Assmang (Pty) Ltd:
Khumani Iron Ore Mine

Basic Assessment Report and Management Plan

LOW GRADE ROM SORTER PLANT & SILO RELOCATION

Report Purpose

FINAL for DMR Consideration

Report Status

FINAL

Report Reference

EnviroGistics Ref.: 21707

Departmental Ref.: Awaiting (application submitted on 3 May 2017 on 22 May 2017, the DMR confirmed that the application was with Registry)

Mining Right Ref: NC30/5/1/2/3/2/1/070

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19 July 2017

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Author

Tanja Bekker is registered as a Professional Natural Scientist with the South African Council of Natural Science Professional Board and is also a Certified Environmental Assessment Practitioner (EAP) with the Interim Certification Body of Environmental Practitioner Association of South Africa (EPASA), a legal requirement stipulated by the National Environmental Management Act, 1998. She is further certified as an ISO 14001 Lead Auditor. Her qualifications include a BSc. Earth Sciences (Geology and Geography), BSc. Hons. Geography, and a MSc. Environmental Management. In addition to her tertiary qualifications, she obtained a Certificate in Project Management, and completed the Management Advance Programme at Wits Business School.

With more than 14 years' experience in environmental management and the consulting industry she follows a methodical and practical approach in approaching environmental problems and a holistic approach towards approaching environmental solutions throughout the project planning, initiation, operation and decommissioning or closure of projects.

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Quality Control

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Report Ref. No.	21707F
Report Status	FINAL
Report Purpose	Submission to DMR

	Signature	Date
Report Co-Author	Estie Retief	30 May 2017
Report Review and Second Author	Tanja Bekker	4 July 2017
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Amendments

Report Ref:	Nature of Amendment	Date	Report Output Ref:
21707D	Clarification on project description. Minor amendments. Inclusion of Portion 9 of the farm Parson.	8 June 2017	21707D1
21707D1	Inclusion of the final Paleontological Study	4 July 2017	21707F

Distribution

Distributed To:	Purpose:	Date	Format/Amount
Dirk Coetzee	Client Review	3 June 2017	Electronic
Philip de Weerdt & Quentin Hall	Client Sign off	3 June 2017	Electronic
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Tanja Bekker (Dirk Coetzee)	Incorporation of Client Comments	8 June 2017	Electronic
Philip de Weerdt & Quentin Hall & Dirk Coetzee	Client Sign off	8 June 2017	Electronic
DMR, DWS, NCDENC	Stakeholder Review	9 June 2017	Hard Copy
Registered Stakeholders	Stakeholder Review	12 June 2017	Electronic Copy
Philip de Weerdt & Quentin Hall & Dirk Coetzee	Finalisation of Report	19 July 2017	Electronic

Executive Summary

Introduction

Assmang (Pty) Ltd.'s Khumani Iron Ore Mine (Khumani) is situated 15km south of Kathu, adjacent to the Kumba Iron Ore Mine. Khumani compromises of four (4) farms, namely Parson 564 (including Police Camp 692) (Portions 0, 2, 8 and 9), King (Portions 0), Bruce 544 (Portion RE) and Mokaning 560 (Portions 0, 1, 2, 3, and 4). Khumani falls within two Local and District Municipalities. The farm Mokaning is situated within the Tsantsabane Local Municipality (NC085), which forms part of the ZF Mgcawu District Municipality (formally known as the Siyanda District Municipality). The farms Parson, Bruce and King are situated within the Gamagara Local Municipality (NC01B1), which forms part of the John Taolo Gaetsewe Districts Municipality (formally known as the Kgalagadi District Municipality). Neighbouring towns and villages include Olifantshoek, Beeshoek, Postmasburg, and Dingleton. The main industries in the area include mining (mainly for manganese ore, iron ore and tiger's eye), agriculture (mainly for cattle, sheep, goat and game farming) and tourism.

The right to mine was granted to Assmang Proprietary Limited (Assmang) in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA) in January 2007. Construction of the mine was initiated after approval was received from the Northern Cape Department of Environment and Nature Conservation (NCDENC) in June 2006 and the first train was loaded with iron ore at Khumani in May 2008. The overall mining area over which Khumani operates is approximately 9000ha. Today, the mine is a fully operational opencast mining operation, with an approved production capacity of 16 million tons of iron ore per annum.

The iron ore is mined from a series of open pits on the farms Bruce and King by conventional drill and blasting methods. Haul trucks transport the Run of Mine (ROM) ore to the primary crushers, from where the material is transferred by conveyor to the ROM stockpiles, ahead of the Beneficiation Plant (Parsons Plant), located on the farm Parson. Thereafter, the product is transported via conveyor to the rapid load out and railway siding for transport to either Saldanha for export or to Port Elizabeth for the local market.

Project Description

It is Khumani's intention to initiate certain additional activities on site. These will include the establishment of a Low Grade Run of Mine (ROM) Sorter Plant, south-west of the existing King Plant, the decommissioning of the existing Magazines and Silos on site, and the establishment of two new Silos/Magazines areas on site to replace the decommissioned sites.

<u>The first project:</u>

The mine intends to establish a new Low Grade ROM Sorter Plant to beneficiate the low grade ROM from the Khumani Opencast Pit operations at the King Mine. The project will be developed in a time phased approach. Phase 1 will involve the processing of 700tph ROM through a sorter plant. Phase 2 will be a second plant similar to Phase 1 allowing an additional 700tph to be processed. The -32mm size fraction stockpile emanating from Phase 1 and Phase 2 will be located on the already approved Low Grade ROM Stockpile (Named Stockpile J in the approved EMP), as well as the low-low grade sorter discharge ROM stockpile. For the Phase 3 portion of the plant, the -32mm stockpile will be re-located to a position east of the Low Grade ROM Sorter plant to be reprocessed. Sorter plant material, which can be processed during later phases of the plant will also be stockpiled on the existing Low Grade ROM Stockpile, located to the west of the proposed plant.

The low-grade material (grade not further processed as part of this plant output) emanating from the Phase1, Phase 2 and Phase 3 sorter plants will be stockpiled on the already approved Low Grade ROM Stockpile. The intention is to beneficiate a product, which is currently not being processed by the current plant at Khumani, thus re-enforcing one of the aims at Khumani, which is to ensure optimal beneficiation of ROM.

In terms of the National Environmental Management Waste Act, 2008 (Act No. 59 of 2008) (NEMWA), and associated regulations, which came into effect on 24 July 2015, which included Mine Residue Stockpiles as listed Waste Management Activities, all such activities that commenced prior to 24 July 2015, may be regarded as lawful and need not be authorised (regulation 7(1) of GN 921 contains the relevant transitional requirements). Prior to the NEMWA Regulations of 2015, the reclamation of residue for re-use did not require EMP amendments, as it fell within the definition of mining (as defined in the MPRDA), especially in this instance where no separate infrastructure (e.g. crushing plants) were constructed that had to be reflected in the EMPs. However, Khumani has approval in terms of

the NEMA and the MPRDA to rework its Low Grade ROM Stockpiles on site through the approved EMPs and as a result a Waste Management License will not be required. Activities associated with the Low Grade Sorter Plant, such as the thickener process (Phase 3), will not result in storage or disposal of dirty water, but is considered an integral part of the beneficiation process for optimal water reuse. Waste from the Low Grade Sorter Plant will be deposited on the approved Low Grade Stockpile [Permit 21/2016 issued by the Northern Cape Department of Environment and Nature Conservation (NCDENC)], which is located to the south-west of the proposed plant. Low grade fines (-10mm) emanating from the wet Phase 3 beneficiation processes will be deposited on the approved Paste Disposal Facility [approved in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA) Ref: NC30/5/1/2/3//1/070EM, dated 25 January 2007; the Environmental Impact Assessment Regulations under the Environmental Conservation Act, 1989 (Act No. 73 of 1989) (ECA) Ref 43/2006, dated 13 June 2006, and the National Water Act, 1998 (Act No 36 of 1998) (NWA) Ref 10/D41J/BC1J/2122, dated 16 March 2013.

The second project:

Khumani will decommission the existing emulsion silos located on farm King and farm Parsons.

At King Mine, the silos will be relocated due to encroaching mining activities. The new silos will be established on farm Mokaning, which forms part of the approved mining area. This area will comprise of an Emulsion Silo [capacity of approximately 67 cubic meters (89 tons)] and a second Silo, which will house ammonium nitrate [approximately 65 cubic meters (52 tons)]. Two magazines will also be established at this area and will house electric detonators (all types), boosters, blasting cartridges and detonating cord (cortex).

The magazines and silos currently located on farm Parsons will be moved to Bruce Mine to reduce the travelling distance between the storage area and where mining is undertaken. The area will comprise of an emulsion silo (capacity of approximately 33 cubic meters) and a second silo, which will house ammonium nitrate (approximately 32 cubic meters). Two magazines will also be relocated to this area and will house electric detonators (all types), boosters, blasting cartridges and detonating cord (cortex).

Both sites will comprise of a fenced area of about 2.5ha

Additional Project – not triggering a listed activity:

Khumani is in the process of optimising and improving its internal water reticulation system on site. For this purpose, a pipeline is required between the King and Bruce Mining area. This pipeline will be of suitable dimensions to transfer water between key water storage areas in the event that this is required. The proposed pipeline will consist of approximately 8km of pipeline. The pipeline will as far as practically possible follow existing conveyor routes to allow for easy access when maintenance is required and will follow the existing crossings of the Vaal Gamagara (approved under the NWA, Ref 10/D41J/BC1J/2122, dated 16 March 2013.

Note that the pipeline as proposed is below the threshold as identified in the NEMA regulations [internal diameter of the pipe is less than 0.36m and throughput less than the 120l/s), and as such does not trigger a listed activity].

Listed Activities

The proposed activities are listed under Regulations Listing Notice 1 Government Notice Regulation 326 and Regulation 327 (dated April 2017) of NEMA:

- NEMA Government Notice 327, Listing Notice 1:
  - Activity 34: "The expansion or changes to existing facilities for any process or activity where such expansion or changes will result in the need for a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the release of emissions or pollution" (not considered at this time, but may be required depending on Department of Water and Sanitation Consultation);
  - Activity 24: "The development of a road— with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres;
  - Activity 56: "The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre— (ii) where no reserve exists, where the existing road is wider than 8 metres; excluding where widening or lengthening occur inside urban areas.
  - Activity 27: "The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation……"

- Activity 14: "The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres"
- Activity 13: The decommissioning of existing facilities, structures or infrastructure for—(v) any activity regardless the time the activity was commenced with, where such activity: a) is similarly listed to an activity in (i)[,] or (ii)[, or (iii)] above; and b) is still in operation or development is still in progress
- Listing 1, Activity 56 – The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre—(ii) where no reserve exists, where the existing road is wider than 8 metres.

Application and Consultation Process

Introductory Meeting

An introductory meeting has not been scheduled with the Department of Mineral Resources (DMR) to date as the application form has not been allocated to an official. Once an official has been allocated to the project, a site visit will be scheduled.

Application Form

It should be noted that the application from was delivered to the DMR, Kimberley on 3 May 2017 at 11h00. During a follow up telephonic discussion with the DMR on 22 May 2017, the Registry informed EnviroGistics that the application form is still with Registry (22 May 2017) and that it will be allocated as soon as possible. A second round of follow up was undertaken on 1 June 2017 after which, Ms. Raisibe Sekepane, informed the Environmental Assessment Practitioner (EAP) on 6 June 2017 that the relevant official is Mr Livhuwani Malatjie.

The application was acknowledged by the DMR on 19 June 2017. The responsible official is Mr. Mashau Humbulani. The draft Basic Assessment Report was submitted to stakeholders between 14-17 June 2017. The final Basic Assessment Report will be submitted to the DMR on 21 July 2017.

Notification

In order to inform surrounding communities and adjacent landowners of the proposed project, five (5) notices were erected on site (on Monday, 8 May 2017) and at visible locations close to the site. The notices were displayed in both Afrikaans and English.

Background Information Documents were distributed via email to all parties on the Interested and Affected Parties (I&APs) Database on 12 May 2017.

The formal announcement of the proposed project was undertaken by placing an advertisement in the Kathu Gazette on 13 May 2017 to invite all Interested and Affected (I&APs) to register. The advertisements were published in both Afrikaans and English.

All registered stakeholders will be informed of the availability of the draft BAR to allow them the opportunity to review this document.

Impact Statement

Direct Impacts during Construction

It should be noted that impacts associated with the proposed Low Grade ROM Sorter Plant & Silo Relocation project will be significantly lower than a greenfields project, as activities are located within Khumani's mining right area and mostly within already disturbed environments.

Geology (Mineral Resources)

- The planned area for the Low Grade ROM Plant, is indicating the presence of a possible minable iron ore reserve. This is still being assessed for its economic viability by Khumani as part of Khumani's ongoing exploration activities. Should minable reserves present in this area be deemed feasible to mine, it will have far reaching implications not only on the Low Grade ROM Stockpile, but also on the current approved mining infrastructure, with particular reference to the existing King Mine Plant and associated infrastructure. For this reason, the project (the 'project' is low grade sorter, pipeline, silos and magazine. Should the ore reserve

be deemed minable, only the low grade sorter plant and king plant infrastructure will be affected. The pipeline, silos and magazines will happen irrespective of the ore reserve outcome) has been proceeding pending further exploration details.

Topography

- Direct impact: topographical changes as a result of land and footprint clearance, topsoil stripping, stockpiling, and infrastructure establishment.

Soils, Land Use and Land Capability

- Direct impact: loss of topsoil (soil stripping) in preparation for the construction phase;
- Direct impact: stripping of topsoil and sub-surface layers will alter the soil landscape during the construction phase;
- Direct impact: soil compaction due to construction activities and vehicular movement on site;
- Direct impact: soil erosion due to exposed surfaces; and
- Direct impact: soil contamination due to construction vehicles and potential hydrocarbon spillages and/or leaks.

Hydrology

- Direct impact: hydrocarbon spillages from equipment utilised in construction activities.

Geohydrology

- Due to the nature of the activities, no additional impact on groundwater environment is expected. Regarding the Low Grade Sorter Plant, westerly run-off will be collected in the existing dams west of the facility by expanding the dam catchment area. Water run-off in an easterly direction will more than likely flow where the already approved Low Grade Stockpile is located. Due to the limited volumes, runoff from the existing Low Grade ROM Stockpiles are generally contained by berms, or paddock systems from where evaporation takes place. No additional water containment will be required for the purposes of this project.

Biodiversity

- Direct impact: loss of floral and faunal species of conservation importance due to topsoil removal and vegetation disturbance;
- Direct impact: displacement of faunal species and human/animal conflict during site preparation activities.

Air Quality

Direct impact: increase in dust fallout from topsoil removal and vegetation removal.

Visual

- Direct impact: stripping and footprint clearance will impact the perceptions of people travelling past site and staying/working near site.

Noise

- Direct impact: increased noise due to increased vehicular movement on site.

Wetlands

- The infrastructures have been placed in such a manner to not disturb or impact on any National Ecosystem & Freshwater Protected Areas (NEFPA).

<u>Direct Impacts during the Operational Phase</u>

Topography

- No additional impacts are foreseen as part of the operational phase.

Soils, Land Use and Land Capability

- Direct impact: soil erosion due to exposed surfaces; and.
- Direct impact: soil contamination due to operations vehicles and equipment possibly spilling hydrocarbons.
- Direct impact: soil contamination due to the filling and handling of emulsion on site.
- Direct impact: soil contamination due to the spill of ROM during the conveying of such material.

Geohydrology

- Due to the nature of the activities, no additional impact resulting from this project on groundwater environment is expected.

Biodiversity

- No further impacts foreseen.

Air Quality

- Direct impact: increase in dust fallout from the stockpiles due to the disposal of material onto the ROM stockpile areas.
- Direct impact: Increase of dust in the conveying of ROM between the transfer stations.

Visual

- The area is characterised by mining related activities. The proposed plant area will be located behind the approved Low Grade ROM Stockpile and alongside the current plant operations. The silos and magazines will be placed within the approved mining area, and in the vicinity of mining related infrastructure. No impact is foreseen as part of the operational phase.

Noise

- The proposed plant area will be located behind the approved Low Grade ROM Stockpile and alongside the current plant operations. No impact is foreseen as part of the operational phase.

Wetlands

- The infrastructure have been placed in such a manner to not disturb or impact on any NEFPA.

Direct Impacts during Decommissioning and Closure

The nature of the listed activities applied for is that these are required as part of the long term mining strategy. Therefore the decommissioning and rehabilitation of this infrastructure will only be required at the end of the Life of Mine (LOM).

Topography

- Direct positive impact: reshaping of the area following mining activities in order to achieve the proposed end of mine land use.

Soils, Land Use and Land Capability

- Direct impact: soil erosion due to exposed surfaces and rehabilitation;
- Direct impact: soil contamination due to operations vehicles and equipment possibly spilling hydrocarbons.
- Direct positive impact: Re-establishment of end land use objectives.

Hydrology

- Direct impact: surface water contamination as a result of hydrocarbon spills from vehicles used during decommissioning;
- Direct impact: surface water contamination as a result of emulsion spills from decommissioning of silos; and
- Direct impact: Siltation due to site water run-off once the berms and storm water infrastructure are decommissioned in the event that free drainage is not implemented or achieved.

Geohydrology

- Due to the nature of the activities, no additional impact on groundwater environment is expected.

Biodiversity

- Direct impact: disruption to faunal and floral communities that have established on site during the operational phase; and.
- Direct positive impact: re-establishment of faunal and floral communities during the rehabilitation process.

Air Quality

- Direct impact: fugitive dust emissions; and
- Direct impact: dust entrainment from vehicles on site as a result of driving on exposed surfaces.

Visual

- Direct positive impact: landscaping of the entire site; and
- Direct positive impact: removal of infrastructure from site and re-establishment of vegetated areas.

Noise

- Direct impact: increased noise due to rehabilitation activities; and
- Direct positive impact: reduction in noise levels due to mining cessation.

Social

- Direct impact: out-migration of job seekers as the mining operations cease;
- Direct impact: job losses;
- Direct impact: loss of the social and economic investment by Khumani as part of the Khumani's Social and Labour Plan into the municipal Integrated Development Plan (IDP); and
- Direct impact: a reduction in economic activities due to job losses and mine closure.

Direct Cumulative Impacts

Biodiversity

- Loss of ecological connectivity and ecosystem functioning, resulting in the overall movement of animals within this region, which could impact surrounding game reserves and tourism activities.
- Impact on the presence of vegetation of conservation importance.

Air Quality

- Increase in dust fallout throughout the life of mine and impact on surrounding residence, especially considering the combined impact with including surrounding mining activities in the area.

Social and Economic Character

- Increased sustainability of mining operations in this area will have a multiplier effect in terms of employment and economic activities in the region.

Concluding Statement

It is the opinion of the EAP that the activity should be authorized.

Aim of the Project

The aim of the project is to firstly optimise the beneficiation of the available ROM on site, and secondly to place essential infrastructure (silos, magazines and water reticulation) in locations which will benefit the internal logistics of Khumani.

Alternatives Considered:

- Low Grade ROM Sorter Plant:

Phase 3 will require an additional stockpile (indicated to the east of the plant), from where the -32mm size fraction will be beneficiated. As an alternative, Khumani may consider a truck tip instead of the additional stockpile to beneficiate the -32mm size fraction, resulting in less clearance. This will however be determined and finalised as part of the project design, and will not have a further impact on the environmental considerations as presented in this report.

Another alternative would be the no-go option. With the no-go option, Khumani will continue utilising the existing approved facility as is, without the opportunity to optimise the beneficiation of ROM from the mining operations.

- Silos:

The explosive magazines and silos located on farm Parsons are located a distance away from the existing mining operations at Bruce Mine. The alterative to moving the silos will be to retain the site where it currently is. The relocation of the silos at this site is an economic decision which involves the relocation of the silos and magazine will reduce transportation costs once situated closer to the Bruce Mine.

The silos at King Mine are located within the plant and workshops areas. To improve efficiency, the mine intends constructing a magazine on King Mine. In order to ensure a sufficient buffer distance, an area to the south of the King Mine has been earmarked for the re-location of the silos and installation of a magazine.

Impacts:

As part of the impact assessment no impacts where identified which cannot be mitigated or addressed through the stated management measures.

Recommended Conditions:

The following conditions should be included in the authorisation in addition to the general conditions included in the Environmental Authorisations:

- An independent Environmental Control Officer must be appointed to assess the construction activities, at least once a month to ensure that all components of the EMP are addressed.
- Tree removal permits to be applied for where required.
- The pan to the south-west of the proposed King Silo should retain a 500m buffer.
- The pipeline route, as it is presently proposed, runs through a *Vachellia erioloba* forest on the floodplains of the Gamagara River. Due to the protected status of this species, as well as the inherent conservation importance of floodplains according to the NWA, the rerouting of the pipeline is recommended, through the *Vachellia mellifera* thicket to the south of the current route. However where this is technically not possible, the required tree removal permits to be obtained.
- Khumani must fast tract the establishment of the Environmental Protected Area (Offset Area) project.
- Due to the lack of significant heritage resources in the study area the impact of the proposed project on heritage resources is considered low and it is recommended that the proposed project can commence on the condition that the following recommendations are implemented as part of the EMPr and based on approval from SAHRA: Implementation of a chance find procedure.

Contents Page

List of Figures

List of Tables

List of Annexures

mineral resources
Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

BASIC ASSESSMENT REPORT

And

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

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

NAME OF APPLICANT:	Assmang (Pty) Ltd: Khumani Iron Ore Mine
TEL NO:	+27(0) 53 372 8000
FAX NO:	+27(0) 53 723 8599
POSTAL ADDRESS:	Private Bag X 503, Kathu, Northern Cape
PHYSICAL ADDRESS:	Khumani Iron Ore Mine, 15km south of Kathu along the N14
FILE REFERENCE NUMBER SAMRAD:	Mining Right Reference Number: NC30/5/1/2/3/2/1/070

1 IMPORTANT NOTICE

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

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

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

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

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

Please refer to Annexure 1 for the proof of submission of the Application Form and Acknowledgment of Receipt by the DMR.

2 OBJECTIVE OF THE BASIC ASSESSMENT

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

- *a) determine the policy and legislative context within which the proposed activity is located and how the activity complies with and responds to the policy and legislative context;*
- *b) identify the alternatives considered, including the activity, location, and technology alternatives;*
- *c) describe the need and desirability of the proposed alternatives,*
- *d) through the undertaking of an impact and risk assessment process inclusive of cumulative impacts which focused on determining the geographical, physical, biological, social, economic, heritage , and cultural sensitivity of the sites and locations within sites and the risk of impact of the proposed activity and technology alternatives on the these aspects to determine:*
  - *a. the nature, significance, consequence, extent, duration, and probability of the impacts occurring to; and*
  - *b. the degree to which these impacts—*
    - *i. can be reversed;*
    - *ii. may cause irreplaceable loss of resources; and*
    - *iii. can be managed, avoided or mitigated;*
  - *c. through a ranking of the site sensitivities and possible impacts the activity and technology alternatives will impose on the sites and location identified through the life of the activity to—*
    - *i. identify and motivate a preferred site, activity and technology alternative;*
    - *ii. identify suitable measures to manage, avoid or mitigate identified impacts; and*
    - iii. *identify residual risks that need to be managed and monitored.*

PART A

SCOPE OF ASSESSMENT AND BASIC ASSESSMENT REPORT

The application for the Basic Assessment Project was submitted to the Department of Mineral Resources (DMR) on 3 May 2017 (delivered at 11h00). It should be noted that the application from was delivered to the DMR, Kimberley on 3 May 2017 at 11h00. During a follow up telephonic discussion with the DMR on 22 May 2017, the Registry informed EnviroGistics that the application form is still with Registry (22 May 2017) and that it will be allocated as soon as possible. A second round of follow up was undertaken on 1 June 2017 after which, Ms. Raisibe Sekepane, informed the Environmental Assessment Practitioner (EAP) on 6 June 2017 that the relevant official is Mr Livhuwani Malatjie.

The application was acknowledged by the DMR on 19 June 2017. The responsible official is Mr. Mashau Humbulani. The draft Basic Assessment Report was submitted to stakeholders between 14-17 June 2017. The final Basic Assessment Report will be submitted to the DMR on 20 July 2017.

The project has continued based on the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA), Environmental Impact Assessment Regulations, 2017 (EIA Regulations) to ensure that the regulatory timeframes stipulated in the EIA Regulations are complied with.

Please refer to Annexure 1 for the submitted application form and proof of submission.

3 CONTACT PERSON AND CORRESPONDENCE ADDRESS

3.a Details

3.a.i Details of the EAP

Table 1: Details of EAP

Name	Tanja Bekker
Designation	Environmental Assessment Practitioner
Postal Address	PO Box 22014, Helderkruin, 1733
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Email Address	tanja@envirogistics.co.za

3.a.ii Expertise of the EAP

The following table presents a summary of the EAPs experience:

Table 2: Experience of EAP

Name	Position	Qualification	Professional Registrations	Experience
Tanja Bekker	Principal Practitioner	M.Sc. Environmental Management (RAU), now Johannesburg University)	Certified member of the Environmental Assessment Practitioners Association of South Africa (October 2013) Registered with the South African Council of National Scientific Professions (SACNASP: Pr.Sci.Nat. Reg No. 400198/09) Member of International Association of Impact Assessors Member of the Environmental Law Association of South Africa	14 Years

Please refer to Annexure 2 for the EAPs Curriculum Vitae.

Education

B.Sc. Earth Sciences (Geography & Geology) – RAU (University of Johannesburg)
B.Sc. Geography Honours - RAU (University of Johannesburg)
M.Sc. Environmental Management - RAU (University of Johannesburg)

Career Enhancing Courses

ISO 14000 Lead Auditors Course (WTH Management)
Certificate in Project Management (Pretoria University)
Management Advance Programme (MAP 81) (Wits Business School)

Professional Affiliations

Certified member of Environmental Assessment Practitioners Association of South Africa
Certified ISO 14001 Environmental Management System Auditor
Registered as a Professional Natural Scientist,
Member of the South African affiliate of the International Association for Impact Assessment
Member of the Environmental Law Association of South Africa (ELA).

Summary of the EAP's past experience

Ms. Bekker is registered as a Professional Natural Scientist with the South African Council of Natural Science Professional Board and is also a Certified Environmental Assessment Practitioner (EAP) with the Interim Certification Body of Environmental Practitioner Association of South Africa (EPASA), a legal requirement stipulated by the National Environmental Management Act, 1998. She is further certified as an ISO 14001 Lead Auditor. Her qualifications include a BSc. Earth Sciences (Geology and Geography), BSc. Hons. Geography, and a MSc. Environmental Management. In addition to the tertiary qualifications, she obtained a Certificate in Project Management, and completed the Management Advance Programme at Wits Business School.

With more than 13 years' working experience in environmental management and the consulting industry and managing various Large Account Clients, she understands the South African Regulatory System, and can advise client with due diligence on their environmental regulatory requirements and offer a solution driven service to their project life cycle. She is equipped with exceptional project management and coordination skills, which especially enhances the service she offers clients within the environmental permitting system.

Her key focus is environmental management and compliance with extensive experience in the mining industry. Project Management and Coordination of projects form a critical component of her duties, which include project planning, initiation of projects, client, authority and stakeholder consultation, specialist coordination, budget control, process control, quality control and timeframe management. Her interest lies in a client advisory capacity, being involved during due diligence investigations, pre-project development and assist the client and engineering team in adding value to develop the project in and environmental sustainable manner, considering client costs and liabilities, as well as consider the implication of environmental authorisation conditions and requirements on project deliverables. Her involvement in projects has spanned over the project life cycle from Due Diligence Investigations, Pre-Feasibility Investigation's, Prospecting Right Applications, Mining Right Applications, Environmental Reporting and implementation and auditing of Environmental Management Plans and Authorisations.

3.a.iii Details of the Applicant

The right to mine was granted to Assmang Proprietary Limited (Assmang) in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA) in January 2007. Construction of the mine was initiated after approval was received from the Northern Cape Department of Environment and Nature Conservation (NCDENC) in June 2006 on the farm Parson and the first train was loaded with iron ore at Khumani in May 2008. The overall mining area over which Khumani operates is approximately 9000ha. Today, the mine is a fully operational opencast mining operation, with an approved capacity of producing 16 million tons of iron ore per annum.

The iron ore is mined from a series of open pits on the farms Bruce and King by conventional drill and blasting methods. Haul trucks transport the ROM to the primary crushers, from where the material is transferred by conveyor to the ROM stockpiles, ahead of the Beneficiation Plant (Parsons Plant), located on the farm Parson. Thereafter, the product is transported via conveyor to the rapid load out and local railway siding for transport to either Saldanha for export and to Port Elizabeth for the local market.

The mine is operating with all required environmental authorisations in terms of the:

The mine is operating with all required environmental authorisations in terms of the:

- National Environmental Management Act, 1998 (Act No. 107 of 1998) (hereafter referred to as the "NEMA") (also the original approval in terms of the Environmental Conservation Act, 1989);
- National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) (hereafter referred to as the "NEMWA);
- Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (hereafter referred to as the "MPRDA"); and
- National Water Act, 1998 (Act No. 36 of 1998) (hereafter referred to as the "NWA").
    - The last mentioned Act makes provision for a Water Use License (hereafter referred to as a {"WUL"), which was obtained during 2013. This License is currently being amended by the Department of Water and Sanitation (hereafter referred to as the "DWS") due to inconsistencies found in the License.

These include the following:

- Permits:
    - NEMWA:
        - Permit 12/9/11/L812/8 for the Landfill Site and Hazardous Storage Facility
    - NWA:
        - WUL License: 10/D41J/BC1J/2122 for the 2013 Water Use License
    - NEMA (and ECA):
        - Permit 43/2006 for the development of an iron ore opencast mine with all associated infrastructure
        - Permit 47/2009 for the Railway Line Diversion and Local Siding Establishment
        - Permit 37/2012 for the expansion of diesel storage and a silo for explosives, construction of a tar road and additional refuelling station, storm water dams and storage tanks.
        - Permit 56/2013 for the Off-grade 2 Plant
        - Permit 21/2016 for the construction of the WHIMS Plant at Parson, the Expansion of the Parson Discard Dump, Bruce Low Grade ROM Stockpile and King/Mokaning Low Grade ROM Stockpile, and the establishment of additional Low Grade Stockpiles at King.
    - MPRDA
        - MPRDA ROD 2007 for the new Mining Operation and associated EMP dated February 2006
        - MPRDA RoDs – undated 2007 (document date of modification states August 2007) for the Barrier Pillar and associated EMP dated April 2007 (EMP resulted in a change to certain commitments by the mine since the original EMP)
        - MPRDA ROD 2011 – for the additional infrastructure such the local siding in line with Permit 47/2009
        - MPRDA ROD 2012 for the additional infrastructure such as the diesel storage in line with Permit 37/2012

Refer to Annexure 3 for the list of Authorisations.

Table 3: Details of Applicant

Project applicant:	Assmang (Pty) Ltd: Khumani Iron Ore Mine
Registration no (if any):	1935/007343/06
Trading name (if any):	Assmang (Pty) Limited - Khumani Iron Ore Mine

Responsible Person, (e.g. Director, CEO, etc.):	Mr Dirk Coetzee
Contact person:	Mr Dirk Coetzee
Physical address:	Khumani Iron Ore Mine, Kathu, Northern Cape Province, 15km south of Kathu, along the N14
Postal address:	Private Bag X503,Kathu, Northern Cape Province, 8446
Postal code:	8446
Telephone:	+27 (0) 53 723 8090
E-mail:	Dirk.Coetzee@assmang.co.za
Cell Phone Number	+27 83 459 7580
Fax:	+27 (0) 53 723 8599

3.b Location of the Activity

The area in question is presented in the following table:

Table 4: Property Location

Farm Name:	King 561, Portion RE Mokaning 260, Portion 1 Parson 564, Portion RE Bruce 544. Portion RE
Portion	As Above
Application area (ha)	**The area to be decommissioned is approximately:** Bruce: approximately 3.7ha King: approximately 1.4ha Parson: approximately 4.5ha Area of disturbance of indigenous Vegetation: 0ha **The area on which the new Silos and magazines will be developed**: King: approximately 2.5ha Bruce: approximately 2.5ha Area of disturbance of indigenous Vegetation: 5ha **The area on which the King Low Grade ROM Sorter Plant will be developed:** Overall area of approximately 23ha Area of disturbance of indigenous Vegetation: approximately 1.7ha **Overall Project Area (all listed activities):** Approximately 38ha, of which 9.6ha forms part of existing activities to be demolished. **Overall area of new activities:** Approximately 28ha **Overall area of clearance of indigenous vegetation:** Approximately 6.7ha
Magisterial district:	Kuruman
Distance and direction from nearest town	The entrance Bruce Mine and Parson Silo Access is respectively 16km and 23km south of Kathu, with the entrance to King Mine approximately 13km to the south of Kathu.
Title Deed	T572/1968 T193/2006 T349/1954 SG474/2015
21 digit Surveyor General Code for each farm portion	King 561, Portion RE: C04100000000056100000 Mokaning 260, Portion 1: C04100000000056000001 Parson 564, Portion RE: C04100000000056400000 Parson 564, Portion 9: C04100000000056400009 Bruce 544. Portion RE: C04100000000054400000
Ownership	Assmang (Pty) Ltd

Refer to Annexure 4 for the title deeds.

3.c Locality Map

Please refer to the following figures providing the local setting of Khumani and the location of the proposed infrastructure upgrades within Khumani's boundary.

Khumani is situated 15km south of Kathu, adjacent to the Kumba Iron Ore Mine. Assmang (Pty) Ltd.'s Khumani Iron Ore Mine (Khumani) is situated 15km south of Kathu, adjacent to the Kumba Iron Ore Mine. Khumani compromises of four (4) farms, namely Parson 564 (including Police Camp 692) (Portions 0, 2, 8 and 9), King (Portions 0), Bruce 544 (Portion RE) and Mokaning 560 (Portions 0, 1, 2, 3, and 4).

The mine falls within two Local and District Municipalities. The farm Mokaning is situated within the Tsantsabane Local Municipality (NC085), which forms part of the ZF Mgcawu District Municipality. The farms Parson, Bruce and King are situated within the Gamagara Local Municipality (NC01B1), which forms part of the John Taolo Gaetsewe Districts Municipality (formally known as the Kgalagadi District Municipality). Neighbouring towns and villages include, Olifantshoek, Beeshoek, Postmasburg, and Dingleton. The main industries in the area include mining (mainly for manganese ore, iron ore and tiger's eye), agriculture (mainly for cattle, sheep, goat and game farming) and tourism.

The mine has been operational since 2006.

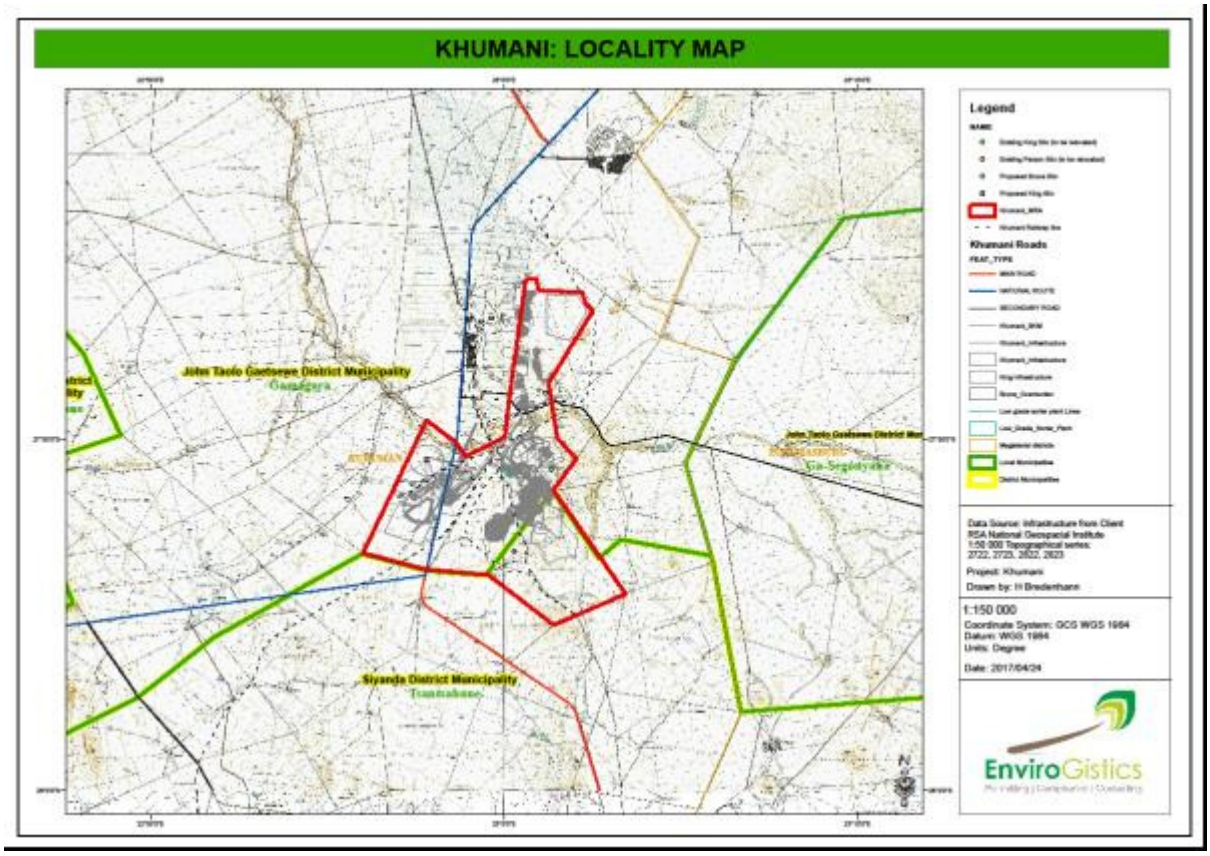


Figure 1: Local Setting of Khumani Iron Ore Mine

Please refer to the enlarge map overleaf.

3.d Description of the Scope of the Proposed Activity

The following table presents the coordinates of the listed activities being applied for:

Activity	Farm Portion	Coordinate	Size (ha approx.)
Low Grade ROM Sorter plant and Stockpile	King 561, Portion RE	27°50'55.28"S; 23° 0'9.66"E	23ha (1.7ha of vegetation clearance)
Proposed King Silo and Magazine	King 561, Portion RE	27°53'12.09"S; 23° 0'18.69"E	2.5ha
Proposed Bruce Silo and Magazine	Bruce 544, Portion RE	27°48'41.29"S; 23° 1'10.50"E	2.5ha
Parson Silo for demolition	Parson 564, Portion 9	27°50'35.79"S; 22°57'48.75"E	4.5ha
King Silo for demolition	Mokaning 560, Portion 1	27°50'51.95"S; 23° 1'21.33"E	1.4ha

3.d.i Low Grade ROM Sorter Plant

The mine intends to establish a new Low Grade ROM Sorter Plant to beneficiate the low grade ROM from the Khumani Opencast Pit operations at the King Mine. The project will be developed in a time phased approach. Phase 1 will involve the processing of 700tph ROM through a sorter plant. Phase 2 will be a second plant similar to Phase 1 allowing an additional 700tph to be processed. The -32mm size fraction stockpile emanating from Phase 1 and Phase 2 will be located on the already approved Low Grade ROM Stockpile (approved as Stockpile J in the approved Environmental Authorisation, as well as the low-low grade sorter discharge ROM stockpile. For the Phase 3 portion of the plant, the -32mm stockpile will be re-located to a position east of the Low Grade ROM Sorter plant to be reprocessed. Sorter plant material, which can be processed during later phases of the plant will also be stockpiled on the existing Low Grade ROM Stockpile, located to the west of the proposed plant.

The low-grade material (grade not further processed as part of this plant output) emanating from the Phase1, Phase 2 and Phase 3 sorter plants will be stockpiled on the already approved Low Grade ROM Stockpile. The intention is to beneficiate a product, which is currently not being processed by the current plant at Khumani, thus re-enforcing one of the aims at Khumani, which is to ensure optimal beneficiation of ROM.

In terms of the National Environmental Management Waste Act, 2008 (Act No. 59 of 2008) (NEMWA), and associated regulations, which came into effect on 24 July 2015, which included Mine Residue Stockpiles as listed Waste Management Activities, all such activities that commenced prior to 24 July 2015, may be regarded as lawful and need not be authorised (regulation 7(1) of GN 921 contains the relevant transitional requirements). Prior to the NEMWA Regulations of 2015, the reclamation of residue for re-use did not require EMP amendments, as it fell within the definition of mining (as defined in the MPRDA), especially in this instance where no separate infrastructure (e.g. crushing plants) were constructed that had to be reflected in the EMPs. However, Khumani has approval in terms of the NEMA and the MPRDA to rework its Low Grade ROM Stockpiles on site through the approved EMPs and as a result a Waste Management License will not be required. Activities associated with the Low Grade Sorter Plant, such as the thickener process (Phase 3), will not result in storage or disposal of dirty water, but is considered an integral part of the beneficiation process for optimal water reuse. Waste from the Low Grade Sorter Plant will be deposited on the approved Low Grade Stockpile [Permit 21/2016 issued by the NCDENC], which is located to the south-west of the proposed plant. Low grade fines (-10mm) emanating from the wet Phase 3 beneficiation processes will be deposited on the approved Paste Disposal Facility [approved in terms of the MPRDA Ref: NC30/5/1/2/3//1/070EM, dated 25 January 2007; the Environmental Impact Assessment Regulations under the ECA Ref 43/2006, dated 13 June 2006, and the National Water Act, 1998 (Act No 36 of 1998) (NWA) Ref 10/D41J/BC1J/2122, dated 16 March 2013.

3.d.i.1 Phase 1

A tripper chute arrangement on the King ROM Buffer Stockpile Feed Conveyor, will divert the low grade crushed ROM coming from the primary and secondary crushing sections. The ROM will be discharged onto a stockpile for buffering purposes.

The low grade ROM will be fed to a screening section where the +80mm, -80+32mm and the -32mm will be classified. The +80mm will discharge onto the Sorter Plant Product Conveyor and will be fed back to the overland conveyor feeding the Parsons Plant via a product stockpile, the -32mm will be stockpiled for future use in the low grade stockpile area. The -80+32mm fraction is the sorter plant feed.

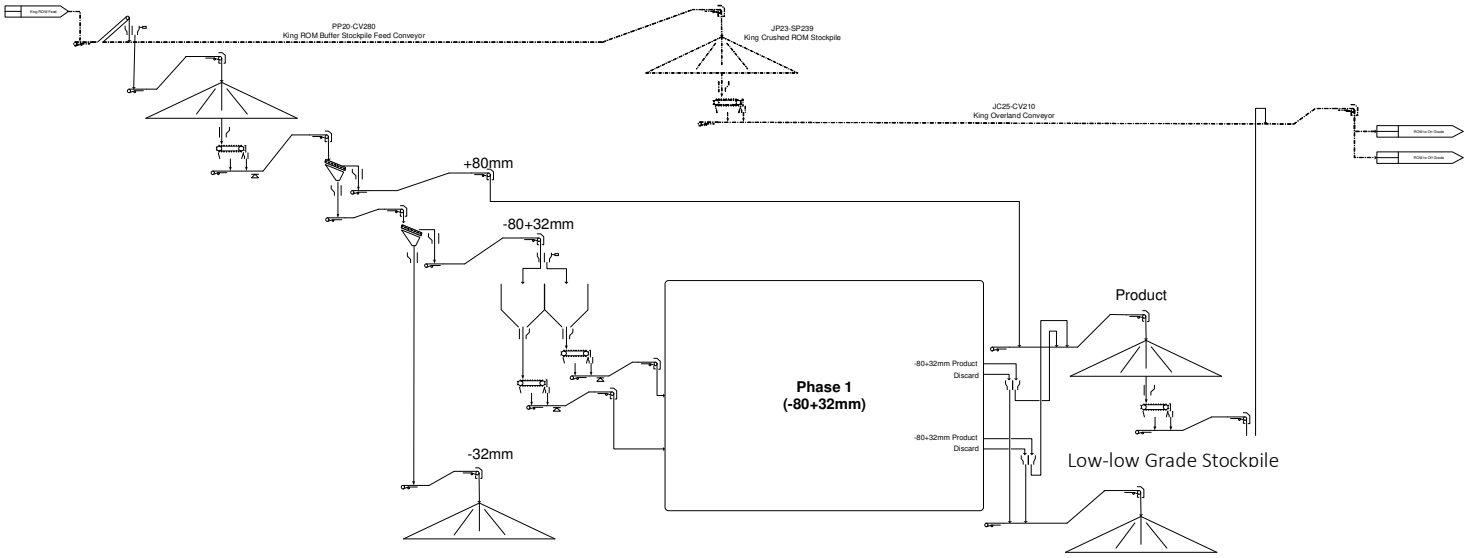


Diagram 1: Phase 1 Flow Diagram.

Sorted product will be stockpiled to achieve a buffer before it is fed to the Parsons Plant, where it will be processed and then despatched via rail for export or to local markets.

Sorter plant material, which can be processed during later phases of the plant will be stockpiled on the existing Low Grade ROM Stockpile, located to the west of the proposed plant.

3.d.i.2 Phase 2

Phase 2 of the plant will comprise an additional sorter and associated equipment to allow a further 700 tph of low grade ROM to be processed and fed back into the overall system to be further beneficiated at the Parsons Plant. Phase 2 will feed the existing stockpiles as discussed in phase 1. Phase 2 will have an additional plant feed stockpile of similar size as phase 1.

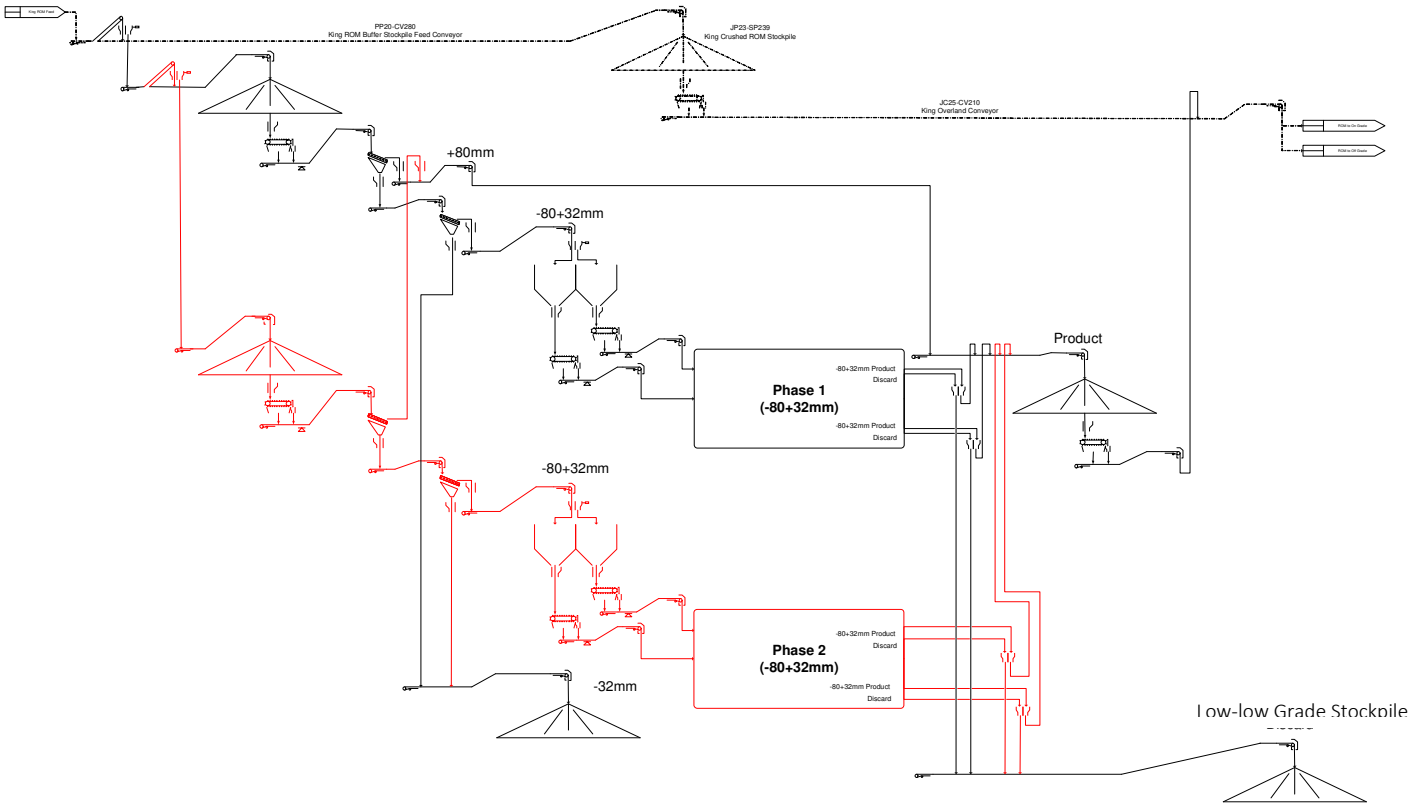


Diagram 2: Phase 2 Flow Diagram (black: phase 1; red: phase 2)

3.d.i.3 Phase 3

Phase 3 will be implemented in two stages.

Phase 3a, will involve a feeding arrangement to the relocated -32mm stockpile. The -32mm material will be fed to a wet screening section where the -32+10mm, -10+1mm and the -1mm will be classified. An additional sorter will be installed and the -32+10mm size fraction will be the Phase 3 sorter pant feed.

The -10+1mm will report to the Low -Low Grade Stockpile located on the already approved Low Grade ROM Stockpile, the -1mm will be processed in a dewatering section with Thickener and discharged onto the already existing King Mine tailings dam using existing infrastructure.

As per the prior two phases, product will be stockpiled to achieve a buffer before it is fed to Parsons, where it will be further processed and despatched via rail for export to local markets.

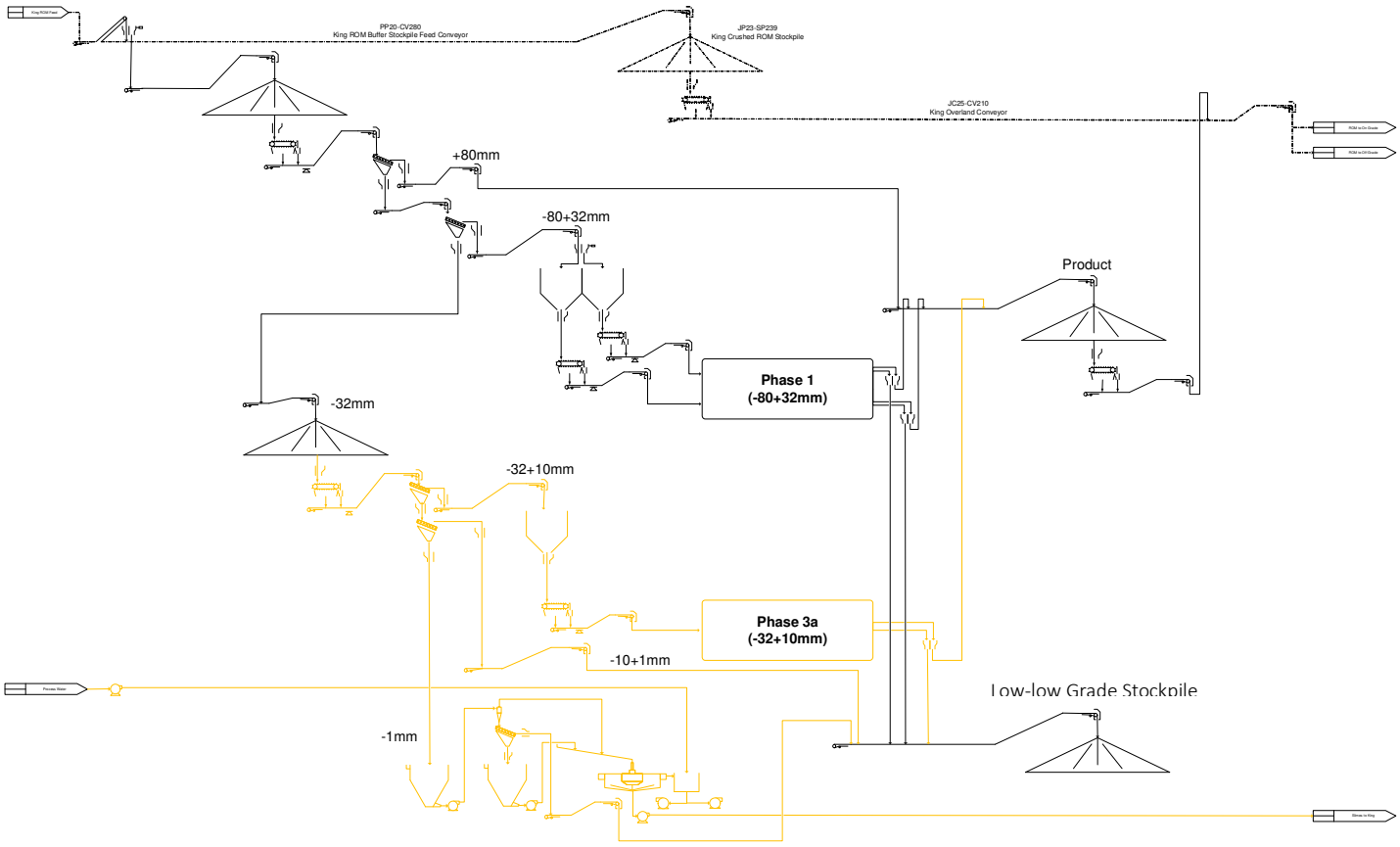


Diagram 3: Phase 3a Flow Diagram (black: phase 1 & 2; yellow: phase 3)

As part of Phase 3b, a Feeding arrangement on the -32mm Stockpile, -32mm coming from the -150+32mm section will be fed to a wet screening section where the -32+10mm, -10+1mm and the -1mm will be classified. The -32+10mm is the Sorter Plant Feed. The -10+1mm will report to the Sorter Plant Low-low Grade Stockpile (which will be disposed of on the approved Low Grade Stockpile J), the -1mm will be processed in a dewatering section with Thickener and discharged onto the already existing King Mine tailings dam using existing infrastructure.

Please refer to the diagram overleaf for the process flow illustration.

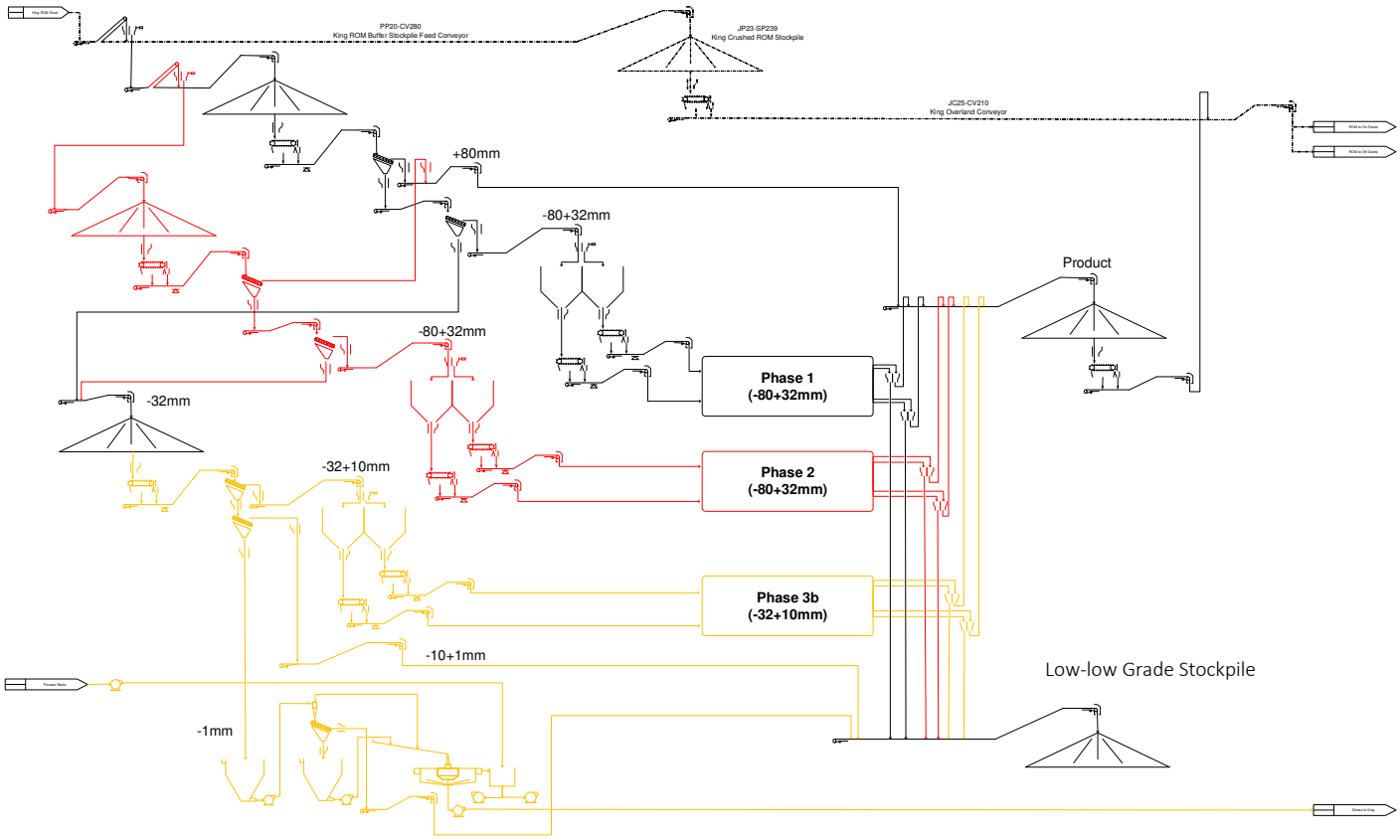


Diagram 4: Phase 3 Flow Diagram (black: phase 1; red: phase 2, yellow phase 3, dotted lines, and existing infrastructure)

3.d.i.4 Discussion on Storm Water Management

The existing storm water dam, serving the King Plant is located to the west of the proposed plant and will be utilised to contain all storm water from almost the centre of the plant location towards the west and possibly water during maintenance and shutdown procedures to reduce the presence of dirty water ponding in these areas during these times.

The storm water runoff east of the centre of the plant will naturally gravitate towards the Low Grade Stockpile J. This stockpile will therefore serve as a constructed berm to contain dirty water.

Paddocks must be constructed downgradient of all stockpiles (low grade ROM stockpiles) on site to contain any seep from these facilities according to the approved EMPs.

In addition to the above, topsoil and overburden removed during the landscaping and site clearance phase, will be stockpiled around the plant facility, for future reuse in the rehabilitation of the footprint.

3.d.i.5 Discussion on Waste Management

The Low Grade ROM Sorter Plant's purpose is to beneficiate the low grade ROM from the King Mine. A second source will be the low grade ROM from the existing stockpiles on site.

In terms of the National Environmental Management Waste Act, 2008 (Act No. 59 of 2008) (NEMWA), and associated regulations, which came into effect on 24 July 2015, which included Mine Residue Stockpiles as listed Waste Management Activities, all such activities that commenced prior to 24 July 2015, may be regarded as lawful and need not be authorised (regulation 7(1) of GN 921 contains the relevant transitional requirements). Prior to the NEMWA Regulations of 2015, the reclamation of residue for re-use did not require EMP amendments, as it fell within the definition of mining (as defined in the MPRDA), especially in this instance where no separate infrastructure (e.g. crushing plants) were constructed that had to be reflected in the EMPs. However, Khumani has approval in terms of the NEMA and the MPRDA to rework its Low Grade ROM Stockpiles on site through the approved EMPs and as a result a Waste Management License will not be required.

Activities associated with the Low Grade Sorter Plant, such as the thickener process, will not result in storage or disposal of dirty water, but is considered an integral part of the beneficiation process for optimal water reuse. Material for further processing from the Low Grade Sorter Plant will be deposited on the approved Low Grade ROM Stockpile, which is located to the south-west of the proposed plant.

No additional access roads will be required for the plant, all existing access roads will be utilised.

Refer to the Figure 2 for the Low Grade ROM Sorter Plant Location and infrastructure. Some internal changes have been made to the Plant, which will be updated in Figure 2 as part of the final BAR. This will however not change the descriptions or footprints in this report.

3.d.ii Explosives Magazine & Silos

The mine will decommission the existing silos at King Mine and farm Parsons and relocate these to the alternative location at the King Mine and Bruce Mine respectively. Both sites will comprise of a fenced area of about 2.5ha.

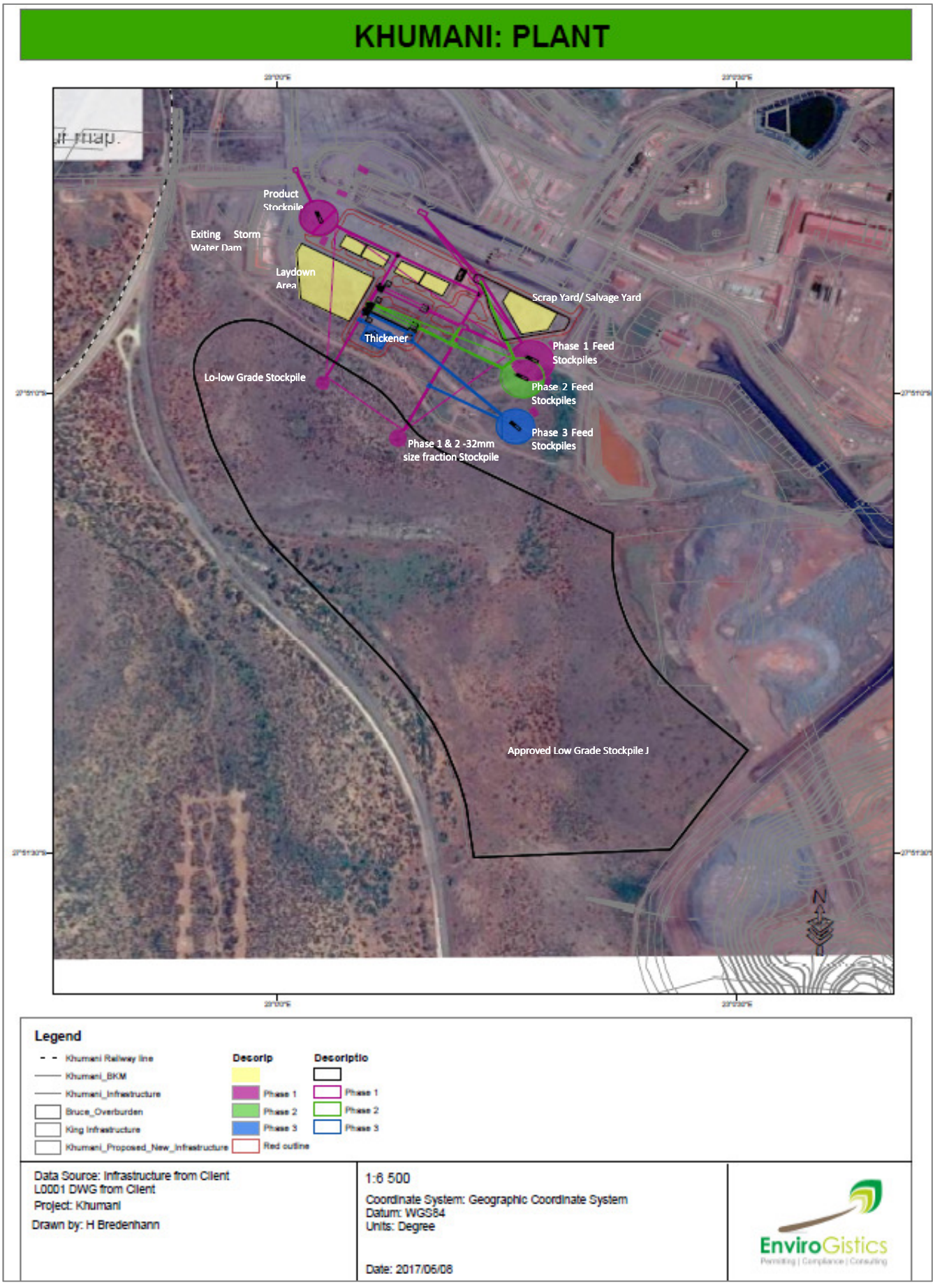


Figure 2: Low Grade ROM Sorter Plant Location (updated drawing to be presented as part of the final BAR)

3.d.ii.1 King Silo Project

At King Mine, the Silos will be relocated from its current position due to encroaching mining activities. The new silos will be established on the Mokaning farm, which forms part of the approved mining area. This site is located approximately 600m from a dry pan (see figure below).

