basis for exotic or invasive plant species and weeds. (3) Chemical removal shall be used in accordance with the manufacturer's specification for weeds where mechanical eradication/control is no longer affective. (4) The type of chemical to be utilised must be determined in consultation with a herbicide consultant and the Environmental Control Officer/Environmental Officer/SHEQ Officer. (5) Those exotic/invasive plant or weed which cannot be eradicated by means of herbicides, needs to be manually removed from site. (6) The herbicide consultant must have a Pest Control Operators licence. (7) Control the type of material imported to site to ensure that soil contamination, in terms of weed and alien invasive plants does not occur. ***Legal requirements:*** (1) Adherence to requirements stipulated by GN R. 598 of NEMBA. (2) ***Section 3: Category 1b Listed Invasive Species*** ***(A total number of 6 species were identified – Appendix G):*** (2.1) Category 1b Listed Invasive Species are those species listed as such by notice in terms of section 70(1)(a) of the Act as species which must be controlled.	(1) Develop and implement an alien eradication and control management plan.	Entire Life cycle of project

				(2.2) A person in control of a Category 1 b Listed Invasive Species must control the listed invasive species in compliance with sections 75(1), (2) and (3) of the Act. (2.3) If an Invasive Species Management Programme has been developed in terms of section 75(4) of the Act, a person must control the listed invasive species in accordance with such programme. (2.4) A person contemplated in sub-regulation (2) must allow an authorised official from the Department to enter onto the land to monitor, assist with or implement the control of the listed invasive species, or compliance with the Invasive Species Management Programme contemplated in section 75(4) of the Act. (3) ***Section 4. Category 2 Listed Invasive Species*** ***(One specie has been identified – Agave sisalana):*** (3.1) Category 2 Listed Invasive Species are those species listed by notice in terms of section 70(1)(a) of the Act as species which require a permit to carry out a restricted activity within an area specified in the Notice or an area specified in the permit, as the case may be. (3.2) Unless otherwise indicated in the Notice, no person may carry out a restricted activity in respect of a Category 2 Listed Invasive Species without a permit. (3.3) A landowner on whose land a Category 2 Listed Invasive Species occurs or person in possession of a permit, must ensure that the specimens of the species do not spread outside of the land or the area specified in the Notice or permit. (3.4) If an Invasive Species Management Programme has been developed in terms of section 75(4) of the Act, a person must control the listed invasive species in accordance with such programme. (3.5) Unless otherwise specified in the Notice, any species listed as a Category 2 Listed Invasive Species that occurs outside the specified area contemplated in sub-regulation (1), must, for purposes of these regulations, be considered to be a Category 1 b Listed Invasive Species and must be managed according to Regulation 3. (3.6) Notwithstanding the specific exemptions relating to existing plantations in respect of Listed Invasive Plant Species published in Government Gazette No. 37886, Notice 599 of 1 August 2014 (as amended), any person or organ of state must ensure that the specimens of such Listed Invasive Plant Species do not spread outside of the land over which they have control. (4) ***Section 5. Category 3 Listed Invasive Species*** ***(One specie has been identified – Morus alba):*** (4.1) Category 3 Listed Invasive Species are species that are listed by notice in terms of section 70(1)(a) of the Act, as species which are subject to exemptions in terms of section 71(3) and prohibitions in terms of section 71A of Act, as specified in the Notice. (4.2) Any plant species identified as a Category 3 Listed Invasive Species that occurs in riparian areas, must, for the purposes of these regulations, be considered to be a Category 1b Listed Invasive Species and must be managed according to regulation 3. (4.3) If an Invasive Species Management Programme has been developed in terms of section 75(4) of the Act, a person must control the listed invasive species in accordance with such programme. (5) When using herbicides and pesticides, requirements stipulated in section 7(2)(a)i) of the Fertilizers,		

				farm feeds, agricultural remedies, and stock remedies Act of 1947 must be considered. (6) Requirements for the prohibition of spreading weeds stipulated in section 5 of the Conservation of Agricultural Resources Act (CARA) of 43 must be adhered with. (7) Regulation 15 of GN R.1048 published under CARA must be adhered with and considered as part of the alien invasive species management plan. ***Specialist recommendations:*** (1) Wheels of large machinery should be checked prior to entering the site and cleared of seed material of alien invasive plants if transport routes go through infested areas (especially of species with spiny or bur-like seeds). Such seed must be destroyed. (3) If filling material is to be used, this should be sourced from areas free of invasive species (4) Monitor the establishment of (alien) invasive species and remove as soon as detected, whenever possible before flowers or other regenerative material can be produced. Destruction of regenerative material by burning in a protected area is encouraged. (5) Adherence to the comprehensive Plant Search and rescue, Re-vegetation and Alien Invasive Management plan (Appendix E of the Biodiversity Impact Report (**Appendix G** to this report)).		
37. Rehabilitation of the lay down areas	**Vegetation and habitat loss**	Decommissioning		***Implementation of EMS***: (1) Development of Mine Rehabilitation, decommissioning and mine closure liability Plan in compliance with GN R. 1147 of NEMA. (2) Develop and implement a plant species search and rescue management plan. (3) Regular inspection of sensitive areas. (4) A soil conservation and stockpiling plan to be developed and implemented. (5) Reporting and recording incidents related to unnecessary clearance of vegetation. (6) Ensuring corrective and preventative actions are taken to address nonconformities. (7) Communicating findings of concern to I&AP. (8) Record keeping of all removed/relocated species. ***On-site mitigation measures***: (1) Avoid clearing areas outside the development footprint. (2) Avoid development in sensitive environments such as areas within pristine or valuable ecological significance. (3) Before the commencement of any vegetation clearance, a search and rescue operation should take place identifying possible protected species as well as indigenous species. (4) An area should be identified to re-instate protected and indigenous areas. (5) If feasible an onsite nursery should be established and maintained. ***Legal requirements***: (1) Section 28 of NEMA describes the duty of care and remediation of environmental damage. (2) A number of the proposed activities fall within or within close proximity to the Sekhukhune Centre of Endemism. Working outside the authorised footprints would require additional authorisation in terms of NEMA and The National Environmental Management: Biodiversity Act (NEMBA) of 2002.	(1) Develop a plant species search and rescue management plan. (2) Development of Mine Rehabilitation, decommissioning and mine closure liability Plan in compliance with GN R. 1147 of NEMA. (3) Develop and implement a soil conservation management plan. (4) Apply for permits to remove protected species (provincial and national).	Entire Life cycle of project

				(3) The removal or disturbance of listed protected species in terms of NEMBA, the Limpopo Environmental Management Act of 2003, and the National Forest Act of 1998 would require a permit. ***<u>Specialist recommendations</u>:*** ***Terrestrial Ecology –*** (1) Prior to any new area being impacted by the mine, that area and a suitable buffer will have to be delineated and activities have to be preceded by a very thorough walkthrough, conducted between January and April, followed by the necessary plant Search and Rescue operations where applicable. (2) ***Themeda triandra – Diheteropogon amplectens Grasslands*** ***(High sensitivity rating – Avoid as far possible)*** (2.1) Development in Grasslands should be limited to the absolute minimum, aiming for minimal to no alteration of the habitat configuration. (2.2) If some of these habitats are impacted or will be altered by the proposed development, all development must be preceded by a thorough footprint investigation followed by a Search and Rescue operation for all plants of conservation concern. (2.3) Components of the proposed development that should under no circumstance be located in this vegetation would include: (2.3.1) Buildings and/or ablution facilities; (2.3.2) Any form of waste/soil/overburden disposal or stockpiling (2.3.3) Tailings dams or processing plants; and (2.3.4) Any form of storage of materials or machinery. (3) ***Cyperus sexangularis – Flueggea virosa Riparian Vegetation*** ***(No Go Area – only suitable crossings permissible)*** (3.1) Development in this vegetation/habitat and at least 50 m beyond should be limited to crossings of access roads only, aiming for minimal to no alteration of the habitat configuration. (3.2) Mining/development in this vegetation/habitat is strongly discouraged. (3.3) Where upstream vegetation will be obliterated or severely denuded, adequate storm water and erosion control measures must be put in place to slow down and disperse runoff volumes and prevent the degradation of other channels and riparian vegetation. (3.4) Where road crossings are necessary, channels may under no circumstance be sealed with any impermeable material, as this will lead to a loss of runoff- and related retention/replenishment of soil moisture reserves, nutrients and seeds. (3.5) Culverts must be designed in a way that water will never be concentrated to a width narrower than the actual channel, causing accelerated erosion during heavy downpours. (3.6) Components of the proposed development that may under no circumstance be located in or within 100 m of any drainage would include: (3.6.1) Buildings and/or ablution facilities; (3.6.2) Any form of waste/soil/overburden disposal or stockpile; (3.6.3) Tailings dams or processing plants; and (3.6.4) Any form of storage of materials or machinery		

				(4) ***Acacia tortilis – Dichrostachys cinerea Dry Mixed Bushveld*** ***(Medium Low sensitivity)*** (4.1) It is recommended that if additional space is required in future for any additional infrastructure, this will be situated on the more disturbed sections of this vegetation. (4.2) Community members should be engaged to clear out as much wood as possible from areas to be developed to alleviate the wood-clearing of more valuable large trees in the area. (4.3) Runoff from any sealed or bare surface must be contained to prevent the erosion of the donga areas and drainage lines below these plains. (4.4) Mine management of the Spitsvale Project has indicated that they will attempt, where possible, to create more grazing for the Dithamaga community by trying to clear some of the encroached bush to allow perennial grasses to become re-established. For this, it was strongly advised against removing all vegetation with a bulldozer. Rather, the following should be done to break the sealed upper surface and reduce sheet erosion: (4.4.1) With a Ripper only, rip sections of up to 5 m wide along the contour, alternating with ± 5 m of bushveld as it is; (4.4.2) Rips should be at least 500 mm deep, and invasive thorn bushes uprooted to that depth as well to ensure their resprouting capacity from the below-ground lignotuber is also eradicated; (4.4.3) If possible, hand-collected seeds from surrounding areas should be re-introduced to the rips; (4.4.4) Use the cleared thorn bushes to loosely brush-pack the area - with the branching side facing upslope (5) ***Kirkia wilmsii – Terminalia prunioides variable Bushveld*** ***(Medium-High sensitivity – Avoid as far possible)*** (5.1) Mining/development in this vegetation/habitat should be limited to the absolute minimum, aiming for minimal alteration of the habitat configuration. (5.2) This is most important within 100 m of any mountain streams and drainages, to prevent the accelerated erosion of lower-lying plains and fluvial systems. (5.3) If some of these habitats are impacted or will be altered by the proposed development, newly created slopes should preferably be shallower than the original slopes, but never steeper to enable a gradual re-establishment of the woody and herbaceous layer. (5.4) After decommissioning, it will be important to facilitate the re-establishment of a diverse vegetation layer as soon as possible. (6) ***Hippobromus pauciflorus – Rhoicissus tridentata Rock Outcrops*** ***(High sensitivity – Treat as No Go Areas as far possible)*** (6.1) Same requirements as stipulated under (5). (7) ***Combretum hereroense – Euclea sekhukhuniensis low bushveld*** ***(No Go, only limited access roads permissible)*** (7.1) Mining/development in this vegetation/habitat is strongly discouraged, aiming for no alteration of the habitat. (7.2) Adjacent (upstream) areas also need to be cleared with care, ensuring that no excessive runoff is directed toward the donga plains.		

				(7.3) Although current dongas may be relatively old and stable, new and accelerated erosion must be monitored and mitigated at all times. (7.4) After decommissioning, it will be important to facilitate the re-establishment of a dense herbaceous vegetation layer as soon as possible where these plains have been impacted. (8) Rehabilitate and re-vegetate all areas that have been disturbed as soon as practically possible. (9) Continually monitor the progress/success of rehabilitation efforts and adapt if rehabilitation targets are not met in acceptable timeframes (10) As part of decommissioning, all stockpiles must be entirely obliterated and landscaped to merge into the surroundings. (11) Keep main internal access route as planned along existing gravel roads. (12) After the final layout of mining operation components has been approved, conduct a thorough footprint investigation to determine any protected or red data plant species population location and size, and animal burrows: (12.1) Map (by GPS) as far as possible larger concentrations of large trees and protected species that could be avoided or must be relocated; (12.2) Protected trees, succulents and geophytes: must be relocated (trees as far as feasible); (12.3) Animal burrows: must be monitored by EO/ECO prior to ground clearing for activity/presence of animal species. If detected, such animals must be removed and relocated by a qualified professional/contractor. (13) Strictly restrict all movement of vehicles and heavy machinery to permissible areas, these being designated access roads, maintenance roads, turning points and parking areas. No off-road driving beyond designated areas may be allowed. (14) Animals accidentally injured by moving vehicles or machinery must be taken to a local veterinarian to be treated or put down in a humane manner. (15) Create designated turning areas and strictly prohibit any off-road driving or parking of vehicles and machinery outside designated areas. (16) Keep the clearing of natural veldt to a minimum. (19) It is desirable that community members be engaged to remove wood suitable for their purposes from areas to be cleared to alleviate the pressure of wood-harvesting currently on other areas of the land portions. (20) All remaining material of cleared shrubs and trees must be shredded and used as mulch. (21) Topsoil (the upper 25 cm of soil) is an important natural resource as it contains most of the geophytic storage organs as well as valuable soil seed resources necessary for re-vegetation; where it can (and then must) be stripped, never mix it with subsoil or any other material, store and protect it separately until it can be re-applied, minimise handling of topsoil. (21) Adherence to the comprehensive Plant Search and rescue, Re-vegetation and Alien Invasive Management plan (Appendix E of the Biodiversity Impact Report (Appendix to this report)). ***Avifauna –*** (1) Leave, as far as possible, as much of the natural indigenous bush undisturbed and in its pristine		

				sate. (2) Route connecting roads as close as is possible to already developed sites or roads. (3) Restrict or prohibit any off-road driving in areas of pristine indigenous bush. (4) Route power lines along these connecting roads, or if possible route them underground. ***Bat Survey –*** (1) Conserve as much of the natural vegetation as possible. Only create haul roads that are absolutely necessary. (2) Discourage vehicles from driving through the natural vegetation were mining activities are not taking place. (3) Prohibit mining plant and trucks from washing or dumping material near a water course (wet or dry) to prevent the pollution of natural water bodies. (4) Prohibit any chemical and/or heavy metal from being released into the environment. (5) Manage all waste water and stormwater to prevent pollution to water bodies.		
38. Demolition of PCD's **39. Demolition of workshops, waste storage facilities, fuel storage facilities etc.**	**Contamination of water resources**	Decommissioning		**<u>Implementation of EMS:</u>** (1) Development and implementation of a water monitoring program. (2) Development and implementation of an Integrated Water and Waste Management Plan (IWWMP) (3) Development and implementation of a storm water management plan. (4) Regular inspections of all areas posing a risk of contaminating water resources. (5) Reporting and recording all related incidents according to a developed procedure. (6) Develop and implement an emergency preparedness plan. (7) Ensuring corrective and preventative actions are taken to address nonconformities. (8) Communicating findings of concern to I&AP. **<u>On-site mitigation measures:</u>** (1) All sources of process water must be identified and quantified for the life cycle of the authorised activities. (2) A wastewater management system must be installed complying with regal requirements. (3) A water use licence for waste water storage facilities to be obtained. (4) All waste water management facilities to be designed by a qualified engineer. (5) Wash bays, service areas, and fuel storage areas may not be located within the 1:100 year flood line or horizontal distance of 100 m (whichever is greater) of a watercourse or drainage line. (6) No environmentally harmful detergents may be used. (7) Workshops, refuelling depots and washing areas shall be bunded. (8) All bunded areas to be constructed in a way as to avoid seepage to the surrounding environment as well as be able to contain its content to a capacity of 110%. (9) Water from wash bays, service areas and fuel storage areas must be discharged into oil separators and sumps. (10) Oils collected in this manner should be retained in a safe holding tank and removed from site by specialist oil recycling company or disposal at approved waste disposal sites.	(1) Develop and implement an Integrated Waste Water Management Plan (IWWMP). (2) Develop and implement a water monitoring schedule according to the water management plan. (3) Ensure compliance with the WUL conditions. (4) Develop an emergency preparedness plan addressing the prevention and management of incidents related to water contamination.	Entire Life cycle of project

				(11) No drainage from fuel storage areas to be permitted. (12)Never hose oil or fuel spills into storm water drain or sewer, or into the surrounding natural environment. (13) Any contaminated storm water and other run-off from dirty areas to be disposed off in the suitably designed PCD's. (14) Any spill which may contaminate water must be treated according to the approved spill management procedure. (15) Contain oil or fuel spills in water using an approved oil absorbent fibre. (16) Grey water not deemed suitable for dust suppression must be disposed of with other waste water in the designated and suitably designed PCD. (17) Waste water as well as spilled fuel collected within bunded areas and refuelling areas shall be disposed of or treated as hazardous waste. (18) Avoid unnecessary alteration of drainage lines. (19) Avoid locating lay down areas, wash bays, workshops etc. within the 1:50 year flood line or within horizontal distance of 100 m (whichever is greater) of a water course. (20) Contain contaminated runoff from dirty areas (i.e. lay down areas, RoM and product stockpile areas, workshops, fuelling bays etc.) in suitable designed PCD's. (21) Contaminated runoff to be treated and re-used for processing water or dust suppression in dirty areas only when complying with legal requirements or water quality standards specified in the Water Use Licence. (22) Do not locate any ablution facilities, chemical toilets, sanitary convenience, septic tanks, or French drains within the 1:100 year flood line, or within a horizontal distance of 100 m (whichever is greater) of any watercourses. (23) Do not allow the use of any drainage line or wetland for swimming, bathing, or cleaning of clothing, tools or equipment. (24) Prevent the discharge of water containing polluting matter or visible suspended materials directly into drainage lines or streams. (25) Deflect any unpolluted water/runoff away from any dirty area. (26) Ensure that no storm water is allowed to enter any drainage installation for the reception, conveyance, storage, and or treatment of sewage. (27) Before any water is permitted to enter natural drainage lines, the quality of the water must comply with the standards contained within the Water Use Licensing conditions authorised by the DWAS. (28) Ensure water passing trough vehicle wash bays and workshops pass through oil separators before passing into conservancy tank. (29) Avoid unnecessary cutting roads through river, stream banks as this may lead to erosion causing siltation of streams and downstream dams. **Legal requirements:** (1) Obtain a Water Use Licence from the DWAS. **Specialist recommendations:**		

				Geohydrology – (1) Development of an environmental monitoring programme in order to monitor the groundwater quality and groundwater level changes up- and downstream of the proposed open cast mine workings. (2) Collected monitoring data (quarterly) may be used for future model updates (e.g. every second year). (3) A number of geosites (i.e. boreholes, springs and surface water drainages) and newly proposed boreholes were identified (refer to the Geohydrological report in **Appendix M**) to be included into a monthly/quarterly monitoring programme. (4) The parameters to be analysed should comprise the following: Physical-chemical parameters (pH, EC, TDS);Major anions (F, Cl, NO3, SO4, HCO3, NH4, PO4,);Major cations (K, Na, Mg, Ca, NH4,); and Other elements/metals (Fe, Mn, Zn, Pb, Co, Cr, Cr (VI),). (5) Emphasis should be placed on monitoring of groundwater levels prior mining and during the operation phase as well as to establish the origin of the elevated nitrate concentrations in the project area. (6) Recording of pit dewatering rates. Initial monthly (and later quarterly) sampling and analysis (major and trace elements) of pumped water. ***Hydrology –*** (1) A number of monitoring sample points have been identified in the Hydrological report (**Appendix L**). Additional sampling points have been recommended and should be included in the final water monitoring plan. (2) As part of the monitoring program going forward, samples should be taken monthly for at least the first year of operation. This can be revised to quarterly monitoring if no concerns are highlighted with the approval of DWAS. (3) The monitoring should include the standard analysis of major cations/anions as well as ICP scan for metals. (4) A conceptual storm water management plan (**Appendix L**) has been developed based on the requirements of GN R. 704 of the National Water Act of 1998. (5) Implementation of the guidance provided by the South African National Roads Agency Limited (SANRAL) drainage manual. This document provides guidance on maximum permissible velocities for grass covers to avoid erosion and should be consulted during the detailed design phase.		

e) Impact Management Outcomes

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

This section defines the objectives and targets (Table 17) associated to the mitigation programme.

