mineral resources

Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

SCOPING REPORT

FOR THE WASTE MANAGEMENT ACTIVITIES ASSOCIATED TO THE SPITSVALE CHROME ORE MINE

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

Submission date: August 2016

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Contents

REVISION AND APPROVAL

Revision number:	00
Environmental Management Assistance (Pty) Ltd (EMA) ref:	BCR Minerals Project
Title:	SCOPING REPORT FOR THE WASTE MANAGEMENT ACTIVITIES ASSOCIATED TO THE SPITSVALE CHROME ORE MINE

Reviewers

	Name	Digital Signature	Date
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Document Authorisation	**Taryn Bigwood** *Masters* ***EMA Director*** *Member of LaRSSA, SAAG and IAIAsa*		16 August 2016
Applicant Authorisation	**Walter Murray** **Managing Director at BCR Minerals (Pty) Ltd**		16 August 2016

EXECUTIVE SUMMARY

Environmental Management Assistance (Pty) Ltd has been appointed as the independent EAP to manage the Scoping and EIA process associated with the waste management activities listed under Category B in GNR 633 of 24 July 2015 (GG 39020) in accordance with 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 to be referred to as 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, (South West of the town of Steelpoort Limpopo Province.

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), the National Environmental Management Waste Act, 2008 (Act no 59 of 2008), and the Mineral and Petroleum Resources Development Act, 2002 (Act no. 28 of 2002), as amended.

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 portion 22 of 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 (Portion 24,25,26 and 28 of the farm Spitskop 333 KT) 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 extent 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) whereafter the raw sorted ore be transported in bulk to various markets.

The scope of work requires investigating all potential environmental and social impacts associated to the waste management activities that may have a detrimental impact on the environment in terms of GN R. 633 of the National Environmental Management Waste Act, Act 59 of 2008 (NEMWA). The waste management activity associated to the application is listed as a Category B activity and therefore requires the Scoping and EIA process to be followed in terms of the 2014 EIA regulations (GN R. 982).

This report should be read in conjunction with the EIR and EMPr submitted (25th of April 2016) as part of the Mining right application process with the same reference number (DMR ref: LP 30/5/1/2//3/2/1(10104)).

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.

1. OBJECTIVE OF THE SCOPING PROCESS

The objective of the scoping process is to, through a consultative process—

(a) identify the relevant policies and legislation relevant to the activity;

(b) motivate 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 and confirm the preferred activity and technology alternative through an impact and risk assessment and ranking process;

(d) identify and confirm the preferred site, through a detailed site selection process, which includes an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified alternatives focusing on the geographical, physical, biological, social, economic, and cultural aspects of the environment;

(e) identify the key issues to be addressed in the assessment phase;

(f) agree on the level of assessment to be undertaken, including the methodology to be applied, the expertise required as well as the extent of further consultation to be undertaken to determine the impacts and risks the activity will impose on the preferred site through the life of the activity, including the nature, significance, consequence, extent, duration and probability of the impacts to inform the location of the development footprint within the preferred site; and

(g) identify suitable measures to avoid, manage, or mitigate identified impacts and to determine the extent of the residual risks that need to be managed and monitored.

SCOPING REPORT

2. Contact Person and correspondence address

Environmental Management Assistance (Pty) Ltd has been requested to complete the Scoping and EIA process associated to the application for the licensing of a Waste Management Activity in terms of the National Environmental Management: Waste Act, Act no. 59 of 2008 (NEMWA) 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.

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 (Candidate 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 has 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**.

All existing infrastructure currently on site are assumed to form part of the prospecting rights and associated bulk sampling activities held by BCR Minerals (Pty) Ltd.

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 Pollution Containment Dams (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 during the initial Mining right application process (attached as **Appendix D** find the EA granted). Table 1 refers to the listed waste management activities applicable as part of this application.

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*
Residue stockpiles	45ha		GNR984 - Activities 6 & 15 GNR985 - Activity 12 GNR 633 - Activity 11
RoM & product stockpiling	19ha		GNR984 - Activity 6 GNR985 - Activity 12 GNR 633 – Activity 11

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 town, 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 applicable waste management activity relates to residue stockpiles and the product stockpiles associated with 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

Figure 1: Typical MG1, MG2, MG3 and MG4 Package located on the south-eastern limb of the Bushveld Complex

Figure 2: View of Spitskop and Kennedy's Vale in an easterly direction, MG1, MG2, MG3 and MG4 Package are indicating sub-outcrop position as well as dip direction.

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 3). 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.

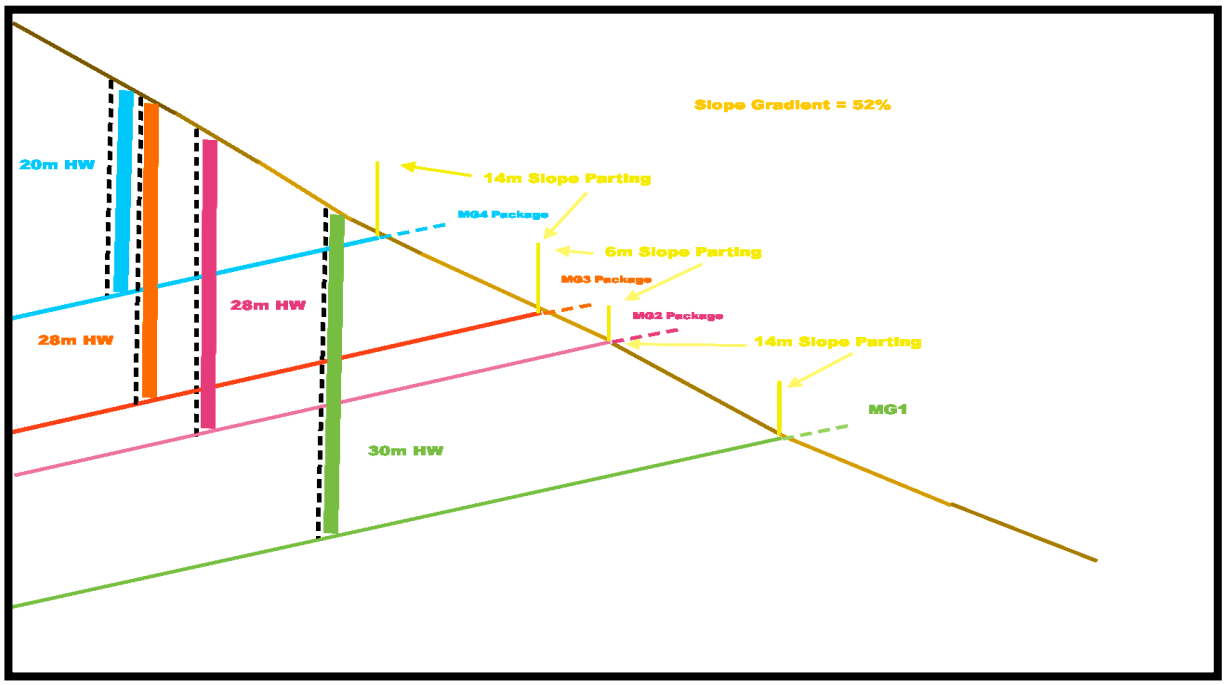

Figure 3: Image showing the mining bench heights from the MG4 to the MG1 bench

(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 1 above.	
Waste Dumping	Waste will be moved to the waste dump situated on the final pit perimeter, with a lot of waste to be dumped back directly into the pit (Concurrent	Concurrent backfill mining proved in South Africa and Africa, significantly reducing truck cycle time and equipment fleet requirements.

	backfilling whilst mining).	
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 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.

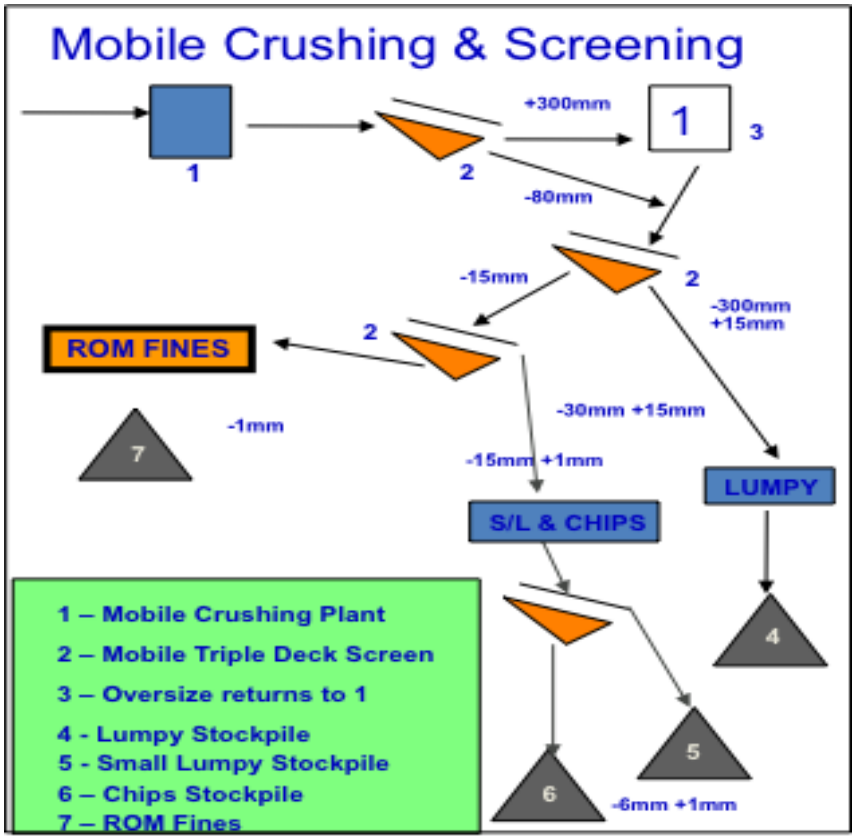

Figure 2: A schematic flow sheet and description of the major items in the proposed Spitsvale project process

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 of 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**
National Legislation and regulations	
Section 24 of the Constitution of South Africa Act no. 108 of 1996	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 economic and social development.
The Minerals and Petroleum Resources Development Act, 2002 Act No. 28 of 2002 (MPRDA)	• Submission of a mining works programme • Submission of an application to a mining right • Application for Environmental Authorisation A Rehabilitation, closure, and liability plan have been developed as part of the initial mining right application process and are attached as **Appendix S**
National Environmental Management Act 107 of 1998 (NEMA)	• Development of an EMPr for the proposed activities. • Application for authorisation resulting in the submission of this document. • 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 of 1998): Environmental Impact Assessment Regulations, 2014 (2014 EIA regulations)	Independent EAP appointed to ensure adherence with the EIA procedure.
GN R. 983 – 985: Listing notices 1 to 3	A Scoping and EIA process completed. See **Appendix ?** for the authorisation granted.
GN R. 1147: Regulations pertaining to the financial provision for prospecting, exploration, mining or production	Application for authorisation of listed activities in terms of listing notice 1-3 submitted together with the submission of the EIR, EMPr, and Rehabilitation, closure, and liability plan. See **Appendix?** For the proof of submission.
National Environmental Management: Air Quality Act 39 of 2004 **(NEMAQA)**	Requirements as stipulated in the Act will be incorporated with the EIR and EMPr to be submitted for approval. An air quality assessment was conducted during the Scoping and EIA process associated to the mining right application. The recommendations made by the specialist report were incorporated into the EIR and EMPr. These recommendations will form part of the Waste Management Plan (EMPr to be submitted as part of the Waste Management Licence application).
The following regulations in terms of NEMAQA are applicable:	
GN 893: List of activities which result in atmospheric emissions	No licence required at this time of the proposed activity.
GN R. 827: National dust control regulations	Requirements will be incorporated in the EIR and EMPr.
GN R. 283: National atmospheric emissions reporting regulations	Requirements will be incorporated in the EIR and EMPr.
GN R. 1210: National ambient air quality standards	Requirements will be incorporated in the EIR and EMPr.
GN R. 351: Regulations regarding the phasing-out and management of ozone-depleting substances	In the event that any PCB containing product will be used on site this regulation will be applicable. Requirements will be incorporated in the EIR and EMPr.