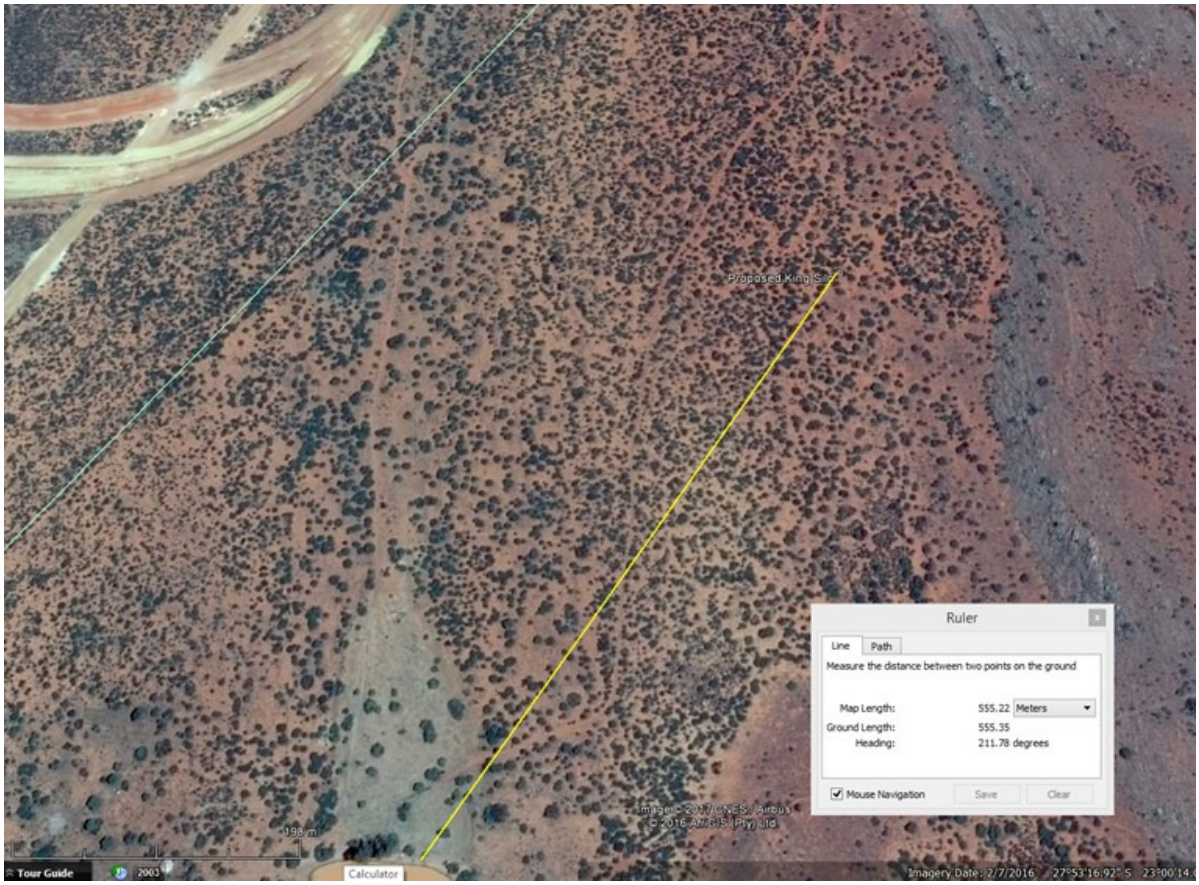


Figure 3: Location of proposed King Silo in relation to dry pan

This area will comprise of an Emulsion Silo [capacity of approximately 67 cubic meters (89 tons)] and a second Silo, which will house ammonium nitrate [approximately 65 cubic meters (52 tons)]. Two magazines will also be established at this area and will house electric detonators (all types), boosters, blasting cartridges and detonating cord (cortex).

Access to King Silo:

Access to the re-located King Mine silos will be via existing roads. However, some expansions will be required.

The most probable access to the proposed King Silo will be from the existing haul road system of the King West Pit and the King/Mokaning Low Grade ROM Stockpile.

Please refer to the following figure for the illustration of the potential access road. The areas indicated in red could be potential extensions to the existing roads. Such extensions would be in sum total approximately 500m in length. The roads proposed will not exceed a width of 8m.

Figure 4: King Silo Potential Access

3.d.ii.2 Parson and Bruce Silo Project

The silos and magazine at farm Parsons will be moved to Bruce Mine to reduce the travelling distance between the facility and where mining is undertaken. The area will comprise of an emulsion silo (capacity of approximately 33 cubic meters) and a second silo, which will house ammonium nitrate (approximately 32 cubic meters). Two magazines will also be relocated to this area and will house electric detonators (all types), boosters, blasting cartridges and detonating cord (cortex).

Access to Bruce Silo will be via existing roads. However, some expansions will be required.

Access to Bruce Silo:

The most probable access to the proposed Bruce Silo will be from the existing burning ground, located to the west of the proposed location.

Please refer to the following figure for the illustration of the potential access road. The areas indicated in red could be potential extensions to the existing roads. Such extensions would be in sum total approximately 500m in length. The roads proposed will not exceed a width of 8m.

Figure 5: Bruce Silo Potential Access

Refer to the figure overleaf for the location of the silos.

3.d.iii Pipeline Project (additional activity) – not triggering a listed activity:

Khumani is in the process of optimising and improving its internal water reticulation system on site. In addition to this, Khumani is investigating the potential to abstract water from the aquifers for supply due to the uncertainty of supply from the current Sedibeng Water Supply Pipeline. It should be noted that the abstraction of groundwater does not form part of this project application, and should this be deemed a feasible water supply option, the necessary Water Use License Applications for this purpose would be required. However, to allow for transfer of water between the mining operations for any scenario, a pipeline is required between the King and Bruce Mining area. This pipeline will also be of suitable dimensions to transfer water between key water storage areas in the event that this is required. The proposed pipeline will consist of approximately 8km of pipeline. The pipeline will as far as practically possible follow existing conveyor routes to allow for easy access when maintenance is required and also to allow for following existing crossings of the Vaal Gamagara.

Note that the pipelines as proposed are below the thresholds as identified in the NEMA regulations [internal diameter of the pipe is less than 0.36m and throughput less than the 120l/s), and as such do not trigger a listed activity].

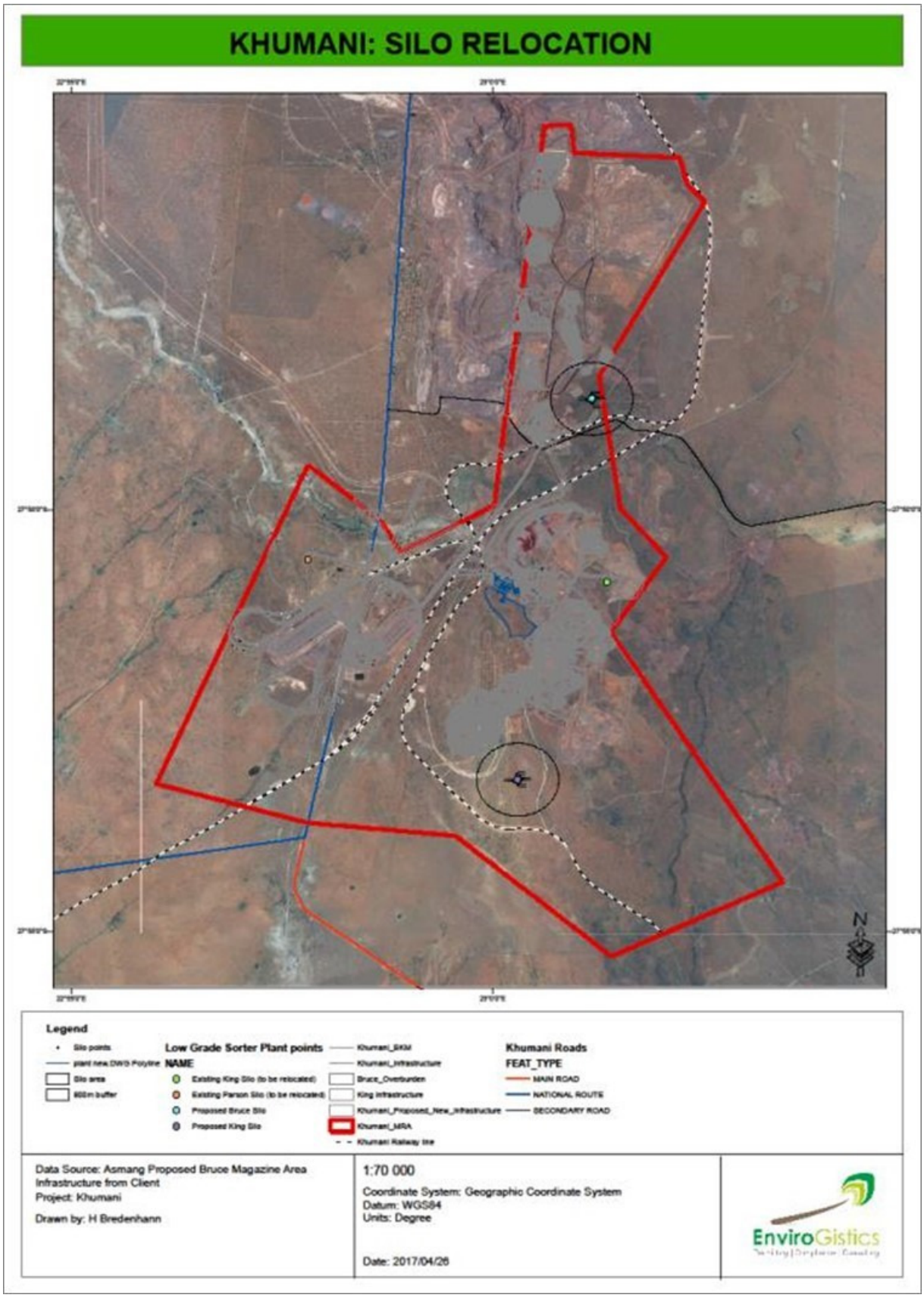


Figure 6: Location of the Silos and Relocation Areas

As part of the project plan, the location of pipelines were developed to ensure that the pipelines do not cross the Gamagara River at any new areas not authorised in term of the current WUL.

As mentioned before, Khumani is currently investigating the opportunity to make use of the aquifer to augment the supply of water. This study is still in its planning phase however, and the necessary groundwater investigations still need to be concluded to determine whether this is in fact possible, based on the extent of impacts as well as the supply of water. The pipeline study has however investigated the placement of pipelines based on the available borehole locations utilised in the investigation. The design study has indicated that the following infrastructure will be required:

This proposed infrastructure consists of the following:

- Boreholes, already drilled in consultation with the DWS, equipped with pumps and sensors with all required valves, fittings and controls.
- Two centrifugal pump stations, each with two pumps (one duty and one standby) complete with motors, forced cooling fans, buffer tank, valves, fittings and controls.
- 200mm ø HDPE PE100 PN16 underground pipelines to connect the boreholes with the buffer tank at each pump station installed below ground.
- Either? 200 HDPE PE100 PN16 pipelines (below ground) to convey the water to elevated storage tank A3.
- 250 mm ø HDPE PE100 PN16 pipeline (below ground), replacing the existing main supply pipeline from point B2 to point A2.
- 200 mm ø Galvanised mild steel pipeline installed above ground on plinths to connect main supply pipeline with elevated storage tank B3.
- 150 mm ø steel pipe replacing existing elevated storage tank pipework.
- Air valve, scour valve and junction boxes to operate and maintain the system.

Please refer to the figure overleaf presenting the location of the pipeline routes. From the current available information, P1, P2, P3 and P4 illustrates the potential water supply points. A3 and B3 indicates the proposed tanks required for intermediate storage. One river crossing will be require, between point A2 and A1, which is associated with the existing conveyor crossing on the mine and approved as Water Use 2 under the Section 21c & i water uses in the approved 2013 WUL.

The pipeline will flowing existing infrastructure (pipelines and conveyors) between point A3 at Bruce to B3 at King. Small areas between P1 and A1 and P3 and the Bruce Access Road will be new to pipeline development. These will however require limited clearance.

No listed activities are triggered by these activities, but to ensure a comprehensive management system on site, management measures have been considered as part of this EMP. The activities in terms of water abstraction may only take place under an approved WUL and in consultation with surrounding landowners.

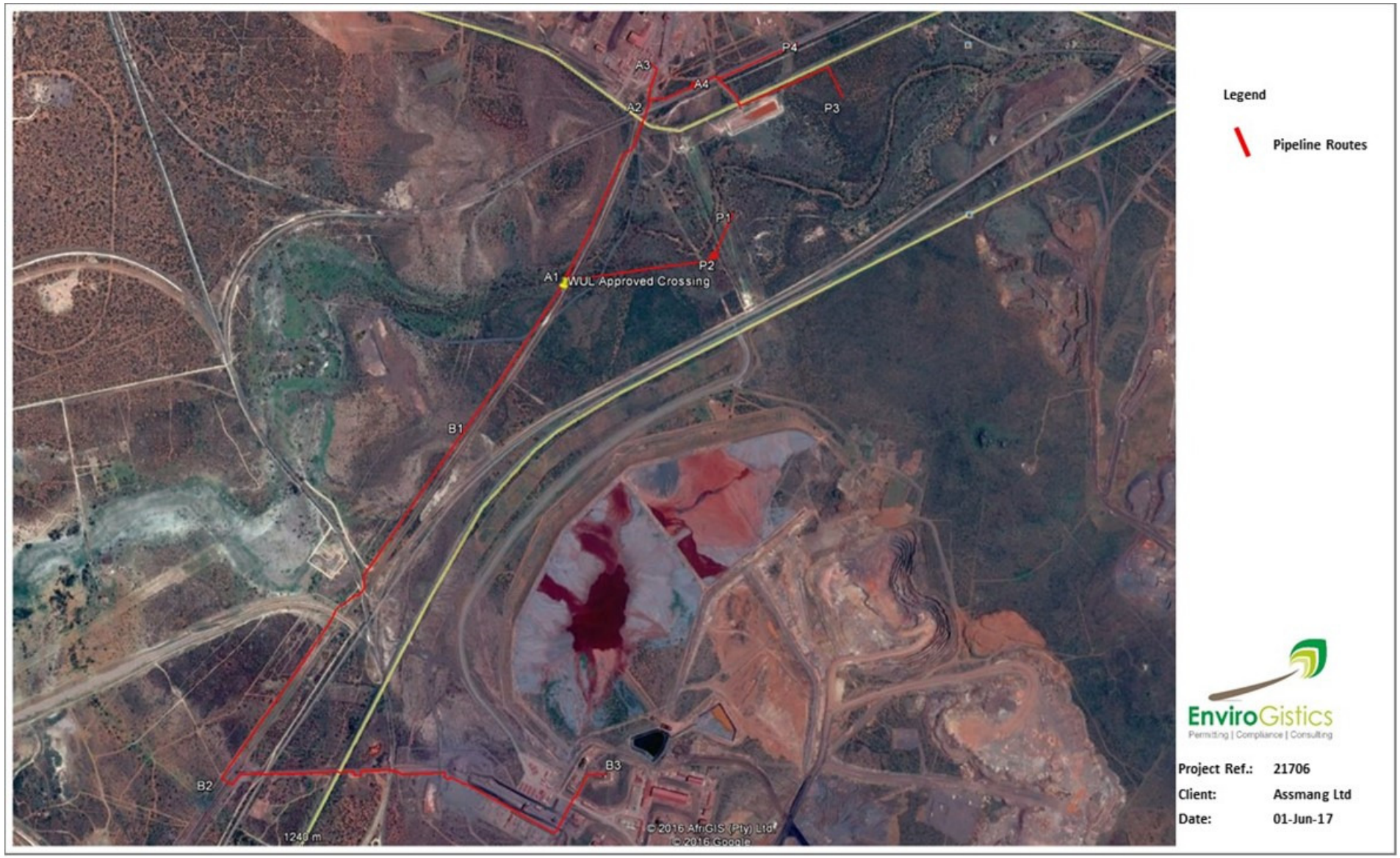


Figure 7: Pipeline Routes

3.d.iv Listed and Specified Activities

National Environmental Management Act, 1998:

The proposed activities are listed under Regulations Listing Notice 1 Government Notice Regulation 326 and Regulation 327 (dated April 2017) of NEMA:

- NEMA Government Notice 327, Listing Notice 1:
  - Activity 34: "The expansion or changes to existing facilities for any process or activity where such expansion or changes will result in the need for a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the release of emissions or pollution" (not considered at this time, but may be required depending on Department of Water and Sanitation Consultation);
  - Activity 24: "The development of a road— with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres;
  - Activity 56: "The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre— (ii) where no reserve exists, where the existing road is wider than 8 metres; excluding where widening or lengthening occur inside urban areas.
  - Activity 27: "The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation……"
  - Activity 14: "The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres"
  - Activity 13: The decommissioning of existing facilities, structures or infrastructure for—(v) any activity regardless the time the activity was commenced with, where such activity: a) is similarly listed to an activity in (i)[,] or (ii)[, or (iii)] above; and b) is still in operation or development is still in progress
  - Listing 1, Activity 56 – The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre—(ii) where no reserve exists, where the existing road is wider than 8 metres.

Please refer to the following table for the details in terms of the listed activities.

Table 5: Listed Activities

Activity Description	Aerial Extent	Listing Notice
It is not assumed that the activities proposed in this project description will require licencing or permits in terms of release of emissions or pollution. Activities associated with the Low Grade ROM Sorter Plant, such as the thickener process, will not result in storage or disposal of dirty water, but is considered an integral part of the beneficiation process for optimal water reuse. Material to be further processed from the Low Grade ROM Sorter Plant will be deposited on the approved Low Grade ROM Stockpile, which is located to the south-west of the proposed plant.	N/A	GNR327 (Listing 1, Activity 34 – The expansion or changes to existing facilities for any process or activity where such expansion or changes will result in the need for a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the release of emissions or pollution)
At King Mine area, roads may be required for access to the Silo.	Development of roads to the Silos. Should the King/Mokaning access road be used, a link of approximately 1.5km to this road will be required.	GN327 (Listing 1, Activity 24): The development of a road— (i) [a road] for which an environmental authorisation was obtained for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Government Notice 545 of 2010; or

Activity Description	Aerial Extent	Listing Notice
		(ii) [a road] with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres; but excluding a road— (a) [roads] which [are] is identified and included in activity 27 in Listing Notice 2 of 2014; (b) [roads] where the entire road falls within an urban area; or (c) which is 1 kilometre or shorter.
Where upgrades to existing roads are required, such upgrades will not result in the widening of a road by more than 6m or lengthening of a road by more than 1km.	Upgrades of roads to the Bruch Silos, may require an extension of approximately 450m to existing roads.	GN327 (Listing 1, Activity 56): The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre— (i) where the existing reserve is wider than 13,5 meters; or (ii) where no reserve exists, where the existing road is wider than 8 metres; excluding where widening or lengthening occur inside urban areas.
Existing roads will be utilised in and around this Low Grade Sorter Plant area, with an access road from these to the plant.	The access road, which will tie in from the existing roads should not be in excess of 1km.	GN327 (Listing 1, Activity 24): The development of a road— (i) [a road] for which an environmental authorisation was obtained for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Government Notice 545 of 2010; or (ii) [a road] with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres; but excluding a road— (a) [roads] which [are] is identified and included in activity 27 in Listing Notice 2 of 2014; (b) [roads] where the entire road falls within an urban area; or (c) which is 1 kilometre or shorter.
Overall area of clearance of indigenous vegetation will amount to an approximate area of 6.7ha.	6.7ha	GN327 (Listing 1, Activity 27): The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation…
Bruce: Two magazine areas, an emulsion silo and an ammonium nitrate silo. This area will include all ancillary required infrastructure. King: Two magazine areas, an emulsion silo and an ammonium nitrate silo. This area will include all ancillary required infrastructure.	5ha in total Total storage of 195m^3 (Emulsion: 113m^3) Ammonium Nitrate: 82m^3)	GN327 (Listing 1, Activity 14): The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres.
The existing King and Parson emulsion silos, ammonium nitrate silos and explosive magazines will be decommissioned.	9.6ha	GN327 (Listing 1, Activity 13): The decommissioning of existing facilities, structures or infrastructure for— (i) any development and related operation activity or activities listed in this Notice, Listing Notice 2 of 2014 or Listing Notice 3 of 2014; (ii) any expansion and related operation activity or activities listed in this Notice, Listing Notice 2 of 2014 or Listing Notice 3 of 2014; (iii) [any development and related operation activity or activities and expansion and related operation activity or activities listed in this Notice,

Activity Description	Aerial Extent	Listing Notice
		Listing Notice 2 of 2014 or Listing Notice 3 of 2014;] … (iv) any phased activity or activities for development and related operation activity or expansion or related operation activities listed in this Notice or Listing Notice 3 of 2014; or (v) any activity regardless the time the activity was commenced with, where such activity: a) is similarly listed to an activity in (i)[,] or (ii)[, or (iii)] above; and b) is still in operation or development is still in progress;

National Water Act, 1998 (Act No. 36 of 1998) (NWA)

Chapter 4 of the NWA specifically addresses the use of water and is a tool for an authority to ensure the implementation of the principle that National Government has overall responsibility over water resource management, including the equitable allocation and beneficial use of water in the public interest, a person can only be entitled to use water if the use is permissible under the Act. In general a water use must be licensed unless it is listed in Schedule I, is an existing lawful use, is permissible under a general authorization, or if a responsible authority waives the need for a license. Section 21 of the NWA identifies eleven (11) consumptive and non-consumptive water uses which must be authorized.

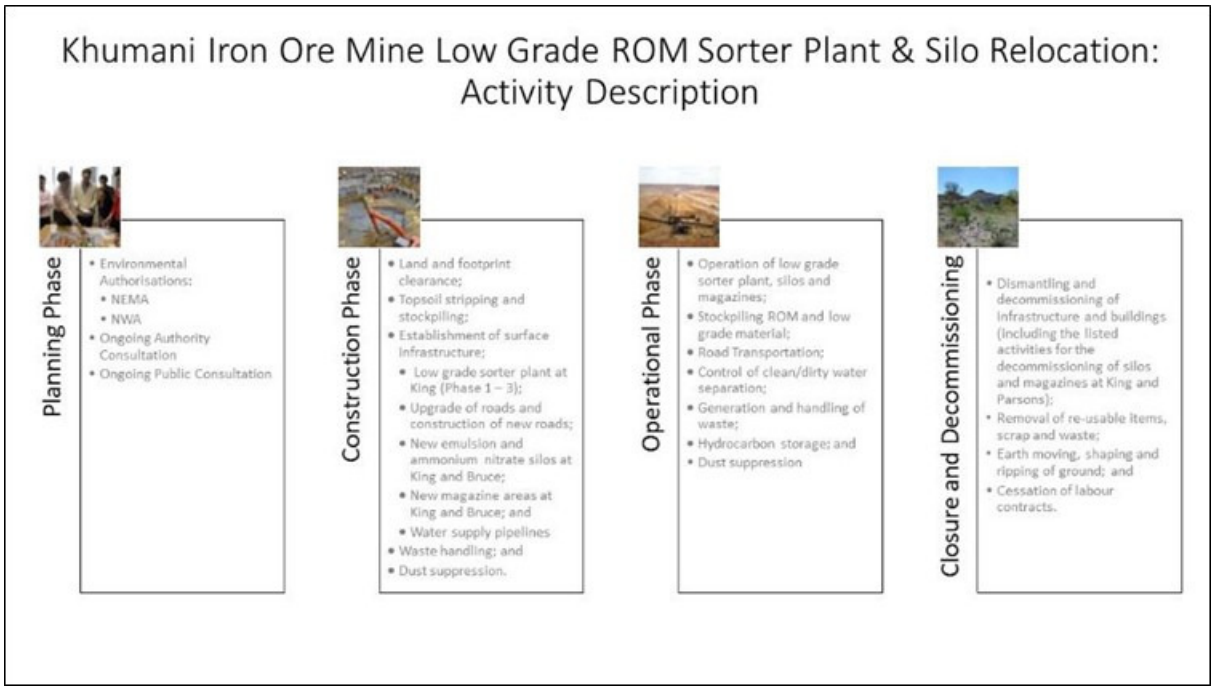
The activities associated with this project should not trigger any WULs, due to the following:

- No waste disposal, or mine residue disposal will be undertaken in addition to that which is approved in the pending WUL Application – the south-western (Low Grade Stockpile J) was not included into the approval WUL, but has subsequently been included into the pending license. This stockpile will be used for the storage of the low grade ore not yet beneficiated by the sorter plant;
- The thickener associated with the plant, is not an area storing dirty water, but part of the internal water and process circuit and not the disposal of a waste or water containing waste. Any potential slimes from the process will be deposited on the existing King Mine Paste Disposal Facility utilising existing infrastructure;
- One river crossing will be require, between point A2 and A1, which is associated with the existing conveyor crossing on the mine and approved as Water Use 2 under the Section 21c & i water uses in the approved 2013 WUL. .For this reason no river crossing application will be required as the pipeline will be located within the existing servitude, and will only route clean water at any given time.

Please refer to Annexure 3for a copy of the WUL.

3.d.v Description of the Activities to be undertaken

The activities that will form part of the proposed project will include the following:



Please refer to Section 3.d for the detailed project description.

3.e Policy and Legislative Context

Table 6: Policy and Legislative Context

Applicable Legislation And Guidelines Used To Compile The Report	Reference Where Applied	How Does This Development Comply With And Respond To The Legislation And Policy Context
Specific Environmental Management Acts (SEMAs)		
National Environmental Management: Biodiversity Act, 2004	Presence of Kameeldoring and Olienhout trees	The EMP will regulate the applicant to apply for Tree Removal Permit from the NCDENC prior to the potential removal of any sensitive and/or protected species.
National Heritage Resources Act, 1999	Potential presence of heritage sites during construction and excavation studies.	A heritage assessment and paleontological assessment is being undertaken for the proposed plant expansion and demolition activities. At this time of the project, no impact on heritage sites are foreseen. However, it should be noted that by the mere nature of such site, these may be present once excavation activities take place. In this event, all construction activities will cease and the SAHRA will be contacted to determine the way forward.
National Legislation		
National Environmental Management Act, 1998	This Basic Assessment Report & EMP	The BAR Application fee of R2000 was paid to the DMR on 26 April 2016. An Application for Environmental Authorisation was couriered to the DMR on 2 May, 2017. The proof of delivery (delivery date at DMR) is 3 May 2017. The acknowledgement of received from the DMR was received on 19 June 2017. Please refer to Annexure 1.
National Water Act, 1998	Water pipelines and abstraction of water	A Water Use License is currently being updated, and it is proposed that the activities associated with this project be included therewith.

Applicable Legislation And Guidelines Used To Compile The Report	Reference Where Applied	How Does This Development Comply With And Respond To The Legislation And Policy Context
Mineral and Petroleum Resources Development Act, 2002	Existing Right	The project does not entail any additional authorisation for mining rights in terms of the MPRDA. The surface infrastructure will be located within the approved plant area with Assmang as the surface owners.
Municipal Plans		
Integrated Development Plan (IDP)	Economic Development	Some of the key issues identified by the IDP are basic service development and local economic development.

3.f Need and Desirability of the Proposed Activities

The objective is to beneficiate the low grade ROM from the King Mine, similar to the plant process applied for at the Parson Mine. The project will not allow for (the extension to the LOM – what is meant by this?), but rather lead to the improvement of beneficiation on site, by allowing for the beneficiation of a lower grade iron ore.

In terms of Local Economic Development Projects. The lawful and sustainable (or economic) operation of the mine allows the mine to contribute to the Local Economic Development Programmes which includes:

- Third language to a primary school in Postmasburg;
- Teacher salary subsidy;
- Pre Schools salary subsidy teachers- 2 schools;
- Skill development;
- Agricultural training;
- Learning and study skills to grade 11 learners;
- Winter School support to grade 12 learners;
- Science expo local and provincial;
- Car wash project to ex-prisoners Rental and counselling support;
- Laundry enterprise for local community
- Car wash enterprise for local community
- Various infrastructure projects like GatKoppies water pipeline; Boichoko pressure tower, maintenance of the Waste Water Treatment plant, maintenance of the landfill site, upgrade of End Street
- Mine managers project;
- Funding done on ad hoc basis to creditable applications e.g. welfare requests;
- Computer training to communities;
- Pensioners gardening project;
- Khumani Boesman upliftment project;
- Student Computer Training;
- Gamagara forum Funding towards the forum;
- Assmang Diversity intervention. Intervention which includes the families of employees;
- Lerato Project in Olifantshoek Feeding Scheme;
- CSI Study assistance to non-University student;
- Tunnel Gardening project Job creation;
- Olive tree project (job creation project);
- Gem Cutting assistance;
- HPM Project Learning skills to learners;
- North West Expo;
- Famsa Volunteer training;
- Famsa Basic Counselling Training;
- Trauma House Meal assistance;
- Spring school assistance;
- Spring school Bedding assistance;
- Protection Group Visible policing clothing;
- Alcohol abuse training to youth;
- Whistles against crime for the elderly;
- Police on WHEELS Cycles to police;

- Crime stop;
- Mintek gem cutting equipment for future LED Project;
- IT Assistance to police;
- Computer and internet facility Primary school;
- Expo 2006 for High School;
- Postdene Library; and
- Primary school entrepreneurs.

3.g Motivation for the Overall Preferred Site, Activities and Technology Alternative

Refer to Section 3h for footprint alternatives considered.

The project should not be regarded as a new activity or a green-fields requirement, but rather the improvement of the existing processes on the mine.

The Low Grade ROM Sorter Plant, will tie into the existing King Plant to allow for the optimisation of beneficiation by beneficiating a lower grade iron ore.

The decommissioning and relocation of the silos are based on available space, in close proximity of the mining operations. The King Silo had to consider the presence of a dry pan and the associated 500m buffer around it, as well as the future extension (approved) of the King West Opencast Pit.

3.h Full Description of the Process followed to reach the proposed Preferred Alternative within the site

3.h.i Details of the Development Footprint Alternatives Considered

Low Grade ROM Sorter Plant:

Phase 3 will require an additional stockpile from where the -32mm size fraction will be beneficiated. As an alternative, Khumani may consider a truck tip instead of the additional stockpile to beneficiate the -32mm size fraction, resulting in less clearance. This will however be determined and finalised as part of the project design, and will not have a further impact on the environmental considerations as presented in this report.

Another alternative would be the no-go option. With the no-go option, Khumani will continue utilising the existing approved facility as is, without the opportunity to optimise the beneficiation of ROM from the mining operations.

Silos:

The explosive magazines and silos located on farm Parsons are located a distance away from the existing mining operations at Bruce Mine. The alterative to moving the silos will be to retain the site where it currently is. The relocation of the silos at this site is an economic decision which involves the relocation of the silos and magazine will reduce transportation costs once situated closer to the Bruce Mine.

The silos at King Mine are located within the plant and workshops areas. To improve efficiency, the mine intends constructing a magazine on King Mine. In order to ensure a sufficient buffer distance, an area to the south of the King Mine has been earmarked for the re-location of the silos and installation of a magazine.

Figure 8: The King Silo Alternatives

3.h.ii Details of the Public Participation Process Followed

The Comments and Responses Report (C&RR) includes the comments received during the Public Participation Process undertaken to date. The Comments and Responses Section has the following objectives:

1. To provide a formal and integrated record of all the issues raised by Interested and Affected Parties (I&APs) to date and the responses provided by the EIA Study Team.
2. To provide a mechanism that allows all parties participating in the process (including the environmental authorities) to verify whether the issues raised have been considered and where appropriate, adequately addressed by the EIA Study Team.

Issues have been raised and recorded through a variety of mechanisms. These include:

- Comments sheets received by fax, and/or e-mail;
- Comments sent to the public participation office via e-mails;
- Comments received telephonically; and
- Comments received during the announcement phase when adjacent landowners were visited.

3.h.ii.1 Introductory and Interim DWS Meeting

It should be noted that the application from was delivered to the DMR, Kimberley on 3 May 2017 at 11h00. During a follow up telephonic discussion with the DMR on 22 May 2017, the Registry informed EnviroGistics that the application form is still with Registry (22 May 2017) and that it will be allocated as soon as possible. A second round of follow up was undertaken on 1 June 2017 after which, Ms. Raisibe Sekepane, informed the Environmental Assessment Practitioner (EAP) on 6 June 2017 that the relevant official is Mr Livhuwani Malatjie.

The application was acknowledged by the DMR on 19 June 2017. The responsible official is Mr. Mashau Humbulani. The draft Basic Assessment Report was submitted to stakeholders between 14-17 June 2017. The final Basic Assessment Report will be submitted to the DMR on 20 July 2017.

The department has been invited for a site visit, however this has to date not been accepted.

3.h.ii.2 Stakeholder Identification

The current Stakeholder Database on the mine was utilised as a basis for the development of the consultation register for this project. In addition, relevant government departments, municipalities and affected ward councillors were contacted to inform them of the proposed project and to obtain their issues and comments in this regard. The following stakeholders were consulted as part of the project:

- DWS;
- DMR;
- NCDENC;
- Local Municipality;
- Districts Municipality;
- Ward Councillor;
- Surrounding Landowners; and
- Other Identified Stakeholders.

Please refer to Annexure 5 for the list of stakeholders consulted.

3.h.ii.3 Notification

Stakeholders were notified by means of the following systems:

- Notices;
- Background Information Documents (BIDs); and
- Advertisements.

Please refer to Annexure 5 for copies of these notifications. Proof of email submissions can be requested from the EAP.

3.h.ii.4 Site Notices

In order to inform surrounding communities and adjacent landowners of the proposed project, five (5) site notices were erected on site (on 8 May 2017) and at visible locations close to the site.

Site Notices were place at the following locations:

- King Mine Entrance;
- Bruce Mine Entrance;
- Parson Silo Entrance;
- Kathu Municipality; and
- Olifantshoek Municipality.

King Mine Entrance

Kathu Municipality

Bruce Mine Entrance

Olifantshoek Municipality

Parson Silo Entrance

3.h.ii.5 Background Information Documents

Background Information Documents were distributed via email to all parties on the database on 12 May 2017. Please refer to Annexure 5 for a copy of this document.

3.h.ii.6 Advertisements

The formal announcement of the proposed project was undertaken by placing an advertisement in the Kathu Gazette on 13 May 2017 to invite all Interested and Affected (I&APs) to register. The advertisements were published in both Afrikaans and English.

The objective of this newspaper advertisement was to:

- Inform I&APs of the proposed project;
- Inform I&APs of the Environmental Impact Assessment procedure and the way in which I&APs could lodge any objections to the proposed development and provide comments; and
- Invite I&APs to become involved in the proposed project by registering as I&APs.

Please refer to Annexure 5 for a copy of these adverts.

3.h.ii.7 Document Review

All registered stakeholders were informed of the availability of the draft BAR on 12 June 2017 for the opportunity to review this document. No comments outside of those presented in the draft reports were received.

3.h.iii Summary of Issues raised by the I&APs

To date the only comments received were:

Table 7: Stakeholder Comments received

Raised By	Date	Comment	Response
Transnet (Mr. André Bodenstein)	15 May 2017	"Kindly forward your layer "Khumani MRA" on your locality map as a shapefile, DXF or DWG. We need to overlay it with our data to make an informed comment."	Shape files send to Transnet on 22 May 2017.
Alfrede Markram	23 May 2017	Requested to be registered as an I&AP.	Included onto the database.

3.h.v The Environmental Attributes associated with the Alternatives

As no significant changes in the location of infrastructure have been undertaken, the environmental attributes associated with the current site location is presented.

3.h.v.1.a Baseline Information

3.h.v.1.a.1 Climate

Information contained in this section was obtained from Khumani EMP Amendment undertaken in 2011, the Air Quality Assessment undertaken by Airshed Planning Professionals (Pty) Ltd in 2005 and the Air Quality Gap Analysis undertaken by Prism EMS (Pty) Ltd in 2015.

Temperature

Although the Northern Cape is mainly semi desert, the western areas of the Northern Cape, including Namaqualand, a small section of the Green Kalahari and Calvinia, Nieuwoudville and Loeriesfontein in the Karoo fall into the winter rainfall area from April to September. Sharing the same climate as Namaqualand, these two sub regions will give you displays of wild flowers during spring months from July to October.

The Northern Cape's weather is typical of desert and semi desert areas. This is a large dry region of fluctuating temperatures and varying topographies. The annual rainfall is sparse, only 50 to 400mm per annum. In January, afternoon temperatures usually range from 34 to 40º C. In 1939 an all-time high of 47.8º C was recorded at the Orange River. Summer temperatures often reach 40ºC. See the following for the mean monthly minimum and maximum temperatures from the Parsons Weather Station.

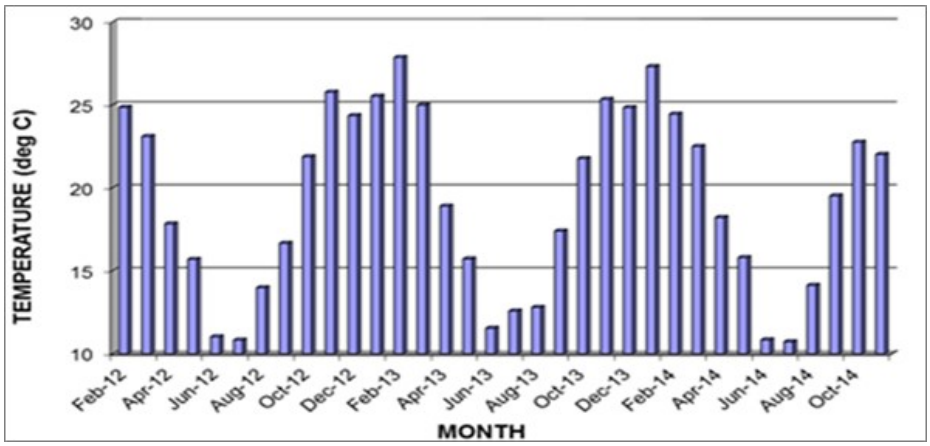


Table 8: Mean monthly Minimum and Maximum temperatures

Rainfall

Records from the previous study from South African Weather Service for the Postmasburg and Kuruman Weather Stations (years 2000 and 2003) and from the Sishen Weather Station for the years 1961 to 2001 (Sishen Iron Ore Mine EMPR, 2002) show that the mean annual rainfall for the area is approximately 386 mm, while the observed records for the Parsons Farm for the three year period show 353mm. The data obtained from the weather station on site for the period 2012, 2013 and 2014, noted an annual rainfall for the area of 418, 154, and 314mm respectively, as shown in the following figure.

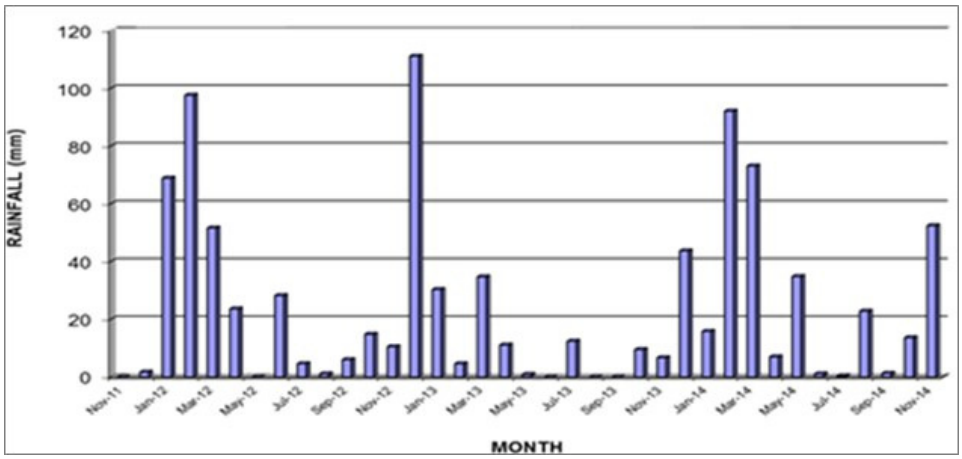


Figure 9: Total Annual Rainfall measured at Parsons Weather Station (2012-2014)

Wind

The weather station that monitors standard meteorological parameters has been operational on farm Parsons at the Salvage Yard, north of processing plant and west of stackers/reclaimers since the end of November 2011. The station experienced problems with data capturing during the first few months of operation, but is now yielding results on a regular basis. The graphs for wind roses and different measured parameters are presented in the following graph.

In terms of the data collected from the weather station, the spatial and annual variability in the wind field for farm Parsons is clearly evident in Figure 10. The predominant wind direction is from north-northeast and south southwest, with frequent winds also occurring from the north and south. Over the three-year period, frequency of occurrence was over 8% from the south and south south-westerly sector, with south-westerly winds occurring over 7% of the time. Less frequent winds (above 6% of the time), but stronger were noted from the north, north-north-easterly and north-easterly sector.

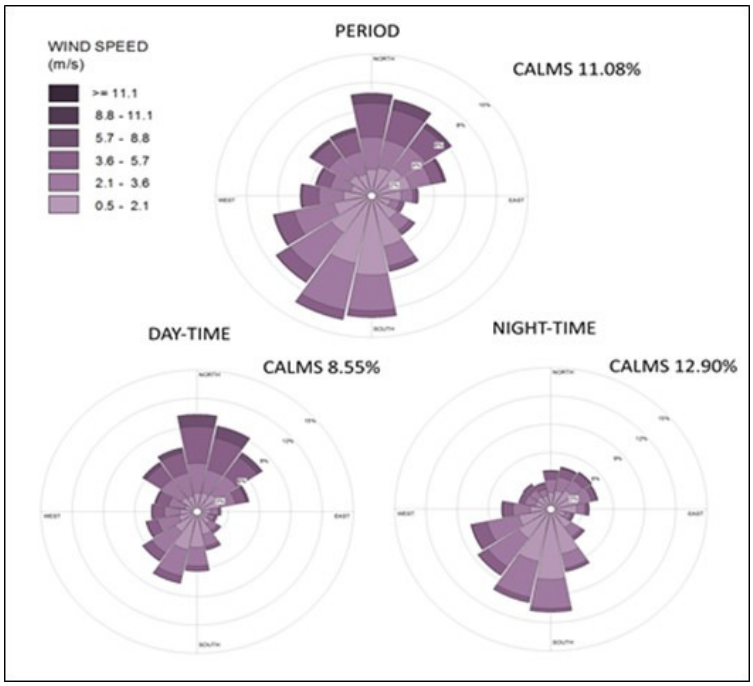


Figure 10: Period wind roses measured at Parsons Weather Station (2012-2014)

Calm conditions (wind speeds less than 0.5m/s) occur for less than 11.8% of the time, with winds between 0.5-2.1m/s occurring for 40% of the time. The data is in good agreement with data sourced for the previous study for

the SAWS automated weather station in Kathu, indicating that the average wind speeds over this site for the period November 2011 to end November 2014 is 2.21m/s.

During daytime there is an increase in winds from north-northwest, north and northwest, with frequencies of greater than 10%. Nocturnal wind flow reflects more dominant winds from the south, south-southwest and southwest. Frequent winds from the south occur for approximately 10% of the time. Night-time conditions also reflect a decrease in wind speeds with average wind speed decreasing to 1.87 m/s in comparison to daily wind speeds of between 2.55m/s. Refer to Figure 11 for indication of seasonal wind directions as measures at Parsons Weather Station.

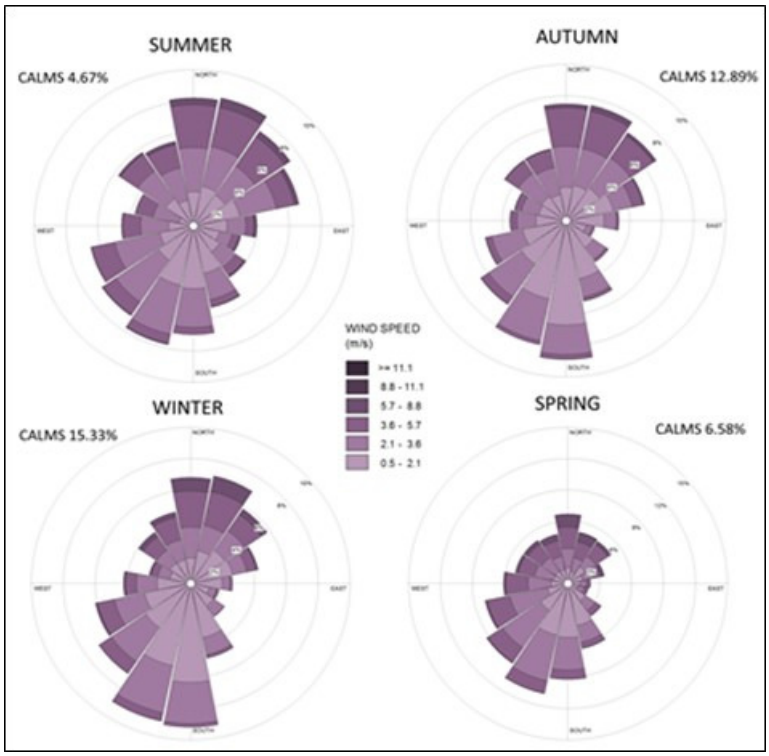


Figure 11: Seasonal wind roses measured at Parsons Weather Station (2012-2014)

3.h.v.1.a.2 Topography

The topography of the study area is characterised by relatively flat terrain, with no steep inclines with the exception of the mountain ranges to the west (Langberg range) and a smaller range to the east (Kuruman Heuwels). Altitudes range from approximately 1235 metres above mean sea level (mamsl) in the south to 1210mamsl in the north.

Various landform elevations occur within the mining rights area (MRA), with the highest elevation present on the southern portion of the Bruce area (1271mamsl) and the lowest elevation present (1200masl) in the floodplain of the Gamagara River, with the land gradually increasing in gradient to approximately 1240masl in the central part of the mining rights area. The elevation gradient from north to south along the central line of the MRA is shown.

The project areas in question is located on relatively flat terrain, as can be seen from the following figures.

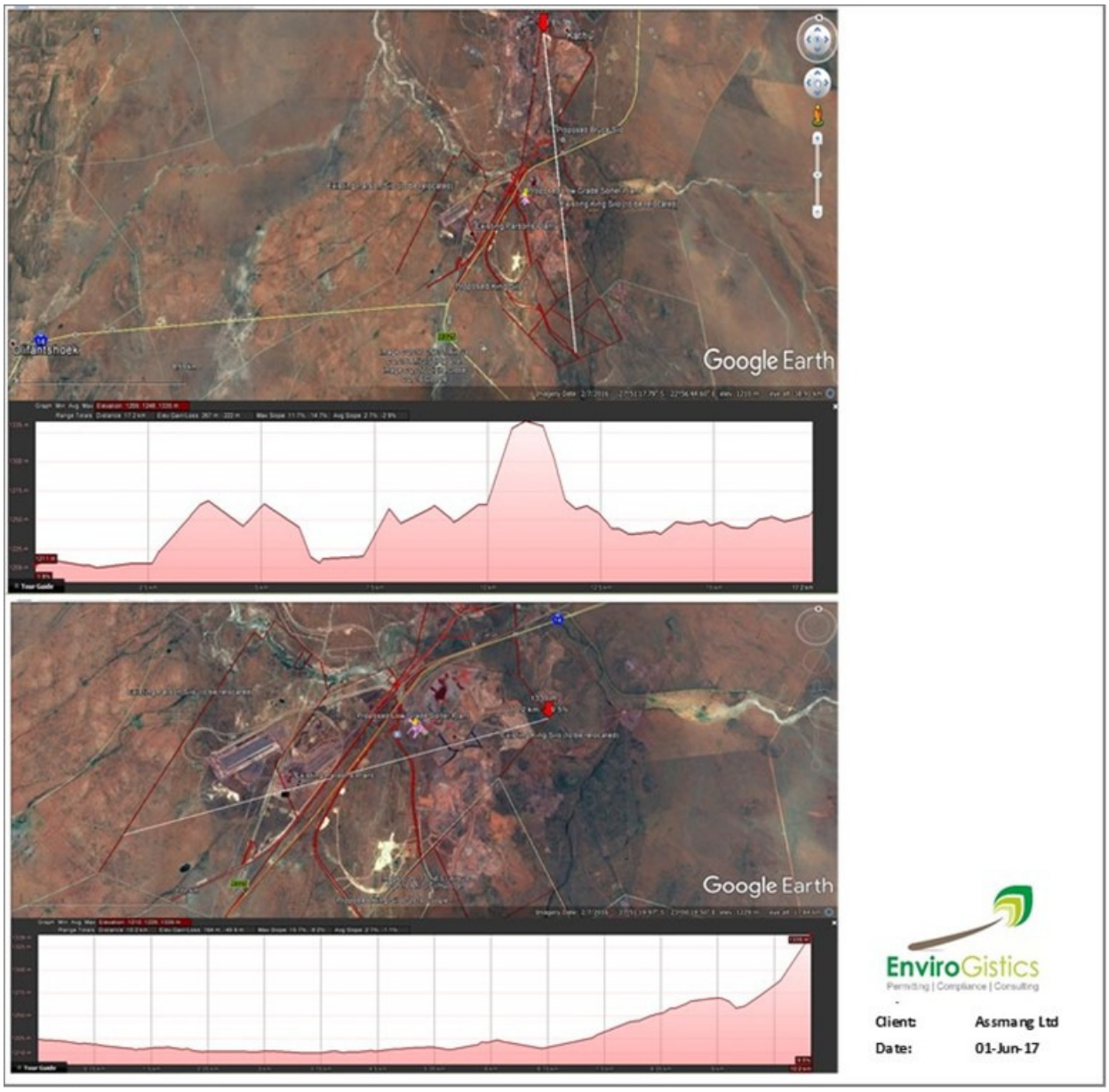


Figure 12: Topographical Setting of Khumani Iron Ore Mine

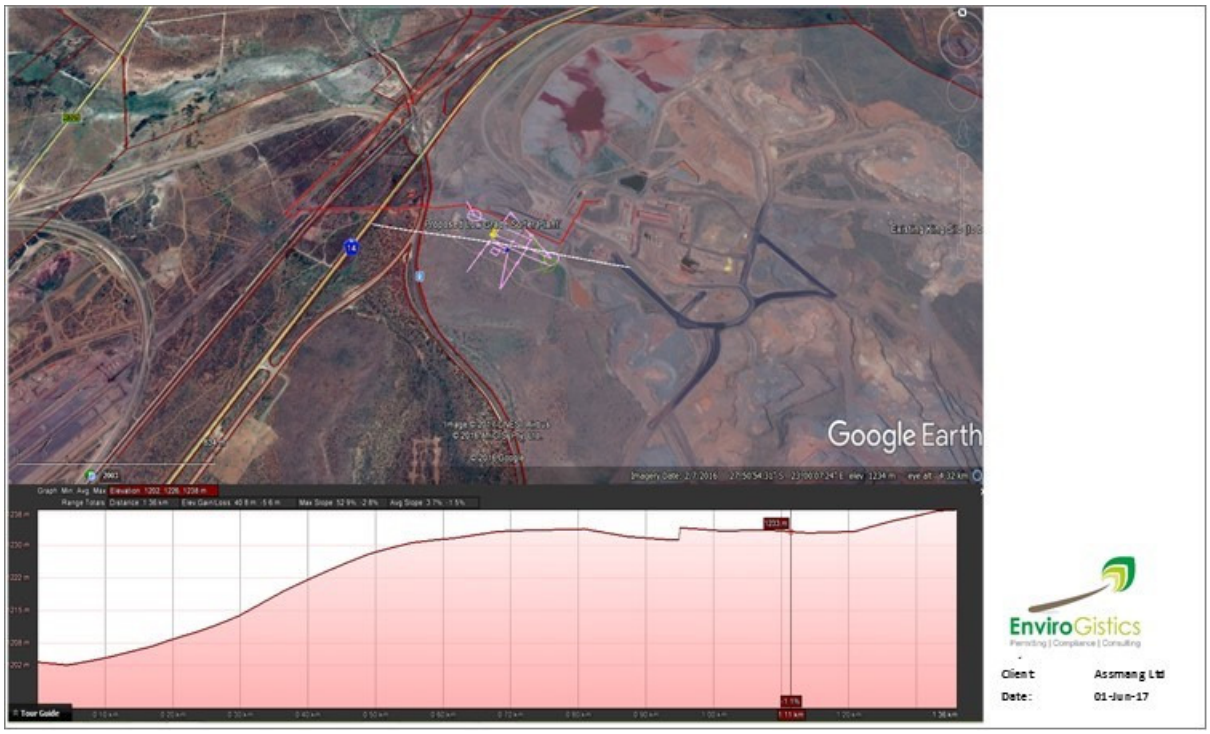


Figure 13: Topographical Setting of Low Grade ROM Stockpile

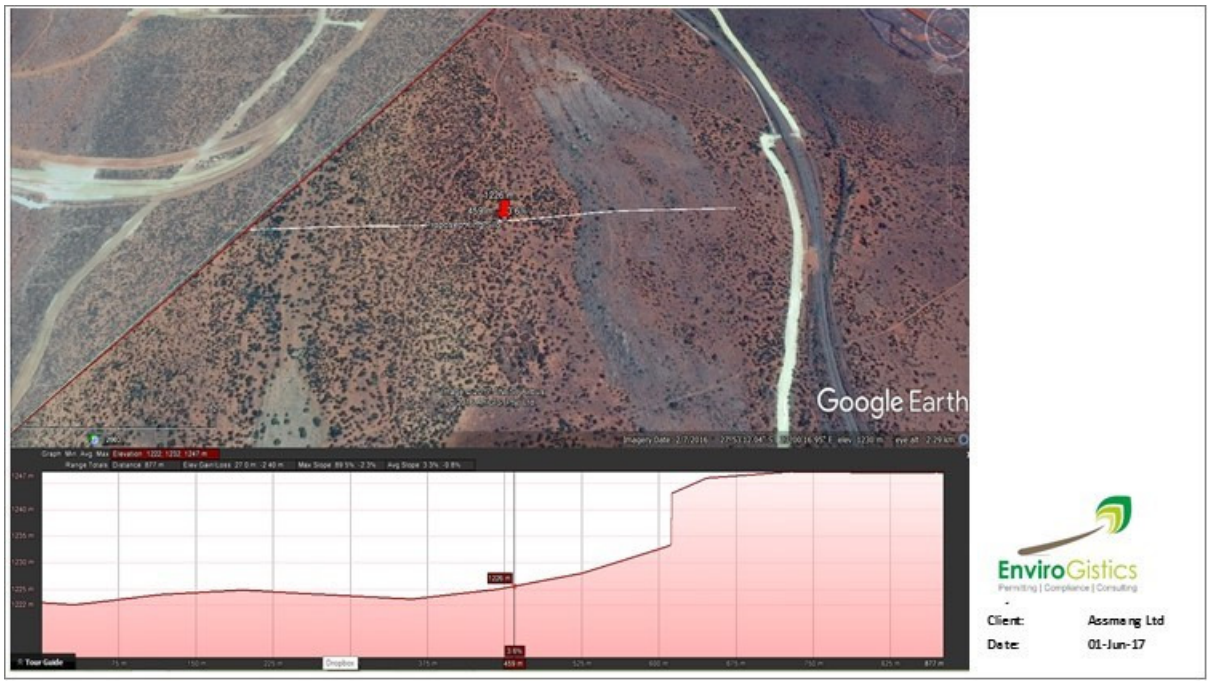


Figure 14: Topographical Setting of King Silo

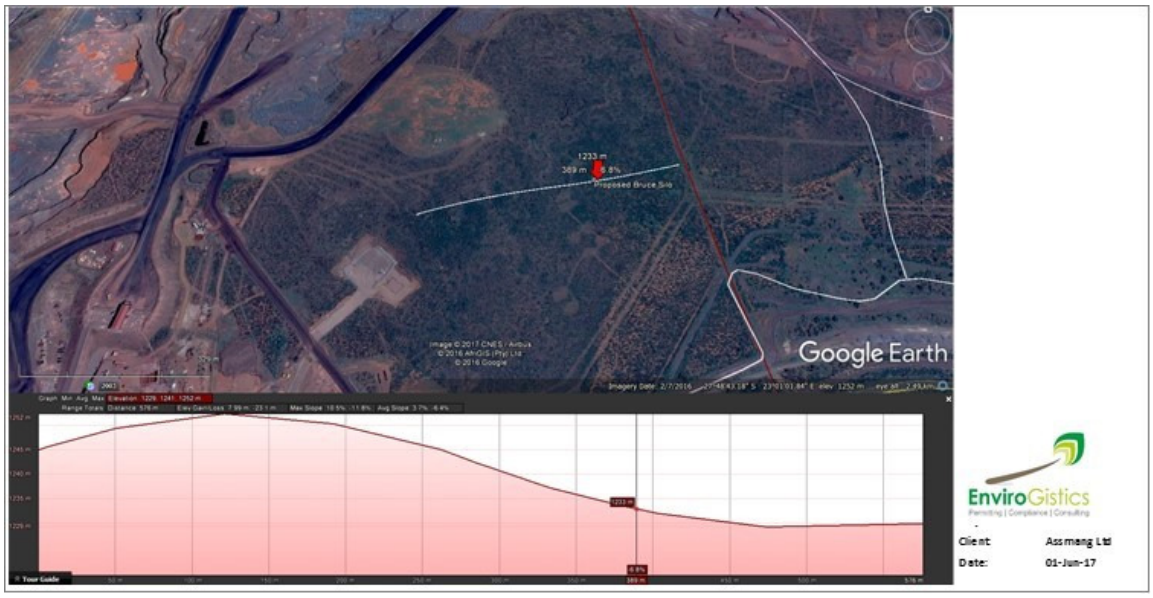


Figure 15: Topographical Setting of Bruce Silo

3.h.v.1.a.3 Geology

The farm Parsons is situated in the northern part of the Maramane Dome. Carbonate rocks of the Campbellrand Subgroup and iron formations of the Asbesheuwels Subgroup of the Transvaal sequence define the dome. The eastern part of Maramane Dome is exposed. The red beds of the Gamagara Formation of the Olifantshoek Group overlie the Transvaal sequence along an angular unconformity to the west.

The south-eastern and central parts of Bruce are characterised by higher topography than the surroundings, which is defined by the Manganore Iron-formation. This includes chert breccia, banded ironstone, shale and laminated iron ore. The ore deposits occur within the Wolhaarkop Breccia, which overlies the dolomites of the Cambellrand Formation and in turn is overlain by the Sishen shale.

The planned area for the Low Grade ROM Plant, is indicating the presence of a possible minable iron ore reserve. This is still being assessed for its economic viability by Khumani as part of Khumani's ongoing exploration activities. Should minable reserves present in this area be deemed feasible to mine, it will have far reaching implications not only on the Low Grade ROM Stockpile, but also on the current approved mining infrastructure, with particular reference to the existing King Mine plant and associated infrastructure. For this reason, the project (the 'project' is low grade sorter, pipeline, silos and magazine. Should the ore reserve be deemed minable, only the low grade sorter plant and king plant infrastructure will be affected. The pipeline, silos and magazines will happen irrespective of the ore reserve outcome) has been proceeding pending further exploration details.

3.h.v.1.a.4 Soils

Soil distribution is strongly linked to the topography of the area. In turn, the topography is closely linked to the underlying surface geology. Hard rock outcrops characterise the topographic highs of the area. The outcrops generally comprise quartzites and the iron ore bearing ironstones. These outcrops form prominent hills or ridges with moderate to steep slopes. In these areas, soils are very shallow to non-existent, occurring as erratic pockets of orange sands within the outcrops. The pockets can be as deep as 1m. These soils are classified as Mispah Form soils, with minor occurrences of Hutton Form soils.

The very gently sloping areas between the hills and ridges are generally underlain by calcrete or dolomite. The calcrete is overlain by orange fine sands, which can be classified as Plooysburg Form soils. The calcrete surface is undulating, with isolated boulder outcrops occurring within the soils. The soil depth is highly variable, being between about 0,3m to greater than 2m. This is the area in which the new infrastructure is located.

On the lower slopes, between the Plooysburg Form soils and the Mispah Form soils are Hutton Form soils. These areas are characterised by abundant, to numerous surface boulders, derived from the outcrops upslope thereof, which have moved by gravity down slope to be deposited on the ground surface. Refer to the following figure for the soil map.

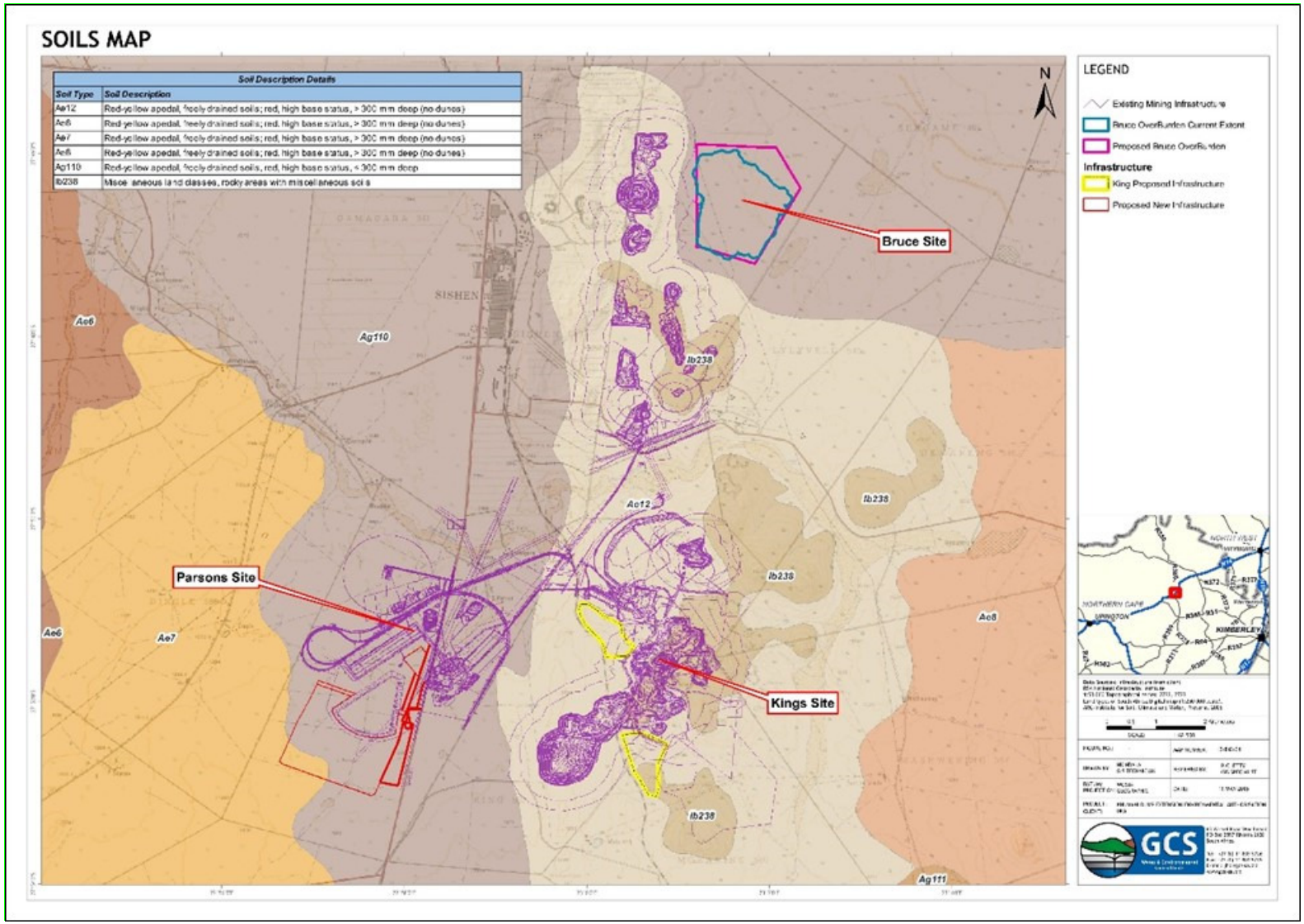


Figure 16: Soils map of Khumani

3.h.v.1.a.5 Ecological Footprint

According to Musina and Rutherford (2006), Khumani falls within four vegetation types (Figure 17) namely Kuruman Thornveld (SVk 9), Kuruman Mountain Bushveld (SVk 10), Kathu Bushveld (SVk 12) and Olifantshoek Plains Thornveld (SVk 13). All elements of the study however fall within the Kuruman Thornveld vegetation type (SVk 9) vegetation type.

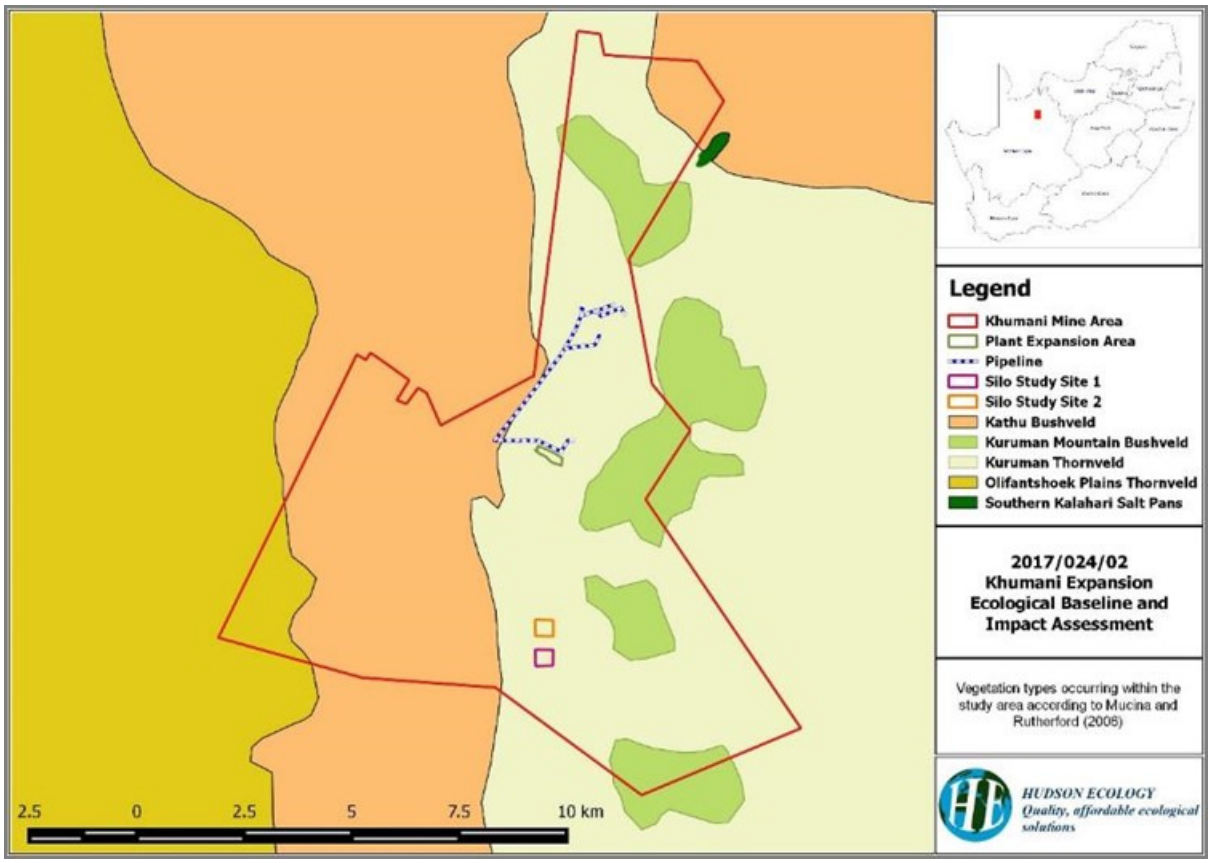


Figure 17: Vegetation Types

The study area falls within savanna vegetation biome of South Africa and Swaziland constitutes the southernmost extension of the most widespread biome in Africa. It represents 32.8% of South Africa (399 600km^2) and 74.2% of Swaziland (12 900km^2). It extends beyond the tropics to meet the Nama-Karoo Biome on the central plateau, the Grassland Biome at higher altitudes towards the east and extends down the eastern seaboard interior and valleys where it grades into Albany Thicket in the Eastern Cape. The most recent and detailed description of the vegetation of this region is part of a national map (Mucina & Rutherford, 2006).