Table 17: Impact management outcomes associated to the identified aspects

ACTIVITY whether listed or not listed. **(E.g. Excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc…etc…etc.).**	**POTENTIAL IMPACT (e.g. dust, noise, drainage surface disturbance, fly rock, surface water contamination, groundwater contamination, air pollution etc….etc…)**	**ASPECTS AFFECTED**	**PHASE** In which impact is anticipated **(e.g. Construction, commissioning, operational Decommissioning, closure, post-closure)**	**MITIGATION TYPE (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. etc) E.g. Modify through alternative method. Control through noise control Control through management and monitoring Remedy through rehabilitation..**	**STANDARD TO BE ACHIEVED (Impact avoided, noise levels, dust levels, rehabilitation standards, end use objectives) etc.**	
					Objective	**Target**
Construction Phase						

1. Access and hauling along roads i.e. during the construction of roads **2. Site clearing and topsoil stripping for lay down area and all related mining infrastructure** **5. Mining offices (construction and operation) i.e. operation of training centres, offices and kitchen facilities** **8. Pollution Control Dams (PCD's) i.e.**	**Dust generation**	Air Quality Human Health Topography and Visual Environment	Construction & Operational	**Control**	Control dust fallout throughout the life cycle of the mining activity.	(1) Dust fallout levels at active operational sites do not exceed the pre-determined baseline levels by more than 10%. (2) Zero number of complaints from site staff, surrounding landowners and communities. (3) Adherence with legal required dust fallout levels. (4) Adherence with 600 mg/m² /day averaged over 30 days in residential areas and 1200 mg/m² /day averaged over 30 days in non-residential areas. (5) No more than two within a year, no two sequential months per dust fallout monitoring site. (6) If exceeding dust fallout standard, within 3 months after submission of a dust fallout monitoring report, develop and submit a dust management plan to the air quality officer for approval.

Construction and operation						
1. Access and hauling along roads i.e. during the construction of roads **2. Site clearing and topsoil stripping for lay down area and all related mining infrastructure**	**Hydrocarbon Contamination**	Surface Water quality Groundwater quality	Construction & Operational	**Control**	Adequate protection of soil and water resources. Active remediation in case of spill is ensured.	(1) No evidence of hydrocarbon and hazardous spills. (2) No release of contaminated water into the natural environment. (3) Immediate removal and remediation of all spills. (4) Reporting of all section 30 of NEMA and section 20 of the National Water Act incidents.

3. Weigh bridge **6. Storm water runoff management features** **9.Stores, workshops &wash bays** **11. Fuel operating power generators** **13. Fuel storage** **15. Transport of construction material, mobile plant and equipment to the site** **16. Use of existing drilled /**		Wetlands and Aquatic Ecology Soil quality				

new boreholes						
1. Access and hauling along roads i.e. during the construction of roads **2. Site clearing and topsoil stripping for lay down area and all related**	**Degradation of soil resources**	Soil quality	Construction & Operational	**Remedy**	Adequate protection of soil resources and remediation if degradation cannot be avoided.	(1) No evidence of erosion. (2) No mixing of topsoil or fertile soils with infertile soils. (3) No signs of prolonged exposure of un-vegetated areas by lack of implementing rehabilitation measures.

mining infrastructure **9.Stores, workshops &wash bays** **10. Ablutions & change house with sewage treatment plant** **11. Fuel operating power generators** **13. Fuel storage**		Flora micro-ecosystems				

1. Access and hauling along roads i.e. during the construction of roads **2. Site clearing and topsoil stripping for lay down area and all related mining infrastructure** **6. Storm water runoff management features** **15. Transport of construction material, mobile plant and equipment to the site**	**Erosion**	Loss of fertile soil	Construction & Operational	**Control**	To prevent any erosion and to provide adequate erosion control measures where required.	(1) No visible signs of erosion formations such as dongas or rills. (2) Sedimentation loads of streams and rivers not to exceed the baseline levels by more than 10%. (3) Erosion control measures implemented in high risk areas. (4) No signs of prolonged exposure of un-vegetated areas by lack of implementing rehabilitation measures.
		Micro-ecosystems				

1. Access and hauling along roads i.e. during the construction of roads	**Vegetation and habitat loss**	Macro and Micro organisms	Construction & Operational	**Remedy**	Avoid unnecessary loss of vegetation and habitats. Rehabilitation of all affected habitats and mining related areas.	(1) Limiting site clearance to areas as per the approved site layout plan. (2) All sensitive or protected flora identified to be rescued and relocated. (3) No signs of prolonged exposure of un-vegetated areas by lack of implementing rehabilitation measures.

2. Site clearing and topsoil stripping for lay down area and all related mining infrastructure **6. Storm water runoff management features**		Fauna and Flora				(4) No unauthorised activities outside of the proposed footprint. (5) Avoid activities in No-Go areas as identified in **Appendix G**.
1. Access and hauling along roads i.e. during the construction of roads **2. Site clearing and topsoil**	**Sedimentation and siltation of watercourses**	Wetland and Aquatic Ecology	Construction & Operational	**Control**	Avoid or minimise the degradation of water quality of watercourses due to sedimentation and siltation.	(1) Ensure water quality results do not exceed the pre-determined baseline results with more than 10%. (2) Water quality of streams and rivers are maintained within the pre-determined seasonality baseline levels. (3) No incidents related to the pollution of rivers and streams.

stripping for lay down area and all related mining infrastructure **6. Storm water runoff management features** **15. Transport of construction material, mobile plant and equipment to the site**		Surface Water				(4) No visible signs of erosion damages.
1. Access and hauling along roads i.e. during the construction of roads **2. Site clearing and topsoil**	**Noise generation**	Surrounding noise quality	Construction & Operational	**Control**	Control potential noise pollution stemming from the construction of the project	(1) Ensure equivalent A-weighted noise levels below 55 dBA at potentially noise-sensitive receptors (daytime). (2) Ensure equivalent A-weighted noise levels below 45 dBA at potentially noise-sensitive receptors (night-time). (3) Define the noisy areas with a set boundary ensuring that equivalent A-weighted noise

stripping for lay down area and all related mining infrastructure **5. Mining offices (construction and operation) i.e. operation of training centres, offices and kitchen facilities** **9.Stores, workshops &wash bays** **11. Fuel operating power generators**						levels at this boundary does not exceed 61 dB LAleq,24hr. It should be noted that the area would have to be demarcated as a "controlled zone" in terms of the NCR; (4)Ensure that the change in ambient sound levels as experienced by Potentially Sensitive Receptors is less than 5 - 7 dBA; (5) Ensuring compliance with the National Noise Control Regulations and SANS10103:2008 guidelines. The referencing of the International Finance Corporation (World Bank) guidelines for an acceptable sound level in a residential area was also considered.

1. Access and hauling along roads i.e. during the construction of roads **2. Site clearing and topsoil stripping for lay down area and all related mining infrastructure** **6. Storm water runoff management features**	**Alteration of drainage patterns**	Wetland and Aquatic Ecology Surface Water quality	Construction & Operational	**Remedy**	Remedy the possible effects of alteration to natural drainage lines. Adherence with water quality requirements as set by the Water Use Licence Conditions.	(1) No visible signs of erosion formations such as dongas or rills. (2) Sedimentation loads of streams and rivers not to exceed the baseline levels by more than 10%. (3) Erosion control measures implemented in high risk areas. (4) No signs of degradation of diversion channels or drainage systems.
1. Access and hauling along roads i.e. during	**Destruction of upstream tributaries and**	Wetland and Aquatic Ecology Downstream water users	Construction & Operational	**Remedy**	Remedy the possible effects of destruction of upstream tributaries and reduction in the	(1) No visible signs of erosion formations such as dongas or rills. (2) Sedimentation loads of streams and rivers not to exceed the baseline levels by more than

the construction of roads	**reduction in water in the catchment**	Surface Water quality			water catchment. Adherence with water quality requirements set by the Water Use Licence Conditions.	10%. (3) Erosion control measures implemented in high risk areas. (4) No signs of degradation of diversion channels or drainage systems.
1. Access and hauling along roads i.e. during the construction of roads	**Water usage for dust suppression**	Wastage of water resource	Construction & Operational	**Control**	Storm water run-off from dirty areas is as far as possible recycled for reuse.	(1) Abstraction from natural watercourses is kept to a minimum and does not exceed the DWAS Water Use Licence provisions by more than 5% on an annual basis.
1. Access and hauling along roads i.e. during the construction of roads **2. Site clearing and topsoil stripping for lay down area and all related mining**	**Influx of alien invasive vegetation**	Fauna and Flora micro and macro ecosystems	Construction	**Control**	Prevent the spreading of alien plants/seeds on site and to the surrounding areas. Eradication and removal of alien and invasive plants.	(1) No visible presence of alien vegetation on site.

infrastructure **5. Mining offices (construction and operation) i.e. operation of training centres, offices and kitchen facilities**						
1. Access and hauling along roads i.e. during the construction of roads **2. Site clearing and topsoil stripping for lay down area and all related mining infrastructure**	**CO_2 emissions & Release of noxious gasses**	Air Quality	Construction & Operational	**Control**	The levels of greenhouse gas and CO2 emissions emanating from the use of plant and vehicles as well as the use of generators for power on site, is kept to a minimum.	(1) All vehicles, plant, and equipment to be serviced as per manufacturer's maintenance schedules. (2) Record keeping of service records of all vehicles, plant, and equipment. (3) No evidence of plant, equipment or vehicles in bad condition.

9.Stores, workshops &wash bays **11. Fuel operating power generators** **15. Transport of construction material, mobile plant and equipment to the site**						
2. Site clearing and topsoil stripping for lay down area and all related mining infrastructure	**Topography and visual alteration**	Topography and Visual Environment	Construction	**Remedy**	Remedy alteration of the visual environment and topography as close as possible to the predetermined state.	(1) No areas left un-vegetated. (2) No signs of alien or invasive species on site. (3) Control of visual effects. (4) Implement rehabilitation measures as per the Mine Rehabilitation, decommissioning and mine closure liability Plan in compliance with GN R. 1147 of NEMA.

5. Mining offices (construction and operation) i.e. operation of training centres, offices and kitchen facilities						
2. Site clearing and topsoil stripping for lay down area and all related mining infrastructure **16. Use of existing drilled / new boreholes**	**Water level reduction and contamination**	Groundwater quality Downstream water users Surface Water quality	Construction & Operational	**Control**	Control the potential water level reduction and contamination related to authorised activities.	(1) Ensure water quality results do not exceed the pre-determined baseline results with more than 10%. (2)Water quality of streams and rivers are maintained within the pre-determined seasonality baseline levels. (3) No incidents related to the pollution of rivers and streams. (4) No visible signs of erosion damages. (5) No signs of blockages to the natural flow of the associated river catchment.
2. Site clearing and topsoil stripping for lay	**Destruction of graves**	Loss of heritage resources	Construction & Operational	**Avoid**	Identification of all possible sites of archaeological value and graves has been identified prior to the	(1) All sites clearly demarcated as no-go areas. (2) Evidence of records should further discoveries be identified during construction. (3) Full compliance to all mitigation measures.

down area and all related mining infrastructure					commencement of authorised work.	
2. Site clearing and topsoil stripping for lay down area and all related mining infrastructure	**Degradation of cultural significance heritage sites**	Loss of heritage resources	Construction & Operational	**Avoid**	Identification of all possible sites of archaeological value and graves has been identified prior to the commencement of authorised work.	(1) All sites clearly demarcated as no-go areas. (2) Evidence of records should further discoveries be identified during construction. (3) Full compliance to all mitigation measures.
4. Onsite Clinic	**Medical Waste generation**	Human Health	Construction & Operational	**Control**	Properly manage all medical waste resulting from first aid incidents.	(1) No incidents related to miss management of medical waste.
4. Onsite Clinic **5. Mining offices (construction and operation) i.e. operation of training centres, offices and kitchen facilities**	**Electricity usage**	CO_2 emissions	Operational	**Control**	Control and monitor the carbon footprint of the Spitsvale project.	(1) Annual reduction of the Carbon footprint.

12. Lighting						
4. Onsite Clinic **5. Mining offices (construction and operation) i.e. operation of training centres, offices and kitchen facilities**	**Domestic water usage**	Wastage of water resource	Operational	**Avoid**	Avoid wastage of water resources. Maintain all infrastructures associated to the management of domestic water.	(1) Abstraction from natural watercourses is kept to a minimum and does not exceed the DWAS Water Use Licence provisions by more than 5% on an annual basis. (2) No visible signs of leaks or damage to water storage infrastructures.
5. Mining offices (construction and operation) i.e. operation of training centres, offices and kitchen facilities	**General waste generation & Littering**	Visual Environment Soils quality due to leachates Surface Water quality due to leachates	Construction & Operational	**Control**	Promoting the reduction, re-use, or recycle of waste where prevention is not possible. Disposal of waste to local waste disposal sites is limited.	(1) No littering. (2) No unpleasant odours. (3) Marked and sealable bins observed. (4) Evidence of waste disposal certificates.
7. Water storage	**Improper water**	Wastage of water resource	**Operational**	**Avoid**	Avoid the wastage of water	(1) Abstraction from natural watercourses is

facilities	**storage management**	Water contamination			resources. Full compliance to the water abstraction limits provided by DWAS. Ensure maintenance of infrastructure related to water usage and storage.	kept to a minimum and does not exceed the DWAS Water Use Licence provisions by more than 5% on an annual basis. (2) No visible signs of leaks or damage to water storage infrastructures.
8. Pollution Control Dams (PCD's) i.e. Construction and operation **9.Stores, workshops &wash bays** **10. Ablutions & change house**	**Contamination of water resources**	Wetlands and Aquatic Ecology Surface Water quality	**Operational**	**Avoid**	Avoid the release of pollutants into the aquatic environment. Waste water is appropriately managed. Erosion is prevented. Suitable water management facilities and treatment works are developed and maintained.	(1) Water quality of streams and rivers are maintained within the predetermined seasonally baseline levels. (2) No evidence of pollutants released into streams and rivers. (3) No formation of erosion gullies or rills. (4) No leaks or spills caused by inadequate waste water management facilities. (5) Reporting of all section 30 of NEMA and section 20 of the National Water Act incidents.

with sewage treatment plant **11. Fuel operating power generators** **13. Fuel storage**		Groundwater quality				
8. Pollution Control Dams (PCD's) i.e. Construction and operation **10. Ablutions & change house with sewage treatment plant**	**Smell nuisance**	Human health and safety environment	Construction & Operational	**Avoid**	Avoid the generation of unpleasant odours on site at all times.	(1) All toilets are serviced. (2) PCD's containing putrescrible waste to be monitored and kept free of odour. (3) All putrescrible waste removed and disposed off in a suitable manner.
9.Stores, workshops &wash bays	**Chemical Fires**	Human health and safety environment	Construction & Operational	**Avoid**	Avoid and prevent chemical fires. Hazardous spills are	(1) Water quality of streams and rivers are maintained within the predetermined seasonally baseline levels.

11. Fuel operating power generators **13. Fuel storage**		Loss of ecosystems Damage to property			prevented and no incidents to human health occur.	(2) Immediate removal and remediation of all spills. (3) All staff trained. (4) All hazardous substances are documented. (5) No incidents recorded involving chemical fires. (6) Reporting of all section 30 of NEMA and section 20 of the National Water Act incidents.
12. Lighting	**Light pollution**	Disruption in ecosystem especially nocturnal fauna species	Construction & Operational	**Control**	Limit the possible contribution to light pollution as far as reasonably possible.	(1) No signs of usage of light during nigh times, if not essential for the safety of operation or humans.
13. Fuel storage	**Emission of noxious fumes**	Air Quality Human Health	Construction & Operational	**Avoid**	Avoid the release of emissions of noxious fumes from fuel storage facilities.	(1) No leaks from bulk fuel storage facilities. (2) No incidents relating to damage to lungs and eyes of employees or sub-contractors.
14. Employment of workers and procurement of construction materials.	**Loss of farm labour**	Socio-economic	Construction & Operational	**Control**	Promoting open public communication in terms of required labour.	(1) No complaints from local landowners regarding loss of farm labour. (2) Peaceful negotiations regarding employment opportunities.
	Population Influx – Pressure on Resources	Socio-economic	Construction & Operational	**Control**	Promoting the management of population influx associated to the mining operations in a sustainable manner.	(1) Provision of existing housing infrastructures.

	Population Influx – Social Pathologies	Socio-economic	Construction & Operational	**Control**	Control convicting social pathologies.	(1) Continuous awareness training on HIV/AIDS/STD in collaboration with local health service providers.
	Population Influx – Community Conflict	Socio-economic	Construction & Operational	**Control**	Promoting peaceful negotiations with the surrounding communities and local business owners.	(1) Peaceful negotiations regarding employment, skills development, and financial provisions for social development projects.
	Health and Safety of employees	Human health and safety environment	Construction & Operational	**Control**	Ensuring the health and safety of all personnel on site.	(1) Low incidents of injured on duty (IOD's) on site. (2) Low incidents of reported pedestrian accidents (3) Records kept of health and safety training conducted for all staff on site. (4) Visible evidence and use of PPE. (5) Visible health and safety signs of high risk areas.
	Job Creation and Skills Training	Socio-economic	Construction & Operational	**Control**	Promote job creation and skills development of local employment.	(1) Peaceful negotiations regarding employment, skills development, and financial provisions for social development projects.
	Job Creation (Multiplier	Socio-economic	Construction & Operational	**Control**	Promote job creation and skills development of local employment.	(1) Peaceful negotiations regarding employment, skills development, and financial provisions for social development projects.

	affect) and Population Influx					
Operational Phase						
17. Employment of workers	**Loss of farm labour**	Socio-economic	Construction & Operational	**Control**	Promoting open public communication in terms of required labour.	(1) No complaints from local landowners regarding loss of farm labour. (2) Peaceful negotiations regarding employment opportunities.
	Population Influx – Pressure on Resources	Socio-economic	Construction & Operational	**Control**	Promoting the management of population influx associated to the mining operations in a sustainable manner.	(1) Provision of existing housing infrastructures.
	Population Influx – Social Pathologies	Socio-economic	Construction & Operational	**Control**	Control convicting social pathologies.	(1) Continuous awareness training on HIV/AIDS/STD in collaboration with local health service providers.
	Population Influx – Community Conflict	Socio-economic	Construction & Operational	**Control**	Promoting peaceful negotiations with the surrounding communities and local business owners.	(1) Peaceful negotiations regarding employment, skills development, and financial provisions for social development projects.

	Health and Safety of employees	Human health and safety environment	Construction & Operational	**Control**	Ensuring the health and safety of all personnel on site.	(1) Low incidents of injured on duty (IOD's) on site. (2) Low incidents of reported pedestrian accidents. (3) Records kept of health and safety training conducted for all staff on site. (4) Visible evidence and use of PPE. (5) Visible health and safety signs of high risk areas.
	Job Creation and Skills Training	Socio-economic	Construction & Operational	**Control**	Promote job creation and skills development of local employment.	(1) Peaceful negotiations regarding employment, skills development, and financial provisions for social development projects.
	Job Creation (Multiplier affect) and Population Influx	Socio-economic	Construction & Operational	**Control**	Promoting open public communication in terms of required labour.	(1) No complaints from local landowners regarding loss of farm labour. (2) Peaceful negotiations regarding employment opportunities.

18.Topsoil and subsoil stripping & stockpiling for mining operation area **19.Opencast mining excavations** **20.Drilling & Blasting** **21. RoM &**	**Dust generation**	Air Quality Human Health	Construction	**Control**	Control dust fallout throughout the life cycle of the mining activity.	(1) Dust fallout levels at active operational sites do not exceed the pre-determined baseline levels by more than 10%. (2) Zero number of complaints from site staff, surrounding landowners and communities. (3) Adherence with legal required dust fallout levels. (4) Adherence with 600 mg/m² /day averaged over 30 days in residential areas

product stockpiling **22. Residue stockpiles** **23. Screening Operations** **24. Discard disposal (backfilling of mining area)** **30. Vehicular activity on haul roads; and operation of mining equipment** **31. Bulk transporting of Ore to market on Public roads**		Topography and Visual Environment				and 1200 mg/m² /day averaged over 30 days in non-residential areas. (5) No more than two within a year, no two sequential months per dust fallout monitoring site. (6) If exceeding dust fallout standard, within 3 months after submission of a dust fallout monitoring report, develop and submit a dust management plan to the air quality officer for approval.

18.Topsoil and subsoil stripping & stockpiling for mining operation area **19.Opencast mining excavations** **21. RoM & product stockpiling** **22. Residue stockpiles**	**Alteration of the visual environment and topography**	Topography and Visual Environment	Construction	**Remedy**	Remedy alteration of the visual environment and topography as close as possible to the predetermined state.	(1) No areas left un-vegetated. (2) No signs of alien or invasive species on site. (3) Control of visual effects. (4) Implement rehabilitation measures as per the Mine Rehabilitation, decommissioning and mine closure liability Plan in compliance with GN R. 1147 of NEMA.