Atmospheric Pollution Prevention Act of 1965 **GN R. 1651:** Regulations concerning the control of noxious or offensive gasses emitted by diesel-driven vehicles	Requirements will be incorporated in the EIR and EMPr.
National Environmental Management: Waste Act 59 of 208 **(NEMWA)**	All waste management activities associated to the proposed mining operation must comply with the requirements set out by the Act. These requirements will be incorporated in the EIR and EMPr.
The following regulations in terms of NEMWA are applicable:	
GN R. 634: Waste classification and management regulations	A waste classification has been conducted to determine the classification of the residue stockpiles and product stockpiles. The findings of the report conducted by an independent consultant will be incorporated in the final EIR and EMPr. Requirements will be incorporated in the EIR and EMPr.
GN R. 632: Regulations regarding the planning and management of residue stockpiles and residue deposits from prospecting, mining, exploration or production operation	
GN R. 921: Activities listed requiring a waste management licence (WML)	Listed activity number 11, as amended by GNR 633, 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)" This document serves as an application for a WML.
GN R. 633: Amendments to the list of waste management activities that have, or are likely to have, a detrimental effect on the environment	
GN R. 625: National waste information regulations	As listed activity 11 of GN R. 633 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 EIR and EMPr associated to the WML.
GN R. 635: National Norms and Standards for the assessment of waste for landfill disposal	This regulation stipulates the requirements to assess generated waste for disposal to specific designed landfills. As a result, the requirements stipulated in these regulations will be considered in the EIR and EMPr.

GN R. 636: National norms and standards for disposal of waste to landfill	This regulation stipulates the general principles associated to the disposal of waste to landfill. As a result the requirements stipulated in these regulations will be considered in the EIR and EMPr.
GN R. 926: National norms and standards for storage of waste	This regulation describes the general requirements for the management and storage of waste. As a result the requirements stipulated in these regulations will be considered in the EIR and 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	Requirements incorporated will be considered in the EIR and EMPr.
National Water Act 36 of 1998 (NWA)	Application for a Water Use Licence (WUL) is in process. General conditions stipulated in the NWA will be considered in the EIR and 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	An application for a WUL is in process. The requirements will be incorporated in the EIR and EMPr.
Hazardous Substances Act 15 of 1973	Requirements will be incorporated into the EIR and EMPr. Requirements to be incorporated into the Spitsvale Health and Safety management plan.
Mine Health and Safety Act of 1996 **GN R. 1237:** Mines and works regulations	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 will be incorporated into the EIR

GN R. 911: Mine health and safety regulations	and EMPr. The following specific sections are applicable in this report and the EMPr: • Storage of hazardous substances; • Acquisition of hazardous chemicals.
Fertilizers, farm feeds, agricultural remedies and stock remedies Act 36 of 1947	The requirements specifically related to the use of herbicides and pesticides will be incorporated into the EMPr.
Conservation of Agricultural Resources Act 43 of 1983 (CARA) **GN R. 1048:** Declared Weeds and Invader plants	The requirements will be incorporated into the EIR and EMPr. This act also deals with permitting of land zoned as Agriculture.
National Environmental Management: Biodiversity Act, 2002 **(NEMBA)**	Requirements will be incorporated into the EIR and 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 that formed part of the mining right application process.
National Veldt and Forest Fire Act 101 of 1998	Measures to prevent the spreading of fires will be incorporated into the EIR and EMPr.
National Forest Act 84 of 1998	Requirements will be incorporated into the EIR and EMPr. However, before the commencement of site clearance an application must be lodged for the removal of protected tree species as identified in the Terrestrial ecological assessment that formed part of the mining right application process.
National Heritage Resources Act 25 of 2000	The EIR & EMPr submitted as part of the mining right application 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**:	Requirements to be incorporated in the Mine Health and Safety plan.
Government Policies	
Waste Management policies	In terms of waste management in South Africa, there are two main policies that will be considered in the development of the EIR and 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 will be incorporated into the EIR and EMPr.
National Environmental Health Policy	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	The following two SANS standards will be 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	Requirements will be incorporated in the EIR and EMPr. The requirements for permitting of protected plants are stipulated and form part of LEMA.
Limpopo Conservation plan	Requirements will be incorporated in the EIR and EMPr.

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 Accelerated and Shared Growth Initiative for South Africa (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 tapped 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 Spitsvale operations.

g) 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.

h) Description of the process followed to reach the proposed preferred site

(NB!! – This section is not about the impact assessment itself; It is about the determination of the specific site layout having taken into consideration (1) the comparison of the originally proposed site plan, the comparison of that plan with the plan of environmental features and current land uses, the issues raised by interested and affected parties, and the consideration of alternatives to the initially proposed site layout as a result.)

i) Details of all alternatives considered

(With reference to the site plan provided as Appendix 4 and the location of the individual activities on site, provide details of the alternatives considered with respect to: (a) the property on which or location where it is proposed to undertake the activity; (b) the type of activity to be undertaken; (c) the design or layout of the activity; (d) the technology to be used in the activity; (e) the operational aspects of the activity; and (f) the option of not implementing the activity.

(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.

(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 alternatives 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 (the importance of mining development as indicated in the GTM IDP 2015/2016), 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.

ii) Details of the Public Participation Process (PPP) 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.

Determining the level of public participation

The level of public participation was determined by taking into account the scale of the anticipated impacts of the proposed project, the sensitivity of the affected environment, the degree of controversy, and the characteristics of the potentially affected parties. Based on the findings of the aforementioned consideration (Appendix A: Level of public participation), it was deemed not necessary to elaborate on the minimum requirements of the public participation process as described in the EIA Regulations, 2014.

No reasonable alternative methods, in those instances where a person is desiring of but unable to participate in the process due to illiteracy, disability or any other disadvantage, were required.

Notification of potentially interested & affected parties

The PPP commenced on the 09th of August 2016. Potentially interested and affected parties were notified of the proposed application by –

Fixing two (2) notice boards 60cm by 42cm at places conspicuous to and accessible by the public on 12th of August 2016, specifically at:

1. S 24.8425895°' & E 30.1220816'
2. S 24.8328232° & E 30.1237309°'

Written notice to owners and occupiers of land adjacent to Portions 24, 25, 26, and 28 on farm Spitskop 333 KT and Portions 8 and 22 on farm Kennedy's Vale 361 KT and any organ of state having jurisdiction in respect of the proposed activity were provided.

A Background Information Document (BID), that included the waste management activities, was prepared and distributed via email, fax or post to all possible I&AP on 12th of August 2016.

An advertisement in a local newspaper, the Steelburger News, was placed on the 12th August 2016.
Public participation during the impact assessment phase of the EIA revolves around a review of the findings of the EIA, presented in the draft EIR and EMPr including specialist studies. This report will be made available to potential and registered I&APs for a 30-day comment period, including:

- State department(s) that administer a law relating to a matter affecting the environment,
- The Competent Authority (CA), and then
- Potential and registered I&APs.

Potential and registered I&APs will be advised of the availability of the draft EIR and EMPr and of how to obtain it.

The Specialist Feedback meeting, that included the discussion of waste management activities, was held at Tubatse Country Club on the 28th of January 2016. The purpose of the meeting was to discuss the findings of the specialist assessments that were undertaken and any other comments, queries and/or concerns regarding the draft EIR. The date was determined by the availability of the relevant specialist reports and to provide potential and registered I&APs sufficient time to review the reports and raise their concerns at the meeting, as well as give the EAP reasonable time to respond to and incorporate the comments from the said meetings into the final EIA Report.

Comments were recorded. All the issues, comments and suggestions raised during the comment period on the draft EIR and EMPr that formed part of the mining right application process were added to the Comments and Response Sheet.

Once the competent authority has made a decision whether to grant or refuse authorisation in respect of all or part of the activity applied for, the EAP will, within 14 days of the date of the decision to the application, notify Registered I&APs of the decision, including how to access the decision, reasons for such a decision and draw their attention to the fact that an appeal may be lodged. Preferred distribution of the written notification shall be via email, facsimile and post, if necessary.

iii) Summary of issues raised by I&APs

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

Table 6 summarises the comments received during the mining right application process. At the onset of the Public Participation Process, the applicant intended to review the application to include the Waste Management activities as part of the mining right environmental authorisation. However, the application was not able to be amended and the separate application for a Waste Management Licence (WML) was initiated.

Therefore, the comments received during the mining right application will also be considered during the WML application process.

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					
Dawie Barnard	x	**Email on 10/12/15**	Rhodium Reefs Ltd would like to register as interested and affected party. Please keep us informed of all meetings in this regard.	Noted. Thank you Mr Barnard	Appendix T – registered I&AP
Kennedy Owuor (Representative of	x	**At the meeting held**	Where is Lion Smelter on the map? Will later want to know the exact proximity.	Showed on the map.	All comments and concerns are addressed

Glencore)		**on 28/01/16**	Will copies of the specialist studies be provided?	PDF format copies will be provided and will be in the final report as well. A dropbox link will also be created.	in Part B of this report (EMPr)
			Follow-up on the soil types & management plan that will be coming out of it. Look at how soil erosion & flooding is to be dealt with as it was indicated that the area has thin soil. Especially during stripping. When stripping all sorts of alien species come up very fast, management thereof. During the Land use, which is connected to water. Portion 8 – Part of Glencore Surface Rights. Will we be consulted more in terms of monitoring of boreholes & notified to make recommendation. Within this area. Especially Portion 8 on the Spitskop side, that is where the Lion Smelter extracts its water from, especially the water used for the plant. If the borehole is going to be set there, we need to know if it's going to be a monitoring borehole. We will be affected in terms of our current water use license from the Department. Existing roads – The Tweefontein road from R555 towards the entry. We have a concern there; traffic management will need to be looked into, in terms of the trucks and the speed. Temporary lanes are recommended to accommodate the public.	Erosion & flood events are dealt with in the hydrological assessment report as well as Stormwater measures and flood measures. Will look into the traffic report to see if it was	

				considered. EAP mentioned that recommendations were included in the traffic assessment report.	
			Need to understand how much water will be needed, be it for processes/consumption. The borehole water will not be enough. Borehole water is not advisable. Consider surface water, the closest is the Dwars River, approach the DWS. Look at Lebalelo Pipeline, its expensive yes, but might be better. Look at alternatives, De Hoop would be a best bet. Is it possible to get an estimate of how much water will be used.	Noted. Water balance will provide detail on total water usage requirements.	All concerns and comments will be addressed in the IWWMP as part of the WULA process.
			Dust Monitoring: Are those the places (positions indicated on the slide) where the dust buckets will be placed?	Client will be advised to use more locations for dust-bucket placing. Consult Lion Smelter when locating the dust-buckets. Wouldn't want cross-liabilities.	
			Where are the boreholes on those properties? Please provide that information to Lion Smelter as well.	Showed on the map. Noted. Will do.	
			Are you saying there will be no dewatering?	No, around the Spitsvale Flat areas koppie areas, there will be. On this particular seam, the pit is going to be below that of the groundwater resource.	

			Asked that ground water levels of water be checked next to the Lion Smelter on Portion 8 & 9.	Will do.	
			Why include S21(g) if you will not do tailings?	In terms of waste management there will be no tailings associated with processed material, only residue stockpiles i.e. Inert material). Overburden is considered as waste in terms of the Waste Act. Section 21 (g) are also applicable to the PCD's (Pollution Control Dams). GN 704 requires that "dirty" and "clean" water be separated, "Dirty" or any effluent resulting from the proposed mining activities will be contained in these PCD's, therefore section 21 (g) applies.	
Lawful occupier/s of the land					
Shadrack Masha (Resides in Dithamaga Village)	x	**By hand on the registration sheet at the meeting on 28/01/16**	Take note that Dithamaga Village is a community closer to the Spitsvale Mining- BCR Minerals Ltd. The said community deserves to have or given first priority in business operation with regard to SMMME Development simply because the negative impact (Air pollution, noise pollution, ground shaking during blasting, etc) in mining operations do affect them i.e Dithamaga is an affected party. Moreover, Dithamaga Community and/or business people	Noted. Thank you!	Comments were considered in the developed Social and Labour plan (**Appendix D**). Recommendations to address these concerns were addressed in **Appendix N** and in Part B of this

			must be given priority to comply in terms of the mining charter. BCR Minerals or Spitsvale Mining must ensure that first priority is given to Dithamaga SMME in terms of procurement. BCR needs to develop mechanisms for SMME financial empowerment for instance, financial incubation programmes must be in place. BCR must take a lead. Dithamaga being poor of the poorest in deep rural areas SMMEs must get letters of intent so as to simply acquire financial support or empowerment from financial aid agencies like e.g. Anglo Zimele. Personally, individuals need to be given first priority in terms of broad based long term skills development programmes like for instance, learnerships, internships and bursaries. BCR must develop career plan and mentorship plan which also, must be included in their draft SLP. In conclusion Dithamaga Land owners must come up with well-informed business models in order to give support to private company or developers to pro-actively unpack the		report. Concerns raised regarding water uses will be addressed in the IWWMP as part of the WULA process.