The diversity of African savanna is exceptional, comprising more than 13,000 plant species, of which 8,000 are savanna endemics. Specifically, dry savannas have more than 3,000. This diversity equals that of the South African grasslands and is only exceeded by Fynbos (Knobel, 1999). Similarly, in respect of animal diversity, savannas are without peer, including approximately 167 mammals (15% endemism), 532 birds (15% endemism), 161 reptiles (40% endemism), 57 amphibians (18% endemism) and an unknown number of invertebrates (Knobel, 1999). Flagship species include the Starburst Horned Baboon Spider (*Ceratogyrus bechuanicus*), ground Hornbill (*Bucorvus leadbeateri*), Cape Griffon (*Gyps coprotheres*), Wild dog (*Lycaon pictus*), Short-Eared Trident Bat (*Cloeotis percivali*) and the White Rhino (*Ceratotherium simum*) (Endangered Wildlife Trust, 2002)

Distribution of Kuruman Thornveld SVk9:

This vegetation type occurs in the North-West and Northern Cape Provinces. This vegetation type tends to occur on flats from the vicinity of Postmasburg and Danielskuil (west of the Kuruman Hills), in the south, and extending via Kuruman to Tsineng and Dewar in the North West Province in the north, at an altitude of 1100–1500m (Mucina & Rutherford, 2006).

Vegetation and Landscape Features:

This vegetation type is characterised by an open tree layer dominated by *Vachellia erioloba, V. karroo*, *Rhus lancea* and *Ziziphus mucronata*. The shrub layer poorly developed and dominated mainly by *Grewia flava* and *Tarchonanthus camphoratus*. The grass layer is characterised as open, with a large amount of bare soil in places (Mucina & Rutherford, 2006).

Important Taxa:

Tall Tree: *Vachellia erioloba* (d).

Small Trees: *Vachellia mellifera* subsp. *detinens* (d), *Boscia albitrunca* (d) (Mucina & Rutherford, 2006).

Tall Shrubs: *Grewia flava* (d), *Lycium hirsutum* (d), *Tarchonanthus camphoratus* (d), *Gymnosporia buxifolia* (Mucina & Rutherford, 2006).

Low Shrubs: *Vachellia hebeclada* subsp. *hebeclada* (d), *Monechma divaricatum* (d), *Gnidia polycephala*, *Helichrysum zeyheri*, *Hermannia comosa*, *Pentzia calcarea*, *Plinthus sericeus*. Geoxylic Suffrutex: *Elephantorrhiza elephantina* (Mucina & Rutherford, 2006).

Graminoids: *Aristida meridionalis* (d), *A. stipitata* subsp. *stipitata* (d), *Eragrostis lehmanniana* (d), *E. echinochloidea*, *Melinis repens* (Mucina & Rutherford, 2006).

Herbs: *Dicoma schinzii*, *Gisekia africana*, *Harpagophytum procumbens* subsp. *procumbens*, *Indigofera daleoides*, *Limeum fenestratum*, *Nolletia ciliaris*, *Seddera capensis*, *Tripteris aghillana*, *Vahlia capensis* subsp. *vulgaris* (Mucina & Rutherford, 2006).

Biographically Important Taxa:

([GW]Griqualand West endemic, [K]Kalahari endemic, [S]Southern most distribution in interior of southern Africa)

Small Trees: *Vachellia luederitzii* var. *luederitzii* [K], *Terminalia sericea*[S] (Mucina & Rutherford, 2006)

Tall Shrub: *Vachellia haematoxylon*[K] (Mucina & Rutherford, 2006)

Low Shrub: *Blepharis marginata*[GW] (Mucina & Rutherford, 2006)

Graminoid: *Digitaria polyphylla*[GW] (Mucina & Rutherford, 2006)

Herb: *Corchorus pinnatipartitus*[GW] (Mucina & Rutherford, 2006)

Endemic Taxon:

Herb: *Gnaphalium englerianum* (Mucina & Rutherford, 2006)

Conservation Status:

This vegetation type is classified as least threatened. It has a conservation target of 16%, but none of this vegetation type is conserved in statutory conservation areas. Only approximately 2% of this vegetation type is already transformed and erosion potential is very low. Disturbed areas of this vegetation type are characterised by *Aristida adscensionis*, *A. congesta*, *Enneapogon scoparius*, *Geigeria ornativa*, *Melhania rehmanii*, *Rhigozum trichotomum* (Mucina & Rutherford, 2006).

Site Specific Discussion

The plant expansion area was found to host three species of conservation importance, namely *Vachellia erioloba, Boscia albitrunca* and *Aloe grandidentata*. The locations of these species are given in Figure 18. GPS co-ordinates for these species will be made available to the mine for planning purposes, but not published in a document for public consumption. Only two locations of *Aloe grandidentata* were recorded in Silo site 2 and will need to be relocated the locations are given in Figure 18. Due to the existence of a pan and inherent conservation importance associated with the pan Silo site 1 was deemed infeasible for the purposes of construction of a silo (Figure 19) and for this reason, the site was excluded as an alternative.

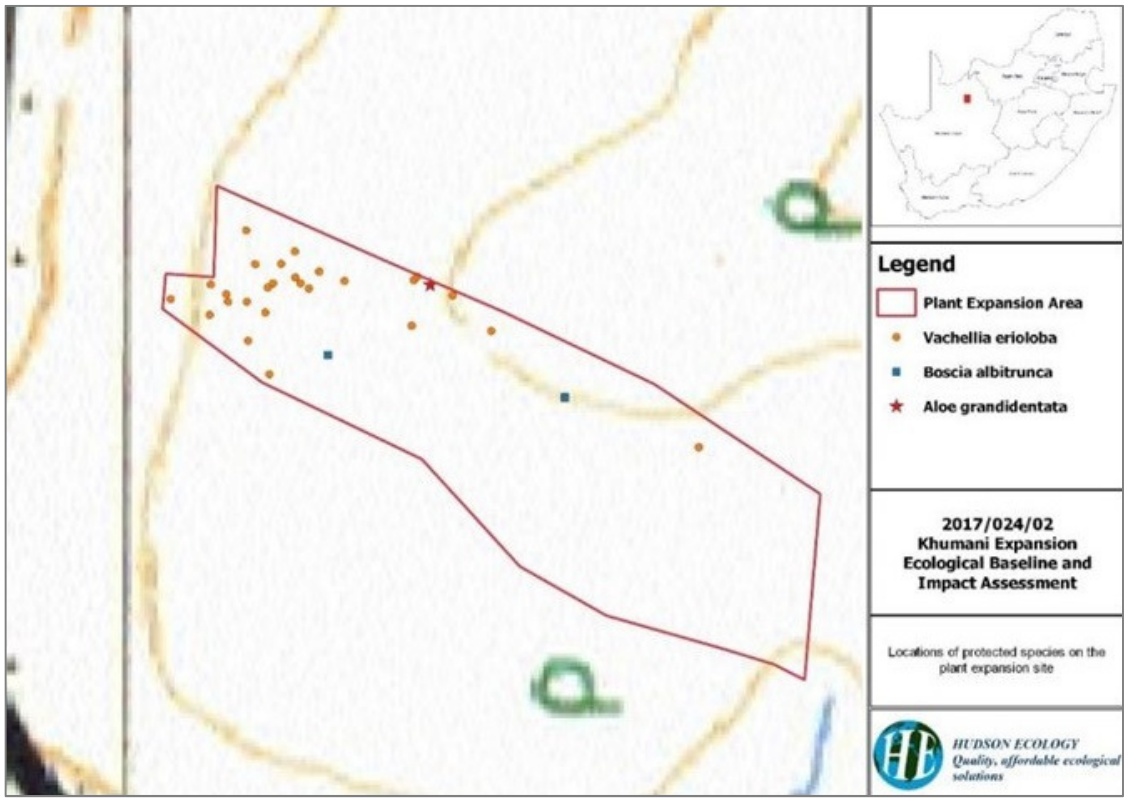


Figure 18: Locations of species of conservation importance in the plant expansion area

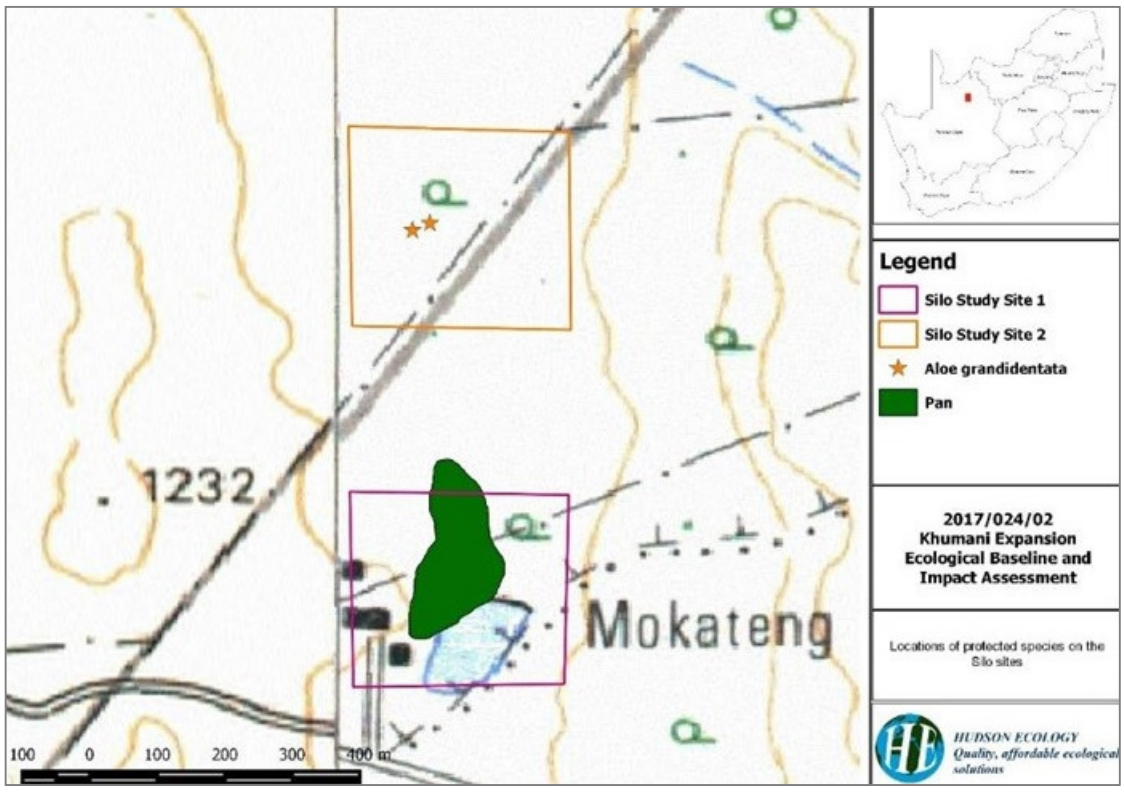


Figure 19: Locations of species of concern and sensitive habitats for the silo sites

The pipeline route, as it is presently proposed, runs through a *Vachellia erioloba* forest on the floodplains of the Gamagara River (Figure 20). Due to the protected status of this species, as well as the inherent conservation

importance of floodplains according to the National Water Act, the specialist would suggest that this section of the pipeline be rerouted to run through the *Vachellia mellifera* thicket to the south of the current route as shown in Figure 20 where possible.

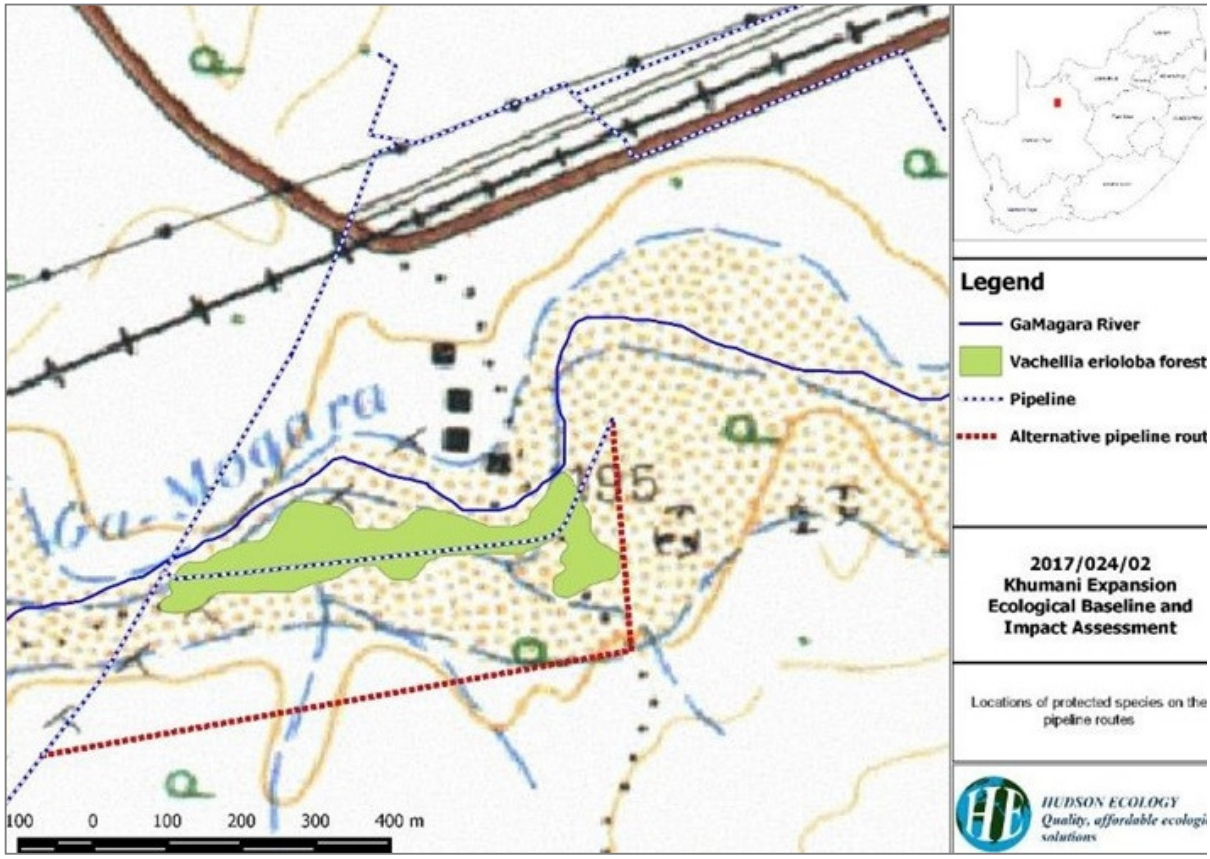


Figure 20: Species of concern associated with the pipeline routes

Ecological Integrity

The ecological integrity of the study area (Figure 21) ranges between low in the *Vachellia mellifera* thicket due to the large scale encroachment that has occurred in this vegetation community resulting in the reduction of important ecological patterns and processes. This vegetation also occurs in patches in the area thus there is little or no linkage of this vegetation community with similar communities.

The *Tarchonanthus – Vachellia* Open Shrubland vegetation can be considered as exhibiting a moderate ecological integrity due to the reduction of important ecological patterns and processes due to anthropogenic impacts in this area. This vegetation also occurs in patches in the area thus there is little or no linkage of this vegetation community with similar communities. The Pan area and floodplain vegetation can be considered as exhibiting high ecological integrity due to the fact that linkage is maintained in the river system and pans inherently lack linkage, most of the ecological patterns and processes are still maintained in these systems.

In keeping with the Precautionary Principle (COMEST, 2005), a higher ecological integrity was assumed when in doubt.

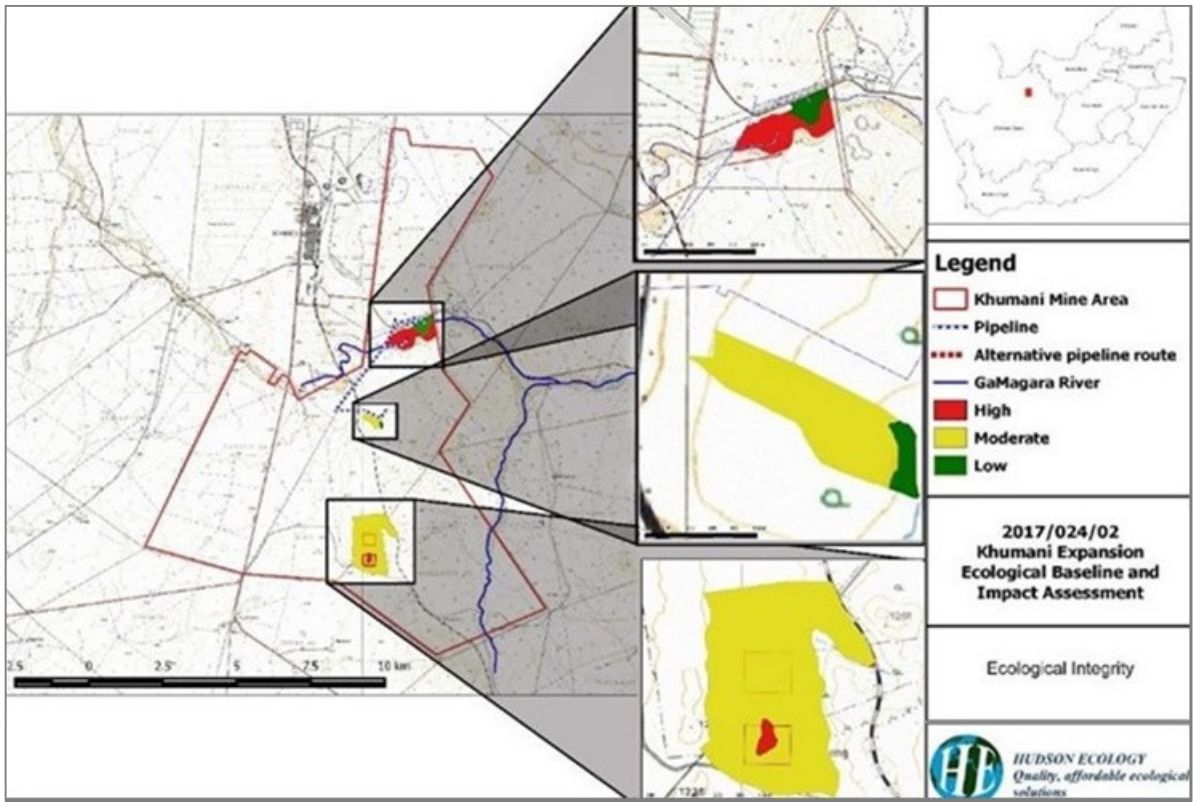


Figure 21: Ecological Integrity of Study Area

Conservation Importance

The conservation importance of the study area (Figure 22) ranges between moderate in the *Vachellia mellifera* thicket due to the large scale encroachment that has occurred in this vegetation community resulting in the exclusion of many species that would usually occur in these areas and subsequent, particularly species of conservation importance.

The Tarchonanthus – Vachellia Open Shrubland and Floodplain vegetation can be considered as exhibiting a high conservation importance due to the fact that these areas host species of conservation importance such as *Aloe grandidentata*, *Vichellia erioloba* and *Boscia albitrunca*. The Pan area can also be considered as exhibiting high conservation importance due to the inherent conservation importance of wetlands enshrined within the national legislation and should be avoided.

In keeping with the Precautionary Principle, a higher conservation importance was assumed when in doubt.

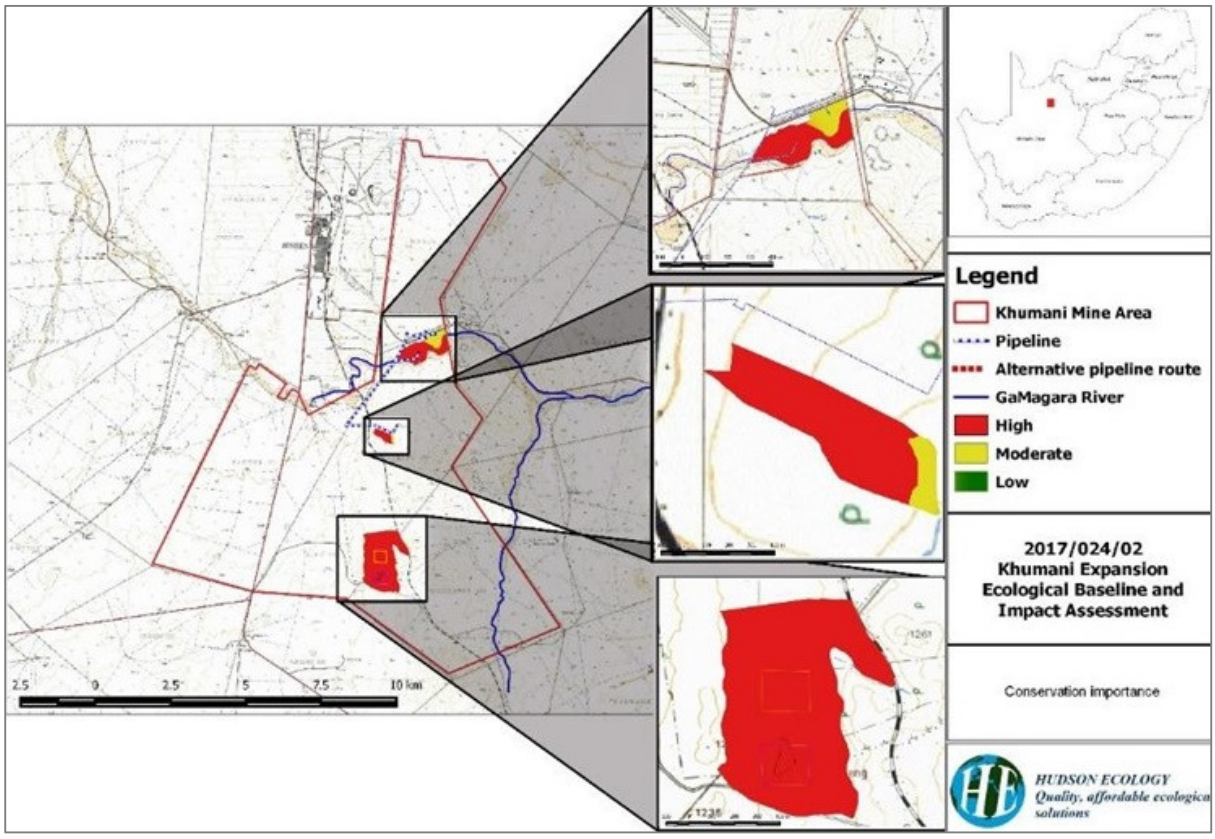


Figure 22: Conservation Importance of Study Area

Fauna

A list of plant species previously recorded in the quarter degree grid in which the study area is situated was obtained from the South African National Biodiversity Institute. Additional species that could occur in similar habitats, as determined from official database searches and reviewed literature, but not recorded in study area were also taken into account. A total of 21 species were determined to possibly be occurring in the study area. The species, listed as possibly occurring in the study area, were evaluated to determine the probability of occurrence in the study area based on habitat suitability. Of the species that are considered to occur within the area under investigation, there were five species that could occur in habitats that are available in the study area. Three of the species of concern, *Aloe grandidentata, Vachellia eroloba and Boscia albitrunca* were recorded in the study area and could occur anywhere within the study area.

Exotic species were not numerous in the study areas although a number of exotic species were recorded in low abundances.

Thirty arthropod species were recorded during the study. No threatened arthropod species were recorded and the likelihood of finding any Red Data List (RDL) invertebrate species is considered low due to the lack of suitable habitat and the proposed development is unlikely to pose a significant conservational threat to species of concern for this taxon.

Eight species of herpetofauna were confirmed during the site visit and no species of conservation importance were recorded during the study. No exotic herpetofauna species are expected to occur on the study site.

Six amphibian species were recorded in the study area during the study, it is unlikely that all six these species would be present on site at drier times. All the recorded species were common species which are not listed or range restricted.

Recorded avifauna species diversity and abundance was low with only 39 species being recorded during the site visit. All the recorded avifauna species were common species which are not listed or range restricted.

All eleven mammal species recorded species recorded are robust and widespread, mostly with the proviso that suitable habitat and sufficient space to maintain home ranges / territories are available. Given no or low-key prosecution, all species are capable of maintaining their presences in remote areas such as the site and surrounding properties.

A regional list of protected faunal species for the Northern Cape Province is included in the Northern Cape Nature Conservation Act No. 9 of 2009 (NCNCA, 2009). No Red Data List (RDL) status has been included in this report and thus the National publication of RDL faunal species list, which was published in 2004 and amended in 2007 (National Environmental Management: Biodiversity Act No. 10 of 2004, NEMBA 2007) and the IUCN red data list, was used to identify listed or threatened species with distribution ranges that overlap with the study area. Optimal habitat for these species as documented by the IUCN 2013 and Birdlife International were then compared to the habitat available within the subject property.
No species of conservation importance were identified within the subject property and due to surrounding anthropogenic activity it is deemed unlikely that a great diversity of species of conservation importance would be found. Of the 12 species of concern that may occur in the study area, one has low probability of occurrence, eight have a medium probability of occurrence and three has a high probability of occurrence. Three of the species with a high probability of occurrence.

The ecological integrity of the study area ranges between low in the *Vachellia mellifera* Thicket to moderate in the *Tarchonanthus – Vachellia* Open Shrubland vegetation and high in the pan and floodplain vegetation systems. The conservation importance of the study area ranges between moderate in the *Vachellia mellifera* Thicket to high in the *Tarchonanthus – Vachellia* Open Shrubland, pan and Floodplain vegetation.

3.h.v.1.a.6 Land Use and Capability

Land Capability

The Mispah Form soils can be classified as wilderness land or non-arable land. Although the remainder of the area is underlain by Plooysburg and Hutton Form soils, due to the variability of soil depth and the presence of isolated rock outcrops within these soils, as well as abundant to numerous scattered boulders on the surface, these soils are classified as low yield grazing land.

The site is located within the mining area and surrounded by infrastructure associated with the mining industry and as a result, has no specific land capabilities other than that of mining and mining related activities.

Land Use

Kumba Iron Ore Mine, a large opencast mining operation, is situated directly north of the farm Parson, northwest of the farm King and west of the farm Bruce. Besides the mining operations, other activities in the region include livestock farming, and small residential communities and business trade. The land use on site is currently mining and mining related operations. The main land uses in the study area are livestock grazing, game farming and mining.

3.h.v.1.a.7 Hydrological Setting

The area of the proposed upgrades falls within the Lower Vaal Water Management Area. The area is situated in the catchment of the Gamagara River, the quaternary catchment being D41J. The site is located on gently sloping to hilly terrain with rivers flowing in a north-westerly direction. The major river traversing the site is the Gamagara River, which flows from the east to west north of the Parsons Plant area. The river then flows north to confluence with the Kuruman River.

Iron ore, diamonds and manganese are mined in the water management area. Farming activity ranges from extensive livestock production and rain fed cultivation to intensive irrigation enterprises at Vaalharts. Kimberley, which straddles the divide between the Lower Vaal and Upper Orange water management areas, is the largest urban centre in the area. More than 50% of the yield from natural water resources in the tributary catchments within the water management area is supplied from groundwater.

Water Management Area and Catchment

Khumani is located in Water Management Area (WMA) 10: Lower Vaal. The Lower Vaal WMA borders Botswana in the North of the Northern Cape Province and lies in the North West Province as well. The major rivers are listed

as Molopo, Harts, Dry Harts, Kuruman and Vaal Rivers. A particular characteristic of the Orange/Vaal WMAs is the extensive inter-catchment transfer of water within WMAs as well as interbasin transfers between these and other adjoining WMAs.

The Lower Vaal WMA is dependent on water releases from the Middle Vaal WMA for meeting the bulk of the water requirements by the urban, mining and industrial sectors within its area of jurisdiction, with local resources mainly used for irrigation and smaller towns.

Water quality is of special concern in the lower reaches of the Harts and the Vaal Rivers because of the high salinity of leach water from the Vaalharts irrigation scheme. To counter this problem, better quality water is transferred from the Orange River to the Douglas Weir in the lower reaches of the Vaal River for blending purposes.

Downstream Water Users

There are no significant surface water users downstream of the mine due to the unreliability of flow in the Gamagara River and its tributaries (Knight Piesold, 2005). Downstream users (primarily the farming community) rely on groundwater abstraction for livestock watering and domestic consumption (Knight Piesold, 2005). During a site visit on the 27th of March 2014, mine personnel confirmed that there are no significant surface water users downstream of the mine area.

Surface Water Settling

Within the region there are no significant dams on the Orange River. There are however various containment dams from which water for irrigation or urban settlement is diverted through canals. Examples of these are Boegoeberg Dam near Groblershoop and the Neusberg Dam near Kakamas. The Rooiberg Dam at Kenhardt is fed by the Hartbees River and is sometimes empty because of the inconsistency of the river flow. In the North of the region is the Leeubos Dam in the Swartbees River.

Although the amount of silt in the Orange River has decreased since the construction of the Gariep Dam, the Boegoeberg Dam was already covered by silt before the building of the Gariep Dam. The quality of the rain water is good in the area since there is no significant air pollution in the area which could result in acid rain.

A bulk water supply scheme from the Vaal River to the arid areas of the Gamagara valley near Postmasburg and North thereof was implemented by the DWA to supply potable water to these areas and thus to enable the development of the large scale mining operations in areas such as Beeshoek, Lime Acres, Sishen, Mamatwane, Hotazel and Blackrock.

Surface Water Quality

The quality of the water from the Orange River has systematically been degrading. Reasons for this are the increasing agricultural and industrial activities which are upstream from Upington, as well as the lessening of the inflow of high quality water from Lesotho. At present, the analysis of the water is as follows.

- pH 7.5;
- conductivity 34 ms/m;
- total hardness (as CaCO2) 152 mg/l;
- Chlorides 120 mg/l.

The quality of the water varies with the seasons, as well as depending on which river feeds the main inflow.

If it is the Orange River, the turbidity, sand and salt content is usually high. If the inflow comes mainly from the Vaal River, one finds a light nutrient content which leads to algae growth. The blue-green algae (nucro-systis) are typically found. The removal of large concentrations of both silt/sand and algae is problematic at times.

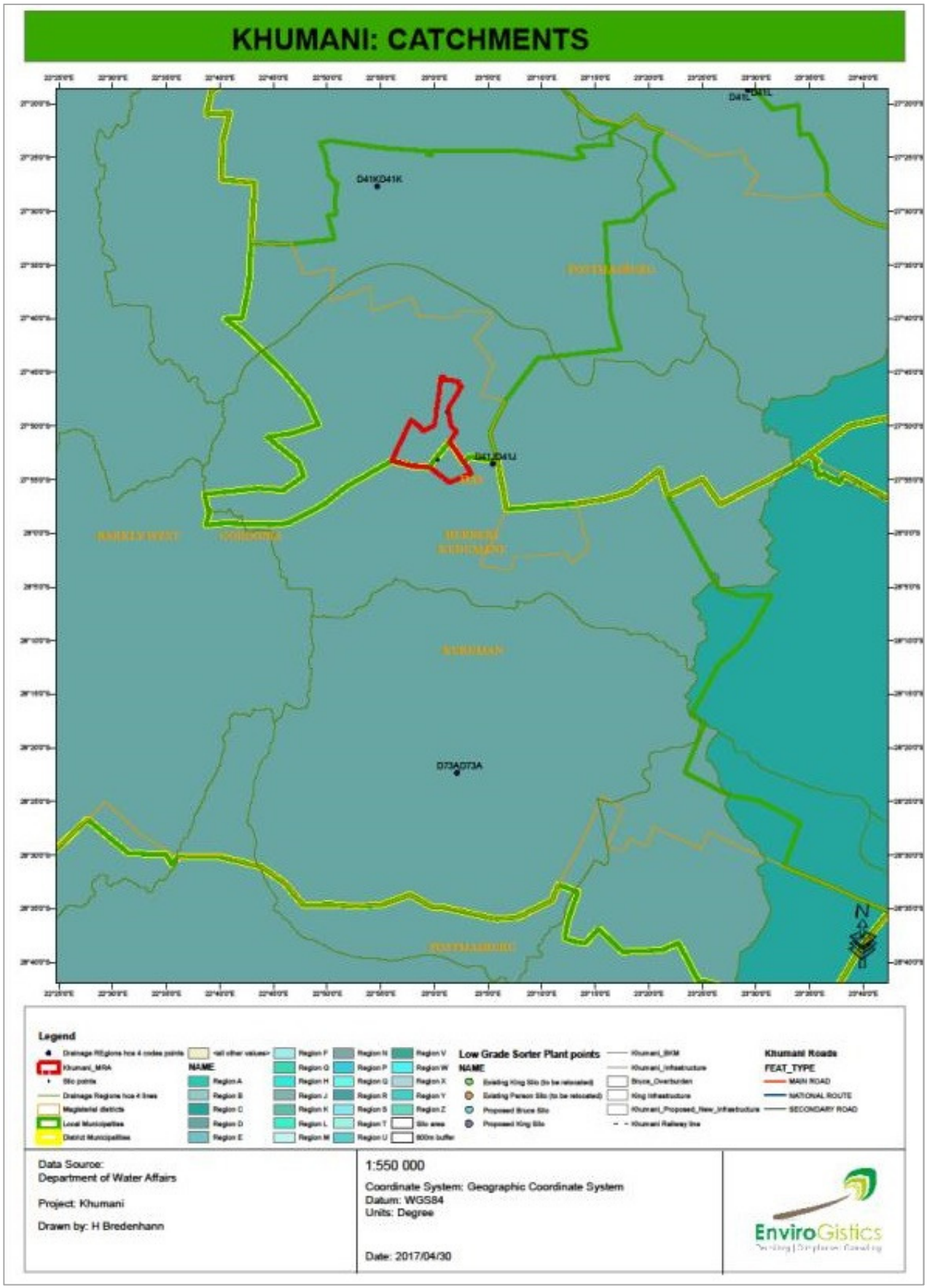


Figure 23: Catchments

3.h.v.1.a.8 Hydrogeological Setting

The hydraulic properties of the area are characterised by shallow dolomitic aquifers with high transmissivities. The lithologies below the dolomites are characterised by a host interbedded chert, ironstones, chert breccias, quartzite's, conglomerates and shales which would be indicative of primary and secondary aquifers. Groundwater flow will mainly be in the form of fracture flow. Porosities vary greatly throughout the lithologies from 1% to 30%.

The dykes in the area that have not been permeated by faulting, form compartments where water is dammed up and greatly disrupt groundwater flow; this phenomenon is known as compartmentalisation. The shallow aquifers are of younger age than the dyke structures and are therefore not intruded by these structures. The implication of this is that the shallow, unconsolidated sandy aquifers were previously not affected by the dyke structures and water could flow freely across the top of the dyke structures and the water levels would be more constant throughout the area. As the water table has now been lowered, the effect of compartmentalisation has now become relevant.

It is likely that the geohydrological regime in the study area is made up of two aquifer systems. The first, the upper, semi-confined aquifer occurs in the calcrete or on the contact between the calcrete and underlying Kalahari clay formation, if the latter is present. This aquifer is, however, often poorly developed in the study area and only sustains livestock and domestic water supply. Where thick clay layers are developed in this aquifer, a recharge lag time to the underlying aquifer(s) often occurs. The second, deeper aquifer is associated with fractures, fissures and joints and other discontinuities within the older hard rock geology of the Transvaal Supergroup and associated intrusives. The aquifer occurs at depths of between 20m and 350m or even deeper in the study area. Where the upper aquifer is present, mining in the BKM mine boundary area will completely destroy it but the dewatering effects of the aquifer will not be so widespread due to its limited depth. The most significant dewatering effect as well as contamination, if present, will be on the deeper secondary aquifer with higher transmissive properties and more dynamic hydraulic properties.

Theoretically, water entering the system will migrate vertically downwards until a perched aquifer is encountered. As the perched aquifer did not feature very prominently during drilling, it is likely that the recharging water might be retarded, but the majority will continue to migrate downwards into the saturated zone. From there it will migrate in the direction of the hydraulic gradient until it eventually enters surface water bodies (i.e. rivers or springs) from where it will flow out as surface water.

Groundwater Use

Groundwater is mainly used for domestic supply, livestock watering and watering of gardens. The borehole yields from the upper calcrete aquifer are relatively low. The deeper fractured rock aquifer is generally associated with higher yields, with exploitable potential.

3.h.v.1.a.9 Sensitive Sites or Wetlands

The proposed development is situated in quaternary catchment D41J in the Lower Vaal Management Area (WMA4), Sub water management area Molopo. The recently published Atlas of Freshwater Ecosystem Priority Areas in South Africa (Nel et al, 2011a) (The Atlas), which represents the culmination of the National Freshwater Ecosystem Priority Areas project (NFEPA), a partnership between SANBI, CSIR, WRC, DEA, DWA, WWF, SAIAB and SANParks, provides a series of maps detailing strategic spatial priorities for conserving South Africa's freshwater ecosystems and supporting sustainable use of water resources. Freshwater Ecosystem Priority Areas (FEPA's) were identified through a systematic biodiversity planning approach that incorporated a range of biodiversity aspects such as ecoregion, current condition of habitat, presence of threatened vegetation, fish, frogs and birds, and importance in terms of maintaining downstream habitat. The Atlas incorporates the National Wetland Inventory (SANBI, 2011) to provide information on the distribution and extent of wetland areas.

No sensitive landscapes or rivers are located within close vicinity (500m) of the proposed listed activities. However, various areas defined as part of the National Freshwater Ecosystem Protection Areas Databased in terms of wetlands are present on the southern portions of the mine. These are associated with the Eastern Kalahari Bushveld Group 3 Depressions.

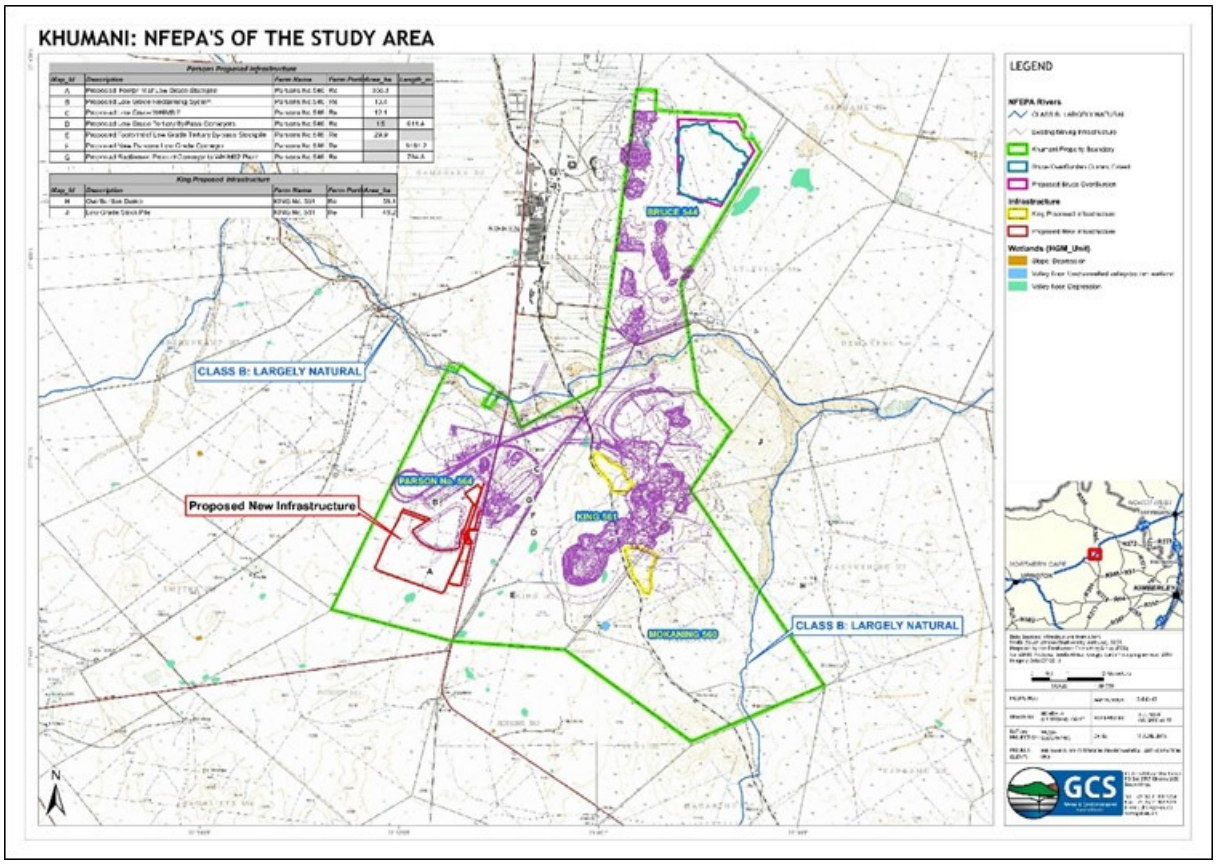


Figure 24: NFEPA Wetlands and Rivers

3.h.v.1.a.10 Air Quality

An air quality monitoring programme has been implemented to measure fallout dust and to monitor ambient concentration of suspended particulate matter (dust).

The air quality data used was from the previous Khumani EMP Amendment 2011, and from the Air Quality Gap Analysis undertaken by Prism EMS (Pty) Ltd in 2015.

Sources that may contribute to air pollution include, blasting activities associated with the mining operations, windblown dust from the various mine stockpiles in the area, vehicle emissions (the N14 runs between the farms Bruce and King), household fuel combustion, biomass burning (from veld fires and agriculture) and various miscellaneous fugitive dust sources (agriculture activities, wind erosion of open areas and vehicle entrainment of dust along unpaved and paved roads).

Sensitive receptor areas in the vicinity of the mine are road users on the N14, the towns of Olifantshoek and Kathu. In addition, there are various farms and homesteads surrounding the proposed area.

Khumani currently has an ambient air and weather monitoring programme that includes dust fall monitoring, Particulate Matter 10 microns (PM10) and meteorological monitoring. Dust fallout is measured at:

- Khumani has 15 single fall out dust monitoring points.

PM10 monitoring is conducted at:

- Seven (7) PM10 monitoring locations (E-Samplers manufactured by Met One Instruments, Inc.) that are located at strategic locations to capture ambient concentration of particulate matter on mine premises [five (5) instruments are co-located with dust monitoring points, while two (2) are independent, stand-alone sites].
- Three (3) monitoring locations with handheld instrument (SKC Deployable Particulate Sampler System with Portable Air Kit for 24-hour sampling) once a month for 24 hours.

A meteorological Station (EM-02-WXT weather station with Vaisala all-weather sensor) measures temperature, relative humidity, rainfall, hail, barometric pressure, as well as wind direction, wind speed, and wind gusts via ultrasonic anemometer. The station is located in the Salvage Yard on the Parsons Farm (coordinates: 27°51'23.05"S; 22°58'34.59"E), east of the Dingleton Road.

3.h.v.1.a.11 Noise

The noise description was from the previous Khumani EIA/EMP as part of the EMP Amendment 2011.

The area in which the proposed the proposed infrastructure upgrades are to be established is characterised by the following environments:

- A rural farming community where the farmsteads are located at large distances apart;
- The existing large opencast operation at Kumba;
- The existing opencast operation at Khumani; and
- The N14 and the railway lines that cross the area.

Areas in the proximity of existing mining activities will already be subjected to the noise emissions from diesel-powered equipment and other mining processes. However, unless farmsteads are very close to these sources of noise, the pre-development ambient noise levels are still expected to be very low.

The major sources of noise from the current mining operations are:

- The diesel powered equipment, such as bulldozers, FELs, construction and haul trucks used during both the construction and operational periods of the mine;
- The drilling of rock inside the open pit;
- The handling of material inside the pit, e.g. the loading of haul trucks;
- The hauling of ore and waste rock from the open pit to the surface;
- The dumping of ore and waste rock at the crushing plant and on the waste rock dumps respectively. During this process the use of reverse warning hooters may be audible over long distances, particularly during the night;
- The crushing and screening of ore in the plant area.

Limited noise may result from the proposed infrastructure, although this may be considered to be insignificant as the proposed location is already surrounded by mining activities.

3.h.v.1.a.12 Cultural and Heritage Setting

<u>Heritage Assessment</u>

The archaeological record for the greater study area consists of the Stone Age and Iron Age. Please refer to Annexure 7.

<u>Stone Age</u>

South Africa has a long and complex Stone Age sequence of more than 2 million years. The broad sequence includes the Later Stone Age, the Middle Stone Age and the Earlier Stone Age. Each of these phases contains sub-phases or industrial complexes, and within these we can expect regional variation regarding characteristics and time ranges. For Cultural Resources Management (CRM) purposes it is often only expected/ possible to identify the presence of the three main phases. Yet sometimes the recognition of cultural groups, affinities or trends in technology and/or subsistence practices, as represented by the sub-phases or industrial complexes, is achievable (Lombard 2011). The three main phases can be divided as follows;

- Later Stone Age; associated with Khoi and San societies and their immediate predecessors. Recently to ~30 thousand years ago.
- Middle Stone Age; associated with Homo sapiens and archaic modern humans. 30-300 thousand years ago.
- Earlier Stone Age; associated with early Homo groups such as Homo habilis and Homo erectus. 400 000- > 2 million years ago.

The larger study area has a wealth of pre-colonial archaeological sites (Morris & Beaumont 2004). Famous sites in the region include the world renowned Wonderwerk Cave to the north of the study area. Closer to Kuruman

two shelters on the northern and southern faces of GaMohaan (in the Kuruman Hills north west of the town) contain Later Stone Age remains and rock paintings. Rock art is known to occur at Danielskuil to the north east and on Carter Block (Morris 2008). Middle Stone Age material is on record around the study area.

Archaeological surveys have shown rocky outcrops and hills, drainage lines, riverbanks and confluences to be prime localities for archaeological finds and specifically Stone Age sites, as these areas where utilized for settlement of base camps close to water and hunting ranges.

Iron Age

Iron Age expansion southwards past Kuruman into the Ghaap plato and towards Postmasburg dates to the 1600's (Humphreys, 1976 and Thackeray, 1983). Definite dates for Tswana presence in the Postmasburg area are around 1805 when Lichtenstein visited the area and noted the mining activities of the Tswana (probably the Thlaping) tribes in the area. The Thlaro and Thlaping settled the area from Campbell in the east to Postmasburg and towards the Langeberg close to Olifantshoek in the north west before 1770 (Snyman, 1988). The Korana expansion after 1770 started to drive the Thlaro and Thlaping further north towards Kuruman (Shillington, 1985).

Anglo-Boer War

There are no battlefields or concentration camp sites close to the study area.

Cultural Landscape

The mine was constructed from October 2006 (http://www.assmang.co.za/content.asp?pg=7), prior to this the area was undeveloped and characterised by sparse vegetation. The surrounding area have been characterised by intensive mining activities.

No archaeological sites or material of significance was recorded during the survey and an independent paleontological study has been commissioned. No further mitigation prior to construction is recommended in terms of the archaeological component of Section 35 for the proposed development to proceed. In terms of the built environment of the area (Section 34), no standing structures older than 60 years occur within the study areas. In terms of Section 36 of the Act no burial sites were recorded. If any graves are located in future they should ideally be preserved in-situ or alternatively relocated according to existing legislation. No public monuments are located within or close to the study area. The study area is surrounded by existing mining developments and infrastructure and the proposed development will not impact negatively on significant cultural landscapes or viewscapes. During the public participation process conducted for the project no heritage concerns was raised.

Paleontologically Assessment

According to the specialist study undertaken during June 2017, the development footprint is underlain by Palaeoproterozoic Gamagarra Formation sediments that are not considered to be paleontologically sensitive.

The site is capped by superficial (Quaternary) deposits considered to be of low to very low palaeontological sensitivity, because the impact area is degraded and not situated within or near pan, alluvial or spring deposits (considered to be potentially fossiliferous in the region). The proposed development may proceed as far as the palaeontological heritage is concerned and a phase 1 impact study (site visit) is not necessary, provided that all excavation activities are restricted to within the boundaries of the development footprint. In the unlikely event of fossil discovery within the Quaternary overburden during the operational phase of the development (i.e. modern-looking but more or less lithified animal bones and teeth), a professional palaeontologist must be called in immediately to confirm and record the finds. In the meantime, ex situ remains must be wrapped in paper towels or heavy duty tin foil and stored in a safe place. The material should not be washed or cleaned in any way. In situ material must be kept in place and protected from further damage by covering it with light but rigid object like a box, bucket or metal sheet until further confirmation by the palaeontologist.

3.h.v.1.a.13 Socio-Economic Setting

The proposed expansion project falls for the greater part within the Northern Cape Province, John Taolo District Municipality and Gamagara Local Municipality.

In order to assess the potential impact of the proposed project, it is important to consider the particular Province, district municipalities, and local municipalities as well as the nearby towns in a holistic way.

Population

The population size (persons) for the Gamagara District Municipality increased by 25.47% over the 1995 to 2011 time period, whereas the John Taolo Gaetsewe District Municipality only grew by 12.49% over the same period. Households have also grown over the 1995 to 2011 time period, with the Gamagara Local Municipality showing a 30.36% increase and the John Taolo Gaetsewe District Municipality by 27.23%.

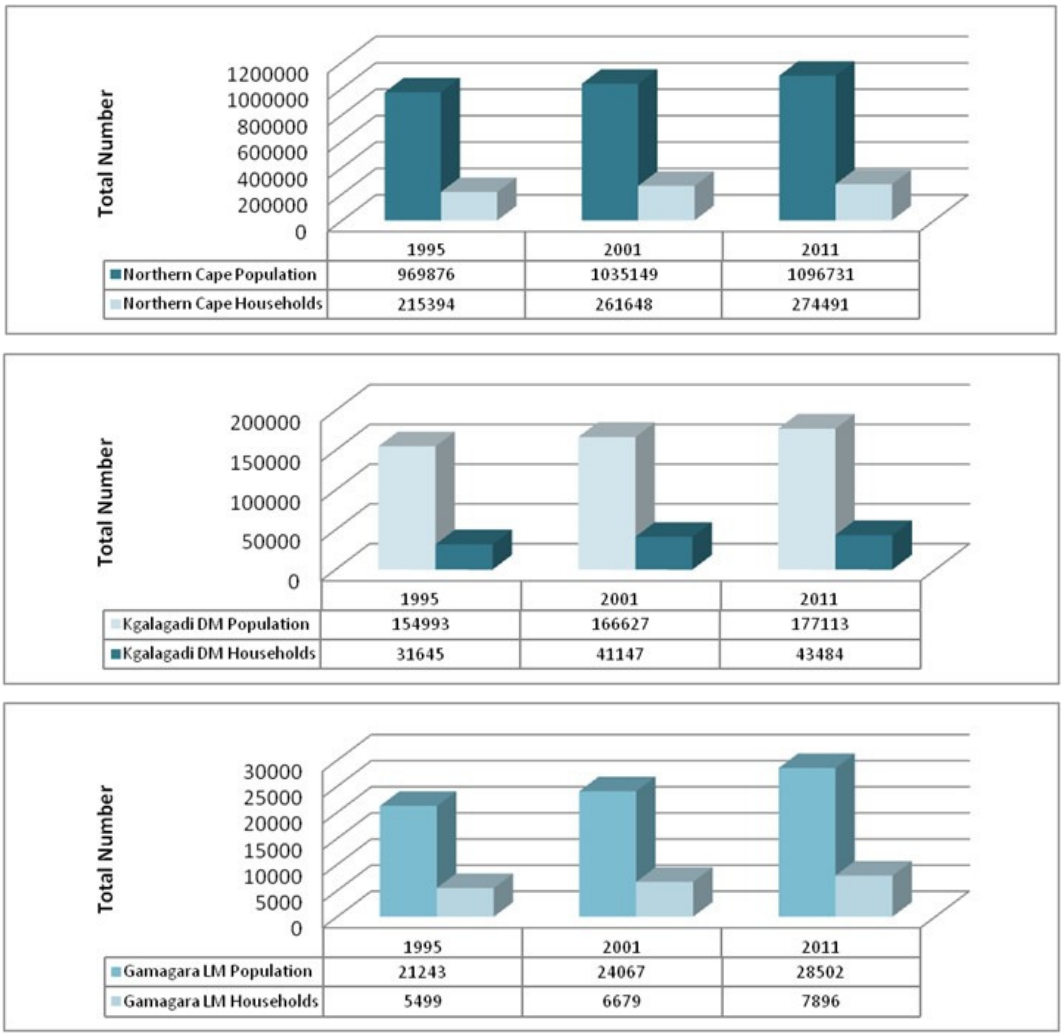


Figure 25: Population and household size (1995 – 2011) Age

Age

It is important to assess the age distribution of persons in order to determine both the current and future needs of an area. Age is an important indicator as it relates to education, skills and dependency. A young population may require an improved educational system, whereas an older society may need an accented focus on healthcare. The largest percentage of people in the Gamagara Local Municipality, 71.9% fall within the working age category (16-64 years of age). 25.5% of the population are between the age of 0 and 14. And the elderly population forms 2.5% of the municipality's population. (Statistics South Africa, census 2011) Persons younger than 15 years of age do not form part of the Economically Active Population (EAP) of the area. The age and sex distribution for the Gamagara Local Municipality is depicted.

Education

The largest percentage (89,5%) of the Gamagara Local Municipality population has obtained some form of primary schooling. 24.9% of the population has attained matric and a further 3.6% with higher education.

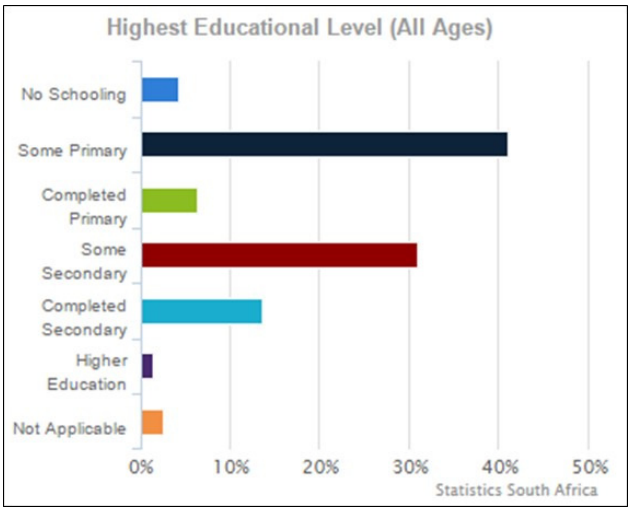


Figure 26: Education Level (2011)

Strategic Development Framework

According to the IDP, the SDF also indicate the Impact of development activities planned in this document on the environment and rate impacts as low, medium and high. National Biodiversity Strategy According to the NBS, biodiversity considerations are to be integrated into all other strategies and plans at local government level, such as poverty eradication and developmental programmes. The NBS provides the map for achieving the biodiversity related objectives contained, i.e. reducing the rate of loss of biodiversity by 2010. The goal of the NBS was therefore always to conserve and manage biodiversity to ensure sustainable benefits to the people of South Africa, through co-operation and partnerships that build on strengths and opportunities.

According to the National Spatial Biodiversity Assessment (NSBA), Tsantsabane and the broader Siyanda was not identified as a priority with regard to biodiversity. However, it continues to be important to address the issue, since biodiversity makes a substantial contribution to the livelihoods of rural communities, in the form of housing, fuel, food and medicines. The results of the assessment also highlighted that many people have become alienated from nature, through apartheid policies and processes like urbanization. Hence, much more needs to be done to make conservation more inclusive and relevant to people's lives.

With all the development happening in the area, the demands for water have increase as in the rest of the semi-arid province.

The area is rich in minerals which has historically been the mainstay of the area's economy. Iron and manganese mining is an important activity in the economy of the area. Haematite deposits in the form of ferriginised banded 15 ironstone occur as a cake or capping to the Gamagara hills which lies between Postmasburg and Sishen. The ore is very pure and typically consist of 95% ferric oxide. There are significant undeveloped mineral resources left in the area that can contribute to future economic growth in the area, depending on the future viability of exploiting the minerals. Large areas of un-rehabilitated and poorly rehabilitated mining activities (current and closed) have a significant negative effect on the scenic environment in the area, especially in the mountainous areas.

Environmental Management Framework

According to the IDP the EMF further indicates strategies focusing on the alleviation of potential key development / environment friction areas by providing direction in respect of how these friction areas should be dealt with. The following strategies have been compiled and in future Tsantsabane will align its own environmental planning to these:

- Strategy for the protection and conservation of high quality natural vegetation
- Protection of sensitive environmental features on large properties
- Protection of sensitive environmental features on large properties across Siyanda

- Strategy for the protection of sensitive environmental features, surrounded or abutted by small properties.

Internal Strategic Perspective

According to the Lower Vaal Water Management Area: Overview of Water Resources Availability and Utilisation Report, the GDP of the Lower Vaal WMA was R9, 8bn in 1997. The most important magisterial districts in terms of contribution to GDP in this WMA are shown below:

- Kimberley 29,6%
- Postmasburg 14,8%
- Lichtenburg 9,6%
- Kuruman 8,9%
- Vryburg 8,3%.

The most important economic activities of the WMA are:

- Mining 23%
- Government 16%
- Trade 15%
- Agriculture 14%

The main agricultural activities identified include livestock and dryland cropping. Livestock includes beef and dairy cattle, goats, non-wooled sheep, pigs and ostriches. Crops grown are mainly maize, but also sunflower, cotton, groundnuts and vegetables. The mining activities in this WMA include mining for diamonds, iron ore, manganese and other minerals such as lime stone, dolomite and amphibole asbestos. Kimberlite diamonds are mined at the Finsch Mine at Lime Acres, one of the most important diamond producing mines of the De Beers Company. Kimberley is also an important diamond mining area, which is known for its high quality diamonds. The Sishen Mine, currently the major supplier of iron ore in the country, is located in the Lower Vaal WMA. This mine has a mineable depth of 30 metres and was opened in 1953 as part of Iscor's expansion strategy. In 1997, it produced approximately 2 400 million ton iron ore per year. An increase in mining and transportation activities can be expected with the construction of the Sishen-Coega railway line that will link Sishen with the Coega initiative near Port Elizabeth. Other important mining areas includes Kudumane (iron, manganese and asbestos etc.), Ganyesa (diamonds, mica group clay and salt) and Taung (diamonds, limestone, dolomite and salt). Since manufacturing production is far less than mining production, it can be deduced that only a small percentage of beneficiation is done locally. This implies that a large percentage of raw mining products are exported to other areas for beneficiation. Lichtenburg is the largest manufacturing town in the WMA, where manufacturing includes cement and cheese factories. Kimberley is the second largest manufacturing town, but its output is half that of Lichtenburg.

The trade sector is concentrated in wholesale of primary products and related services to the community. Main products of trade in this WMA are:

1. diamonds (for export)
2. food retail related products
3. ostrich-related products

3.h.v.1.b Type of Environment Affected by the Proposed Activity

Please refer to the preceding section detailing the environmental setting in which the mine is located. The proposed activities will be located in already disturbed areas but will still necessitate the following:

- Clearing of Vegetation
- Removal and stockpiling of soils;
- Shaping of the landscape; and
- Establishment of infrastructure.

These activities will therefore impact on the following:

- Ecological Settling (removal of ecology and potential spread of invasive species);

- Soils;
- Topography; and
- Natural run off.

3.h.v.1.c Description of the Current Land Uses

The area in which the proposed project is located is zoned as mining.

The primary land use in the municipality is mining and agriculture with iron ore and manganese being the prime minerals mined in the area and the main focus of agriculture being on cattle and goats. Game farming and hunting are increasing in popularity.

3.h.v.1.d Description of Specific Environmental Features and Infrastructure on Site

No specific environmental features are present within the area where the proposed project is planned, i.e. all listed activities are planned outside of 500m from any watercourse. The ecological study has identified sensitive species which would require permit for removal and/or relocation. It should however be noted that this area has proven rich in archaeological artefacts. With the excavation activities artefacts and/or graves below surface and currently not known may be found. In this event, all activities should cease, SAHRA should be contacted and the necessary processes must be followed.

3.h.v.1.e Environmental and Current Land Use Map

Kumba Iron Ore Mine (Kumba), a large opencast mining operation of the Anglo American Group, is situated directly north of the farm Parson, west of the farm Bruce, and north west of the farm King. To the east of the farm King, small scale mining activities are undertaken by 3rd parties. The areas surrounding Khumani therefore, is characterised by mining activities, mainly opencast. Besides the mining operations, other activities in the region include livestock farming. These areas are mainly located to the south of the farm Mokaning and to the west of the farm Parson. The closest town to the mine is Kathu located approximately 15km north of the mine.

The main land uses in the study area are:

- Livestock grazing;
- Game farming; and
- Mining.

In terms of the municipal Strategic Development Framework the area is zoned for mining activities.

As mentioned before, the proposed activities are located within the mining area and surrounded by infrastructure associated with the mining industry and as a result, has no specific land capabilities other than that of mining and mining related activities.

There are no substantial areas of arable land or wetland areas within the site, some pans (depressions) does exists on site, but will retain a 500m from the proposed activities. The figure overleaf present a graphic illustration of the environmental setting in which the project is located.

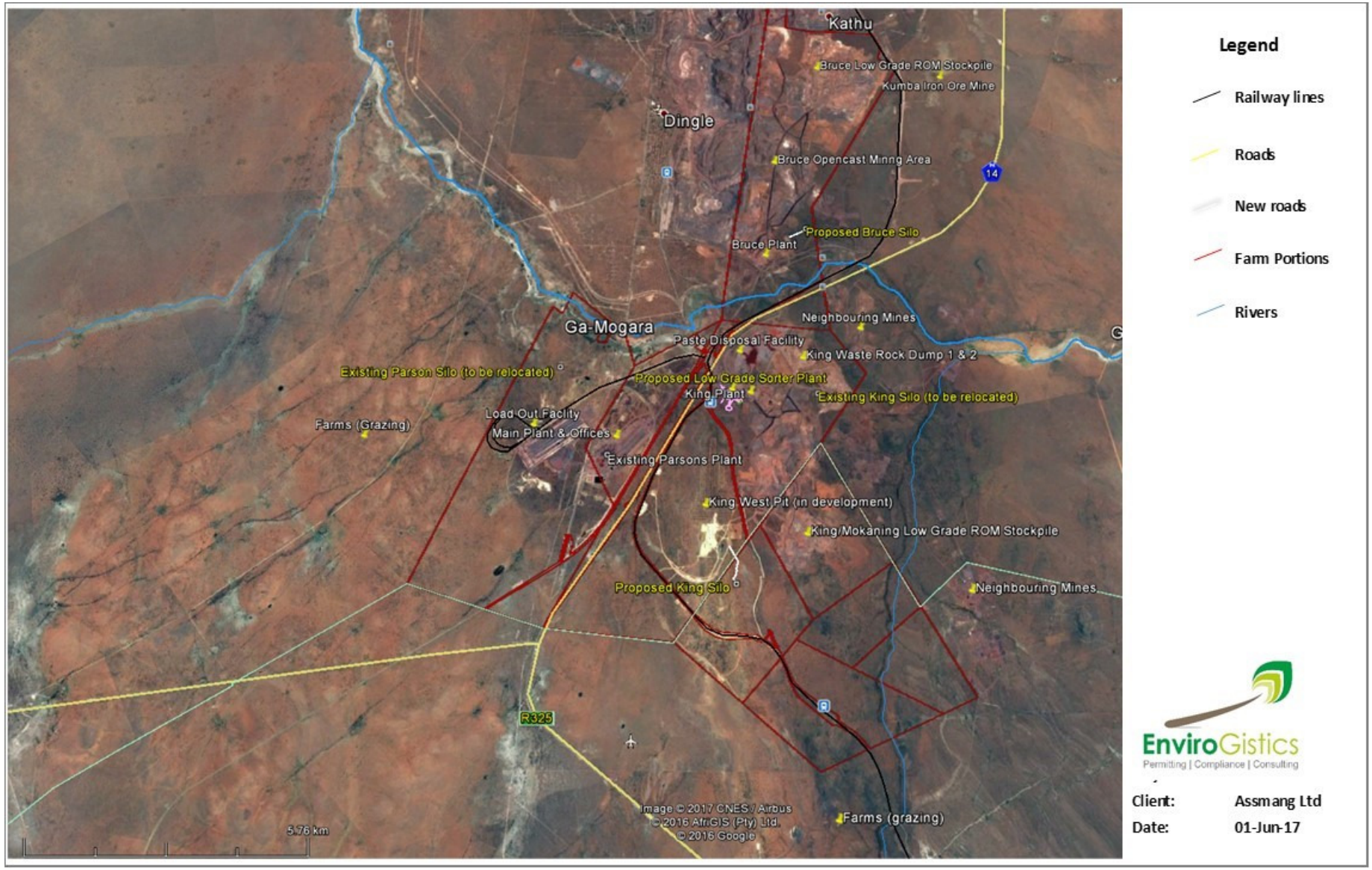


Figure 27: Project Location within overall Land Use Setting

3.h.vi Methodology used in determining and ranking the Nature, Significance, Consequences, Extent, Duration and Probability of potential Environmental Impacts and Risks

The following section presents the criteria used to assess the potential impacts presented in the previous section.