18.Topsoil and subsoil stripping & stockpiling for mining operation area **19.Opencast mining excavations**	**Degradation of soil resources**	Soil quality	Construction & Operational	**Remedy**	Adequate protection of soil resources and remediation if degradation cannot be avoided.	(1) No evidence of erosion. (2) No mixing of topsoil or fertile soils with infertile soils. (3) No signs of prolonged exposure of un-vegetated areas by lack of implementing rehabilitation measures.

20.Drilling & Blasting **21. RoM & product stockpiling** **22. Residue stockpiles** **23. Screening Operations** **24. Discard disposal (backfilling of mining area)** **25. Waste generation, storage and disposal** **26. Chemical Toilets**		Flora micro-ecosystems				

29. Storage of fuel and lubricants in temporary facilities **33. Rehabilitation of mining areas**						

18.Topsoil and subsoil stripping & stockpiling for mining operation area **19.Opencast mining excavations** **21. RoM & product stockpiling** **22. Residue stockpiles** **33. Rehabilitation of mining areas**	**Vegetation and habitat loss**	Macro and Micro organisms Fauna and Flora	Construction & Operational	**Remedy**	Avoid unnecessary loss of vegetation and habitats. Rehabilitation of all affected habitats and mining related areas.	(1) Limiting site clearance to areas as per the approved site layout plan. (2) All sensitive or protected flora identified to be rescued and relocated. (3) No signs of prolonged exposure of un-vegetated areas by lack of implementing rehabilitation measures. (4) No unauthorised activities outside of the proposed footprint. (5) Avoid activities in No-Go areas as identified in **Appendix G**.
18.Topsoil and subsoil stripping & stockpiling for mining operation	**Destruction of Wetlands**	Wetlands and Aquatic Ecology	Construction & Operational	**Avoid**	Avoid the destruction of wetlands.	(1) Ensure water quality results do not exceed the pre-determined baseline results with more than 10%.

area						(2)Water quality of streams and rivers are maintained within the pre-determined seasonality baseline levels. (3) No incidents related to the pollution of rivers and streams. (4) No visible signs of erosion damages.
18.Topsoil and subsoil stripping & stockpiling for mining operation area **19.Opencast mining excavations** **20.Drilling & Blasting**	**Hydrocarbon Contamination**	Surface Water quality Groundwater quality	Construction & Operational	**Control**	Adequate protection of soil and water resources. Active remediation in case of spill is ensured.	(1) No evidence of hydrocarbon and hazardous spills. (2) No release of contaminated water into the natural environment. (3) Immediate removal and remediation of all spills. (4) Reporting of all section 30 of NEMA and section 20 of the National Water Act incidents.

21. RoM & product stockpiling **23. Screening Operations** **24. Discard disposal (backfilling of mining area)** **27. River crossings** **29. Storage of fuel and lubricants in temporary facilities** **30. Vehicular activity on haul roads; and operation of**		Wetlands and Aquatic Ecology Soil Quality				

mining equipment						
18.Topsoil and subsoil stripping & stockpiling for mining operation area **19.Opencast mining excavations** **21. RoM & product stockpiling**	**Sedimentation and siltation of watercourses**	Wetland and Aquatic Ecology	Construction & Operational	**Control**	Avoid or minimise the degradation of water quality of watercourses due to sedimentation and siltation.	(1) Ensure water quality results do not exceed the pre-determined baseline results with more than 10%. (2)Water quality of streams and rivers are maintained within the pre-determined seasonality baseline levels. (3) No incidents related to the pollution of rivers and streams. (4) No visible signs of erosion damages.

22. Residue stockpiles **23. Screening Operations** **24. Discard disposal (backfilling of mining area)** **27. River crossings** **30. Vehicular activity on haul roads; and operation of mining equipment** **32. Water Management** **33. Rehabilitation of**		Surface Water quality				

mining areas						
18.Topsoil and subsoil stripping & stockpiling for mining operation area **27. River crossings** **28. Water supply (potable & process)** **32. Water**	**Water level reduction and contamination**	Groundwater quality Downstream water users Surface Water quality	Construction & Operational	**Control**	Control the potential water level reduction and contamination related to authorised activities.	(1) Ensure water quality results do not exceed the pre-determined baseline results with more than 10%. (2)Water quality of streams and rivers are maintained within the pre-determined seasonality baseline levels. (3) No incidents related to the pollution of rivers and streams. (4) No visible signs of erosion damages. (5) No signs of blockages to

Management						the natural flow of the associated river catchment. (6) Reporting of all section 30 of NEMA and section 20 of the National Water Act incidents.
18.Topsoil and subsoil stripping & stockpiling for mining operation area **19.Opencast mining excavations** **20.Drilling & Blasting** **21. RoM & product stockpiling** **23. Screening Operations**	**Noise generation**	Surrounding noise quality	Construction & Operational	**Control**	Control potential noise pollution stemming from the operational of the project	(1) Ensure equivalent A-weighted noise levels below 55 dBA at potentially noise-sensitive receptors (daytime). (2) Ensure equivalent A-weighted noise levels below 45 dBA at potentially noise-sensitive receptors (night-time). (3) Define the noisy areas with a set boundary ensuring that equivalent A-weighted noise levels at this boundary does not exceed 61 dB LAIeq,24hr. It should be noted that the area would have to be demarcated as a "controlled zone" in terms of

24. Discard disposal (backfilling of mining area) **30. Vehicular activity on haul roads; and operation of mining equipment** **33. Rehabilitation of mining areas**						the NCR; (4) Ensure that the change in ambient sound levels as experienced by Potentially Sensitive Receptors is less than 5 - 7 dBA; (5) Ensuring compliance with the National Noise Control Regulations and SANS10103:2008 guidelines. The referencing of the International Finance Corporation (World Bank) guidelines for an acceptable sound level in a residential area was also considered.
18.Topsoil and subsoil stripping & stockpiling for mining operation area	**Destruction of graves**	Loss of heritage resources	Construction & Operational	**Avoid**	Identification of all possible sites of archaeological value and graves has been identified prior to the commencement of authorised work.	(1) All sites clearly demarcated as no-go areas. (2) Evidence of records should further discoveries be identified during construction. (3) Full compliance to all mitigation measures.

18.Topsoil and subsoil stripping & stockpiling for mining operation area	**Degradation of cultural significance heritage sites**	Loss of heritage resources	Construction & Operational	**Avoid**	Identification of all possible sites of archaeological value and graves has been identified prior to the commencement of authorised work.	(1) All sites clearly demarcated as no-go areas. (2) Evidence of records should further discoveries be identified during construction. (3) Full compliance to all mitigation measures.
18.Topsoil and subsoil stripping & stockpiling for mining operation area **19.Opencast**	**Erosion**	Loss of fertile soil	Construction & Operational	**Control**	To prevent any erosion and to provide adequate erosion control measures where required.	(1) No visible signs of erosion formations such as dongas or rills. (2) Sedimentation loads of streams and rivers not to exceed the baseline levels by more than 10%. (3) Erosion control measures

mining excavations **21. RoM & product stockpiling** **24. Discard disposal (backfilling of mining area)** **27. River crossings** **30. Vehicular activity on haul roads; and operation of mining equipment** **32. Water Management** **33.**		Micro-ecosystems				implemented in high risk areas. (4) No signs of prolonged exposure of un-vegetated areas by lack of implementing rehabilitation measures.

Rehabilitation of mining areas						
18.Topsoil and subsoil stripping & stockpiling for mining operation area **19.Opencast mining excavations**	**CO_2 emissions**	Air Quality	Construction & Operational	**Control**	The levels of greenhouse gas and CO2 emissions emanating from the use of plant and vehicles as well as the use of generators for power on site, is kept to a minimum.	(1) All vehicles, plant, and equipment to be serviced as per manufacturer's maintenance schedules. (2) Record keeping of service records of all vehicles, plant, and equipment. (3) No evidence of plant, equipment or vehicles in bad

21. RoM & product stockpiling **23. Screening Operations** **28. Water supply (potable & process)** **30. Vehicular activity on haul roads; and operation of mining equipment** **31. Bulk transporting of Ore to market on Public roads**						condition.

18.Topsoil and subsoil stripping & stockpiling for mining operation area **19.Opencast mining excavations** **22. Residue stockpiles** **27. River crossings** **32. Water Management**	**Alteration of drainage patterns**	Wetland and Aquatic Ecology Surface Water quality	Construction & Operational	**Remedy**	Remedy the possible effects of alteration to natural drainage lines. Adherence with water quality requirements as set by the Water Use Licence Conditions.	(1) No visible signs of erosion formations such as dongas or rills. (2) Sedimentation loads of streams and rivers not to exceed the baseline levels by more than 10%. (3) Erosion control measures implemented in high risk areas. (4) No signs of degradation of diversion channels or drainage systems.
18.Topsoil and subsoil stripping & stockpiling for mining operation area	**Destruction of upstream tributaries and reduction in water in the catchment**	Wetland and Aquatic Ecology Downstream water users	Construction & Operational	**Remedy**	Remedy the possible effects of destruction of upstream tributaries and reduction in the water catchment. Adherence with water quality requirements set by the Water Use Licence Conditions.	(1) No visible signs of erosion formations such as dongas or rills. (2) Sedimentation loads of streams and rivers not to exceed the baseline levels by more than 10%.

19.Opencast mining excavations **32. Water Management**		Surface Water quality				(3) Erosion control measures implemented in high risk areas. (4) No signs of degradation of diversion channels or drainage systems.
18.Topsoil and subsoil stripping & stockpiling for mining operation area **19.Opencast mining excavations** **21. RoM & product stockpiling** **33. Rehabilitation of mining areas**	**Influx of alien invasive vegetation**	Fauna and Flora micro and macro ecosystems	Construction & Operational	**Control**	Prevent the spreading of alien plants/seeds on site and to the surrounding areas. Eradication and removal of alien and invasive plants.	(1) No visible presence of alien vegetation on site.

19.Opencast mining excavations **20.Drilling & Blasting** **21. RoM & product stockpiling** **22. Residue stockpiles** **23. Screening Operations** **24. Discard disposal (backfilling of mining area)** **25. Waste generation, storage and disposal**	**Contamination of water resources**	Wetlands and Aquatic Ecology	Construction & Operational	**Avoid**	Avoid the release of pollutants into the aquatic environment. Waste water is appropriately managed. Erosion is prevented. Suitable water management facilities and treatment works are developed and maintained.	(1) Water quality of streams and rivers are maintained within the predetermined seasonally baseline levels. (2) No evidence of pollutants released into streams and rivers. (3) No formation of erosion gullies or rills. (4) No leaks or spills caused by inadequate waste water management facilities. (5) Reporting of all section 30 of NEMA and section 20 of the National Water Act incidents.
		Surface Water quality				
		Groundwater quality				

26. Chemical Toilets **27. River crossings** **28. Water supply (potable & process)** **29. Storage of fuel and lubricants in temporary facilities** **32. Water Management**						
20.Drilling & Blasting	**Damage to surrounding landowner properties**	Socio-economic Human health and safety environment	Operational	**Avoid**	Avoid damage to any surrounding landowner properties, infrastructures or mining equipment. Avoid any injuries caused by blasting activities.	(1) No signs of damage to surrounding landowner property, infrastructure, or mining equipment. (2) No injuries caused by blasting activities.

22. Residue stockpiles **25. Waste generation, storage and disposal**	**Hazardous Leachate**	Groundwater quality Aquatic ecology	Operational	**Control**	Ensure that hazardous leachates are not released into the natural environment.	(1) Exceedance in water quality are limited to 5% of the baseline thresholds. (2) No contamination of water resources. (3) Reporting of all section 30 of NEMA and section 20 of the National Water Act incidents.
25. Waste generation, storage and disposal	**Illegal dumping**	Surface water contamination Human health and safety environment Soil Contamination	Construction & Operational	**Avoid**	Promoting the reduction, re-use, or recycle of waste where prevention is not possible. Disposal of waste to local waste disposal sites is limited.	(1) No littering. (2) No unpleasant odours. (3) Marked and sealable bins observed. (4) Evidence of waste disposal certificates.
26. Chemical Toilets	**Smell nuisance**	Human health and safety environment	Construction & Operational	**Avoid**	Avoid the generation of unpleasant odours on site at all times.	(1) All toilets are serviced. (2) PCD's containing putrescrible waste to be monitored and kept free of odour. (3) All putrescrible waste removed and disposed off in a suitable manner.

28. Water supply (potable & process) **32. Water Management**	**Improper water storage management**	Wastage of water resource Water contamination	Construction & Operational	**Avoid**	Avoid wastage of water resources. Maintain all infrastructures associated to the management of domestic water.	(1) Abstraction from natural watercourses is kept to a minimum and does not exceed the DWAS Water Use Licence provisions by more than 5% on an annual basis (2) No visible signs of leaks or damage to water storage infrastructures. (3) Reporting of all section 30 of NEMA and section 20 of the National Water Act incidents.
29. Storage of fuel and lubricants in temporary facilities	**Chemical Fires**	Human health and safety environment Loss of ecosystems Damage to property	Construction & Operational	**Avoid**	Avoid and prevent chemical fires. Hazardous spills are prevented and no incidents to human health occur.	(1) Water quality of streams and rivers are maintained within the predetermined seasonally baseline levels. (2) Immediate removal and remediation of all spills (3) All staff trained. (4) All hazardous substances are documented.

						(5) No incidents recorded involving chemical fires. (6) Reporting of all section 30 of NEMA and section 20 of the National Water Act incidents.
31. Bulk transporting of Ore to market on Public roads	**Pressure on public transport infrastructure**	Socio-economic	Construction & Operational	**Control**	Accidents are kept to a minimum. The surface quality of the road is not negatively impacted resulting from haulage of ROM product. The presence of heavy vehicles turning are clearly indicated thereby minimising potential accidents. Sections of existing road surfaces which have been impacted on by the haulage of ROM product are remediated.	(1) No incidents reported of vehicle, pedestrian, and livestock accidents. (2) Condition of road surface maintained (3) No complaints from surrounding landowners or road users. (4) Clearly visibility of warning signage. (5) Existing road surfaces are utilised and maintained within baseline levels.
Decommissioning						
35. Demolition / removal of portable and	**Hydrocarbon Contamination**	Surface Water quality	Decommissioning	**Control**	Adequate protection of soil and water resources. Active remediation in case of spill is ensured.	(1) No evidence of hydrocarbon and hazardous spills. (2) No release of

related infrastructure **36. Vehicular activity: removal of mobile plant / equipment and vehicles** **38. Demolition of PCD's** **39. Demolition of workshops, waste storage facilities, fuel storage facilities etc.**		Groundwater quality Soil quality				contaminated water into the natural environment. (3) Immediate removal and remediation of all spills. (4) Reporting of all section 30 of NEMA and section 20 of the National Water Act incidents. (5) Implement rehabilitation measures as per the Mine Rehabilitation, decommissioning and mine closure liability Plan in compliance with GN R. 1147 of NEMA.
35. Demolition / removal of portable and related	**Dust generation**	Air Quality	Decommissioning	**Control**	Control dust fallout throughout the life cycle of the mining activity.	(1) Dust fallout levels at active operational sites do not exceed the pre-determined baseline levels by more than 10%.

infrastructure **36. Vehicular activity: removal of mobile plant / equipment and vehicles** **37. Rehabilitation of the lay down areas** **38. Demolition of PCD's** **39. Demolition of workshops, waste storage facilities, fuel storage facilities etc.**		Human Health Topography and Visual Environment				(2) Zero number of complaints from site staff, surrounding landowners and communities. (3) Adherence with legal required dust fallout levels. (4) Adherence with 600 mg/m² /day averaged over 30 days in residential areas and 1200 mg/m² /day averaged over 30 days in non-residential areas. (5) No more than two within a year, no two sequential months per dust fallout monitoring site. (6) If exceeding dust fallout standard, within 3 months after submission of a dust fallout monitoring report, develop and submit a dust management plan to the air quality officer for approval.

35. Demolition / removal of portable and related infrastructure **37. Rehabilitation of the lay down areas** **38. Demolition of PCD's** **39. Demolition of workshops, waste storage facilities, fuel storage facilities etc.**	**Degradation of soil resources**	Soil quality Flora micro-ecosystems	Decommissioning	**Remedy**	Adequate protection of soil resources and remediation if degradation cannot be avoided.	(1) No evidence of erosion. (2) No mixing of topsoil or fertile soils with infertile soils. (3) No signs of prolonged exposure of un-vegetated areas by lack of implementing rehabilitation measures. (4) Implement rehabilitation measures as per the Mine Rehabilitation, decommissioning and mine closure liability Plan in compliance with GN R. 1147 of NEMA.

35. Demolition / removal of portable and related infrastructure **36. Vehicular activity: removal of mobile plant / equipment and**	**Erosion**	Loss of fertile soil	Decommissioning	**Control**	To prevent any erosion and to provide adequate erosion control measures where required.	(1) No visible signs of erosion formations such as dongas or rills. (2) Sedimentation loads of streams and rivers not to exceed the baseline levels by more than 10%. (3) Erosion control measures implemented in high risk areas.

vehicles **37. Rehabilitation of the lay down areas** **38. Demolition of PCD's** **39. Demolition of workshops, waste storage facilities, fuel storage facilities etc.**		Micro-ecosystems				(4) No signs of prolonged exposure of un-vegetated areas by lack of implementing rehabilitation measures. (5) Implement rehabilitation measures as per the Mine Rehabilitation, decommissioning and mine closure liability Plan in compliance with GN R. 1147 of NEMA.
35. Demolition / removal of portable and related infrastructure **36. Vehicular activity: removal of mobile plant /**	**Noise generation**	Surrounding noise quality	Decommissioning	**Control**	Control potential noise pollution stemming from the decommissioning phase of the project	(1) Ensure equivalent A-weighted noise levels below 55 dBA at potentially noise-sensitive receptors (daytime). (2) Ensure equivalent A-weighted noise levels below 45 dBA at potentially noise-sensitive receptors (night-

equipment and vehicles **38. Demolition of PCD's** **39. Demolition of workshops, waste storage facilities, fuel storage facilities etc.**						time). (3) Define the noisy areas with a set boundary ensuring that equivalent A-weighted noise levels at this boundary does not exceed 61 dB LAleq,24hr. It should be noted that the area would have to be demarcated as a "controlled zone" in terms of the NCR; (4) Ensure that the change in ambient sound levels as experienced by Potentially Sensitive Receptors is less than 5 - 7 dBA; (5) Ensuring compliance with the National Noise Control Regulations and SANS10103:2008 guidelines. The referencing of the International Finance Corporation (World Bank) guidelines for an acceptable sound level in a residential

						area was also considered.
35. Demolition / removal of portable and related infrastructure **38. Demolition of PCD's** **39. Demolition of workshops, waste storage facilities, fuel storage facilities etc.**	**General waste generation & Littering**	Topography and Visual Environment Soils quality due to leachates Surface Water quality due to leachates	Decommissioning	**Control**	Promoting the reduction, re-use, or recycle of waste where prevention is not possible. Disposal of waste to local waste disposal sites is limited.	(1) No littering. (2) No unpleasant odours. (3) Marked and sealable bins observed. (4) Evidence of waste disposal certificates
36. Vehicular activity: removal of mobile plant / equipment and vehicles	**CO_2 emissions**	Air Quality	Decommissioning	**Control**	The levels of greenhouse gas and CO2 emissions emanating from the use of plant and vehicles as well as the use of generators for power on site, is kept to a minimum.	(1) All vehicles, plant, and equipment to be serviced as per manufacturer's maintenance schedules. (2) Record keeping of service records of all vehicles, plant, and equipment.

						(3) No evidence of plant, equipment or vehicles in bad condition.
36. Vehicular activity: removal of mobile plant / equipment and vehicles **37. Rehabilitation of the lay down areas**	**Sedimentation and siltation of watercourses**	Wetland and Aquatic Ecology Surface Water quality	Decommissioning	**Control**	Avoid or minimise the degradation of water quality of watercourses due to sedimentation and siltation.	(1) Ensure water quality results do not exceed the pre-determined baseline results with more than 10%. (2)Water quality of streams and rivers are maintained within the pre-determined seasonality baseline levels. (3) No incidents related to the pollution of rivers and streams. (4) No visible signs of erosion damages.
37. Rehabilitation of the lay down areas	**Influx of alien invasive vegetation**	Fauna and Flora micro and macro ecosystems	Decommissioning	**Control**	Prevent the spreading of alien plants/seeds on site and to the surrounding areas. Eradication and removal of alien and invasive plants.	(1) No visible presence of alien vegetation on site.