			LED projects. For instance, tourism & farming are also major economic development empowerment for broader bonafide citizens of South Africa, the country, continent & internationally.		
			Will copies of the presentation be made available?	Yes, transparency is the main aim and objective of the Public Participation Process.	
			Elaborate on the water supply (potable & process).	Forms part of the Water Use License process to look at and assess all the impacts concurrently.	
			On air quality- Can you comment on the air pollution.	Will go into detail later when the slide on the findings of the study conducted on air quality comes up.	
			Clarity on the impacts of blasting on the residential area. How close is the blasting area?	Slides on the radius of the blasting area are coming. There are many ways of blasting. Close to humans controlled blasting will be practiced. DS confirmed this.	
			On some of the slides "mining on Tubatse" comes up; Tubatse what?	The specialists don't always have insight into the accurate landmarks names. There are three (3) mining areas on the property. Tubatse is a name for one of the areas that will be mined. We will get into that	

				slide later.	
			Another distribution centre for the report needs to be the Greater Tubatse Municipality Library. Will the EMPr also be ready by the end of February?	The Final Report, including all specialist reports, will be done only at the end of February. Yes, the EMPr will be ready, but the DMR has been informed of the time extension.	
			The Mabelane Homestead is just a section that falls under the Dithamaga Village. The affected communities are on Phase 2. Both Tubatse & Dithamaga are affected, not only Tubatse.	It's the area of the village that is closer to the mine. Noted.	
			Water source from boreholes – 70% of the water will be used for the mining industry. Check with relevant source when the distribution process will begin with De Hoop Dam. Cost should not be an issue because it's the municipality's responsibility to make sure that the distribution is budgeted for.	Reason for alternative sources is because the Olifants Water Resources Development Project (ORWRDP) pipeline is far from being finished, and hence alternatives had to be considered. The distribution & associated costs from the ORWRDP are also uncertain. The mining activity will not involve processing, so the only use for water will be for ablutions and consumption. The water will also be used for dust suppression, however the specialist have indicated on the static water balance that there will be an excess of Average wet season is 22 527m^3/month and	

				average dry season is 8 065m^3/month.	
			Clarity on the mentioned places for the PM10 & PM 2.5 dust fall outs.	Just shows that the fallout is way below the thresholds (within the limit).	
			Please include Dithamaga & Tubatse on the baselines and reports.	Noted.	
			Concerned about the Koppies (Klarinet & Tubatse) that are being referred to. Why not Dithamaga Mountains? Namely; Madikoto, Marutseng, Tshehleng.	This model shows water at different levels over mining areas.	
			How often is the water level tested when the mine becomes operational? Legislatively what should it be?	Quarterly. Will confirm if its quality or quantity. Will be specified once the license has been issued.	
			Where are the tailings to be put?	At this point there will not be any tailings, as no processing will be done. JB added that the idea is to look at the project holistically. That is why some activities might not apply in initial phases but are likely to come on line at later stages..	
			The landowner must speed up it's business model in terms of economic development and tourism. Long term skills development needs to be considered – Provide people with skills & opportunities to create their own jobs. Financial letter of intent to support the local SME's. Ownership	Needs to come into the Social Plan as part of the mining works program. There are other tools to capture what you have just named.	

			participation to be considered. Procurement systems.		
Thomas Mpholwane (Resides in Dithamaga Village)	x	**At the meeting held on 28/01/16**	Portion 28 (Tubatse Residence) - close to the area of operation also on the side of the R555. Is there any specific level of decibels that will be considered, the recommended is 85? Especially with regards to blasting.	It was suggested that it be seen if the noise presentation covers that (to follow later in PowerPoint presentation) and if not, will be requested from the specialist.	All concerns raised were addressed in a number of specialist reports (see the appendices). The social and Labour plan was made available to the public (See **Appendix D**). Part B to this report provides the management plan to mitigate and control all potential impacts.
			Please check on the chromite diseases that will arise.	Yes, and that it should be on the air quality & human health slides.	
			Suggest that the distribution centre be the Post Office in Steelport, Dithamaga Community Office & Eerste Geluk Library. Is there any other consultation that will be done similar to this one so as to follow up if the comments were incorporated into the final decision?	Any comments will be put into the comments and response register, will be responded to and will form part of the final reports.	
			It's not Manapane, its Mangabane.	Noted.	
			Once the draft has been finalized, monitoring should be clarified.	Noted.	
			Is a Social Labour Plan analysis in place and made available to everyone? Please translate these reports into Sepedi.	Will look into it.	
			Thank you for the invitation to engage in this process.	Noted.	

			Monitoring programmes must be finalised, so as to see if they are in conjunction with the LED (Limpopo Economic Development) programmes.	We are truly committed to speeding it up as much as we can, but not at the expense of proper process or content of the reports.	
Thomas Mavunda (Representing Eskom- as a Servitude Holder)	x	**At the meeting held on 28/01/16**	Eskom needs a site layout plan to check and verify the exact location of the project's impacts on their lines.	Will provide plan.	No confirmation received whether future and current Eskom projects will be affected.
			There are building restrictions that must be complied to. Eskom must be consulted for comments on all plans, so as to alert them on planned line routes, including blasting. There is an Eskom standard that must be adhered to. Can we please have a copy of the presentation?	Shape files will be supplied to both Eskom Distribution & Transmission to make sure that necessary mitigations are included in the EMPr. All attendees will receive a copy of the presentation.	
			Will Eskom's supply NOT be needed? Are there any operations currently?	Yes, Eskom's supply will be needed at the operational stage. There is a preliminary process currently underway known as bulk sampling as part of the prospecting process.	
			Eskom wants it to be known that their lines might be extended and/or upgraded in future. It's important for the mine NOT to ignore Eskom as it is their obligation to supply sufficient energy. A drawing showing the exact position is	Noted.	

			vital to facilitate proper planning.		
			Does the mine own all the portions?	Only one portion is owned by the mined, all the others are leased.	
Vuledzani Thanyani (Representing Eskom- as a Servitude Holder)	x		Are the red areas on the map the only areas that will be mined? The shape files we got were not clear enough as to which areas will be mined. We were under the impression that the whole box will be mined. Can we get the shape files just for the areas where activity will take place so that we can overlay the drawings?	Yes. We will supply that.	No confirmation received whether future and current Eskom projects will be affected. Specific mitigation measures to manage blasting activities have been addressed in Part B of this report.
		At the meeting held on 28/01/16	Looking at the blasting rings, were existing infrastructures considered and looked at? It looks like there are existing powerlines.	Suspicion is there is a standard blasting protocol that was / will be used. In those sensitive areas, the safest method will be used and considered as mitigations. Blasting areas are carefully considered and taken into account. Given at least a 500m radius. Blasting areas will be shifted accordingly to take into account existing infrastructure.	
			We have an environmental authorization for new lines that will run exactly where the blasting will take place	It was asked that the plans and EA be supplied so that they can be overlaid on the mining plan and necessary adjustments	

				made where feasible.	
			What is the mine's power source? Two proposed sub-stations will be affected by this development.	Currently using *Genset,* a generator system. Will be interested in an alternative method in future.	
			Does the study cover the whole block? Will the Department authorize the whole block or just the activity area?	The 2014 Regulations no longer allows for the amendment of EA's to include additional listed activities, a new assessment process needs to be undertaken; so that is why we include everything even though it might not be implemented immediately, including the layout plan which is then binding on the client.	
			Don't want to be okay with the whole polygon that might be authorized by the Department with the impression that only a small area will be mined & will not affect their infrastructures. Eskom needs to know exactly where the activity will take place so as to object if need arises because currently a whole lot of their lines will have to run there in the near future.	The properties affected by the mining activities are listed but not the entire area will be utilized only sections within its boundaries.	
			There are powerlines that have been authorized for the future that run across the study area. Plans need to be joined so as to make proper and relevant remarks & comments.	The process of consultation and analysis of potential areas of conflict can be driven by the current EIA process. Even if you can give us the name of the EAP that consulted for the EA to obtain the necessary shapefiles to	

				create the necessary map overlays.	
Landowners or lawful occupiers on adjacent properties –					
See Appendix T					
Municipal councillor - See Appendix T					
Municipality - See Appendix T					
Organs of state *(Responsible for infrastructure that may be affected Roads Department, Eskom, Telkom, DWA etc.)*					
Phuti Mabotha (Representing LEDET)	x	**At the meeting held on 28/01/16**	Explain in detail negative impacts as well as mitigations.	That is impractical and will take forever, however, the report will entail that. The Public Meeting does not cater for in-depth analysis of Aspects, Impacts & Mitigations, that information is contained in the EIR & EMPr available for review.	See Part A and B of this report.
Tshifhiwa Mathase (Representing DWAFF)	x	**At the meeting held on 28/01/16**	Has the trees & natural forest been covered? Please consider the protected trees & natural forest. Projects that will impact species such as *Catha Transvalensis* (*Lydenburgia cassinoides*, Sekhukhune busman's tea) and *Catha edulis* (Bushman's tea) should be avoided. Certain Species are only found here in the Sekhukhune District, serious mitigation strategies need to be in place. The Department needs to be part of the site inspection.	Yes. A biodiversity study has been undertaken; there is a full species list of species. Mitigation measures include a pre-construction walk through for purposes of search & rescue (translocation where possible) of protected plants & will be included in the EMPr. Department (DAFF) to be part of search process.	See **Appendix G**.

		Email on 18/04/16, pending site inspection on 12/04/16.	*Lydenburgia Cassinoides* (Sekhukhune Bushmen's tea) is confined at Sekhukhune District Municipality only therefore, the Department requires a plan that will ensure continuous existence within the municipality.	Noted.	Included in Part B of this report.
			When constructing new roads, divergence of roads is recommended where protected trees will be affected.	Noted.	
			As endorsed in your EMPr, relocation of protected trees should be adhered to, particularly all trees that are 1m and below. It should also be done under supervision of specialists to minimize mortality rate.	Noted.	
Communities -					
See Appendix T					
Dept. Land Affairs -					
See Appendix T					
Traditional Leaders -					
See Appendix T					
Dept. Environmental Affairs					
See Appendix T					
Other Competent Authorities affected -					
See Appendix T					
OTHER AFFECTED PARTIES					
See Appendix T					
INTERESTED PARTIES					
Humphrey Mphage		**Email on**	Please register as interested and affected party in your	Good morning Mphage,	A number of the

	13/12/15	project. We need PR/M licence no. from DMR for Spitsvale Chrome mine. Can u furnish corporate person report on Spitsvale Chrome mine? Furnish us with draft water use licence, EAI, waste management report, drilling programme report, Acid mine drainage report and PH pollution report, Type of chrome oxide for processing, Social labour plan draft or final, Copies of permits from district, local and national gov. or any documents linking to project. Who is black partner to the projected, Lwala mining BEE partner is Ehlobo Holding, Batho Barena, employees and women in mining. Do your project comply with climate change, mine health and safety principles .Can u furnish footprint of area to be affected by your project. In an opencast mine did u measure distance of affected, how many kilos from mine, is blasting safe 4 villagers/passbyers/land owner. Did u research existing boreholes, rivers to be affected. Can u furnish list of stakeholders to the project. The ff. Are community biz ,eg, Ore transport, diesel supply, waste management, borehole drilling, Park homes supply, fencing, roads construction, chemicals supply to separate ores and what community projects as sustainable could formed, who will fund them. Is BCR MINERALS ,Ecoleges having local BEE partners?	Thank you for registering as an Interested and Affected Party (I&AP). Your questions and requests have been noted, and will be responded to in due time.	concerns were addressed throughout the EIR and EMPr (Part A and part B of the report).
	Email on 18/12/15	Thanks Hlengile 4 registration. I tried 2 send another additional comments but failed on Justin email. Kindly register ff:- -Can we form conservation $environmental	See Appendix I(2) of the report attached in **Appendix T**	A number of the concerns were addressed throughout

		committee as watch dog to project operations perpetually ?-Can your mine put budget to conservation $ environmental committee as contained in your SLP continuously as starting of environmental sustainability? How are u going to monitor environmental protection $ sustainability ?Root causes of environmental crisis ,principles of ecology , biomes and aquatic life zones ,self sustaining mechanism in ecosystems ,Human ecology. Solutions 4 a sustainable society- how are u going to create a sustainable system of agriculture to feed community? How are u going 2 preserve grasslands, forests, wilderness, if any, water resources, the earth and minerals resources. The year 2016 in February mining Indaba is taking in Cape Town, can u sponsor environmental committee for five days ,travelling, accommodation ,registration and attending courses, meals etc. Learning 2 live with earth's carrying capacity ; how will u be creating sustainable villages, graves, customs etc .How will u protect principles of toxicology, Air pollution and noise, water pollution ,Hazardous and solid waste ,Sustainable economics to villagers and land owners, Sustainable economic development ,Law, Government, and Society. Thanks, Humphrey		the EIR and EMPr (Part A and part B of the report). As part of compliance with GNR 982, all compliance reports will be made available to the public to review and comment.