3.h.vi.1 Criteria of assigning significance to potential impacts

The evaluation of impacts is conducted in terms of the criteria detailed in Table 9 to Table 14. The various environmental impacts and benefits of this project are discussed in terms of impact status, extent, duration, probability, and intensity. Impact significance is regarded as the sum of the impact extent, duration, probability and intensity and a numerical rating system has been applied to evaluate impact significance. Therefore, an impact magnitude and significance rating is applied to rate each identified impact in terms of its overall magnitude and significance (Table 14).

In order to adequately assess and evaluate the impacts and benefits associated with the project, it was necessary to develop a methodology that would scientifically achieve this and to reduce the subjectivity involved in making such evaluations. To enable informed decision-making it is necessary to assess all legal requirements and clearly defined criteria in order to accurately determine the significance of the predicted impact or benefit on the surrounding natural and social environment.

3.h.vi.1.a Impact Status

The nature or status of the impact is determined by the conditions of the environment prior to construction and operation. A discussion on the nature of the impact will include a description of what causes the effect, what will be affected and how it will be affected. The nature of the impact can be described as negative, positive or neutral.

Table 9: Status of Impact

Rating	Description	Quantitative rating
Positive	A benefit to the receiving environment.	P
Neutral	No cost or benefit to the receiving environment.	-
Negative	A cost to the receiving environment.	N

3.h.vi.1.b Impact Extent

The extent of an impact is considered as to whether impacts are either limited in extent or if it affects a wide area or group of people. Impact extent can be site specific (within the boundaries of the development area), local, regional or national and/or international.

Table 10: Extent of Impact

Rating	Description	Quantitative rating
Low	Site Specific; Occurs within the site boundary.	1
Medium	Local; Extends beyond the site boundary; Affects the immediate surrounding environment (i.e. up to 5 km from the Project Site boundary).	2
High	Regional; Extends far beyond the site boundary; Widespread effect (i.e. 5 km and more from the Project Site boundary).	3
Very High	National and/or international; Extends far beyond the site boundary; Widespread effect.	4

3.h.vi.1.c Impact Duration

The duration of the impact refers to the time scale of the impact or benefit.

Table 11: Duration of Impact

Rating	Description	Quantitative rating
Low	Short term; Quickly reversible; Less than the project lifespan; 0 – 5 years.	1
Medium	Medium term; Reversible over time; Approximate lifespan of the project; 5 – 17 years.	2
High	Long term; Permanent; Extends beyond the decommissioning phase; >17 years.	3

3.h.vi.1.d Impact Probability

The probability of the impact describes the likelihood of the impact actually occurring.

Table 12: Probability of Impact

Rating	Description	Quantitative rating
Improbable	Possibility of the impact materialising is negligible; Chance of occurrence <10%.	1
Probable	Possibility that the impact will materialise is likely; Chance of occurrence 10 – 49.9%.	2
Highly Probable	It is expected that the impact will occur; Chance of occurrence 50 – 90%.	3
Definite	Impact will occur regardless of any prevention measures; Chance of occurrence >90%.	4
Definite and Cumulative	Impact will occur regardless of any prevention measures; Chance of occurrence >90% and is likely to result in in cumulative impacts	5

3.h.vi.1.e Impact Intensity

The intensity of the impact is determined to quantify the magnitude of the impacts and benefits associated with the proposed project.

Table 13: Intensity of Impact

Rating	Description	Quantitative rating
Maximum Benefit	Where natural, cultural and / or social functions or processes are positively affected resulting in the maximum possible and permanent benefit.	+ 5
Significant Benefit	Where natural, cultural and / or social functions or processes are altered to the extent that it will result in temporary but significant benefit.	+ 4
Beneficial	Where the affected environment is altered but natural, cultural and / or social functions or processes continue, albeit in a modified, beneficial way.	+ 3
Minor Benefit	Where the impact affects the environment in such a way that natural, cultural and / or social functions or processes are only marginally benefited.	+ 2
Negligible Benefit	Where the impact affects the environment in such a way that natural, cultural and / or social functions or processes are negligibly benefited.	+ 1
Neutral	Where the impact affects the environment in such a way that natural, cultural and / or social functions or processes are not affected.	0
Negligible	Where the impact affects the environment in such a way that natural, cultural and / or social functions or processes are negligibly affected	- 1
Minor	Where the impact affects the environment in such a way that natural, cultural and / or social functions or processes are only marginally affected.	- 2
Average	Where the affected environment is altered but natural, cultural and / or social functions or processes continue, albeit in a modified way.	- 3
Severe	Where natural, cultural and / or social functions or processes are altered to the extent that it will temporarily cease.	- 4
Very Severe	Where natural, cultural and / or social functions or processes are altered to the extent that it will permanently cease.	- 5

3.h.vi.1.f Impact Significance

The impact magnitude and significance rating is utilised to rate each identified impact in terms of its overall magnitude and significance.

Table 14: Impact Magnitude and Significance Rating

Impact	Rating	Description	Quantitative rating
Positive	High	Of the highest positive order possible within the bounds of impacts that could occur.	+ 12 – 16
	Medium	Impact is real, but not substantial in relation to other impacts that might take effect within the bounds of those that could occur. Other means of achieving this benefit are approximately equal in time, cost and effort.	+ 6 – 11
	Low	Impacts is of a low order and therefore likely to have a limited effect. Alternative means of achieving this benefit are likely to be easier, cheaper, more effective and less time-consuming.	+ 1 – 5
No Impact	No Impact	Zero impact.	0
Negative	Low	Impact is of a low order and therefore likely to have little real effect. In the case of adverse impacts, mitigation is either easily achieved or little will be required, or both. Social, cultural, and economic activities of communities can continue unchanged.	- 1 – 5
	Medium	Impact is real, but not substantial in relation to other impacts that might take effect within the bounds of those that could occur. In the case of adverse impacts, mitigation is both feasible and fairly possible. Social cultural and economic activities of communities are changed but can be continued (albeit in a different form). Modification of the project design or alternative action may be required.	- 6 – 11
	High	Of the highest order possible within the bounds of impacts that could occur. In the case of adverse impacts, there is no possible mitigation that could offset the impact, or mitigation is difficult, expensive, time-consuming or a combination of these. Social, cultural and economic activities of communities are disrupted to such an extent that these come to a halt.	- 12 - 16

3.h.vii Impacts and Risks identified including the Nature, Significance, Consequence, Extent, Duration and Probability of the Impacts, including to which these Impacts

The following table presents the list of impacts, and indicates the nature, extent, duration, probability and significance, as well as whether these impacts can be avoided, are reversible or will result in residual impacts.

Table 15: Planning and Construction Phase Impact Assessment and Management Measures (Significance before Mitigation –SbM; Significance after Mitigation – SaM)

Name of Activity	Impact Area	Potential Impacts	Aspects								Mitigation Type	Rating Post Measures					
Activities	Impact Area			Status	Extent	Duration	Probability	Intensity	SbM	Reversible (R), Irreplaceable Damage (ID) or Can be Avoided (CbA)	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
Planning Phase (and throughout LOM to ensure Legal Compliance)																	
Legal Requirements (Environmental Permits)	South Africa Enviro-Legal Requirements	Unlawful water and waste (mine residue) activities, which could lead to NWA Directives and Section 24G Rectification fines.	Legal Compliance.	N	-4	-3	-2	-5	-14	CbA	A legal assessment of all activities must be undertaken on site must be undertaken annually to ensure that all Environmental Authorisations are in place, implemented and activities licensed. The mine must familiarise themselves with the NEMWA Regulations for the management of Mine Residue Deposits. Those included in previous approved EMPs are considered lawful under the NEMWA, however when reworking, rehabilitation, stockpiling are taking place, and not included into the previous EMP, these activities are unlawful and may require a Waste License. All legally appointed personnel responsible or involved in approved activities on site must receive training on the requirements of the Environmental Authorisations. Quarterly integral audits must be undertaken on the lawful implementation of the WUL. The Environmental Authorisation must be available on site at all times. The legal register must be updated to indicate all approved activities on site (NEMA, NEMWA, ECA and MPRDA).	P	4	3	5	5	17
Construction Phase																	
Activity 1 - Land and Footprint Clearance Construction & widening of Roads:	Geology	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Topography	Direct impact: Alteration of topography. Removal of vegetation and the associated shaping of the area to prepare footprint for construction will allow for increased surface water runoff,	Footprint clearance	N	-2	-3	-3	-2	-10	R	Construction areas must be clearly demarcated to control movement of personnel and vehicles, providing clear boundaries for construction sites in order to limit the spread of impacts. Markers and pegs will be erected and maintained	N	-1	-3	-2	-1	-7

Name of Activity	Impact Area	Potential Impacts	Aspects								Mitigation Type	Rating Post Measures					
Activities	Impact Area			Status	Extent	Duration	Probability	Intensity	SbM	Reversible (R), Irreplaceable Damage (ID) or Can be Avoided (CbA)	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
Development of roads to the King Silos. Should the King/Mokaning access road be used, a link of approximately 1.5km to this road will be required. Upgrades of roads to the Bruch Silos, may require an extension of approximately 450m to existing roads. **Construction of Silos and Magazines at Bruce:** Two magazine areas, an emulsion silo and an ammonium nitrate Silo). This area will include all ancillary required infrastructure. Activity 1 - Land and Footprint Clearance **Construction of**		which may lead to change in topographical characteristics of the area.									along the boundaries of the working areas, access roads, haul roads and paths before commencing any work. If proved insufficient for control, these shall be replaced by fencing. Draw up a procedure clearly reflecting the method and phases of clearance of vegetation only in areas where construction will take place. Removal of vegetation must be undertaken in a phased approach to limit surface exposure. Erosion control measures must be implemented early in the construction phase. Clean and dirty water separation must be implemented early in the construction phase, especially down-gradient of construction areas. Where possible existing roads must be utilised. Linear infrastructure must follow for as far as practically possible the natural contours of the area.						
	Soil, Land Use and Land Capability	Direct impact: The removal and stockpiling of topsoil may lead to a loss of soil resource and land capability through erosion of the stockpiles and chemical and physical degradation.	Footprint clearance	N	-1	-4	-5	-3	-13	CbA	Adhere to Soil Stripping, Soil Stockpiling and Soil Management Plan as part of the original EMP (Soil Utilisation Guideline). Prior to construction of the road and the plant the soil will be stripped and placed in close proximity to the facilities. It is recommended that the soil and overburden be stockpiled as 1-1.5m berms around the roads and plant area. Remove 30cm of soil or until hard rock is	N	-1	-3	-5	-1	-10

Name of Activity	Impact Area	Potential Impacts	Aspects								Mitigation Type	Rating Post Measures					
Activities	Impact Area			Status	Extent	Duration	Probability	Intensity	SbM	Reversible (R), Irreplaceable Damage (ID) or Can be Avoided (CbA)	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
Silos and Magazines at King: An emulsion silo and ammonium nitrate silo). This area will include all ancillary required infrastructure. combined a total storage of 195m3 (emulsion: 113m3) ammonium nitrate: 82m3) **Laying of the pipelines within undisturbed areas:** A pipeline route of approximately 800m will be required between point A1 and the two water supply areas P1 and P2. **Activity 2 - Topsoil Stripping and Stockpiling Construction &**											reached. Any new topsoil stockpiles should not exceed 1.5m. Where exceedance is present on existing facilities, erosion control measures should be implemented and vegetation establishment should be encouraged to assist in maintaining the structure of the soils for rehabilitation.						
		Direct impact: Soil compaction	Footprint clearance	N	-1	-4	-2	-2	-9	CbA	The contractor will ensure that all activities, material and equipment storage and personnel movement take place within the designated area. All contractors must receive induction. Site clearance and activities should be restricted to the approved footprint. Contractor's areas should be established on already disturbed footprints.	N	-1	-4	-2	-1	-8
		Direct impact: Clearing vegetation will result in the exposure of soil, which may in turn lead to soil erosion.	Footprint clearance	N	-1	-4	-3	-3	-11	CbA	Adhere to Storm water Management Plan. Ensure that all design drawings include effective erosion control measures. Ensure the required erosion protection measures are monitored and corrected where necessary. Natural vegetation establishment (self-succession) will be encouraged. The mine will investigate an appropriate seed mix for the rehabilitation purposes should self-succession not establish on rehabilitated sites. Areas of construction must be clearly demarcated. No construction or project related activities may be undertaken outside of the demarcated areas. Clean and dirty water systems must be established prior to construction.	N	-1	-4	-2	-1	-8

Name of Activity	Impact Area	Potential Impacts	Aspects								Mitigation Type	Rating Post Measures					
Activities	Impact Area			Status	Extent	Duration	Probability	Intensity	SbM	Reversible (R), Irreplaceable Damage (ID) or Can be Avoided (CbA)	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
widening of Roads: Development of roads to the King Silos. Should the King/Mokaning access road be used, a link of approximately 1.5km to this road will be required. Upgrades of roads to the Bruch Silos, may require an extension of approximately 450m to existing roads. **Construction of Silos and Magazines at Bruce:** Two magazine areas, an emulsion silo and an ammonium nitrate silo). This area will include all ancillary required infrastructure. **Construction of Silos and**											Where vegetation cannot be established during the life of construction and operations, appropriate measure will be taken to control erosion. These will include grading of surfaces to prevent rapid run-off of storm water and / or the use of energy dissipaters. The mine will ensure that erosion controls are included in the designs of all linear infrastructure (access roads, conveyors or open channels) and points of water discharge.						
	Terrestrial Ecology (Fauna & Flora)	Direct impact: Unplanned loss of floral and faunal species of conservation importance	Footprint clearance	N	-2	-4	-4	-4	-14	CbA	Prior to the removal of plant species, an ecologist should investigate the site (if not already done) to record all species of importance and which should be removed under tree removal permits. All such species should be demarcated by signage or tape. Obtain tree removal permit prior to the removal of any protected species. The pipeline proposed between P2/P1 and A1 should be rerouted if practically possible to avoid the floodplain vegetation and rather be rerouted to run through the Vachellia mellifera thicket to the south of the current route as shown in Figure 20 where possible. The pending offset area should be finalised to contribute to the overall conservation of sensitive and red data species. All employees, or contractors on site should receive a detailed induction on the expectations for the protection of fauna and flora on site. Weed eradication should be implemented on site.	N	-2	-1	-1	-2	-6

Name of Activity	Impact Area	Potential Impacts	Aspects							Mitigation Type	Rating Post Measures					
Activities	Impact Area			Status	Extent	Duration	Probability	Intensity	SbM	Reversible (R), Irreplaceable Damage (ID) or Can be Avoided (CbA)	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
Magazines at King: An emulsion silo and an ammonium nitrate silo). This area will include all ancillary required infrastructure. For the Bruce and King expansions combined a total storage of 195m3 (emulsion: 113m3) ammonium nitrate: 82m3)		Direct impact: Displacement of faunal species and human/animal conflict	Footprint clearance	N	-2	-4	-4	-4	-14	CbA	A record of any animal fatalities should be kept on site. The reason for the fatality and action to avoid such in the future (if possible) should be stated. All employees, or contractors on site should receive a detailed induction on the expectations for the protection of fauna and flora on site. Clearance of vegetation must be undertaken in such a manner as to provide sufficient time for animals to relocate.	N	-2	-1	-1	-2	-6
		Direct impact: Loss of ecological connectivity and ecosystem functioning. This will be specifically important around the King Silo and to the east of the Bruce Silo, as these areas will be located in the less disturbed areas within the mining area.	Footprint clearance	N	-2	-4	-5	-1	-12	CbA	No construction or project related activities may be undertaken outside of the demarcated areas. The construction area can be isolated by means of a chain link fence in order to prevent animals on local migrations entering the area and being killed. In the establishment of fences, erect fences in such a manner as to limit the potential of animals to enter the plant and silo areas. This could involve the placement of rocks and materials at on the surface of the fences.	N	-2	-4	-4	-1	-11
		The disturbance of the cleared areas may allow the establishment of alien invasive vegetation. Increased prevalence of exotic invasive species: The fact that the area will be cleared for construction creates niches that can be colonised by exotic and/or invasive species. This is compounded by the fact that trucks and other heavy machinery often act as vectors for seeds of these species.	Footprint clearance	N	-2	-4	-5	-1	-12	CbA	Weed eradication should be implemented on site. Areas of construction must be clearly demarcated. No construction or project related activities may be undertaken outside of the demarcated areas.		-2	-4	-4	-1	-11
		Disturbance of biodiversity due to vibration and noise: Vibration and	Footprint clearance		-2	-3	-4	-2	-11	CbA	Equipment will be well maintained to reduce excessive noise creation.	N	-1	-2	-2	-2	-7

Name of Activity	Impact Area	Potential Impacts	Aspects								Mitigation Type	Rating Post Measures					
Activities	Impact Area			Status	Extent	Duration	Probability	Intensity	SbM	Reversible (R), Irreplaceable Damage (ID) or Can be Avoided (CbA)	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
		noise will have a significant effect mainly on fauna species in the immediate vicinity of the development, due to the heavy machinery utilised. Vibration can affect a number of subterranean fauna taxa, such as burrowing mammals, reptiles and arthropods. Vibration affects these animals by causing the collapsing of burrows, and causing these animals to leave the area due to the vibration. Noise will also affect a wide range of taxa including avifauna, mammals, reptiles, amphibians and arthropods. Avifauna, especially songbirds, and amphibians may find it difficult to find mates in areas of increased noise, mammals, reptiles and arthropods may find increased noise disturbing and therefore move away from the area									Activities will be restricted to the day time.						
		Habitat degradation due to dust: Increased dust will occur in all areas where vegetation is cleared. Dust will be caused by excavation, and construction. Dust in the area will be greatly increased due to the dry weather conditions and the nature of the soil in the area. Dust settling on plant material can reduce the amount of light reaching the chlorophyll in the leaves, thereby reducing photosynthesis, which in turn reduces plant productivity, growth and recruitment.	Dust dispersion		-2	-3	-4	-2	-11	CbA	Install air quality monitoring stations that determine fallout and respirable dust (PM10) concentrations that could arise from the mining activities.	N	-1	-1	-2	-1	-5

Name of Activity	Impact Area	Potential Impacts	Aspects								Mitigation Type	Rating Post Measures					
Activities	Impact Area			Status	Extent	Duration	Probability	Intensity	SbM	Reversible (R), Irreplaceable Damage (ID) or Can be Avoided (CbA)	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
		Effects on local migrations: Local migrations of fauna in the area may be affected by linear infrastructure, fences and buildings, due to these areas forming a barrier to migrating animals or reducing the chance of an animal surviving its migration due to collisions with vehicles on roads. This impact is likely to be low due to the greatly reduced wildlife in the area due to previous disturbances in the area causing a greatly reduced species. Furthermore, many of the roads are already in use. The study area is recognised as an ESA due to being a migratory route, this requires further investigation.	Footprint clearance		-2	-3	-4	-2	-11	CbA	The construction area can be isolated by means of a chain link fence in order to prevent animals on local migrations entering the area and being killed. Conduct annual Biodiversity Action Plans and implement the required conditions. The effect of roads on local migrations can be mitigated by the installation of culverts at regular intervals along the roads and the installation of drift fences towards the culverts , although these methods may not eliminate the mortalities among migrating animals, they should greatly reduce the number of animals killed on haul roads A clearly marked and enforced vehicle speed will be implemented on the internal mine and transportation routes.	N	-1	-1	-2	-1	-5
		Increased erosion: Increased erosion can eventually lead to the loss of vegetation and habitats for further species. Soils in the area are prone to erosion in areas where vegetation is cleared, this is further compounded by the fact that precipitation in the area occurs through heavy rainfall events in in the form of thundershowers in summer. Furthermore large areas will be cleared before construction leaving these areas prone to erosion.	Footprint clearance	N	-2	-3	-4	-2	-11	CbA	Ensure the required erosion protection measures are monitored and corrected where necessary. An erosion monitoring and mitigation plan should be put in place.	N	-2	-3	-2	-3	-10
	Wetland	Loss or Impact on NEFPA Sites	Footprint clearance		-4	-3	-1	-5	-13	CbA	No activities are planned within 500m from any NEFPA sites. This restriction should be maintained.	-	-1	-1	-1	-1	-4
	Hydrology	Direct impact: The removal of vegetation can lead to increased surface runoff, which may in turn	Footprint clearance	N	-2	-4	-3	-1	-10	CbA	Rehabilitate open areas as soon as practically possible. Self-succession should be encouraged.	N	-2	-2	-1	-1	-6

Name of Activity	Impact Area	Potential Impacts	Aspects								Mitigation Type	Rating Post Measures					
Activities	Impact Area			Status	Extent	Duration	Probability	Intensity	SbM	Reversible (R), Irreplaceable Damage (ID) or Can be Avoided (CbA)	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
		alter natural surface water flows and increase siltation of watercourses as well as pollution control facilities.									Limit the areas to be cleared to the demarcated sites.						
	Geohydrology	No direct impact	-	-	0	0	0	0	0	CbA	-	-	0	0	0	0	0
	Heritage	No direct impact is foreseen in this area.	-	N	-3	-3	-3	-4	-13	CbA	In the event that heritage artefacts or graves are encountered during the excavation activities, all activities must cease and the SAHRA should be contacted to determine the way forward before construction may continue.	N	-2	-1	-3	-3	-9
	Visual	Direct impact: soil stripping and footprint clearance	Footprint clearance	N	-1	-2	-3	-1	-7	CbA	Stripping of vegetation and soils should be undertaken within the demarcated areas.	N	-1	-1	-2	-1	-5
	Air Quality	Direct impact: Dust-fallout	Footprint clearance	N	-2	0	-4	-1	-7	CbA	Implement dust monitoring around construction sites. Strictly enforced speed limits on haul roads Dust suppression to be implemented as per the approved EMP	N	-1	0	-4	-3	-8
	Noise	The area is located within the mining area. Noise impacts are not considered to be significant but can occur during excavation and construction activities.	Removal of topsoil.	N	-2	-2	-2	-2	-8	CbA	Equipment will be well maintained to reduce excessive noise creation. Activities will be restricted to the day time.	N	-1	-1	-1	-1	-4
	Social	No direct impact	-	-	0	0	0	0	0	CbA	-	-	0	0	0	0	0
Activity 3 - Establishment of Surface Infrastructure Construction & widening of Roads: Development of roads to the King Silos. Should the King/Mokaning access road be	Geology	The establishment of the Low Grade Sorter Plant may result in the sterilisation of mineable reserves.	Active construction	N	-4	-2	-3	-4	-13	R	Exploration studies should be fast tracked in this area to determine whether future mining would be required in this area. In the event that this is required, the license holder should proactively apply for an amendment to the Low Grade ROM Sorter Plant authorisation.	N	-1	-2	-1	-3	-7
	Topography	Direct impact: Alteration of topography	Active construction	N	-2	-3	-3	-2	-10	CbA	Demarcate footprint area clearly	N	-1	-2	-2	-1	-6

Name of Activity	Impact Area	Potential Impacts	Aspects							Mitigation Type	Rating Post Measures					
Activities	Impact Area			Status	Extent	Duration	Probability	Intensity	SbM	Reversible (R), Irreplaceable Damage (ID) or Can be Avoided (CbA)	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
used, a link of approximately 1.5km to this road will be required. Upgrades of roads to the Bruch Silos, may require an extension of approximately 450m to existing roads. **Construction of Silos and Magazines at Bruce:** Two magazine areas, an emulsion silo and an ammonium nitrate silo). This area will include all ancillary required infrastructure. **Construction of Silos and Magazines at King:** An emulsion silo and an ammonium nitrate silo). This area will include all ancillary		Direct impact: Soil compaction	Active construction	N	-1	-4	-2	-2	-9	CbA	Activities should be restricted to the cleared areas and associated impacts as presented as part of Activity 1 and 2 above.	N	-1	-4	-2	-1	-8
	Soil, Land Use and Land Capability	Direct impact: Construction activities with surrounding exposed soil may in turn lead to soil erosion.	Active construction	N	-1	-4	-3	-3	-11	CbA	Ensure that all design drawings include effective erosion control measures. Ensure the required erosion protection measures are monitored and corrected where necessary. Natural vegetation establishment (self-succession) will be encouraged. The mine will investigate an appropriate seed mix for the rehabilitation purposes should self-succession not establish on rehabilitated sites. Areas of construction must be clearly demarcated. No construction or project related activities may be undertaken outside of the demarcated areas. Clean and dirty water systems must be established prior to construction. Where vegetation cannot be established during the life of construction and operations, appropriate measure will be taken to control erosion. These will include grading of surfaces to prevent rapid run-off of storm water and / or the use of energy dissipaters.	N	-1	-4	-2	-1	-8
	Terrestrial Ecology (Fauna & Flora)	All impacts assessed under Activity 1 - Footprint clearance	-	-	0	0	0	0	0	CbA	-	-	-	-	-	-	-
	Wetland	All impacts assessed under Activity 1 - Footprint clearance	-	-	0	0	0	0	0	CbA	-	-	-	-	-	-	-
	Hydrology	Direct impact: The removal of vegetation as part of the previous Activities 1 & 2 can lead to increased surface runoff, which may in turn alter natural surface water flows and increase siltation	Active construction	N	-2	-4	-3	-1	-10	CbA	Limit the areas to be where construction is undertaken to the demarcated sites. Clean and dirty systems should be included at all new activities. For the Silos, all dirty water should be contained, and routed to a sump for evaporation. For the	N	-2	-2	-1	-1	-6

Name of Activity	Impact Area	Potential Impacts	Aspects							Reversible (R), Irreplaceable Damage (ID) or Can be Avoided (CbA)	Mitigation Type	Rating Post Measures					
Activities	Impact Area			Status	Extent	Duration	Probability	Intensity	SbM		Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
required infrastructure. . For the Bruce and King expansions combined a total storage of 195m3 (emulsion: 113m3) ammonium nitrate: 82m3)		of watercourses as well as pollution control facilities.									Plant area, the runoff water to the north will follow to the existing PCD on site, the water to the west will run towards the Low Grade ROM Stockpile, from where it will evaporate. Maintain clean and dirty water system.						
	Geohydrology	No direct impact	-	-	0	0	0	0	0	CbA	-	-	-	-	-	-	-
	Heritage	No direct impact	-	-	0	0	0	0	0	CbA	-	-	-	-	-	-	-
	Visual	No direct impact	-	-	0	0	0	0	0	CbA	-	-	-	-	-	-	-
	Air Quality	Direct impact: Dust-fallout	Active construction	N	-2	0	-4	-1	-7	CbA	Implement dust monitoring around construction sites. Strictly enforced speed limits on haul roads Dust suppression to be implemented as per the approved EMP	N	-1	0	-4	-3	-8
	Noise	Direct impact: Construction activities will increase the ambient noise levels in the area. This is however only temporary.	Vehicle Movement	N	-2	-3	-5	1	-9	CbA	Vehicles will be equipped with mufflers where practical to reduce the emission of noise. Where noise becomes a nuisance management measures will be investigated and implemented to address these. Construction activities will be limited to the hours of 7h00 to 18h00 weekdays. Equipment will be well maintained to reduce excessive noise creation.	N	-1	-3	-2	-1	-7
	Social	No direct impact	-	-	0	0	0	0	0	CbA	-	-	-	-	-	-	-
Activity 4: Waste Management Hydrocarbon spills within the mining area	Groundwater	Large scale hydrocarbon spills could be present at the mining area	Spill and Release of Waste Material.	N	-1	-1	-4	-4	-10	R	Clean and Dirty water separation systems should be incorporated in terms of the 2016 SWMP. No activities associated with hydrocarbons and/or chemicals may be undertaken outside of an effectively designed and contained area. All used oils must be removed from site by a licensed company and disposed of at a suitably licensed site.	N	-1	-1	-2	-1	-5

Name of Activity	Impact Area	Potential Impacts	Aspects							Mitigation Type	Rating Post Measures					
Activities	Impact Area			Status	Extent	Duration	Probability	Intensity	SbM	Reversible (R), Irreplaceable Damage (ID) or Can be Avoided (CbA)	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
											Any spills occurring during the collection process must be cleaned up immediately.						
											Any significant spills must be captured in the incident reports and must be reported to the relevant department (NCDENC, WUA, CMA, and DWS).						
											A clean up procedure (i.e. Works Instruction) must be in place.						
	Soils	Contamination of soil resources due to hydrocarbon spills.	Spills and Release of Contaminants.	N	-1	-2	-4	-4	-11	CBA	Storage of fuels and oils, the refuelling of vehicles and equipment maintenance must be limited to designated, bunded (bunds to be 110% of volume of the materials stored) areas.	N	-1	-2	-1	-1	-5
											All fuels and soils must be stored in appropriate containers.						
											Chemicals and hazardous material must be stored in suitable containers, fit for purpose and in line with SDS requirements.						
											Where drip trays are too small, specially prepared, non-pervious bunds with solution trenches must be used to capture spillages						
											Oils and potentially hazardous materials must be disposed of at a licensed facility and waste certificates obtained.						
											A spill kit must be provided to be used in the event of a spill.						
											If a spill occurs, the contaminated soil must be removed immediately. Contaminated soil must be stored according to best practices until it can be disposed of at a suitably licensed facility.						
											Safety signage must be used at designated storage areas.						
											All workers must undergo an induction which includes environmental awareness training to make them aware of the environmental incident management						

Name of Activity	Impact Area	Potential Impacts	Aspects								Mitigation Type	Rating Post Measures					
Activities	Impact Area			Status	Extent	Duration	Probability	Intensity	SbM	Reversible (R), Irreplaceable Damage (ID) or Can be Avoided (CbA)	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
											procedures as well as the importance of complying with management measures.						
		Contamination of surface water resources. There are no surface water resources in the area, however, the natural runoff, which must be managed internally on site could become impacted	Spill and Release of Waste Material and Contaminated Water.	N	-1	-2	-3	-3	-9	CbA	Clean and Dirty water separation systems should be incorporated in terms of the 2016 SWMP. Vehicles/machinery will be regularly monitored and maintained. Maintenance programmes will be established and implemented. All used oils must be removed from site by a licensed company and disposed of at a suitably licensed site Any spills occurring during the collection process must be cleaned up immediately. Soil that has been contaminated by spillages, seepages and leachates will be sampled and analysed. If necessary, the soils will be treated, ameliorated or removed for safe disposal. Any significant spills must be captured in the incident reports and must be reported to the relevant department (NCDENC, WUA, CMA, and DWS). In this event a remediation strategy should be developed and enforced. A clean up procedure (i.e. Works Instruction) must be in place.	N	-1	-1	-2	-1	-5
Activity 4: Waste Management Waste Handling	Groundwater	Handling or Hazardous Waste within workshops and general mine area.	Spill and Release of Waste Material and Contaminated Water.	N	-2	-2	-2	-4	-10	CbA	Clean and Dirty water separation systems should be incorporated in terms of the 2016 SWMP. Waste management training must be implemented on site. Clear signs informing staff of waste management practices must be implemented on site. Hazardous waste handling should only take place within bunded and/or lined areas, with a capacity of at least 110% of the volume stored.	N	-1	-1	-2	-2	-6

Name of Activity	Impact Area	Potential Impacts	Aspects								Mitigation Type	Rating Post Measures					
Activities	Impact Area			Status	Extent	Duration	Probability	Intensity	SbM	Reversible (R), Irreplaceable Damage (ID) or Can be Avoided (CbA)	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
											Hazardous waste should be removed by a licenced removal company and taken to a suitable and licenced landfill site. Documentation of removal and safe disposal must be available on site.						
		Handling and Storing of Domestic Waste	Spill and Release of Waste Material and Contaminated Water.	N	-3	-3	-3	-3	-12	CbA	Clean and Dirty water separation systems should be incorporated in terms of the 2016 SWMP. Waste management training must be implemented on site. Clear signs informing staff of waste management practices must be implemented on site. The landfill site at Khumani must be operated in line with the Environmental Authorisation requirements and conditions. This landfill site, may only be utilised for domestic and general waste, no industrial or hazardous waste will be dumped on this site. Recycling practices must be investigated and implemented on site. Ongoing rehabilitation of the landfill site must be undertaken, by covering and shaping the facility regularly. Groundwater monitoring must be undertaken in such a manner as to ensure that any potential impacts from the landfill site can be detected.	N	-2	-3	-2	-2	-9
	Ecology	The unmanaged disposal of waste, could result in the spread of invader species, as well as the influx of opportunistic species.	Loss of Ecology and the influx of Opportunistic Species.	N	-2	-3	-3	-4	-12	CbA	Develop dedicated waste handling areas; prevent access to rodents and opportunistic species; prevent the spread of waste. Develop dedicated waste handling areas, fit for purpose and prevent the spread of waste.	N	-1	-1	-2	-1	-5

Name of Activity	Impact Area	Potential Impacts	Aspects								Mitigation Type	Rating Post Measures					
Activities	Impact Area			Status	Extent	Duration	Probability	Intensity	SbM	Reversible (R), Irreplaceable Damage (ID) or Can be Avoided (CbA)	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
	Surface Water	Handling of Hazardous Waste within workshops and general mine area could contaminate the dirty water storage areas. The water is then reused in the system and could have impacts on the integrity of the storm water system and also the production.	Spill and Release of Waste Material and Contaminated Water.	N	-3	-2	-2	-4	-11	CbA	Clean and Dirty water separation systems should be incorporated in terms of the 2016 SWMP. A detailed waste management strategy will be established and implemented, which will clearly demarcate the containments for different waste streams. Waste management training must be implemented on site. Clear signs informing staff of waste management practices must be implemented on site. Hazardous waste handling should only take place within bunded and/or lined areas. Hazardous waste should be removed by a licenced removal company and taken to a suitable and licenced landfill site. Documentation of removal and safe disposal must be available on site. The mine will adopt a cradle-to grave approach to ensure that the waste is removed and disposed of in a legally compliant manner. Weekly inspections of Storm Water Management Systems must be undertaken. Any blockages or maintenance requirements must be documented and an action plan developed.	N	-1	-1	-2	-2	-6
		Handling and Storing of Domestic Waste should have no impact on the surface water resources due to the location of the facility. However, incorrect disposal of waste could hamper the integrity of the storm water system.	Spill and Release of Waste Material and Contaminated Water.	N/A	-1	-2	-3	-3	-9	CbA	Clean and Dirty water separation systems should be incorporated in terms of the 2016 SWMP. Waste management training must be implemented on site. Weekly inspections of Storm Water Management Systems must be undertaken. Any blockages or maintenance requirements must be	N	-1	-1	-2	-1	-5

Name of Activity	Impact Area	Potential Impacts	Aspects									Mitigation Type	Rating Post Measures					
Activities	Impact Area			Status	Extent	Duration	Probability	Intensity	SbM	Reversible (R), Irreplaceable Damage (ID) or Can be Avoided (CbA)	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
											documented and an action plan developed.						
											Clear signs informing staff of waste management practices must be implemented on site.						
											The landfill site at Khumani must be operated in line with the Environmental Authorisation requirements and conditions.						
											Access control must be strictly enforced.						
											The berm around upstream of the facility must be maintained.						
											Recycling practices must be investigated and implemented on site.						
											Ongoing rehabilitation of the landfill site must be undertaken, by covering and shaping the facility.						
											Groundwater monitoring must be undertaken in such a manner as to ensure that any potential impacts from the landfill site can be detected.						

Table 16: Operational Phase Impact Assessment and Management Measures (Significance before Mitigation –SbM; Significance after Mitigation – SaM)

Name of Activity	Impact Area	Potential Impacts	Aspects								Mitigation Type	Rating Post Measures					
Activities	Impact Area			Status	Extent	Duration	Probability	Intensity	SbM	Reversible (R), Irreplaceable Damage (ID) or Can be Avoided (CbA)	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
Operational Phase																	
Activity 1 - Operation of low grade sorter plant, silos and magazines	Geology	The establishment of the Low Grade Sorter Plant may result in the sterilisation of mineable reserves.	Operational activities	N	-4	-2	-3	-4	-13	R	Exploration studies should be fast tracked in this area to determine whether future mining would be required in this area. In the event that this is required, the license holder should proactively apply for an amendment to the Low Grade ROM Sorter Plant authorisation.	N	-1	-2	-1	-3	-7
	Topography	No direct impact	-	-	0	0	0	0	0	CbA	-	-	0	0	0	0	0
	Soil, Land Use and Land Capability	Spills around the silos may result in the contamination of soils.	Operational activities	-	-1	-2	-4	-4	-11	CbA	Any emulsion or other contaminants should be collected and the soils remediated immediately.	-	-1	-2	-1	-1	-5
	Ecology	Presence of invader species could impact on the natural succession of vegetation on the slopes of WRDs.	Increase in invader species.	N	-2	-3	-4	-4	-13	CbA	A weed eradication programme will be developed and implemented to eradicate weeds and invader plants and to prevent new invasions during the ongoing mining operation. Where self-succession does not establish, harvested seeds and plants must be used in concurrent rehabilitation for any areas along the area which may be affected. Compile list of protected and Red Data species, compile relocation programme. All employees must undergo an induction prior to construction where they will be made aware of the footprint, prohibited areas and the importance of compliance with management measures, as well as potential penalties for noncompliance. No open fires must be allowed. Vegetation clearance must be limited to within the footprint area A weed eradication programme must be implemented on site and enforced. This	N	-1	-1	-2	-1	-5

Name of Activity	Impact Area	Potential Impacts	Aspects								Mitigation Type	Rating Post Measures					
Activities	Impact Area			Status	Extent	Duration	Probability	Intensity	SbM	Reversible (R), Irreplaceable Damage (ID) or Can be Avoided (CbA)	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
											programme must stipulate the monitoring plan, which should include: capturing of areas where invader species are present; action plan to remove these; % successful removal).						
	Wetland	No direct impact	-	-	0	0	0	0	0	CbA	-	-	0	0	0	0	0
	Hydrology	Risk of surface water contamination as a result of plant and silo a related activities.	Release of Contaminated Water.	N	-2	-3	-3	-4	-12	CbA	Clean and dirty systems should be included at all new activities. For the Silos, all dirty water should be contained, and routed to a sump for evaporation. For the Plant area, the runoff water to the north will follow to the existing PCD on site, the water to the west will run towards the Low Grade ROM Stockpile, from where it will evaporate.	N	-1	-2	-2	-2	-7
		Exposed soils will be susceptible to soil erosion.	Loss of Soil Resources	N	-2	-3	-3	-4	-12	CbA	The Storm Water Management Plan as per the 2016 WULA will be implemented on site.	N	-1	-2	-2	-2	-7
		Discharge of contaminated water during maintenance and shutdown practices.	Release of contaminated water.	N	-2	-3	-4	-5	-14	CbA	The existing storm water dam to the west of the proposed plant should be utilised to contained water during maintenance and shutdown procedures to reduce the presence of dirty water ponding in these areas during these times. The storm water runoff on the south, south-east and north, will naturally gravitate towards the Low Grade Stockpile J. This stockpile will therefore serve as a constructed berm to contain dirty water. Paddocks must be constructed downgradient of all stockpiles (low grade ROM stockpiles) on site to contain any seep from these facilities according to the approved EMPs. A detailed water conservation and demand management plan should be developed to optimise water reuse in the plant circuit.	N	-1	-1	-2	-1	-5

Name of Activity	Impact Area	Potential Impacts	Aspects								Mitigation Type	Rating Post Measures					
Activities	Impact Area			Status	Extent	Duration	Probability	Intensity	SbM	Reversible (R), Irreplaceable Damage (ID) or Can be Avoided (CbA)	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
											The capacities of the water containment infrastructure (clarifier, Thickener, etc.) should be revisited and managed to ensure that a freeboard of 0.8m can be maintained. Ensure that fuels, lubricants and chemicals for use in the operational areas are stored in properly bunded and protected areas.						
	Air Quality	The use of unsurfaced roads, plant crushing equipment, presence of stockpiles and the transfer points at conveyors may lead to an increase of dust emissions in the area.	Dispersion of dust.	N	-2	-1	-3	-3	-9	CbA	Install air quality monitoring stations that determine fallout and respirable dust (PM10) concentrations that could arise from the mining activities. Dust extraction systems comprising of wet scrubbers will be installed at the secondary and tertiary crushing and screening plants. For crushing and screening operations at metallic mineral processing plants, fugitive dust can be controlled with wet scrubbers or baghouses. Chemical dust suppression systems will be implemented at the primary crushing and screening plants. Tarpaulins will be placed over all vehicles transporting product.						
	Noise	Increase in noise levels in and around the plant areas.	Increase in noise levels.	N	-2	-1	-3	-3	-9	CbA	Machinery and vehicles will be well maintained to prevent excessive nose and to comply with national and provincial regulations. Implement a noise monitoring network. Implemented operational controls on equipment used in the workshops, plant and buildings to reduce noise levels where required.	N	-1	-1	-2	-1	-5
	Geohydrology	Handling of ROM, Emulsions, and hydrocarbons may lead to contaminated water ponding on site.	Spill and Release of Waste Material.	N	-1	-1	-4	-4	-10	R	Clean and Dirty water separation systems should be incorporated in terms of the 2016 SWMP. No activities associated with hydrocarbons and/or chemicals may be undertaken outside of an effectively designed and contained area.	N	-1	-1	-2	-1	-5

Name of Activity	Impact Area	Potential Impacts	Aspects								Mitigation Type	Rating Post Measures					
Activities		Impact Area		Status	Extent	Duration	Probability	Intensity	SbM	Reversible (R), Irreplaceable Damage (ID) or Can be Avoided (CbA)	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
											A dedicated area for the placement of waste skips must be determined prior to construction activities. Waste will be temporarily stored in the dedicated area until it is collected and disposed of at the approved Khumani waste disposal area. All used oils must be removed from site by a licensed company and disposed of at a suitably licensed site.						
											Any spills occurring during the collection process must be cleaned up immediately.						
											Any significant spills must be captured in the incident reports and must be reported to the relevant department (NCDENC, WUA, CMA, and DWS).						
											A clean up procedure (i.e. Works Instruction) must be in place.						
		Managing the existing King PCD and Bruce PCD on site.	Release of Contaminated Water.	N	-3	-3	-4	-3	-13	CbA	All dirty water must be contained in fit for purpose designed tanks or in lined dams.	N	-2	-2	-1	-1	-6
											These facilities must be inspected regularly and replaced if indications exists of leaks.						
											Where leaks or seepage is found, these must be inspected and fixed as soon as found.						
											The water balance must be updated annually, with a strong focus on improving the management of the internal water circuit on site.						
											The water circuit must be managed at one central location to ensure that there is integration between the plant, and general surface water needs and requirements.						
											Upstream and downstream monitoring boreholes must be available to monitor groundwater quality and to detect potential leaks from these facilities.						

Name of Activity	Impact Area	Potential Impacts	Aspects								Mitigation Type	Rating Post Measures					
Activities	Impact Area			Status	Extent	Duration	Probability	Intensity	SbM	Reversible (R), Irreplaceable Damage (ID) or Can be Avoided (CbA)	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
											The groundwater monitoring programme must be implemented and undertaken in accordance to the approved WUL.						
	Heritage	No significant impacts are envisaged during the operational phase. The proposed development will be located within existing mining operations.	-	-	0	0	0	0	0	CbA	-	-	0	0	0	0	0
	Visual	No significant impacts are envisaged during the operational phase. The proposed development will be located within existing mining operations.	-	-	0	0	0	0	0	CbA	-	-	0	0	0	0	0
	Social	No significant impacts are envisaged during the operational phase. The proposed development will be within existing mining operations.	-	-	0	0	0	0	0	CbA	-	-	0	0	0	0	0
Activity 2 - Stockpiling ROM and low grade material within the silo footprint area	Geology	The establishment of the Low Grade Sorter Plant may result in the sterilisation of mineable reserves.	Operational activities	N	-4	-2	-3	-4	-13	R	Exploration studies should be fast tracked in this area to determine whether future mining would be required in this area. In the event that this is required, the license holder should proactively apply for an amendment to the Low Grade ROM Sorter Plant authorisation.	N	-1	-2	-1	-3	-7
	Topography	The stockpiling of material will impact on the micro and macro topography due to the establishment of the stockpiles.	Operational activities	N	-2	-2	-3	-3	-10	CbA	Stockpiles will only be placed within the designated mine area boundaries.	N	-1	-2	-2	-1	-6
	Soil, Land Use and Land Capability	No additional impacts are envisaged during the operational phase, which has not been addressed as part of Activity 1. The proposed development will be located within existing mining operations.	-	-	0	0	0	0	0	CbA	-	-	0	0	0	0	0
	Terrestrial Ecology (Fauna & Flora)	No additional impacts are envisaged during the operational phase. The proposed development will be located within existing mining operations.	-	-	0	0	0	0	0	CbA	-	-	0	0	0	0	0

Name of Activity	Impact Area	Potential Impacts	Aspects								Mitigation Type	Rating Post Measures					
Activities	Impact Area			Status	Extent	Duration	Probability	Intensity	SbM	Reversible (R), Irreplaceable Damage (ID) or Can be Avoided (CbA)	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
	Wetland	No direct impact	-	-	0	0	0	0	0	CbA	-	-	0	0	0	0	0
	Hydrology	Runoff from stockpiles due to rainfall could cause seepage which may impact on the clean water resources.	Water quality	N	-2	-2	-3	3	-10	CbA	Clean and dirty systems should be included at all new activities. For the Silos, all dirty water should be contained, and routed to a sump for evaporation. For the Plant area, the runoff water to the north will follow to the existing PCD on site, the water to the west will run towards the Low Grade ROM Stockpile, from where it will evaporate. All water management systems to conform to the GN704 requirements (note that the 1999 Regulations are in the process of being amended).	N	-2	-2	-2	-1	-7
	Geohydrology	Impacts on the groundwater regime as a result of infiltration.	Release of contaminated water	N	-3	-3	-4	-3	-13	CbA	Clean water needs to be kept away from the stockpiling area to minimise water infiltrating from the site. Keep stockpiles as small as possible, to minimise their footprint.	N	-2	-2	-1	-1	-6
										CbA	No additional Waste Rock Dumps with the exception of those already approved on site will be constructed as part of this project.						
	Heritage	No direct impact	-	-	0	0	0	0	0	CbA	-	-	0	0	0	0	0
	Visual	No direct impact	-	-	0	0	0	0	0	CbA	-	-	0	0	0	0	0
	Air Quality	The use of unsurfaced roads, plant crushing equipment, presence of stockpiles and the transfer points at conveyors may lead to an increase of dust emissions in the area.	Dispersion of dust.	N	-2	-1	-3	-3	-9	CbA	Install air quality monitoring stations that determine fallout and respirable dust (PM10) concentrations that could arise from the mining activities.	N	-1	-2	-2	-1	-6
											Tarpaulins will be placed over all vehicles transporting product.						
	Noise	No significant impacts are envisaged during the operational phase.	-	-	0	0	0	0	0	CbA	-	-	0	0	0	0	0
	Social	No direct impact	-	-	0	0	0	0	0	CbA	-	-	0	0	0	0	0

Name of Activity	Impact Area	Potential Impacts	Aspects							Mitigation Type	Rating Post Measures					
Activities	Impact Area			Status	Extent	Duration	Probability	Intensity	SbM	Reversible (R), Irreplaceable Damage (ID) or Can be Avoided (CbA)	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
Activity 3: Operation of the Infrastructure Transportation (conveyors, rail, haul roads and access roads) New roads to the King Silos (approximately 1.5km, of which 800m will amount to new clearing) and upgrades of roads to the Bruch Silos (approximately 500m).	Soil	Contamination of Soil due to hydrocarbon spills	Loss of Soil Resources	N	-1	-2	-4	-4	-11	CbA	Vehicles and Machinery will be regularly maintained. Maintenance programmes will be established and implemented. All refuelling of vehicles and equipment maintenance must be done within designated bunded areas. If necessary, the polluted soils will be remediated and affected areas rehabilitated.	N	-1	-1	-2	-1	-5
		Spills from conveyors.	Contamination of Soils.	N	-1	-2	-4	-4	-11	CbA	Ongoing maintenance around transfer points should be undertaken. Any spills of ROM around the conveyor systems should be collected and taken to designated ROM stockpile areas	N	-1	-1	-2	-1	-5
	Ecology	The establishment of Weeds and Invader Species.	Loss of Vegetation	N	-2	-3	-4	-4	-13	CBA	A weed eradication programme will be developed and implemented to eradicate weeds and invader plants and to prevent new invasions during the ongoing mining operation. Where self-succession does not establish, harvested seeds and plants must be used in concurrent rehabilitation for any areas along the area which may be affected.	N	-1	-1	-2	-1	-5
		Accidental death of animals on the roads.	Loss of Animal	N	-2	-3	-2	-5	-13	CbA	Clearly marked signs will be erected along the transportation routes to create awareness of animal crossings. A clearly marked and enforced vehicle speed will be implemented on the internal mine and transportation routes. A detailed induction programme will be in place to ensure that all parties are aware of the rules and regulations on site in terms of the use of roads. Vehicles may only travel on demarcated roads on site.	N	-1	-3	-1	-5	-10
	Surface Water	Contamination of surface water resources. There are no surface water resources in the area,	Spill and Release of Waste Material and	N	-1	-2	-3	-3	-9	CbA	Clean and Dirty water separation systems should be incorporated in terms of the 2016 SWMP.	N	-1	-1	-2	-1	-5

Name of Activity	Impact Area	Potential Impacts	Aspects								Mitigation Type	Rating Post Measures					
Activities	Impact Area			Status	Extent	Duration	Probability	Intensity	SbM	Reversible (R), Irreplaceable Damage (ID) or Can be Avoided (CbA)	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
		however, the natural runoff, which must be managed internally on site could become impacted	Contaminated Water.								Manage storm water flow with temporary erosion control measures where possible (cut-off trenches or berms)						
											Railways and conveyors will be maintained and constructed with the appropriate culverts and drains, levelling and surfacing to ensure adequate drainage.						
											Vehicles/machinery will be regularly monitored and maintained. Maintenance programmes will be established and implemented.						
											All used oils must be removed from site by a licensed company and disposed of at a suitably licensed site						
											Any spills occurring during the collection process must be cleaned up immediately.						
											Soil that has been contaminated by spillages, seepages and leachates will be sampled and analysed. If necessary, the soils will be treated, ameliorated or removed for safe disposal.						
											Any significant spills must be captured in the incident reports and must be reported to the relevant department (NCDENC, WUA, CMA, and DWS). In this event a remediation strategy should be developed and enforced.						
											A clean up procedure (i.e. Works Instruction) must be in place.						
	Air Quality	The use of unsurfaced roads may lead to an increase of dust emissions in the area.	Dispersion of dust.	N	-2	-1	-3	-3	-9	CbA	Install air quality monitoring stations that determine fallout and respirable dust (PM10) concentrations that could arise from the mining activities.	N	-1	-1	-2	-1	-5
											Dust suppression should be undertaken regularly to prevent dust emissions.						
											During operational phase of the mine, haulage roads will be treated with dust suppression techniques such as wet to reduce dust creation.						

Name of Activity	Impact Area	Potential Impacts	Aspects								Mitigation Type	Rating Post Measures					
Activities	Impact Area			Status	Extent	Duration	Probability	Intensity	SbM	Reversible (R), Irreplaceable Damage (ID) or Can be Avoided (CbA)	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
											Tarpaulins will be placed over all vehicles transporting product.						
	Heritage	No direct impact	-	-	0	0	0	0	0	CbA	-	-	0	0	0	0	0
	Visual	No direct impact	-	-	0	0	0	0	0	CbA	-	-	0	0	0	0	0
	Noise	Noise of vehicles traversing the access roads will be almost constant	Increase in noise levels.	N	-2	-3	-3	-2	-10	CbA	Machinery and vehicles will be well maintained to prevent excessive nose and to comply with national and provincial regulations. All vehicles will have muffles to minimise noise emissions, where necessary. Where noise becomes a nuisance nose management measures will be investigated and implemented to address these concerns Implement a noise monitoring network. Noise monitoring will be undertaken (ambient conditions) to ensure that noise levels comply with Health and Safety Standards.	N	-1	-3	-2	-2	-8
	Social	No direct impact	-	-	0	0	0	0	0	CbA	-	-	0	0	0	0	0
Activity 4: Waste Management Hydrocarbon spills within the mining area	Groundwater	Large scale hydrocarbon spills could be present at the mining area	Spill and Release of Waste Material.	N	-1	-1	-4	-4	-10	R	Clean and Dirty water separation systems should be incorporated in terms of the 2016 SWMP. No activities associated with hydrocarbons and/or chemicals may be undertaken outside of an effectively designed and contained area. All used oils must be removed from site by a licensed company and disposed of at a suitably licensed site. Any spills occurring during the collection process must be cleaned up immediately. Any significant spills must be captured in the incident reports and must be reported to the relevant department (NCDENC, WUA, CMA, and DWS). A clean up procedure (i.e. Works Instruction) must be in place.	N	-1	-1	-2	-1	-5
	Soils	Contamination of soil resources due to hydrocarbon spills.		N	-1	-2	-4	-4	-11	CBA	Storage of fuels and oils, the refuelling of vehicles and equipment maintenance	N	-1	-2	-1	-1	-5

Name of Activity	Impact Area	Potential Impacts	Aspects								Mitigation Type	Rating Post Measures					
Activities	Impact Area			Status	Extent	Duration	Probability	Intensity	SbM	Reversible (R), Irreplaceable Damage (ID) or Can be Avoided (CbA)	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
			Spills and Release of Contaminants.								must be limited to designated, bunded (bunds to be 110% of volume of the materials stored) areas. All fuels and soils must be stored in appropriate containers. Chemicals and hazardous material must be stored in suitable containers, fit for purpose and in line with SDS requirements. Where drip trays are too small, specially prepared, non-pervious bunds with solution trenches must be used to capture spillages Oils and potentially hazardous materials must be disposed of at a licensed facility and waste certificates obtained. A spill kit must be provided to be used in the event of a spill. If a spill occurs, the contaminated soil must be removed immediately. Contaminated soil must be stored according to best practices until it can be disposed of at a suitably licensed facility. Safety signage must be used at designated storage areas. All workers must undergo an induction which includes environmental awareness training to make them aware of the environmental incident management procedures as well as the importance of complying with management measures.						
		Contamination of surface water resources. There are no surface water resources in the area, however, the natural runoff, which must be managed internally on site could become impacted	Spill and Release of Waste Material and Contaminated Water.	N	-1	-2	-3	-3	-9	CbA	Clean and Dirty water separation systems should be incorporated in terms of the 2016 SWMP. Vehicles/machinery will be regularly monitored and maintained. Maintenance programmes will be established and implemented.	N	-1	-1	-2	-1	-5

Name of Activity	Impact Area	Potential Impacts	Aspects								Mitigation Type	Rating Post Measures					
Activities	Impact Area			Status	Extent	Duration	Probability	Intensity	SbM	Reversible (R), Irreplaceable Damage (ID) or Can be Avoided (CbA)	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
											All used oils must be removed from site by a licensed company and disposed of at a suitably licensed site						
											Any spills occurring during the collection process must be cleaned up immediately.						
											Soil that has been contaminated by spillages, seepages and leachates will be sampled and analysed. If necessary, the soils will be treated, ameliorated or removed for safe disposal.						
											Any significant spills must be captured in the incident reports and must be reported to the relevant department (NCDENC, WUA, CMA, and DWS). In this event a remediation strategy should be developed and enforced.						
											A clean up procedure (i.e. Works Instruction) must be in place.						
Activity 5: Waste Management Waste Handling	Groundwater	Handling or Hazardous Waste within workshops and general mine area.	Spill and Release of Waste Material and Contaminated Water.	N	-2	-2	-2	-4	-10	CbA	Clean and Dirty water separation systems should be incorporated in terms of the 2016 SWMP.	N	-1	-1	-2	-2	-6
											Waste management training must be implemented on site.						
											Clear signs informing staff of waste management practices must be implemented on site.						
											Hazardous waste handling should only take place within bunded and/or lined areas, with a capacity of at least 110% of the volume stored.						
											Hazardous waste should be removed by a licenced removal company and taken to a suitable and licenced landfill site.						
											Documentation of removal and safe disposal must be available on site.						
		Handling and Storing of Domestic Waste	Spill and Release of Waste Material and Contaminated Water.	N	-3	-3	-3	-3	-12	CbA	Clean and Dirty water separation systems should be incorporated in terms of the 2016 SWMP.	N	-2	-3	-2	-2	-9
											Waste management training must be implemented on site.						

Name of Activity	Impact Area	Potential Impacts	Aspects								Mitigation Type	Rating Post Measures					
Activities	Impact Area			Status	Extent	Duration	Probability	Intensity	SbM	Reversible (R), Irreplaceable Damage (ID) or Can be Avoided (CbA)	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
											Clear signs informing staff of waste management practices must be implemented on site. The landfill site at Khumani must be operated in line with the Environmental Authorisation requirements and conditions. This landfill site, may only be utilised for domestic and general waste, no industrial or hazardous waste will be dumped on this site. Recycling practices must be investigated and implemented on site. Ongoing rehabilitation of the landfill site must be undertaken, by covering and shaping the facility regularly. Groundwater monitoring must be undertaken in such a manner as to ensure that any potential impacts from the landfill site can be detected.						
	Ecology	The unmanaged disposal of waste, could result in the spread of invader species, as well as the influx of opportunistic species.	Loss of Ecology and the influx of Opportunistic Species.	N	-2	-3	-3	-4	-12	CbA	Develop dedicated waste handling areas; prevent access to rodents and opportunistic species; prevent the spread of waste. Develop dedicated waste handling areas, fit for purpose and prevent the spread of waste.	N	-1	-1	-2	-1	-5
	Surface Water	Handling of Hazardous Waste within workshops and general mine area could contaminate the dirty water storage areas. The water is then reused in the system and could have impacts on the integrity of the storm water system and also the production.	Spill and Release of Waste Material and Contaminated Water.	N	-3	-2	-2	-4	-11	CbA	Clean and Dirty water separation systems should be incorporated in terms of the 2016 SWMP. A detailed waste management strategy will be established and implemented, which will clearly demarcate the containments for different waste streams. Waste management training must be implemented on site. Clear signs informing staff of waste management practices must be implemented on site.	N	-1	-1	-2	-2	-6

Name of Activity	Impact Area	Potential Impacts	Aspects								Mitigation Type	Rating Post Measures					
Activities		Impact Area		Status	Extent	Duration	Probability	Intensity	SbM	Reversible (R), Irreplaceable Damage (ID) or Can be Avoided (CbA)	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
											Hazardous waste handling should only take place within bunded and/or lined areas. Hazardous waste should be removed by a licenced removal company and taken to a suitable and licenced landfill site. Documentation of removal and safe disposal must be available on site. The mine will adopt a cradle-to grave approach to ensure that the waste is removed and disposed of in a legally compliant manner. Weekly inspections of Storm Water Management Systems must be undertaken. Any blockages or maintenance requirements must be documented and an action plan developed.						
		Handling and Storing of Domestic Waste should have no impact on the surface water resources due to the location of the facility. However, incorrect disposal of waste could hamper the integrity of the storm water system.	Spill and Release of Waste Material and Contaminated Water.	N/A	-1	-2	-3	-3	-9	CbA	Clean and Dirty water separation systems should be incorporated in terms of the 2016 SWMP. Waste management training must be implemented on site. Weekly inspections of Storm Water Management Systems must be undertaken. Any blockages or maintenance requirements must be documented and an action plan developed. Clear signs informing staff of waste management practices must be implemented on site. The landfill site at Khumani must be operated in line with the Environmental Authorisation requirements and conditions. Access control must be strictly enforced. The berm around upstream of the facility must be maintained.	N	-1	-1	-2	-1	-5

Name of Activity	Impact Area	Potential Impacts	Aspects								Mitigation Type	Rating Post Measures					
Activities	Impact Area			Status	Extent	Duration	Probability	Intensity	SbM	Reversible (R), Irreplaceable Damage (ID) or Can be Avoided (CbA)	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
											Recycling practices must be investigated and implemented on site.						
											Ongoing rehabilitation of the landfill site must be undertaken, by covering and shaping the facility.						
											Groundwater monitoring must be undertaken in such a manner as to ensure that any potential impacts from the landfill site can be detected.						