37. Rehabilitation of the lay down areas	**Vegetation and habitat loss**	Macro and Micro organisms	Decommissioning	**Remedy**	Avoid unnecessary loss of vegetation and habitats. Rehabilitation of all affected habitats and mining related areas.	(1) Limiting site clearance to areas as per the approved site layout plan. (2) All sensitive or protected flora identified to be rescued and relocated. (3) No signs of prolonged exposure of un-vegetated areas by lack of implementing rehabilitation measures. (4) Implement rehabilitation measures as per the Mine Rehabilitation, decommissioning and mine closure liability Plan in compliance with GN R. 1147 of NEMA. (5) No unauthorised activities outside of the proposed footprint. (6) Avoid activities in No-Go areas as identified in **Appendix G**.
		Fauna and Flora				

38. Demolition of PCD's **39. Demolition of workshops, waste storage facilities, fuel storage facilities etc.**	**Contamination of water resources**	Wetlands and Aquatic Ecology Surface Water quality Groundwater quality	Decommissioning	**Avoid**	Avoid the release of pollutants into the aquatic environment. Waste water is appropriately managed. Erosion is prevented. Suitable water management facilities and treatment works are developed and maintained.	(1) Water quality of streams and rivers are maintained within the predetermined seasonally baseline levels. (2) No evidence of pollutants released into streams and rivers. (3) No formation of erosion gullies or rills. (4) No leaks or spills caused by inadequate waste water management facilities. (5) Reporting of all section 30 of NEMA and section 20 of the National Water Act incidents. (6) Implement rehabilitation measures as per the Mine Rehabilitation, decommissioning and mine

						closure liability Plan in compliance with GN R. 1147 of NEMA.

f) Impact Management Actions

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

In the previous section management objectives and targets have been established. Table 18 identifies management actions to be implemented in order to reach the defined objectives identified in Table 17.

As part of the Spitsvale Environmental Management System (based on the International ISO 14001:2004 standard) the following additional requirements must be implemented in order to promote continual improvement.

Development of an Environmental Policy

The management team of the Spitsvale Project shall define an organisational environmental Policy and ensure that, within the defined scope of this EMS, it:

- Is appropriate to the nature, scale and environmental impacts of its activities, products and services;
- Includes a commitment to continual improvement and prevention of pollution;
- Includes a commitment to comply with applicable legal requirements and with other requirements to which the Spitsvale Project subscribes which relate to its environmental aspects;
- Provides the framework for setting and reviewing environmental objectives and targets;
- Is documented, implemented, and maintained;
- Is communicated to all persons working for or on behalf of the Spitsvale Project; and
- Is available to the public.

Legal and other requirements

The management team of the SPitsvale Project shall establish, implement, and maintain a procedure (s) to:

- Identify and have access to the applicable legal requirements and other requirements to which the organisation subscribes related to its environmental aspects; and
- Determine how these requirements apply to its environmental aspects.

The managerial team of the Spitsvale Project shall ensure that all the applicable legal requirements identified in Part A section ***e)*** or any other legislative requirements published after the approval of this report, to which the project subscribes are taken into account in establishing, implementing, and maintaining the Spitsvale EMS.

Resources, roles, responsibility and authority

Management shall ensure the availability of resources essential to establish, implement, maintain, and improve the Spitsvale EMS. Resources include human resources and specialised skills, organisational infrastructure, technology and financial resources.

Roles, responsibilities and authorities must be defined, documented and communicated in order to facilitate effective environmental management.

Spitsvale's top management shall appoint a specific management representative(s) who, irrespective of other responsibilities, shall have defined roles, responsibilities, and authority for:

- Ensuring that an EMS is established, implemented, and maintained in accordance with the requirements stipulated by the Environmental Authorisation and approved EMPr; and
- Reporting to top management on the performance of the EMS for review including recommendations for improvement.

Competence, training and awareness

The management team of the Spitsvale project shall ensure that any person(s) performing tasks for it or on its behalf have the potential to cause a significant environmental impact(s) identified by the project is (are) competent on the basis of appropriate education, training, or experience, and shall retain associated records.

Training needs associated with its environmental aspects and its EMS shall be identified. Actions shall be taken to provide the required training to meet the identified needs and records of this shall be kept.

The management of the Spitsvale project shall establish, implement, and maintain a procedure(s) to make persons working for it or on its behalf aware of the following:

- The importance of conformity with the established environmental policy, procedures, the EMPr, and Environmental Authorisation (EA);
- The significant environmental aspects and related actual or potential impacts associated with their work, and the environmental benefits of improved personal performance;
- Their roles and responsibilities in achieving conformity with the requirements of the environmental management system; and
- The potential consequences of non-conformities from the specified procedures.

Communication

With regard to its environmental aspects and the EMS, the management team of the Spitsvale project shall establish, implement, and maintain a procedure(s) for:

- Internal communication among various levels and functions; and
- Receiving, documenting, and responding to relevant communication from external I&AP.

GN R. 982 (2014 EIA regulations) requires that the compliance of the environmental authorisation, EMPr, and closure plan (in compliance with GN R. 1147) be audited throughout the time these documentation remains valid.

Section 34 (6) of the 2014 EIA regulation stipulated the following:

"Within 7 days of the date of submission of an environmental audit report to the competent authority, the holder of an environmental authorisation must notify all potential and registered interested and affected parties of the submission of that report, and make such report immediately available- (a) to anyone on request; and (b) on a publicly accessible website, where the holder has such a website."

Therefore in order to comply with the requirement stipulated above, a method of communicating the auditing report shall be established and implemented.

Documentation

The Spitsvale Project EMS documentation shall include the following:

- The Spitsvale Project environmental policy and the objectives and targets specified in the EMPr (Table 17);
- Description of the scope of the EMS;
- Description of the main elements of the EMS and their interaction, and reference to related documents;
- Documents, including records required by the EMPr and EA; and
- Documents, including records, determined by the Spitsvale EMS, EMPr and EA to be necessary to ensure effective planning, operation and control of processes that relate to its significant environmental aspects.

Operational Control

The identified significant environmental impacts and/or risk as specified in Part A of this report must be managed by identifying and planning those operations associated to each impact and/or risk that are

consistent with the developed environmental policy, objectives and targets, in order to ensure that they are carried out under specified conditions, by:

- Establishing, implementing and maintaining a documented procedure(s) to control situations where their absence could lead to deviation from the environmental policy, objectives and targets;
- Stipulating the operating criteria in the procedure(s); and
- Establishing, implementing and maintaining procedures related to the identified significant environmental aspects of goods and services used by the Spitsvale Project and communicating applicable procedures and requirements to suppliers, including contractors or sub-contractors.

Emergency preparedness and response

Procedure(s) to identify potential emergency situations and potential accidents that can have an impact(s) on the environment and methods of respond to them shall be established, implemented and maintained.

All actual emergency situations and accidents shall be responded to immediately and preventative or mitigation measures associated to the adverse environmental impacts shall be implemented.

This document shall be reviewed periodically and, where necessary, revise its emergency preparedness and response procedure, in particular, after the occurrence of accidents or emergency situations.

The Emergency preparedness and response plan shall also periodically test such procedures where practicable.

Monitoring and measurement

As part of the Spitsvale Project's EMS, a procedure(s) to monitor and measure, on a regular basis, the key characteristics of the activities that can have a significant environmental impact must be established, implemented and maintained. This procedure shall include the documenting of information to monitor performance, applicable operational controls and conformity with the established objectives and goals.

Evaluation of compliance

In addition to the auditing requirements set by GN R. 982, the Spitsvale Project shall establish, implement and maintain a procedure for periodically evaluating compliance with all requirements set out in the developed Spitsvale EMS, the approved EMPr, EA, and closure plan (complying with the requirements set by GN R. 1147). Records of these results must be kept and communicated to all responsible persons.

Nonconformity, corrective action and preventative action

A procedure for dealing with actual and potential nonconformities and for taking corrective and preventative actions shall be established, implemented, and maintained. This procedure should include and define the following requirements:

- Identifying and correcting nonconformity (ies) and taking action(s) to mitigate their environmental impacts;
- Investigating nonconformity(ies), determining their cause(s) and taking actions in order to avoid their recurrence;
- Evaluating the need for action(s) to prevent nonconformity(ies) and implementing appropriate actions designed to avoid their occurrence;
- Recording the results of corrective action(s) and preventative action(s) taken; and
- Reviewing the effectiveness of corrective action(s) and preventative action(s).

The actions to be implemented shall be appropriate to the magnitude of the problems and the environmental impacts encountered.

Internal Audit

As discussed in previous sections, GN R. 982 (2014 EIA regulations) requires that compliance with the environmental authorisation, environmental management programme and the closure plan be submitted to the competent authority. However, this shall not be the only audit report generated throughout the life cycle of the Spitsvale Project.

A internal audit of the Spitsvale EMS is recommended to be conducted on a biannual (at least once before submitting independent audit report to the competent authority) basis, if found to be feasible. The purpose of these audits will be as follows:

- Determine whether the EMS conforms to the planned arrangements for environmental management including the requirements set out by the EMPr, EA, and closure plan;
- The EMS has been properly implemented and is maintained; and
- Provide information on the results of audits to be managed.

The purpose of the audit report is as follows:

- To describe findings or nonconformity(ies);
- Communicate compliance status to responsible persons;
- To determine compliance status with the EMPr, EA, and closure plan;

- Indicate areas requiring improvement; and
- Determine the accuracy of documented procedures and mitigation measures.

This audit must be conducted by an appointed suitably qualified person with the expertise of environmental management.

Management Review

Top management shall review the Spitsvale EMS at planned intervals (recommended to occur at least biannually), to ensure its continuing suitability, adequacy and effectiveness. Reviews shall include assessing opportunities for improvement and the need for changes to the EMS, EMPr, EA, and closure plan. Records of these review meeting must be documented and kept.

Input to management reviews shall include:

- Results of internal audits and evaluations of compliance with legal and other requirements;
- Communication from external I&AP, including complaints;
- The environmental performance of the Spitsvale Project;
- The extent to which objectives and targets have been met;
- Status of corrective and preventative actions;
- Follow-up actions from previous management reviews;
- Changing circumstances, including developments in legal and other requirements related to its environmental aspects; and
- Recommendations for improvement.

The outputs from the management reviews shall include any decisions and actions related to possible changes to environmental policy, objectives and targets and other elements of the EMS, EMRr, EA, and closure plan, consistent with the commitment to continual improvement.

Table 18: Recommended management actions to be implemented to ensure objectives and targets are reached

ACTIVITY whether listed or not listed. **(E.g. Excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc…etc…etc.).**	**POTENTIAL IMPACT** **(e.g. dust, noise, drainage surface disturbance, fly rock, surface water contamination, groundwater contamination, air pollution etc….etc…)**	**MITIGATION TYPE** **(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. etc)** **E.g.** **Modify through alternative method.** **Control through noise control** **Control through management and monitoring** **Remedy through rehabilitation..**	**TIME PERIOD FOR IMPLEMENTATION** 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.	**COMPLIANCE WITH STANDARDS** (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)
Construction Phase				
1. Access and hauling along roads i.e. during the construction of roads **2. Site clearing and topsoil stripping for lay down area and all related mining infrastructure** **5. Mining offices (construction and operation) i.e. operation of training centres, offices and kitchen facilities** **8. Pollution Control Dams (PCD's) i.e. Construction and operation**	**Dust generation**	**Control**	(1) Measures must be implemented when required during the activities listed (2) Ongoing monitoring of compliance throughout the entire life cycle of the project	(1) Development and implementation of a Dust management plan as part of an Air quality management plan to including the monitoring and prevention programme. (2) Ensuring compliance with the National Environmental Management: Air Quality Act (NEMAQA), No. 39 of 2004 as amended by Act no 20 of 2014. (3) Ensure activities remain under the thresholds stipulated in GNR 893 (in terms of section 21 of NEMAQA. (4) Register online to the National Atmospheric Emissions Inventory System (NAEIS) in terms of the National Reporting Regulations (GNR 283) as Group C emitters. (5) Ensuring compliance with the National Ambient Air Quality Standards (GNR 1210 of 24 December 2009) (6) Ensuring compliance with the National Dust Control regulations (GNR 897 of November 2013)
1. Access and hauling along roads i.e. during the construction of roads **2. Site clearing and topsoil stripping for lay down area and all related mining infrastructure**	**Hydrocarbon Contamination**	**Control**	(1) Mitigation measures must be implemented for the complete duration of the activities listed (2) Ongoing monitoring of compliance throughout the entire life cycle of the project (3) Immediate remediation actions	(1) Development of water management plan addressing monitoring and management requirements. (2) Development of a storm water management plan addressing the separation of "dirty" and clean “areas”. (3) Development of emergency response plan with specific reference to spill prevention and remediation. (4) Development and implementation of vehicle/plant/equipment maintenance plan with specific reference to daily inspections of plant/vehicles/equipment for leaks or breakages. (5) Development and implementation of a Hazardous substances management plan.

3. Weigh bridge **6. Storm water runoff management features** **9.Stores, workshops &wash bays** **11. Fuel operating power generators** **13. Fuel storage** **15. Transport of construction material, mobile plant and equipment to the site** **16. Use of existing drilled / new boreholes**			in the event of an incident	
1. Access and hauling along roads i.e. during the construction of roads **2. Site clearing and topsoil stripping for lay down area and all related mining infrastructure** **9.Stores, workshops &wash bays** **10. Ablutions & change house with sewage treatment plant** **11. Fuel operating power generators** **13. Fuel storage**	**Degradation of soil resources**	**Remedy**	(1) Mitigation measures must be implemented for the complete duration of the activities listed (2) Ongoing monitoring of compliance throughout the entire life cycle of the project (3) Immediate remediation actions in the event of an incident	(1) Development of a soil conservation management plan. (2) Development of a storm water management plan. (3) Development and implementation of vehicle/plant/equipment maintenance plan with specific reference to daily inspections of plant/vehicles/equipment for leaks or breakages.
1. Access and hauling along	**Erosion**	**Control**	(1) Mitigation measures must be	(1) Development and implementation of a storm water management plan. (2) Development of a soil conservation management plan.

roads i.e. during the construction of roads **2. Site clearing and topsoil stripping for lay down area and all related mining infrastructure** **6. Storm water runoff management features** **15. Transport of construction material, mobile plant and equipment to the site**			implemented for the complete duration of the activities listed (2) Ongoing monitoring of compliance throughout the entire life cycle of the project (3) Immediate remediation actions in the event of an incident	(3) Development and implementation of mine rehabilitation plan.
1. Access and hauling along roads i.e. during the construction of roads **2. Site clearing and topsoil stripping for lay down area and all related mining infrastructure** **6. Storm water runoff management features**	**Vegetation and habitat loss**	**Remedy**	(1) Mitigation measures must be implemented for the complete duration of the activities listed (2) Ongoing monitoring of compliance throughout the entire life cycle of the project (3) Immediate remediation actions in the event of an incident (4) Immediate re-vegetation on completion of listed activity	(1) Develop a plant species search and rescue management plan. (2) Develop and implement a phased rehabilitation management plan. (3) Develop and implement a soil conservation management plan. (4) Apply for permits to remove protected species (provincial and national).
1. Access and hauling along roads i.e. during the construction of roads **2. Site clearing and topsoil stripping for lay down area and all related mining infrastructure** **6. Storm water runoff management features** **15. Transport of construction**	**Sedimentation and siltation of watercourses**	**Control**	(1) Mitigation measures must be implemented for the complete duration of the activities listed (2) Ongoing monitoring of compliance throughout the entire life cycle of the project (3) Immediate remediation actions in the event of an incident (4) Immediate re-vegetation on completion of listed activity (5) Reporting of incidents within 48h to the competent authority	(1) Develop a storm water management plan. (2) Develop and implement a water management plan and specifically include water monitoring and pollution prevention strategies.

material, mobile plant and equipment to the site				
1. Access and hauling along roads i.e. during the construction of roads **2. Site clearing and topsoil stripping for lay down area and all related mining infrastructure** **5. Mining offices (construction and operation) i.e. operation of training centres, offices and kitchen facilities** **9.Stores, workshops &wash bays** **11. Fuel operating power generators**	**Noise generation**	**Control**	(1) Mitigation measures must be implemented for the complete duration of the activities listed (2) Ongoing monitoring of compliance throughout the entire life cycle of the project (3) Immediate remediation actions in the event of an incident	(1) Develop and implement a noise monitoring programme to ensure compliance with the National Noise Control Regulations and SANS10103:2008 guidelines. (2) Develop and implement a vehicle/plant/equipment management plan to specifically include routine inspections and testing of sound frequencies.
1. Access and hauling along roads i.e. during the construction of roads **2. Site clearing and topsoil stripping for lay down area and all related mining infrastructure** **6. Storm water runoff management features**	**Alteration of drainage patterns**	**Remedy**	(1) Mitigation measures must be implemented for the complete duration of the activities listed (2) Ongoing monitoring of compliance throughout the entire life cycle of the project (3) Immediate remediation actions in the event of an incident (4) Immediate re-vegetation on completion of listed activity (5) Immediate rehabilitation measures to be implemented on the completion of listed activity.	(1) Develop and implement a storm water management plan (2) Develop and implement a water management plan specifically including a strategy for the management of alterations to drainage patterns.
1. Access and hauling along roads i.e. during the	**Destruction of upstream tributaries and reduction in**	**Remedy**	(1) Mitigation measures must be implemented for the complete	(1) Develop and implement a storm water management plan. (2) Develop and implement a water management plan specifically including a strategy for the management of alterations to drainage patterns.

construction of roads	**water in the catchment**		duration of the activities listed (2) Ongoing monitoring of compliance throughout the entire life cycle of the project (3) Immediate remediation actions in the event of an incident (4) Immediate re-vegetation on completion of listed activity (5) Immediate rehabilitation measures to be implemented on the completion of listed activity.	
1. Access and hauling along roads i.e. during the construction of roads	**Water usage for dust suppression**	**Control**	(1) Mitigation measures must be implemented for the complete duration of the activities listed (2) Ongoing monitoring of compliance throughout the entire life cycle of the project	(1) Development and implementation of a Dust management plan including the monitoring and prevention programme. (2) Develop and implement a water usage record keeping procedure.
1. Access and hauling along roads i.e. during the construction of roads **2. Site clearing and topsoil stripping for lay down area and all related mining infrastructure** **5. Mining offices (construction and operation) i.e. operation of training centres, offices and kitchen facilities**	**Influx of alien invasive vegetation**	**Control**	(1) Mitigation measures must be implemented for the complete duration of the activities listed (2) Ongoing monitoring of compliance throughout the entire life cycle of the project (3) Immediate removal of all alien invasive species	(1) Develop and implement an alien eradication and control management plan.
1. Access and hauling along	**CO_2 emissions & Release of**	**Control**	(1) Mitigation measures must be	(1) Develop and maintain a Carbon footprint reporting policy.

roads i.e. during the construction of roads **2. Site clearing and topsoil stripping for lay down area and all related mining infrastructure** **9.Stores, workshops &wash bays** **11. Fuel operating power generators** **15. Transport of construction material, mobile plant and equipment to the site**	**noxious gasses**		implemented for the complete duration of the activities listed (2) Ongoing monitoring of compliance throughout the entire life cycle of the project	
2. Site clearing and topsoil stripping for lay down area and all related mining infrastructure **5. Mining offices (construction and operation) i.e. operation of training centres, offices and kitchen facilities**	**Topography and visual alteration**	**Remedy**	(1) Mitigation measures must be implemented for the complete duration of the activities listed (2) Ongoing monitoring of compliance throughout the entire life cycle of the project (3) Immediate remediation actions in the event of an incident (4) Immediate re-vegetation on completion of listed activity (5) Immediate rehabilitation measures to be implemented on the completion of listed activity.	(1) Mine plan in accordance with the MPRDA Regulation 56 section (1) to (8). (2) Adherence to the finalised approved lay out plan. (3) Development and implementation of the phased mine rehabilitation management plan.
2. Site clearing and topsoil stripping for lay down area and all related mining infrastructure **16. Use of existing drilled / new boreholes**	**Water level reduction and contamination**	**Control**	(1) Mitigation measures must be implemented for the complete duration of the activities listed (2) Ongoing monitoring of compliance throughout the entire life cycle of the project (3) Immediate remediation actions	(1) Develop and implement a water management plan and specifically include measures to be implemented to reduce the impact on surface and groundwater reduction. (2) Ensure compliance with the issued WUL requirements. (3) Develop and implement a storm waste management plan and specifically address the diversion of "clean" water into the natural drainage lines.