Find attached **Appendix E** for the details of all registered I&AP.

iv) Environmental attributes associated with the sites

(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 as part of the mining right application.

The section to follow summarises these findings and recommendations that formed part of the application process and are will be considered as part of the waste management licence application process.

(a) Type of environment affected by the proposed activity

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

The information in the following sections has been extracted from the submitted specialist reports that were submitted as part of the mining right application.

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).

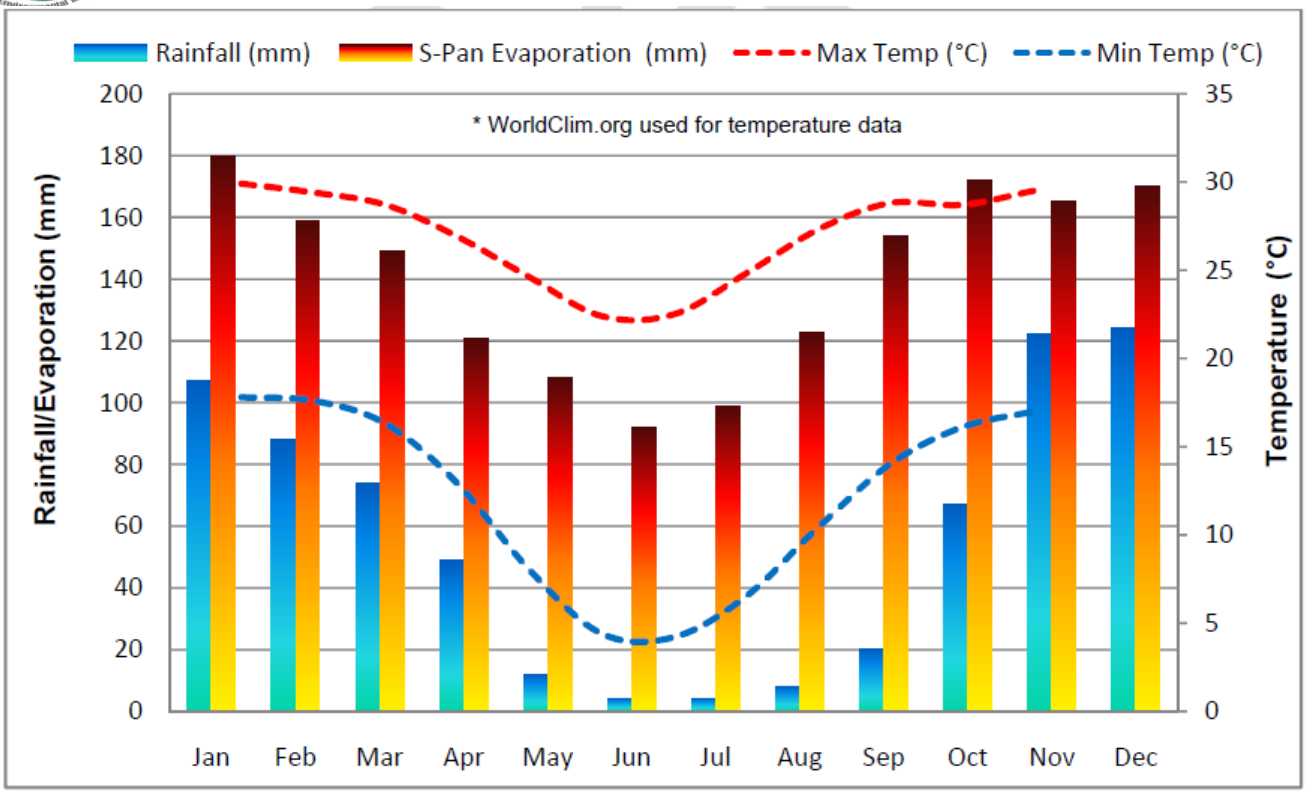

Figure 3: Summary of average climate for site

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.

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.

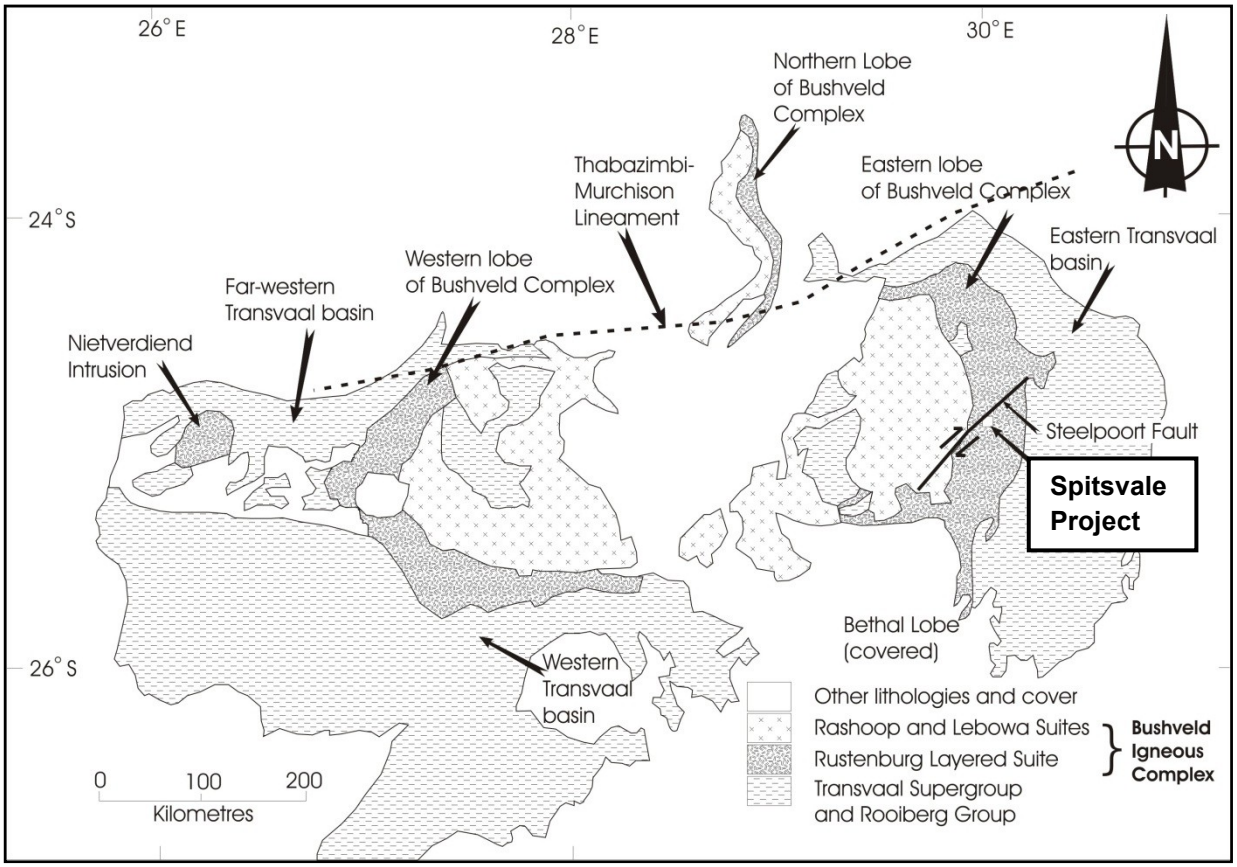

Figure 4: Approximate location of Spitsvale Project and the Steelpoort Fault within the Bushveld Igneous Complex

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.

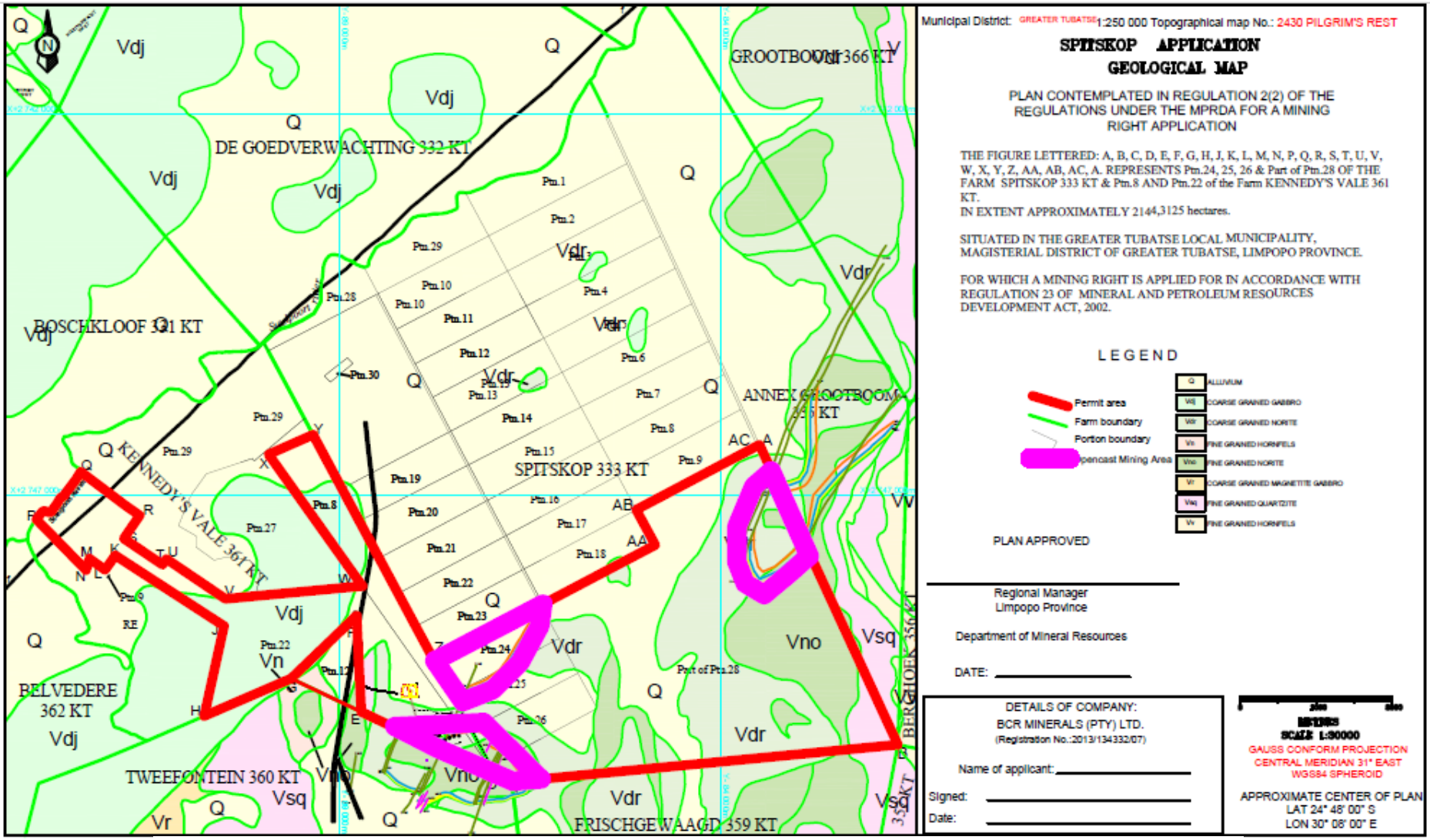

Figure 5: Regional geological map

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 (Total Suspended Particles 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 Air Quality 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.

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 an Environmental Noise Impact Assessment (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.

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.

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. 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.

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 affect 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.

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

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.

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.