Table 17: Decommissioning and Closure Phase Impact Assessment and Management Measures (Significance before Mitigation –SbM; Significance after Mitigation – SaM)

Name of Activity	Impact Area	Potential Impacts	Aspects								Mitigation Type	Rating Post Measures					
Activities	Impact Area			Status	Extent	Duration	Probability	Intensity	SbM	Reversible (R), Irreplaceable Damage (ID) or Can be Avoided (CbA)	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
Closure and Decommissioning Phase																	
Legal Requirements (Environmental Permits)	South Africa Enviro-Legal Requirements	Unlawful activities could lead to NWA Directives and Section 24G Rectification fines.	Legal Compliance.	N	-4	-3	-2	-5	-14	CbA	A legal assessment of all Water Uses must be undertaken annually to ensure that all Water Uses are licensed. A detailed closure plan must be developed and submitted to the relevant departments for approval. All legally appointed personnel responsible or involved in water use activities on site must receive training on the requirements of the WUL. Quarterly integral audits must be undertaken on the lawful implementation of the WUL. Water Use Licence must be available on site at all times. The legal register must be updated to indicate all updated water uses.	P	4	3	5	5	17
Activity 1 - Land and Footprint Clearance Construction & widening of Roads: Development of roads to the King Silos. Should the King/Mokaning access road be used, a link of approximately 1.5km to this road will be required. Upgrades of roads to the Bruch Silos, may require an extension of approximately 450m to existing	Geology	No direct impact	-	-	0	0	0	0	0	CbA	-	-	-	0	0	0	0
	Topography	Removal of infrastructure may impact on the topography.	Alteration of surface topography.	N	-2	-3	-4	-4	-13	R	Linear Infrastructure constructed by the mine (roads, conveyors, railway lines, power lines) will be removed if it proves to inhibit land use at decommissioning. Where possible infrastructure will remain for social investment opportunities, this will be decided in conjunction with the Integrated Development Plan of the area ant eh local authorities. All haul roads and access roads will be rehabilitated by ripping these structures to a depth of 500mm. All fences erected around the infrastructure be dismantled and either disposed of at a permitted disposal site or sold off as scrap (provided that these structures will no longer be required by the post mining land owner). Fences	P	3	3	4	4	14

Name of Activity	Impact Area	Potential Impacts	Aspects								Mitigation Type	Rating Post Measures					
Activities	Impact Area			Status	Extent	Duration	Probability	Intensity	SbM	Reversible (R), Irreplaceable Damage (ID) or Can be Avoided (CbA)	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
roads. **Construction of Silos and Magazines at Bruce:** Two magazine areas, an emulsion silo and an ammonium nitrate Silo). This area will include all ancillary required infrastructure. Activity 1 - Land and Footprint Clearance **Construction of Silos and Magazines at King:** An emulsion silo and ammonium nitrate silo). This area will include all ancillary required infrastructure. combined a total storage of 195m3 (emulsion: 113m3) ammonium nitrate: 82m3) **Laying of the pipelines within undisturbed areas:** A pipeline route of approximately 800m will be required between											erected to cordon off dangerous excavations will remain in place and will be maintained as and when required. The silos will be removed by the operational responsible contractor (such as Sasol Nitro, or the relevant company at that time). The overland conveyors and railway lines, if not used as a community initiative, will be dissembled and the components removed from the site. The material can either be sold as a unit or the components sold as scrap.						
	Soil, Land Use and Land Capability	Spills around the silos may result in the contamination of soils.	Operational activities	N	-1	-2	-4	-4	-11	CbA	Any emulsion or other contaminants should be collected and the soils remediated immediately.	-	-1	-2	-1	-1	-5
		Loss of soils due to decommissioning activities present on site.	Operational activities	N	-1	-2	-4	-4	-11	CbA	Draw up a plan clearly defining the area where the removal of infrastructure should take place. Implement the plan with sufficient measures in place not to compact new areas. Implement a strict penalty fine system for rule breaking with regard to vehicular movement. Maintain clean and dirty water systems and undertake regular monitoring and maintenance thereof.	N	-1	-2	-1	-1	-5
	Ecology	The establishment of Weeds and Invader Species.	Loss of Vegetation	N	-2	-3	-4	-4	-13	CBA	A weed eradication programme will be developed and implemented to eradicate weeds and invader plants and to prevent new invasions during the ongoing mining operation. Where self-succession does not establish, harvested seeds and plants must be used in	N	-1	-1	-2	-1	-5

Name of Activity	Impact Area	Potential Impacts	Aspects							Mitigation Type	Rating Post Measures					
Activities	Impact Area	Impact Area		Status	Extent	Duration	Probability	Intensity	SbM	Reversible (R), Irreplaceable Damage (ID) or Can be Avoided (CbA)	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
point A1 and the two water supply areas P1 and P2. **Activity 2 - Topsoil Stripping and Stockpiling Construction & widening of Roads:** Development of roads to the King Silos. Should the King/Mokaning access road be used, a link of approximately 1.5km to this road will be required. Upgrades of roads to the Bruch Silos, may require an extension of approximately 450m to existing roads. **Construction of Silos and Magazines at Bruce:** Two magazine areas, an emulsion silo and an ammonium nitrate silo). This area will include all ancillary required infrastructure. **Construction of Silos and Magazines at King:**											concurrent rehabilitation for any areas along the area which may be affected.						
		Direct impact: Unplanned loss of floral and faunal species of conservation importance	Footprint clearance	N	-2	-4	-4	-4	-14	CbA	Prior to the removal of plant species, an ecologist should investigate the site (if not already done) to record all species of importance and which should be removed under tree removal permits. All such species should be demarcated by signage or tape. Obtain tree removal permit prior to the removal of any protected species. The pipeline proposed between P2/P1 and A1 should be rerouted if practically possible to avoid the floodplain vegetation and rather be rerouted to run through the Vachellia mellifera thicket to the south of the current route as shown in Figure 20 where possible. The pending offset area should be finalised to contribute to the overall conservation of sensitive and red data species. All employees, or contractors on site should receive a detailed induction on the expectations for the protection of fauna and flora on site. Weed eradication should be implemented on site.	N	-2	-1	-1	-2	-6
		Accidental death of animals on the roads.	Loss of Animal	N	-2	-3	-2	-5	-13	CbA	Clearly marked signs will be erected along the transportation routes to create awareness of animal crossings. A clearly marked and enforced vehicle speed will be implemented on the internal mine and transportation routes. A detailed induction programme will be in place to ensure that all parties are aware of the rules and regulations on site in terms of the use of roads. Vehicles may only travel on demarcated roads on site.	N	-1	-3	-1	-5	-10

Name of Activity	Impact Area	Potential Impacts	Aspects								Mitigation Type	Rating Post Measures					
Activities	Impact Area			Status	Extent	Duration	Probability	Intensity	SbM	Reversible (R), Irreplaceable Damage (ID) or Can be Avoided (CbA)	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
An emulsion silo and an ammonium nitrate silo). This area will include all ancillary required infrastructure. For the Bruce and King expansions combined a total storage of 195m3 (emulsion: 113m3) ammonium nitrate: 82m3)	Wetland	Loss or Impact on NEFPA Sites	Footprint clearance	N	-4	-3	-1	-5	-13	CbA	No activities are planned within 500m from any NEFPA sites. This restriction should be maintained.	N	-1	-1	-1	-1	-4
	Hydrology	Erosion control over rehabilitated areas and the prevention of erosion gullies.	Active Rehabilitation	N	-1	-1	-4	-2	-8	CbA	The topography of all disturbed areas must be rehabilitated in such a manner that the surrounding natural area blends naturally with the rehabilitated areas well as to be free-draining. This will reduce soil erosion and improve natural re-vegetation.	N	-1	-1	-2	-2	-6
		Contamination of surface water as a result of removal of infrastructure.	Operation of machinery and vehicle	N	-2	-2	-4	-3	-11	R	The detailed waste management strategy implemented during the construction and operation phases must be continuously implemented throughout the closure and decommissioning phase.	N	-1	-1	-2	-2	-6
		Rubble and waste from site could pollute local water resources.	Waste generation and disposal	N	-1	-1	-4	-2	-8	CbA	Waste that is not removed from site should be spread, covered and suitably rehabilitated.	N	-1	-1	-2	-2	-6
	Geohydrology	No direct impact	-	-	0	0	0	0	0	CbA	-	-	0	0	0	0	0
	Heritage	No direct impact	-	-	0	0	0	0	0	CbA	-	-	0	0	0	0	0
	Visual	Fugitive dust emissions as a result of infrastructure removal and associated exposed/bare areas may have an impact in terms of air quality and visual characteristics.	Vehicle movement and active rehabilitation	N	-2	-2	-4	-3	-11	R	The dust monitoring network and dust suppression programme established during the construction phase of the project will be maintained throughout the closure phase of the mine. With respect to haul road dust levels, it is recommended to limit vehicle speeds, especially during high risk periods of high winds, high temperature and low humidity. Establish and implement a dust suppression plan in consultation with the environmental control officer and an air quality specialist as part of the contractor's responsibility.	N	-2	-1	-3	1	-5
	Air Quality	All activities associated with the removal of infrastructure and rehabilitation has the potential to release dust.	Active Rehabilitation	N	-2	-2	-4	1	-7	R	The dust monitoring network and dust suppression programme established during the construction phase of the project will be maintained throughout	N	-2	-1	-3	1	-5

Name of Activity	Impact Area	Potential Impacts	Aspects								Mitigation Type	Rating Post Measures					
Activities	Impact Area			Status	Extent	Duration	Probability	Intensity	SbM	Reversible (R), Irreplaceable Damage (ID) or Can be Avoided (CbA)	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
											the closure phase of the mine. With respect to haul road dust levels, it is recommended to limit vehicle speeds, especially during high risk periods of high winds, high temperature and low humidity.						
	Noise	All activities associated with the removal of infrastructure and rehabilitation has the potential to generate noise.	Active Rehabilitation	N	-2	-2	-4	1	-7	CbA	The removal of all infrastructure is to take place during daytime periods only. Where noise becomes a nuisance, management measures will be investigated and implemented to address these.	N	-2	-1	-3	1	-5
	Social	Disruption and nuisance factors associated with the actual decommissioning such as noise, visual and traffic related impacts.	Active Rehabilitation	N	-2	-2	-4	1	-7	CbA	Local residents, with the focus on the surrounding landowners, should receive accurate information with regards to the project status, timeframes for decommissioning and other relevant information about issues that could influence their daily living and movement patterns.	N	-2	-1	-3	1	-5
Activity 2: Earth Moving, shaping and ripping of ground	Geology	No direct impact	-	-	0	0	0	0	0	CbA	-	-	0	0	0	0	0
	Topography	The shaping of the site should be undertaken in such a manner that it improves the overall topography of the site.	Active Rehabilitation	P	1	3	4	5	13	CbA	-	-	1	3	5	5	14
	Soil, Land Use and Land Capability	Soil erosion	Wind and water erosion in unvegetated areas	N	-6	-3	-4	-3	-16	CbA	Re-vegetate as soon as possible	N	-2	-1	-3	1	-5
		Ripping and topsoil replacement will restore the soil physical characteristics prior to re-vegetation.	Active Rehabilitation	P	1	3	4	5	13	CbA	Compacted soils will be ripped and topsoil will be replaced. After the topsoil has been replaced the area should be ameliorated and seeded, should self-succession of vegetation not take place. Only species indigenous to the area will be included.	P	1	3	5	5	14

Name of Activity	Impact Area	Potential Impacts	Aspects								Mitigation Type	Rating Post Measures					
Activities	Impact Area			Status	Extent	Duration	Probability	Intensity	SbM	Reversible (R), Irreplaceable Damage (ID) or Can be Avoided (CbA)	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
	Terrestrial Ecology (Fauna & Flora)	The rehabilitation of the site will allow reestablishment of natural vegetation.	Rehabilitation	P	1	2	3	4	10	CbA	Compacted soils will be ripped and topsoil will be replaced. After the topsoil has been replaced the area should be ameliorated and seeded, should self-succession of vegetation not take place. Only species indigenous to the area will be included. Remove alien vegetation post decommissioning, with long term follow-up afterwards.	P	4	3	5	5	17
	Wetland	No direct impact	-	N	0	0	0	0	0	CbA	-	-	-	-	-	-	-
	Hydrology	Runoff from rehabilitated areas will impact on watercourses especially during intensive rainstorms especially if the area are not free draining.		N	-2	-1	-3	1	-5	CbA	Berms, should they be necessary, must remain upstream and downstream of the dumps and stockpiles to ensure that clean water is kept separate from dirty water until the area is free draining and re-vegetation has occurred.	N	-2	-3	-4	1	-8
	Geohydrology	No direct impact	-	-	0	0	0	0	0	CbA		-	0	0	0	0	0
	Heritage	No direct impact	-	-	0	0	0	0	0	CbA	-	-	0	0	0	0	0
	Visual	The rehabilitation (ripping, topsoil replacement and landscaping) will remove the visual incongruity.	Infrastructure removal	P	2	4	4	1	11	CbA	An overall visual improvement will be noticed once all mining related infrastructure has been demolished and the area has been landscaped and re-vegetated. Demarcate the decommissioning area and limit the decommissioning activities as far as possible.	P	2	4	4	3	13

Name of Activity	Impact Area	Potential Impacts	Aspects								Mitigation Type	Rating Post Measures					
Activities	Impact Area			Status	Extent	Duration	Probability	Intensity	SbM	Reversible (R), Irreplaceable Damage (ID) or Can be Avoided (CbA)	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
											Final shaping will be implemented such that the final profile of the rehabilitated areas are formed to emulate natural contours of the area. Foundations will be removed to a depth of 1 m below the surface and the area rehabilitated. All material recovered from the demolition of buildings and/or structures will either be transported to a permitted disposal site, or made available to the local community as building materials (provided they are in a satisfactory condition following demolition). Linear infrastructure constructed by the mine (i.e. roads, conveyors and power lines) will be removed if it proves to inhibit land use at decommissioning. All fences erected around the mine will be dismantled and disposed of at a permitted disposal site.						
	Air Quality	All activities associated with the removal of infrastructure has the potential to release dust.	Infrastructure removal	N	-2	-2	-4	1	-7	CbA	Dust sampling will be undertaken on a monthly basis and analysed according to the prescribed monitoring programme contained in the EIA/EMP. Monthly monitoring reports will be generated by the mine or through a suitably qualified air quality specialist. In the event that air quality or dust issues are identified based on the monitoring programme, an independent specialist should be appointed to determine the best course of action to ameliorate the situation.	N	-2	-1	-3	1	-5
	Noise	All activities associated with the removal of infrastructure and	Infrastructure removal	N	-2	-1	-4	3	-4	CbA	The removal of all infrastructure is to take place during daytime periods only.	N	-2	-1	-3	1	-5

Name of Activity	Impact Area	Potential Impacts	Aspects								Mitigation Type	Rating Post Measures					
Activities	Impact Area			Status	Extent	Duration	Probability	Intensity	SbM	Reversible (R), Irreplaceable Damage (ID) or Can be Avoided (CbA)	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
		rehabilitation has the potential to generate noise.									Where noise becomes a nuisance, management measures will be investigated and implemented to address these. Machinery with low noise levels and maintained in a good order to be used and to comply with the IFC's Health and Safety Regulations. Speed control measures will be implemented by the mine through the placement of adequate signage. Implement a penalty system for non-compliance to speed control measures and ensure that all workers are made aware of the penalty systems. Gravel roads to be maintained in as good and smooth a condition as possible.						
	Social		-	-	0	0	0	0	0	CbA	-	-	-	-	-	-	-
Activity 3: Cessation of Labour Contracts	Geology	No direct impact	-	-	0	0	0	0	0	CbA	-	-	-	-	-	-	-
	Topography	No direct impact	-	-	0	0	0	0	0	CbA	-	-	-	-	-	-	-
	Soil, Land Use and Land Capability	No direct impact	-	-	0	0	0	0	0	CbA	-	-	-	-	-	-	-
	Terrestrial Ecology (Fauna & Flora)	No direct impact	-	-	0	0	0	0	0	CbA	-	-	-	-	-	-	-
	Wetland	No direct impact	-	-	0	0	0	0	0	CbA	-	-	-	-	-	-	-
	Hydrology	No direct impact	-	-	0	0	0	0	0	CbA	-	-	-	-	-	-	-
	Geohydrology	No direct impact	-	-	0	0	0	0	0	CbA	-	-	-	-	-	-	-
	Heritage	No direct impact	-	-	0	0	0	0	0	CbA	-	-	-	-	-	-	-
	Visual	No direct impact	-	-	0	0	0	0	0	CbA	-	-	-	-	-	-	-
	Air Quality	No direct impact	-	-	0	0	0	0	0	CbA	-	-	-	-	-	-	-
	Noise	No direct impact	-	-	0	0	0	0	0	CbA	-	-	-	-	-	-	-
	Socio-Economic	Plant, store and workshop areas could benefit the local community.	Opportunity to improve economic conditions.	N	-3	-3	-4	-5	-15	CbA	Instead of demolition of certain areas, these areas could be sold off as commercial property for use in the local community.	P	3	3	4	4	14

Name of Activity	Impact Area	Potential Impacts	Aspects							Reversible (R), Irreplaceable Damage (ID) or Can be Avoided (CbA)	Mitigation Type	Rating Post Measures					
Activities		Impact Area		Status	Extent	Duration	Probability	Intensity	SbM		Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
		Loss of Employment.	Reduction in Economic Activities and Job Opportunities on site.	N	-3	-3	-4	-5	-15	CbA	The mine should continue with the skills development programme and Social and Labour Plan commitments to empower the workforce to undertake other economically viable activities.	P	2	3	3	3	11
Waste Management	Groundwater	Handling or Hazardous Waste within workshops and general mine area.	Spill and Release of Waste Material and Contaminated Water.	N	-2	-2	-2	-4	-10	CbA	Clean and Dirty water separation systems should be incorporated in terms of the 2016 SWMP. Waste management training must be implemented on site. Clear signs informing staff of waste management practices must be implemented on site. Hazardous waste handling should only take place within bunded and/or lined areas. Hazardous waste should be removed by a licenced removal company and taken to a suitable and licenced landfill site. Documentation of removal and safe disposal must be available on site.	N	-1	-1	-2	-2	-6
		Handling of Building Rubble	Disposal of demolished infrastructure and the potential impact on groundwater resources.	N	-2	-2	-2	-3	-9	CbA	All infrastructure will be removed and rehabilitated, should no alternative use be found for the structures. Foundations will be removed to a depth of 1m below surface. All building rubble will follow the waste hierarchy and will therefore either be sold for reuse where possible, disposed of within opencast pits (with the necessary approvals in place by the regulatory authority for the disposal of building rubble and as per the 2009 EMP) and as a last option be disposed of at a licensed facility suitable for such waste.	N	-1	-1	-2	-2	-6
		Handling and Storing of Domestic Waste	Spill and Release of Waste Material	N	-3	-3	-3	-3	-12	CbA	Clean and Dirty water separation systems should be incorporated in terms of the 2016 SWMP.	N	-2	-3	-2	-2	-9

Name of Activity	Impact Area	Potential Impacts	Aspects								Mitigation Type	Rating Post Measures					
Activities	Impact Area			Status	Extent	Duration	Probability	Intensity	SbM	Reversible (R), Irreplaceable Damage (ID) or Can be Avoided (CbA)	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
			and Contaminated Water.								Waste management training must be implemented on site. Clear signs informing staff of waste management practices must be implemented on site. The landfill site at Khumani must be operated in line with the Environmental Authorisation requirements and conditions. Recycling practices must be investigated and implemented on site. Ongoing rehabilitation of the landfill site must be undertaken, by covering and shaping the facility. Groundwater monitoring must be undertaken in such a manner as to ensure that any potential impacts from the landfill site can be detected.						
	Surface Water	Handling of Hazardous Waste within workshops and general mine area could contaminate the dirty water storage areas. The water is then reused in the system and could have impacts on the integrity of the storm water system and also the production.	Spill and Release of Waste Material and Contaminated Water.	N	-3	-2	-2	-4	-11	CbA	Clean and Dirty water separation systems should be incorporated in terms of the 2016 SWMP. Waste management training must be implemented on site. Clear signs informing staff of waste management practices must be implemented on site. Hazardous waste handling should only take place within bunded and/or lined areas. Hazardous waste and contaminated materials should be removed by a licenced removal company and taken to a suitable and licenced landfill site. Documentation of removal and safe disposal must be available on site. Weekly inspections of Storm Water Management Systems must be undertaken. Any blockages or maintenance requirements must be	N	-1	-1	-2	-2	-6

Name of Activity	Impact Area	Potential Impacts	Aspects							Mitigation Type	Rating Post Measures					
Activities	Impact Area			Status	Extent	Duration	Probability	Intensity	SbM	Reversible (R), Irreplaceable Damage (ID) or Can be Avoided (CbA)	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
											documented and an action plan developed.						
		Handling and Storing of Domestic Waste should have no impact on the surface water resources due to the location of the facility. However, incorrect disposal of waste could hamper the integrity of the storm water system.	Spill and Release of Waste Material and Contaminated Water.	N/A	-1	-2	-3	-3	-9	CbA	Clean and Dirty water separation systems should be incorporated in terms of the 2016 SWMP. Waste management training must be implemented on site. Weekly inspections of Storm Water Management Systems must be undertaken. Any blockages or maintenance requirements must be documented and an action plan developed. Clear signs informing staff of waste management practices must be implemented on site. The landfill site at Khumani must be operated in line with the Environmental Authorisation requirements and conditions. Building rubble must be disposed of in line with the requirements of the NEM:WA. Access control must be strictly enforced. The berm around upstream of the facility must be maintained. Recycling practices must be investigated and implemented on site. Ongoing rehabilitation of the landfill site must be undertaken, by covering and shaping the facility. Groundwater monitoring must be undertaken in such a manner as to ensure that any potential impacts from the landfill site can be detected.	N	-1	-1	-2	-1	-5
	Air Quality	The area is located within the mining area and neighbouring the Village Opencast Pit. Dust emissions is not considered to be	Removal of topsoil.	N	-2	-2	-2	-2	-8	CbA	Dust suppression should be undertaken where and when dust is present.	N	-1	-1	-2	-2	-6

Name of Activity	Impact Area	Potential Impacts	Aspects								Mitigation Type	Rating Post Measures					
Activities	Impact Area			Status	Extent	Duration	Probability	Intensity	SbM	Reversible (R), Irreplaceable Damage (ID) or Can be Avoided (CbA)	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM
		significant but can occur during excavation and construction activities.															
	Noise	The area is located within the mining area and neighbouring the Village Opencast Pit. Noise impacts are not considered to be significant but can occur during excavation and construction activities.	Removal of topsoil.	N	-2	-2	-2	-2	-8	CbA	Equipment will be well maintained to reduce excessive noise creation. Activities will be restricted to the day time.	N	-1	-1	-2	-2	-6

3.h.viii The Positive and Negative Impacts that the Proposed Activity (in terms of the Initial Site Layout) and Alternatives will have on the Environment and the Community that may be Affected

Alternatives included the following:

Low Grade ROM Sorter Plant:

Phase 3 will require an additional stockpile from where the -32mm size fraction will be beneficiated. As an alternative, Khumani may consider a truck tip instead of the additional stockpile to beneficiate the -32mm size fraction, resulting in less clearance. This will however be determined and finalised as part of the project design, and will not have a further impact on the environmental considerations as presented in this report.

Another alternative would be the no-go option. With the no-go option, Khumani will continue utilising the existing approved facility as is, without the opportunity to optimise the beneficiation of ROM from the mining operations.

Silos:

The explosive magazines and silos located on farm Parsons are located a distance away from the existing mining operations at Bruce Mine. The alterative to moving the silos will be to retain the site where it currently is. The relocation of the silos at this site is an economic decision which involves the relocation of the silos and magazine will reduce transportation costs once situated closer to the Bruce Mine.

The silos at King Mine are located within the plant and workshops areas. To improve efficiency, the mine intends constructing a magazine on King Mine. In order to ensure a sufficient buffer distance, an area to the south of the King Mine has been earmarked for the re-location of the silos and installation of a magazine.

In terms of Local Economic Development Projects. The lawful operation of the mine allows the mine to contribute to the Local Economic Development Programmes which includes:

- Third language to a primary school in Postmasburg;
- Teacher salary subsidy;
- Pre Schools salary subsidy teachers- 2 schools;
- Skill development;
- Agricultural training;
- Learning and study skills to grade 11 learners;
- Winter School support to grade 12 learners;
- Science expo local and provincial;
- Car wash project to ex-prisoners Rental and counselling support;
- Mine managers project;
- Funding done on ad hoc basis to creditable applications e.g. welfare requests;
- Computer training to communities;
- Pensioners gardening project;
- Khumani Boesman upliftment project;
- Agricultural Training;
- Student Computer Training;
- Gamagara forum Funding towards the forum;
- Assmang Diversity intervention. Intervention which includes the families of employees;
- Lerato Project in Olifantshoek Feeding Scheme;
- CSI Study assistance to non-University student;
- Tunnel Gardening project Job creation;
- Olive tree project (job creation project);
- Gem Cutting assistance;
- HPM Project Learning skills to learners;
- North West Expo;
- Famsa Volunteer training;
- Famsa Basic Counselling Training;
- Trauma House Meal assistance;
- Spring school assistance;

- Spring school Bedding assistance;
- Protection Group Visible policing clothing;
- Alcohol abuse training to youth;
- Whistles against crime for the elderly;
- Police on WHEELS Cycles to police;
- Crime stop;
- Mintek gem cutting equipment for future LED Project;
- IT Assistance to police;
- Computer and internet facility Primary school;
- Expo 2006 for High School;
- Postdene Library; and
- Primary school entrepreneurs.

3.h.ix The Possible Mitigation Measures that could be applied and the Level of Risk

According to the standard BAR template of the DMR, this section should present a list of the issues raised by stakeholders and an assessment or discussion of the mitigation or site layout alternatives available to accommodate or address the concerns raised.

To date no concerns have been raised by stakeholders.

3.h.x Motivation where no alternative sites were considered

Alternatives were considered as part of this project:

3.h.xi Statement Motivating the Alternative Development Location within the overall Site

With the no-go option of the Low Grade Sorter Plant, Khumani will continue utilising the existing approved facility as is, without the opportunity to optimise the beneficiation of ROM from the mining operations.

The relocation of the silos at this site is an economic decision which involves the relocation of the silos and magazine will reduce transportation costs once situated closer to the Bruce Mine.

The silos at King Mine are located within the plant and workshops areas. To improve efficiency, the mine intends constructing a magazine on King Mine. In order to ensure a sufficient buffer distance, an area to the south of the King Mine has been earmarked for the re-location of the silos and installation of a magazine.

3.i Full Description of the Process undertaken to Identify, Assess and Rank the Impacts and Risks the Activity will Impose on the preferred Site (In respect of the Final Site Layout Plan) through the Life of the Activity

In order to identify the potential impacts associated with the proposed activities the following steps were undertaken:

- The stakeholder consultation process is undertaken in a manner to be interactive, providing landowners and identified stakeholders with the opportunity to provide input into the project. This is a key focus, as the local residence have capabilities of providing site specific information, which may not be available in desktop research material. Stakeholders are requested (as part of the BID) to provide their views on the project and any potential concerns which they may have. All comments and concerns received to date, have been captured and formulated into the impact assessment.
- Various Environmental Studies have been undertaken for a number of projects at the Khumani Mine, these include the MPRDA EMP, EMP Alignment, various Basic Assessment Process, etc. on the portions of land, applicable to this project. The baseline studies and impact findings, were incorporated into the assessment of impacts and the ranking of these.
- A detailed desktop investigation was undertaken to determine the environmental setting in which the project is located. Based on the desktop investigations various resources were used to determine the

significance and sensitivity of the various environmental considerations. The desktop investigation involved the use of:

- South African National Biodiversity Institute (SANBI) Biodiversity Geographic Database LUDS system;
- Geographic Information System base maps;
- Department of Water and Sanitation (previously the Department of Water Affairs) information documents such as the (ISP and Groundwater Vulnerability Reports);
- AGIS;
- Municipal Integrated Development Plan; etc.
- Site Visits were undertaken in August 2015, February 2016 and again April 2016. This site visit was utilized to ensure that the information gathered as part of the desktop investigation reflects the current status of the land.

- Detailed Ecological assessment was undertaken to assess the presence of species of conservation importance. This study was incorporated into this Basic Assessment Report.
- A detailed heritage and palaeontological assessment was undertaken, where applicable this study has also been incorporated into this report.
- The rating of the identified impacts were undertaken in a quantitative manner as provided from p51 (Impact Ratings). The ratings are undertaken in a manner to calculate the significance of each of the impacts. The EAP also assessed the outcomes of the calculation to determine whether the outcome reflects the perceived and actual views.
- The identification of management measures are done based on the significance of the impacts and measures that have been considered appropriate and successful, specifically as Best Practical and Economical Options.

3.j Assessment of Each Identified Potential Significant Impact and Risk

The assessment of the impacts are presented in Table 15 to Table 17.

3.k Summary of Specialist Reports

For the purposes of this project, a detailed Ecological, Heritage and Paleontological investigation was undertaken. Please refer to Annexure 6 & Annexure 7 for these reports. The table below presents a concise snapshot of what the outcomes of this study were and what led to this Basic Assessment Application.

Table 18: Specialist Study Findings

List of studies undertaken	Recommendations of specialist reports	Specialist recommendations that have been included in the Basic Assessment report (mark with an x where applicable)	Reference to applicable section of report where specialist recommendations have been included.
Ecology	• The plant expansion area was found to host three species of conservation importance, namely *Vachellia erioloba, Boscia albitrunca* and *Aloe grandidentata*. The locations of these species are given in Figure 18. • Due to the existence of a pan and inherent conservation importance associated with the pan Silo site 1 was deemed infeasible for the purposes of construction of a silo (Figure 19). • The pipeline route, as it is presently proposed, runs through a *Vachellia erioloba* forest on the floodplains of the Gamagara River (Figure 20). Due to the protected status of this species, as well as the inherent conservation importance of floodplains according to the National Water Act, we would suggest that this section of the pipeline be rerouted to run through the *Vachellia mellifera* thicket to the south of the current route as shown in Figure 20.	Tree removal permits will be applied for where required. The site with the pan was excluded as a location. The rerouting of the pipeline is recommended, however where this is technically not possible, the required tree removal permits will be obtained. The mine must fast tract the establishment of the Environmental Protected Area (Offset Area) project.	Refer to Section 3.d and Table 15. Also refer to Section 3.n.
Heritage	• According to the initial discussions with the specialist after the initial site visit on 22 May 2017, no areas of significance were observed. • Report still being compiled – to be incorporated into the Final BAR	All recommendations are included into the final BAR.	Refer to Section 3.d and Table 15.
Paleontological	• The proposed development may proceed as far as the palaeontological heritage is concerned and a phase 2 impact study is not necessary, provided that all excavation activities are restricted to within the boundaries of the development footprint. In the unlikely event of fossil discovery within the Quaternary overburden during the operational phase of the development (i.e. modern-looking but more or less lithified animal bones and teeth), a professional palaeontologist must be called in immediately to confirm and record the finds. In the meantime, ex situ remains must be wrapped in paper towels or heavy duty tin foil and stored in a safe place. The material should not be washed or cleaned in any way. In situ material must be kept in place and	All recommendations are included into the final BAR.	Refer to Section 3.d and Table 15.

	protected from further damage by covering it with light but rigid object like a box, bucket or metal sheet until further confirmation by the palaeontologist.		

3.l Environmental Impact Statement

3.l.i Summary of the Key Findings of the Environmental Impact Assessment

It should be noted that impacts associated with the proposed Low Grade ROM Sorter Plant & Silo Relocation project will be significantly lower than a greenfields project, as activities are located within Khumani's mining right area and mostly within already disturbed environments.

3.l.i.1 Direct Impacts during Construction

It should be noted that impacts associated with the proposed Low Grade ROM Sorter Plant & Silo Relocation project will be significantly lower than a greenfields project, as activities are located within Khumani's mining right area and mostly within already disturbed environments.

Geology (Mineral Resources)

- The planned area for the Low Grade ROM Plant, is indicating the presence of a possible minable iron ore reserve. This is still being assessed for its economic viability by Khumani as part of Khumani's ongoing exploration activities. Should minable reserves present in this area be deemed feasible to mine, it will have far reaching implications not only on the Low Grade ROM Stockpile, but also on the current approved mining infrastructure, with particular reference to the existing King Mine Plant and associated infrastructure. For this reason, the project (the 'project' is low grade sorter, pipeline, silos and magazine. Should the ore reserve be deemed minable, only the low grade sorter plant and king plant infrastructure will be affected. The pipeline, silos and magazines will happen irrespective of the ore reserve outcome) has been proceeding pending further exploration details.

Topography

- Direct impact: topographical changes as a result of land and footprint clearance, topsoil stripping, stockpiling, and infrastructure establishment.

Soils, Land Use and Land Capability

- Direct impact: loss of topsoil (soil stripping) in preparation for the construction phase;
- Direct impact: stripping of topsoil and sub-surface layers will alter the soil landscape during the construction phase;
- Direct impact: soil compaction due to construction activities and vehicular movement on site;
- Direct impact: soil erosion due to exposed surfaces; and
- Direct impact: soil contamination due to construction vehicles and potential hydrocarbon spillages and/or leaks.

Hydrology

- Direct impact: hydrocarbon spillages from equipment utilised in construction activities.

Geohydrology

- Due to the nature of the activities, no additional impact on groundwater environment is expected. Regarding the Low Grade Sorter Plant, westerly run-off will be collected in the existing dams west of the facility by expanding the dam catchment area. Water run-off in an easterly direction will more than likely flow where the already approved Low Grade Stockpile is located. Due to the limited volumes, runoff from the existing Low Grade ROM Stockpiles are generally contained by berms, or paddock systems from where evaporation takes place. No additional water containment will be required for the purposes of this project.

Biodiversity

- Direct impact: loss of floral and faunal species of conservation importance due to topsoil removal and vegetation disturbance;
- Direct impact: displacement of faunal species and human/animal conflict during site preparation activities.

Air Quality

Direct impact: increase in dust fallout from topsoil removal and vegetation removal.

Visual

- Direct impact: stripping and footprint clearance will impact the perceptions of people travelling past site and staying/working near site.

Noise

- Direct impact: increased noise due to increased vehicular movement on site.

Wetlands

- The infrastructures have been placed in such a manner to not disturb or impact on any National Ecosystem & Freshwater Protected Areas (NEFPA).

3.l.i.2 Direct Impacts during the Operational Phase

Topography

- No additional impacts are foreseen as part of the operational phase.

Soils, Land Use and Land Capability

- Direct impact: soil erosion due to exposed surfaces; and.
- Direct impact: soil contamination due to operations vehicles and equipment possibly spilling hydrocarbons.
- Direct impact: soil contamination due to the filling and handling of emulsion on site.
- Direct impact: soil contamination due to the spill of ROM during the conveying of such material.

Geohydrology

- Due to the nature of the activities, no additional impact resulting from this project on groundwater environment is expected.

Biodiversity

- No further impacts foreseen.

Air Quality

- Direct impact: increase in dust fallout from the stockpiles due to the disposal of material onto the ROM stockpile areas.
- Direct impact: Increase of dust in the conveying of ROM between the transfer stations.

Visual

- The area is characterised by mining related activities. The proposed plant area will be located behind the approved Low Grade ROM Stockpile and alongside the current plant operations. The silos and magazines will be placed within the approved mining area, and in the vicinity of mining related infrastructure. No impact is foreseen as part of the operational phase.

Noise

- The proposed plant area will be located behind the approved Low Grade ROM Stockpile and alongside the current plant operations. No impact is foreseen as part of the operational phase.

Wetlands

- The infrastructure have been placed in such a manner to not disturb or impact on any NEFPA.

3.l.i.3 Direct Impacts during Decommissioning and Closure

The nature of the listed activities applied for is that these are required as part of the long term mining strategy. Therefore the decommissioning and rehabilitation of this infrastructure will only be required at the end of the Life of Mine (LOM).

Topography

- Direct positive impact: reshaping of the area following mining activities in order to achieve the proposed end of mine land use.

Soils, Land Use and Land Capability

- Direct impact: soil erosion due to exposed surfaces and rehabilitation;
- Direct impact: soil contamination due to operations vehicles and equipment possibly spilling hydrocarbons.
- Direct positive impact: Re-establishment of end land use objectives.

Hydrology

- Direct impact: surface water contamination as a result of hydrocarbon spills from vehicles used during decommissioning;
- Direct impact: surface water contamination as a result of emulsion spills from decommissioning of silos; and
- Direct impact: Siltation due to site water run-off once the berms and storm water infrastructure are decommissioned in the event that free drainage is not implemented or achieved.

Geohydrology

- Due to the nature of the activities, no additional impact on groundwater environment is expected.

Biodiversity

- Direct impact: disruption to faunal and floral communities that have established on site during the operational phase; and.
- Direct positive impact: re-establishment of faunal and floral communities during the rehabilitation process.

Air Quality

- Direct impact: fugitive dust emissions; and
- Direct impact: dust entrainment from vehicles on site as a result of driving on exposed surfaces.

Visual

- Direct positive impact: landscaping of the entire site; and
- Direct positive impact: removal of infrastructure from site and re-establishment of vegetated areas.

Noise

- Direct impact: increased noise due to rehabilitation activities; and
- Direct positive impact: reduction in noise levels due to mining cessation.

Social

- Direct impact: out-migration of job seekers as the mining operations cease;
- Direct impact: job losses;
- Direct impact: loss of the social and economic investment by Khumani as part of the Khumani's Social and Labour Plan into the municipal Integrated Development Plan (IDP); and
- Direct impact: a reduction in economic activities due to job losses and mine closure.

3.l.ii Direct Cumulative Impacts

Biodiversity

- Loss of ecological connectivity and ecosystem functioning, resulting in the overall movement of animals within this region, which could impact surrounding game reserves and tourism activities.
- Impact on the presence of vegetation of conservation importance.

Air Quality

- Increase in dust fallout throughout the life of mine and impact on surrounding residence, especially considering the combined impact with including surrounding mining activities in the area.

Social and Economic Character

- Increased sustainability of mining operations in this area will have a multiplier effect in terms of employment and economic activities in the region.

3.l.iii Final Site Map

Refer to Figure 6 for the final site map indicating the listed activity footprints.

3.l.iv Summary of the Positive and Negative Impacts and Risks of the Proposed Activity and Identified Alternatives

Please refer to Table 15 for the detailed assessment of impacts. The key impacts to consider will include:

- Positive Impacts
  - The aim of the project is to firstly optimise the beneficiation of the available low grade ROM on site, and secondly to place essential infrastructure (silos and magazines) in locations which will benefit the internal logistics of the mine.

- Negative Impacts
  - No significant impacts are associated with this project. However, the general impacts associate with construction such as the following will require management:
    - Loss of soil resources, which will be used in rehabilitation activities;
    - Relocation of sensitive flora will be required;
    - Increase presence of weeds and invader species due to the presence of human activities in the area and the clearing of surfaces;
    - Erosion due to the clearing of vegetation.
    - Waste management due to increased presence of construction workers in the area – specifically considering domestic waste management; and
    - Increased occurrence of hydrocarbon spills during the presence of construction vehicle and activities on site which could lead to the presence of soil contamination.
- Alternatives
  - <u>Low Grade ROM Sorter Plant:</u>

Phase 3 will require an additional stockpile from where the -32mm size fraction will be beneficiated. As an alternative, Khumani may consider a truck tip instead of the additional stockpile to beneficiate the -32mm size fraction, resulting in less clearance. This will however be determined and finalised as part of the project design, and will not have a further impact on the environmental considerations as presented in this report.

Another alternative would be the no-go option. With the no-go option, Khumani will continue utilising the existing approved facility as is, without the opportunity to optimise the beneficiation of ROM from the mining operations.

  - <u>Silos</u>:

The explosive magazines and silos located on farm Parsons are located a distance away from the existing mining operations at Bruce Mine. The alterative to moving the silos will be to retain the site where it currently is. The relocation of the silos at this site is an economic decision which involves the relocation of the silos and magazine will reduce transportation costs once situated closer to the Bruce Mine.

The silos at King Mine are located within the plant and workshops areas. To improve efficiency, the mine intends constructing a magazine on King Mine. In order to ensure a sufficient buffer distance, an area to the south of the King Mine has been earmarked for the re-location of the silos and installation of a magazine.

3.m Proposed Impact Management Objectives and the Impact Management Outcomes for inclusion in the EMPr

Please refer to the PART B EMP (Table 23) for the detailed assessment of impacts and recommended objectives. The key objectives to consider will include:

- The EMP must be utilised to:
  - Provide sufficient information to strategically plan the activities as to avoid unnecessary social and environmental impacts.
  - Provide sufficient information and guidance to plan prospecting activities in a manner that would reduce impacts (both social and environmental) as far as practically possible.
  - Ensure an approach that will provide the necessary confidence in terms of environmental compliance.
  - Provide a management plan that is effective and practical for implementation.

The proposed impact management objectives as referred to in the table above includes:

- To operate within the enviro-legal ambits of South Africa.
- To be aware of the latest environmental legal requirements.
- Limit the impact of the activities on the Ecological Setting of the area.
- Operate the water management circuit on site to increase mining efficiency and reduce the need for maintenance of these facilities.
- Limit the loss of soils as far as possible and ensure that the integrity remains during stockpiling for the purposes of successful rehabilitation.
- Protect the soil resources within the area in which the mine operates.
- Remain within the designated area demarcated for activities.
- Remain within the National Environmental Management: Air Quality Act, 2004 Dust Regulation guidelines for rural communities.
- Protect heritage resources for future generations.
- Protect the groundwater resources to ensure that limited to no impact on groundwater resources occur as a result of the mining operations.
- Follow the waste hierarchy approach.
- Protect the integrity of the Storm Water Management System.
- Develop the area to its intended final land use.

Through the implementation of the proposed mitigation measures, it is anticipated that the identified impacts can be managed and mitigated effectively and the objectives set can be met. Through the implementation of the mitigation and management measures it is expected that:

- The pollution of soil and water resources can be effectively managed through containment;
- Impact on unknown heritage sites can be effectively managed to the implementation of a management protocol in the event that such facilities are encountered.
- Ecological impact can be managed through the implementation of pollution prevention measures, minimizing land clearing, restricting working hours (faunal disturbance) and rehabilitation.

3.n Aspects for Inclusion as Conditions of Authorisation

The following conditions should be included in the authorisation in addition to the general conditions included in the Environmental Authorisations:

- An independent Environmental Control Officer must be appointed to assess the construction activities, at least once a month to ensure that all components of the EMP are addressed.
- Tree removal permits to be applied for where required.
- The pan to the south-west of the proposed King Silo should retain a 500m buffer.
- The pipeline route, as it is presently proposed, runs through a *Vachellia erioloba* forest on the floodplains of the Gamagara River. Due to the protected status of this species, as well as the inherent conservation importance of floodplains according to the NWA, the rerouting of the pipeline is recommended, through the *Vachellia mellifera* thicket to the south of the current route. However where this is technically not possible, the required tree removal permits to be obtained.
- Khumani must fast tract the establishment of the Environmental Protected Area (Offset Area) project.
- Due to the lack of significant heritage resources in the study area the impact of the proposed project on heritage resources is considered low and it is recommended that the proposed project can commence on the condition that the following recommendations are implemented as part of the EMPr and based on approval from SAHRA: Implementation of a chance find procedure.
- In the unlikely event of fossil discovery within the Quaternary overburden during the operational phase of the development (i.e. modern-looking but more or less lithified animal bones and teeth), a professional palaeontologist must be called in immediately to confirm and record the finds. In the meantime, ex situ remains must be wrapped in paper towels or heavy duty tin foil and stored in a safe place. The material should not be washed or cleaned in any way. In situ material must be kept in place and protected from further damage by covering it with light but rigid object like a box, bucket or metal sheet until further confirmation by the palaeontologist.

3.o Description of any Assumptions, Uncertainties and Gaps in Knowledge

The following assumptions, uncertainties and gaps are applicable to this project:

- The Basic Assessment Report is based on existing available environmental information and those presented by the specialists and is considered as true and correct;
- The project description is based on the information presented by the appliance and is considered as true and correct.

3.p Reasoned Opinion as to Whether the Proposed Activity should or should not be Authorised

It is the opinion of the EAP that the activity should be authorized.

Aim of the Project

The aim of the project is to firstly optimise the beneficiation of the available low grade ROM on site, and secondly to place essential infrastructure (silos in magazines) in locations which will benefit the internal logistics of the mine.

Alternatives Considered:

With the no-go option of the Low Grade Sorter Plant, Khumani will continue utilising the existing approved facility as is, without the opportunity to optimise the beneficiation of ROM from the mining operations.

The relocation of the silos at this site is an economic decision which involves the relocation of the silos and magazine will reduce transportation costs once situated closer to the Bruce Mine.

The silos at King Mine are located within the plant and workshops areas. To improve efficiency, the mine intends constructing a magazine on King Mine. In order to ensure a sufficient buffer distance, an area to the south of the King Mine has been earmarked for the re-location of the silos and installation of a magazine.

Impacts:

As part of the impact assessment no impacts where identified which cannot be mitigated or addressed through the stated management measures.

Recommended Conditions:

The following conditions should be included in the authorisation in addition to the general conditions included in the Environmental Authorisations:

- An independent Environmental Control Officer must be appointed to assess the construction activities, at least once a month to ensure that all components of the EMP are addressed.
- Tree removal permits to be applied for where required.
- The pan to the south-west of the proposed King Silo should retain a 500m buffer.
- The pipeline route, as it is presently proposed, runs through a *Vachellia erioloba* forest on the floodplains of the Gamagara River. Due to the protected status of this species, as well as the inherent conservation importance of floodplains according to the NWA, the rerouting of the pipeline is recommended, through the *Vachellia mellifera* thicket to the south of the current route. However where this is technically not possible, the required tree removal permits to be obtained.
- Khumani must fast tract the establishment of the Environmental Protected Area (Offset Area) project.
- Due to the lack of significant heritage resources in the study area the impact of the proposed project on heritage resources is considered low and it is recommended that the proposed project can commence on the condition that the following recommendations are implemented as part of the EMPr and based on approval from SAHRA: Implementation of a chance find procedure.
- In the unlikely event of fossil discovery within the Quaternary overburden during the operational phase of the development (i.e. modern-looking but more or less lithified animal bones and teeth), a professional palaeontologist must be called in immediately to confirm and record the finds. In the meantime, ex situ remains must be wrapped in paper towels or heavy duty tin foil and stored in a safe place. The material should not be washed or cleaned in any way. In situ material must be kept in place and protected from further damage by covering it with light but rigid object like a box, bucket or metal sheet until further confirmation by the palaeontologist.

3.q Period for which the Environmental authorisation is required

The project is required for the LOM, which may still continue in excess of 30 years.

3.r Undertaking

An undertaken by the EAP and the client is provided for in Section 2 of the EMP (PART B).

3.s Financial Provision

Newly promulgated regulations (November 2015) pertaining to the Financial Provision for Prospecting, Exploration, Mining and Production Operations in terms of the National Environmental Management Act, 1998 (Act 107 of 1998) ("NEMA") prescribes the determination and making of Financial Provision for existing rights/permit holders (Regulation 11 of GNR.1147). Importantly, the provisions in Section 24P of NEMA has been given effect through these newly promulgated regulations.

The following sections presents the methodology for the determination of the financial provision.

3.s.i Explain how the amount was derived

Most important to note is that the prescribed method for estimating a closure cost, as provided for by the DMR in the form of the Guideline Document for the Evaluation of Financial Provisions, only acts as a guideline, and therefore indicates the minimum requirements for assessing and reporting on a closure cost estimate.

3.s.i.1 Method of Assessment

As mentioned before, EnviroGistics made use of the Guideline Document for the Evaluation of Financial Provisions made by the Mining Industry. The following table presents the step-by-step details on how the

financial provision has been derived. For the purposes of determining the quantum for closures, it is assumed that the infrastructure will have no salvage value.

3.s.i.2 Quantity Estimation

For the purposes of this assessment, EnviroGistics can confirm that the method adopted to obtain and compile the schedule of quantities is sound, correct, and provides detail that is required by the DMR. The information will allow for continued monitoring and updating of quantities and provides the ideal platform to manage and monitor the actual on-site rehabilitation measures and costs incurred.

3.s.i.3 Determination of Rates

Table 19 below indicates the unit rates for each rehabilitation and closure component associated with Khumani, specifically those applicable to this application. These rates are based on the December 2016 Closure Assessment undertaken for Khumani. This assessment is updated annually and is scheduled for July 2017.

The rates was determined by a civil engineer.

Table 19: Master Rate Calculation

Infrastructure	Description	Unit	Planned Units	Cost per Unit	Planned Cost
King Existing Silo	Rip and Shape of footprints	m2	45000	R 4,56	R 205 200,00
	200mm thick topsoil cover	m3	9911	R 22,00	R 218 002,36
	Seeding footprint (x2 for two types of grasses)	m2	4500	R 4,50	R 40 500,00
	Fence dismantling	m	800	R 35,00	R 28 000,00
Parson Existing Silo	Rip and Shape of footprints	m2	37000	R 4,56	R 168 720,00
	200mm thick topsoil cover	m3	8149	R 22,00	R 179 245,40
	Seeding footprint (x2 for two types of grasses)	m2	4500	R 4,50	R 40 500,00
	Fence dismantling	m	800	R 35,00	R 28 000,00
Parson Existing Silo Access Road	Demolish unsurfaced haul roads, rip and shape	m2	6600	R 11,00	R 72 600,00
Low grade ROM sorter plant Demolition	Dismantling of Conveyors, including support structures	m	3350	R 450,00	R 1 507 500,00
	Rip and Shape stockpile Footprints	m2	67140	R 5,47	R 367 390,08
	200mm thick topsoil cover	m3	19679	R 22,00	R 432 859,28
	Seeding footprint (x2 for two types of grasses)	m2	89450	R 4,50	R 805 050,00
	Fence dismantling (additional fence to tie into existing fences)	m	580	R 35,00	R 20 300,00
New King and Parson Silos	Net Zero Effect (replacement of exiting quantified infrastructure), included into exiting costing (only replacement of infrastructure)	-	-	-	-
Total Cost (including 20% contingency)					R 4 113 867,12

3.s.i.4 Annual Rehabilitation Report

The following sections (Sections 3.s.i.4.a to 3.s.i.4.g presents the Annual Rehabilitation Plan.

The objective of the annual rehabilitation plan is to–

a) review concurrent rehabilitation and remediation activities already implemented;
b) establish rehabilitation and remediation goals and outcomes for the forthcoming 12 months, which contribute to the gradual achievement of the post-mining land use, closure vision and objectives identified in the holder's final rehabilitation, decommissioning and mine closure plan;
c) establish a plan, schedule and budget for rehabilitation for the forthcoming 12 months;

d) identify and address shortcomings experienced in the preceding 12 months of rehabilitation; and
e) evaluate and update the cost of rehabilitation for the 12 month period and for closure, for purposes of supplementing the financial provision guarantee or other financial provision instrument.

According to the November 2015 Regulations, the annual rehabilitation plan will be relevant for a period of 1 year, after which the plan will be updated by the holder of a right or permit to reflect progress relating to rehabilitation and remediation activities in the preceding 12 months and to establish a plan, schedule and budget for the forthcoming 12 months. The annual rehabilitation plan must contain information that defines concurrent rehabilitation and remediation activities for the forthcoming 12 months and how these relate to the operations' closure vision, as detailed in the final rehabilitation, decommissioning and mine closure plan, must indicate what closure objectives and criteria are being achieved through the implementation of the plan, must be measurable and auditable and must include

3.s.i.4.a Details of the Person that prepared the plan

The regulation requires:

(a) details of the–

(i) person or persons that prepared the plan;

(ii) professional registrations and experience of the person or persons;

(iii) timeframes of implementation of the current, and review of the previous rehabilitation activities.

Please refer to Section 3.a for the details of the EAP.

The timeframes of implementation will commence once the Environmental Authorisation has been approved and will again be assessed at each of the subsequent annual assessments of the Financial Provision, which is scheduled annually for June/July.

3.s.i.4.b Environmental and Project Context

The regulation requires:

(b) the pertinent environmental and project context relating directly to the planned annual rehabilitation and remediation activity

Please refer to Section 3.h.iv and 3.d respectively for the environmental context in which the project is related and the specific context associated with the project.

3.s.i.4.c Risks and Remedial Impacts

The regulation requires:

(c) results of monitoring of risks identified in the final rehabilitation, decommissioning and mine closure plan with a view to informing rehabilitation and remediation activities.

The activity as itself will not result in a long term or remedial impacts. With the implementation of the management measures for closure as stipulated in this EMP the area can be rehabilitated to a suitable land use such as wilderness land.

3.s.i.4.d Shortcomings in the preceding 12 months

The regulation requires:

(d) an identification of shortcomings experienced in the preceding 12 months.

This section is not applicable as this activity has not yet been constructed. This section will be addressed during the next annual assessment once the project has been approved and construction has commenced.

3.s.i.4.e Planned annual rehabilitation activities for the forthcoming 12 months

The regulation requires:

(e) details of the planned annual rehabilitation and remediation activities or measures for the forthcoming 12 months, including those which will address the shortcomings contemplated in (d) above or which were identified from monitoring in the preceding 12 months, and including–

(i) if no areas are available for annual rehabilitation and remediation concurrent with mining, an indication to that effect and motivation why no annual rehabilitation or remediation can be undertaken;

(ii) where areas are available for annual rehabilitation and remediation concurrent with mining, annual rehabilitation and remediation activities related to previous disturbance or expected planned impacts and disturbance, as per the mine works programme, in the period under consideration, which should be tabulated and must indicate, but not necessarily be limited to,--

(aa) nature or type of activity and associated infrastructure;

(bb) planned remaining life of the activity under consideration;

(cc) area already disturbed or planned to be disturbed in the period of review;

(dd) percentage of the already disturbed or planned to be disturbed area available for concurrent rehabilitation and remediation activities;

(ee) percentage of the already disturbed or planned to be disturbed area available as per (dd) and on which concurrent rehabilitation and remediation can be undertaken;

(ff) notes to indicate why total available or planned to be available area differs from area already disturbed or planned to be disturbed;

(gg) notes to indicate why concurrent rehabilitation will not be undertaken on the full available or planned to be available area;

(hh) details of rehabilitation activity planned on this area for the period of review;

(ii) the pertinent closure objectives and performance targets that will be addressed in the forthcoming year, which objectives and targets are aligned to the final rehabilitation, decommissioning and mine closure plan;

(jj) description of the relevant closure design criteria adopted in the annual rehabilitation and remediation activities and the expected final land use once all rehabilitation and remediation activities are complete for the activity or aspect; and

(iii) a site plan indicating at least the total area disturbed, area available for rehabilitation and remediation and the area to be rehabilitated or remediated per aspect or activity.

As part of this project, the existing silos and magazine will be decommissioned. It is foreseen that these activities will be initiated within one year of the approval of the Environmental Authorisation.

The construction activities of the new silos and magazines should be completed within six (6) months from approval of the Environmental Authorisation, whereas the operation of the new Silos will continue for the life of mine. Once the existing silos and magazine have been rehabilitated, no annual rehabilitation will be required for these listed activities. Due to the nature of the listed activities in this application, no concurrent rehabilitation is planned.

The overall objectives for the forthcoming year will be to:

- To operate within the enviro-legal ambits of South Africa.
- To be aware of the latest environmental legal requirements.
- Rehabilitate the area where the existing silos (Parson and King) are located.
- Limit the impact of the activities on the Ecological Setting of the area.
- Limit the loss of soils as far as possible and ensure that the integrity remains during stockpiling for the purposes of successful rehabilitation.
- Protect the soil resources within the area in which the mine operates.
- Remain within the designated area demarcated for activities.

- Remain within the National Environmental Management: Air Quality Act, 2004 Dust Regulation guidelines for rural communities.
- Protect heritage resources for future generations.
- Protect the integrity of the Storm Water Management System.

The area for rehabilitation in the 2017 financial year will include the existing Silos (Parson and King). The rehabilitation will include:

- Removal/relocation of infrastructure;
- Shaping of footprint and allowed to self-vegetate.

The overall intention is to ensure that this area be rehabilitated to wilderness land.

3.s.i.4.f Review of previous year's annual rehabilitation

The regulation requires:

(f) a review of the previous year's annual rehabilitation and remediation activities, indicating a comparison between activities planned in the previous year's annual rehabilitation and remediation plan and actual rehabilitation and remediation implemented, which should be tabulated and as a minimum contain–

(aa) area planned to be rehabilitated and remediated during the plan under review;

(bb) actual area rehabilitation or remediated; and

(cc) if the variance between planned and actual exceeds 15%, motivation indicating reasons for the inability to rehabilitate or remediate the full area.

This section is not applicable as the facility has not been constructed and no review of previous year rehabilitation is available.

3.s.i.4.g Costing

The regulation requires:

(g) costing, including–

(i) an explanation of the closure cost methodology;

(ii) auditable calculations of costs per activity or infrastructure;

(iii) cost assumptions; and

(iv) monitoring and maintenance costs likely to be incurred both during the period of the annual rehabilitation plan and those that will extend past the period of the final rehabilitation, decommissioning and mine closure plan, on condition that the monitoring and maintenance costs included in previous annual rehabilitation plans must be accumulated into subsequent versions of the annual rehabilitation plan until such time as the monitoring and maintenance obligation is discharged.

Please refer to Section 3.s.i for the methodology of costing utilised.

Please refer to 3.s.i.6 for the preliminary cost which will be updated based on the overall annual financial provision which will be undertaken by the applicant during June/July 2017.

3.s.i.5 Final Rehabilitation, Decommissioning and Mine Closure Plan

The final rehabilitation, decommissioning and mine closure plan for the entire mine was drafted during December 2017, but will be updated again during June/July 2017. It should be noted that these Regulation 6 forms will only be required in 2019 according to the latest NEMA Regulations for Financial Provision.

3.s.i.6 Preliminary Cost Estimation

The following table presents the closure cost rehabilitation components and cost.

Table 20: Closure Cost

Infrastructure	Description	Planned Cost
King Existing Silo	Rip and Shape of footprints	R 205 200,00
	200mm thick topsoil cover	R 218 002,36
	Seeding footprint (x2 for two types of grasses)	R 40 500,00
	Fence dismantling	R 28 000,00
Parson Existing Silo	Rip and Shape of footprints	R 168 720,00
	200mm thick topsoil cover	R 179 245,40
	Seeding footprint (x2 for two types of grasses)	R 40 500,00
	Fence dismantling	R 28 000,00
Parson Existing Silo Access Road	Demolish unsurfaced haul roads, rip and shape	R 72 600,00
Low grade ROM sorter Plant Demolition	Dismantling of Conveyors, including support structures	R 1 507 500,00
	Rip and Shape stockpile Footprints	R 367 390,08
	200mm thick topsoil cover	R 432 859,28
	Seeding footprint (x2 for two types of grasses)	R 805 050,00
	Fence dismantling (additional fence to tie into existing fences)	R 20 300,00
New King and Parson Silos	Net Zero Effect (replacement of exiting quantified infrastructure), included into exiting costing (only replacement of infrastructure)	-
Total Cost (including 20% contingency)		R 4 113 867,12

Financial Provision

The rehabilitation and liability estimation for the proposed infrastructure related to this application only was determined as a clean closure estimate – no allowance for off-sets or salvage value. The assessment was conducted in accordance with the DMR Guideline and best current practice.

A Sub Total 1 Amount of approximately R 4 113 867.12.00 (excluding VAT, but including P&Gs and Contingencies).

The financial provision required by the holder of the mining right must be provided for by one or more of the following methods in order to achieve the total quantum of rehabilitation and remediation of environmental impacts and damage as well as final closure:

- Approved dedicated trust fund;
- Financial guarantee from a South African registered bank or any other approved financial institution;
- Cash deposit to be deposited at the office of the Regional Manager; or
- Any other manner determined by the Minister.

The client is required to annually assess the total quantum of environmental liability for the operation and ensure that financial provision is sufficient to cover the current liability (in the event of premature closure), as well as the end of life liability.

As per Government Legislature, the client is required to ensure full financial cover for the current liability at any point in the life of the operation. Pecuniary provision must be made for the shortfall between the existing trust fund balance and the premature closure or current environmental rehabilitation liability if applicable.

3.s.ii Confirm that this amount can be provided for from Operating Expenditure

The mine has a trust fund in place to cater for the financial provision of rehabilitation activities. This is assessed annually to ensure that suitable funds are available. The next assessment will be undertaken in June/July 2017.

3.t Specific Information Required by the Competent Authority

3.t.i Compliance with the Provisions of Section 24(4)(a) and (b) read with Section 24(3)(a) and (7) of the National Environmental Management Act (Act 107 of 1998) The EIA Report must include the:-

3.t.i.1 Impact on the Socio-Economic Conditions of any Directly Affected Person

Please refer to Section 3.h.viii. This activity will not present any specific positive or negative impacts in terms of Socio-Economic Conditions of any directly affected parties, but will aim at the optimal beneficiation of ROM on site as well as the logistical placement of infrastructure on site.

3.t.i.2 Impact of any National Estate referred to in Section 3(2) of the National Heritage Resources Act.

According to the Heritage Study (refer to Annexure 7, no archaeological sites or material of significance was recorded during the survey and an independent paleontological study has been commissioned. No further mitigation prior to construction is recommended in terms of the archaeological component of Section 35 for the proposed development to proceed.

In terms of the built environment of the area (Section 34), no standing structures older than 60 years occur within the study areas. In terms of Section 36 of the National Heritage Resources Act, no burial sites were recorded. If any graves are located in future they should ideally be preserved in-situ or alternatively relocated according to existing legislation. No public monuments are located within or close to the study area. The study area is surrounded by existing mining developments and infrastructure and the proposed development will not impact negatively on significant cultural landscapes or viewscapes. During the public participation process conducted for the project no heritage concerns was raised.

3.u Other Matters Required in terms of Section 24(4)(a) and (b) of the Act

None.

PART B

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

1 DRAFT ENVIRONMENTAL MANAGEMENT PROGRAMME/PLAN REPORT

1.a Details of the EAP

Table 21: Details of EAP

Name	Tanja Bekker
Designation	Environmental Assessment Practitioner
Postal Address	PO Box 22014, Helderkruin, 1733
Physical Address	21 Gladiolus Street, Roodekrans, 1724
Telephone Number	+27 (0) 82 412 1799
Cell Phone Number	+27 (0) 82 412 1799
Fax Number:	+ 27 (0) 86 551 5233
Email Address	tanja@envirogistics.co.za

1.a.i Expertise of the EAP

The following table presents a summary of the EAPs experience:

Table 22: Experience of EAP

Name	Position	Qualification	Professional Registrations	Experience
Tanja Bekker	Principal Practitioner	M.Sc. Environmental Management (RAU), now Johannesburg University)	Certified member of the Environmental Assessment Practitioners Association of South Africa (October 2013) Registered with the South African Council of National Scientific Professions (SACNASP: Pr.Sci.Nat. Reg No. 400198/09) Member of International Association of Impact Assessors Member of the Environmental Law Association of South Africa	14 Years

Please refer to Annexure 2 for the Curriculum Vitae of the EAP.

Education

B.Sc. Earth Sciences (Geography & Geology) – RAU (University of Johannesburg)

B.Sc. Geography Honours - RAU (University of Johannesburg)

M.Sc. Environmental Management - RAU (University of Johannesburg)

Career Enhancing Courses

ISO 14000 Lead Auditors Course (WTH Management)

Certificate in Project Management (Pretoria University)

Management Advance Programme (MAP 81) (Wits Business School)

Professional Affiliations

Certified member of Environmental Assessment Practitioners Association of South Africa

Certified ISO 14001 Environmental Management System Auditor

Registered as a Professional Natural Scientist,

Member of the South African affiliate of the International Association for Impact Assessment

Member of the Environmental Law Association of South Africa (ELA).

Summary of the EAP's past experience

Ms. Bekker is registered as a Professional Natural Scientist with the South African Council of Natural Science Professional Board and is also a Certified Environmental Assessment Practitioner (EAP) with the Interim Certification Body of Environmental Practitioner Association of South Africa (EPASA), a legal requirement stipulated by the National Environmental Management Act, 1998. She is further certified as an ISO 14001 Lead Auditor. Her qualifications include a BSc. Earth Sciences (Geology and Geography), BSc. Hons. Geography, and a MSc. Environmental Management. In addition to the tertiary qualifications, she obtained a Certificate in Project Management, and completed the Management Advance Programme at Wits Business School.

With more than 13 years' working experience in environmental management and the consulting industry and managing various Large Account Clients, she understands the South African Regulatory System, and can advise client with due diligence on their environmental regulatory requirements and offer a solution driven service to their project life cycle. She is equipped with exceptional project management and coordination skills, which especially enhances the service she offers clients within the environmental permitting system.

Her key focus is environmental management and compliance with extensive experience in the mining industry. Project Management and Coordination of projects form a critical component of her duties, which include project planning, initiation of projects, client, authority and stakeholder consultation, specialist coordination, budget control, process control, quality control and timeframe management. Her interest lies in a client advisory capacity, being involved during due diligence investigations, pre-project development and assist the client and engineering team in adding value to develop the project in and environmental sustainable manner, considering client costs and liabilities, as well as consider the implication of environmental authorisation conditions and requirements on project deliverables. Her involvement in projects has spanned over the project life cycle from Due Diligence Investigations, Pre-Feasibility Investigation's, Prospecting Right Applications, Mining Right Applications, Environmental Reporting and implementation and auditing of Environmental Management Plans and Authorisations.

1.b Description of the Aspects of the Activity

The requirement to describe the aspects of the activity that are covered by the draft environmental management programme is already included in PART A, Section 3.d.v.

1.c Composite Map

Please refer to Figure 27 presented in Part A.

1.d Description of Impact Management Objectives including Management Statements

1.d.i Determination of Closure Objectives

The rehabilitation plan is developed on the basis that the rehabilitated areas are safe, stable, non-polluting and are able to support a self-sustaining ecosystem similar to surrounding natural environment. To ensure that the rehabilitation plan is aligned with the closure objective, a high level risk assessment of the prospecting components has been undertaken to establish the potential risks associated therewith.

Please refer to Table 23 for the detailed assessment of impacts and recommended objectives. The key objectives to consider will include:

- The EMP must be utilised to:
  - Provide sufficient information to strategically plan the activities as to avoid unnecessary social and environmental impacts.
  - Provide sufficient information and guidance to plan prospecting activities in a manner that would reduce impacts (both social and environmental) as far as practically possible.

- Ensure an approach that will provide the necessary confidence in terms of environmental compliance.
- Provide a management plan that is effective and practical for implementation.

The proposed impact management objectives as referred to in the table above includes:

- To operate within the enviro-legal ambits of South Africa.
- To be aware of the latest environmental legal requirements.
- Limit the impact of the activities on the Ecological Setting of the area.
- Operate the water management circuit on site to increase mining efficiency and reduce the need for maintenance of these facilities.
- Limit the loss of soils as far as possible and ensure that the integrity remains during stockpiling for the purposes of successful rehabilitation.
- Protect the soil resources within the area in which the mine operates.
- Remain within the designated area demarcated for activities.
- Remain within the National Environmental Management: Air Quality Act, 2004 Dust Regulation guidelines for rural communities.
- Protect heritage resources for future generations.
- Protect the groundwater resources to ensure that limited to no impact on groundwater resources occur as a result of the mining operations.
- Follow the waste hierarchy approach.
- Develop the area to its intended final land use.

1.d.ii Volumes and Rate of Water Use Required for the Operation

Khumani has an approved Water Use Licence, and no additional water will be required for this project. Khumani is currently investigating opportunities to improve water use within the mining system and also the reliable source of water for processing purposes. Once these studies have been completed the necessary environmental and water authorisations will be applied for.

One river crossing will be require, between point A2 and A1 (refer to Figure 7), which is associated with the existing conveyor crossing on the mine and approved as Water Use 2 under the Section 21c & i water uses in the approved 2013 WUL. .For this reason no river crossing application will be required as the pipeline will be located within the existing servitude, and will only route clean water at any given time.

1.d.iii Has a Water Use License been applied for?

Activities associated with the Low Grade Sorter Plant, such as the thickener process, will not result in storage or disposal of dirty water, but is considered an integral part of the beneficiation process for optimal water reuse. Material for further processing from the Low Grade Sorter Plant will be deposited on the approved Low Grade ROM Stockpile, which is located to the south-west of the proposed plant.

It is not foreseen that a Water Use License will be required for this project.

1.d.iv Impacts to be mitigated in their Respective Phases

The following table presents the:

- Phases of the proposed project;
- Mitigation requirements;
- Compliance standards; and
- Time period during which the management measures should be implemented.

Table 23: Construction Phase Impact Table with Management Measure, Objectives and Standards

Name of Activity	Impact Area	Potential Impacts	Aspects	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Timeframes			
Activities	Impact Area			Mitigation Measures			Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout Life of Mine
Planning Phase (and throughout LOM to ensure Legal Compliance)										
Legal Requirements (Environmental Permits)	South Africa Enviro-Legal Requirements	Unlawful water and waste (mine residue) activities, which could lead to NWA Directives and Section 24G Rectification fines.	Legal Compliance.	A legal assessment of all activities must be undertaken on site must be undertaken annually to ensure that all Environmental Authorisations are in place, implemented and activities licensed.	To operate within the enviro-legal ambits of South Africa.	Ensure that all activities undertaken by the mine are lawful with the required environmental licences in place.	x			x
				The mine must familiarise themselves with the NEM:WA Regulations for the management of Mine Residue Deposits. Those included in previous approved EMPs are considered lawful under the NEM:WA, however when reworking, rehabilitation, stockpiling are taking place, and not included into the previous EMP, these activities are unlawful and may require a Waste License.	To be aware of the latest environmental legal requirements.	Ensure that all environmental authorisations on site is implemented on site and ongoing monitoring of compliance are undertaken to reach 100% compliance.	x			x
				All legally appointed personnel responsible or involved in approved activities on site must receive training on the requirements of the Environmental Authorisations.		All Departments responsible for development of the mine, must understand the requirements of the environmental legislation and must involve this into their planning processes.	x			x
				Quarterly integral audits must be undertaken on the lawful implementation of the WUL.						
				The Environmental Authorisation must be available on site at all times.						
				The legal register must be updated to indicate all approved activities on site						

Name of Activity	Impact Area	Potential Impacts	Aspects	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Timeframes			
Activities	Impact Area			Mitigation Measures			Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout Life of Mine
				(NEMA, NEMWA, ECA and MPRDA).						
Construction Phase										
Activity 1 - Land and Footprint Clearance **Construction & widening of Roads:** Development of roads to the King Silos. Should the King/Mokaning access road be used, a link of approximately 1.5km to this road will be required. Upgrades of roads to the Bruch Silos, may require an extension of approximately 450m to existing roads. **Construction of Silos and Magazines at Bruce:** Two magazine areas, an emulsion silo and an ammonium nitrate Silo). This area will include all ancillary required infrastructure. Activity 1 - Land and Footprint Clearance **Construction of Silos and Magazines at King:** An emulsion silo and ammonium nitrate silo). This area will include all ancillary required infrastructure. combined a total storage of 195m3 (emulsion: 113m3) ammonium nitrate: 82m3) **Laying of the pipelines within undisturbed areas:** A pipeline route of approximately 800m will	Geology	No direct impact	-	-	-	-	-	-	-	-
	Topography	Direct impact: Alteration of topography. Removal of vegetation and the associated shaping of the area to prepare footprint for construction will allow for increased surface water runoff, which may lead to change in topographical characteristics of the area.	Footprint clearance	Construction areas must be clearly demarcated to control movement of personnel and vehicles, providing clear boundaries for construction sites in order to limit the spread of impacts. Markers and pegs will be erected and maintained along the boundaries of the working areas, access roads, haul roads and paths before commencing any work. If proved insufficient for control, these shall be replaced by fencing.	Remain within demarcated areas. Design facilities to blend into the existing site character as far as practically possible.	No disturbed areas should remain beyond the demarcated areas. 100% compliance to remain with approved footprint areas.	x			
				Draw up a procedure clearly reflecting the method and phases of clearance of vegetation only in areas where construction will take place.						
				Removal of vegetation must be undertaken in a phased approach to limit surface exposure.						
				Erosion control measures must be implemented early in the construction phase.						
				Clean and dirty water separation must be implemented early in the construction phase, especially down-gradient of construction areas.						
				Where possible existing roads must be utilised.						