			in the event of an incident (4) Immediate rehabilitation measures to be implemented on the completion of listed activity. (5) Reporting of incidents within 48h to the competent authority	
2. Site clearing and topsoil stripping for lay down area and all related mining infrastructure	**Destruction of graves**	**Avoid**	(1) Mitigation measures must be implemented for the complete duration of the activities listed (2) Ongoing monitoring of compliance throughout the entire life cycle of the project (3) Immediate reporting of incidents to the NHRA	(1) Ensure compliance with the National Heritage Resources Act (NHRA), No. 25 of 1999. (2) Ensure compliance with the Human Tissue Act, 1983 (Act no. 65 of 1983.
2. Site clearing and topsoil stripping for lay down area and all related mining infrastructure	**Degradation of cultural significance heritage sites**	**Avoid**	(1) Mitigation measures must be implemented for the complete duration of the activities listed (2) Ongoing monitoring of compliance throughout the entire life cycle of the project (3) Immediate reporting of incidents to the NHRA	(1) Ensure compliance with the National Heritage Resources Act (NHRA), No. 25 of 1999. (2) Ensure compliance with the Human Tissue Act, 1983 (Act no. 65 of 1983.
4. Onsite Clinic	**Medical Waste generation**	**Control**	(1) Mitigation measures must be implemented for the complete duration of the activities listed (2) Ongoing monitoring of compliance throughout the entire life cycle of the project (3) Immediate remediation actions in the event of an incident	(1) Development of a Health and Safety management plan specifically addressing the management of medical waste. (2) Development of a management plan for the operation of the on-site Clinic. (3) Development and implementation of a detailed Waste management plan.
4. Onsite Clinic **5. Mining offices (construction**	**Electricity usage**	**Control**	(1) Mitigation measures must be implemented for the complete duration of the activities listed	(1) Develop and implement an electricity usage monitoring programme. (2) Develop and implement a carbon footprint reporting policy.

and operation) i.e. operation of training centres, offices and kitchen facilities **12. Lighting**			(2) Ongoing monitoring of compliance throughout the entire life cycle of the project	
4. Onsite Clinic **5. Mining offices (construction and operation) i.e. operation of training centres, offices and kitchen facilities**	**Domestic water usage**	**Avoid**	(1) Mitigation measures must be implemented for the complete duration of the activities listed (2) Ongoing monitoring of compliance throughout the entire life cycle of the project	(1) Develop and implement a water usage record keeping procedure. (2) Develop and implement an infrastructure maintenance programme to include frequent inspections of water pipes and taps.
5. Mining offices (construction and operation) i.e. operation of training centres, offices and kitchen facilities	**General waste generation & Littering**	**Control**	(1) Mitigation measures must be implemented for the complete duration of the activities listed (2) Ongoing monitoring of compliance throughout the entire life cycle of the project (3) Immediate remediation actions in the event of an incident	(1) Develop and implement a Waste Management plan. (2) Recording of all waste generated by authorised activities.
7. Water storage facilities	**Improper water storage management**	**Avoid**	(1) Mitigation measures must be implemented for the complete duration of the activities listed (2) Ongoing monitoring of compliance throughout the entire life cycle of the project (3) Immediate remediation actions in the event of an incident	(1) Develop and implement a water management plan specifically addressing the storage of water as well as the frequent inspections of storage facilities.
8. Pollution Control Dams (PCD's) i.e. Construction and operation **9.Stores, workshops &wash**	**Contamination of water resources**	**Avoid**	(1) Mitigation measures must be implemented for the complete duration of the activities listed (2) Ongoing monitoring of compliance throughout the entire	(1) Develop and implement an Integrated Waste Water Management Plan (IWWMP). (2) Develop and implement a water monitoring schedule according to the water management plan. (2) Ensure compliance with the WUL conditions. (3) Develop an emergency preparedness plan addressing the prevention and management of incidents related to water contamination.

bays **10. Ablutions & change house with sewage treatment plant** **11. Fuel operating power generators** **13. Fuel storage**			life cycle of the project (3) Immediate remediation actions in the event of an incident (4) Reporting of incidents within 48h to the competent authority	
8. Pollution Control Dams (PCD's) i.e. Construction and operation **10. Ablutions & change house with sewage treatment plant**	**Smell nuisance**	**Avoid**	(1) Mitigation measures must be implemented for the complete duration of the activities listed (2) Ongoing monitoring of compliance throughout the entire life cycle of the project (3) Immediate remediation actions in the event of an incident (4) Reporting of incidents within 48h to the competent authority	(1) Develop and implement an Integrated Waste Water Management plan specifically addressing the management of sewage or chemical toilets. (2) Develop and implement an Infrastructure inspection programme to ensure no leaks or spillages of sewerage or waste. (3) Develop and implement a Waste Management plan.
9.Stores, workshops &wash bays **11. Fuel operating power generators** **13. Fuel storage**	**Chemical Fires**	**Avoid**	(1) Mitigation measures must be implemented for the complete duration of the activities listed (2) Ongoing monitoring of compliance throughout the entire life cycle of the project (3) Immediate remediation actions in the event of an incident (4) Reporting of incidents within 48h to the competent authority	(1) Develop and implement a fire prevention plan that includes measures of prevention and response to chemical fires. (2) Develop an emergency preparedness procedure and include the process to be followed in case of a chemical fire. (3) Develop a Hazardous substances management plan. (4) Develop a frequent inspection programme to include inspections of hazardous substances storage facilities.
12. Lighting	**Light pollution**	**Control**	(1) Biennial investigation and reporting	(1) Biennial investigation of the impact of Light pollution to nocturnal species.
13. Fuel storage	**Emission of noxious fumes**	**Avoid**	(1) Mitigation measures must be implemented for the complete duration of the activities listed (2) Ongoing monitoring of compliance throughout the entire life cycle of the project	(1) Develop and implement a Hazardous substance management plan addressing adherence to applicable SANS standards for the storage of fuel. (2) Develop and implement an infrastructure inspection schedule and programme and include the inspections of fuel storage facilities. (3) Develop and implement a Health and Safety Management plan. (4) Develop an Emergency preparedness plan addressing prevention and mitigation of incidents.

			(3) Immediate remediation actions in the event of an incident	
14. Employment of workers and procurement of construction materials.	**Loss of farm labour**	**Control**	(1) Mitigation measures must be implemented for the complete duration of the activities listed (2) Ongoing monitoring of compliance throughout the entire life cycle of the project	(1) Develop and implement a Social Labour plan as defined by the MRPDA. (2) Develop and implement a grievance lodging procedure.
	Population Influx – Pressure on Resources	**Control**		(1) Develop and implement a Social Labour plan as defined by the MRPDA. (2) Develop and implement a grievance lodging procedure.
	Population Influx – Social Pathologies	**Control**		(1) Develop and implement a Social Labour plan as defined by the MRPDA. (2) Develop and implement a grievance lodging procedure.
	Population Influx – Community Conflict	**Control**		(1) Develop and implement a Social Labour plan as defined by the MRPDA. (2) Develop and implement a grievance lodging procedure.
	Health and Safety of employees	**Control**		(1) Develop and implement a Health and Safety Management plan.
	Job Creation and Skills Training	**Control**		(1) Develop and implement a Social Labour plan as defined by the MRPDA. (2) Develop and implement a grievance lodging procedure.
	Job Creation (Multiplier affect) and Population Influx	**Control**		(1) Develop and implement a Social Labour plan as defined by the MRPDA. (2) Develop and implement a grievance lodging procedure.
Operational Phase				
17. Employment of workers	**Loss of farm labour**	**Control**	(1) Mitigation measures must be implemented for the complete duration of the activities listed (2) Ongoing monitoring of compliance throughout the entire life cycle of the project	(1) Develop and implement a Social Labour plan as defined by the MRPDA. (2) Develop and implement a grievance lodging procedure.
	Population Influx – Pressure on Resources	**Control**		(1) Develop and implement a Social Labour plan as defined by the MRPDA. (2) Develop and implement a grievance lodging procedure.
	Population Influx – Social Pathologies	**Control**		(1) Develop and implement a Social Labour plan as defined by the MRPDA. (2) Develop and implement a grievance lodging procedure.
	Population Influx – Community Conflict	**Control**		(1) Develop and implement a Social Labour plan as defined by the MRPDA. (2) Develop and implement a grievance lodging procedure.
	Health and Safety of employees	**Control**		(1) Develop and implement a Health and Safety Management plan.
	Job Creation and Skills Training	**Control**		(1) Develop and implement a Social Labour plan as defined by the MRPDA. (2) Develop and implement a grievance lodging procedure.

	Job Creation (Multiplier affect) and Population Influx	**Control**		(1) Develop and implement a Social Labour plan as defined by the MRPDA. (2) Develop and implement a grievance lodging procedure.
18.Topsoil and subsoil stripping & stockpiling for mining operation area **19.Opencast mining excavations** **20.Drilling & Blasting** **21. RoM & product stockpiling** **22. Residue stockpiles** **23. Screening Operations** **24. Discard disposal (backfilling of mining area)** **30. Vehicular activity on haul roads; and operation of mining equipment** **31. Bulk transporting of Ore to market on Public roads**	**Dust generation**	**Control**	(1) Measures must be implemented when required during the activities listed (2) Ongoing monitoring of compliance throughout the entire life cycle of the project	(1) Development and implementation of a Dust management plan as part of a Air quality management plan to including the monitoring and prevention programme. (2) Ensuring compliance with the National Environmental Management: Air Quality Act (NEMAQA), No. 39 of 2004 as amended by Act no 20 of 2014. (3) Ensure activities remain under the thresholds stipulated in GNR 893 (in terms of section 21 of NEMAQA. (4) Register online to the National Atmospheric Emissions Inventory System (NAEIS) in terms of the National Reporting Regulations (GNR 283) as Group C emitters. (5) Ensuring compliance with the National Ambient Air Quality Standards (GNR 1210 of 24 December 2009) (6) Ensuring compliance with the National Dust Control regulations (GNR 897 of November 2013)
18.Topsoil and subsoil stripping & stockpiling for mining operation area **19.Opencast mining excavations** **21. RoM & product stockpiling** **22. Residue stockpiles**	**Alteration of the visual environment and topography**	**Remedy**	(1) Mitigation measures must be implemented for the complete duration of the activities listed (2) Ongoing monitoring of compliance throughout the entire life cycle of the project (3) Immediate remediation actions in the event of an incident (4) Immediate re-vegetation on completion of listed activity (5) Immediate rehabilitation	(1) Mine plan in accordance with the MPRDA Regulation 56 section (1) to (8). (2) Adherence to the finalised approved lay out plan. (3) Development and implementation of the phased mine rehabilitation management plan.

			measures to be implemented on the completion of listed activity.	
18.Topsoil and subsoil stripping & stockpiling for mining operation area **19.Opencast mining excavations** **20.Drilling & Blasting** **21. RoM & product stockpiling** **22. Residue stockpiles** **23. Screening Operations** **24. Discard disposal (backfilling of mining area)** **25. Waste generation, storage and disposal** **26. Chemical Toilets** **29. Storage of fuel and lubricants in temporary facilities** **33. Rehabilitation of mining areas**	**Degradation of soil resources**	**Remedy**	(1) Mitigation measures must be implemented for the complete duration of the activities listed (2) Ongoing monitoring of compliance throughout the entire life cycle of the project (3) Immediate remediation actions in the event of an incident	(1) Development of a soil conservation management plan. (2) Development of a storm water management plan. (3) Development and implementation of vehicle/plant/equipment maintenance plan with specific reference to daily inspections of plant/vehicles/equipment for leaks or breakages.
18.Topsoil and subsoil stripping & stockpiling for mining operation area **19.Opencast mining excavations** **21. RoM & product stockpiling**	**Vegetation and habitat loss**	**Remedy**	(1) Mitigation measures must be implemented for the complete duration of the activities listed (2) Ongoing monitoring of compliance throughout the entire life cycle of the project (3) Immediate remediation actions in the event of an incident	(1) Develop a plant species search and rescue management plan. (2) Develop and implement a phased rehabilitation management plan. (3) Develop and implement a soil conservation management plan. (4) Apply for permits to remove protected species (provincial and national).

22. Residue stockpiles **33. Rehabilitation of mining areas**			(4) Immediate re-vegetation on completion of listed activity	
18.Topsoil and subsoil stripping & stockpiling for mining operation area	**Destruction of Wetlands**	**Avoid**	(1) Mitigation measures must be implemented for the complete duration of the activities listed (2) Ongoing monitoring of compliance throughout the entire life cycle of the project (3) Immediate remediation actions in the event of an incident (4) Immediate re-vegetation on completion of listed activity (5) Immediate rehabilitation measures to be implemented on the completion of listed activity.	(1) Develop and implement a water management plan and specifically include the conservation measures to be implemented in wetland areas. (2) Ensure compliance with the issued WUL requirements.
18.Topsoil and subsoil stripping & stockpiling for mining operation area **19.Opencast mining excavations** **20.Drilling & Blasting** **21. RoM & product stockpiling** **23. Screening Operations** **24. Discard disposal (backfilling of mining area)**	**Hydrocarbon Contamination**	**Control**	(1) Mitigation measures must be implemented for the complete duration of the activities listed (2) Ongoing monitoring of compliance throughout the entire life cycle of the project (3) Immediate remediation actions in the event of an incident	(1) Development of water management plan addressing monitoring and management requirements. (2) Development of a storm water management plan addressing the separation of "dirty" and clean “areas". (3) Development of emergency response plan with specific reference to spill prevention and remediation. (4) Development and implementation of vehicle/plant/equipment maintenance plan with specific reference to daily inspections of plant/vehicles/equipment for leaks or breakages. (5) Development and implementation of a Hazardous substances management plan.

27. River crossings **29. Storage of fuel and lubricants in temporary facilities** **30. Vehicular activity on haul roads; and operation of mining equipment**				
18.Topsoil and subsoil stripping & stockpiling for mining operation area **19.Opencast mining excavations** **21. RoM & product stockpiling** **22. Residue stockpiles** **23. Screening Operations** **24. Discard disposal (backfilling of mining area)** **27. River crossings** **30. Vehicular activity on haul roads; and operation of mining equipment** **32. Water Management** **33. Rehabilitation of mining areas**	**Sedimentation and siltation of watercourses**	**Control**	(1) Mitigation measures must be implemented for the complete duration of the activities listed (2) Ongoing monitoring of compliance throughout the entire life cycle of the project (3) Immediate remediation actions in the event of an incident (4) Immediate re-vegetation on completion of listed activity (5) Reporting of incidents within 48h to the competent authority	(1) Develop a storm water management plan. (2) Develop and implement a water management plan and specifically include water monitoring and pollution prevention strategies.
18.Topsoil and subsoil stripping & stockpiling for mining	**Water level reduction and contamination**	**Control**	(1) Mitigation measures must be implemented for the complete	(1) Develop and implement a water management plan and specifically include measures to be implemented to reduce the impact on surface and groundwater reduction. (2) Ensure compliance with the issued WUL requirements.

operation area **27. River crossings** **28. Water supply (potable & process)** **32. Water Management**			duration of the activities listed (2) Ongoing monitoring of compliance throughout the entire life cycle of the project (3) Immediate remediation actions in the event of an incident (4) Immediate rehabilitation measures to be implemented on the completion of listed activity. (5) Reporting of incidents within 48h to the competent authority	(3) Develop and implement a storm water management plan and specifically address the diversion of "clean" water into the natural drainage lines.
18.Topsoil and subsoil stripping & stockpiling for mining operation area **19.Opencast mining excavations** **20.Drilling & Blasting** **21. RoM & product stockpiling** **23. Screening Operations** **24. Discard disposal (backfilling of mining area)** **30. Vehicular activity on haul roads; and operation of mining equipment** **33. Rehabilitation of mining areas**	**Noise generation**	**Control**	(1) Mitigation measures must be implemented for the complete duration of the activities listed (2) Ongoing monitoring of compliance throughout the entire life cycle of the project (3) Immediate remediation actions in the event of an incident	(1) Develop and implement a noise monitoring programme to ensure compliance with the National Noise Control Regulations and SANS10103:2008 guidelines. (2) Develop and implement a vehicle/plant/equipment management plan to specifically include routine inspections and testing of sound frequencies.
18.Topsoil and subsoil stripping & stockpiling for mining operation area	**Destruction of graves**	**Avoid**	(1) Mitigation measures must be implemented for the complete duration of the activities listed (2) Ongoing monitoring of compliance throughout the entire life cycle of the project	(1) Ensure compliance with the National Heritage Resources Act (NHRA), No. 25 of 1999. (2) Ensure compliance with the Human Tissue Act, 1983 (Act no. 65 of 1983.

			(3) Immediate reporting of incidents to the NHRA	
18.Topsoil and subsoil stripping & stockpiling for mining operation area	**Degradation of cultural significance heritage sites**	**Avoid**	(1) Mitigation measures must be implemented for the complete duration of the activities listed (2) Ongoing monitoring of compliance throughout the entire life cycle of the project (3) Immediate reporting of incidents to the NHRA	(1) Ensure compliance with the National Heritage Resources Act (NHRA), No. 25 of 1999. (2) Ensure compliance with the Human Tissue Act, 1983 (Act no. 65 of 1983.
18.Topsoil and subsoil stripping & stockpiling for mining operation area **19.Opencast mining excavations** **21. RoM & product stockpiling** **24. Discard disposal (backfilling of mining area)** **27. River crossings** **30. Vehicular activity on haul roads; and operation of mining equipment** **32. Water Management** **33. Rehabilitation of mining areas**	**Erosion**	**Control**	(1) Mitigation measures must be implemented for the complete duration of the activities listed (2) Ongoing monitoring of compliance throughout the entire life cycle of the project (3) Immediate remediation actions in the event of an incident	(1) Development and implementation of a storm water management plan. (2) Development of a soil conservation management plan. (3) Development and implementation of mine rehabilitation plan.
18.Topsoil and subsoil stripping & stockpiling for mining operation area **19.Opencast mining excavations**	**CO_2 emissions**	**Control**	(1) Mitigation measures must be implemented for the complete duration of the activities listed (2) Ongoing monitoring of compliance throughout the entire life cycle of the project	(1) Develop and maintain a Carbon footprint reporting policy.