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.

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 F.**

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 G**). 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 H**.

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.

XIV. Waste Classification

A classification procedure was performed according to the National Environmental Management Act: Waste Act, 2008 (Act No.59 of 2008): National Norms and Standards for the Assessment of Waste for Land Disposal, as published in the Government Gazette No. 36784, dated August 2013.

The basis of the norms and standards is to define a pollution control barrier system for the waste to be disposed of. The approach was as follow:

- Identification of chemical substances present in the waste.
- Sampling and analyses to determine the total concentrations (TC) and leachable concentrations (LC) for the elements and chemical substances identified in the waste.
- The TC and LC limits of the chemical substances in the waste must be compared to the threshold limits for total concentration (TCT limits) and leachable concentrations (LCT limits) of the specific elements and chemical substances.
- Based on the TC and LC limits of the elements and chemical substances in the waste exceeding the corresponding TCT and LCT limits, respectively, the specific type of waste for disposal to land must be determined.

The residue deposits recorded alkaline pH and low to undetected levels of soluble (mobile) macro- and micro constituents. Given the nature and mineralogy of the Bushveld Complex, the total concentration analyses did reveal some micro constituents to be above detection levels whilst also exceeding TCT0 levels with regards to the Norms and Standards. Micro-elements that exceeded the TCT0 levels include cobalt, copper, manganese, nickel, vanadium and fluoride.

If the Norms and Standards methodology is strictly applied to the WRDs, it can neither be classed as Type 3 or a Type 4 waste material. According to the methodology, for a waste material to be classified as Type 4, the LC (leachable

concentration) and the TC (total concentration) must be below the LCT0 and TCT0, while for a waste to be classified as Type 3, the LC and TC must be below the LCT1 and TCT1, respectively. However, the following is true for the waste rock:

(LC < LCT0 and TCT0 < TC < TCT1)

Strictly in terms of the National Norms and Standards for Disposal of Waste to Landfill (Government Notice R636), which is also applicable to MRSRDs, the containment barriers for the WRDs must comply with the minimum engineering design requirements of a Class C Landfill or Class D Landfill as shown below.

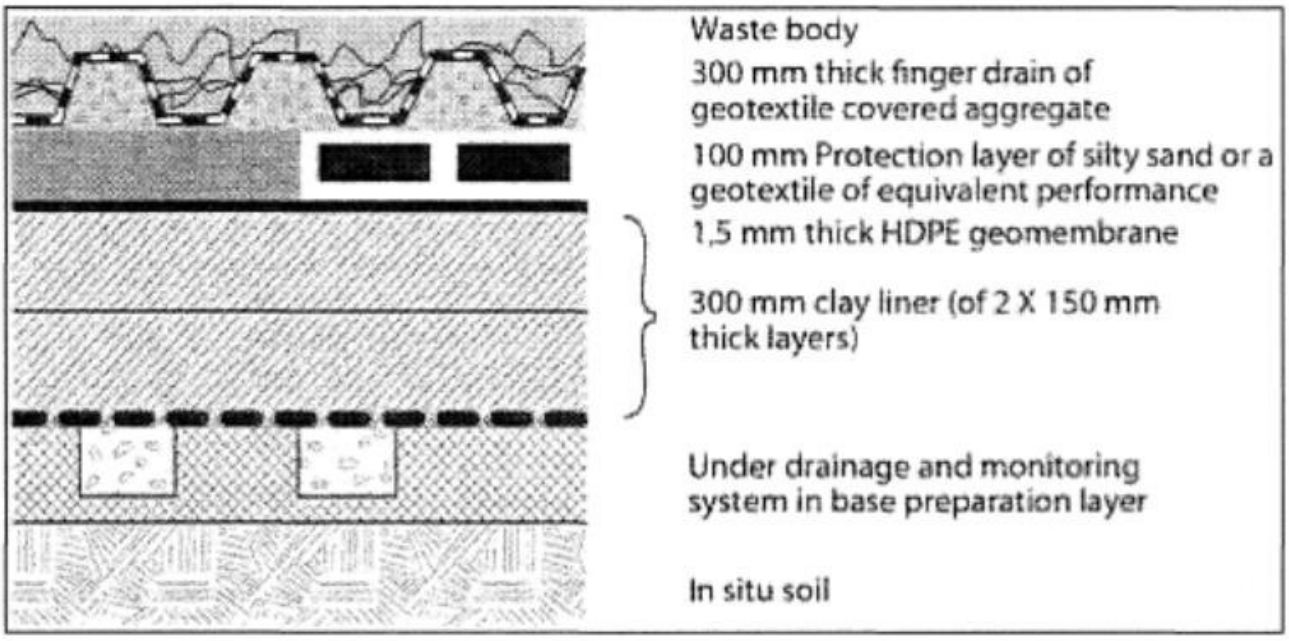

Figure ?: Class C Landfill engineering design

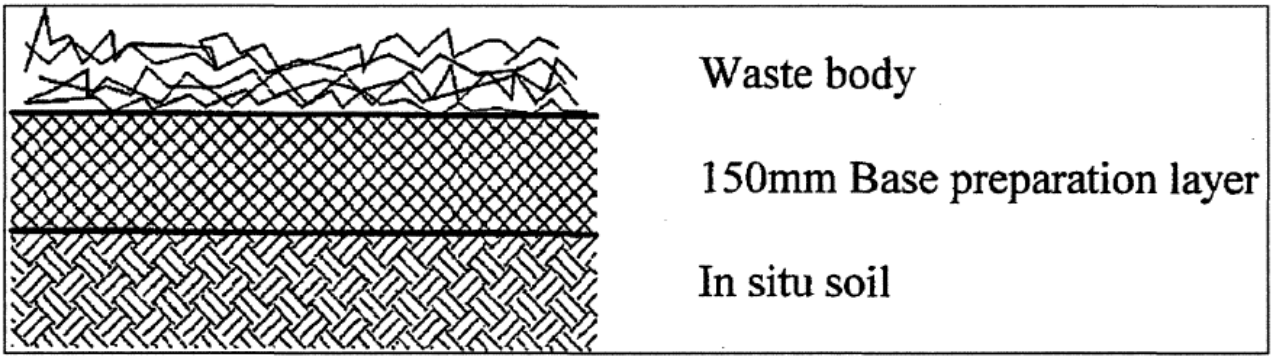

Figure ? :Class D Landfill engineering design

The BCR WRDs recorded within LCT0 limits, and this together with the fact that the material is non-acid generating, the risk of poor quality leachate developing from the WRDs towards the receiving environment is perceived to be very low. A Class D Landfill Engineering Design is therefore proposed.

A copy of the Waste Classification Report is attached as **Appendix I**.

(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 J** 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 K** 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.

(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 L** 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 L**.

v) Impacts identified

(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)

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.

For the purpose of this section, the mitigation measures recommended will only summarise the approach taken to manage each risk. A detailed mitigation plan will form part of the final EIR and EMPr.

Table 10: Explanation of colour indicator

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

Table 11: Summary of identified potential impacts and aspects associated to the Waste Management Activities

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	DESCRIPTION OF ENVIRONMENTAL RISK (Direct and indirect impact)	PHASE	Duration	Extent	Magnitude	Probability	SIGNIFICANCE (Pre-Mitigation)	MITIGATION CONSIDERATIONS Mitigation Type	Duration	Extent	Magnitude	Probability	SIGNIFICANCE (Post-Mitigation)
Infrastructure development															
1. Access and hauling along roads i.e. during the construction of roads **2. Site clearing and topsoil stripping** **3. Transport of construction material, mobile plant and equipment to the site**	Dust generation	Air Quality	**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.	Construction & Operational	1	2	6	5	45	**Control**	1	1	4	3	18
		Human Health		Construction & Operational	2	1	6	5	45		1	1	4	3	18
		Topography and Visual Environment		Construction & Operational	1	1	6	5	40		1	2	6	3	27
	Hydrocarbon Contamination	Surface Water quality	**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.	Construction & Operational	1	1	6	4	32	**Control**	1	1	6	3	24
		Groundwater quality		Construction & Operational	1	2	6	3	27		1	2	6	2	18
		Soil quality		Construction & Operational	2	1	6	4	36		1	1	6	3	24
	Degradation of soil resources	Soil quality	**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.	Construction & Operational	1	1	6	3	24	**Remedy**	1	1	6	3	24
		Flora micro-ecosystems		Construction & Operational	1	1	6	3	24		1	1	6	3	24
	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 effect the micro-ecosystems of the surrounding environment.	Construction & Operational	2	1	6	5	45	**Control**	1	1	8	3	30
		Micro-ecosystems		Construction & Operational	1	1	4	3	18		1	1	6	3	24

1. Access and hauling along roads i.e. during the construction of roads **2. Site clearing and topsoil stripping** **3. Transport of construction material, mobile plant and equipment to the site**	Vegetation and habitat loss	Macro and Micro organisms	**Direct Impact:** Clearing the area to construct the access roads leads to the loss of vegetation and habitats of macro and micro organisms. The loss of vegetation also affects the surrounding Fauna and Flora.	Construction & Operational	3	1	6	5	50	**Remedy**	2	1	6	4	36
		Fauna and Flora		Construction & Operational	3	1	6	5	50		2	1	6	4	36
	Sedimentation and siltation of watercourses	Wetland and Aquatic Ecology	**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.	Construction & Operational	2	1	6	5	45	**Control**	2	1	6	3	27
		Surface Water		Construction & Operational	2	1	6	5	45		2	1	6	4	36
	Noise generation	Surrounding noise quality	**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.	Construction & Operational	1	1	6	4	32	**Control**	1	1	4	3	18
	Alteration of drainage patterns	Wetland and Aquatic Ecology	**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.	Construction & Operational	2	2	6	5	50	**Remedy**	1	1	4	3	18
		Surface Water quality		Construction & Operational	2	2	6	5	50		1	1	6	3	24
	Destruction of upstream tributaries and reduction in water in the catchment	Wetland and Aquatic Ecology	**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.	Construction & Operational	3	2	6	3	33	**Remedy**	1	1	6	3	24
		Downstream water users		Construction & Operational	3	2	6	4	44		1	1	6	3	24
		Surface Water quality		Construction & Operational	2	2	6	4	40		1	1	6	3	24

1. Access and hauling along roads i.e. during the construction of roads **2. Site clearing and topsoil stripping** **3. Transport of construction material, mobile plant and equipment to the site**	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.	Construction & Operational	1	2	4	5	35	**Modify**	1	1	4	3	18
	Influx of alien invasive vegetation	Fauna and Flora micro and macro ecosystems	**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.	Construction & Operational	3	2	8	5	65	**Control**	2	2	6	4	40
	CO_2 emissions	Air Quality	**Direct Impact:** Contributing factor the BCR Minerals (Pty) Ltd carbon footprint.	Construction & Operational	1	3	6	5	50	**Control**	1	1	2	3	12
	Alteration of the visual environment and topography	Topography and Visual Environment	**Direct Impact:** Vegetation stripping during site clearing and topsoil removal activities will alter the visual environment and topography.	Construction	3	2	6	5	55	**Remedy**	1	2	6	4	36
	Destruction of Wetlands	Wetlands and Aquatic Ecology	**Direct Impact:** Site clearing and topsoil stripping in Wetlands will cause the loss of micro and macro aquatic species.	Construction & Operational	3	2	8	5	65	**Avoid**	2	1	6	4	36
	Water level reduction and contamination	Groundwater quality	**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.	Construction & Operational	2	1	6	5	45	**Control**	1	1	6	3	24
		Downstream water users		Construction & Operational	2	2	6	5	50		1	1	6	3	24
		Surface Water quality		Construction & Operational	2	1	6	5	45		1	1	6	3	24
	Destruction of graves	Loss of heritage resources	**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.	Construction & Operational	5	2	6	5	65	**Avoid**	5	2	6	3	39
	Degradation of cultural significance heritage sites	Loss of heritage resources	**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.	Construction & Operational	5	2	6	5	65	**Avoid**	5	2	6	3	39
	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.	Construction & Operational	4	2	6	5	60	**Control**	4	2	4	3	30
		Micro-ecosystems		Construction & Operational	4	2	6	5	60		4	2	4	3	30