Name of Activity	Impact Area	Potential Impacts	Aspects	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Timeframes			
Activities	Impact Area			Mitigation Measures			Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout Life of Mine
be required between point A1 and the two water supply areas P1 and P2. **Activity 2 - Topsoil Stripping and Stockpiling** **Construction & widening of Roads:** Development of roads to the King Silos. Should the King/Mokaning access road be used, a link of approximately 1.5km to this road will be required. Upgrades of roads to the Bruch Silos, may require an extension of approximately 450m to existing roads. **Construction of Silos and Magazines at Bruce:** Two magazine areas, an emulsion silo and an ammonium nitrate silo). This area will include all ancillary required infrastructure. **Construction of Silos and Magazines at King:** An emulsion silo and an ammonium nitrate silo). This area will include all ancillary required infrastructure. For the Bruce and King expansions combined a total storage of 195m3 (emulsion: 113m3) ammonium nitrate: 82m3)				Linear infrastructure must follow for as far as practically possible the natural contours of the area.						
	Soil, Land Use and Land Capability	Direct impact: The removal and stockpiling of topsoil may lead to a loss of soil resource and land capability through erosion of the stockpiles and chemical and physical degradation.	Footprint clearance	Adhere to Soil Stripping, Soil Stockpiling and Soil Management Plan as part of the original EMP (Soil Utilisation Guideline). Prior to construction of the road and the plant the soil will be stripped and placed in close proximity to the facilities. It is recommended that the soil and overburden be stockpiled as 1-1.5m berms around the roads and plant area. Remove 30cm of soil or until hard rock is reached. Any new topsoil stockpiles should not exceed 1.5m. Where exceedance is present on existing facilities, erosion control measures should be implemented and vegetation establishment should be encouraged to assist in maintaining the structure of the soils for rehabilitation.	Limit the loss of soils as far as possible and ensure that the integrity remains during stockpiling for the purposes of successful rehabilitation. Protect the soil resources within the area in which the mine operates.	The integrity of the soils stockpiled must remain suitable for the purposes of rehabilitation. No disturbed areas should remain beyond the demarcated areas. 100% compliance to remain with approved footprint areas.	x			x
		Direct impact: Soil compaction	Footprint clearance	The contractor will ensure that all activities, material and equipment storage and personnel movement take place within the designated area.						

Name of Activity	Impact Area	Potential Impacts	Aspects	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Timeframes			
Activities	Impact Area			Mitigation Measures			Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout Life of Mine
				All contractors must receive induction.						
				Site clearance and activities should be restricted to the approved footprint. Contractor's areas should be established on already disturbed footprints.						
		Direct impact: Clearing vegetation will result in the exposure of soil, which may in turn lead to soil erosion.	Footprint clearance	Adhere to Storm water Management Plan.	Limit the loss of soils as far as possible and ensure that the integrity remains during stockpiling for the purposes of successful rehabilitation. Protect the soil resources within the area in which the mine operates.	The integrity of the soils stockpiled must remain suitable for the purposes of rehabilitation.	x			x
				Ensure that all design drawings include effective erosion control measures.						
				Ensure the required erosion protection measures are monitored and corrected where necessary.						
				Natural vegetation establishment (self-succession) will be encouraged.						
				The mine will investigate an appropriate seed mix for the rehabilitation purposes should self-succession not establish on rehabilitated sites.						
				Areas of construction must be clearly demarcated.						
				No construction or project related activities may be undertaken outside of the demarcated areas.						
				Clean and dirty water systems must be established prior to construction.						
				Where vegetation cannot be established during the life of construction and operations, appropriate measure will be	Retaining soil integrity for rehabilitation.	Maintaining soil integrity, with successful vegetation establishment.	x			x

Name of Activity	Impact Area	Potential Impacts	Aspects	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Timeframes			
Activities	Impact Area			Mitigation Measures			Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout Life of Mine
				taken to control erosion. These will include grading of surfaces to prevent rapid run-off of storm water and / or the use of energy dissipaters.						
				The mine will ensure that erosion controls are included in the designs of all linear infrastructure (access roads, conveyors or open channels) and points of water discharge.						
	Terrestrial Ecology (Fauna & Flora)	Direct impact: Unplanned loss of floral and faunal species of conservation importance	Footprint clearance	Prior to the removal of plant species, an ecologist should investigate the site (if not already done) to record all species of importance and which should be removed under tree removal permits. All such species should be demarcated by signage or tape.	Limit the impact of the mining operation on the Ecological Setting of the area.	Offset area should be in place and efficiently operated for the intended purpose of conservation. No unlawful removal of flora of conservation importance should take place. Initiate rehabilitation of disturbed areas within one year of final activity. Successful self-succession to be achieved. Eradication of invasive species within the mining area footprint.	x			x
				Obtain tree removal permit prior to the removal of any protected species.						
				The pipeline proposed between P2/P1 and A1 should be rerouted if practically possible to avoid the floodplain vegetation and rather be rerouted to run through the Vachellia mellifera thicket to the south of the current route as shown in Figure 20 where possible.						

Name of Activity	Impact Area	Potential Impacts	Aspects	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Timeframes			
Activities	Impact Area			Mitigation Measures			Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout Life of Mine
				The pending offset area should be finalised to contribute to the overall conservation of sensitive and red data species.						
				All employees, or contractors on site should receive a detailed induction on the expectations for the protection of fauna and flora on site.						
				Weed eradication should be implemented on site.						
		Direct impact: Displacement of faunal species and human/animal conflict	Footprint clearance	A record of any animal fatalities should be kept on site. The reason for the fatality and action to avoid such in the future (if possible) should be stated.	Limit the impact of the mining operation on the Ecological Setting of the area.	Zero animal fatality rates should be achieved. No unlawful removal of flora of conservation importance should take place. Offset area should be in place and efficiently operated for the intended purpose of conservation.	x			x
				All employees, or contractors on site should receive a detailed induction on the expectations for the protection of fauna and flora on site.						
				Clearance of vegetation must be undertaken in such a manner as to provide sufficient time for animals to relocate.						
		Direct impact: Loss of ecological connectivity and ecosystem functioning. This will be specifically important around the King Silo and to the east of the Bruce Silo, as these areas will be located in the less disturbed areas within the mining area.	Footprint clearance	No construction or project related activities may be undertaken outside of the demarcated areas.	Limit the impact of the mining operation on the Ecological Setting of the area.	Zero animal fatality rates should be achieved.	x			x
				The construction area can be isolated by means of a chain link fence in order to prevent animals on local migrations entering the area and being killed.						
				In the establishment of fences, erect fences in such a						

Name of Activity	Impact Area	Potential Impacts	Aspects	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Timeframes			
Activities	Impact Area			Mitigation Measures			Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout Life of Mine
				manner as to limit the potential of animals to enter the plant and silo areas. This could involve the placement of rocks and materials at on the surface of the fences.						
		The disturbance of the cleared areas may allow the establishment of alien invasive vegetation. Increased prevalence of exotic invasive species: The fact that the area will be cleared for construction creates niches that can be colonised by exotic and/or invasive species. This is compounded by the fact that trucks and other heavy machinery often act as vectors for seeds of these species.	Footprint clearance	Weed eradication should be implemented on site. Areas of construction must be clearly demarcated. No construction or project related activities may be undertaken outside of the demarcated areas.	Awareness creation on the importance of that natural ecosystem in which Khumani operates. Rehabilitation of disturbed areas with indigenous vegetation. Smallest possible area of disturbance philosophy.	Eradication of invasive species within the mining area footprint. Successful self-succession to be achieved. 100% compliance to remain with approved footprint areas. Initiate rehabilitation of disturbed areas within one year of final activity.	x			x
		Disturbance of biodiversity due to vibration and noise: Vibration and noise will have a significant effect mainly on fauna species in the immediate vicinity of the development, due to the heavy machinery utilised. Vibration can affect a number of subterranean fauna taxa, such as burrowing mammals, reptiles and arthropods. Vibration affects these animals by causing the collapsing of burrows, and causing these animals to leave the area due to the vibration. Noise will also affect a	Footprint clearance	Equipment will be well maintained to reduce excessive noise creation. Activities will be restricted to the day time.	Limit the impact of the mining operation on the Ecological Setting of the area. Remain within the current ambient character of the site.	Remain within the regulated guidelines and limits as required by the Mine Health and Safety Act. Zero complaints from surrounding landowners regarding noise levels	x			x

Name of Activity	Impact Area	Potential Impacts	Aspects	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Timeframes			
Activities	Impact Area			Mitigation Measures			Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout Life of Mine
		wide range of taxa including avifauna, mammals, reptiles, amphibians and arthropods. Avifauna, especially songbirds, and amphibians may find it difficult to find mates in areas of increased noise, mammals, reptiles and arthropods may find increased noise disturbing and therefore move away from the area								
		Habitat degradation due to dust: Increased dust will occur in all areas where vegetation is cleared. Dust will be caused by excavation, and construction. Dust in the area will be greatly increased due to the dry weather conditions and the nature of the soil in the area. Dust settling on plant material can reduce the amount of light reaching the chlorophyll in the leaves, thereby reducing photosynthesis, which in turn reduces plant productivity, growth and recruitment.	Dust dispersion	Install air quality monitoring stations that determine fallout and respirable dust (PM10) concentrations that could arise from the mining activities.	Recording of dust fall out to determine trends.	Meeting ambient dust fall out limits in terms of applicable NEM:AQA Regulations.	x			x
		Effects on local migrations: Local migrations of fauna in the area may be affected by linear infrastructure, fences and buildings, due to these areas forming a	Footprint clearance	The construction area can be isolated by means of a chain link fence in order to prevent animals on local migrations entering the area and being killed.	Awareness creation on the importance of that natural ecosystem in which Khumani operates.	Zero animal fatality.	x			x

Name of Activity	Impact Area	Potential Impacts	Aspects	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Timeframes			
Activities	Impact Area			Mitigation Measures			Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout Life of Mine
		barrier to migrating animals or reducing the chance of an animal surviving its migration due to collisions with vehicles on roads. This impact is likely to be low due to the greatly reduced wildlife in the area due to previous disturbances in the area causing a greatly reduced species. Furthermore, many of the roads are already in use. The study area is recognised as an ESA due to being a migratory route, this requires further investigation.		Conduct annual Biodiversity Action Plans and implement the required conditions.	Implementation of safe operation practices.					
				The effect of roads on local migrations can be mitigated by the installation of culverts at regular intervals along the roads and the installation of drift fences towards the culverts , although these methods may not eliminate the mortalities among migrating animals, they should greatly reduce the number of animals killed on haul roads						
				A clearly marked and enforced vehicle speed will be implemented on the internal mine and transportation routes.						
		Increased erosion: Increased erosion can eventually lead to the loss of vegetation and habitats for further species. Soils in the area are prone to erosion in areas where vegetation is cleared, this is further compounded by the fact that precipitation in the area occurs through heavy rainfall events in in the form of thundershowers in summer. Furthermore large areas will be cleared before construction leaving these areas prone to erosion.	Footprint clearance	Ensure the required erosion protection measures are monitored and corrected where necessary.	Limit the impact of the mining operation on the Ecological Setting of the area.	Maintaining soil integrity, with successful vegetation establishment.	x			x
				An erosion monitoring and mitigation plan should be put in place.	Retaining soil integrity for rehabilitation.					

Name of Activity	Impact Area	Potential Impacts	Aspects	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Timeframes			
Activities	Impact Area			Mitigation Measures			Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout Life of Mine
	Wetland	Loss or Impact on NEFPA Sites	Footprint clearance	No activities are planned within 500m from any NEFPA sites. This restriction should be maintained.	Protect sensitive ecosystems.	Remain within the designated footprints at all times.	x			x
	Hydrology	Direct impact: The removal of vegetation can lead to increased surface runoff, which may in turn alter natural surface water flows and increase siltation of watercourses as well as pollution control facilities.	Footprint clearance	Rehabilitate open areas as soon as practically possible. Self-succession should be encouraged. Limit the areas to be cleared to the demarcated sites.	Operate the water management circuit on site to increase mining efficiency and reduce the need for maintenance of these facilities.	Implement the SWMP on site.	x	x		
	Geohydrology	No direct impact	-	-	-	-	-	-	-	-
	Heritage	No direct impact is foreseen in this area.	-	In the event that heritage artefacts or graves are encountered during the excavation activities, all activities must cease and the SAHRA should be contacted to determine the way forward before construction may continue.	Protect heritage resources for future generations.	Ensure that there is a 100% non-occurrence of impacts on heritage resources.	x			x
	Palaeontology	No direct impact is foreseen in this area.	-	In the unlikely event of fossil discovery within the Quaternary overburden during the operational phase of the development (i.e. modern-looking but more or less lithified animal bones and teeth), a professional palaeontologist must be called in immediately to confirm and record the finds. In the meantime, ex situ remains must be wrapped in paper towels or heavy duty tin foil and stored in a safe place. The material should not be	Protect paleontological resources for future generations.	Ensure that there is 100& non-occurrence of impact on palaeontological resources.				

Name of Activity	Impact Area	Potential Impacts	Aspects	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Timeframes			
Activities	Impact Area			Mitigation Measures			Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout Life of Mine
				washed or cleaned in any way. In situ material must be kept in place and protected from further damage by covering it with light but rigid object like a box, bucket or metal sheet until further confirmation by the palaeontologist.						
	Visual	Direct impact: soil stripping and footprint clearance	Footprint clearance	Stripping of vegetation and soils should be undertaken within the demarcated areas.	Retain the aesthetics of the area as far as practically possible.	Design and construction infrastructure to blend in with the general topography as far as practically possible. No encroachment outside of demarcated areas.	x			x
	Air Quality	Direct impact: Dust-fallout	Footprint clearance	Implement dust monitoring around construction sites. Strictly enforced speed limits on haul roads Dust suppression to be implemented as per the approved EMP	Recording of dust fall out to determine trends.	Meeting ambient dust fall out limits in terms of applicable NEM:AQA Regulations.				x
	Noise	The area is located within the mining area. Noise impacts are not considered to be significant but can occur during excavation and construction activities.	Removal of topsoil.	Equipment will be well maintained to reduce excessive noise creation. Activities will be restricted to the day time.	Remain with the required health and safety standards.	Remain within the regulated guidelines and limits as required by the Mine Health and Safety Act.	x			x
	Social	No direct impact	-	-	-	-	-	-	-	-
Activity 3 - Establishment of Surface Infrastructure Construction & widening of Roads: Development of roads to the King Silos. Should the King/Mokaning access road	Geology	The establishment of the Low Grade Sorter Plant may result in the sterilisation of mineable reserves.	Active construction	Exploration studies should be fast tracked in this area to determine whether future mining would be required in this area. In the event that this is required, the license holder should proactively	Optimal mining of available resources should be pursued.	All activities should be undertaken under approved Environmental Authorisations.	x			x

Name of Activity	Impact Area	Potential Impacts	Aspects	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Timeframes			
Activities	Impact Area			Mitigation Measures			Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout Life of Mine
be used, a link of approximately 1.5km to this road will be required. Upgrades of roads to the Bruch Silos, may require an extension of approximately 450m to existing roads. **Construction of Silos and Magazines at Bruce:** Two magazine areas, an emulsion silo and an ammonium nitrate silo). This area will include all ancillary required infrastructure. **Construction of Silos and Magazines at King:** An emulsion silo and an ammonium nitrate silo). This area will include all ancillary required infrastructure. . For the Bruce and King expansions combined a total storage of 195m3 (emulsion: 113m3) ammonium nitrate: 82m3)				apply for an amendment to the Low Grade ROM Sorter Plant authorisation.		Profitable mining operations.				
	Topography	Direct impact: Alteration of topography	Active construction	Demarcate footprint area clearly	Design facilities to blend into the existing site character as far as practically possible.	Maintain the aesthetics of the area.	x			x
	Soil, Land Use and Land Capability	Direct impact: Soil compaction	Active construction	Activities should be restricted to the cleared areas and associated impacts as presented as part of Activity 1 and 2 above.	Limit the loss of soils as far as possible and ensure that the integrity remains during stockpiling for the purposes of successful rehabilitation.	The integrity of the soils stockpiled must remain suitable for the purposes of rehabilitation.	x			x
		Direct impact: Construction activities with surrounding exposed soil may in turn lead to soil erosion.	Active construction	Ensure that all design drawings include effective erosion control measures.						
				Ensure the required erosion protection measures are monitored and corrected where necessary.						
				Natural vegetation establishment (self-succession) will be encouraged.	Retaining soil integrity for rehabilitation.		x			x
				The mine will investigate an appropriate seed mix for the rehabilitation purposes should self-succession not establish on rehabilitated sites.						
				Areas of construction must be clearly demarcated. No construction or project related activities may be undertaken outside of the demarcated areas.						
				Clean and dirty water systems must be established prior to construction.						

Name of Activity	Impact Area	Potential Impacts	Aspects	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Timeframes			
Activities	Impact Area			Mitigation Measures			Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout Life of Mine
				Where vegetation cannot be established during the life of construction and operations, appropriate measure will be taken to control erosion. These will include grading of surfaces to prevent rapid run-off of storm water and / or the use of energy dissipaters.						
	Terrestrial Ecology (Fauna & Flora)	All impacts assessed under Activity 1 - Footprint clearance	-	-	-	-	-	-	-	-
	Wetland	All impacts assessed under Activity 1 - Footprint clearance	-	-	-	-	-	-	-	-
	Hydrology	Direct impact: The removal of vegetation as part of the previous Activities 1 & 2 can lead to increased surface runoff, which may in turn alter natural surface water flows and increase siltation of watercourses as well as pollution control facilities.	Active construction	Limit the areas to be where construction is undertaken to the demarcated sites.	Operate the water management circuit on site to increase mining efficiency and reduce the need for maintenance of these facilities.	Implement the SWMP on site.	x	x		
				Clean and dirty systems should be included at all new activities. For the Silos, all dirty water should be contained, and routed to a sump for evaporation. For the Plant area, the runoff water to the north will follow to the existing PCD on site, the water to the west will run towards the Low Grade ROM Stockpile, from where it will evaporate.						
				Maintain clean and dirty water system.						
	Geohydrology	No direct impact	-	-	-	-	-	-	-	-
	Heritage & Palaeontology	No direct impact	-	-	-	-	-	-	-	-
	Visual	No direct impact	-	-	-	-	-	-	-	-
	Air Quality	Direct impact: Dust-fallout	Active construction	Implement dust monitoring around construction sites.	Recording of dust fall out to determine trends.	Meeting ambient dust fall out limits in terms of applicable NEM:AQA Regulations.				x
				Strictly enforced speed limits on haul roads						

Name of Activity	Impact Area	Potential Impacts	Aspects	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Timeframes			
Activities	Impact Area			Mitigation Measures			Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout Life of Mine
				Dust suppression to be implemented as per the approved EMP						
	Noise	Direct impact: Construction activities will increase the ambient noise levels in the area. This is however only temporary.	Vehicle Movement	Vehicles will be equipped with mufflers where practical to reduce the emission of noise.	Remain within the designated area demarcated for activities. Remain within the National Environmental Management: Air Quality Act, 2004 Dust Regulation guidelines for rural communities.	Where noise becomes a nuisance, management measures will be investigated and implemented to address these.	x			x
				Where noise becomes a nuisance management measures will be investigated and implemented to address these.						
				Construction activities will be limited to the hours of 7h00 to 18h00 weekdays.						
				Equipment will be well maintained to reduce excessive noise creation.						
	Social	No direct impact	-	-	-	-	-	-	-	-
Activity 4: Waste Management Hydrocarbon spills within the mining area	Groundwater	Large scale hydrocarbon spills could be present at the mining area	Spill and Release of Waste Material.	Clean and Dirty water separation systems should be incorporated in terms of the 2016 SWMP.	Protect the groundwater resources to ensure that limited to no impact on groundwater resources occur as a result of the mining operations.	Achieve 100% compliance to the water quality objectives as agreed to between the mine and the DWS based on the discussions within this IWWMP.		x		x
				No activities associated with hydrocarbons and/or chemicals may be undertaken outside of an effectively designed and contained area.						
				All used oils must be removed from site by a licensed company and disposed of at a suitably licensed site.						
				Any spills occurring during the collection process must be cleaned up immediately.		Implement the SWMP on site.	x			
				Any significant spills must be captured in the incident reports and must be reported to the relevant department		Maintain a 100% no-spill record.	x			x

Name of Activity	Impact Area	Potential Impacts	Aspects	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Timeframes			
Activities	Impact Area			Mitigation Measures			Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout Life of Mine
				(NCDENC, WUA, CMA, and DWS).						
				A clean up procedure (i.e. Works Instruction) must be in place.		Clean spills, if occur witan 24 hours.	x			x
	Soils	Contamination of soil resources due to hydrocarbon spills.	Spills and Release of Contaminants.	Storage of fuels and oils, the refuelling of vehicles and equipment maintenance must be limited to designated, bunded (bunds to be 110% of volume of the materials stored) areas.	Protecting of soil integrity.	Zero presence of contaminated land due to early detection and implementation of actions.	x			x
				All fuels and soils must be stored in appropriate containers.						
				Chemicals and hazardous material must be stored in suitable containers, fit for purpose and in line with SDS requirements.						
				Where drip trays are too small, specially prepared, non-pervious bunds with solution trenches must be used to capture spillages						
				Oils and potentially hazardous materials must be disposed of at a licensed facility and waste certificates obtained.						
				A spill kit must be provided to be used in the event of a spill.	Awareness creation on site regarding duty of care and waste management.					
				If a spill occurs, the contaminated soil must be removed immediately. Contaminated soil must be stored according to best practices until it can be disposed of at a suitably licensed facility.						

Name of Activity	Impact Area	Potential Impacts	Aspects	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Timeframes			
Activities	Impact Area			Mitigation Measures			Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout Life of Mine
				Safety signage must be used at designated storage areas.						
				All workers must undergo an induction which includes environmental awareness training to make them aware of the environmental incident management procedures as well as the importance of complying with management measures.						
		Contamination of surface water resources. There are no surface water resources in the area, however, the natural runoff, which must be managed internally on site could become impacted	Spill and Release of Waste Material and Contaminated Water.	Clean and Dirty water separation systems should be incorporated in terms of the 2016 SWMP.	Operate the water management circuit on site to increase mining efficiency and reduce the need for maintenance of these facilities.	Implement the SWMP on site.	x			
				Vehicles/machinery will be regularly monitored and maintained. Maintenance programmes will be established and implemented.						
				All used oils must be removed from site by a licensed company and disposed of at a suitably licensed site						
				Any spills occurring during the collection process must be cleaned up immediately.		Maintain a 100% no-spill record.	x			x
				Soil that has been contaminated by spillages, seepages and leachates will be sampled and analysed. If necessary, the soils will be treated, ameliorated or removed for safe disposal.						
				Any significant spills must be captured in the incident reports and must be reported to the relevant department (NCDENC, WUA, CMA, and		Clean spills, if occur witan 24 hours.	x			x

Name of Activity	Impact Area	Potential Impacts	Aspects	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Timeframes			
Activities	Impact Area			Mitigation Measures			Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout Life of Mine
				DWS). In this event a remediation strategy should be developed and enforced.						
				A clean up procedure (i.e. Works Instruction) must be in place.						
Activity 4: Waste Management Waste Handling	Groundwater	Handling or Hazardous Waste within workshops and general mine area.	Spill and Release of Waste Material and Contaminated Water.	Clean and Dirty water separation systems should be incorporated in terms of the 2016 SWMP.	Protect the groundwater resources to ensure that limited to no impact on groundwater resources occur as a result of the mining operations.	Achieve 100% compliance to the water quality objectives as agreed to between the mine and the DWS based on the discussions within this IWWMP.		x		x
				Waste management training must be implemented on site.						
				Clear signs informing staff of waste management practices must be implemented on site.		Maintain a 100% safe disposal record on the disposal of hazardous waste.	x			x
				Hazardous waste handling should only take place within bunded and/or lined areas, with a capacity of at least 110% of the volume stored.						
				Hazardous waste should be removed by a licenced removal company and taken to a suitable and licenced landfill site.						
				Documentation of removal and safe disposal must be available on site.						
		Handling and Storing of Domestic Waste	Spill and Release of Waste Material and Contaminated Water.	Clean and Dirty water separation systems should be incorporated in terms of the 2016 SWMP.		Achieve 100% compliance to the water quality objectives as agreed to between the mine and the DWS based on the discussions within this IWWMP.		x		x
				Waste management training must be implemented on site.						
				Clear signs informing staff of waste management practices		Maintain a 100% compliance with the	x			x

Name of Activity	Impact Area	Potential Impacts	Aspects	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Timeframes			
Activities	Impact Area			Mitigation Measures			Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout Life of Mine
				must be implemented on site.		conditions of the ECA permit for the landfill site.				
				The landfill site at Khumani must be operated in line with the Environmental Authorisation requirements and conditions.						
				This landfill site, may only be utilised for domestic and general waste, no industrial or hazardous waste will be dumped on this site.						
				Recycling practices must be investigated and implemented on site.		Maintain a 100% accurate recording of waste and submission of such recording to the Department.	x			x
				Ongoing rehabilitation of the landfill site must be undertaken, by covering and shaping the facility regularly.						
				Groundwater monitoring must be undertaken in such a manner as to ensure that any potential impacts from the landfill site can be detected.		Maintain daily covering of the landfill site.	x			x
	Ecology	The unmanaged disposal of waste, could result in the spread of invader species, as well as the influx of opportunistic species.	Loss of Ecology and the influx of Opportunistic Species.	Develop dedicated waste handling areas; prevent access to rodents and opportunistic species; prevent the spread of waste.	Proper waste management practices on site.	No unlawful disposal of waste. Registration of all waste handling and/or storage areas on site.	x			x
				Develop dedicated waste handling areas, fit for purpose and prevent the spread of waste.						
	Surface Water	Handling of Hazardous Waste within workshops and general mine area could contaminate the dirty water storage areas. The water is then reused in the system and could have impacts on the integrity of	Spill and Release of Waste Material and Contaminated Water.	Clean and Dirty water separation systems should be incorporated in terms of the 2016 SWMP.	Protect the integrity of the Storm Water Management System.	Implement the SWMP on site.	x			
				A detailed waste management strategy will be established and implemented, which will clearly demarcate the						

Name of Activity	Impact Area	Potential Impacts	Aspects	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Timeframes			
Activities	Impact Area			Mitigation Measures			Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout Life of Mine
		the storm water system and also the production.		containments for different waste streams.						
				Waste management training must be implemented on site.		Maintain a 100% no-spill record.				x
				Clear signs informing staff of waste management practices must be implemented on site.		Clean spills, if occur witan 24 hours.				x
				Hazardous waste handling should only take place within bunded and/or lined areas.		Maintain a 100% safe disposal record on the disposal of hazardous waste.				x
				Hazardous waste should be removed by a licenced removal company and taken to a suitable and licenced landfill site.		Provide training to all staff on best practices regarding waste management every year.	x			x
				Documentation of removal and safe disposal must be available on site.						
				The mine will adopt a cradle-to grave approach to ensure that the waste is removed and disposed of in a legally compliant manner.						
				Weekly inspections of Storm Water Management Systems must be undertaken. Any blockages or maintenance requirements must be documented and an action plan developed.						
		Handling and Storing of Domestic Waste should have no impact on the surface water resources due to the location of the facility. However, incorrect disposal of waste could hamper the integrity of the storm water system.	Spill and Release of Waste Material and Contaminated Water.	Clean and Dirty water separation systems should be incorporated in terms of the 2016 SWMP.		Maintain a 100% compliance with the conditions of the ECA permit for the landfill site.	x			x
				Waste management training must be implemented on site.						
				Weekly inspections of Storm Water Management Systems						

Name of Activity	Impact Area	Potential Impacts	Aspects	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Timeframes			
Activities	Impact Area			Mitigation Measures			Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout Life of Mine
				must be undertaken. Any blockages or maintenance requirements must be documented and an action plan developed.						
				Clear signs informing staff of waste management practices must be implemented on site.						
				The landfill site at Khumani must be operated in line with the Environmental Authorisation requirements and conditions.						
				Access control must be strictly enforced.						
				The berm around upstream of the facility must be maintained.						
				Recycling practices must be investigated and implemented on site.						
				Ongoing rehabilitation of the landfill site must be undertaken, by covering and shaping the facility.		Maintain daily covering of the landfill site.	x			x
				Groundwater monitoring must be undertaken in such a manner as to ensure that any potential impacts from the landfill site can be detected.						

Table 24: Operational Phase Impact Table with Management Measure, Objectives and Standards

Name of Activity	Impact Area	Potential Impacts	Aspects	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Timeframes			
Activities	Impact Area			Mitigation Measures			Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout Life of Mine
Operational Phase										
Activity 1 - Operation of low grade ROM sorter plant, silos and magazines	Geology	The establishment of the Low Grade Sorter Plant may result in the sterilisation of mineable reserves.	Operational activities	Exploration studies should be fast tracked in this area to determine whether future mining would be required in this area. In the event that this is required, the license holder should proactively apply for an amendment to the Low Grade ROM Sorter Plant authorisation.	Optimal mining of available resources should be pursued.	All activities should be undertaken under approved Environmental Authorisations.				**x**
	Topography	No direct impact	-	-	-	-	-	-	-	-
	Soil, Land Use and Land Capability	Spills around the silos may result in the contamination of soils.	Operational activities	Any emulsion or other contaminants should be collected and the soils remediated immediately.	Protecting of soil integrity.	Zero presence of contaminated land due to early detection and implementation of actions.		**x**		**x**
	Ecology	Presence of invader species could impact on the natural succession of vegetation on the slopes of WRDs.	Increase in invader species.	A weed eradication programme will be developed and implemented to eradicate weeds and invader plants and to prevent new invasions during the ongoing mining operation.	Awareness creation on the importance of that natural ecosystem in which Khumani operates. Rehabilitation of disturbed areas with indigenous vegetation. Smallest possible area of disturbance philosophy.	Eradication of invasive species within the mining area footprint. Successful self-succession to be achieved. 100% compliance to remain with approved footprint areas. Initiate rehabilitation of disturbed areas within one year of final activity.		**x**		**x**
				Where self-succession does not establish, harvested seeds and plants must be used in concurrent rehabilitation for any areas along the area which may be affected.						
				Compile list of protected and Red Data species, compile relocation programme.						
				All employees must undergo an induction prior to construction where they will be made aware of the						

Name of Activity	Impact Area	Potential Impacts	Aspects	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Timeframes			
Activities	Impact Area			Mitigation Measures			Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout Life of Mine
				footprint, prohibited areas and the importance of compliance with management measures, as well as potential penalties for noncompliance.						
				No open fires must be allowed.						
				Vegetation clearance must be limited to within the footprint area						
				A weed eradication programme must be implemented on site and enforced. This programme must stipulate the monitoring plan, which should include: capturing of areas where invader species are present; action plan to remove these; % successful removal).						
	Wetland	No direct impact	-	-	-	-	-	-	-	-
	Hydrology	Risk of surface water contamination as a result of plant and silo a related activities.	Release of Contaminated Water.	Clean and dirty systems should be included at all new activities. For the Silos, all dirty water should be contained, and routed to a sump for evaporation. For the Plant area, the runoff water to the north will follow to the existing PCD on site, the water to the west will run towards the Low Grade ROM Stockpile, from where it will evaporate.	Operate the water management circuit on site to increase mining efficiency and reduce the need for maintenance of these facilities.	Implement the SWMP on site.	x	x		
		Exposed soils will be susceptible to soil erosion.	Loss of Soil Resources	The Storm Water Management Plan as per the 2016 WULA will be implemented on site.	The establishment of a free draining area.	No presence of erosion gulley's. Effective implementation of storm water	**x**			**x**

Name of Activity	Impact Area	Potential Impacts	Aspects	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Timeframes			
Activities		Impact Area		Mitigation Measures			Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout Life of Mine
						management measures.				
		Discharge of contaminated water during maintenance and shutdown practices.	Release of contaminated water.	The existing storm water dam to the west of the proposed plant should be utilised to contained water during maintenance and shutdown procedures to reduce the presence of dirty water ponding in these areas during these times. The storm water run off on the south, south-east and north, will naturally gravitate towards the Low Grade Stockpile J. This stockpile will therefore serve as a constructed berm to contain dirty water. Paddocks must be constructed downgradient of all stockpiles (low grade ROM stockpiles) on site to contain any seep from these facilities according to the approved EMPs.	Conservation of water on site.	Zero release of dirty water from site. Reuse of dirty water within the plant area to reduce the input of clean water into the process. Operate dams (process dams) with a 0.8m freeboard 100% of the year.	x			x
				A detailed water conservation and demand management plan should be developed to optimise water reuse in the plant circuit.						
				The capacities of the water containment infrastructure (clarifier, Thickener, etc.) should be revisited and managed to ensure that a freeboard of 0.8m can be maintained.						
				Ensure that fuels, lubricants and chemicals for use in the						

Name of Activity	Impact Area	Potential Impacts	Aspects	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Timeframes			
Activities	Impact Area			Mitigation Measures			Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout Life of Mine
				operational areas are stored in properly bunded and protected areas.						
	Air Quality	The use of unsurfaced roads, plant crushing equipment, presence of stockpiles and the transfer points at conveyors may lead to an increase of dust emissions in the area.	Dispersion of dust.	Install air quality monitoring stations that determine fallout and respirable dust (PM10) concentrations that could arise from the mining activities.	Reducing dust emissions on site.	Zero complaints from surrounding landowners regarding dust.	x			x
				Dust extraction systems comprising of wet scrubbers will be installed at the secondary and tertiary crushing and screening plants. For crushing and screening operations at metallic mineral processing plants, fugitive dust can be controlled with wet scrubbers or baghouses. Chemical dust suppression systems will be implemented at the primary crushing and screening plants.		Meeting ambient dust fall out limits in terms of applicable NEM:AQA Regulations.				
				Tarpaulins will be placed over all vehicles transporting product.		Recording of dust fall out to determine trends.				
	Noise	Increase in noise levels in and around the plant areas.	Increase in noise levels.	Machinery and vehicles will be well maintained to prevent excessive nose and to comply with national and provincial regulations.	Protect the ambiance of the area, as well as maintain good relationships with surrounding land users.	Meeting noise limit requirements in terms of the Mine Health and Safety Act.	x			x
				Implement a noise monitoring network.						
				Implemented operational controls on equipment used in the workshops, plant and buildings to reduce noise levels where required.						
	Geohydrology	Handling of ROM, Emulsions, and		Clean and Dirty water separation systems should	Protect the groundwater	Achieve 100% compliance to the		x		x

Name of Activity	Impact Area	Potential Impacts	Aspects	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Timeframes			
Activities		Impact Area		Mitigation Measures			Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout Life of Mine
		hydrocarbons may lead to contaminated water ponding on site.	Spill and Release of Waste Material.	be incorporated in terms of the 2016 SWMP.	resources to ensure that limited to no impact on groundwater resources occur as a result of the mining operations.	water quality objectives as agreed to between the mine and the DWS based on the discussions within the IWWMP.				
				No activities associated with hydrocarbons and/or chemicals may be undertaken outside of an effectively designed and contained area.						
				A dedicated area for the placement of waste skips must be determined prior to construction activities. Waste will be temporarily stored in the dedicated area until it is collected and disposed of at the approved Khumani waste disposal area. All used oils must be removed from site by a licensed company and disposed of at a suitably licensed site.						
				Any spills occurring during the collection process must be cleaned up immediately.		Implement the SWMP on site.	x			
				Any significant spills must be captured in the incident reports and must be reported to the relevant department (NCDENC, WUA, CMA, and DWS).		Zero presence of contaminated land due to early detection and implementation of actions.	x			x
				A clean up procedure (i.e. Works Instruction) must be in place.		Clean spills, within 24 hours.	x			x
		Managing the existing King PCD and Bruce PCD on site.	Release of Contaminated Water.	All dirty water must be contained in fit for purpose designed tanks or in lined dams.	Protect the groundwater resources to ensure that limited to no impact on groundwater resources occur as a	Operate dirty water dams to have no seepage.	x			x
				These facilities must be inspected regularly and replaced if indications exists of leaks.						

Name of Activity	Impact Area	Potential Impacts	Aspects	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Timeframes			
Activities	Impact Area			Mitigation Measures			Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout Life of Mine
				Where leaks or seepage is found, these must be inspected and fixed as soon as found.	result of the mining operations.					
				The water balance must be updated annually, with a strong focus on improving the management of the internal water circuit on site.		Maintain an updated record sheet of dam level readings.	x			x
				The water circuit must be managed at one central location to ensure that there is integration between the plant, and general surface water needs and requirements.		Upon suspecting that a dam may be leaking, report such potential leak to the SHERQ department within 4 hours.	x			x
				Upstream and downstream monitoring boreholes must be available to monitor groundwater quality and to detect potential leaks from these facilities.						
				The groundwater monitoring programme must be implemented and undertaken in accordance to the approved WUL.		Develop an action plan within 12 hours from reporting.	x			x
	Heritage	No significant impacts are envisaged during the operational phase. The proposed development will be located within existing mining operations.	-	-	-	-	-	-	-	-
	Palaeontology	No direct impact is foreseen in this area.	-	-	-	-	-	-	-	-
	Visual	No significant impacts are envisaged during the operational phase. The proposed development will be located within existing mining operations.	-	-	-	-	-	-	-	-

Name of Activity	Impact Area	Potential Impacts	Aspects	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Timeframes			
Activities	Impact Area			Mitigation Measures			Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout Life of Mine
	Social	No significant impacts are envisaged during the operational phase. The proposed development will be within existing mining operations.	-	-	-	-	-	-	-	-
Activity 2 - Stockpiling ROM and low grade material within the footprint area	Geology	The establishment of the Low Grade Sorter Plant may result in the sterilisation of mineable reserves.	Operational activities	Exploration studies should be fast tracked in this area to determine whether future mining would be required in this area. In the event that this is required, the license holder should proactively apply for an amendment to the Low Grade ROM Sorter Plant authorisation.	Optimal mining of available resources should be pursued.	All activities should be undertaken under approved Environmental Authorisations.				**x**
	Topography	The stockpiling of material will impact on the micro and macro topography due to the establishment of the stockpiles.	Operational activities	Stockpiles will only be placed within the designated mine area boundaries.	Operating within approved EMP conditions and footprints.	All ROM Stockpiles and Product stockpiles to be removed at the end of LOM.				**x**
	Soil, Land Use and Land Capability	No additional impacts are envisaged during the operational phase, which has not been addressed as part of Activity 1. The proposed development will be located within existing mining operations.	-	-	-	-	-	-	-	-
	Terrestrial Ecology (Fauna & Flora)	No additional impacts are envisaged during the operational phase. The proposed development will be located within existing mining operations.	-	-	-	-	-	-	-	-
	Wetland	No direct impact	-	-	-	-	-	-	-	-
	Hydrology	Runoff from stockpiles due to rainfall could cause seepage which may impact on the clean water resources.	Water quality	Clean and dirty systems should be included at all new activities. For the Silos, all dirty water should be contained, and routed to a sump for evaporation. For	Understanding the impact of the mining activities on water resources.	Optimal operation and maintenance of clean and dirty water system will be conducted.	**x**			**x**

Name of Activity	Impact Area	Potential Impacts	Aspects	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Timeframes			
Activities	Impact Area			Mitigation Measures			Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout Life of Mine
				the Plant area, the runoff water to the north will follow to the existing PCD on site, the water to the west will run towards the Low Grade ROM Stockpile, from where it will evaporate. All water management systems to conform to the GN704 requirements (note that the 1999 Regulations are in the process of being amended).						
	Geohydrology	Impacts on the groundwater regime as a result of infiltration.	Release of contaminated water	Clean water needs to be kept away from the stockpiling area to minimise water infiltrating from the site. Keep stockpiles as small as possible, to minimise their footprint.	Protect the groundwater resources to ensure that limited to no impact on groundwater resources occur as a result of the mining operations.	Meet the water quality requirements as stipulated in the WUL.	x			x
				No additional Waste Rock Dumps with the exception of those already approved on site will be constructed as part of this project.			x			x
							x			x
							x			x
	Heritage	No direct impact	-	-	-	-	-	-	-	-
	Palaeontology	No direct impact	-	-	-	-	-	-	-	-
	Visual	No direct impact	-	-	-	-	-	-	-	-
	Air Quality	The use of unsurfaced roads, plant crushing equipment, presence of stockpiles and the transfer points at conveyors may lead to an increase of dust emissions in the area.	Dispersion of dust.	Install air quality monitoring stations that determine fallout and respirable dust (PM10) concentrations that could arise from the mining activities.	Reducing dust emissions on site.	Zero complaints from surrounding landowners regarding dust.	x			x
				Tarpaulins will be placed over all vehicles transporting product.		Recording of dust fall out to determine trends.				
	Noise	No significant impacts are envisaged during the operational phase.	-	-	-	-	-	-	-	-
	Social	No direct impact	-	-	-	-	-	-	-	-

Name of Activity	Impact Area	Potential Impacts	Aspects	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Timeframes			
Activities	Impact Area			Mitigation Measures			Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout Life of Mine
Activity 3: Operation of the Infrastructure Transportation (conveyors, rail, haul roads and access roads) New roads to the King silos (approximately 1.5km, of which 800m will amount to new clearing) and upgrades of roads to the Bruch silos (approximately 500m).	Soil	Contamination of Soil due to hydrocarbon spills	Loss of Soil Resources	Vehicles and Machinery will be regularly maintained. Maintenance programmes will be established and implemented.	Protecting of soil integrity.	Zero presence of contaminated land due to early detection and implementation of actions.	x			x
				All refuelling of vehicles and equipment maintenance must be done within designated bunded areas.						
				If necessary, the polluted soils will be remediated and affected areas rehabilitated.						
		Spills from conveyors.	Contamination of Soils.	Ongoing maintenance around transfer points should be undertaken.						
				Any spills of ROM around the conveyor systems should be collected and taken to designated ROM stockpile areas						
	Ecology	The establishment of Weeds and Invader Species.	Loss of Vegetation	A weed eradication programme will be developed and implemented to eradicate weeds and invader plants and to prevent new invasions during the ongoing mining operation.	Limit the impact of the mining operation on the Ecological Setting of the area.	Reduce the presence of invader species by 90% on site.	x			x
				Where self-succession does not establish, harvested seeds and plants must be used in concurrent rehabilitation for any areas along the area which may be affected.						
		Accidental death of animals on the roads.	Loss of Animal	Clearly marked signs will be erected along the transportation routes to create awareness of animal crossings.	Awareness creation on the importance of that natural ecosystem in which Khumani operates.	Zero animal fatality.	x			x

Name of Activity	Impact Area	Potential Impacts	Aspects	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Timeframes			
Activities	Impact Area			Mitigation Measures			Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout Life of Mine
				A clearly marked and enforced vehicle speed will be implemented on the internal mine and transportation routes.	Implementation of safe operation practices.					
				A detailed induction programme will be in place to ensure that all parties are aware of the rules and regulations on site in terms of the use of roads.						
				Vehicles may only travel on demarcated roads on site.						
	Surface Water	Contamination of surface water resources. There are no surface water resources in the area, however, the natural runoff, which must be managed internally on site could become impacted	Spill and Release of Waste Material and Contaminated Water.	Clean and Dirty water separation systems should be incorporated in terms of the 2016 SWMP.	Operate the water management circuit on site to increase mining efficiency and reduce the need for maintenance of these facilities.	Implement the SWMP on site.	x			
				Manage storm water flow with temporary erosion control measures where possible (cut-off trenches or berms)						
				Railways and conveyors will be maintained and constructed with the appropriate culverts and drains, levelling and surfacing to ensure adequate drainage.						
				Vehicles/machinery will be regularly monitored and maintained. Maintenance programmes will be established and implemented.						
				All used oils must be removed from site by a licensed company and disposed of at a suitably licensed site						

Name of Activity	Impact Area	Potential Impacts	Aspects	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Timeframes			
Activities	Impact Area			Mitigation Measures			Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout Life of Mine
				Any spills occurring during the collection process must be cleaned up immediately.		Zero presence of contaminated land due to early detection and implementation of actions.	x			x
				Soil that has been contaminated by spillages, seepages and leachates will be sampled and analysed. If necessary, the soils will be treated, ameliorated or removed for safe disposal.						
				Any significant spills must be captured in the incident reports and must be reported to the relevant department (NCDENC, WUA, CMA, and DWS). In this event a remediation strategy should be developed and enforced.		Clean spills, if occur witan 24 hours.	x			x
				A clean up procedure (i.e. Works Instruction) must be in place.						
	Air Quality	The use of unsurfaced roads may lead to an increase of dust emissions in the area.	Dispersion of dust.	Install air quality monitoring stations that determine fallout and respirable dust (PM10) concentrations that could arise from the mining activities.	Reducing dust emissions on site.	Zero complaints from surrounding landowners regarding dust.	x			x
				Dust suppression should be undertaken regularly to prevent dust emissions.						
				During operational phase of the mine, haulage roads will be treated with dust suppression techniques such as wet to reduce dust creation.		Recording of dust fall out to determine trends. Meeting ambient dust fall out limits in terms of applicable NEM:AQA Regulations.	x			x
				Tarpaulins will be placed over all vehicles transporting product.						
	Heritage	No direct impact	-	-	-	-	-	-	-	-
	Palaeontology	No direct impact	-	-	-	-	-	-	-	-

Name of Activity	Impact Area	Potential Impacts	Aspects	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Timeframes			
Activities	Impact Area			Mitigation Measures			Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout Life of Mine
	Visual	No direct impact	-	-	-	-	-	-	-	-
	Noise	Noise of vehicles traversing the access roads will be almost constant	Increase in noise levels.	Machinery and vehicles will be well maintained to prevent excessive nose and to comply with national and provincial regulations.	Protect the ambiance of the area, as well as maintain good relationships with surrounding land users.	Meeting noise limit requirements in terms of the Mine Health and Safety Act.	x			x
				All vehicles will have muffles to minimise noise emissions, where necessary.						
				Where noise becomes a nuisance nose management measures will be investigated and implemented to address these concerns						
				Implement a noise monitoring network.						
				Noise monitoring will be undertaken (ambient conditions) to ensure that noise levels comply with Health and Safety Standards.						
	Social	No direct impact	-	-	-	-	-	-	-	-
Activity 4: Waste Management Hydrocarbon spills within the Mining Area	Groundwater	Large scale hydrocarbon spills could be present at the mining area	Spill and Release of Waste Material.	Clean and Dirty water separation systems should be incorporated in terms of the 2016 SWMP.	Protect the groundwater resources to ensure that limited to no impact on groundwater resources occur as a result of the mining operations.	Achieve 100% compliance to the water quality objectives as agreed to between the mine and the DWS based on the discussions within the IWWMP.		**x**		**x**
				No activities associated with hydrocarbons and/or chemicals may be undertaken outside of an effectively designed and contained area.						
				All used oils must be removed from site by a licensed company and disposed of at a suitably licensed site.						
				Any spills occurring during the collection process must be cleaned up immediately.		Implement the SWMP on site.	**x**			**x**
				Any significant spills must be captured in the incident		Zero presence of contaminated land	**x**			**x**

Name of Activity	Impact Area	Potential Impacts	Aspects	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Timeframes			
Activities	Impact Area			Mitigation Measures			Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout Life of Mine
				reports and must be reported to the relevant department (NCDENC, WUA, CMA, and DWS).		due to early detection and implementation of actions.				
				A clean up procedure (i.e. Works Instruction) must be in place.		Clean spills, within 24 hours.	x			x
	Soils	Contamination of soil resources due to hydrocarbon spills.	Spills and Release of Contaminants.	Storage of fuels and oils, the refuelling of vehicles and equipment maintenance must be limited to designated, bunded (bunds to be 110% of volume of the materials stored) areas.	Protecting of soil integrity.	Zero presence of contaminated land due to early detection and implementation of actions.	x			x
				All fuels and soils must be stored in appropriate containers.						
				Chemicals and hazardous material must be stored in suitable containers, fit for purpose and in line with SDS requirements.						
				Where drip trays are too small, specially prepared, non-pervious bunds with solution trenches must be used to capture spillages						
				Oils and potentially hazardous materials must be disposed of at a licensed facility and waste certificates obtained.						
				A spill kit must be provided to be used in the event of a spill.	Awareness creation on site regarding duty of care and waste management.					
				If a spill occurs, the contaminated soil must be removed immediately. Contaminated soil must be stored according to best practices until it can be						

Name of Activity	Impact Area	Potential Impacts	Aspects	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Timeframes			
Activities	Impact Area			Mitigation Measures			Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout Life of Mine
				disposed of at a suitably licensed facility.						
				Safety signage must be used at designated storage areas.						
				All workers must undergo an induction which includes environmental awareness training to make them aware of the environmental incident management procedures as well as the importance of complying with management measures.						
		Contamination of surface water resources. There are no surface water resources in the area, however, the natural runoff, which must be managed internally on site could become impacted	Spill and Release of Waste Material and Contaminated Water.	Clean and Dirty water separation systems should be incorporated in terms of the 2016 SWMP.	Operate the water management circuit on site to increase mining efficiency and reduce the need for maintenance of these facilities.	Implement the SWMP on site.	x			
				Vehicles/machinery will be regularly monitored and maintained. Maintenance programmes will be established and implemented.						
				All used oils must be removed from site by a licensed company and disposed of at a suitably licensed site						
				Any spills occurring during the collection process must be cleaned up immediately.		Zero presence of contaminated land due to early detection and implementation of actions.	x			x
				Soil that has been contaminated by spillages, seepages and leachates will be sampled and analysed. If necessary, the soils will be treated, ameliorated or removed for safe disposal.						
				Any significant spills must be captured in the incident reports and must be		Clean spills, within 24 hours.	x			x

Name of Activity	Impact Area	Potential Impacts	Aspects	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Timeframes			
Activities		Impact Area		Mitigation Measures			Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout Life of Mine
				reported to the relevant department (NCDENC, WUA, CMA, and DWS). In this event a remediation strategy should be developed and enforced.						
				A clean up procedure (i.e. Works Instruction) must be in place.						
Activity 5: Waste Management Waste Handling	Groundwater	Handling or Hazardous Waste within workshops and general mine area.	Spill and Release of Waste Material and Contaminated Water.	Clean and Dirty water separation systems should be incorporated in terms of the 2016 SWMP.	Protect the groundwater resources to ensure that limited to no impact on groundwater resources occur as a result of the mining operations.	Achieve 100% compliance to the water quality objectives as agreed to between the mine and the DWS based on the discussions within the IWWMP.		x		x
				Waste management training must be implemented on site.						
				Clear signs informing staff of waste management practices must be implemented on site.		Maintain a 100% safe disposal record on the disposal of hazardous waste.	x			x
				Hazardous waste handling should only take place within bunded and/or lined areas, with a capacity of at least 110% of the volume stored.						
				Hazardous waste should be removed by a licenced removal company and taken to a suitable and licenced landfill site.						
				Documentation of removal and safe disposal must be available on site.						
		Handling and Storing of Domestic Waste	Spill and Release of Waste Material and Contaminated Water.	Clean and Dirty water separation systems should be incorporated in terms of the 2016 SWMP.		Achieve 100% compliance to the water quality objectives as agreed to between the mine and the DWS based on the discussions within the IWWMP.		x		x
				Waste management training must be implemented on site.						

Name of Activity	Impact Area	Potential Impacts	Aspects	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Timeframes			
Activities	Impact Area			Mitigation Measures			Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout Life of Mine
				Clear signs informing staff of waste management practices must be implemented on site.		Maintain a 100% compliance with the conditions of the ECA permit for the landfill site.	x			x
				The landfill site at Khumani must be operated in line with the Environmental Authorisation requirements and conditions.						
				This landfill site, may only be utilised for domestic and general waste, no industrial or hazardous waste will be dumped on this site.						
				Recycling practices must be investigated and implemented on site.		Maintain a 100% accurate recording of waste and submission of such recording to the Department.	x			x
				Ongoing rehabilitation of the landfill site must be undertaken, by covering and shaping the facility regularly.						
				Groundwater monitoring must be undertaken in such a manner as to ensure that any potential impacts from the landfill site can be detected.		Maintain daily covering of the landfill site present at Khumani.	x			x
	Ecology	The unmanaged disposal of waste, could result in the spread of invader species, as well as the influx of opportunistic species.	Loss of Ecology and the influx of Opportunistic Species.	Develop dedicated waste handling areas; prevent access to rodents and opportunistic species; prevent the spread of waste.	Proper waste management practices on site.	No unlawful disposal of waste. Registration of all waste handling and/or storage areas on site.	x			x
				Develop dedicated waste handling areas, fit for purpose and prevent the spread of waste.						
	Surface Water	Handling of Hazardous Waste within workshops and general mine area could contaminate the dirty water storage areas. The water is then reused in	Spill and Release of Waste Material and Contaminated Water.	Clean and Dirty water separation systems should be incorporated in terms of the 2016 SWMP.	Protect the integrity of the Storm Water Management System.	Implement the SWMP on site.	x			
				A detailed waste management strategy will be						

Name of Activity	Impact Area	Potential Impacts	Aspects	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Timeframes			
Activities		Impact Area		Mitigation Measures			Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout Life of Mine
		the system and could have impacts on the integrity of the storm water system and also the production.		established and implemented, which will clearly demarcate the containments for different waste streams.						
				Waste management training must be implemented on site.		Zero presence of contaminated land due to early detection and implementation of actions.				x
				Clear signs informing staff of waste management practices must be implemented on site.		Clean spills, within 24 hours.				x
				Hazardous waste handling should only take place within bunded and/or lined areas.		Maintain a 100% safe disposal record on the disposal of hazardous waste.				x
				Hazardous waste should be removed by a licenced removal company and taken to a suitable and licenced landfill site.		Provide training to all staff on best practices regarding waste management every year.	x			x
				Documentation of removal and safe disposal must be available on site.						
				The mine will adopt a cradle-to grave approach to ensure that the waste is removed and disposed of in a legally compliant manner.						
				Weekly inspections of Storm Water Management Systems must be undertaken. Any blockages or maintenance requirements must be documented and an action plan developed.						
		Handling and Storing of Domestic Waste should have no impact on the surface water resources	Spill and Release of Waste Material and	Clean and Dirty water separation systems should be incorporated in terms of the 2016 SWMP.		Maintain a 100% compliance with the conditions of the ECA	x			x

Name of Activity	Impact Area	Potential Impacts	Aspects	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Timeframes			
Activities		Impact Area		Mitigation Measures			Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout Life of Mine
		due to the location of the facility. However, incorrect disposal of waste could hamper the integrity of the storm water system.	Contaminated Water.	Waste management training must be implemented on site.		permit for the landfill site.				
				Weekly inspections of Storm Water Management Systems must be undertaken. Any blockages or maintenance requirements must be documented and an action plan developed.						
				Clear signs informing staff of waste management practices must be implemented on site.						
				The landfill site at Khumani must be operated in line with the Environmental Authorisation requirements and conditions.						
				Access control must be strictly enforced.		Maintain daily covering of the landfill site present at Khumani.	x			x
				The berm around upstream of the facility must be maintained.						
				Recycling practices must be investigated and implemented on site.						
				Ongoing rehabilitation of the landfill site must be undertaken, by covering and shaping the facility.						
				Groundwater monitoring must be undertaken in such a manner as to ensure that any potential impacts from the landfill site can be detected.						

Table 25: Decommissioning and Closure Phase Impact Table with Management Measure, Objectives and Standards

Name of Activity	Impact Area	Potential Impacts	Aspects	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Timeframes			
Activities	Impact Area			Mitigation Measures			Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout Life of Mine
Legal Requirements (Environmental Permits)	South Africa Enviro-Legal Requirements	Unlawful activities could lead to NWA Directives and Section 24G Rectification fines.	Legal Compliance.	A legal assessment of all Water Uses must be undertaken annually to ensure that all Water Uses are licensed.	To operate within the enviro-legal ambits of South Africa.	Ensure that all activities undertaken by the mine are lawful with the required environmental licences in place.				x
				A detailed closure plan must be developed and submitted to the relevant departments for approval.	To be aware of the latest environmental legal requirements.	Ensure that all environmental authorisations on site is implemented on site and ongoing monitoring of compliance are undertaken to reach 100% compliance.				x
				All legally appointed personnel responsible or involved in water use activities on site must receive training on the requirements of the WUL.		All Departments responsible for development of the mine, must understand the requirements of the environmental legislation and must involve this into their planning processes.				x
				Quarterly integral audits must be undertaken on the lawful implementation of the WUL.						
				Water Use Licence must be available on site at all times.						
				The legal register must be updated to indicate all updated water uses.						
Activity 1: Dismantling and decommissioning of infrastructure and buildings	Geology	No direct impact	-	-	-	-	-	-	-	-
Decommissioning Activities: The existing King and Parson Emulsion Silos, Ammonium Nitrate Silos and explosive magazines will be decommissioned. The decommissioning	Topography	Removal of infrastructure may impact on the topography.	Alteration of surface topography.	Linear Infrastructure constructed by the mine (roads, conveyors, railway lines, power lines) will be removed if it proves to inhibit land use at decommissioning. Where possible infrastructure will remain for social investment opportunities, this will be decided in conjunction with the Integrated	Lawful removal of all infrastructure. Achieving final land use objectives.	Availability of safe disposal certificates. Free draining environment, with successful self-succession establishment.				x

Name of Activity	Impact Area	Potential Impacts	Aspects	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Timeframes			
Activities	Impact Area			Mitigation Measures			Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout Life of Mine
activities does not have any Construction or Operational impacts associated therewith. **Silos at Bruce:** Two magazine areas, an Emulsion Silo and Ammonium Nitrate Silo) - including all ancillary required infrastructure. **Silos at King:** An Emulsion Silo and Ammonium Nitrate Silo) - including all ancillary required infrastructure.				Development Plan of the area ant eh local authorities.						
				All haul roads and access roads will be rehabilitated by ripping these structures to a depth of 500mm.						
				All fences erected around the infrastructure be dismantled and either disposed of at a permitted disposal site or sold off as scrap (provided that these structures will no longer be required by the post mining land owner). Fences erected to cordon off dangerous excavations will remain in place and will be maintained as and when required.						
				The silos will be removed by the operational responsible contractor (such as Sasol Nitro, or the relevant company at that time).						
				The overland conveyors and railway lines, if not used as a community initiative, will be dissembled and the components removed from the site. The material can either be sold as a unit or the components sold as scrap.						
	Soil, Land Use and Land Capability	Spills around the silos may result in the contamination of soils.	Operational activities	Any emulsion or other contaminants should be collected and the soils remediated immediately.	Protection of Soil Integrity.	Zero presence of contaminated land due to early detection and implementation of actions.				x
		Loss of soils due to decommissioning activities present on site.	Operational activities	Draw up a plan clearly defining the area where the removal of infrastructure should take place. Implement the plan with		Maintaining soil integrity, with successful vegetation establishment.				x

Name of Activity	Impact Area	Potential Impacts	Aspects	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Timeframes			
Activities	Impact Area			Mitigation Measures			Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout Life of Mine
				sufficient measures in place not to compact new areas.						
				Implement a strict penalty fine system for rule breaking with regard to vehicular movement.						
				Maintain clean and dirty water systems and undertake regular monitoring and maintenance thereof.						
	Ecology	The establishment of Weeds and Invader Species.	Loss of Vegetation	A weed eradication programme will be developed and implemented to eradicate weeds and invader plants and to prevent new invasions during the ongoing mining operation.	Limit the impact of the mining operation on the Ecological Setting of the area.	Reduce the presence of invader species by 90% on site.				x
				Where self-succession does not establish, harvested seeds and plants must be used in concurrent rehabilitation for any areas along the area which may be affected.						
		Direct impact: Unplanned loss of floral and faunal species of conservation importance	Footprint clearance	Prior to the removal of plant species, an ecologist should investigate the site (if not already done) to record all species of importance and which should be removed under tree removal permits. All such species should be demarcated by signage or tape.	Achieving final land use commitments.	Self-succession of vegetation should establish within the first rainy season after construction has been completed. Zero removal of species of conservation importance without the necessary permits in place.				x
				Obtain tree removal permit prior to the removal of any protected species.						
				The pipeline proposed between P2/P1 and A1 should be rerouted if practically possible to avoid the floodplain vegetation and rather be rerouted to run through the Vachellia mellifera thicket to						

Name of Activity	Impact Area	Potential Impacts	Aspects	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Timeframes			
Activities		Impact Area		Mitigation Measures			Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout Life of Mine
				the south of the current route as shown in Figure 20 where possible.						
				The pending offset area should be finalised to contribute to the overall conservation of sensitive and red data species.						
				All employees, or contractors on site should receive a detailed induction on the expectations for the protection of fauna and flora on site.						
				Weed eradication should be implemented on site.						
		Accidental death of animals on the roads.	Loss of Animal	Clearly marked signs will be erected along the transportation routes to create awareness of animal crossings.	Awareness creation on the importance of that natural ecosystem in which Khumani operates. Implementation of safe operation practices.	Zero animal fatality.				x
				A clearly marked and enforced vehicle speed will be implemented on the internal mine and transportation routes.						
				A detailed induction programme will be in place to ensure that all parties are aware of the rules and regulations on site in terms of the use of roads.						
				Vehicles may only travel on demarcated roads on site.						
	Wetland	Loss or Impact on NEFPA Sites	Footprint clearance	No activities are planned within 500m from any NEFPA sites. This restriction should be maintained.	Protect sensitive ecosystems.	Remain within the designated footprints at all times.				x
	Hydrology	Erosion control over rehabilitated areas and the prevention of erosion gullies.	Active Rehabilitation	The topography of all disturbed areas must be rehabilitated in such a manner that the surrounding natural area blends naturally with the rehabilitated areas well as to be free-draining. This will	Protect the water resources within the area in which the mine operates.	Maintenance of storm water management systems. Meeting the conditions in terms of				

Name of Activity	Impact Area	Potential Impacts	Aspects	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Timeframes			
Activities	Impact Area			Mitigation Measures			Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout Life of Mine
				reduce soil erosion and improve natural re-vegetation.		Section 21c & of the WUL.				
		Contamination of surface water as a result of removal of infrastructure.	Operation of machinery and vehicle	The detailed waste management strategy implemented during the construction and operation phases must be continuously implemented throughout the closure and decommissioning phase.						x
		Rubble and waste from site could pollute local water resources.	Waste generation and disposal	Waste that is not removed from site should be spread, covered and suitably rehabilitated.						x
	Geohydrology	No direct impact	-	-	-	-	-	-	-	-
	Heritage	No direct impact	-	-	-	-	-	-	-	-
	Palaeontology	No direct impact	-	-	-	-	-	-	-	-
	Visual	Fugitive dust emissions as a result of infrastructure removal and associated exposed/bare areas may have an impact in terms of air quality and visual characteristics.	Vehicle movement and active rehabilitation	The dust monitoring network and dust suppression programme established during the construction phase of the project will be maintained throughout the closure phase of the mine. With respect to haul road dust levels, it is recommended to limit vehicle speeds, especially during high risk periods of high winds, high temperature and low humidity.	Remain within the regulated guidelines and limits.	Recording of dust fall out to determine trends.				x
				Establish and implement a dust suppression plan in consultation with the environmental control officer and an air quality specialist as part of the contractor's responsibility.						
	Air Quality	All activities associated with the removal of infrastructure and rehabilitation has the potential to release dust.	Active Rehabilitation	The dust monitoring network and dust suppression programme established during the construction phase of the project will be maintained throughout the closure phase	Remain within the regulated guidelines and limits.	Recording of dust fall out to determine trends.				x
						Meeting ambient dust fall out limits in terms				x

Name of Activity	Impact Area	Potential Impacts	Aspects	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Timeframes			
Activities	Impact Area			Mitigation Measures			Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout Life of Mine
				of the mine. With respect to haul road dust levels, it is recommended to limit vehicle speeds, especially during high risk periods of high winds, high temperature and low humidity.		of applicable NEM:AQA Regulations.				
	Noise	All activities associated with the removal of infrastructure and rehabilitation has the potential to generate noise.	Active Rehabilitation	The removal of all infrastructure is to take place during daytime periods only.	Remain within the regulated guidelines and limits.	Machinery with low noise levels and maintained in a good order to be used and to comply with the IFC's Health and Safety Regulations.				x
				Where noise becomes a nuisance, management measures will be investigated and implemented to address these.		Health and Safety Regulations in terms of noise monitoring should be met.				x
	Social	Disruption and nuisance factors associated with the actual decommissioning such as noise, visual and traffic related impacts.	Active Rehabilitation	Local residents, with the focus on the surrounding landowners, should receive accurate information with regards to the project status, timeframes for decommissioning and other relevant information about issues that could influence their daily living and movement patterns.	Remain within the regulated guidelines and limits.	The community forum established should continue, through which issues can be addressed, and a representative from Khumani should become involved.				x
Activity 2: Earth Moving, shaping and ripping of ground	Geology	No direct impact	-	-	-	-	-	-	-	-
	Topography	The shaping of the site should be undertaken in such a manner that it improves the overall topography of the site.	Active Rehabilitation	-	Develop the area to its intended final land use.	Implement an action plan to systematically plan for closure.				x
	Soil, Land Use and Land Capability	Soil erosion	Wind and water erosion in unvegetated areas	Re-vegetate as soon as possible	Develop the area to its intended final land use.	Continuous rehabilitation of the decommissioning area will be conducted in line with the Best			x	x

Name of Activity	Impact Area	Potential Impacts	Aspects	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Timeframes			
Activities	Impact Area			Mitigation Measures			Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout Life of Mine
		Ripping and topsoil replacement will restore the soil physical characteristics prior to re-vegetation.	Active Rehabilitation	Compacted soils will be ripped and topsoil will be replaced. After the topsoil has been replaced the area should be ameliorated and seeded, should self-succession of vegetation not take place. Only species indigenous to the area will be included.		Practice Guidelines released by the DWA.				
	Terrestrial Ecology (Fauna & Flora)	The rehabilitation of the site will allow reestablishment of natural vegetation.	Rehabilitation	Compacted soils will be ripped and topsoil will be replaced. After the topsoil has been replaced the area should be ameliorated and seeded, should self-succession of vegetation not take place. Only species indigenous to the area will be included. Remove alien vegetation post decommissioning, with long term follow-up afterwards.	Protect the Ecology within which the mine operates	Free draining environment with successful self-succession in place.			**x**	
	Wetland	No direct impact	-	-	-	-	-	-	-	-
	Hydrology	Runoff from rehabilitated areas will impact on watercourses especially during intensive rainstorms especially if the area are not free draining.		Berms, should they be necessary, must remain upstream and downstream of the dumps and stockpiles to ensure that clean water is kept separate from dirty water until the area is free draining and re-vegetation has occurred.	Protect the water resources within the area in which the mine operates.	Continuous rehabilitation of the decommissioning area will be conducted in line with the Best Practice Guidelines released by the DWA.	**x**			
	Geohydrology	No direct impact	-		Protect the groundwater resources to ensure that limited to no impact on groundwater resources occur as a result of the mining operations.	Implement and operate a detailed waste manifest on site and maintain a 100% safe disposal record on the disposal of waste on site.			x	x
	Heritage	No direct impact	-	-	-	-	-	-	-	-
	Palaeontology	No direct impact	-	-	-	-	-	-	-	-

Name of Activity	Impact Area	Potential Impacts	Aspects	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Timeframes			
Activities	Impact Area			Mitigation Measures			Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout Life of Mine
	Visual	The rehabilitation (ripping, topsoil replacement and landscaping) will remove the visual incongruity.	Infrastructure removal	An overall visual improvement will be noticed once all mining related infrastructure has been demolished and the area has been landscaped and re-vegetated.	Successful establishment of vegetation.	Remain within the designated area demarcated for activities. Remain within the National Environmental Management: Air Quality Act, 2004 Dust Regulation guidelines for rural communities.				x
				Demarcate the decommissioning area and limit the decommissioning activities as far as possible.						
				Final shaping will be implemented such that the final profile of the rehabilitated areas are formed to emulate natural contours of the area.						
				Foundations will be removed to a depth of 1 m below the surface and the area rehabilitated.						
				All material recovered from the demolition of buildings and/or structures will either be transported to a permitted disposal site, or made available to the local community as building materials (provided they are in a satisfactory condition following demolition).						
				Linear infrastructure constructed by the mine (i.e. roads, conveyors and power lines) will be removed if it proves to inhibit land use at decommissioning.						