21. RoM & product stockpiling **23. Screening Operations** **28. Water supply (potable & process)** **30. Vehicular activity on haul roads; and operation of mining equipment** **31. Bulk transporting of Ore to market on Public roads**				
18.Topsoil and subsoil stripping & stockpiling for mining operation area **19.Opencast mining excavations** **22. Residue stockpiles** **27. River crossings** **32. Water Management**	**Alteration of drainage patterns**	**Remedy**	(1) Mitigation measures must be implemented for the complete duration of the activities listed (2) Ongoing monitoring of compliance throughout the entire life cycle of the project (3) Immediate remediation actions in the event of an incident (4) Immediate re-vegetation on completion of listed activity (5) Immediate rehabilitation measures to be implemented on the completion of listed activity.	(1) Develop and implement a storm water management plan. (2) Develop and implement a water management plan specifically including a strategy for the management of alterations to drainage patterns.
18.Topsoil and subsoil stripping & stockpiling for mining operation area **19.Opencast mining excavations** **32. Water Management**	**Destruction of upstream tributaries and reduction in water in the catchment**	**Remedy**	(1) Mitigation measures must be implemented for the complete duration of the activities listed (2) Ongoing monitoring of compliance throughout the entire life cycle of the project (3) Immediate remediation actions in the event of an incident (4) Immediate re-vegetation on completion of listed activity (5) Immediate rehabilitation	(1) Develop and implement a storm water management plan. (2) Develop and implement a water management plan specifically including a strategy for the management of alterations to drainage patterns.

			measures to be implemented on the completion of listed activity.	
18.Topsoil and subsoil stripping & stockpiling for mining operation area **19.Opencast mining excavations** **21. RoM & product stockpiling** **33. Rehabilitation of mining areas**	**Influx of alien invasive vegetation**	**Control**	(1) Mitigation measures must be implemented for the complete duration of the activities listed (2) Ongoing monitoring of compliance throughout the entire life cycle of the project (3) Immediate removal of all alien invasive species	(1) Develop and implement an alien eradication and control management plan.
19.Opencast mining excavations **20.Drilling & Blasting** **21. RoM & product stockpiling** **22. Residue stockpiles** **23. Screening Operations** **24. Discard disposal (backfilling of mining area)** **25. Waste generation, storage and disposal** **26. Chemical Toilets** **27. River crossings** **28. Water supply (potable & process)** **29. Storage of fuel and lubricants in temporary**	**Contamination of water resources**	**Avoid**	(1) Mitigation measures must be implemented for the complete duration of the activities listed (2) Ongoing monitoring of compliance throughout the entire life cycle of the project (3) Immediate remediation actions in the event of an incident (4) Reporting of incidents within 48h to the competent authority	(1) Develop and implement an Integrated Waste Water Management Plan (IWWMP). (2) Develop and implement a water monitoring schedule according to the water management plan. (2) Ensure compliance with the WUL conditions. (3) Develop an emergency preparedness plan addressing the prevention and management of incidents related to water contamination.

facilities **32. Water Management**				
20.Drilling & Blasting	**Damage to surrounding landowner properties**	**Avoid**	(1) Mitigation measures must be implemented for the complete duration of the activities listed (2) Ongoing monitoring of compliance throughout the entire life cycle of the project (3) Immediate remediation actions in the event of an incident	(1) Health and safety act, act 29 of 1996. (2) Explosives Act, act 15 of 2003.
22. Residue stockpiles **25. Waste generation, storage and disposal**	**Hazardous Leachate**	**Control**	(1) Mitigation measures must be implemented for the complete duration of the activities listed (2) Ongoing monitoring of compliance throughout the entire life cycle of the project (3) Immediate remediation actions in the event of an incident (4) Reporting of incidents within 48h to the competent authority	(1) Develop and implement a Waste Management plan. (2) Develop and implement an Integrated Waste Water Management plan.
25. Waste generation, storage and disposal	**Illegal dumping**	**Avoid**	(1) Mitigation measures must be implemented for the complete duration of the activities listed (2) Ongoing monitoring of compliance throughout the entire life cycle of the project (3) Immediate remediation actions in the event of an incident	(1) Compliance with the National Environmental Management: Waste Act, act no 59 of 2008 and associated regulations.
26. Chemical Toilets	**Smell nuisance**	**Avoid**	(1) Mitigation measures must be implemented for the complete duration of the activities listed (2) Ongoing monitoring of	(1) Develop and implement an Integrated Waste Water Management plan specifically addressing the management of sewage or chemical toilets. (2) Develop and implement a Infrastructure inspection programme to ensure no leaks or spillages of sewerage or waste. (3) Develop and implement a Waste Management plan.

			compliance throughout the entire life cycle of the project (3) Immediate remediation actions in the event of an incident	
28. Water supply (potable & process) **32. Water Management**	**Improper water storage management**	**Avoid**	(1) Mitigation measures must be implemented for the complete duration of the activities listed (2) Ongoing monitoring of compliance throughout the entire life cycle of the project (3) Immediate remediation actions in the event of an incident	(1) Develop and implement a water management plan specifically addressing the storage of water as well as the frequent inspections of storage facilities.
29. Storage of fuel and lubricants in temporary facilities	**Chemical Fires**	**Avoid**	(1) Mitigation measures must be implemented for the complete duration of the activities listed (2) Ongoing monitoring of compliance throughout the entire life cycle of the project (3) Immediate remediation actions in the event of an incident (4) Reporting of incidents within 48h to the competent authority	(1) Develop and implement a fire prevention plan that includes measures of prevention and response to chemical fires. (2) Develop a emergency preparedness procedure and include the process to be followed in case of a chemical fire. (3) Develop a Hazardous substances management plan. (4) Develop a frequent inspection programme to include inspections of hazardous substances storage facilities.
31. Bulk transporting of Ore to market on Public roads	**Pressure on public transport infrastructure**	**Control**	(1) Mitigation measures must be implemented for the complete duration of the activities listed (2) Ongoing monitoring of compliance throughout the entire life cycle of the project	(1) Develop and implement a traffic management plan. (2) Develop and implement a Public Complaints procedure.
Decommissioning Phase				
35. Demolition / removal of portable and related infrastructure **36. Vehicular activity: removal**	**Hydrocarbon Contamination**	**Control**	(1) Mitigation measures must be implemented for the complete duration of the activities listed (2) Ongoing monitoring of compliance throughout the entire	(1) Development of water management plan addressing monitoring and management requirements. (2) Development of a storm water management plan addressing the separation of "dirty" and clean “areas". (3) Development of emergency response plan with specific reference to spill prevention and remediation. (4) Development and implementation of vehicle/plant/equipment maintenance plan with specific reference to daily inspections of plant/vehicles/equipment for leaks or breakages. (5) Development and implementation of a Hazardous substances management plan.

of mobile plant / equipment and vehicles **38. Demolition of PCD's** **39. Demolition of workshops, waste storage facilities, fuel storage facilities etc.**			life cycle of the project (3) Immediate remediation actions in the event of an incident (4) Immediate re-vegetation on completion of listed activity (5) Immediate rehabilitation measures to be implemented on the completion of listed activity.	
35. Demolition / removal of portable and related infrastructure **36. Vehicular activity: removal of mobile plant / equipment and vehicles** **37. Rehabilitation of the lay down areas** **38. Demolition of PCD's** **39. Demolition of workshops, waste storage facilities, fuel storage facilities etc.**	**Dust generation**	**Control**	(1) Measures must be implemented when required during the activities listed (2) Ongoing monitoring of compliance throughout the entire life cycle of the project	(1) Development and implementation of a Dust management plan as part of a Air quality management plan to including the monitoring and prevention programme. (2) Ensuring compliance with the National Environmental Management: Air Quality Act (NEMAQA), No. 39 of 2004 as amended by Act no 20 of 2014. (3) Ensure activities remain under the thresholds stipulated in GNR 893 (in terms of section 21 of NEMAQA. (4) Register online to the National Atmospheric Emissions Inventory System (NAEIS) in terms of the National Reporting Regulations (GNR 283) as Group C emitters. (5) Ensuring compliance with the National Ambient Air Quality Standards (GNR 1210 of 24 December 2009). (6) Ensuring compliance with the National Dust Control regulations (GNR 897 of November 2013)
35. Demolition / removal of portable and related infrastructure **37. Rehabilitation of the lay down areas** **38. Demolition of PCD's** **39. Demolition of workshops, waste storage facilities, fuel storage facilities etc.**	**Degradation of soil resources**	**Remedy**	(1) Mitigation measures must be implemented for the complete duration of the activities listed (2) Ongoing monitoring of compliance throughout the entire life cycle of the project (3) Immediate remediation actions in the event of an incident (4) Immediate re-vegetation on completion of listed activity (5) Immediate rehabilitation measures to be implemented on the completion of listed activity.	(1) Development of a soil conservation management plan. (2) Development of a storm water management plan. (3) Development and implementation of vehicle/plant/equipment maintenance plan with specific reference to daily inspections of plant/vehicles/equipment for leaks or breakages.

35. Demolition / removal of portable and related infrastructure **36. Vehicular activity: removal of mobile plant / equipment and vehicles** **37. Rehabilitation of the lay down areas** **38. Demolition of PCD's** **39. Demolition of workshops, waste storage facilities, fuel storage facilities etc.**	**Erosion**	**Control**	(1) Mitigation measures must be implemented for the complete duration of the activities listed (2) Ongoing monitoring of compliance throughout the entire life cycle of the project (3) Immediate remediation actions in the event of an incident (4) Immediate re-vegetation on completion of listed activity (5) Immediate rehabilitation measures to be implemented on the completion of listed activity.	(1) Development and implementation of a storm water management plan. (2) Development of a soil conservation management plan. (3) Development and implementation of mine rehabilitation plan.
35. Demolition / removal of portable and related infrastructure **36. Vehicular activity: removal of mobile plant / equipment and vehicles** **38. Demolition of PCD's** **39. Demolition of workshops, waste storage facilities, fuel storage facilities etc.**	**Noise generation**	**Control**	(1) Mitigation measures must be implemented for the complete duration of the activities listed (2) Ongoing monitoring of compliance throughout the entire life cycle of the project (3) Immediate remediation actions in the event of an incident	(1) Develop and implement a noise monitoring programme to ensure compliance with the National Noise Control Regulations and SANS10103:2008 guidelines. (2) Develop and implement a vehicle/plant/equipment management plan to specifically include routine inspections and testing of sound frequencies.
35. Demolition / removal of portable and related infrastructure **38. Demolition of PCD's** **39. Demolition of workshops, waste storage facilities, fuel storage facilities etc.**	**General waste generation & Littering**	**Control**	(1) Mitigation measures must be implemented for the complete duration of the activities listed (2) Ongoing monitoring of compliance throughout the entire life cycle of the project (3) Immediate remediation actions in the event of an incident	(1) Compliance with the National Environmental Management: Waste Act, act no 59 of 2008 and associated regulations.

36. Vehicular activity: removal of mobile plant / equipment and vehicles	**CO_2 emissions**	**Control**	(1) Mitigation measures must be implemented for the complete duration of the activities listed (2) Ongoing monitoring of compliance throughout the entire life cycle of the project	(1) Develop and maintain a Carbon footprint reporting policy.
36. Vehicular activity: removal of mobile plant / equipment and vehicles **37. Rehabilitation of the lay down areas**	**Sedimentation and siltation of watercourses**	**Control**	(1) Mitigation measures must be implemented for the complete duration of the activities listed (2) Ongoing monitoring of compliance throughout the entire life cycle of the project (3) Immediate remediation actions in the event of an incident (4) Immediate re-vegetation on completion of listed activity (5) Immediate rehabilitation measures to be implemented on the completion of listed activity.	(1) Develop a storm water management plan. (2) Develop and implement a water management plan and specifically include water monitoring and pollution prevention strategies.
37. Rehabilitation of the lay down areas	**Influx of alien invasive vegetation**	**Control**	(1) Mitigation measures must be implemented for the complete duration of the activities listed (2) Ongoing monitoring of compliance throughout the entire life cycle of the project (3) Immediate removal of all alien invasive species	(1) Develop and implement an alien eradication and control management plan.
37. Rehabilitation of the lay down areas	**Vegetation and habitat loss**	**Remedy**	(1) Mitigation measures must be implemented for the complete duration of the activities listed (2) Ongoing monitoring of compliance throughout the entire life cycle of the project (3) Immediate remediation actions	(1) Develop a plant species search and rescue management plan. (2) Develop and implement a phased rehabilitation management plan. (3) Develop and implement a soil conservation management plan. (4) Apply for permits to remove protected species (provincial and national).

			in the event of an incident (4) Immediate re-vegetation on completion of listed activity	
38. Demolition of PCD's **39. Demolition of workshops, waste storage facilities, fuel storage facilities etc.**	**Contamination of water resources**	**Avoid**	(1) Mitigation measures must be implemented for the complete duration of the activities listed (2) Ongoing monitoring of compliance throughout the entire life cycle of the project (3) Immediate remediation actions in the event of an incident (4) Reporting of incidents within 48h to the competent authority	(1) Develop and implement an Integrated Waste Water Management Plan (IWWMP). (2) Develop and implement a water monitoring schedule according to the water management plan. (3) Ensure compliance with the WUL conditions. (3) Develop an emergency preparedness plan addressing the prevention and management of incidents related to water contamination.

i) Financial Provision

As part of the Spitsvale Mine Rehabilitation closure and Liability plan (attached as **Appendix S),** the financial provision for the mining operations were determined based on information currently available.

(1) Determined amount for Financial Provision

An assessment was conducted of all the infrastructure and activities taking place on site that fall within the properties associated to the mining right application. The infrastructure was classified in accordance with the tariffs list and the surface areas of the infrastructure were calculated to determine the volume or surface requiring rehabilitation or demolition. A supplementary calculation was done to incorporate Phase 2 & 3 and a second laydown area. These extensions are planned as part of the next phases of the project and will only commence once phase 1 mining operations have ceased.

The premature quantum was calculated using the demolition and rehabilitation rates and has been calculated as **R 90 452 381.83 (including P&G, contingency and excluding VAT)** for the physical and biophysical components associated with the current activities and infrastructure on the site. This related to Open pit 1, Laydown area 1, Ore stockpile area, ROM stockpile area and roads.

It is evident that the biophysical component of rehabilitation makes for 98% of the liability cost. The physical rehabilitation (demolition and removal of structures) amounts to 2% (**R 1 636 330.71**) of the liability cost. A focussed rehabilitation and closure strategy can minimise the liability of both components.

A cost estimate has been included for the current and future activities. The assumption made with regards to placement of waste rock in the future activities is that a starter waste rock dump will be constructed and as soon as mining allows it, the waste rock will be backfilled into the pit area. This will be done as part of operational cost. Thus no waste rock dumps will remain subsequent to mining operations ceasing.

The quantum calculated for all activities and infrastructure associated with the entire Spitsvale Project (including mining of phase 2 and 3 and the associated infrastructure) was calculated as **R106 671 605.22** (**including P&G, contingency and excluding VAT).**

The increase in biophysical costs can be attributed to the addition of two opencast pits, with their associated infrastructure, in the future.
The costing sheets have been reviewed externally by a registered financial institution for correctness regarding the calculations.

Based on the current information it is estimated that the accuracy level of the phase 1 calculation is 90% and the accuracy level of the calculation of the future mining development is 50%.

The detailed mine closure cost assessment report is attached as an Appendix C to **Appendix S**.

(a) Describe the closure objectives and the extent to which they have been aligned to the baseline environment described under Regulation 22 (2) (d) as described in 2.4 herein

A conceptual closure plan for the existing mining licence application has been developed for the Spitsvale Project. The closure of the mine is guided by the closure vision that was developed for the mine's conceptual closure plan, with the closure objectives and post closure strategy developed to support the vision.

As the vision covers the mine lease area, it is reasonable that the vision will extent to any new areas included in the mining licence. The closure vision is therefore: BCR Minerals (Pty) Ltd will develop a sustainable post closure environment that is not harmful to the safety and health of surrounding communities, where prospects to utilize infrastructure after closure are maximized and where final post closure land use is optimized so that there is no net negative loss of biodiversity.

Find **Appendix S** for the detailed closure plan.

(b) Confirm specifically that the environmental objectives in relation to closure have been consulted with landowner and interested and affected parties

During the finalisation of the Spitsvale Mine Rehabilitation, Closure, and Liability plan (**Appendix S**), the landowners were invited for discussions on their current and future proposed land use of the affected areas, as well as challenges they currently have with rangeland management and its possible risk to future liabilities of the mine. A compilation of these discussions, together with an attendance register, is presented in **Appendix S**.

This document will be subjected to an additional 30 days PPP as required by GNR 982.

(c) 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

Find **Appendix S**.

(d) Explain why it can be confirmed that the rehabilitation plan is compatible with the closure objectives

Find **Appendix S**.

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

The detailed mine closure cost assessment report is attached as an Appendix C to **Appendix S**.

Process followed to calculate and state the quantum of financial provision required

Most of the information used for the quantum calculation was obtained from the draft closure plan, the prospecting rights and associated EMP's. Various images and the most recent Google earth imagery were used, as found in specialists' reports, to identify and mark the entire related infrastructure. Once this was complete a list of all the infrastructure was compiled. The infrastructure was classified in accordance with the tariffs list (as listed in the detailed mine cost assessment report) and the surface areas of the infrastructure were calculated to determine the volume or surface requiring rehabilitation or demolition. A detailed list is available in **Appendix S**.

Closure cost calculations

The premature quantum was calculated using the demolition and rehabilitation rates and has been calculated as **R 90 452 381.83 (including P&G, contingency and excluding VAT)** for the physical and biophysical components associated with the current activities and infrastructure on the site. This related to Open pit 1, Laydown area 1, Ore stockpile area, ROM stockpile area and roads.

It is evident that the biophysical component of rehabilitation makes for 98% of the liability cost. The physical rehabilitation (demolition and removal of structures) amounts to 2% (**R 1 636 330.71**) of the liability cost. A focussed rehabilitation and closure strategy can minimise the liability of both components.

A cost estimate has been included for the current and future activities. The assumption made with regards to placement of waste rock in the future activities is that a starter waste rock dump will be constructed and as soon as mining allows it, the waste rock will be backfilled into the pit area. This will be done as part of operational cost. Thus no waste rock dumps will remain subsequent to mining operations ceasing.

The quantum calculated for all activities and infrastructure associated with the entire Spitsvale Project (including mining of phase 2 and 3 and the associated infrastructure) was calculated as **R106 671 605.22** (**including P&G, contingency and excluding VAT).**

The increase in biophysical costs can be attributed to the addition of two opencast pits, with their associated infrastructure, in the future.

The costing sheets have been reviewed externally by a registered financial institution for correctness regarding the calculations.

Based on the current information it is estimated that the accuracy level of the phase 1 calculation is 90% and the accuracy level of the calculation of the future mining development is 50%.

(f) Confirm that the financial provision will be provided as determined

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

- Monitoring of Impact Management Actions
- Monitoring and reporting frequency
- Responsible persons
- Time period for implementing impact management actions
- Mechanism for monitoring compliance

As part of the Spitsvale Project's EMS, a procedure(s) to monitor and measure, on a regular basis, the key characteristics of the activities that can have a significant environmental impact must be established, implemented and maintained.

This procedure shall include:

- The documenting of information to monitor performance
- Applicable operational controls and conformity with the established objectives and goals
- Procedure to address the recommendations made in Table 19

It is recommended that a legal compliance and EMS audit be regularly conducted by professional consultants throughout the life of the mine, to monitor the compliance with requirements set out in the EMPr, EA, and closure plan. The outcome of this audit should be as follows:

- Advise on any mitigation measures which need to be added to the existing programmes
- Communication of findings to Mine management
- Communicating environmental progress on the set objectives and targets in both the EMPr and closure plan
- Status of legal compliance with specific reference to the National Water Act (Act No. 36 of 1998), the MPRDA, NEMA, and the Mine health and safety act (Act no 29 of 1996)

The audit should take into consideration the management principles and strategies stated in the Environmental Management Programme, and assess whether this strategy is providing the required results. Any flaws found in the rehabilitation process will be included in the Report along with the recommended mitigation measures.

In section ***1) e)*** it is recommended that an internal audit of the Spitsvale EMS is be conducted on a biannual (at least once before submitting independent audit report to the competent authority) basis, if found to be feasible.