4. Storm water runoff management features **5. Pollution Control Dams (PCD's) i.e. Construction and operation** **6. River crossings**	Vegetation and habitat loss	Macro and Micro organisms	**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. The loss of vegetation also affects the habitat of surrounding Fauna and Flora. **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.	Construction & Operational	3	1	6	5	50	**Remedy**	2	1	6	3	27
		Fauna and Flora		Construction & Operational	3	1	6	5	50		2	1	6	3	27
	Sedimentation and siltation of watercourses	Wetland and Aquatic Ecology	**Direct Impact:** Improper or ineffective storm water runoff management features poses a risk of contributing to the sedimentation and siltation of watercourses.	Construction & Operational	4	2	8	5	70	**Control**	4	2	6	3	36
		Surface Water quality		Construction & Operational	4	2	8	5	70		4	2	6	3	36
	Hydrocarbon Contamination	Surface Water quality	**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.	Construction & Operational	4	2	8	5	70	**Control**	2	1	6	2	18
		Groundwater quality		Construction & Operational	4	2	8	4	56		2	1	4	2	14
		Wetlands and Aquatic Ecology		Construction & Operational	4	2	8	5	70		2	1	6	2	18
	Alteration of drainage patterns	Wetland and Aquatic Ecology	**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.	Construction & Operational	4	2	8	5	70	**Remedy**	4	1	6	3	33
		Surface Water quality		Construction & Operational	4	2	6	5	60		4	1	6	3	33
	Contamination of water resources	Wetlands and Aquatic Ecology	**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.	Operational	5	2	8	4	60	**Avoid**	1	1	6	2	16
		Surface Water quality		Operational	5	2	8	5	75		1	1	6	2	16
		Groundwater quality		Operational	5	2	8	5	75		1	1	6	2	16
	Smell nuisance	Human health and safety environment	**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.	Construction & Operational	4	1	6	5	55	**Avoid**	1	2	6	3	27

7. Fuel storage	Emission of noxious fumes	Human health	**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 may lead to the development of respiratory problems and irritation to eyes.	Construction & Operational	4	1	8	5	65	**Avoid**	4	1	6	3	33
8. Employment of workers and procurement of construction materials.	Loss of farm labour	Socio-economic	**Direct Impact:** Increased demand of labour force poses a risk of the local farmers losing farm labour due to competing financial income.	Construction & Operational	4	2	4	5	50	**Control**	4	2	2	4	32
	Population Influx – Pressure on Resources	Socio-economic	**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.	Construction & Operational	4	2	4	5	50	**Control**	4	2	2	4	32
	Population Influx – Social Pathologies	Socio-economic	**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.	Construction & Operational	4	2	4	5	50	**Control**	4	2	2	4	32
	Population Influx – Community Conflict	Socio-economic	**Direct Impact:** Increased demand for labour force poses a risk of a population influx. The increased population influx may lead to community conflicts in the surrounding local community.	Construction & Operational	4	3	6	5	65	**Control**	4	2	2	4	32
	Health and Safety of employees	Human health and safety environment	**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.	Construction & Operational	4	1	6	5	55	**Control**	4	1	6	3	33
	Job Creation and Skills Training	Socio-economic	**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.	Construction & Operational	4	2	0	4	24	**Control**	4	2	0	4	24
	Job Creation (Multiplier Effect) and Population Influx	Socio-economic	**Indirect Impact:** Social projects forming part of the proposed mining project will create additional job opportunities for the local communities.	Construction & Operational	4	3	0	5	35	**Control**	4	2	0	4	24

Mining Operations															
9. Employment of workers	Loss of farm labour	Socio-economic	**Direct Impact:** Increased demand of labour force poses a risk of the local farmers losing farm labour due to competing financial income.	Construction & Operational	4	3	4	5	55	**Control**	4	2	0	4	24
	Population Influx – Pressure on Resources	Socio-economic	**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.	Construction & Operational	4	2	4	5	50	**Control**	4	2	0	5	30
	Population Influx – Social Pathologies	Socio-economic	**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.	Construction & Operational	4	2	4	4	40	**Control**	4	2	0	4	24
	Population Influx – Community Conflict	Socio-economic	**Direct Impact:** Increased demand for labour force poses a risk of a population influx. The increased population influx may lead to community conflicts in the surrounding local community.	Construction & Operational	4	3	6	5	65	**Control**	4	2	0	4	24
	Health and Safety of employees	Human health and safety environment	**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.	Construction & Operational	4	1	6	5	55	**Control**	4	1	6	3	33
	Job Creation and Skills Training	Socio-economic	**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.	Construction & Operational	4	1	0	5	25	**Control**	4	1	0	5	25
	Job Creation (Multiplier Effect) and Population Influx	Socio-economic	**Indirect Impact:** Social projects forming part of the proposed mining project will create additional job opportunities for the local communities.	Construction & Operational	4	2	0	5	30	**Control**	4	2	0	4	24

10. RoM & product stockpiling **11. Residue stockpiles** **11. Screening Operations** **12. Discard disposal (backfilling of mining area)**	Sedimentation and siltation of watercourses	Wetland and Aquatic Ecology	**Direct Impact:** Stockpiling 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.	Construction & Operational	4	2	8	5	70	**Control**	4	2	6	4	48
		Surface Water quality		Construction & Operational	4	3	8	5	75		4	2	6	4	48
	Alteration of drainage patterns	Wetland and Aquatic Ecology	**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.	Construction & Operational	5	2	8	5	75	**Remedy**	4	2	6	5	60
		Surface Water quality		Construction & Operational	5	3	8	5	80		4	2	6	5	60
	Destruction of upstream tributaries and reduction in water in the catchment	Wetland and Aquatic Ecology	**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.	Construction & Operational	4	3	6	5	65	**Remedy**	4	1	6	3	33
		Downstream water users		Construction & Operational	4	3	6	5	65		4	1	6	3	33
		Surface Water quality		Construction & Operational	4	3	6	5	65		4	1	6	4	44
	Alteration of the visual environment and topography	Topography and Visual Environment	**Direct Impact:** Open cast mining will alter the topography and visual environment throughout the mining operation in a significant way.	Construction	4	2	8	5	70	**Remedy**	4	1	6	5	55
	Influx of alien invasive vegetation	Fauna and Flora micro and macro ecosystems	**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.	Construction & Operational	4	2	6	5	60	**Control**	4	1	4	5	45
	Dust generation	Air Quality	**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.	Construction & Operational	3	2	6	5	55	**Control**	4	1	4	4	36
		Human Health		Construction & Operational	3	2	6	5	55		4	1	4	4	36
		Topography and Visual Environment		Construction & Operational	3	2	4	5	45		4	1	4	4	36

	Degradation of soil resources	Soil quality	**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.	Construction & Operational	4	1	8	5	65	**Remedy**	4	1	6	5	55
		Flora micro-ecosystems		Construction & Operational	5	1	8	5	70		4	1	6	5	55
	Contamination of water resources	Wetlands and Aquatic Ecology	**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.	Construction & Operational	4	2	8	5	70	**Avoid**	4	1	6	4	44
		Surface Water quality		Construction & Operational	4	3	8	5	75		4	1	6	4	44
		Groundwater quality		Construction & Operational	4	2	8	5	70		4	1	6	3	33
10. RoM & product stockpiling **11. Residue stockpiles** **11. Screening Operations** **12. Discard disposal (backfilling of mining area)**	Hydrocarbon Contamination	Surface Water quality	**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.	Construction & Operational	4	2	8	5	70	**Control**	4	1	6	4	44
		Groundwater quality		Construction & Operational	4	2	8	5	70		4	1	6	2	22
		Soil quality		Construction & Operational	4	1	8	5	65		4	1	6	4	44
	Noise generation	Surrounding noise quality	**Direct Impact:** The use of drill Riggs and blasting activities itself will result in the generation of noise. If equipment are not maintained and serviced regularly high levels of noise may result throughout the operational phase.	Construction & Operational	4	2	6	5	60	**Control**	4	2	4	5	50
	Damage to surrounding landowner properties	Socio-economic	**Direct Impact:** Blasting outside the safe zones or in areas within close proximity to properties of landowners poses a risk of damaging properties. Fly rock poses a human health and safety risk.	Construction & Operational	5	2	6	5	65	**Avoid**	4	2	6	3	36
		Human health and safety environment		Construction & Operational	4	2	6	5	60		4	2	6	3	36
	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.	Construction & Operational	4	1	8	5	65	**Control**	4	1	6	4	44
		Micro-ecosystems		Construction & Operational	4	1	8	5	65		4	1	6	4	44
	Vegetation and habitat loss	Macro and Micro organisms	**Direct Impact:** Clearing of site and stripping of topsoil leads to the loss of vegetation and habitats of macro and micro organisms. The loss of vegetation also affects the habitat of surrounding Fauna and Flora.	Construction & Operational	5	1	8	5	70	**Remedy**	4	1	6	5	55
		Fauna and Flora		Construction & Operational	5	1	8	5	70		4	1	6	5	55

	CO_2 emissions	Air Quality	**Direct Impact:** The use of diesel operated construction equipment will cause a contributing factor the BCR Minerals (Pty) Ltd carbon footprint.	Construction & Operational	4	2	4	5	50	**Control**	4	1	2	5	35
	Hazardous Leachate	Groundwater quality	**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 is hazardous to the aquatic ecology and water resources.	Operational	5	3	8	5	80	**Control**	4	1	6	3	33
		Aquatic ecology		Operational	5	3	8	5	80		4	1	6	3	33
		Human Health		Construction & Operational	4	2	8	5	70		4	1	6	5	55
		Topography and Visual Environment		Construction & Operational	4	2	4	5	50		4	1	6	5	55
13. Waste generation, storage and disposal **14. Chemical Toilets** **15. Storage of fuel and lubricants in temporary facilities**	Degradation of soil resources	Soil quality	**Direct Impact:** Improper management of waste generated during the operational phase 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.	Construction & Operational	5	1	8	5	70	**Remedy**	4	1	6	4	44
		Flora micro-ecosystems		Construction & Operational	5	1	8	5	70		4	1	6	3	33
	Contamination of water resources	Wetlands and Aquatic Ecology	**Direct Impact:** Water seeping from waste storage facilities 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.	Construction & Operational	4	2	8	5	70	**Avoid**	4	1	6	3	33
		Surface Water quality		Construction & Operational	4	3	8	5	75		4	1	6	3	33
		Groundwater quality		Construction & Operational	4	3	8	5	75		4	1	6	2	22
		Surface Water quality		Construction & Operational	4	2	8	5	70		4	1	6	3	33
	Illegal dumping	Surface water contamination	**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.	Construction & Operational	4	2	8	5	70	**Control**	4	1	4	3	27
		Human health and safety environment		Construction & Operational	4	2	8	5	70		4	1	4	3	27
		Soil Contamination		Construction & Operational	5	2	8	5	75		4	1	4	3	27

13. Waste generation, storage and disposal **14. Chemical Toilets** **15. Storage of fuel and lubricants in temporary facilities**	Hazardous Leachate	Groundwater quality	**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.	Operational	4	2	8	5	70	**Control**	4	1	6	2	22
		Aquatic ecology		Operational	5	2	8	5	75		4	1	6	2	22
	Degradation of soil resources	Soil quality	**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.	Construction & Operational	1	1	6	5	40	**Remedy**	1	1	4	4	24
		Flora micro-ecosystems		Construction & Operational	1	1	6	5	40		1	1	4	4	24
	Smell nuisance	Human health and safety environment	**Direct Impact:** Lack of maintenance and treatment may result in a smelling environment.	Construction & Operational	1	1	6	5	40	**Avoid**	1	1	4	4	24
	Hydrocarbon Contamination	Surface Water quality	**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.	Construction & Operational	3	2	6	5	55	**Control**	4	1	6	4	44
		Groundwater quality		Construction & Operational	3	2	6	5	55		4	1	6	4	44
		Soil quality		Construction & Operational	3	2	8	5	65		4	1	6	4	44
		Micro-ecosystems		Construction & Operational	4	1	8	5	65		4	1	4	4	36
16.Rehabilitation of mining areas	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 effect the micro-ecosystems of the surrounding environment.	Construction & Operational	4	1	8	5	65	**Control**	4	1	6	3	33
		Micro-ecosystems		Construction & Operational	4	1	8	5	65		4	1	6	3	33
	CO_2 emissions	Air Quality	**Direct Impact:** Haul vehicles will cause a contributing factor the BCR Minerals (Pty) Ltd carbon footprint.	Construction & Operational	4	2	6	5	60	**Control**	4	1	4	5	45
	Sedimentation and siltation of watercourses	Wetland and Aquatic Ecology	**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.	Construction & Operational	4	2	8	5	70	**Control**	4	1	6	4	44
		Surface Water quality		Construction & Operational	4	2	8	5	70		4	1	6	4	44
	Noise generation	Surrounding noise quality	**Direct Impact:** If vehicles are not maintained and serviced regularly high levels of noise may result throughout the construction and operational phase.	Construction & Operational	4	2	6	5	60	**Control**	4	1	4	5	45