Name of Activity	Impact Area	Potential Impacts	Aspects	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Timeframes			
Activities	Impact Area			Mitigation Measures			Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout Life of Mine
				All fences erected around the mine will be dismantled and disposed of at a permitted disposal site.						
	Air Quality	All activities associated with the removal of infrastructure has the potential to release dust.	Infrastructure removal	Dust sampling will be undertaken on a monthly basis and analysed according to the prescribed monitoring programme contained in the EIA/EMP.	No concerns raised by surrounding landowners regarding air quality.	Remain within the designated area demarcated for activities.	x			x
				Monthly monitoring reports will be generated by the mine or through a suitably qualified air quality specialist.		Remain within the National Environmental Management: Air Quality Act, 2004 Dust Regulation guidelines for rural communities.				
				In the event that air quality or dust issues are identified based on the monitoring programme, an independent specialist should be appointed to determine the best course of action to ameliorate the situation.						
	Noise	All activities associated with the removal of infrastructure and rehabilitation has the potential to generate noise.	Infrastructure removal	The removal of all infrastructure is to take place during daytime periods only. Where noise becomes a nuisance, management measures will be investigated and implemented to address these.	No concerns raised by surrounding landowners regarding air quality.	Remain within the designated area demarcated for activities.	x			x
				Machinery with low noise levels and maintained in a good order to be used and to comply with the IFC's Health and Safety Regulations.						
				Speed control measures will be implemented by the mine through the placement of adequate signage.		Remain within the National Environmental Management: Air				

Name of Activity	Impact Area	Potential Impacts	Aspects	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Timeframes			
Activities	Impact Area			Mitigation Measures			Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout Life of Mine
				Implement a penalty system for non-compliance to speed control measures and ensure that all workers are made aware of the penalty systems.		Quality Act, 2004 Dust Regulation guidelines for rural communities.				
				Gravel roads to be maintained in as good and smooth a condition as possible.						
	Social		-	-	-	-	-	-	-	-
Activity 3: Cessation of Labour Contracts	Geology	No direct impact	-	-	-	-	-	-	-	-
	Topography	No direct impact	-	-	-	-	-	-	-	-
	Soil, Land Use and Land Capability	No direct impact	-	-	-	-	-	-	-	-
	Terrestrial Ecology (Fauna & Flora)	No direct impact	-	-	-	-	-	-	-	-
	Wetland	No direct impact	-	-	-	-	-	-	-	-
	Hydrology	No direct impact	-	-	-	-	-	-	-	-
	Geohydrology	No direct impact	-	-	-	-	-	-	-	-
	Heritage	No direct impact	-	-	-	-	-	-	-	-
	Palaeontology	No direct impact	-	-	-	-	-	-	-	-
	Visual	No direct impact	-	-	-	-	-	-	-	-
	Air Quality	No direct impact	-	-	-	-	-	-	-	-
	Noise	No direct impact	-	-	-	-	-	-	-	-
	Socio-Economic	Plant, store and workshop areas could benefit the local community.	Opportunity to improve economic conditions.	Instead of demolition of certain areas, these areas could be sold off as commercial property for use in the local community.	Optimally utilise buildings and infrastructure.	Safe disposal and lawful operation of infrastructure.	x			x
		Loss of Employment.	Reduction in Economic Activities and Job Opportunities on site.	The mine should continue with the skills development programme and Social and Labour Plan commitments to empower the workforce to undertake other economically viable activities.	Ensuring successful skills development to allow for continued economically active people and opportunities in the area post mining.	Successful implementation of skills development and opportunities on site.		x	x	x
Waste Management	Groundwater	Handling or Hazardous Waste within workshops and general mine area.	Spill and Release of Waste Material and	Clean and Dirty water separation systems should be incorporated in terms of the 2016 SWMP.	Protect the groundwater resources to ensure that limited to no	Achieve 100% compliance to the water quality objectives as agreed to		x		x

Name of Activity	Impact Area	Potential Impacts	Aspects	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Timeframes			
Activities		Impact Area		Mitigation Measures			Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout Life of Mine
			Contaminated Water.	Waste management training must be implemented on site.	impact on groundwater resources occur as a result of the mining operations.	between the mine and the DWS based on the discussions within this IWWMP.				
				Clear signs informing staff of waste management practices must be implemented on site.		Maintain a 100% safe disposal record on the disposal of hazardous waste.				x
				Hazardous waste handling should only take place within bunded and/or lined areas.						
				Hazardous waste should be removed by a licenced removal company and taken to a suitable and licenced landfill site.						
				Documentation of removal and safe disposal must be available on site.						
		Handling of Building Rubble	Disposal of demolished infrastructure and the potential impact on groundwater resources.	All infrastructure will be removed and rehabilitated, should no alternative use be found for the structures.						
				Foundations will be removed to a depth of 1m below surface.						
				All building rubble will follow the waste hierarchy and will therefore either be sold for reuse where possible, disposed of within opencast pits (with the necessary approvals in place by the regulatory authority for the disposal of building rubble and as per the 2009 EMP) and as a last option be disposed of at a licensed facility suitable for such waste.		Implement and operate a detailed waste manifest on site and maintain a 100% safe disposal record on the disposal of waste on site.			x	x
		Handling and Storing of Domestic Waste	Spill and Release of Waste Material and Contaminated Water.	Clean and Dirty water separation systems should be incorporated in terms of the 2016 SWMP.		Achieve 100% compliance to the water quality objectives as agreed to between the mine and the DWS based on the		x		x
				Waste management training must be implemented on site.						

Name of Activity	Impact Area	Potential Impacts	Aspects	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Timeframes			
Activities	Impact Area			Mitigation Measures			Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout Life of Mine
						discussions within this IWWMP.				
				Clear signs informing staff of waste management practices must be implemented on site.		Maintain a 100% compliance with the conditions of the ECA permit for the landfill site.				x
				The landfill site at Khumani must be operated in line with the Environmental Authorisation requirements and conditions.						
				Recycling practices must be investigated and implemented on site.		Maintain a 100% accurate recording of waste and submission of such recording to the Department.				x
				Ongoing rehabilitation of the landfill site must be undertaken, by covering and shaping the facility.						
				Groundwater monitoring must be undertaken in such a manner as to ensure that any potential impacts from the landfill site can be detected.		Maintain daily covering of the landfill site.	x			x
	Surface Water	Handling of Hazardous Waste within workshops and general mine area could contaminate the dirty water storage areas. The water is then reused in the system and could have impacts on the integrity of the storm water system and also the production.	Spill and Release of Waste Material and Contaminated Water.	Clean and Dirty water separation systems should be incorporated in terms of the 2016 SWMP.	Develop the area to its intended final land use.	Maintain the SWMP on site.				x
				Waste management training must be implemented on site.		Maintain a 100% no-spill record.				x
				Clear signs informing staff of waste management practices must be implemented on site.		Clean spills, if occur witan 24 hours.				x
				Hazardous waste handling should only take place within bunded and/or lined areas.		Maintain a 100% safe disposal record on the disposal of hazardous waste.				x
				Hazardous waste and contaminated materials should be removed by a licenced removal company and taken to a suitable and licenced landfill site.		Provide training to all staff on best practices regarding waste management every year.	x			x

Name of Activity	Impact Area	Potential Impacts	Aspects	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Timeframes			
Activities		Impact Area		Mitigation Measures			Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout Life of Mine
				Documentation of removal and safe disposal must be available on site.						
				Weekly inspections of Storm Water Management Systems must be undertaken. Any blockages or maintenance requirements must be documented and an action plan developed.						
		Handling and Storing of Domestic Waste should have no impact on the surface water resources due to the location of the facility. However, incorrect disposal of waste could hamper the integrity of the storm water system.	Spill and Release of Waste Material and Contaminated Water.	Clean and Dirty water separation systems should be incorporated in terms of the 2016 SWMP.		Maintain a 100% compliance with the conditions of the ECA permit for the landfill site.	x			x
				Waste management training must be implemented on site.						
				Weekly inspections of Storm Water Management Systems must be undertaken. Any blockages or maintenance requirements must be documented and an action plan developed.						
				Clear signs informing staff of waste management practices must be implemented on site.						
				The landfill site at Khumani must be operated in line with the Environmental Authorisation requirements and conditions.						
				Building rubble must be disposed of in line with the requirements of the NEM:WA.		Maintain daily covering of the landfill site up until final covering.	x			x
				Access control must be strictly enforced.						
				The berm around upstream of the facility must be maintained.		Self-succession of vegetation should establish within the first rainy season after	x			x
				Recycling practices must be investigated and implemented on site.						

Name of Activity	Impact Area	Potential Impacts	Aspects	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Timeframes			
Activities	Impact Area			Mitigation Measures			Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout Life of Mine
				Ongoing rehabilitation of the landfill site must be undertaken, by covering and shaping the facility. Groundwater monitoring must be undertaken in such a manner as to ensure that any potential impacts from the landfill site can be detected.		construction has been completed.				
	Air Quality	The area is located within the mining area and neighbouring the Village Opencast Pit. Dust emissions is not considered to be significant but can occur during excavation and construction activities.	Removal of topsoil.	Dust suppression should be undertaken where and when dust is present.	Remain within the designated area demarcated for activities. Remain within the National Environmental Management: Air Quality Act, 2004 Dust Regulation guidelines for rural communities.	Remain within the regulated guidelines and limits.	x			x
	Noise	The area is located within the mining area and neighbouring the Village Opencast Pit. Noise impacts are not considered to be significant but can occur during excavation and construction activities.	Removal of topsoil.	Equipment will be well maintained to reduce excessive noise creation. Activities will be restricted to the day time.	Remain within the designated area demarcated for activities. Remain within the National Environmental Management: Air Quality Act, 2004 Dust Regulation guidelines for rural communities.	Remain within the regulated guidelines and limits.	x			x

1.e Impact Management Outcomes

Please refer to the previous section and Table 23 providing a detailed description of the management objectives and the standards required to be achieved.

1.f Impact Management Actions

Please refer to the previous section and Table 23 providing a detailed description of the management objectives and the standards required to be achieved.

1.f.i Financial Provision

Newly promulgated regulations (November 2015) pertaining to the Financial Provision for Prospecting, Exploration, Mining and Production Operations in terms of the National Environmental Management Act, 1998 (Act 107 of 1998) ("NEMA") prescribes the determination and making of Financial Provision for existing rights/permit holders (Regulation 11 of GNR.1147). Importantly, the provisions in Section 24P of NEMA has been given effect through these newly promulgated regulations.

The following sections presents the methodology for the determination of the financial provision.

Most important to note is that the prescribed method for estimating a closure costs, as provided for by the DMR in the form of the Guideline Document for the Evaluation of Financial Provisions, only acts as a guideline, and therefore indicates the minimum requirements for assessing and reporting on a closure cost estimate.

For the purposes of this assessment, EnviroGistics can confirm that the method adopted to obtain and compile the schedule of quantities is sound, correct, and provides detail that is required by the DMR. The information will allow for continued monitoring and updating of quantities and provides the ideal platform to manage and monitor the actual on-site rehabilitation measures and costs incurred.

Table 19The table hereafter indicates the unit rates for each rehabilitation and closure component associated with Khumani, specifically those applicable to this application. These rates are based on the December 2016 Closure Assessment undertaken for the mine. This assessment is updated annually and is scheduled for July 2017.

The rates was determined by a civil engineer, who also conducted the closure provision for the Assmang Ferrous Operations during 2016.

The rehabilitation and liability estimation for Khumani Mine for the proposed infrastructure related to this application only was determined as a clean closure estimate – no allowance for off-sets or salvage value. The assessment was conducted in accordance with the DMR Guideline and best current practice.

A Sub Total 1 Amount of approximately R 4 113 867.12.00 (excluding VAT, but including P&Gs and Contingencies).

The financial provision required by the holder of the mining right must be provided for by one or more of the following methods in order to achieve the total quantum of rehabilitation and remediation of environmental impacts and damage as well as final closure:

- Approved dedicated trust fund;
- Financial guarantee from a South African registered bank or any other approved financial institution;
- Cash deposit to be deposited at the office of the Regional Manager; or
- Any other manner determined by the Minister.

The client is required to annually assess the total quantum of environmental liability for the operation and ensure that financial provision is sufficient to cover the current liability (in the event of premature closure), as well as the end of life liability.

Table 26: Master Rate Calculation

Infrastructure	Description	Unit	Planned Units	Cost per Unit	Planned Cost
King Existing Silo	Rip and Shape of footprints	m2	45000	R 4,56	R 205 200,00
	200mm thick topsoil cover	m3	9911	R 22,00	R 218 002,36
	Seeding footprint (x2 for two types of grasses)	m2	4500	R 4,50	R 40 500,00
	Fence dismantling	m	800	R 35,00	R 28 000,00
Parson Existing Silo	Rip and Shape of footprints	m2	37000	R 4,56	R 168 720,00
	200mm thick topsoil cover	m3	8149	R 22,00	R 179 245,40
	Seeding footprint (x2 for two types of grasses)	m2	4500	R 4,50	R 40 500,00
	Fence dismantling	m	800	R 35,00	R 28 000,00
Parson Existing Silo Access Road	Demolish unsurfaced haul roads, rip and shape	m2	6600	R 11,00	R 72 600,00
Low grade ROM sorter Plant Demolition	Dismantling of Conveyors, including support structures	m	3350	R 450,00	R 1 507 500,00
	Rip and Shape stockpile Footprints	m2	67140	R 5,47	R 367 390,08
	200mm thick topsoil cover	m3	19679	R 22,00	R 432 859,28
	Seeding footprint (x2 for two types of grasses)	m2	89450	R 4,50	R 805 050,00
	Fence dismantling (additional fence to tie into existing fences)	m	580	R 35,00	R 20 300,00
New King and Parson Silos	Net Zero Effect (replacement of exiting quantified infrastructure), included into exiting costing (only replacement of infrastructure)	-	-	-	-
Total Cost (including 20% contingency)					R 4 113 867,12

As per Government Legislature, the client is required to ensure full financial cover for the current liability at any point in the life of the operation. Pecuniary provision must be made for the shortfall between the existing trust fund balance and the premature closure or current environmental rehabilitation liability if applicable.

1.f.i.1.a Describe the Closure Objectives and the Extent to which they have been aligned to the Baseline Environment described under the Regulation

The closure objectives of this project, therefore will tie into the overall mine's closure objectives, which includes:

- To operate within the enviro-legal ambits of South Africa.
- To be aware of the latest environmental legal requirements.
- Limit the impact of the activities on the Ecological Setting of the area.
- Operate the water management circuit on site to increase mining efficiency and reduce the need for maintenance of these facilities.
- Limit the loss of soils as far as possible and ensure that the integrity remains during stockpiling for the purposes of successful rehabilitation.
- Protect the soil resources within the area in which the mine operates.
- Remain within the designated area demarcated for activities.
- Remain within the National Environmental Management: Air Quality Act, 2004 Dust Regulation guidelines for rural communities.
- Protect heritage resources for future generations.
- Protect the groundwater resources to ensure that limited to no impact on groundwater resources occur as a result of the mining operations.
- Follow the waste hierarchy approach.
- Develop the area to its intended final land use.

Please refer to the previous section and Table 23 providing a detailed description of the management objectives and the standards required to be achieved.

1.f.i.1.b Confirm specifically that the Environmental Objectives in relation to Closure have been consulted with Landowner and Interested and Affected Parties

Please refer to Part A, 0 for the detailed discussion regarding I&AP Consultation.

The current Stakeholder Database on the mine was utilised as a bases for the development of the consultation register for this project. In addition to this relevant government departments, municipalities and the affected ward councillors were contacted to inform them of the proposed project and to obtain their issues and comments in this regard. The following stakeholders were consulted as part of the project:

- DWS;
- DMR;
- NCDENC;
- Local Municipality;
- Districts Municipality;
- Ward Councillor;
- Surrounding Landowners; and
- Other Identified Stakeholders.

In order to inform surrounding communities and adjacent landowners of the proposed project, five (5) notices were erected on site (on Monday, 8 May 2017) and at visible locations close to the site. The notices were displayed in both Afrikaans and English.

Background Information Documents were distributed via email to all parties on the database on 12 May 2017.

The formal announcement of the proposed project was done by placing an advert in the Kathu Gazette on 13 May 2017 to invite all Interested and Affected (I&APs) to register. The adverts were published in both Afrikaans and English.

The objective of this newspaper advertisement was to:

- Inform I&APs of the proposed project;
- Inform I&APs of the Environmental Impact Assessment procedure and the way in which I&APs could lodge any objections to the proposed development and provide comments; and
- Invite I&APs to become involved in the proposed project by registering as I&APs.

All registered stakeholders will be informed of the availability of the draft reports to receive the opportunity to comment on the report and to be informed of the potential impacts, proposed management measures and closure objectives.

1.f.i.1.c Provide a Rehabilitation Plan that Describes and Shows the Scale and Aerial Extent of the Main Mining Activities, including the anticipated Mining area at the time of Closure

This project application does not include mining activities. All mining activities at Khumani have been approved. The rehabilitation plan for the overall mining operation will involve the following:

1. To backfill the majority of opencast pits.
2. All mine residue stockpiles, where not reworked, will be shaped and ripped, where after self-succession of vegetation will be promoted.
3. All infrastructure (buildings, plants, etc.) will be demolished and firstly sold for reuse and where this is not possible be disposed of at a licensed landfill site or where possible be utilised in the backfilling of voids. This last mentioned options will have to fulfil the requirements of the NEMWA and may involve the need for a Waste License, depending on the regulatory requirements at that time.
4. Water management infrastructure will remain up until all dirty water areas have been successfully rehabilitated. Only then will the water be left to either evaporate, or where it fulfil the water quality requirements of the Catchment Standards be discharged into the environment (with written approval

from the DWS required). Silt remaining in these facilities will be disposed of on the paste facility or if the quality thereof is suitable and of good quality, be used in the shaping of areas.

Refer to the following table, which is included to present the typical rehabilitation plan for the listed activities in question:

Table 27: Rehabilitation Plan

	Requirement	Target	Responsible Person	Timeframes
	General Surface Rehabilitation			
A	**Planning**			
A1	The closure plan will be reviewed during the life of the mine (closure, operational and decommissioning phases) as part of the NEMA Regulations for financial provision.	Legal closure review compliance.	Environmental Specialist	Annually during operational phase.
A2	Notify the DMR of intended cessation of mining activities and rehabilitation in accordance with the NEMA.	Notification	Environmental Department	Five years prior to closure
A3	Apply for the necessary Environmental Authorisation for the decommissioning of activities in terms of the NEMA, NEM:WA and NWA.	Environmental Authorisation.	Environmental Department	At least 2 years prior to intended decommissioning.
A4	Appoint a project manager to oversee the process	Appointment of suitably qualified project manager.	Mine Manager	Prior to the commencement of closure planning and implementation.
A5	Where still present, asbestos roofs and materials containing asbestos must be identified and removed by a person competent to do so. Asbestos waste must be disposed of at an appropriately licenced facility.	Disposal of waste in terms of Asbestos regulations and the NEM:WA.	Engineering Manager and Environmental Department.	Demolition phase
A6	Identify any protected species that may require permitting prior to disturbing.	Biodiversity Permits	Environmental Specialist	Prior to commencement of rehabilitation.
A7	A storm water management plan (clean and dirty water separation) for the purposes of rehabilitating towards the final land use should be developed.	Free draining environment	Hydrologist/Engineer	Prior to commencement of rehabilitation.
A8	If any archaeological artefacts of potential significance are identified at any stage, work must cease and SAHRA must be notified for instruction on how to proceed.	Protection of artefacts	Environmental Specialist	Ongoing
B	**Removal of Surface Infrastructure and Structures**			
B1	Photographs of the infrastructure, before, during and after rehabilitation will be taken at selected fixed points and kept on record for the Manager (Group Environmental Department) and the DMR purpose	Documentation of rehabilitation process.	Environmental Department	Ongoing
B2	All temporary buildings (pre-fabricated buildings) should be removed and their footprints rehabilitated.	Surface rights area cleared up of all mining related infrastructure and structures.	Project Manager	Ongoing
B3	All fixed assets that can be profitably removed will be removed for salvage or resale (the salvage and resale value have however not been incorporated into the closure cost estimate as per the legislative requirements)	Surface rights area cleared up of all mining related infrastructure and structures.	Project Manager	Ongoing

	Requirement	Target	Responsible Person	Timeframes
B4	All surface structures, infrastructure and 'hard surfaces' (inter alia, redundant surfaced roads, parking and paved areas) are to be demolished and removed from the disturbed mine footprint; unless an alternative/continued use for any such items is agreed upon, in writing, with the Department of Mineral Resources (DMR).	Surface rights area cleared up of all mining related infrastructure and structures.	Project Manager	Ongoing
B5	Any item that has no salvage value to the mine but could be of value to individuals will be treated as waste, unless otherwise defined in terms of the NEM:WA	Surface rights area cleared up of all mining related infrastructure and structures.	Project Manager	Ongoing
B6	All structures will be demolished, terracing removed and foundations demolished to 1m below the original ground level	No remaining sub-surface structures that may impede further phases of rehabilitation or vegetation establishment.	Project Manager	Ongoing
B7	Dismantle and remove redundant fencing for salvage	Surface rights area cleared up of all mining related infrastructure and structures.	Project Manager	Ongoing
B8	Water pollution control structures will remain until the completion of all demolition and associated rehabilitation activities where after these will be rehabilitated.	Free draining environment	Hydrologist/Engineer	Prior to commencement of rehabilitation.
B9	The soils beneath any structures used for the bulk storage of hazardous substances (i.e. bulk fuel and oil storage facilities, oil-water separators/sumps), must be made subject to a hydrocarbon contamination screening exercise undertaken by a suitably qualified, independent, professional.	Documented proof of contamination assessments on record. Compliance with any further recommendations from appointed specialist prior to further rehabilitation of contaminated site(s).	Project Manager	Ongoing
C	**Soil Preparation**			
C1	Where sites have been alienated of vegetation or where soils have been compacted or covered with concretes, these sites will be ripped and ploughed.	No topsoil replacement on compacted soil horizons.	Project Manager	Ongoing
C2	The topsoil and sub-soils with the appropriate seedbed as stripped during the construction and operational phases will be placed over these areas to a depth as specified by a qualified specialist. The topsoil shall be appropriately ameliorated to allow vegetation to grow rapidly if required – it should be noted that the mine will encourage self-succession of	Replacement of fertile topsoil.	Environmental Scientist	Ongoing

	Requirement	Target	Responsible Person	Timeframes
	vegetation, if this does not take place effectively a re-vegetation project will be implemented			
C3	On-going alien and invasive floral species control is required through all phases of rehabilitation.	No establishment of weeds or invasive species.	Environmental Scientist	Ongoing inspections.
C4	Pre-mining topography should be reasonably restored through shaping and landscaping, such that the topography of rehabilitated areas will ultimately be commensurate with that of adjacent, non-disturbed areas.	No evidence of significant alteration.	Project Manager	Ongoing
C5	The areas will be landscaped to be free draining in line with the approved storm water management plan.	Area to be fee draining	Project Manager	Ongoing
C6	If a reasonable assessment indicates that the re-establishment of vegetation is unacceptable slow, the soil need to be analysed and any deleterious effects must be corrected and the area be seeded with a seed mix to specification	Successful vegetation establishment	Ecologist	Ongoing inspections.
C7	Appropriate erosion control measures (i.e. contour banks) must be taken where required	No evidence of significant alteration.	Project Manager	Ongoing
C8	Care should be taken in choosing a method/machinery to implement C4 and C5 above, such that ripped soils are not re-compacted through efforts to appropriately shape the disturbed sites.	No topsoil replacement on compacted soil horizons.	Project Manager	Ongoing
C9	Access to rehabilitated areas should be restricted to vehicles/machinery specifically required for the implementation of the closure plan.	No unauthorised access.	Project Manager	Ongoing
D	**Soil and Vegetation replacement**			
D1	A topsoil/gravel mixture should be replaced over all rehabilitated area. Where topsoil is insufficient, subsoil must be treated in accordance with the specification of a soil specialist.	Replacement of fertile topsoil.	Environmental Scientist	Ongoing
D2	Topsoil should be screened, as necessary, to remove any foreign objects, rocks, etc., prior to the replacement thereof.	Replacement of topsoil that is fit for purpose.	Project Manager	Ongoing
D3	Any areas with slope ≥ 3° should be inspected weekly for signs of topsoil erosion following the replacement thereof, and appropriate action taken to curb any problematic areas.	No evidence of significant alteration.	Project Manager	Ongoing
D4	Self-succession should be encouraged. One rainy season will be allowed for self-succession to take place.	Successful vegetation establishment	Ecologist	Ongoing inspections.
D5	If a reasonable assessment indicates that the re-establishment of vegetation is unacceptable slow, the soil need to be analysed and any deleterious effects must be corrected and the area be seeded with a seed mix to specification. Should self-succession of vegetation not take place, the mine will implement a vegetation strategy to establish vegetation on these disturbed areas. Appropriate erosion control measures (i.e. contour banks) must be taken where required.	Successful vegetation establishment	Ecologist	Ongoing inspections.
D6	No grazing on rehabilitated areas is to occur within three years of reseeding completion.	Documentation of rehabilitation process.	Project Manager	Three years from re-seeding.

	Requirement	Target	Responsible Person	Timeframes
E	**Disposal of Material**			
E1	Waste will be classified in terms of the NEM:WA to determine the required waste disposal strategies.	Classification of waste in terms of the NEM:WA	Environmental Specialist	Prior to the commencement of closure planning and implementation.
E2	Rubble will be disposed of at a suitable site which will be rehabilitated once it serves its purpose. As per the 2009 EMP, the objective was made that the rubble shall be dumped in the waste landfill site on the mine with approval by the relevant authorities. This activity should also comply with the relevant NEM:WA requirements	Safe disposal certificates.	Environmental Department	Ongoing
E3	All types of waste shall be removed entirely from the area and appropriately dealt with in respect of the general waste handling procedure	Safe disposal certificates.	Environmental Department	Ongoing
E4	Inert ceramics such as bricks, concrete, gravel etc. will be used as backfill or disposed of in a permitted waste disposal site according to the approved EMP, 2009	Disposal of waste in terms of the NEM:WA.	Environmental Department	Ongoing
E5	Inert waste, which is more than 1m underground, such as pipes will be left in place	Disposal of waste in terms of the NEM:WA.	Environmental Department	Ongoing
E6	Inert ceramic and buried waste with a salvage value to individuals such as scrap metal, building materials, etc. will be removed and disposed of at a proper facility	Disposal of waste in terms of the NEM:WA.	Environmental Department	Ongoing
F	**Ongoing monitoring and maintenance**			
F1	All rehabilitated areas will be fenced off up until the area is regarded as stable	No unauthorised access.	Project Manager	Ongoing
F2	All illegal invader plants and weeds shall be dealt with as required in terms of the relevant legislation	No establishment of weeds or invasive species.	Environmental Scientist	Ongoing inspections.
F3	External, independent, 'Mine Rehabilitation' compliance audits must be undertaken by a competent auditor for all areas where rehabilitation is being implemented at the mine at least quarterly. Audit to at least document compliance with this plan, as well as any other relevant provisions of the EMP revision approval by the DMR.	Compliance with closure plan	External Auditor	Quarterly
F4	The mine should undertake monthly internal compliance audits for all areas where rehabilitation is being implemented at the Mine.	Compliance with closure plan	Environmental Department	Monthly
F5	Monitoring and maintenance of all natural physical, chemical and biological processes for which a closure condition has been specified must be monitored for three (3) years after closure or as long as required by the relevant authorities. Such processes include erosion of the rehabilitated surfaces, surface water drainage, air quality, surface water quality, groundwater quality, vegetative re-growth, weed encroachment and colonisation by animals	Compliance with closure plan with at least 90% sustainable establishment of vegetation.	Environmental Department	Ongoing

1.f.i.1.d Explain why it can be confirmed that the Rehabilitation Plan is Compatible with the Closure Objectives

Due to the nature of the activities, the impacts will be very limited and of short duration. The detailed EMP has been provided to address potential impacts associated with these activities. The components presented as part of the rehabilitation plan have been incorporated into the overall impact assessment and management plan, which is tied to the objectives and goals to be achieved.

1.f.i.1.e Calculate and State the Quantum of the Financial Provision required to manage and rehabilitate the environment in accordance with the applicable Guideline

Please refer to PART A, Section 3.s for the detailed presentation of the Financial Provision and Calculation.

The rehabilitation and liability estimation for Khumani for the proposed infrastructure was determined as a clean closure estimate – no allowance for off-sets or salvage value. A summary of the rehabilitation and closure estimate for is presented below:

A Sub Total 1 Amount of approximately R 4 113 867.12.00 (excluding VAT, but including P&Gs and Contingencies).

The financial provision required by the holder of the mining right must be provided for by one or more of the following methods in order to achieve the total quantum of rehabilitation and remediation of environmental impacts and damage as well as final closure:

- Approved dedicated trust fund;
- Financial guarantee from a South African registered bank or any other approved financial institution;
- Cash deposit to be deposited at the office of the Regional Manager; or
- Any other manner determined by the Minister.

1.f.i.1.f Confirm the Financial Provision will be provided as Determined

Khumani has a trust fund in place to cater for the financial provision of rehabilitation activities. This is assessed annually to ensure that suitable funds are available. The next assessment will be undertaken in July 2017 -

In addition to this the client has also signed the undertaking to commit to the conditions as presented in this report.

1.f.i.1.g Mechanisms for Monitoring Compliance with the Performance Assessment against the Environmental Management Programme, including Monitoring of Impact Management Actions

The following table presents the monitoring compliance including the responsible persons, implementation period, and mechanist for monitoring compliance

Table 28: Monitoring Compliance during Construction Phase

Name of Activity	Impact Area	Potential Impacts	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Monitoring Requirements			
Activities	Impact Area		Mitigation Measures			Impacts Requiring Monitoring Programmes	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency
Planning Phase (and throughout LOM to ensure Legal Compliance)									
Legal Requirements (Environmental Permits)	South Africa Enviro-Legal Requirements	Unlawful water and waste (mine residue) activities, which could lead to NWA Directives and Section 24G Rectification fines.	A legal assessment of all activities must be undertaken on site must be undertaken annually to ensure that all Environmental Authorisations are in place, implemented and activities licensed.	To operate within the enviro-legal ambits of South Africa.	Ensure that all activities undertaken by the mine are lawful with the required environmental licences in place.	Compliance in terms of Regulatory Requirements and the implementation of the EMP.	Appointment of an Independent Environmental Control Officer to assess compliance with the EMP.	Independent ECO	Monthly for the construction phase. Thereafter annual external audits can be undertaken.
			The mine must familiarise themselves with the NEM:WA Regulations for the management of Mine Residue Deposits. Those included in previous approved EMPs are considered lawful under the NEM:WA, however when reworking, rehabilitation, stockpiling are taking place, and not included into the previous EMP, these activities are unlawful and may require a Waste License.	To be aware of the latest environmental legal requirements.	Ensure that all environmental authorisations on site is implemented on site and ongoing monitoring of compliance are undertaken to reach 100% compliance.	Compliance in terms of Regulatory Requirements and the implementation of the EMP.	Quarterly internal audits must be undertaken to ensure compliance with the Environmental Authorisation and EMP. This should be undertaken by means of a thorough site visit, record keeping of findings in a checklist format, issuing of non-conformances to responsible parties, listing thereof on the Isometrics or similar reporting system and feedback to the management team.	SHEQ Department	Quarterly
			All legally appointed personnel responsible or involved in approved activities on site must receive training on the requirements of the Environmental Authorisations.		All Departments responsible for development of the mine, must understand the	Compliance in terms of Regulatory Requirements and the	Monthly environmental meetings must be implemented to discuss the mining	SHEQ, Engineering and Mining/Geology Department.	Monthly

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			Quarterly integral audits must be undertaken on the lawful implementation of the WUL. The Environmental Authorisation must be available on site at all times. The legal register must be updated to indicate all approved activities on site (NEMA, NEMWA, ECA and MPRDA).		requirements of the environmental legislation and must involve this into their planning processes.	implementation of the EMP.	plan, implementation thereof, implication on current Environmental Regulations and potential constraints and liabilities. Minutes must be kept of these meetings and action plans with responsibilities must be drafted.		
Construction Phase									
Activity 1 - Land and Footprint Clearance Construction & widening of Roads: Development of roads to the King Silos. Should the King/Mokaning access road be used, a link of approximately 1.5km to this road will be required. Upgrades of roads to the Bruch Silos, may require an extension of approximately 450m to existing roads. **Construction of Silos and Magazines at Bruce:** Two magazine areas, an emulsion silo and	Geology	No direct impact	-	-	-	-	-	-	-
	Topography	Direct impact: Alteration of topography. Removal of vegetation and the associated shaping of the area to prepare footprint for construction will allow for increased surface water runoff, which may lead to change in topographical characteristics of the area.	Construction areas must be clearly demarcated to control movement of personnel and vehicles, providing clear boundaries for construction sites in order to limit the spread of impacts. Markers and pegs will be erected and maintained along the boundaries of the working areas, access roads, haul roads and paths before commencing any work. If proved insufficient for control, these shall be replaced by fencing. Draw up a procedure clearly reflecting the method and phases of clearance of vegetation only in areas where construction will take place. Removal of vegetation must be undertaken in a phased approach to limit surface exposure. Erosion control measures must be implemented early in the construction phase.	Remain within demarcated areas. Design facilities to blend into the existing site character as far as practically possible.	No disturbed areas should remain beyond the demarcated areas. 100% compliance to remain with approved footprint areas.	Soil Erosion and incorrect stockpiling of topsoil.	Appointment of an Independent Environmental Control Officer to assess compliance with the EMP. The SHEQ department should undertake ongoing site monitoring to determine whether activities on site are undertaken in accordance with the EMP Requirements.	Independent ECO and SHEQ Department.	ECO: Monthly for the construction phase. Thereafter annual external audits can be undertaken. SHEQ: Weekly monitoring

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an ammonium nitrate Silo). This area will include all ancillary required infrastructure. Activity 1 - Land and Footprint Clearance **Construction of Silos and Magazines at King:** An emulsion silo and ammonium nitrate silo). This area will include all ancillary required infrastructure. For the Bruce and King expansions combined a total storage of 195m3 (emulsion: 113m3) ammonium nitrate: 82m3) **Laying of the pipelines within undisturbed areas:** A pipeline route of approximately 800m will be required between point A1 and the two water supply areas P1 and P2. **Activity 2 - Topsoil Stripping and Stockpiling Construction & widening of Roads:**			Clean and dirty water separation must be implemented early in the construction phase, especially down-gradient of construction areas.						
			Where possible existing roads must be utilised.						
			Linear infrastructure must follow for as far as practically possible the natural contours of the area.						
	Soil, Land Use and Land Capability	Direct impact: The removal and stockpiling of topsoil may lead to a loss of soil resource and land capability through erosion of the stockpiles and chemical and physical degradation.	Adhere to Soil Stripping, Soil Stockpiling and Soil Management Plan as part of the original EMP (Soil Utilisation Guideline). Prior to construction of the road and the plant the soil will be stripped and placed in close proximity to the facilities. It is recommended that the soil and overburden be stockpiled as 1-1.5m berms around the roads and plant area. Remove 30cm of soil or until hard rock is reached. Any new topsoil stockpiles should not exceed 1.5m. Where exceedance is present on existing facilities, erosion control measures should be implemented and vegetation establishment should be encouraged to assist in maintaining the structure of the soils for rehabilitation.	Limit the loss of soils as far as possible and ensure that the integrity remains during stockpiling for the purposes of successful rehabilitation. Protect the soil resources within the area in which the mine operates.	The integrity of the soils stockpiled must remain suitable for the purposes of rehabilitation. No disturbed areas should remain beyond the demarcated areas. 100% compliance to remain with approved footprint areas.	Soil Erosion and incorrect stockpiling of topsoil.	Appointment of an Independent Environmental Control Officer to assess compliance with the EMP. The SHEQ department should undertake ongoing site monitoring to determine whether activities on site are undertaken in accordance with the EMP Requirements. Erosion protection measures should be implemented and monitored on areas identified. Photographic records of assessments must be kept.	Independent ECO and SHEQ Department.	ECO: Monthly for the construction phase. Thereafter annual external audits can be undertaken. SHEQ: Weekly monitoring
		Direct impact: Soil compaction	The contractor will ensure that all activities, material and equipment						

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Development of roads to the King Silos. Should the King/Mokaning access road be used, a link of approximately 1.5km to this road will be required. Upgrades of roads to the Bruch Silos, may require an extension of approximately 450m to existing roads. **Construction of Silos and Magazines at Bruce:** Two magazine areas, an emulsion silo and an ammonium nitrate silo). This area will include all ancillary required infrastructure. **Construction of Silos and Magazines at King:** An emulsion silo and an ammonium nitrate silo). This area will include all ancillary required infrastructure. For the Bruce and King expansions combined a total storage of 195m3 (emulsion: 113m3)			storage and personnel movement take place within the designated area.						
			All contractors must receive induction.						
			Site clearance and activities should be restricted to the approved footprint. Contractor's areas should be established on already disturbed footprints.						
		Direct impact: Clearing vegetation will result in the exposure of soil, which may in turn lead to soil erosion.	Adhere to Storm water Management Plan.	Limit the loss of soils as far as possible and ensure that the integrity remains during stockpiling for the purposes of successful rehabilitation. Protect the soil resources within the area in which the mine operates.	The integrity of the soils stockpiled must remain suitable for the purposes of rehabilitation.	Soil Erosion and incorrect stockpiling of topsoil.	Appointment of an Independent Environmental Control Officer to assess compliance with the EMP. The SHEQ department should undertake ongoing site monitoring to determine whether activities on site are undertaken in accordance with the EMP Requirements. Erosion protection measures should be implemented and monitored on areas identified. Photographic records of assessments must be kept.	Independent ECO and SHEQ Department.	ECO: Monthly for the construction phase. Thereafter annual external audits can be undertaken. SHEQ: Weekly monitoring
			Ensure that all design drawings include effective erosion control measures.						
			Ensure the required erosion protection measures are monitored and corrected where necessary.						
			Natural vegetation establishment (self-succession) will be encouraged.						
			The mine will investigate an appropriate seed mix for the rehabilitation purposes should self-succession not establish on rehabilitated sites.						
			Areas of construction must be clearly demarcated.						
			No construction or project related activities may be undertaken outside of the demarcated areas.						
			Clean and dirty water systems must be established prior to construction.						
			Where vegetation cannot be established during the life of construction and operations, appropriate measure will be taken to control erosion. These will	Retaining soil integrity for rehabilitation.	Maintaining soil integrity, with successful vegetation establishment.	Soil Erosion and incorrect stockpiling of topsoil.	Appointment of an Independent Environmental Control Officer to assess compliance	Independent ECO and SHEQ Department.	ECO: Monthly for the construction phase. Thereafter

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ammonium nitrate: 82m3)			include grading of surfaces to prevent rapid run-off of storm water and / or the use of energy dissipaters. The mine will ensure that erosion controls are included in the designs of all linear infrastructure (access roads, conveyors or open channels) and points of water discharge.				with the EMP. The SHEQ department should undertake ongoing site monitoring to determine whether activities on site are undertaken in accordance with the EMP Requirements.		annual external audits can be undertaken. SHEQ: Weekly monitoring
	Terrestrial Ecology (Fauna & Flora)	Direct impact: Unplanned loss of floral and faunal species of conservation importance	Prior to the removal of plant species, an ecologist should investigate the site (if not already done) to record all species of importance and which should be removed under tree removal permits. All such species should be demarcated by signage or tape. Obtain tree removal permit prior to the removal of any protected species. The pipeline proposed between P2/P1 and A1 should be rerouted if practically possible to avoid the floodplain vegetation and rather be rerouted to run through the Vachellia mellifera thicket to the south of the current route as shown in Figure 20 where possible. The pending offset area should be finalised to contribute to the overall conservation of sensitive and red data species. All employees, or contractors on site should receive a detailed induction on the expectations for the protection of fauna and flora on site.	Limit the impact of the mining operation on the Ecological Setting of the area.	Offset area should be in place and efficiently operated for the intended purpose of conservation. No unlawful removal of flora of conservation importance should take place. Initiate rehabilitation of disturbed areas within one year of final activity. Successful self-succession to be achieved. Eradication of invasive species within the mining area footprint.	Limit the impact of the construction on the Ecological Setting of the area.	Appointment of an Independent Environmental Control Officer to assess compliance with the EMP. The SHEQ department should undertake ongoing site monitoring to determine whether activities on site are undertaken in accordance with the EMP Requirements.	Independent ECO and SHEQ Department.	ECO: Monthly for the construction phase. Thereafter annual external audits can be undertaken. SHEQ: Weekly monitoring

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			Weed eradication should be implemented on site.						
		Direct impact: Displacement of faunal species and human/animal conflict	A record of any animal fatalities should be kept on site. The reason for the fatality and action to avoid such in the future (if possible) should be stated.	Limit the impact of the mining operation on the Ecological Setting of the area.	Zero animal fatality rates should be achieved. No unlawful removal of flora of conservation importance should take place. Offset area should be in place and efficiently operated for the intended purpose of conservation.	Limit the impact of the construction on the Ecological Setting of the area.	Appointment of an Independent Environmental Control Officer to assess compliance with the EMP. The SHEQ department should undertake ongoing site monitoring to determine whether activities on site are undertaken in accordance with the EMP Requirements.	Independent ECO and SHEQ Department.	ECO: Monthly for the construction phase. Thereafter annual external audits can be undertaken. SHEQ: Weekly monitoring
			All employees, or contractors on site should receive a detailed induction on the expectations for the protection of fauna and flora on site.						
			Clearance of vegetation must be undertaken in such a manner as to provide sufficient time for animals to relocate.						
		Direct impact: Loss of ecological connectivity and ecosystem functioning. This will be specifically important around the King Silo and to the east of the Bruce Silo, as these areas will be located in the less disturbed areas within the mining area.	No construction or project related activities may be undertaken outside of the demarcated areas.	Limit the impact of the mining operation on the Ecological Setting of the area.	Zero animal fatality rates should be achieved.	Limit the impact of the construction on the Ecological Setting of the area.	Appointment of an Independent Environmental Control Officer to assess compliance with the EMP. The SHEQ department should undertake ongoing site monitoring to determine whether activities on site are undertaken in accordance with the EMP Requirements.	Independent ECO and SHEQ Department.	ECO: Monthly for the construction phase. Thereafter annual external audits can be undertaken. SHEQ: Weekly monitoring
			The construction area can be isolated by means of a chain link fence in order to prevent animals			Restriction of access.	The Project Manager should implement the	Project Manager	As part of the project design.

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			on local migrations entering the area and being killed.				necessary design concepts to limit the impact on the ecological connectivity and functioning of the ecosystem.		Prior to construction.
			In the establishment of fences, erect fences in such a manner as to limit the potential of animals to enter the plant and silo areas. This could involve the placement of rocks and materials at on the surface of the fences.						
		The disturbance of the cleared areas may allow the establishment of alien invasive vegetation. Increased prevalence of exotic invasive species: The fact that the area will be cleared for construction creates niches that can be colonised by exotic and/or invasive species. This is compounded by the fact that trucks and other heavy machinery often act as vectors for seeds of these species.	Weed eradication should be implemented on site.	Awareness creation on the importance of that natural ecosystem in which Khumani operates. Rehabilitation of disturbed areas with indigenous vegetation. Smallest possible area of disturbance philosophy.	Eradication of invasive species within the mining area footprint. Successful self-succession to be achieved. 100% compliance to remain with approved footprint areas. Initiate rehabilitation of disturbed areas within one year of final activity.	Invasion of Weeds and Alien Vegetation.	A weed eradication plan must be implemented on site in line with the current Khumani monitoring programme. This must be undertaken prior to the growing season.	SHEQ Department and a Specialised Ecologist.	Weed monitoring (monthly); Weed eradication (annually or as required); Ecological Study (Biodiversity Action Plan) (annually)
			Areas of construction must be clearly demarcated.						
			No construction or project related activities may be undertaken outside of the demarcated areas.						
		Disturbance of biodiversity due to vibration and noise: Vibration and noise will have a significant effect mainly on fauna species in the immediate vicinity of the development, due to the heavy machinery utilised. Vibration can affect a number of	Equipment will be well maintained to reduce excessive noise creation.	Limit the impact of the mining operation on the Ecological Setting of the area. Remain within the current ambient character of the site.	Remain within the regulated guidelines and limits as required by the Mine Health and Safety Act. Zero complaints from surrounding landowners regarding noise levels	Elevated Noise Levels.	Ambient noise monitoring should be undertaken in line with the current Khumani monitoring programme.	SHEQ Department.	Once a month (during the day and during the night). Night time only if activities take place beyond 18h00 in the evening.
			Activities will be restricted to the day time.						

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		subterranean fauna taxa, such as burrowing mammals, reptiles and arthropods. Vibration affects these animals by causing the collapsing of burrows, and causing these animals to leave the area due to the vibration. Noise will also affect a wide range of taxa including avifauna, mammals, reptiles, amphibians and arthropods. Avifauna, especially songbirds, and amphibians may find it difficult to find mates in areas of increased noise, mammals, reptiles and arthropods may find increased noise disturbing and therefore move away from the area							
		Habitat degradation due to dust: Increased dust will occur in all areas where vegetation is cleared. Dust will be caused by excavation, and construction. Dust in the area will be greatly increased due to the dry weather conditions and the nature of the soil in	Install air quality monitoring stations that determine fallout and respirable dust (PM10) concentrations that could arise from the mining activities.	Recording of dust fall out to determine trends.	Meeting ambient dust fall out limits in terms of applicable NEM:AQA Regulations.	Dust dispersion.	Dust dispersion will be monitored in line with the current Khumani dust monitoring programme	SHEQ Department.	Monthly Monitoring with Annual Reporting.

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		the area. Dust settling on plant material can reduce the amount of light reaching the chlorophyll in the leaves, thereby reducing photosynthesis, which in turn reduces plant productivity, growth and recruitment.							
		Effects on local migrations: Local migrations of fauna in the area may be affected by linear infrastructure, fences and buildings, due to these areas forming a barrier to migrating animals or reducing the chance of an animal surviving its migration due to collisions with vehicles on roads. This impact is likely to be low due to the greatly reduced wildlife in the area due to previous disturbances in the area causing a greatly reduced species. Furthermore, many of the roads are already in use. The study area is recognised as an ESA due to being a migratory route, this requires further investigation.	The construction area can be isolated by means of a chain link fence in order to prevent animals on local migrations entering the area and being killed.	Awareness creation on the importance of that natural ecosystem in which Khumani operates. Implementation of safe operation practices.	Zero animal fatality.	Biodiversity Character of the Site.	Annual Biodiversity Action Plans should be compiled.	Ecologist	Ecological Assessment to determine the migratory routes to be completed before end 2018.
			Conduct annual Biodiversity Action Plans and implement the required conditions.				Action Plans associated with the Biodiversity Action Plans should be implemented and audited.	SHEQ Department	Bi-annual internal audits of the action plans.
			The effect of roads on local migrations can be mitigated by the installation of culverts at regular intervals along the roads and the installation of drift fences towards the culverts , although these methods may not eliminate the mortalities among migrating animals, they should greatly reduce the number of animals killed on haul roads						Weekly monitoring of the location of activities on site.
			A clearly marked and enforced vehicle speed will be implemented on the internal mine and transportation routes.						Weekly monitoring of the establishment of vegetation around areas where construction

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									activities have been completed.
		Increased erosion: Increased erosion can eventually lead to the loss of vegetation and habitats for further species. Soils in the area are prone to erosion in areas where vegetation is cleared, this is further compounded by the fact that precipitation in the area occurs through heavy rainfall events in in the form of thundershowers in summer. Furthermore large areas will be cleared before construction leaving these areas prone to erosion.	Ensure the required erosion protection measures are monitored and corrected where necessary.	Limit the impact of the mining operation on the Ecological Setting of the area.	Maintaining soil integrity, with successful vegetation establishment.	Soil Erosion	Appointment of an Independent Environmental Control Officer to assess compliance with the EMP. The SHEQ department should undertake ongoing site monitoring to determine whether activities on site are undertaken in accordance with the EMP Requirements.	ECO and SHEQ Department	ECO: Monthly for the construction phase. Thereafter annual external audits can be undertaken. SHEQ: Weekly monitoring
			An erosion monitoring and mitigation plan should be put in place.	Retaining soil integrity for rehabilitation.					
	Wetland	Loss or Impact on NEFPA Sites	No activities are planned within 500m from any NEFPA sites. This restriction should be maintained.	Protect sensitive ecosystems.	Remain within the designated footprints at all times.	Location of approved activities.	Appointment of an Independent Environmental Control Officer to assess compliance with the EMP. The SHEQ department should undertake ongoing site monitoring to determine whether activities on site are undertaken in accordance with	ECO and SHEQ Department	ECO: Monthly for the construction phase. Thereafter annual external audits can be undertaken. SHEQ: Weekly monitoring

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							the EMP Requirements.		
	Hydrology	Direct impact: The removal of vegetation can lead to increased surface runoff, which may in turn alter natural surface water flows and increase siltation of watercourses as well as pollution control facilities.	Rehabilitate open areas as soon as practically possible. Self-succession should be encouraged. Limit the areas to be cleared to the demarcated sites.	Operate the water management circuit on site to increase mining efficiency and reduce the need for maintenance of these facilities.	Implement the SWMP on site.	Compliance in terms of the WUL and the SWMP; as well as Surface Water Contamination.	Annual compliance in terms of the designs of the facility and compliance in terms of the WUL must be undertaken. The water quality (constituents listed in the WUL) for Khumani must be monitored monthly and records must be kept of these result in a centralised system. Analysis of results must be undertaken by an accredited laboratory.	SHEQ Department and Hydrologist	Surface Water Monitoring in line with the current Khumani monitoring programme
	Geohydrology	No direct impact	-	-	-	-	-	-	-
	Heritage	No direct impact is foreseen in this area.	In the event that heritage artefacts or graves are encountered during the excavation activities, all activities must cease and the SAHRA should be contacted to determine the way forward before construction may continue.	Protect heritage resources for future generations.	Ensure that there is a 100% non-occurrence of impacts to heritage resources.	Presence of archaeological artefacts.	Training of all contractors and responsible parties must be undertaken to ensure that all parties are aware of the need to protect these resources and what to observe for. Daily inspections must be undertaken during the site	Engineering Department.	Daily

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							clearance and excavation phases.		
	Palaeontology	No direct impact is foreseen in this area.	In the unlikely event of fossil discovery within the Quaternary overburden during the operational phase of the development (i.e. modern-looking but more or less lithified animal bones and teeth), a professional palaeontologist must be called in immediately to confirm and record the finds. In the meantime, ex situ remains must be wrapped in paper towels or heavy duty tin foil and stored in a safe place. The material should not be washed or cleaned in any way. In situ material must be kept in place and protected from further damage by covering it with light but rigid object like a box, bucket or metal sheet until further confirmation by the palaeontologist.	Protect paleontological resources for future generations.	Ensure that there is a 100% non-occurrence of impacts to paleontological resources.	Presence of paleontological artefacts.	Training of all contractors and responsible parties must be undertaken to ensure that all parties are aware of the need to protect these resources and what to observe for. Daily inspections must be undertaken during the site clearance and excavation phases.	Engineering Department.	Daily
	Visual	Direct impact: soil stripping and footprint clearance	Stripping of vegetation and soils should be undertaken within the demarcated areas.	Retain the aesthetics of the area as far as practically possible.	Design and construction infrastructure to blend in with the general topography as far as practically possible. No encroachment outside of demarcated areas.	Demarcated areas.	The Project Manager should implement the necessary design concepts to limit the impact on the soil resources and ecological connectivity and functioning of the ecosystem.	Project Manager	As part of the project design. Prior to construction.
	Air Quality	Direct impact: Dust-fallout	Implement dust monitoring around construction sites.		Meeting ambient dust fall out limits in terms	Dust dispersion.	Dust dispersion will be monitored	SHEQ Department.	Dust monitoring to be done in

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			Strictly enforced speed limits on haul roads Dust suppression to be implemented as per the approved EMP	Recording of dust fall out to determine trends.	of applicable NEM:AQA Regulations.		as part of the overall mine dust monitoring programme.		line with the current Khumani monitoring programme
	Noise	The area is located within the mining area. Noise impacts are not considered to be significant but can occur during excavation and construction activities.	Equipment will be well maintained to reduce excessive noise creation. Activities will be restricted to the day time.	Remain with the required health and safety standards.	Remain within the regulated guidelines and limits as required by the Mine Health and Safety Act.		Adjacent landowners will be informed of the planned dates of the significant land clearance activities where applicable. Daily noise monitoring will be undertaken in the areas where high levels of noise take place.	SHEQ Department.	Ongoing consultation with surrounding landowners. Daily noise monitoring.
	Social	No direct impact	-	-	-	-	-	-	-
Activity 3 - Establishment of Surface Infrastructure Construction & widening of Roads: Development of roads to the King Silos. Should the King/Mokaning access road be used, a link of approximately 1.5km to this road will be required. Upgrades of roads to the Bruch Silos, may require an extension of approximately 450m to existing roads.	Geology	The establishment of the Low Grade Sorter Plant may result in the sterilisation of mineable reserves.	Exploration studies should be fast tracked in this area to determine whether future mining would be required in this area. In the event that this is required, the license holder should proactively apply for an amendment to the Low Grade ROM Sorter Plant authorisation.	Optimal mining of available resources should be pursued.	All activities should be undertaken under approved Environmental Authorisations. Profitable mining operations.	Optimal mining of mineral resources	The Mine Works Programme should be updated annually with all potential changes or amendments required.	Geological Department	Annually
							Meetings must be held between the Environmental, Engineering and Geological departments to ensure that all activities can be planned and scheduled in line with Environmental Legislation.	SHEQ, Engineering and Mining/Geology Department. At least monthly meetings are recommended.	At least Quarterly.

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Construction of Silos and Magazines at Bruce: Two magazine areas, an Emulsion Silo and Ammonium Nitrate Silo). This area will include all ancillary required infrastructure. **Construction of Silos and Magazines at King:** An Emulsion Silo and Ammonium Nitrate Silo). This area will include all ancillary required infrastructure. For the Bruce and King expansions combined a total storage of 195m3 (Emulsion: 113m3) Ammonium Nitrate: 82m3)	Topography	Direct impact: Alteration of topography	Demarcate footprint area clearly	Design facilities to blend into the existing site character as far as practically possible.	Maintain the aesthetics of the area.	Soil Erosion and incorrect stockpiling of topsoil.	Appointment of an Independent Environmental Control Officer to assess compliance with the EMP. The SHEQ department should undertake ongoing site monitoring to determine whether activities on site are undertaken in accordance with the EMP Requirements.	ECO and SHEQ Department	ECO: Monthly for the construction phase. Thereafter annual external audits can be undertaken. SHEQ: Weekly monitoring
	Soil, Land Use and Land Capability	Direct impact: Soil compaction	Activities should be restricted to the cleared areas and associated impacts as presented as part of Activity 1 and 2 above.	Limit the loss of soils as far as possible and ensure that the integrity remains during stockpiling for the purposes of successful rehabilitation.	The integrity of the soils stockpiled must remain suitable for the purposes of rehabilitation.	Soil Erosion and incorrect stockpiling of topsoil.	Appointment of an Independent Environmental Control Officer to assess compliance with the EMP. The SHEQ department should undertake ongoing site monitoring to determine whether activities on site are undertaken in accordance with the EMP Requirements. Erosion protection measures should be implemented and monitored on areas identified. Photographic	Independent ECO and SHEQ Department.	ECO: Monthly for the construction phase. Thereafter annual external audits can be undertaken. SHEQ: Weekly monitoring
		Direct impact: Construction activities with surrounding exposed soil may in turn lead to soil erosion.	Ensure that all design drawings include effective erosion control measures. Ensure the required erosion protection measures are monitored and corrected where necessary.						

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Activities	Impact Area		Mitigation Measures			Impacts Requiring Monitoring Programmes	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency
							records of assessments must be kept.		
			Natural vegetation establishment (self-succession) will be encouraged.	Retaining soil integrity for rehabilitation.		Soil Erosion and incorrect stockpiling of topsoil.	Appointment of an Independent Environmental Control Officer to assess compliance with the EMP. The SHEQ department should undertake ongoing site monitoring to determine whether activities on site are undertaken in accordance with the EMP Requirements.	Independent ECO and SHEQ Department.	ECO: Monthly for the construction phase. Thereafter annual external audits can be undertaken. SHEQ: Weekly monitoring
			The mine will investigate an appropriate seed mix for the rehabilitation purposes should self-succession not establish on rehabilitated sites.			Soil integrity analysis.	Assessment of the fertility of Soils	Soil Scientist.	Prior to placement of soils.
			Areas of construction must be clearly demarcated. No construction or project related activities may be undertaken outside of the demarcated areas.						
			Clean and dirty water systems must be established prior to construction.						
			Where vegetation cannot be established during the life of construction and operations, appropriate measure will be taken to control erosion. These will include grading of surfaces to prevent rapid run-off of storm water and / or the use of energy dissipaters.			Vegetation Establishment.	The success of self-succession of vegetation.	SHEQ Department	Monthly

Name of Activity	Impact Area	Potential Impacts	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Monitoring Requirements			
Activities	Impact Area		Mitigation Measures			Impacts Requiring Monitoring Programmes	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency
	Terrestrial Ecology (Fauna & Flora)	All impacts assessed under Activity 1 - Footprint clearance	-	-	-	-	-	-	-
	Wetland	All impacts assessed under Activity 1 - Footprint clearance	-	-	-	-	-	-	-
	Hydrology	Direct impact: The removal of vegetation as part of the previous Activities 1 & 2 can lead to increased surface runoff, which may in turn alter natural surface water flows and increase siltation of watercourses as well as pollution control facilities.	Limit the areas to be where construction is undertaken to the demarcated sites. Clean and dirty systems should be included at all new activities. For the Silos, all dirty water should be contained, and routed to a sump for evaporation. For the Plant area, the runoff water to the north will follow to the existing PCD on site, the water to the west will run towards the Low Grade ROM Stockpile, from where it will evaporate. Maintain clean and dirty water system.	Operate the water management circuit on site to increase mining efficiency and reduce the need for maintenance of these facilities.	Implement the SWMP on site.	Compliance in terms of the WUL and the SWMP; as well as Surface Water Contamination.	Annual compliance in terms of the designs of the facility and compliance in terms of the WUL must be undertaken. The water quality (constituents listed in the WUL) for Khumani must be monitored monthly and records must be kept of these result in a centralised system. Analysis of results must be undertaken by an accredited laboratory.	SHEQ Department and Hydrologist	Surface Water Monitoring in line with the current Khumani monitoring programme
	Geohydrology	No direct impact	-	-	-	-	-	-	-
	Heritage	No direct impact	-	-	-	-	-	-	-
	Palaeontology	No direct impact	-	-	-	-	-	-	-
	Visual	No direct impact	-	-	-	-	-	-	-
	Air Quality	Direct impact: Dust-fallout	Implement dust monitoring around construction sites. Strictly enforced speed limits on haul roads Dust suppression to be implemented as per the approved EMP	Recording of dust fall out to determine trends.	Meeting ambient dust fall out limits in terms of applicable NEM:AQA Regulations.	Dust dispersion.	Dust dispersion will be monitored as part of the overall mine dust monitoring programme.	SHEQ Department.	Dust monitoring to be done in line with the current Khumani monitoring programme

Name of Activity	Impact Area	Potential Impacts	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Monitoring Requirements			
Activities	Impact Area		Mitigation Measures			Impacts Requiring Monitoring Programmes	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency
	Noise	Direct impact: Construction activities will increase the ambient noise levels in the area. This is however only temporary.	Vehicles will be equipped with mufflers where practical to reduce the emission of noise. Where noise becomes a nuisance management measures will be investigated and implemented to address these. Construction activities will be limited to the hours of 7h00 to 18h00 weekdays. Equipment will be well maintained to reduce excessive noise creation.	Remain within the designated area demarcated for activities. Remain within the National Environmental Management: Air Quality Act, 2004 Dust Regulation guidelines for rural communities.	Where noise becomes a nuisance, management measures will be investigated and implemented to address these.	Noise Monitoring.	Adjacent landowners will be informed of the planned dates of the significant land clearance activities where applicable. Daily noise monitoring will be undertaken in the areas where high levels of noise take place.	SHEQ Department.	Khumani will continue with ongoing stakeholder communication.
	Social	No direct impact	-	-	-	-	-	-	-
Activity 4: Waste Management Hydrocarbon spills within the Mining Area	Groundwater	Large scale hydrocarbon spills could be present at the mining area	Clean and Dirty water separation systems should be incorporated in terms of the 2016 SWMP. No activities associated with hydrocarbons and/or chemicals may be undertaken outside of an effectively designed and contained area. All used oils must be removed from site by a licensed company and disposed of at a suitably licensed site. Any spills occurring during the collection process must be cleaned up immediately. Any significant spills must be captured in the incident reports and must be reported to the relevant department (NCDENC, WUA, CMA, and DWS). A clean up procedure (i.e. Works Instruction) must be in place.	Protect the groundwater resources to ensure that limited to no impact on groundwater resources occur as a result of the mining operations.	Achieve 100% compliance to the water quality objectives as agreed to between the mine and the DWS based on the discussions within this IWWMP. Implement the SWMP on site. Maintain a 100% no-spill record. Clean spills, if occur witan 24 hours.	Groundwater Pollution and potential trends & Soil Assessments.	To ensure a proactive approach, the SHEQ department should undertake ongoing site monitoring to determine whether activities on site are undertaken in accordance with the EMP Requirements. The groundwater quality (constituents listed in the WUL) must be monitored monthly and records must be kept of these result in a centralised system. Analysis of results must be	SHEQ Department	Assessments: Weekly. Monitoring: Quarterly

Name of Activity	Impact Area	Potential Impacts	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Monitoring Requirements			
Activities	Impact Area		Mitigation Measures			Impacts Requiring Monitoring Programmes	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency
							undertaken by an accredited laboratory		
	Soils	Contamination of soil resources due to hydrocarbon spills.	Storage of fuels and oils, the refuelling of vehicles and equipment maintenance must be limited to designated, bunded (bunds to be 110% of volume of the materials stored) areas.	Protecting of soil integrity.	Zero presence of contaminated land due to early detection and implementation of actions.	Soil Pollution	The SHEQ department should undertake ongoing site monitoring to determine whether activities on site are undertaken in accordance with the EMP Requirements. This should be undertaken by means of a thorough site visit, record keeping of findings in a checklist format, issuing of non-conformances to responsible parties, listing thereof on the Isometrics or similar reporting system and feedback to the management team.	SHEQ Department	ECO: Annual external audits can be undertaken. SHEQ: Weekly monitoring
			All fuels and soils must be stored in appropriate containers.						
			Chemicals and hazardous material must be stored in suitable containers, fit for purpose and in line with SDS requirements.						
			Where drip trays are too small, specially prepared, non-pervious bunds with solution trenches must be used to capture spillages						
			Oils and potentially hazardous materials must be disposed of at a licensed facility and waste certificates obtained.						
			A spill kit must be provided to be used in the event of a spill.	Awareness creation on site regarding duty of care and waste management.			Induction with the view on creating environmental awareness.	SHEQ Department	Annually for permanent staff. Start of each visit for contractors.
			If a spill occurs, the contaminated soil must be removed immediately. Contaminated soil must be stored according to best practices until it can be disposed of at a suitably licensed facility.						