Table 19: Recommended mechanisms for monitoring compliance with and performance assessment against the EMPr

SOURCE ACTIVITY	IMPACTS REQUIRING MONITORING PROGRAMMES	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES (FOR THE EXECUTION OF THE MONITORING PROGRAMMES)	MONITORING AND REPORTING FREQUENCY and TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS
1. Access and hauling along roads i.e. during the construction of roads **2. Site clearing and topsoil stripping for lay down area and all related mining infrastructure** **5. Mining offices (construction and operation) i.e. operation of training centres, offices and kitchen facilities** **8. Pollution Control Dams (PCD's) i.e. Construction and**	**Dust generation**	The developed Air Quality management plan must include the following: • Methods of controlling dust generation • Identifying sensitive receptors and monitoring points It is recommended that baseline monitoring of dust fallout, PM10 and PM2.5 is conducted at the site for a period of at least 12 months.	(1) Environmental Control Officer/Environmental Officer/ SHEQ Officer (2) Project Management	(1) Review of Air quality management plan as or when required (2) Monthly monitoring of compliance with the NEMAQA regulations (3) Once of registration on the online NAEIS systems thereafter reporting as specified

operation **18.Topsoil and subsoil stripping & stockpiling for mining operation area** **19.Opencast mining excavations** **20.Drilling & Blasting** **21. RoM & product stockpiling** **22. Residue stockpiles** **23. Screening Operations** **24. Discard disposal (backfilling of mining area)** **30. Vehicular activity on haul roads; and operation of mining equipment** **31. Bulk transporting of Ore to market on Public roads** **35. Demolition / removal of portable and related**				

infrastructure **36. Vehicular activity: removal of mobile plant / equipment and vehicles** **38. Demolition of PCD's** **39. Demolition of workshops, waste storage facilities, fuel storage facilities etc.** **35. Demolition / removal of portable and related infrastructure** **36. Vehicular activity: removal of mobile plant / equipment and vehicles** **37. Rehabilitation of the lay down areas** **38. Demolition of PCD's** **39. Demolition of workshops, waste storage facilities, fuel storage facilities etc.**				

1. Access and hauling along roads i.e. during the construction of roads **2. Site clearing and topsoil stripping for lay down area and all related mining infrastructure** **3. Weigh bridge** **6. Storm water runoff management features** **9.Stores, workshops &wash bays** **11. Fuel operating power generators** **13. Fuel storage** **15. Transport of construction material, mobile plant and equipment to the site** **16. Use of existing drilled / new**	**Hydrocarbon Contamination**	Regular inspections of areas prone to hydrocarbon spills and contamination must be inspected on a regular basis. Contamination the affected environment will require remediation actions. ***Soil contamination*** After completion of remediation actions it is recommended that samples be taken to ensure the soil quality comply with the rehabilitation objectives. ***Water contamination*** Water samples should be taken to ensure compliance with legal thresholds and the baseline data as specified in **Appendix L & M.** Records to be kept of monitoring activities.	(1) All staff (2) Environmental Control Officer/Environmental Officer/ SHEQ Officer (3) Project Management	(1) Review of the Water management plan as or when required (2) Review of Storm water Management plan as or when required (3) Annual review of the Emergency preparedness and response plan or review after occurrence of emergency incident (4) Review of vehicle/plan/equipment maintenance plan as or when required (5) Daily inspections of vehicles/plant/equipment (6) Weekly inspections of hazardous substances storage facilities (7) Review of Hazardous substances management plan as or when required (8) Weekly inspections of spill prevention equipment

boreholes **18.Topsoil and subsoil stripping & stockpiling for mining operation area** **19.Opencast mining excavations** **20.Drilling & Blasting** **21. RoM & product stockpiling** **23. Screening Operations** **24. Discard disposal (backfilling of mining area)** **27. River crossings** **29. Storage of fuel and lubricants in temporary facilities** **30. Vehicular activity on haul roads; and operation of mining equipment** **35. Demolition / removal of**				

portable and related infrastructure **36. Vehicular activity: removal of mobile plant / equipment and vehicles** **38. Demolition of PCD's** **39. Demolition of workshops, waste storage facilities, fuel storage facilities etc.**				

1. Access and hauling along roads i.e. during the construction of roads **2. Site clearing and topsoil stripping for lay down area and all related mining infrastructure** **9.Stores, workshops &wash bays** **10. Ablutions & change house with sewage treatment plant** **11. Fuel operating power generators** **13. Fuel storage** **18.Topsoil and subsoil stripping & stockpiling for mining operation area** **19.Opencast mining excavations**	**Degradation of soil resources**	A soil conservation management plan must be developed and address at least the following: • Specify mitigation measures that will be implemented to prevent contamination of topsoil's and fertile soils • Identify measures to be implemented preventing the loss of topsoil and fertile soils • Record keeping of available topsoil and fertile soil for use during the rehabilitation phase of an activity • Monitoring requirements Listed activities must be monitored frequently to ensure compliance with the EMPr, EA, and closure plan. Records to be kept of monitoring activities.	(1) Environmental Control Officer/Environmental Officer/ SHEQ Officer (2) Project Management	(1) Review of soil conservation management plan as or when required (2) Frequent quantification of available fertile soil for rehabilitation (3) Review of storm water management plan as or when required (4) Review of vehicle/plan/equipment maintenance plan as or when required (5) Daily inspections of vehicles/plant/equipment (6) Weekly inspections of spill prevention equipment

20.Drilling & Blasting **21. RoM & product stockpiling** **22. Residue stockpiles** **23. Screening Operations** **24. Discard disposal (backfilling of mining area)** **25. Waste generation, storage and disposal** **26. Chemical Toilets** **29. Storage of fuel and lubricants in temporary facilities** **33. Rehabilitation of mining areas** **35. Demolition / removal of portable and related infrastructure** **37. Rehabilitation of the lay**				

down areas **38. Demolition of PCD's** **39. Demolition of workshops, waste storage facilities, fuel storage facilities etc.**				

1. Access and hauling along roads i.e. during the construction of roads **2. Site clearing and topsoil stripping for lay down area and all related mining infrastructure** **6. Storm water runoff management features** **18.Topsoil and subsoil stripping & stockpiling for mining operation area** **19.Opencast mining excavations** **21. RoM & product stockpiling** **22. Residue stockpiles** **33. Rehabilitation of mining areas** **37. Rehabilitation of the lay**	**Vegetation and habitat loss**	A plant search and rescue management plan must be developed and address at least the following: • Recommendations made in the Biodiversity assessment attached as **Appendix G** • Address requirements issued on the plant species permit obtained • Method of quantification and record keeping of search and rescued plants • Method of reinstating vegetation and ensuring rehabilitation objective is reached A soil conservation management plan must be developed and address at least the following: • Specify mitigation measures that will be implemented to prevent contamination of topsoil's and fertile soils • Identify measures to be implemented preventing the loss of topsoil and fertile soils • Record keeping of available topsoil and fertile soil for use during the rehabilitation phase of an activity • Monitoring requirements Listed activities must be monitored frequently to ensure compliance with the EMPr, EA, and closure plan.	(1) Environmental Control Officer/Environmental Officer/ SHEQ Officer (2) Project Management	(1) Review of soil conservation management plan as or when required (2) Frequent quantification of available fertile soil for rehabilitation (3) Review of storm water management plan as or when required (4) Annual or frequency stipulated by the competent authority compliance auditing with the Mine Rehabilitation and closure plan (5) Annual rehabilitation plan as per GN R. 1142 (6) Review of the Environmental Rehabilitation risk assessment as stipulated by the competent authority (7) Frequent quantification review of search and rescued species (8) Annual review or frequency as stipulated by the permit of plant removal permits

down areas		Records to be kept of monitoring activities.		
1. Access and hauling along roads i.e. during the construction of roads **2. Site clearing and topsoil stripping for lay down area and all related mining infrastructure** **5. Mining offices (construction and operation) i.e. operation of training centres, offices and kitchen facilities** **9.Stores, workshops &wash bays** **11. Fuel operating power generators** **18.Topsoil and subsoil stripping & stockpiling for mining operation area** **19.Opencast mining**	**Noise generation**	A Noise monitoring programme to be developed and address at least the following: • Frequency of monitoring • Method of monitoring • Compliance with the National Noise Control Regulations and SANS10103:2008 guidelines • Mitigation measures to prevent noise generation Listed activities must be monitored frequently to ensure compliance with the EMPr, EA, and closure plan. Records to be kept of monitoring activities. Vehicles/plant/equipments must be inspected on a regular basis. Records of these inspections must be kept.	(1) Environmental Control Officer/Environmental Officer/ SHEQ Officer (2) Project Management (3) Acoustical Consultant	(1) Monthly reporting on compliance with the Noise quality standards as per recommendations in **Appendix F** (2) Review of vehicle/plan/equipment maintenance plan as or when required (3) Frequent inspections of vehicles/plant/equipment

excavations **20.Drilling & Blasting** **21. RoM & product stockpiling** **23. Screening Operations** **24. Discard disposal (backfilling of mining area)** **30. Vehicular activity on haul roads; and operation of mining equipment** **33. Rehabilitation of mining areas** **35. Demolition / removal of portable and related infrastructure** **36. Vehicular activity: removal of mobile plant / equipment and vehicles** **38. Demolition of PCD's** **39. Demolition of workshops,**				

waste storage facilities, fuel storage facilities etc.				
18.Topsoil and subsoil stripping & stockpiling for mining operation area	**Destruction of Wetlands**	Monitoring requirements as stipulated by the conditions of the WUL must be complied with at all times. Compliance with the requirements must be monitored. A Water Management plan must be developed and address at least the following: • Frequency of monitoring • Methods on addressing the requirements set out by the WUL • Compliance of water quality and monitoring of the constituents recommended in **Appendix L & M** • Description of mitigation measure to be implemented • Compliance with legal thresholds • Quantification of production related water balances Listed activities must be monitored frequently to ensure compliance with the EMPr, EA, and closure plan. Records to be kept of monitoring activities.		(1) Review of Water management plan as or when required (2) Monthly reporting or frequency specified in the WUL on the compliance of water quality results as specified in **Appendix L & M** (3) Weekly inspections of diversion infrastructures (4) WUL audits as specified in licensing requirements

1. Access and hauling along roads i.e. during the construction of roads **2. Site clearing and topsoil stripping for lay down area and all related mining infrastructure** **6. Storm water runoff management features** **18.Topsoil and subsoil stripping & stockpiling for mining operation area** **19.Opencast mining excavations** **22. Residue stockpiles** **27. River crossings** **32. Water Management**	**Alteration of drainage patterns**	Monitoring requirements as stipulated by the conditions of the WUL must be complied with at all times. Compliance with the requirements must be monitored. A Water Management plan must be developed and address at least the following: • Frequency of monitoring • Methods on addressing the requirements set out by the WUL • Compliance of water quality and monitoring of the constituents recommended in **Appendix L & M** • Description of mitigation measure to be implemented • Compliance with legal thresholds • Quantification of production related water balances A Storm water management plan must be developed and address at least the following: • Recommendations made in the conceptual storm water management plan in **Appendix L** • Requirements to monitor the functionality of storm water infrastructure • Frequency of monitoring • Dirty water containment methods and frequent quantification and control of volumes	(1) Environmental Control Officer/Environmental Officer/ SHEQ Officer (2) Project Management	(1) Review of storm water management plan as or when required (2) Monthly reporting or frequency specified in the WUL on the compliance of water quality results as specified in **Appendix L & M** (3) Frequent inspections of diversion infrastructures (4) WUL audits as specified in licensing requirements

		• Water quality monitoring requirements • Methods addressing requirements set out in the WUL Listed activities must be monitored frequently to ensure compliance with the EMPr, EA, and closure plan. Records to be kept of monitoring activities.		
1. Access and hauling along roads i.e. during the construction of roads **18.Topsoil and subsoil stripping & stockpiling for mining operation area** **19.Opencast mining excavations** **32. Water Management**	**Destruction of upstream tributaries and reduction in water in the catchment**	Monitoring requirements as stipulated by the conditions of the WUL must be complied with at all times. Compliance with the requirements must be monitored. A Water Management plan must be developed and address at least the following: • Frequency of monitoring • Methods on addressing the requirements set out by the WUL • Compliance of water quality and monitoring of the constituents recommended in **Appendix L & M** • Description of mitigation measure to be implemented • Compliance with legal thresholds • Quantification of production related water balances A Storm water management plan must be developed and address at least the following: • Recommendations made in the conceptual storm water	(1) Environmental Control Officer/Environmental Officer/ SHEQ Officer (2) Project Management	(1) Review of storm water management plan as or when required (2) Monthly reporting or frequency specified in the WUL on the compliance of water quality results as specified in **Appendix L & M** (3) Frequent inspections of diversion infrastructures (4) WUL audits as specified in licensing requirements

		management plan in **Appendix L** • Requirements to monitor the functionality of storm water infrastructure • Frequency of monitoring • Dirty water containment methods and frequent quantification and control of volumes • Water quality monitoring requirements • Methods addressing requirements set out in the WUL Listed activities must be monitored frequently to ensure compliance with the EMPr, EA, and closure plan. Records to be kept of monitoring activities.		
1. Access and hauling along roads i.e. during the construction of roads **2. Site clearing and topsoil stripping for lay down area and all related mining infrastructure** **6. Storm water runoff management features** **15. Transport of construction**	**Sedimentation and siltation of watercourses**	Monitoring requirements as stipulated by the conditions of the WUL must be complied with at all times. Compliance with the requirements must be monitored. A Water Management plan must be developed and address at least the following: • Frequency of monitoring • Methods on addressing the requirements set out by the WUL • Compliance of water quality and monitoring of the constituents recommended in **Appendix L & M** • Description of mitigation measure to be implemented	(1) Environmental Control Officer/Environmental Officer/ SHEQ Officer (2) Project Management	(1) Review of storm water management plan as or when required (2) Monthly reporting or frequency specified in the WUL on the compliance of water quality results as specified in **Appendix L & M** (3) Frequent inspections of diversion infrastructures (4) WUL audits as specified in licensing requirements

material, mobile plant and equipment to the site **18.Topsoil and subsoil stripping & stockpiling for mining operation area** **19.Opencast mining excavations** **21. RoM & product stockpiling** **22. Residue stockpiles** **33. Rehabilitation of mining areas** **36. Vehicular activity: removal of mobile plant / equipment and vehicles** **37. Rehabilitation of the lay down areas**		• Compliance with legal thresholds • Quantification of production related water balances A Storm water management plan must be developed and address at least the following: • Recommendations made in the conceptual storm water management plan in **Appendix L** • Requirements to monitor the functionality of storm water infrastructure • Frequency of monitoring • Dirty water containment methods and frequent quantification and control of volumes • Water quality monitoring requirements • Methods addressing requirements set out in the WUL Listed activities must be monitored frequently to ensure compliance with the EMPr, EA, and closure plan. Records to be kept of monitoring activities.		
1. Access and hauling along roads i.e. during the construction of roads	**Water usage for dust suppression**	Monitor and record water usage for dust suppression. Promoting the re-use of water contained as specified in the Storm water Management plan is recommended. However the water quality should be	(1) Environmental Control Officer/Environmental Officer/ SHEQ	(1) Frequent reporting on the compliance of water quality results as specified in **Appendix L & M**

		tested to ensure legal compliance before re-use. The operational water balances must be monitored and reviewed on a frequent basis as to ensure compliance with the WUL requirements. Listed activities must be monitored frequently to ensure compliance with the EMPr, EA, and closure plan. Records to be kept of monitoring activities.	Officer (2) Project Management	(2) Daily recoding of water usage for dust suppression (3) Frequent review of operational water balances (4) WUL audits as specified in licensing requirements
4. Onsite Clinic **5. Mining offices (construction and operation) i.e. operation of training centres, offices and kitchen facilities**	**Domestic water usage**	Monitor and record water usage for dust suppression. Promoting the re-use of water contained as specified in the Storm water Management plan is recommended. However the water quality should be tested to ensure legal compliance before re-use. The operational water balances must be monitored and reviewed on a frequent basis as to ensure compliance with the WUL requirements. Listed activities must be monitored frequently to ensure compliance with the EMPr, EA, and closure plan. Records to be kept of monitoring activities.	(1) Environmental Control Officer/Environmental Officer/ SHEQ Officer (2) Project Management	(1) Frequent reporting on the compliance of water quality results as specified in **Appendix L & M** (2) Daily recoding of water usage for dust suppression (3) Frequent review of operational water balances (4) WUL audits as specified in licensing requirements
1. Access and hauling along roads i.e. during the construction of roads **2. Site clearing and topsoil**	**Influx of alien invasive vegetation**	An alien eradication and control management plan must be developed and address at least the following: • Identification of areas prone to alien species in accordance with the applicable regulations and **Appendix G**	(1) Environmental Control Officer/Environmental Officer/ SHEQ	(1) Review of alien eradication and control management plan as or when required (2) Weekly inspection of site for

stripping for lay down area and all related mining infrastructure **5. Mining offices (construction and operation) i.e. operation of training centres, offices and kitchen facilities** **18.Topsoil and subsoil stripping & stockpiling for mining operation area** **19.Opencast mining excavations** **21. RoM & product stockpiling** **33. Rehabilitation of mining areas** **37. Rehabilitation of the lay down areas**		• Reference to recommendations made in **Appendix G** • Frequency of monitoring and inspection requirements of areas prone to establishment • Eradication methods • Including requirements stipulated in the legal requirements stipulated in Table 16 Listed activities must be monitored frequently to ensure compliance with the EMPr, EA, and closure plan. Records to be kept of monitoring activities.	Officer (2) Project Management (3) Herbicide consultant	the visible signs of alien species establishment
1. Access and hauling along roads i.e. during the construction of roads	**CO_2 emissions & Release of noxious gasses**	Frequent monitoring and reporting of the Spitsvale Project carbon footprint.	(1) Environmental Control Officer/Environmental Officer/ SHEQ	(1) Frequent reporting of the Spitsvale Carbon footprint status

2. Site clearing and topsoil stripping for lay down area and all related mining infrastructure **9.Stores, workshops &wash bays** **11. Fuel operating power generators** **15. Transport of construction material, mobile plant and equipment to the site** **18.Topsoil and subsoil stripping & stockpiling for mining operation area** **19.Opencast mining excavations** **21. RoM & product stockpiling** **23. Screening Operations** **28. Water supply (potable &**			Officer (2) Project Management	

process) **30. Vehicular activity on haul roads; and operation of mining equipment** **31. Bulk transporting of Ore to market on Public roads** **36. Vehicular activity: removal of mobile plant / equipment and vehicles**				
2. Site clearing and topsoil stripping for lay down area and all related mining infrastructure **5. Mining offices (construction and operation) i.e. operation of training centres, offices and kitchen facilities** **18.Topsoil and subsoil stripping & stockpiling for mining operation area** **19.Opencast mining**	**Topography and visual alteration**	Monitoring adherence with the requirements set out by GN R. 1142. Records to be kept of pre-construction topography. Alteration to be monitored and managed in accordance with the rehabilitation objectives. Listed activities must be monitored frequently to ensure compliance with the EMPr, EA, and closure plan. Records to be kept of monitoring activities.	(1) Environmental Control Officer/Environmental Officer/ SHEQ Officer (2) Project Management	(1) Annual compliance auditing or frequency stipulated by the competent authority with the Mine Rehabilitation and closure plan (2) Review of the Annual rehabilitation plan as stipulated by GN R. 1142 (3) Annual review of the Environmental Rehabilitation risk assessment (4) Frequent inspection of mining areas

excavations **21. RoM & product stockpiling** **22. Residue stockpiles**				
1. Access and hauling along roads i.e. during the construction of roads **2. Site clearing and topsoil stripping for lay down area and all related mining infrastructure** **6. Storm water runoff management features** **15. Transport of construction material, mobile plant and equipment to the site** **18.Topsoil and subsoil stripping & stockpiling for mining operation area** **19.Opencast mining excavations**	**Erosion**	A Storm water management plan must be developed and address at least the following: • Recommendations made in the conceptual storm water management plan in **Appendix L** • Requirements to monitor the functionality of storm water infrastructure • Frequency of monitoring • Dirty water containment methods and frequent quantification and control of volumes • Water quality monitoring requirements • Methods addressing requirements set out in the WUL A soil conservation management plan must be developed and address at least the following: • Specify mitigation measures that will be implemented to prevent contamination of topsoil's and fertile soils • Identify measures to be implemented preventing the loss of topsoil and fertile soils • Record keeping of available topsoil and fertile soil for use	(1) Environmental Control Officer/Environmental Officer/ SHEQ Officer (2) Project Management	(1) Review of soil conservation management plan as or when required (2) Frequent quantification of available fertile soil for rehabilitation (3) Review of storm water management plan as or when required (4) Annual compliance auditing or frequency stipulated by the competent authority with the Mine Rehabilitation and closure plan (5) Annual rehabilitation plan as required by GN R.1142 (6) Annual review of the Environmental Rehabilitation risk assessment as required by GN R.1142

21. RoM & product stockpiling **24. Discard disposal (backfilling of mining area)** **27. River crossings** **30. Vehicular activity on haul roads; and operation of mining equipment** **32. Water Management** **33. Rehabilitation of mining areas** **35. Demolition / removal of portable and related infrastructure** **36. Vehicular activity: removal of mobile plant / equipment and vehicles** **37. Rehabilitation of the lay down areas** **38. Demolition of PCD's**		during the rehabilitation phase of an activity • Monitoring requirements Areas prone to erosion must be monitored frequently to ensure compliance with the EMPr, EA, and closure plan. Records to be kept of monitoring activities.		