	Dust generation	Air Quality	**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.	Construction & Operational	4	3	4	5	55	**Control**	4	1	4	3	27
		Human Health		Construction & Operational	4	3	4	5	55		4	1	4	3	27
		Topography and Visual Environment		Construction & Operational	4	3	4	5	55		4	1	4	3	27
	CO_2 emissions	Air Quality	**Direct Impact:** Haul vehicles will cause a contributing factor the BCR Minerals (Pty) Ltd carbon footprint.	Construction & Operational	4	3	4	5	55	**Control**	4	1	2	5	35
Decommissioning																
17. Demolition / removal of portable and related infrastructure **18. Demolition of PCD's** **19. Demolition of workshops, waste storage facilities, fuel storage facilities etc.**	Erosion	Loss of fertile soil	**Direct 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 effect the micro-ecosystems of the surrounding environment.	Construction & Operational	4	1	8	5	65	**Control**	4	1	4	4	36
		Micro-ecosystems		Construction & Operational	4	1	8	5	65		4	1	4	4	36
	Improper water storage management	Wastage of water resource	**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.	Construction & Operational	4	1	6	5	55	**Avoid**	4	1	4	3	27
		Water contamination		Construction & Operational	4	1	8	5	65		4	1	4	3	27
	Contamination of water resources	Wetlands and Aquatic Ecology	**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.	Construction & Operational	4	2	8	5	70	**Avoid**	4	1	6	3	33
		Surface Water quality		Construction & Operational	4	2	8	5	70		4	1	6	3	33
		Groundwater quality		Construction & Operational	4	2	8	5	70		4	1	6	2	22
	Sedimentation and siltation of watercourses	Wetland and Aquatic Ecology	**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.	Construction & Operational	4	2	8	5	70	**Control**	4	1	6	3	33
		Surface Water quality		Construction & Operational	4	2	8	5	70		4	1	6	3	33
	Alteration of drainage patterns	Wetland and Aquatic Ecology	**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.	Construction & Operational	5	2	8	5	75	**Remedy**	4	1	4	5	45
		Surface Water quality		Construction & Operational	5	2	8	5	75		4	1	4	5	45

17. Demolition / removal of portable and related infrastructure **18. Demolition of PCD's** **19. Demolition of workshops, waste storage facilities, fuel storage facilities etc.**	Water level reduction and contamination	Groundwater quality	**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.	Construction & Operational	4	2	8	5	70	**Control**	4	1	4	3	27
		Downstream water users		Construction & Operational	4	2	8	5	70		4	1	4	3	27
		Surface Water quality		Construction & Operational	4	2	8	5	70		4	1	4	3	27
	Noise generation	Surrounding noise quality	**Direct Impact:** The use of unmaintained equipment and plant throughout the decommissioning phase poses a risk of generating noise.	Decommissioning	1	2	6	5	45	**Control**	1	1	4	5	30
	General waste generation & Littering	Topography and Visual Environment	**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.	Decommissioning	2	2	6	5	50	**Control**	1	1	6	3	24
		Soils quality due to leachates		Decommissioning	5	2	8	5	75		1	1	6	3	24
		Surface Water quality due to leachates		Decommissioning	3	2	8	5	65		1	1	6	3	24
	Hydrocarbon Contamination	Surface Water quality	**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.	Decommissioning	2	1	8	5	55	**Control**	1	1	6	3	24
		Groundwater quality		Decommissioning	2	1	8	5	55		1	1	6	1	8
		Soil quality		Decommissioning	2	1	8	5	55		1	1	6	3	24
	Dust generation	Air Quality	**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.	Decommissioning	2	2	6	5	50	**Control**	1	1	4	5	30
		Human Health		Decommissioning	2	2	6	5	50		1	1	4	5	30
		Topography and Visual Environment		Decommissioning	2	2	6	5	50		1	1	4	5	30
	Influx of alien invasive vegetation	Fauna and Flora micro and macro ecosystems	**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.	Decommissioning	3	1	8	5	60	**Control**	1	1	4	3	18

20. Vehicular activity: removal of mobile plant / equipment and vehicles	Destruction of upstream tributaries and reduction in water in the catchment	Wetland and Aquatic Ecology	**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.	Construction & Operational	4	2	8	5	70	**Remedy**	4	1	4	3	27
		Downstream water users		Construction & Operational	4	2	8	5	70		4	1	4	3	27
		Surface Water quality		Construction & Operational	4	2	8	5	70		4	1	4	3	27
	Erosion	Loss of fertile soil	**Direct Impact:** Exposed un-vegetated rehabilitated areas poses a high risk of erosion. This may lead to the loss of fertile soil and in its turn effect the micro-ecosystems of the surrounding environment.	Operational	5	1	8	5	70	**Control**	4	1	4	4	36
		Micro-ecosystems		Operational	5	1	8	5	70		4	1	4	4	36
	Sedimentation and siltation of watercourses	Wetland and Aquatic Ecology	**Direct Impact:** Runoff from exposed un-vegetated areas poses a risk in contaminating nearby streams, rivers, and drainage lines.	Operational	4	2	8	5	70	**Control**	4	1	4	4	36
		Surface Water quality		Operational	4	2	8	5	70		4	1	4	4	36
	Noise generation	Surrounding noise quality	**Direct Impact:** The use of unmaintained equipment and plant throughout the rehabilitation phase poses a risk of generating noise.	Operational	2	2	6	5	50	**Control**	1	1	4	5	30
21. Rehabilitation of the lay down areas	Influx of alien invasive vegetation	Fauna and Flora micro and macro ecosystems	**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.	Operational	4	2	6	5	60	**Control**	1	1	4	5	30
	Degradation of soil resources	Soil quality	**Direct Impact:** Poor management of topsoil and subsoil poses a risk to degradation of soil resources.	Operational	5	1	10	5	80	**Remedy**	1	1	6	3	24
		Flora micro-ecosystems		Operational	5	1	10	5	80		1	1	6	3	24
	Vegetation and habitat loss	Macro and Micro organisms	**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.	Operational	5	1	10	5	80	**Remedy**	1	1	4	5	30
		Fauna and Flora		Operational	5	1	10	5	80		1	1	4	5	30
	Hydrocarbon Contamination	Surface Water quality	**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.	Decommissioning	2	2	8	5	60	**Control**	1	1	6	3	24
		Groundwater quality		Decommissioning	2	2	8	5	60		1	1	6	1	8
		Soil quality		Decommissioning	2	2	8	5	60		1	1	6	3	24

	Degradation of soil resources	Soil quality	**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.	Decommissioning	5	1	6	5	60	**Remedy**	1	1	4	3	18
		Flora micro-ecosystems		Decommissioning	5	1	6	5	60		1	1	4	3	18
	Erosion	Loss of fertile soil	**Direct Impact:** Exposed un-vegetated rehabilitated areas poses a high risk of erosion. This may lead to the loss of fertile soil and in its turn effect the micro-ecosystems of the surrounding environment.	Decommissioning	5	1	8	5	70	**Control**	1	1	4	4	24
		Micro-ecosystems		Decommissioning	5	1	8	5	70		1	1	4	4	24
	Degradation of soil resources	Loss of fertile soil	**Direct Impact:** Exposed un-vegetated rehabilitated areas poses a high risk of erosion. This may lead to the loss of fertile soil and in its turn effect the micro-ecosystems of the surrounding environment.	Decommissioning	1	1	8	5	50	**Control**	1	1	4	4	24
		Micro-ecosystems		Decommissioning	1	1	8	5	50		1	1	4	4	24
	CO_2 emissions	Air Quality	**Direct Impact:** The use of diesel operated construction equipment will cause a contributing factor the BCR Minerals (Pty) Ltd carbon footprint.	Decommissioning	1	1	6	5	40	**Control**	1	1	2	5	20
	Degradation of soil resources	Soil quality	**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.	Decommissioning	5	1	8	5	70	**Remedy**	1	1	4	3	18
		Flora micro-ecosystems		Decommissioning	5	1	8	5	70		1	1	4	3	18
	Vegetation and habitat loss	Macro and Micro organisms	**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.	Decommissioning	5	1	8	5	70	**Remedy**	1	1	4	4	24
		Fauna and Flora		Decommissioning	4	1	8	5	65		1	1	4	4	24
Waste generation, storage and disposal	General waste generation & Littering	Topography and Visual Environment	**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. Pressure on the local or national landfills poses the risk of land degradation and requires more space in terms of the IDP of the local municipality.	Decommissioning	1	1	8	5	50	**Control**	1	1	4	5	30
		Soils quality due to leachates		Decommissioning	5	1	8	5	70		1	1	6	3	24
		Surface Water quality due to leachates		Decommissioning	3	2	8	5	65		1	1	6	3	24

vi) Methodology used in determining the significance of environmental impacts

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

The significance (quantification) of potential environmental impacts identified during the preliminary 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 12: 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 that the proposed activity (in terms of the initial site layout) and alternatives will have on the environment and the community that may be affected

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

During the initial EIA studies conducted during the application process for a mining right a number of specialist studies were conducted. These findings are also applicable to the waste management activities identified for the purpose of this report.

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
- 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 that could be applied and the level of risk

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

During the EIR and EMPr preparation a detailed management plan of each impact and risks identified in section **v)**. 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) The outcome of the site selection Matrix (Final Site Layout Plan)

(Provide a final site layout plan as informed by the process of consultation with interested and affected parties)

Find attached **AppendixC** the final site layout plan.

x) Motivation where no alternative sites were considered

As discussed in section ***h)*** 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 is submitted indicating the details of all infrastructures associated to the proposed mining development.

xi) 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.

i) Plan of study for the Environmental Impact Assessment process

The section to follow describes how the EIA process will be approach in the development of the EIR and EMPr.

i) Description of alternatives to be considered including the option of not going ahead with the activity

As discussed in section ***h)*** of this report, no property alternatives will be 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 will be considered throughout this process. The placing of RoM and product stockpiles as well as the residue deposits/stockpiles will be assessed and placed accordingly.

ii) Description of the aspects to be assessed as part of the environmental impact assessment process

(The EAP must undertake to assess the aspects affected by each individual mining activity whether listed or not, including activities such as blasting, Loading, hauling and transport, and mining activities such as Excavations, stockpiles, discard dumps or dams, water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc…etc…etc.).

In section **v)** possible impacts and aspects associated to the waste management activities have been predetermined. As part of the EIR and EMPr these impacts and aspects will be explored further and mitigation and management measures will be developed to control reduce and or eliminate possible environmental impacts.

iii) Description of aspects to be assessed by specialist

As part of the application process associated to the mining right application, a number of specialist studies were conducted. These findings are summarised in Table 13.

A waste classification assessment according to GN R. 632 has been conducted. Find the classification report attached as **Appendix I**.

Table 13: Summary of inclusion of specialist recommendations

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS
1. 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 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. Biodiversity Impact Assessment (Terrestrial Ecology)	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 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. 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.
4. 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. 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. Geo-hydrological Impact	The following recommendations are proposed to monitor and minimise potential impacts on the receiving groundwater environment:

Assessment	• 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.

6. 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 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. 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. • 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. 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. 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. 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 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. 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 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. 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.
12. 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 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. Public Participation Report	To be finalised after the completion of the required 30 days PPP.

iv) Proposed method of assessing the environmental aspects including the proposed method of assessing alternatives

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.

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

v) The proposed method of assessing duration significance

The same approach as described in section **vi)** will be used to assess the duration significance.

vi) The stages at which the competent authority will be consulted

A pre-consultation meeting were conducted before the submission of the application document.

The competent authority will be consulted throughout the EIR and EMPr process. All correspondence from and to the registered I&AP will be forwarded to the authority.

vii) Particulars of the public participation process with regard to the impact Assessment process that will be conducted

The process as outlined in section **h)ii)** will be conducted during the Impact Assessment process.

1. Steps to be taken to notify interested and affected parties

(These steps must include the steps that will be taken to ensure consultation with the affected parties identified in (h) (ii) herein).