39. Demolition of workshops, waste storage facilities, fuel storage facilities etc.				
8. Pollution Control Dams (PCD's) i.e. Construction and operation **9.Stores, workshops &wash bays** **10. Ablutions & change house with sewage treatment plant** **11. Fuel operating power generators** **13. Fuel storage** **19.Opencast mining excavations** **20.Drilling & Blasting** **21. RoM & product stockpiling** **22. Residue stockpiles**	**Contamination of water resources**	Monitoring requirements as stipulated by the conditions of the WUL must be complied with at all times. Compliance with the requirements must be monitored. A Water Management plan must be developed and address at least the following: • Frequency of monitoring • Methods on addressing the requirements set out by the WUL • Compliance of water quality and monitoring of the constituents recommended in **Appendix L & M** • Description of mitigation measure to be implemented • Compliance with legal thresholds • Quantification of production related water balances A Storm water management plan must be developed and address at least the following: • Recommendations made in the conceptual storm water management plan in **Appendix L** • Requirements to monitor the functionality of storm water	(1) Environmental Control Officer/Environmental Officer/ SHEQ Officer (2) Project Management	(1) Auditing of IWWMP according to the specified time frames stipulated in the WUL (2) Review of IWWMP according to the specified time frames stipulated in the WUL (3) Monthly reporting or frequency specified in the WUL on the compliance of water quality results as specified in **Appendix L & M** (4) Review of the water management plan as or when required (5) Daily recoding of water usage (6) Frequent review of operational water balances (7) WUL audits as specified in licensing requirements (8) Review of storm water management plan as or when

23. Screening Operations **24. Discard disposal (backfilling of mining area)** **25. Waste generation, storage and disposal** **26. Chemical Toilets** **27. River crossings** **28. Water supply (potable & process)** **29. Storage of fuel and lubricants in temporary facilities** **32. Water Management** **38. Demolition of PCD's** **39. Demolition of workshops, waste storage facilities, fuel storage facilities etc.**		infrastructure • Frequency of monitoring • Dirty water containment methods and frequent quantification and control of volumes • Water quality monitoring requirements • Methods addressing requirements set out in the WUL The compliance of the IWWMP approved by the Department of Water Affairs must be monitored as frequently as indicated by the WUL. Listed activities must be monitored frequently to ensure compliance with the EMPr, EA, and closure plan. Records to be kept of monitoring activities.		required (9) Annual review of the Emergency preparedness and response plan or review after occurrence of emergency incident (10) Weekly inspections of spill prevention equipment

2. Site clearing and topsoil stripping for lay down area and all related mining infrastructure **18.Topsoil and subsoil stripping & stockpiling for mining operation area**	**Destruction of graves**	Sites identified by **Appendix O** must be monitored frequently to ensure compliance with the EMPr, EA, and closure plan. Records to be kept of monitoring activities.	(1) Environmental Control Officer/Environmental Officer/ SHEQ Officer (2) Project Management (3) Suitable accredited and qualified archaeologist	(1) Frequent inspections of marked graves to ensure no disturbance
2. Site clearing and topsoil stripping for lay down area and all related mining infrastructure **18.Topsoil and subsoil stripping & stockpiling for mining operation area**	**Degradation of cultural significance heritage sites**	Sites identified by **Appendix O** must be monitored frequently to ensure compliance with the EMPr, EA, and closure plan. Records to be kept of monitoring activities.	(1) Environmental Control Officer/Environmental Officer/ SHEQ Officer (2) Project Management (3) Suitable accredited and qualified archaeologist	(1) Frequent inspections of marked heritage sites to ensure no disturbance

4. Onsite Clinic **5. Mining offices (construction and operation) i.e. operation of training centres, offices and kitchen facilities** **12. Lighting**	**Electricity usage**	Frequent monitoring and reporting on the use of electricity. Frequent monitoring and reporting of the Spitsvale Project carbon footprint. Records to be kept of such monitoring activities.	(1) Environmental Control Officer/Environmental Officer/ SHEQ Officer (2) Project Management	(1) Frequent reporting of electricity usage (2) Frequent reporting of the Spitsvale Carbon footprint status
4. Onsite Clinic	**Medical Waste generation**	A Waste management plan must be developed and address at least the following: • Identification of possible waste streams both hazardous and general • Description of method to re-use, reduce, recycle, or avoid waste generation • Monitoring requirements • Quantification of waste streams • Description of mitigation measures • Compliance with regulations stipulated in Table 16 The Spitsvale Health and safety management plan must at least include the following specific environmental related requirements: • Management of medical waste • Management of hazardous substances On-going monitoring and recording of medical waste generation.	(1) Health and safety officer (2) Project Management (3) All trained first aid staff	(1) Review of the Spitsvale Mine Health and Safety management plan as or when required (2) Review of the on-site Clinic management plan as or when required (3) Frequent inspection of medical waste facilities (4) Monthly reporting of medical waste generation

5. Mining offices (construction and operation) i.e. operation of training centres, offices and kitchen facilities **35. Demolition / removal of portable and related infrastructure** **38. Demolition of PCD's** **39. Demolition of workshops, waste storage facilities, fuel storage facilities etc.**	**General waste generation & Littering**	A Waste management plan must be developed and address at least the following: • Identification of possible waste streams both hazardous and general • Description of method to re-use, reduce, recycle, or avoid waste generation • Monitoring requirements • Quantification of waste streams • Description of mitigation measures • Compliance with regulations stipulated in Table 16 On-going monitoring, reporting and recording of all waste streams are required. Frequent inspections of waste disposal facilities or areas to take place. Records to be kept of such monitoring activities.		(1)Frequent inspection of on-site waste disposal facilities and sites (2) Review of the Spitsvale Waste Management plan as or when required
22. Residue stockpiles **25. Waste generation, storage and disposal**	**Hazardous Leachate**	A Waste management plan must be developed and address at least the following: • Identification of possible waste streams both hazardous and general • Description of method to re-use, reduce, recycle, or avoid waste generation • Monitoring requirements • Quantification of waste streams		(1)Frequent inspection of on-site waste disposal facilities and sites (2) Review of the Spitsvale Waste Management plan as or when required (3) Monthly reporting or frequency specified in the WUL on the compliance of water

		• Description of mitigation measures • Compliance with regulations stipulated in Table 16 On-going monitoring, reporting and recording of all waste streams are required. Monitoring, auditing, and reporting of compliance with the Waste Management Licence will be required as specified in the authorisation.		quality results as specified in **Appendix L & M** (4) Frequent inspection of waste disposal facilities (5) Compliance audit with the WML as specified by the competent authority
25. Waste generation, storage and disposal	**Illegal dumping**	A Waste management plan must be developed and address at least the following: • Identification of possible waste streams both hazardous and general • Description of method to re-use, reduce, recycle, or avoid waste generation • Monitoring requirements • Quantification of waste streams • Description of mitigation measures • Compliance with regulations stipulated in Table 16 On-going monitoring, reporting and recording of all waste streams are required. Frequent inspections of waste disposal facilities or areas to take place. Records to be kept of such monitoring activities.		(1)Frequent inspection of on-site waste disposal facilities and sites (2) Review of the Spitsvale Waste Management plan as or when required

7. Water storage facilities **28. Water supply (potable & process)** **32. Water Management**	**Improper water storage management**	Monitor and record water usage for dust suppression. Promoting the re-use of water contained as specified in the Storm water Management plan is recommended. However the water quality should be tested to ensure legal compliance before re-use. The operational water balances must be monitored and reviewed on a frequent basis as to ensure compliance with the WUL requirements. Listed activities must be monitored frequently to ensure compliance with the EMPr, EA, and closure plan. Frequent inspection of water storage facilities is required. Records to be kept of monitoring activities.	(1) Environmental Control Officer/Environmental Officer/ SHEQ Officer (2) Project Management	(1) Frequent reporting on the compliance of water quality results as specified in **Appendix L & M** (2) Daily recoding of water usage for dust suppression (3) Frequent review of operational water balances (4) WUL audits as specified in licensing requirements
8. Pollution Control Dams (PCD's) i.e. Construction and operation **10. Ablutions & change house with sewage treatment plant** **26. Chemical Toilets**	**Smell nuisance**	A Waste management plan must be developed and address at least the following: • Identification of possible waste streams both hazardous and general – include the management of effluent • Description of method to re-use, reduce, recycle, or avoid waste generation • Monitoring requirements • Quantification of waste streams • Description of mitigation measures • Compliance with regulations stipulated in Table 16		(1) Frequent reporting on the compliance of water quality results as specified in **Appendix L & M** (2) Review of the Spitsvale Waste Management plan as or when required (3) Frequent inspections of infrastructure associated ablution, sewage, and chemical toilet facilities

		Listed activities must be monitored frequently to ensure compliance with the EMPr, EA, and closure plan. Frequent inspection of sewage and chemical toilet facilities is required. Records to be kept of monitoring activities.		
9.Stores, workshops &wash bays **11. Fuel operating power generators** **13. Fuel storage** **29. Storage of fuel and lubricants in temporary facilities**	**Chemical Fires**	A hazardous substance management plan must be developed and address at least the following: • Storage, transport, handling, and disposal requirements according to the legislative requirements listed in Table 16 • Fire prevention methods including the description of equipment to be available for emergency situations • Health and safety requirements • Monitoring requirements A fire prevention plan must be developed and address at least the following: • Identification of all fire risks associated to the Spitsvale project • Describe preventative measures and include equipment • Monitoring of fire prevention equipment and high risk areas A Emergency preparedness and response plan to be developed and address at least the following: • Identifying possible emergency situations – include Chemical fires	(1) Health and safety officer (2) Site management	(1) Review of fire prevention plan as or when required (2) Frequent inspections of fire prevention equipment (3) Annual review of the Emergency preparedness and response plan or review after occurrence of emergency incident (4) Frequent inspections of hazardous substances storage facilities (5) Review of Hazardous substances management plan as or when required (6) Frequent inspections of spill prevention equipment

		• Describe preventative measures • Describe procedure to be followed in the case of a emergency • Include emergency contact details • Include monitoring requirements of preventative measures and or equipment • Appoint responsible persons Listed activities must be monitored frequently to ensure compliance with the EMPr, EA, and closure plan. Frequent inspection of hazardous substances storage facilities is required. Records to be kept of monitoring activities.		
12. Lighting	**Light pollution**	Monitoring of the effects posed by light pollution.	(1) Project management (2) Environmental Control Officer/Environmental Officer/SHEQ Manager	(1) Biennial investigation and reporting
13. Fuel storage	**Emission of noxious fumes**	A hazardous substance management plan must be developed and address at least the following: • Storage, transport, handling, and disposal requirements according to the legislative requirements listed in Table 16	(1) Health and safety officer (2) Site management	(1) Annual review of the Emergency preparedness and response plan or review after occurrence of emergency

		• Fire prevention methods including the description of equipment to be available for emergency situations • Health and safety requirements • Monitoring requirements A Emergency preparedness and response plan to be developed and address at least the following: • Identifying possible emergency situations – include Chemical fires • Describe preventative measures • Describe procedure to be followed in the case of a emergency • Include emergency contact details • Include monitoring requirements of preventative measures and or equipment • Appoint responsible persons Listed activities must be monitored frequently to ensure compliance with the EMPr, EA, and closure plan. Frequent inspection of fuel storage facilities is required. Records to be kept of monitoring activities.		incident (2) Frequent inspections of hazardous substances storage facilities (3) Review of Hazardous substances management plan as or when required (4) Frequent inspections of spill prevention equipment
14. Employment of workers and procurement of construction materials.	**Loss of farm labour** **Population Influx – Pressure on**	Frequent monitoring of compliance with the Social Labour plan. A grievance procedure to be developed and address at least the following:	(1) Company Directors (2) Human	(1) Review of Social Labour plan as required by legislation and the competent authority

17. Employment of workers	**Resources** **Population Influx – Social Pathologies** **Population Influx – Community Conflict** **Health and Safety of employees** **Job Creation and Skills Training** **Job Creation (Multiplier affect) and Population Influx**	• Procedure for recoding and addressing all complaints received by mine employees, contractors, or sub-contractors and surrounding I&AP. The Spitsvale Health and safety management plan must at least include the following specific environmental related requirements: • Considers recommendations in **Appendix N** Listed activities must be monitored frequently to ensure compliance with the EMPr, EA, and closure plan. Records to be kept of monitoring activities.	Resource manager (3) Project manager (4) SHEQ/ Health and Safety Manger	(2) Review of grievance procedure as or when required (3) Ongoing recording of complaints received by I&AP (4) Review of Spitsvale Health and Safety management plan as or when required
20.Drilling & Blasting	**Damage to surrounding landowner properties**	A drilling and blasting management plan must be developed and address at least the following: • Methods used for drilling and blasting • Safety requirements including • Monitoring requirements • Assessment of possible risks trough a risk assessment Listed activities must be monitored frequently to ensure compliance with	(1) Blasting supervisor/officer. (2) Blasting engineer. (3) Project management (4) Health and safety	(1) Review of drilling and blasting management plan as or when required (2) Frequent monitoring of areas affected by blasting activities

		the EMPr, EA, and closure plan. Records to be kept of monitoring activities.	manager/officer.	
31. Bulk transporting of Ore to market on Public roads	**Pressure on public transport infrastructure**	A traffic management plan must be developed and address at least the following: • Recommendations made in **Appendix P** • Monitoring requirements • Legal requirements Listed activities must be monitored frequently to ensure compliance with the EMPr, EA, and closure plan. Records to be kept of monitoring activities.	(1) Health and Safety Manager/Officer. (2) Project management.	(1) Review of traffic management plan as or when required (2) Frequent monitoring of traffic related issues

(l) Indicate the frequency of the submission of the performance assessment report

Section 34 of GN R. 982 stipulates the requirements for auditing compliance with the Environmental Authorisation (EA), the EMPr, and the closure plan (in compliance with GN R. 1147).

It requires the holder of the authorisation, for the period during which the EA, EMPr, and closure plan are valid, to ensure compliance with all the conditions stipulated in these documents and that is be audited. This audit report must then be submitted to the competent authority.

This audit report must adhere to the following conditions:

- Be prepared by an independent person with the relevant environmental auditing expertise;
- Provide verifiable findings, in a structured and systematic manner, on- (i) the level of performance against and compliance of an organization or project with the provisions of the requisite environmental authorisation or EMPr and, where applicable, the closure plan; and (ii) the ability of the measures contained in the EMPr, and where applicable the closure plan, to sufficiently provide for the avoidance, management and mitigation of environmental impacts associated with the undertaking of the activity;
- Contain the information set out in Appendix 7 of GN R. 982; and
- Be conducted and submitted to the competent authority at intervals as indicated in the environmental authorisation.

The purpose of this audit report is also defined in the regulations and is as follows:

- Determine the ability of the EMPr, and where applicable the closure plan, to sufficiently provide for the avoidance, management and mitigation of environmental impacts associated with the undertaking of the activity on an ongoing basis and to sufficiently provide for the , avoidance, management and mitigation of environmental impacts associated with the closure of the facility; and
- To determine the level of compliance with the provisions of environmental authorisation, EMPr and where applicable the closure plan.

In the event that findings of the environmental audit report indicate insufficient mitigation of environmental impacts of the activity or insufficient levels of compliance with the requirements, the holder of the EA must submit recommendations to amend the EMPr or closure plan in order to rectify the shortcomings identified in the audit report.

The recommendations must be subjected to a public participation process which process has been agreed to by the competent authority and was appropriate to bring the proposed amendment of the EMPr and, where applicable the closure plan, to the attention of potential and registered interested and affected parties, including organs of state which have jurisdiction in respect of any aspect of the relevant activity and the competent authority, for approval by the competent authority.

Within 7 days of the date of submission of an environmental audit report to the competent authority, the holder of an environmental authorisation must notify all potential and registered interested and affected parties of the submission of that report, and make such report immediately available:

- to anyone on request; and
- on a publicly accessible website, where the holder has such a website.

The environmental audit report must contain all information set out in Appendix 7 of GN R. 982.

It is recommended that this ***independent audit*** takes place on an annual basis or as specified by the competent authority in the EA, to promote continual improvement on the Spitsvale Project.

In terms of the definition of the regulations (GN R. 982), ***independent*** in relation to the person responsible for the preparation of an environmental audit report, means:

- That such person has no business, financial, personal, or other interest in the activity and is appointed in terms of the regulations; or
- That there are no circumstances that may compromise the objectivity of the person performing such work excluding fair remuneration for work performed in connection with the environmental audit report.

It is also recommended that an internal audit specified in the previous section be carried out on a biannual basis, if feasible but at least once before the independent audit.

Compliance monitoring to be carried out as recommended in Table 19.

(m) Environmental Awareness Plan

General environmental awareness must be promoted among everyone working on the Spitsvale Project (including consultants and contractors) to encourage the implementation of environmentally sound practices throughout its duration.

This will ensure that environmental incidents are minimised and environmental compliance maximised.

The purpose of an Environmental Awareness Plan is to outline the methodology that will be used to inform the mine's employees of any environmental risks which may result from their work and the manner in which the risks must be dealt with in order to avoid contamination or the degradation of the environment. The awareness plan is primarily a tool to introduce and describe the requirements of the range of environmental and social plans for the Project during the Life of the Project. The environmental awareness plan ensures that training needs are identified and appropriate training is provided.

The environmental awareness plan should at least communicate the following:

- Importance of conformance with the environmental policy, procedures and other requirements of good environmental management;
- The significant environmental impacts and risks of an individual's work activities and the environmental benefits of improved performance;
- Individual's roles and responsibilities in achieving the aims and objectives of the environmental policy; and
- The potential consequences of not complying with environmental procedures.

(1) Manner in which the applicant intends to inform his or her employees of any environmental risk which may result from their work

In order for the environmental awareness policy to be effective, the issues raised through it need to be communicated through training sessions, meetings, consultations and progress reviews. The following are recommended minimum steps that can be taken to ensure communication is effective:

- The agendas of all company board meetings will have an item where issues environmental Projects are discussed and feedback is given;
- Provide progress Reports on the achievement of policy objectives and level of compliance with the approved EMPr and the closure plan complying with GN R. 1147, to the DMR on request;
- Ensure environmental issues are realised at monthly mine management executive committee meetings and at all relevant, mine wide meetings, at all levels; and
- Ensure environmental issues are discussed at all general liaison meetings with local communities and other I&APs.

All employees are required to undergo environmental awareness induction training upon appointment and records of such training must be obtained and recorded. Refresher induction training must periodically take place.

Regular meetings (recommended to be done daily, at least once a week) communicating the following is recommended:

- Findings of environmental performance reports;
- Awareness raising campaigns discussing environmental topics; and
- Information of any environmental risk which may result from employee's work.

(2) Manner in which risks will be dealt with in order to avoid pollution or the degradation of the environment

It is recommended that an awareness training schedule be developed. This schedule should at least indicate the following:

- Topic;

- Method of communicating i.e. through a workshop, training session, or meeting;
- Target group i.e. management, skilled or semi skilled labour, admin staff etc;
- Scheduled time; and
- Progress.

The following topics are recommended:

- Potential environmental risks;
- Legal requirements;
- EMS requirements;
- Environmental performance; and
- Environmental incidents addressing corrective and preventative measures to be implemented.

(n) Specific information required by the Competent Authority

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

The preparation of the Spitsvale Mine Rehabilitation, closure and liability plan in accordance with GN R. 1142 has not been completed by the time of submitting this report. It is therefore recommended that no decision be made regarding granting authorisation before the documents required by the regulations are not completed and reviewed.

The following additional information was requested by the Department of Minerals and Resources on the acceptance of the scoping report:

- *Details of the EAP who prepared the report together with his/her expertise*

Environmental Management Assistance (Pty) Ltd was appointed in September 2016 to manage the EIA and appointment of Specialist.

- *Full description of activities to be taken*

The appointed EAP has listed all activities to the best of their knowledge.

- *Specialist reports should be signed off by an independent specialist if it was prepared by the in-house specialist(s).*

All specialist studies were conducted by independent specialist.

- *Details of the future land use for the site and infrastructure after decommissioning in 20 – 30 years.*

This requirement has not been addressed in this report. It will be addressed in the Spitsvale Mine Rehabilitation, closure and liability plan that is in process to be developed by an independent specialist. This report will be in compliance with GN R. 1142.

- *The total footprint of the proposed development should be indicated.*

Appendix C indicates the total footprint of the proposed development.

- *Should a Water Use License be required, proof of such application should be submitted.*

A WULA process is on its way. However an application has not been lodged at the time of submitting this report.

- *Possible impacts and effects of the development on the vegetation ecology with regard to lowland-highland interface in the locality should be indicated.*

This has been addressed in **Appendix G**.

- *The impacts of the proposed facility on avifauna and bats must be assessed in the EIA phase.*

Both an Avifuna and bat survey was carried out as instructed. The findings have been incorporated into the EIR and EMPr.

Find **Appendix H & J**.

- *Possible impacts and effects of the development on the surrounding industrial area.*

The social implication of the proposed mining development has been addressed throughout the EIR and the EMPr and has been addressed in a number of specialist reports.

Please find Part A section ***1)j)*** for the summary of findings.

- *Information on services required on the site, e.g. sewage, refuge removal, water and electricity should be submitted. Furthermore, information on who will supply these services, agreement thereof and confirmation of the capacity to deliver such services should be submitted.*

The services have been identified through the identification of activities associated to the proposed mining development.

The provision of information as to who will supply these services, agreements thereof and the confirmation of the capacity to deliver such services, however have not been confirmed before the submission of this report.

- *A construction and operational phase in the EMPr should include mitigation and monitoring measures.*

Part B of this report fulfils this requirement.

- *Should blasting be required, appropriate mitigation measures should be provided.*

Mitigation and management measures for blasting related activities have been identified in Part B of this report.

2) UNDERTAKING

The EAP herewith confirms

a. the correctness of the report accompanied by this declaration;

b. the inclusion of comments and inputs from stakeholders and I&AP's;

c. the inclusion of inputs and recommendations from the specialist reports where relevant; and

d. the acceptability of the project in relation to the finding of the assessment and level of mitigation proposed.

The EAP herewith confirms the following to be excluded from this report:

a. site layout including location of storm water infrastructure, pollution containment dams (PCD's), detailed infrastructure within the Tubatse laydown area.