As discussed in section **h)ii)**.

[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.*

2. Details of the engagement process to be followed

(Describe the process to be 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 and records of such consultation will be required in the EIA at a later stage)

As discussed in section **h)ii)**.

3. Description of the information to be provided to Interested and Affected Parties

(Information to be provided must include the initial site plan and sufficient detail of the intended operation and the typical impacts of each activity, to enable them to assess what impact the activities will have on them or on the use of their land)

As discussed in section **h)ii)**.

viii) Description of the tasks that will be undertaken during the environmental impact assessment process

As discussed in the previous sections in this report, all possible impacts and aspects will be assessed associated to the waste management activities.

Mitigation and management measures will be developed to reduce, avoid, and remedy all potential environmental impacts.

These findings will be discussed in the final EIR and EMPr that will be exposed to the required 30 days public comment period. Any comments received from the registered I&AP will be included in the final EIR and EMPr and be submitted to the competent authority for a decision to be made.

ix) Measures to avoid, reverse, mitigate, or manage identified impacts and to determine the extent of the residual risks that need to be managed and monitored

ACTIVITY	POTENTIAL IMPACT	MITIGATION TYPE (modify, remedy, control, or stop)	POTENTIAL FOR RESIDUAL RISK
Construction			
1. Access and hauling along roads i.e. during the construction of roads **2. Site clearing and topsoil stripping** **3. Transport of construction material, mobile plant and equipment to the site**	Dust generation	**Control**	**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.
	Hydrocarbon Contamination	**Control**	**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.
	Degradation of soil resources	**Remedy**	**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.
	Erosion	**Control**	**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 effect the micro-ecosystems of the surrounding environment.
	Vegetation and habitat	**Remedy**	

	loss		**Direct Impact:** Clearing the area to construct the access roads leads to the loss of vegetation and habitats of macro and micro organisms. The loss of vegetation also affects the surrounding Fauna and Flora.
	Sedimentation and siltation of watercourses	**Control**	**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.
	Noise generation	**Control**	**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.
	Alteration of drainage patterns	**Remedy**	**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.
	Destruction of upstream tributaries and reduction in water in the catchment	**Remedy**	**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.
	Water usage for dust suppression	**Modify**	**Direct Impact:** Improper management of the water used during dust suppression may lead to the wastage of the available water resource.
	Influx of alien invasive vegetation	**Control**	**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.
	CO_2 emissions	**Control**	**Direct Impact:** Contributing factor the BCR Minerals (Pty) Ltd carbon footprint.
	Alteration of the visual environment and topography	**Remedy**	**Direct Impact:** Vegetation stripping during site clearing and topsoil removal activities will alter the visual environment and topography.
	Destruction of Wetlands	**Avoid**	**Direct Impact:** Site clearing and topsoil stripping in Wetlands will cause the loss of micro and macro aquatic species.
	Water level reduction and contamination	**Control**	**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.
	Destruction of graves	**Avoid**	**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.
	Degradation of cultural significance heritage sites	**Avoid**	**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.
4. Storm water runoff management features **5. Pollution Control Dams (PCD's) i.e. Construction and operation** **6. River crossings**	Erosion	**Control**	**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.
	Vegetation and habitat loss	**Remedy**	**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. The loss of vegetation also affects the habitat of surrounding Fauna and Flora. **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.
	Sedimentation and siltation of watercourses	**Control**	**Direct Impact:** Improper or ineffective storm water runoff management features poses a risk of contributing to the sedimentation and siltation of watercourses.
	Hydrocarbon Contamination	**Control**	**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.
	Alteration of drainage patterns	**Remedy**	**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.
	Contamination of water	**Avoid**	**Direct Impact:** In the event that PCD's are not constructed in a way to avoid

	resources		seepage to the surrounding environment or if not maintained, it poses a risk of contaminating water resources within close proximity to the facility.
	Smell nuisance	**Avoid**	**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.
7. Fuel storage	Emission of noxious fumes	**Avoid**	**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 may lead to the development of respiratory problems and irritation to eyes.
8. Employment of workers and procurement of construction materials.	Loss of farm labour	**Control**	**Direct Impact:** Increased demand of labour force poses a risk of the local farmers losing farm labour due to competing financial income.
	Population Influx – Pressure on Resources	**Control**	**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.
	Population Influx – Social Pathologies	**Control**	**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.
	Population Influx – Community Conflict	**Control**	**Direct Impact:** Increased demand for labour force poses a risk of a population influx. The increased population influx may lead to community conflicts in the surrounding local community.
	Health and Safety of employees	**Control**	**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.
	Job Creation and Skills Training	**Control**	**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.
	Job Creation (Multiplier Effect) and Population Influx	**Control**	**Indirect Impact:** Social projects forming part of the proposed mining project will create additional job opportunities for the local communities.
Mining Operations			
9. Employment of workers	Loss of farm labour	**Control**	**Direct Impact:** Increased demand of labour force poses a risk of the local farmers losing farm labour due to competing financial income.
	Population Influx – Pressure on Resources	**Control**	**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.
	Population Influx – Social Pathologies	**Control**	**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.
	Population Influx – Community Conflict	**Control**	**Direct Impact:** Increased demand for labour force poses a risk of a population influx. The increased population influx may lead to community conflicts in the surrounding local community.
	Health and Safety of employees	**Control**	**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.
	Job Creation and Skills Training	**Control**	**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.
	Job Creation (Multiplier Effect) and Population Influx	**Control**	**Indirect Impact:** Social projects forming part of the proposed mining project will create additional job opportunities for the local communities.
10. RoM & product stockpiling **11. Residue stockpiles** **11. Screening Operations** **12. Discard disposal (backfilling of mining area)**	Sedimentation and siltation of watercourses	**Control**	**Direct Impact:** Stockpiling 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.
	Alteration of drainage patterns	**Remedy**	**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.
	Destruction of upstream tributaries and reduction in water in the catchment	**Remedy**	**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.
	Alteration of the visual environment and topography	**Remedy**	**Direct Impact:** Open cast mining will alter the topography and visual environment throughout the mining operation in a significant way.
	Influx of alien invasive vegetation	**Control**	**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.
	Dust generation	**Control**	**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.
	Degradation of soil resources	**Remedy**	**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.
	Contamination of water resources	**Avoid**	**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.
	Hydrocarbon Contamination	**Control**	**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.
	Noise generation	**Control**	**Direct Impact:** The use of drill Riggs and blasting activities itself will result in the generation of noise. If equipment are not maintained and serviced regularly high levels of noise may result throughout the operational phase.
	Damage to surrounding landowner properties	**Avoid**	**Direct Impact:** Blasting outside the safe zones or in areas within close proximity to properties of landowners poses a risk of damaging properties. Fly rock poses a human health and safety risk.
	Erosion	**Control**	**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.
	Vegetation and habitat loss	**Remedy**	**Direct Impact:** Clearing of site and stripping of topsoil leads to the loss of vegetation and habitats of macro and micro organisms. The loss of vegetation also affects the habitat of surrounding Fauna and Flora.
	CO_2 emissions	**Control**	**Direct Impact:** The use of diesel operated construction equipment will cause a contributing factor the BCR Minerals (Pty) Ltd carbon footprint.
	Hazardous Leachate	**Control**	**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.
13. Waste generation, storage and disposal **14. Chemical Toilets** **15. Storage of fuel and lubricants in temporary facilities**	Degradation of soil resources	**Remedy**	**Direct Impact:** Improper management of waste generated during the operational phase 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.
	Contamination of water resources	**Avoid**	**Direct Impact:** Water seeping from waste storage facilities 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.
	Illegal dumping	**Control**	**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.
	Hazardous Leachate	**Control**	**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.
	Degradation of soil resources	**Remedy**	**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.
	Smell nuisance	**Avoid**	**Direct Impact:** Lack of maintenance and treatment may result in a smelling environment.
	Hydrocarbon Contamination	**Control**	**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.
16.Rehabilitation of mining areas	Erosion	**Control**	**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 effect the micro-ecosystems of the surrounding environment.
	CO_2 emissions	**Control**	**Direct Impact:** Haul vehicles will cause a contributing factor the BCR Minerals (Pty) Ltd carbon footprint.
	Sedimentation and siltation of watercourses	**Control**	**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.
	Noise generation	**Control**	**Direct Impact:** If vehicles are not maintained and serviced regularly high levels of noise may result throughout the construction and operational phase.
	Dust generation	**Control**	**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.
	CO_2 emissions	**Control**	**Direct Impact:** Haul vehicles will cause a contributing factor the BCR Minerals (Pty) Ltd carbon footprint.
Decommissioning			
17. Demolition / removal of portable and related infrastructure **18. Demolition of PCD's** **19. Demolition of workshops, waste storage facilities, fuel storage facilities etc.**	Erosion	**Control**	**Direct 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 effect the micro-ecosystems of the surrounding environment.
	Improper water storage management	**Avoid**	**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.
	Contamination of water resources	**Avoid**	**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.
	Sedimentation and siltation of watercourses	**Control**	**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.
	Alteration of drainage patterns	**Remedy**	**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.
	Water level reduction and contamination	**Control**	**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.
	Noise generation	**Control**	**Direct Impact:** The use of unmaintained equipment and plant throughout the decommissioning phase poses a risk of generating noise.
	General waste generation & Littering	**Control**	**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.
	Hydrocarbon Contamination	**Control**	**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.
	Dust generation	**Control**	**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.
	Influx of alien invasive vegetation	**Control**	**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.
20. Vehicular activity: removal of mobile plant / equipment and vehicles	Destruction of upstream tributaries and reduction in water in the catchment	**Remedy**	**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.
	Erosion	**Control**	**Direct Impact:** Exposed un-vegetated rehabilitated areas poses a high risk of erosion. This may lead to the loss of fertile soil and in its turn effect the micro-ecosystems of the surrounding environment.
	Sedimentation and siltation of watercourses	**Control**	**Direct Impact:** Runoff from exposed un-vegetated areas poses a risk in contaminating nearby streams, rivers, and drainage lines.
	Noise generation	**Control**	**Direct Impact:** The use of unmaintained equipment and plant throughout the rehabilitation phase poses a risk of generating noise.
21. Rehabilitation of the lay down areas	Influx of alien invasive vegetation	**Control**	**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.
	Degradation of soil resources	**Remedy**	**Direct Impact:** Poor management of topsoil and subsoil poses a risk to degradation of soil resources.
	Vegetation and habitat loss	**Remedy**	**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.
	Hydrocarbon Contamination	**Control**	**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.
	Degradation of soil resources	**Remedy**	**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.
	Erosion	**Control**	**Direct Impact:** Exposed un-vegetated rehabilitated areas poses a high risk of erosion. This may lead to the loss of fertile soil and in its turn effect the micro-ecosystems of the surrounding environment.
	Degradation of soil resources	**Control**	**Direct Impact:** Exposed un-vegetated rehabilitated areas poses a high risk of erosion. This may lead to the loss of fertile soil and in its turn effect the micro-ecosystems of the surrounding environment.
	CO_2 emissions	**Control**	**Direct Impact:** The use of diesel operated construction equipment will cause a contributing factor the BCR Minerals (Pty) Ltd carbon footprint.
	Degradation of soil resources	**Remedy**	**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.
	Vegetation and habitat loss	**Remedy**	**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.
22. **Waste generation, storage and disposal**	General waste generation & Littering	**Control**	**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. Pressure on the local or national landfills poses the risk of land degradation and requires more space in terms of the IDP of the local municipality.

l) Other information required by the competent Authority

At the time of finalising this report for public comment, no specific information was requested by the competent authority.

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 EIR and EMPr that will follow this report will fulfil 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 G**) and the Human health impact assessment (**Appendix F**) 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 H** Section **1)(a)XII** summarises the findings and recommendations made by the specialist investigation.

m) 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 Right area can only be located within the Prospecting Right area.

j) UNDERTAKING REGARDING CORRECTNESS OF INFORMATION

I, **Anandi Alers**, herewith undertake that the information provided in the foregoing report is correct, and that the comments and inputs from stakeholders and Interested and Affected parties have been correctly recorded in the report.

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Signature of the EAP

DATE:

k) UNDERTAKING REGARDING LEVEL OF AGREEMENT

I, **Anandi Alers**, herewith undertake that the information provided in the foregoing report is correct, and that the level of agreement with interested and Affected Parties and stakeholders has been correctly recorded and reported herein.

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Signature of the EAP

DATE:

-END-