Name of Activity	Impact Area	Potential Impacts	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Monitoring Requirements			
Activities	Impact Area		Mitigation Measures			Impacts Requiring Monitoring Programmes	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency
			Safety signage must be used at designated storage areas.						
			All workers must undergo an induction which includes environmental awareness training to make them aware of the environmental incident management procedures as well as the importance of complying with management measures.						
		Contamination of surface water resources. There are no surface water resources in the area, however, the natural runoff, which must be managed internally on site could become impacted	Clean and Dirty water separation systems should be incorporated in terms of the 2016 SWMP.	Operate the water management circuit on site to increase mining efficiency and reduce the need for maintenance of these facilities.	Implement the SWMP on site.	Surface Water Pollution.	The water quality (constituents listed in the WUL) of the dam must be monitored monthly and records must be kept of these result in a centralised system. Analysis of results must be undertaken by an accredited laboratory.	SHEQ Department	Monthly
			Vehicles/machinery will be regularly monitored and maintained. Maintenance programmes will be established and implemented.						
			All used oils must be removed from site by a licensed company and disposed of at a suitably licensed site						
			Any spills occurring during the collection process must be cleaned up immediately.		Maintain a 100% no-spill record.				
			Soil that has been contaminated by spillages, seepages and leachates will be sampled and analysed. If necessary, the soils will be treated, ameliorated or removed for safe disposal.						
			Any significant spills must be captured in the incident reports and must be reported to the relevant department (NCDENC, WUA, CMA, and DWS). In this event a remediation strategy should be developed and enforced.		Clean spills, if occur witan 24 hours.				
			A clean up procedure (i.e. Works Instruction) must be in place.						

Name of Activity	Impact Area	Potential Impacts	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Monitoring Requirements			
Activities	Impact Area		Mitigation Measures			Impacts Requiring Monitoring Programmes	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency
Activity 4: Waste Management Waste Handling	Groundwater	Handling or Hazardous Waste within workshops and general mine area.	Clean and Dirty water separation systems should be incorporated in terms of the 2016 SWMP.	Protect the groundwater resources to ensure that limited to no impact on groundwater resources occur as a result of the mining operations.	Achieve 100% compliance to the water quality objectives as agreed to between the mine and the DWS based on the discussions within this IWWMP.	Groundwater Pollution and potential trends & Soil Assessments.	To ensure a proactive approach, the SHEQ department should undertake ongoing site monitoring to determine whether activities on site are undertaken in accordance with the EMP Requirements. The groundwater quality (constituents listed in the WUL) must be monitored monthly and records must be kept of these result in a centralised system. Analysis of results must be undertaken by an accredited laboratory	SHEQ Department	Assessments: Weekly. Monitoring: Quarterly
			Waste management training must be implemented on site.						
			Clear signs informing staff of waste management practices must be implemented on site.		Maintain a 100% safe disposal record on the disposal of hazardous waste.				
			Hazardous waste handling should only take place within bunded and/or lined areas, with a capacity of at least 110% of the volume stored.						
			Hazardous waste should be removed by a licenced removal company and taken to a suitable and licenced landfill site.						
			Documentation of removal and safe disposal must be available on site.						
		Handling and Storing of Domestic Waste	Clean and Dirty water separation systems should be incorporated in terms of the 2016 SWMP.		Achieve 100% compliance to the water quality objectives as agreed to between the mine and the DWS based on the discussions within this IWWMP.				
			Waste management training must be implemented on site.						
			Clear signs informing staff of waste management practices must be implemented on site.		Maintain a 100% compliance with the conditions of the ECA permit for the landfill site.				
			The landfill site at Khumani must be operated in line with the Environmental Authorisation requirements and conditions.						
			This landfill site, may only be utilised for domestic and general waste, no industrial or hazardous waste will be dumped on this site.						

Name of Activity	Impact Area	Potential Impacts	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Monitoring Requirements			
Activities	Impact Area		Mitigation Measures			Impacts Requiring Monitoring Programmes	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency
			Recycling practices must be investigated and implemented on site.		Maintain a 100% accurate recording of waste and submission of such recording to the Department.				
			Ongoing rehabilitation of the landfill site must be undertaken, by covering and shaping the facility regularly.						
			Groundwater monitoring must be undertaken in such a manner as to ensure that any potential impacts from the landfill site can be detected.		Maintain daily covering of the landfill site.				
	Ecology	The unmanaged disposal of waste, could result in the spread of invader species, as well as the influx of opportunistic species.	Develop dedicated waste handling areas; prevent access to rodents and opportunistic species; prevent the spread of waste.	Proper waste management practices on site.	No unlawful disposal of waste. Registration of all waste handling and/or storage areas on site.	Ongoing Rehabilitation	An operational rehabilitation plan must be implemented and audited by the SHEQ department	SHEQ Department	Audit: Monthly Updated: Annually
			Develop dedicated waste handling areas, fit for purpose and prevent the spread of waste.						
	Surface Water	Handling of Hazardous Waste within workshops and general mine area could contaminate the dirty water storage areas. The water is then reused in the system and could have impacts on the integrity of the storm water system and also the production.	Clean and Dirty water separation systems should be incorporated in terms of the 2016 SWMP.	Protect the integrity of the Storm Water Management System.	Implement the SWMP on site.	Surface Water Pollution & Soil Assessments.	To ensure a proactive approach, the SHEQ department should undertake ongoing site monitoring to determine whether activities on site are undertaken in accordance with the EMP Requirements. The water quality (constituents listed in the WUL) of the dam must be monitored monthly and records must be	SHEQ Department	Assessments: Weekly. Monitoring: Monthly
			A detailed waste management strategy will be established and implemented, which will clearly demarcate the containments for different waste streams.						
			Waste management training must be implemented on site.		Maintain a 100% no-spill record.				
			Clear signs informing staff of waste management practices must be implemented on site.		Clean spills, if occur witan 24 hours.				
			Hazardous waste handling should only take place within bunded and/or lined areas.		Maintain a 100% safe disposal record on the disposal of hazardous waste.				
			Hazardous waste should be removed by a licenced removal company and taken to a suitable and licenced landfill site.		Provide training to all staff on best practices regarding waste				

Name of Activity	Impact Area	Potential Impacts	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Monitoring Requirements			
Activities	Impact Area		Mitigation Measures			Impacts Requiring Monitoring Programmes	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency
			Documentation of removal and safe disposal must be available on site.		management every year.		kept of these result in a centralised system. Analysis of results must be undertaken by an accredited laboratory.		
			The mine will adopt a cradle-to grave approach to ensure that the waste is removed and disposed of in a legally compliant manner.						
			Weekly inspections of Storm Water Management Systems must be undertaken. Any blockages or maintenance requirements must be documented and an action plan developed.						
		Handling and Storing of Domestic Waste should have no impact on the surface water resources due to the location of the facility. However, incorrect disposal of waste could hamper the integrity of the storm water system.	Clean and Dirty water separation systems should be incorporated in terms of the 2016 SWMP.		Maintain a 100% compliance with the conditions of the ECA permit for the landfill site.				
			Waste management training must be implemented on site.						
			Weekly inspections of Storm Water Management Systems must be undertaken. Any blockages or maintenance requirements must be documented and an action plan developed.						
			Clear signs informing staff of waste management practices must be implemented on site.						
			The landfill site at Khumani must be operated in line with the Environmental Authorisation requirements and conditions.						
			Access control must be strictly enforced.		Maintain daily covering of the landfill site.				
			The berm around upstream of the facility must be maintained.						
			Recycling practices must be investigated and implemented on site.						
			Ongoing rehabilitation of the landfill site must be undertaken, by covering and shaping the facility.						

Name of Activity	Impact Area	Potential Impacts	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Monitoring Requirements			
Activities	Impact Area		Mitigation Measures			Impacts Requiring Monitoring Programmes	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency
			Groundwater monitoring must be undertaken in such a manner as to ensure that any potential impacts from the landfill site can be detected.						

Table 29: Monitoring Compliance during Operational Phase

Name of Activity	Impact Area	Potential Impacts	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Monitoring Requirements			
Activities	Impact Area		Mitigation Measures			Impacts Requiring Monitoring Programmes	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency
Activity 1 - Operation of low grade sorter plant, silos and magazines	Geology	The establishment of the Low Grade Sorter Plant may result in the sterilisation of mineable reserves.	Exploration studies should be fast tracked in this area to determine whether future mining would be required in this area. In the event that this is required, the license holder should proactively apply for an amendment to the Low Grade ROM Sorter Plant authorisation.	Optimal mining of available resources should be pursued.	All activities should be undertaken under approved Environmental Authorisations.	Optimal mining of mineral resources	The Mine Works Programme should be updated annually with all potential changes or amendments required.	Geological Department	Annually
							Meetings must be held between the Environmental, Engineering and Geological departments to ensure that all activities can be planned and scheduled in line with Environmental Legislation.	SHEQ, Engineering and Mining/Geology Department. At least monthly meetings are recommended.	At least Quarterly.
	Topography	No direct impact	-	-	-	-	-	-	-
	Soil, Land Use and Land Capability	Spills around the silos may result in the contamination of soils.	Any emulsion or other contaminants should be collected and the soils remediated immediately.	Protecting of soil integrity.	Zero presence of contaminated land due to early detection and implementation of actions.	Soil Pollution	Appointment of an Independent Environmental Control Officer to assess compliance with the EMP. The SHEQ department should undertake ongoing site monitoring to determine whether activities on site are undertaken in accordance with the EMP Requirements.	SHEQ Department	Annual External Audit. Daily internal inspections. Recording of incidents when occurring.

Name of Activity	Impact Area	Potential Impacts	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Monitoring Requirements			
Activities	Impact Area		Mitigation Measures			Impacts Requiring Monitoring Programmes	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency
							This should be undertaken by means of a thorough site visit, record keeping of findings in a checklist format, issuing of non-conformances to responsible parties, listing thereof on the Isometrics or similar reporting system and feedback to the management team.		
	Ecology	Presence of invader species could impact on the natural succession of vegetation on the slopes of WRDs.	A weed eradication programme will be developed and implemented to eradicate weeds and invader plants and to prevent new invasions during the ongoing mining operation.	Awareness creation on the importance of that natural ecosystem in which Khumani operates. Rehabilitation of disturbed areas with indigenous vegetation. Smallest possible area of disturbance philosophy.	Eradication of invasive species within the mining area footprint. Successful self-succession to be achieved. 100% compliance to remain with approved footprint areas. Initiate rehabilitation of disturbed areas within one year of final activity.	Invasion of Weeds and Alien Vegetation.	A weed eradication plan must be implemented on site. This must be undertaken prior to the growing season. An ecological study should be undertaken to determine the status of revegetation on the site especially around the rehabilitated areas.	SHEQ Department and a Specialised Ecologist.	Weed monitoring (monthly); Weed eradication (annually or as required); Ecological Study (annually)
			Where self-succession does not establish, harvested seeds and plants must be used in concurrent rehabilitation for any areas along the area which may be affected.						
			Compile list of protected and Red Data species, compile relocation programme.						
			All employees must undergo an induction prior to construction where they will be made aware of the footprint, prohibited areas and the importance of compliance with management measures, as well as potential penalties for noncompliance.						
			No open fires must be allowed.						Monthly

Name of Activity	Impact Area	Potential Impacts	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Monitoring Requirements			
Activities	Impact Area		Mitigation Measures			Impacts Requiring Monitoring Programmes	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency
			Vegetation clearance must be limited to within the footprint area A weed eradication programme must be implemented on site and enforced. This programme must stipulate the monitoring plan, which should include: capturing of areas where invader species are present; action plan to remove these; % successful removal).				An operational rehabilitation plan must be implemented and audited by the SHEQ department.	SHEQ Department	
	Wetland	No direct impact	-	-	-	-	-	-	-
	Hydrology	Risk of surface water contamination as a result of plant and silo a related activities.	Clean and dirty systems should be included at all new activities. For the Silos, all dirty water should be contained, and routed to a sump for evaporation. For the Plant area, the runoff water to the north will follow to the existing PCD on site, the water to the west will run towards the Low Grade ROM Stockpile, from where it will evaporate.	Operate the water management circuit on site to increase mining efficiency and reduce the need for maintenance of these facilities.	Implement the SWMP on site.	Compliance in terms of GN704 and the SWMP.	Annual compliance in terms of the designs of the facility and compliance in terms of GN704 must be undertaken.	SHEQ Department and Hydrologist (for the GN704 Compliance)	Surface Water Monitoring: Monthly. GN704 Compliance: Annually
		Exposed soils will be susceptible to soil erosion.	The Storm Water Management Plan as per the 2016 WULA will be implemented on site.	The establishment of a free draining area.	No presence of erosion gulley's. Effective implementation of storm water management measures.	Implement the SWMP on site.	Appointment of an Independent Environmental Control Officer to assess compliance with the EMP. The SHEQ department should undertake ongoing site monitoring to determine whether activities on site are undertaken in accordance with the EMP and SWMP Requirements.	ECO: Monthly for the construction phase. Thereafter annual external audits can be undertaken. SHEQ: Weekly monitoring	ECO: Annual external audits can be undertaken. SHEQ: Weekly monitoring
		Discharge of contaminated water	The existing storm water dam to the west of the proposed plant should	Conservation of water on site.	Zero release of dirty water from site.	Compliance in terms of GN704	Appointment of an Independent	ECO: Monthly for the	ECO: Annual external audits

Name of Activity	Impact Area	Potential Impacts	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Monitoring Requirements			
Activities	Impact Area		Mitigation Measures			Impacts Requiring Monitoring Programmes	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency
		during maintenance and shutdown practices.	be utilised to contained water during maintenance and shutdown procedures to reduce the presence of dirty water ponding in these areas during these times. The storm water runoff on the south, south-east and north, will naturally gravitate towards the Low Grade Stockpile J. This stockpile will therefore serve as a constructed berm to contain dirty water. Paddocks must be constructed downgradient of all stockpiles (low grade ROM stockpiles) on site to contain any seep from these facilities according to the approved EMPs.		Reuse of dirty water within the plant area to reduce the input of clean water into the process. Operate dams (process dams) with a 0.8m freeboard 100% of the year.	and the SWMP; as well as Surface Water Contamination. Groundwater Pollution and potential trends.	Environmental Control Officer to assess compliance with the EMP. The SHEQ department should undertake ongoing site monitoring to determine whether activities on site are undertaken in accordance with the EMP and SWMP Requirements.	construction phase. Thereafter annual external audits can be undertaken. SHEQ: Weekly monitoring	can be undertaken. SHEQ: Weekly monitoring
			A detailed water conservation and demand management plan should be developed to optimise water reuse in the plant circuit.				The water quality (constituents listed in the WUL) of the surface water resources must be monitored monthly and records must be kept of these result in a centralised system. Analysis of results must be undertaken by an accredited laboratory.	SHEQ Department	Monthly
			The capacities of the water containment infrastructure (clarifier, Thickener, etc.) should be revisited and managed to ensure that a freeboard of 0.8m can be maintained.				The groundwater quality (constituents listed in the WUL) must be monitored	SHEQ Department	Quarterly

Name of Activity	Impact Area	Potential Impacts	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Monitoring Requirements			
Activities	Impact Area		Mitigation Measures			Impacts Requiring Monitoring Programmes	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency
							monthly and records must be kept of these result in a centralised system. Analysis of results must be undertaken by an accredited laboratory		
			Ensure that fuels, lubricants and chemicals for use in the operational areas are stored in properly bunded and protected areas.				Annual compliance in terms of the designs of the facility and compliance in terms of GN704 must be undertaken.	Independent Specialist (Hydrologist)	Annually
	Air Quality	The use of unsurfaced roads, plant crushing equipment, presence of stockpiles and the transfer points at conveyors may lead to an increase of dust emissions in the area.	Install air quality monitoring stations that determine fallout and respirable dust (PM10) concentrations that could arise from the mining activities.	Reducing dust emissions on site.	Zero complaints from surrounding landowners regarding dust.	Dust dispersion.	Dust dispersion will be monitored as part of the overall mine dust monitoring programme.	SHEQ Department.	Monthly Monitoring with Annual Reporting.
			Dust extraction systems comprising of wet scrubbers will be installed at the secondary and tertiary crushing and screening plants. For crushing and screening operations at metallic mineral processing plants, fugitive dust can be controlled with wet scrubbers or baghouses. Chemical dust suppression systems will be implemented at the primary crushing and screening plants.		Meeting ambient dust fall out limits in terms of applicable NEM:AQA Regulations.				
			Tarpaulins will be placed over all vehicles transporting product.		Recording of dust fall out to determine trends.				
	Noise	Increase in noise levels in and around the plant areas.	Machinery and vehicles will be well maintained to prevent excessive nose and to comply with national and provincial regulations.	Protect the ambiance of the area, as well as maintain good relationships with	Meeting noise limit requirements in terms of the Mine Health and Safety Act.	Elevated Noise Levels.	Ambient noise monitoring should be undertaken.	SHEQ Department	Monthly (during the day and during the night). Night

Name of Activity	Impact Area	Potential Impacts	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Monitoring Requirements			
Activities	Impact Area		Mitigation Measures			Impacts Requiring Monitoring Programmes	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency
			Implement a noise monitoring network.	surrounding land users.					monitoring only when activities extent beyond 18h00.
			Implemented operational controls on equipment used in the workshops, plant and buildings to reduce noise levels where required.				Khumani will continue with ongoing stakeholder communication.	SHEQ Department	Biannual Meetings (at least)
	Geohydrology	Handling of ROM, Emulsions, and hydrocarbons may lead to contaminated water ponding on site.	Clean and Dirty water separation systems should be incorporated in terms of the 2016 SWMP.	Protect the groundwater resources to ensure that limited to no impact on groundwater resources occur as a result of the mining operations.	Achieve 100% compliance to the water quality objectives as agreed to between the mine and the DWS based on the discussions within the IWWMP.	Groundwater Pollution and potential trends & Soil Assessments.	To ensure a proactive approach, the SHEQ department should undertake ongoing site monitoring to determine whether activities on site are undertaken in accordance with the EMP Requirements. The groundwater quality (constituents listed in the WUL) must be monitored monthly and records must be kept of these result in a centralised system. Analysis of results must be undertaken by an accredited laboratory	SHEQ Department	Assessments: Weekly. Monitoring: Quarterly
			No activities associated with hydrocarbons and/or chemicals may be undertaken outside of an effectively designed and contained area.						
			A dedicated area for the placement of waste skips must be determined prior to construction activities. Waste will be temporarily stored in the dedicated area until it is collected and disposed of at the approved Khumani waste disposal area. All used oils must be removed from site by a licensed company and disposed of at a suitably licensed site.						
			Any spills occurring during the collection process must be cleaned up immediately.		Implement the SWMP on site.				
			Any significant spills must be captured in the incident reports and must be reported to the relevant department (NCDENC, WUA, CMA, and DWS).		Zero presence of contaminated land due to early detection and implementation of actions.				
			A clean up procedure (i.e. Works Instruction) must be in place.		Clean spills, within 24 hours.				
		Managing the existing King PCD and Bruce PCD on site.	All dirty water must be contained in fit for purpose designed tanks or in lined dams.	Protect the groundwater resources to ensure	Operate dirty water dams to have no seepage.	Groundwater Pollution and potential trends.	The groundwater quality (constituents	SHEQ Department	Quarterly

Name of Activity	Impact Area	Potential Impacts	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Monitoring Requirements			
Activities	Impact Area		Mitigation Measures			Impacts Requiring Monitoring Programmes	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency
			These facilities must be inspected regularly and replaced if indications exists of leaks.	that limited to no impact on groundwater resources occur as a result of the mining operations.			listed in the WUL) must be monitored monthly and records must be kept of these result in a centralised system. Analysis of results must be undertaken by an accredited laboratory		
			Where leaks or seepage is found, these must be inspected and fixed as soon as found.						
			The water balance must be updated annually, with a strong focus on improving the management of the internal water circuit on site.		Maintain an updated record sheet of dam level readings.				
			The water circuit must be managed at one central location to ensure that there is integration between the plant, and general surface water needs and requirements.		Upon suspecting that a dam may be leaking, report such potential leak to the SHERQ department within 4 hours.				
			Upstream and downstream monitoring boreholes must be available to monitor groundwater quality and to detect potential leaks from these facilities.						
			The groundwater monitoring programme must be implemented and undertaken in accordance to the approved WUL.		Develop an action plan within 12 hours from reporting.				
	Heritage	No significant impacts are envisaged during the operational phase. The proposed development will be located within existing mining operations.	-	-	-	-	-	-	-
	Palaeontology	No significant impacts are envisaged during the operational phase. The proposed development will be located within existing mining operations.	-	-	-	-	-	-	-
	Visual	No significant impacts are envisaged during the operational phase.	-	-	-	-	-	-	-

Name of Activity	Impact Area	Potential Impacts	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Monitoring Requirements			
Activities	Impact Area		Mitigation Measures			Impacts Requiring Monitoring Programmes	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency
		The proposed development will be located within existing mining operations.							
	Social	No significant impacts are envisaged during the operational phase. The proposed development will be within existing mining operations.	-	-	-	-	-	-	-
Activity 2 - Stockpiling ROM and low grade material within the silo footprint area	Geology	The establishment of the Low Grade Sorter Plant may result in the sterilisation of mineable reserves.	Exploration studies should be fast tracked in this area to determine whether future mining would be required in this area. In the event that this is required, the license holder should proactively apply for an amendment to the Low Grade ROM Sorter Plant authorisation.	Optimal mining of available resources should be pursued.	All activities should be undertaken under approved Environmental Authorisations.	Optimal mining of mineral resources	The Mine Works Programme should be updated annually with all potential changes or amendments required.	Geological Department	Annually
							Meetings must be held between the Environmental, Engineering and Geological departments to ensure that all activities can be planned and scheduled in line with Environmental Legislation.	SHEQ, Engineering and Mining/Geology Department. At least monthly meetings are recommended.	At least Quarterly.
	Topography	The stockpiling of material will impact on the micro and macro topography due to the establishment of the stockpiles.	Stockpiles will only be placed within the designated mine area boundaries.	Operating within approved EMP conditions and footprints.	All ROM Stockpiles and Product stockpiles to be removed at the end of LOM.	Ongoing rehabilitation.	An operational rehabilitation plan must be implemented and audited by the SHEQ department.	SHEQ Department	Audit: Monthly Updated: Annually
	Soil, Land Use and Land Capability	No additional impacts are envisaged during the operational phase,	-	-	-	-	-	-	-

Name of Activity	Impact Area	Potential Impacts	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Monitoring Requirements			
Activities	Impact Area		Mitigation Measures			Impacts Requiring Monitoring Programmes	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency
		which has not been addressed as part of Activity 1. The proposed development will be located within existing mining operations.							
	Terrestrial Ecology (Fauna & Flora)	No additional impacts are envisaged during the operational phase. The proposed development will be located within existing mining operations.	-	-	-	-	-	-	-
	Wetland	No direct impact	-	-	-	-	-	-	-
	Hydrology	Runoff from stockpiles due to rainfall could cause seepage which may impact on the clean water resources.	Clean and dirty systems should be included at all new activities. For the Silos, all dirty water should be contained, and routed to a sump for evaporation. For the Plant area, the runoff water to the north will follow to the existing PCD on site, the water to the west will run towards the Low Grade ROM Stockpile, from where it will evaporate. All water management systems to conform to the GN704 requirements (note that the 1999 Regulations are in the process of being amended).	Understanding the impact of the mining activities on water resources.	Optimal operation and maintenance of clean and dirty water system will be conducted.	Clean and dirty water separation	Appointment of an Independent Environmental Control Officer to assess compliance with the EMP. The SHEQ department should undertake ongoing site monitoring to determine whether activities on site are undertaken in accordance with the EMP Requirements. This should be undertaken by means of a thorough site visit, record keeping of findings in a checklist format, issuing of non-conformances to	Independent ECO, Hydrologist and SHEQ Department.	ECO: Annual external audits can be undertaken. Annual GN704 audits to be undertaken. SHEQ: Weekly monitoring

Name of Activity	Impact Area	Potential Impacts	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Monitoring Requirements			
Activities	Impact Area		Mitigation Measures			Impacts Requiring Monitoring Programmes	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency
							responsible parties, listing thereof on the Isometrics or similar reporting system and feedback to the management team.		
	Geohydrology	Impacts on the groundwater regime as a result of infiltration.	Clean water needs to be kept away from the stockpiling area to minimise water infiltrating from the site. Keep stockpiles as small as possible, to minimise their footprint. No additional Waste Rock Dumps with the exception of those already approved on site will be constructed as part of this project.	Protect the groundwater resources to ensure that limited to no impact on groundwater resources occur as a result of the mining operations.	Meet the water quality requirements as stipulated in the WUL.	Groundwater Pollution and potential trends.	The groundwater quality (constituents listed in the WUL) must be monitored monthly and records must be kept of these result in a centralised system. Analysis of results must be undertaken by an accredited laboratory	SHEQ Department	Groundwater monitoring to be conducted in line with current Khumani monitoring programme
	Heritage	No direct impact	-	-	-	-	-	-	-
	Palaeontology	No direct impact	-	-	-	-	-	-	-
	Visual	No direct impact	-	-	-	-	-	-	-
	Air Quality	The use of unsurfaced roads, plant crushing equipment, presence of stockpiles and the transfer points at conveyors may lead to an increase of dust emissions in the area.	Install air quality monitoring stations that determine fallout and respirable dust (PM10) concentrations that could arise from the mining activities. Tarpaulins will be placed over all vehicles transporting product.	Reducing dust emissions on site.	Zero complaints from surrounding landowners regarding dust. Recording of dust fall out to determine trends.	Dust dispersion.	Dust dispersion will be monitored in line with the current Khumani monitoring programme	SHEQ Department.	Dust monitoring to be conducted in line with current Khumani monitoring programme
	Noise	No significant impacts are envisaged during the operational phase.	-	-	-	-	-	-	-
	Social	No direct impact	-	-	-	-	-	-	-

Name of Activity	Impact Area	Potential Impacts	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Monitoring Requirements			
Activities	Impact Area		Mitigation Measures			Impacts Requiring Monitoring Programmes	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency
Activity 3: Operation of the Infrastructure Transportation (Conveyors, Rail, Haul Roads and Access Roads) New roads to the King Silos (approximately 1.5km, of which 800m will amount to new clearing) and upgrades of roads to the Bruch Silos (approximately 500m).	Soil	Contamination of Soil due to hydrocarbon spills	Vehicles and Machinery will be regularly maintained. Maintenance programmes will be established and implemented.	Protecting of soil integrity.	Zero presence of contaminated land due to early detection and implementation of actions.	Soil Pollution	Appointment of an Independent Environmental Control Officer to assess compliance with the EMP. The SHEQ department should undertake ongoing site monitoring to determine whether activities on site are undertaken in accordance with the EMP Requirements. This should be undertaken by means of a thorough site visit, record keeping of findings in a checklist format, issuing of non-conformances to responsible parties, listing thereof on the Isometrics or similar reporting system and feedback to the management team.	SHEQ Department	Annual External Audit. Daily internal inspections. Recording of incidents when occurring.
			All refuelling of vehicles and equipment maintenance must be done within designated bunded areas.				An operational rehabilitation plan must be implemented and audited by the		Monthly

Name of Activity	Impact Area	Potential Impacts	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Monitoring Requirements			
Activities	Impact Area		Mitigation Measures			Impacts Requiring Monitoring Programmes	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency
			If necessary, the polluted soils will be remediated and affected areas rehabilitated.				SHEQ department.		
		Spills from conveyors.	Ongoing maintenance around transfer points should be undertaken.						
			Any spills of ROM around the conveyor systems should be collected and taken to designated ROM stockpile areas						
	Ecology	The establishment of Weeds and Invader Species.	A weed eradication programme will be developed and implemented to eradicate weeds and invader plants and to prevent new invasions during the ongoing mining operation.	Limit the impact of the mining operation on the Ecological Setting of the area.	Reduce the presence of invader species by 90% on site.	Invasion of Weeds and Alien Vegetation.	A weed eradication plan must be implemented on site. This must be undertaken prior to the growing season. An ecological study should be undertaken to determine the status of revegetation on the site especially around the rehabilitated areas.	SHEQ Department and a Specialised Ecologist.	Weed monitoring (monthly); Weed eradication (annually or as required); Ecological Study (annually)
			Where self-succession does not establish, harvested seeds and plants must be used in concurrent rehabilitation for any areas along the area which may be affected.						
		Accidental death of animals on the roads.	Clearly marked signs will be erected along the transportation routes to create awareness of animal crossings.	Awareness creation on the importance of that natural ecosystem in which Khumani operates. Implementation of safe operation practices.	Zero animal fatality.	Creation of Awareness.	Induction with the view on creating environmental awareness.	SHEQ Department	Annually for permanent staff. Start of each visit for contractors.
			A clearly marked and enforced vehicle speed will be implemented on the internal mine and transportation routes.						
			A detailed induction programme will be in place to ensure that all parties are aware of the rules and regulations on site in terms of the use of roads.						

Name of Activity	Impact Area	Potential Impacts	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Monitoring Requirements			
Activities	Impact Area		Mitigation Measures			Impacts Requiring Monitoring Programmes	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency
			Vehicles may only travel on demarcated roads on site.						
	Surface Water	Contamination of surface water resources. There are no surface water resources in the area, however, the natural runoff, which must be managed internally on site could become impacted	Clean and Dirty water separation systems should be incorporated in terms of the 2016 SWMP.	Operate the water management circuit on site to increase mining efficiency and reduce the need for maintenance of these facilities.	Implement the SWMP on site.	Surface Water Pollution.	The water quality (constituents listed in the WUL) of the surface water resources must be monitored monthly and records must be kept of these result in a centralised system. Analysis of results must be undertaken by an accredited laboratory.	SHEQ Department	Monthly
			Manage storm water flow with temporary erosion control measures where possible (cut-off trenches or berms)						
			Railways and conveyors will be maintained and constructed with the appropriate culverts and drains, levelling and surfacing to ensure adequate drainage.						
			Vehicles/machinery will be regularly monitored and maintained. Maintenance programmes will be established and implemented.						
			All used oils must be removed from site by a licensed company and disposed of at a suitably licensed site						
			Any spills occurring during the collection process must be cleaned up immediately.		Zero presence of contaminated land due to early detection and implementation of actions.				
			Soil that has been contaminated by spillages, seepages and leachates will be sampled and analysed. If necessary, the soils will be treated, ameliorated or removed for safe disposal.						
			Any significant spills must be captured in the incident reports and must be reported to the relevant department (NCDENC, WUA, CMA, and DWS). In this event a remediation strategy should be developed and enforced.		Clean spills, if occur witan 24 hours.				
			A clean up procedure (i.e. Works Instruction) must be in place.						

Name of Activity	Impact Area	Potential Impacts	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Monitoring Requirements			
Activities	Impact Area		Mitigation Measures			Impacts Requiring Monitoring Programmes	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency
	Air Quality	The use of unsurfaced roads may lead to an increase of dust emissions in the area.	Install air quality monitoring stations that determine fallout and respirable dust (PM10) concentrations that could arise from the mining activities.	Reducing dust emissions on site.	Zero complaints from surrounding landowners regarding dust.	Dust dispersion.	Dust dispersion will be monitored as part of the overall mine dust monitoring programme.	SHEQ Department.	Monthly Monitoring with Annual Reporting.
			Dust suppression should be undertaken regularly to prevent dust emissions.						
			During operational phase of the mine, haulage roads will be treated with dust suppression techniques such as wet to reduce dust creation.		Recording of dust fall out to determine trends.	Complaints Register.	A complaints register should be in place on site.	SHEQ Department.	Ongoing
			Tarpaulins will be placed over all vehicles transporting product.		Meeting ambient dust fall out limits in terms of applicable NEM:AQA Regulations.		Complaints should be acknowledged with an action plan recommended.	SHEQ Department	Within 24 hours of receipt.
	Heritage	No direct impact	-	-	-	-	-	-	-
	Palaeontology	No direct impact	-	-	-	-	-	-	-
	Visual	No direct impact	-	-	-	-	-	-	-
	Noise	Noise of vehicles traversing the access roads will be almost constant	Machinery and vehicles will be well maintained to prevent excessive nose and to comply with national and provincial regulations.	Protect the ambiance of the area, as well as maintain good relationships with surrounding land users.	Meeting noise limit requirements in terms of the Mine Health and Safety Act.	Elevated Noise Levels.	Ambient noise monitoring should be undertaken	SHEQ Department	Monthly (during the day and during the night)
			All vehicles will have muffles to minimise noise emissions, where necessary.						
			Where noise becomes a nuisance nose management measures will be investigated and implemented to address these concerns						
			Implement a noise monitoring network.						
			Noise monitoring will be undertaken (ambient conditions) to ensure that noise levels comply with Health and Safety Standards.						
	Social	No direct impact	-	-	-	-	-	-	-
Activity 4: Waste Management Hydrocarbon spills	Groundwater	Large scale hydrocarbon spills	Clean and Dirty water separation systems should be incorporated in terms of the 2016 SWMP.	Protect the groundwater resources to ensure	Achieve 100% compliance to the water quality	Groundwater Pollution and	To ensure a proactive approach, the	SHEQ Department	Assessments: Weekly.

Name of Activity	Impact Area	Potential Impacts	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Monitoring Requirements			
Activities	Impact Area		Mitigation Measures			Impacts Requiring Monitoring Programmes	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency
within the Mining Area		could be present at the mining area	No activities associated with hydrocarbons and/or chemicals may be undertaken outside of an effectively designed and contained area.	that limited to no impact on groundwater resources occur as a result of the mining operations.	objectives as agreed to between the mine and the DWS based on the discussions within the IWWMP.	potential trends & Soil Assessments.	SHEQ department should undertake ongoing site monitoring to determine whether activities on site are undertaken in accordance with the EMP Requirements. The groundwater quality (constituents listed in the WUL) must be monitored monthly and records must be kept of these result in a centralised system. Analysis of results must be undertaken by an accredited laboratory		Monitoring: Quarterly
			All used oils must be removed from site by a licensed company and disposed of at a suitably licensed site.						
			Any spills occurring during the collection process must be cleaned up immediately.		Implement the SWMP on site.				
			Any significant spills must be captured in the incident reports and must be reported to the relevant department (NCDENC, WUA, CMA, and DWS).		Zero presence of contaminated land due to early detection and implementation of actions.				
			A clean up procedure (i.e. Works Instruction) must be in place.		Clean spills, within 24 hours.				
	Soils	Contamination of soil resources due to hydrocarbon spills.	Storage of fuels and oils, the refuelling of vehicles and equipment maintenance must be limited to designated, bunded (bunds to be 110% of volume of the materials stored) areas.	Protecting of soil integrity.	Zero presence of contaminated land due to early detection and implementation of actions.	Soil Pollution	The SHEQ department should undertake ongoing site monitoring to determine whether activities on site are undertaken in accordance with the EMP Requirements. This should be undertaken by	SHEQ Department	ECO: Annual external audits can be undertaken. SHEQ: Weekly monitoring
			All fuels and soils must be stored in appropriate containers.						
			Chemicals and hazardous material must be stored in suitable containers, fit for purpose and in line with SDS requirements.						
			Where drip trays are too small, specially prepared, non-pervious						

Name of Activity	Impact Area	Potential Impacts	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Monitoring Requirements			
Activities	Impact Area		Mitigation Measures			Impacts Requiring Monitoring Programmes	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency
			bunds with solution trenches must be used to capture spillages				means of a thorough site visit, record keeping of findings in a checklist format, issuing of non-conformances to responsible parties, listing thereof on the Isometrics or similar reporting system and feedback to the management team.		
			Oils and potentially hazardous materials must be disposed of at a licensed facility and waste certificates obtained.						
			A spill kit must be provided to be used in the event of a spill.	Awareness creation on site regarding duty of care and waste management.			Induction with the view on creating environmental awareness.	SHEQ Department	Annually for permanent staff. Start of each visit for contractors.
			If a spill occurs, the contaminated soil must be removed immediately. Contaminated soil must be stored according to best practices until it can be disposed of at a suitably licensed facility.						
			Safety signage must be used at designated storage areas.						
			All workers must undergo an induction which includes environmental awareness training to make them aware of the environmental incident management procedures as well as the importance of complying with management measures.						
		Contamination of surface water resources. There are no surface water resources in the area,	Clean and Dirty water separation systems should be incorporated in terms of the 2016 SWMP.	Operate the water management circuit on site to increase mining efficiency and reduce the need for	Implement the SWMP on site.	Surface Water Pollution.	The water quality (constituents listed in the WUL) of the dam must be monitored	SHEQ Department	Monthly
			Vehicles/machinery will be regularly monitored and maintained.						

Name of Activity	Impact Area	Potential Impacts	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Monitoring Requirements			
Activities	Impact Area		Mitigation Measures			Impacts Requiring Monitoring Programmes	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency
		however, the natural runoff, which must be managed internally on site could become impacted	Maintenance programmes will be established and implemented.	maintenance of these facilities.			monthly and records must be kept of these result in a centralised system. Analysis of results must be undertaken by an accredited laboratory.		
			All used oils must be removed from site by a licensed company and disposed of at a suitably licensed site						
			Any spills occurring during the collection process must be cleaned up immediately.		Zero presence of contaminated land due to early detection and implementation of actions.				
			Soil that has been contaminated by spillages, seepages and leachates will be sampled and analysed. If necessary, the soils will be treated, ameliorated or removed for safe disposal.						
			Any significant spills must be captured in the incident reports and must be reported to the relevant department (NCDENC, WUA, CMA, and DWS). In this event a remediation strategy should be developed and enforced.		Clean spills, within 24 hours.				
			A clean up procedure (i.e. Works Instruction) must be in place.						
Activity 5: Waste Management Waste Handling	Groundwater	Handling or Hazardous Waste within workshops and general mine area.	Clean and Dirty water separation systems should be incorporated in terms of the 2016 SWMP.	Protect the groundwater resources to ensure that limited to no impact on groundwater resources occur as a result of the mining operations.	Achieve 100% compliance to the water quality objectives as agreed to between the mine and the DWS based on the discussions within the IWWMP.	Groundwater Pollution and potential trends & Soil Assessments.	To ensure a proactive approach, the SHEQ department should undertake ongoing site monitoring to determine whether activities on site are undertaken in accordance with the EMP Requirements. The groundwater quality	SHEQ Department	Assessments: Weekly. Monitoring: Quarterly
			Waste management training must be implemented on site.						
			Clear signs informing staff of waste management practices must be implemented on site.		Maintain a 100% safe disposal record on the disposal of hazardous waste.				
			Hazardous waste handling should only take place within bunded and/or lined areas, with a capacity of at least 110% of the volume stored.						

Name of Activity	Impact Area	Potential Impacts	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Monitoring Requirements			
Activities	Impact Area		Mitigation Measures			Impacts Requiring Monitoring Programmes	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency
			Hazardous waste should be removed by a licenced removal company and taken to a suitable and licenced landfill site.				(constituents listed in the WUL) must be monitored monthly and records must be kept of these result in a centralised system. Analysis of results must be undertaken by an accredited laboratory		
			Documentation of removal and safe disposal must be available on site.						
		Handling and Storing of Domestic Waste	Clean and Dirty water separation systems should be incorporated in terms of the 2016 SWMP.		Achieve 100% compliance to the water quality objectives as agreed to between the mine and the DWS based on the discussions within the IWWMP.				
			Waste management training must be implemented on site.						
			Clear signs informing staff of waste management practices must be implemented on site.		Maintain a 100% compliance with the conditions of the ECA permit for the landfill site.				
			The landfill site at Khumani must be operated in line with the Environmental Authorisation requirements and conditions.						
			This landfill site, may only be utilised for domestic and general waste, no industrial or hazardous waste will be dumped on this site.						
			Recycling practices must be investigated and implemented on site.		Maintain a 100% accurate recording of waste and submission of such recording to the Department.				
			Ongoing rehabilitation of the landfill site must be undertaken, by covering and shaping the facility regularly.						
			Groundwater monitoring must be undertaken in such a manner as to ensure that any potential impacts from the landfill site can be detected.		Maintain daily covering of the landfill site present at Khumani.				
	Ecology	The unmanaged disposal of waste, could result in the spread of invader	Develop dedicated waste handling areas; prevent access to rodents and opportunistic species; prevent the spread of waste.	Proper waste management practices on site.	No unlawful disposal of waste. Registration of all	Ongoing Rehabilitation	An operational rehabilitation plan must be implemented and	SHEQ Department	Audit: Monthly Updated: Annually

Name of Activity	Impact Area	Potential Impacts	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Monitoring Requirements			
Activities	Impact Area		Mitigation Measures			Impacts Requiring Monitoring Programmes	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency
		species, as well as the influx of opportunistic species.	Develop dedicated waste handling areas, fit for purpose and prevent the spread of waste.		waste handling and/or storage areas on site.		audited by the SHEQ department		
	Surface Water	Handling of Hazardous Waste within workshops and general mine area could contaminate the dirty water storage areas. The water is then reused in the system and could have impacts on the integrity of the storm water system and also the production.	Clean and Dirty water separation systems should be incorporated in terms of the 2016 SWMP.	Protect the integrity of the Storm Water Management System.	Implement the SWMP on site.	Surface Water Pollution & Soil Assessments.	To ensure a proactive approach, the SHEQ department should undertake ongoing site monitoring to determine whether activities on site are undertaken in accordance with the EMP Requirements. The water quality (constituents listed in the WUL) of the dam must be monitored monthly and records must be kept of these result in a centralised system. Analysis of results must be undertaken by an accredited laboratory.	SHEQ Department	Assessments: Weekly. Monitoring: Monthly
			A detailed waste management strategy will be established and implemented, which will clearly demarcate the containments for different waste streams.						
			Waste management training must be implemented on site.		Zero presence of contaminated land due to early detection and implementation of actions.				
			Clear signs informing staff of waste management practices must be implemented on site.		Clean spills, within 24 hours.				
			Hazardous waste handling should only take place within bunded and/or lined areas.		Maintain a 100% safe disposal record on the disposal of hazardous waste.				
			Hazardous waste should be removed by a licenced removal company and taken to a suitable and licenced landfill site.		Provide training to all staff on best practices regarding waste management every year.				
			Documentation of removal and safe disposal must be available on site.						
			The mine will adopt a cradle-to grave approach to ensure that the waste is removed and disposed of in a legally compliant manner.						
			Weekly inspections of Storm Water Management Systems must be undertaken. Any blockages or maintenance requirements must be documented and an action plan developed.						

Name of Activity	Impact Area	Potential Impacts	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Monitoring Requirements			
Activities	Impact Area		Mitigation Measures			Impacts Requiring Monitoring Programmes	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency
		Handling and Storing of Domestic Waste should have no impact on the surface water resources due to the location of the facility. However, incorrect disposal of waste could hamper the integrity of the storm water system.	Clean and Dirty water separation systems should be incorporated in terms of the 2016 SWMP.		Maintain a 100% compliance with the conditions of the ECA permit for the landfill site.				
			Waste management training must be implemented on site.						
			Weekly inspections of Storm Water Management Systems must be undertaken. Any blockages or maintenance requirements must be documented and an action plan developed.						
			Clear signs informing staff of waste management practices must be implemented on site.						
			The landfill site at Beeshoek must The landfill site at Khumani must be operated in line with the Environmental Authorisation requirements and conditions.						
			Access control must be strictly enforced.		Maintain daily covering of the landfill site present at Khumani.				
			The berm around upstream of the facility must be maintained.						
			Recycling practices must be investigated and implemented on site.						
			Ongoing rehabilitation of the landfill site must be undertaken, by covering and shaping the facility.						
			Groundwater monitoring must be undertaken in such a manner as to ensure that any potential impacts from the landfill site can be detected.						

Table 30: Monitoring Compliance during Decommissioning and Closure Phase

Name of Activity	Impact Area	Potential Impacts	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Monitoring Requirements			
Activities	Impact Area		Mitigation Measures			Impacts Requiring Monitoring Programmes	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency
Closure and Decommissioning Phase									
Legal Requirements (Environmental Permits)	South Africa Enviro-Legal Requirements	Unlawful activities could lead to NWA Directives and Section 24G Rectification fines.	A legal assessment of all Water Uses must be undertaken annually to ensure that all Water Uses are licensed.	To operate within the enviro-legal ambits of South Africa.	Ensure that all activities undertaken by the mine are lawful with the required environmental licences in place.	Compliance in terms of Regulatory Requirements and the implementation of the EMP.	Appointment of an Independent Environmental Control Officer to assess compliance with the EMP. Quarterly internal audits must be undertaken to ensure compliance with the Environmental Authorisation and EMP. This should be undertaken by means of a thorough site visit, record keeping of findings in a checklist format, issuing of non-conformances to responsible parties, listing thereof on the Isometrics or similar reporting system and feedback to the management team.	Independent ECO & SHEQ	ECO: Weekly; SHEQ: Daily
			A detailed closure plan must be developed and submitted to the relevant departments for approval.	To be aware of the latest environmental legal requirements.	Ensure that all environmental authorisations on site is implemented on site and ongoing monitoring of compliance are undertaken to reach 100% compliance.				
			All legally appointed personnel responsible or involved in water use activities on site must receive training on the requirements of the WUL.		All Departments responsible for development of the mine, must understand the requirements of the environmental legislation and must involve this into their planning processes.				
			Quarterly integral audits must be undertaken on the lawful implementation of the WUL.						
			Water Use Licence must be available on site at all times.						
			The legal register must be updated to indicate all updated water uses.						
Activity 1: Dismantling and decommissioning of infrastructure and buildings	Geology	No direct impact	-	-	-	-	-	-	-
	Topography	Removal of infrastructure may impact on the topography.	Linear Infrastructure constructed by the mine (roads, conveyors, railway lines, power lines) will be removed if it proves to inhibit land use at decommissioning. Where possible	Lawful removal of all infrastructure. Achieving final land use objectives.	Availability of safe disposal certificates. Free draining environment, with	Waste Disposal	Audits on safe disposal records and inspections at disposal sites.	SHEQ Department	Monthly inspection of records Biannual

Name of Activity	Impact Area	Potential Impacts	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Monitoring Requirements			
Activities	Impact Area		Mitigation Measures			Impacts Requiring Monitoring Programmes	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency
Decommissioning Activities: The existing King and Parson Emulsion Silos, Ammonium Nitrate Silos and explosive magazines will be decommissioned. The decommissioning activities does not have any Construction or Operational impacts associated therewith. **Silos at Bruce:** Two magazine areas, an Emulsion Silo and Ammonium Nitrate Silo) - including all ancillary required infrastructure. **Silos at King:** An Emulsion Silo and Ammonium Nitrate Silo) - including all ancillary required infrastructure.			infrastructure will remain for social investment opportunities, this will be decided in conjunction with the Integrated Development Plan of the area ant eh local authorities.		successful self-succession establishment.				inspections of disposal sites
			All haul roads and access roads will be rehabilitated by ripping these structures to a depth of 500mm.						
			All fences erected around the infrastructure be dismantled and either disposed of at a permitted disposal site or sold off as scrap (provided that these structures will no longer be required by the post mining land owner). Fences erected to cordon off dangerous excavations will remain in place and will be maintained as and when required.						
			The silos will be removed by the operational responsible contractor (such as Sasol Nitro, or the relevant company at that time).						
			The overland conveyors and railway lines, if not used as a community initiative, will be dissembled and the components removed from the site. The material can either be sold as a unit or the components sold as scrap.						
	Soil, Land Use and Land Capability	Spills around the silos may result in the contamination of soils.	Any emulsion or other contaminants should be collected and the soils remediated immediately.	Protection of Soil Integrity.	Zero presence of contaminated land due to early detection and implementation of actions.	Soil Integrity	Appointment of an Independent Environmental Control Officer to assess compliance with the EMP. The SHEQ department should undertake ongoing site monitoring to determine	SHEQ Department	Annual External Audit. Daily internal inspections. Recording of incidents when occurring.

Name of Activity	Impact Area	Potential Impacts	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Monitoring Requirements			
Activities	Impact Area		Mitigation Measures			Impacts Requiring Monitoring Programmes	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency
							whether activities on site are undertaken in accordance with the EMP Requirements. This should be undertaken by means of a thorough site visit, record keeping of findings in a checklist format, issuing of non-conformances to responsible parties, listing thereof on the Isometrics or similar reporting system and feedback to the management team.		
		Loss of soils due to decommissioning activities present on site.	Draw up a plan clearly defining the area where the removal of infrastructure should take place. Implement the plan with sufficient measures in place not to compact new areas.		Maintaining soil integrity, with successful vegetation establishment.	Soil Erosion and incorrect stockpiling of topsoil.	Appointment of an Independent Environmental Control Officer to assess compliance with the EMP. The SHEQ department should undertake ongoing site monitoring to determine whether activities on site are undertaken in accordance with the EMP Requirements.	Independent ECO and SHEQ Department.	ECO: Annual external audits can be undertaken. SHEQ: Weekly monitoring
			Implement a strict penalty fine system for rule breaking with regard to vehicular movement.						

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Activities	Impact Area		Mitigation Measures			Impacts Requiring Monitoring Programmes	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency
			Maintain clean and dirty water systems and undertake regular monitoring and maintenance thereof.			Soil integrity analysis	Assessment of the fertility of Soils	Soil Scientist	Prior to placement of soils.
	Ecology	The establishment of Weeds and Invader Species.	A weed eradication programme will be developed and implemented to eradicate weeds and invader plants and to prevent new invasions during the ongoing mining operation.	Limit the impact of the mining operation on the Ecological Setting of the area.	Reduce the presence of invader species by 90% on site.	Invasion of Weeds and Alien Vegetation.	A weed eradication plan must be implemented on site. This must be undertaken prior to the growing season. An ecological study should be undertaken to determine the status of revegetation on the site especially around the rehabilitated areas.	SHEQ Department and a Specialised Ecologist.	Weed monitoring (monthly); Weed eradication (annually or as required); Ecological Study (annually)
			Where self-succession does not establish, harvested seeds and plants must be used in concurrent rehabilitation for any areas along the area which may be affected.						
		Direct impact: Unplanned loss of floral and faunal species of conservation importance	Prior to the removal of plant species, an ecologist should investigate the site (if not already done) to record all species of importance and which should be removed under tree removal permits. All such species should be demarcated by signage or tape.	Achieving final land use commitments.	Self-succession of vegetation should establish within the first rainy season after construction has been completed. Zero removal of species of conservation importance without the necessary permits in place.	Ongoing rehabilitation.	An operational rehabilitation plan must be implemented and audited by the SHEQ department.	SHEQ Department	Monthly
			Obtain tree removal permit prior to the removal of any protected species.						
			The pipeline proposed between P2/P1 and A1 should be rerouted if practically possible to avoid the floodplain vegetation and rather be rerouted to run through the Vachellia mellifera thicket to the						

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			south of the current route as shown in Figure 20 where possible.						
			The pending offset area should be finalised to contribute to the overall conservation of sensitive and red data species.			Vegetation Establishment.	An ecological study should be undertaken to determine the status of revegetation on the site especially around the rehabilitated areas.	SHEQ Department	Monthly
			All employees, or contractors on site should receive a detailed induction on the expectations for the protection of fauna and flora on site.			Invasion of Weeds and Alien Vegetation.	A weed eradication plan must be implemented on site. This must be undertaken prior to the growing season.	SHEQ Department and a Specialised Ecologist.	Weed monitoring (monthly); Weed eradication (annually or as required); Ecological Study (annually)
			Weed eradication should be implemented on site.						
		Accidental death of animals on the roads.	Clearly marked signs will be erected along the transportation routes to create awareness of animal crossings.	Awareness creation on the importance of that natural ecosystem in which Khumani operates. Implementation of safe operation practices.	Zero animal fatality.	Creation of Awareness.	Induction with the view on creating environmental awareness.	SHEQ Department	Annually for permanent staff. Start of each visit for contractors.
			A clearly marked and enforced vehicle speed will be implemented on the internal mine and transportation routes.						
			A detailed induction programme will be in place to ensure that all parties are aware of the rules and regulations on site in terms of the use of roads.						
			Vehicles may only travel on demarcated roads on site.						
	Wetland	Loss or Impact on NEFPA Sites	No activities are planned within 500m from any NEFPA sites. This restriction should be maintained.	Protect sensitive ecosystems.	Remain within the designated footprints at all times.	Location of approved activities.	Appointment of an Independent Environmental Control Officer to	ECO and SHEQ Department	ECO: Monthly for the decommissioning phase. . SHEQ:

Name of Activity	Impact Area	Potential Impacts	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Monitoring Requirements			
Activities	Impact Area		Mitigation Measures			Impacts Requiring Monitoring Programmes	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency
							assess compliance with the EMP. The SHEQ department should undertake ongoing site monitoring to determine whether activities on site are undertaken in accordance with the EMP Requirements.		Weekly monitoring
	Hydrology	Erosion control over rehabilitated areas and the prevention of erosion gullies.	The topography of all disturbed areas must be rehabilitated in such a manner that the surrounding natural area blends naturally with the rehabilitated areas well as to be free-draining. This will reduce soil erosion and improve natural re-vegetation.	Protect the water resources within the area in which the mine operates.	Maintenance of storm water management systems. Meeting the conditions in terms of Section 21c & of the WUL.	Surface Water Pollution & Soil Assessments.	To ensure a proactive approach, the SHEQ department should undertake ongoing site monitoring to determine whether activities on site are undertaken in accordance with the EMP Requirements. The water quality (constituents listed in the WUL) must be monitored monthly and records must be kept of these result in a centralised system. Analysis of results must be undertaken by an accredited	SHEQ Department	Assessments: Weekly. Monitoring: Monthly
		Contamination of surface water as a result of removal of infrastructure.	The detailed waste management strategy implemented during the construction and operation phases must be continuously implemented throughout the closure and decommissioning phase.						
		Rubble and waste from site could pollute local water resources.	Waste that is not removed from site should be spread, covered and suitably rehabilitated.						

Name of Activity	Impact Area	Potential Impacts	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Monitoring Requirements			
Activities	Impact Area		Mitigation Measures			Impacts Requiring Monitoring Programmes	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency
							laboratory. Monitoring of the effectiveness of the rehabilitation programme must be undertaken. This should be undertaken by means of weekly inspections and keeping a photographic record.		
	Geohydrology	No direct impact	-	-	-	-	-	-	-
	Heritage	No direct impact	-	-	-	-	-	-	-
	Palaeontology	No direct impact	-	-	-	-	-	-	-
	Visual	Fugitive dust emissions as a result of infrastructure removal and associated exposed/bare areas may have an impact in terms of air quality and visual characteristics.	The dust monitoring network and dust suppression programme established during the construction phase of the project will be maintained throughout the closure phase of the mine. With respect to haul road dust levels, it is recommended to limit vehicle speeds, especially during high risk periods of high winds, high temperature and low humidity. Establish and implement a dust suppression plan in consultation with the environmental control officer and an air quality specialist as part of the contractor's responsibility.	Remain within the regulated guidelines and limits.	Recording of dust fall out to determine trends.	Dust dispersion.	Dust dispersion will be monitored as part of the overall mine dust monitoring programme.	SHEQ Department.	Monthly Monitoring with Annual Reporting.
	Air Quality	All activities associated with the removal of infrastructure and rehabilitation has the potential to release dust.	The dust monitoring network and dust suppression programme established during the construction phase of the project will be maintained throughout the closure phase of the mine. With respect to haul road dust levels, it is recommended to limit vehicle	Remain within the regulated guidelines and limits.	Recording of dust fall out to determine trends. Meeting ambient dust fall out limits in terms of applicable NEM:AQA Regulations.	Dust dispersion.	Dust dispersion will be monitored as part of the overall mine dust monitoring programme.	SHEQ Department.	Monthly Monitoring with Annual Reporting.

Name of Activity	Impact Area	Potential Impacts	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Monitoring Requirements			
Activities	Impact Area		Mitigation Measures			Impacts Requiring Monitoring Programmes	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency
			speeds, especially during high risk periods of high winds, high temperature and low humidity.						
	Noise	All activities associated with the removal of infrastructure and rehabilitation has the potential to generate noise.	The removal of all infrastructure is to take place during daytime periods only. Where noise becomes a nuisance, management measures will be investigated and implemented to address these.	Remain within the regulated guidelines and limits.	Machinery with low noise levels and maintained in a good order to be used and to comply with the IFC's Health and Safety Regulations. Health and Safety Regulations in terms of noise monitoring should be met.	Noise Monitoring.	Adjacent landowners will be informed of the planned dates of the significant demolition activities where applicable. Daily noise monitoring will be undertaken in the areas where high levels of noise take place during decommissioning.	SHEQ Department.	Ongoing consultation with surrounding landowners. Daily noise monitoring.
	Social	Disruption and nuisance factors associated with the actual decommissioning such as noise, visual and traffic related impacts.	Local residents, with the focus on the surrounding landowners, should receive accurate information with regards to the project status, timeframes for decommissioning and other relevant information about issues that could influence their daily living and movement patterns.	Remain within the regulated guidelines and limits.	The community forum established should continue, through which issues can be addressed, and a representative from Khumani should become involved.	Ongoing stakeholder consultation	Adjacent landowners will be informed of the planned dates of the significant demolition activities where applicable.	SHEQ Department.	Ongoing consultation with surrounding landowners.
Activity 2: Earth Moving, shaping and ripping of ground	Geology	No direct impact	-	-	-	-	-	-	-
	Topography	The shaping of the site should be undertaken in such a manner that it improves the overall topography of the site.	-	Develop the area to its intended final land use.	Implement an action plan to systematically plan for closure.		An operational rehabilitation plan must be implemented and audited by the SHEQ department.	SHEQ Department.	Monthly monitoring.
	Soil, Land Use and Land Capability	Soil erosion Ripping and topsoil replacement will restore the soil physical characteristics prior to re-vegetation.	Re-vegetate as soon as possible Compacted soils will be ripped and topsoil will be replaced. After the topsoil has been replaced the area should be ameliorated and seeded, should self-succession of vegetation	Develop the area to its intended final land use.	Continuous rehabilitation of the decommissioning area will be conducted in line with the Best Practice Guidelines released by the DWA.	Soil Erosion and incorrect stockpiling of topsoil.	Erosion protection measures should be implemented and monitored on areas identified. Photographic	Independent ECO and SHEQ Department.	ECO: Weekly for the decommissioning phase. Thereafter annual external audits can be

Name of Activity	Impact Area	Potential Impacts	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Monitoring Requirements			
Activities	Impact Area		Mitigation Measures			Impacts Requiring Monitoring Programmes	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency
			not take place. Only species indigenous to the area will be included.				records of assessments must be kept.		undertaken. SHEQ: Weekly monitoring
	Terrestrial Ecology (Fauna & Flora)	The rehabilitation of the site will allow reestablishment of natural vegetation.	Compacted soils will be ripped and topsoil will be replaced. After the topsoil has been replaced the area should be ameliorated and seeded, should self-succession of vegetation not take place. Only species indigenous to the area will be included. Remove alien vegetation post decommissioning, with long term follow-up afterwards.	Protect the Ecology within which the mine operates	Free draining environment with successful self-succession in place.	Invasion of Weeds and Alien Vegetation.	A weed eradication plan must be implemented on site. This must be undertaken prior to the growing season. An ecological study should be undertaken to determine the status of revegetation on the site especially around the rehabilitated areas.	SHEQ Department and a Specialised Ecologist.	Weed monitoring (monthly); Weed eradication (annually or as required); Ecological Study (annually)
	Wetland	No direct impact	-	-	-	-	-	-	-
	Hydrology	Runoff from rehabilitated areas will impact on watercourses especially during intensive rainstorms especially if the area are not free draining.	Berms, should they be necessary, must remain upstream and downstream of the dumps and stockpiles to ensure that clean water is kept separate from dirty water until the area is free draining and re-vegetation has occurred.	Protect the water resources within the area in which the mine operates.	Continuous rehabilitation of the decommissioning area will be conducted in line with the Best Practice Guidelines released by the DWA.	Surface Water Pollution & Soil Assessments.	To ensure a proactive approach, the SHEQ department should undertake ongoing site monitoring to determine whether activities on site are undertaken in accordance with the EMP Requirements. The water quality (constituents listed in the WUL) must be monitored monthly and	SHEQ Department	Assessments: Weekly. Monitoring: Monthly

Name of Activity	Impact Area	Potential Impacts	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Monitoring Requirements			
Activities	Impact Area		Mitigation Measures			Impacts Requiring Monitoring Programmes	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency
							records must be kept of these result in a centralised system. Analysis of results must be undertaken by an accredited laboratory. Monitoring of the effectiveness of the rehabilitation programme must be undertaken. This should be undertaken by means of weekly inspections and keeping a photographic record.		
	Geohydrology	No direct impact		Protect the groundwater resources to ensure that limited to no impact on groundwater resources occur as a result of the mining operations.	Implement and operate a detailed waste manifest on site and maintain a 100% safe disposal record on the disposal of waste on site.	Groundwater Pollution and potential trends.	The groundwater quality (constituents listed in the WUL) must be monitored monthly and records must be kept of these result in a centralised system. Analysis of results must be undertaken by an accredited laboratory	SHEQ Department	Quarterly
	Heritage	No direct impact	-	-	-	-	-	-	-
	Palaeontology	No direct impact	-	-	-	-	-	-	-

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Activities	Impact Area		Mitigation Measures			Impacts Requiring Monitoring Programmes	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency
	Visual	The rehabilitation (ripping, topsoil replacement and landscaping) will remove the visual incongruity.	An overall visual improvement will be noticed once all mining related infrastructure has been demolished and the area has been landscaped and re-vegetated.	Successful establishment of vegetation.	Remain within the designated area demarcated for activities. Remain within the National Environmental Management: Air Quality Act, 2004 Dust Regulation guidelines for rural communities.	Dust dispersion.	Dust dispersion will be monitored as part of the overall mine dust monitoring programme.	SHEQ Department.	Monthly Monitoring with Annual Reporting.
			Demarcate the decommissioning area and limit the decommissioning activities as far as possible.						
			Final shaping will be implemented such that the final profile of the rehabilitated areas are formed to emulate natural contours of the area.						
			Foundations will be removed to a depth of 1 m below the surface and the area rehabilitated.			Vegetation Establishment.	An ecological study should be undertaken to determine the status of revegetation on the site especially around the rehabilitated areas.	SHEQ Department	Monthly
			All material recovered from the demolition of buildings and/or structures will either be transported to a permitted disposal site, or made available to the local community as building materials (provided they are in a satisfactory condition following demolition).						
			Linear infrastructure constructed by the mine (i.e. roads, conveyors and power lines) will be removed if it proves to inhibit land use at decommissioning.						
			All fences erected around the mine will be dismantled and disposed of at a permitted disposal site.						

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Activities	Impact Area		Mitigation Measures			Impacts Requiring Monitoring Programmes	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency
	Air Quality	All activities associated with the removal of infrastructure has the potential to release dust.	Dust sampling will be undertaken on a monthly basis and analysed according to the prescribed monitoring programme contained in the EIA/EMP.	No concerns raised by surrounding landowners regarding air quality.	Remain within the designated area demarcated for activities.	Dust dispersion.	Dust dispersion will be monitored as part of the overall mine dust monitoring programme.	SHEQ Department.	Monthly Monitoring with Annual Reporting.
			Monthly monitoring reports will be generated by the mine or through a suitably qualified air quality specialist.		Remain within the National Environmental Management: Air Quality Act, 2004 Dust Regulation guidelines for rural communities.				
			In the event that air quality or dust issues are identified based on the monitoring programme, an independent specialist should be appointed to determine the best course of action to ameliorate the situation.						
	Noise	All activities associated with the removal of infrastructure and rehabilitation has the potential to generate noise.	The removal of all infrastructure is to take place during daytime periods only. Where noise becomes a nuisance, management measures will be investigated and implemented to address these.	No concerns raised by surrounding landowners regarding air quality.	Remain within the designated area demarcated for activities.	Noise Monitoring.	Adjacent landowners will be informed of the planned dates of the significant demolition activities where applicable. Daily noise monitoring will be undertaken in the areas where high levels of noise take place during decommissioning.	SHEQ Department.	Ongoing consultation with surrounding landowners. Daily noise monitoring.
			Machinery with low noise levels and maintained in a good order to be used and to comply with the IFC's Health and Safety Regulations.		Remain within the National Environmental Management: Air Quality Act, 2004 Dust Regulation guidelines for rural communities.				
			Speed control measures will be implemented by the mine through the placement of adequate signage.						
			Implement a penalty system for non-compliance to speed control measures and ensure that all workers are made aware of the penalty systems.						
			Gravel roads to be maintained in as good and smooth a condition as possible.						
	Social		-	-	-	-	-	-	-
	Geology	No direct impact	-	-	-	-	-	-	-

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Activities	Impact Area		Mitigation Measures			Impacts Requiring Monitoring Programmes	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency
Activity 3: Cessation of Labour Contracts	Topography	No direct impact	-	-	-	-	-	-	-
	Soil, Land Use and Land Capability	No direct impact	-	-	-	-	-	-	-
	Terrestrial Ecology (Fauna & Flora)	No direct impact	-	-	-	-	-	-	-
	Wetland	No direct impact	-	-	-	-	-	-	-
	Hydrology	No direct impact	-	-	-	-	-	-	-
	Geohydrology	No direct impact	-	-	-	-	-	-	-
	Heritage	No direct impact	-	-	-	-	-	-	-
	Palaeontology	No direct impact	-	-	-	-	-	-	-
	Visual	No direct impact	-	-	-	-	-	-	-
	Air Quality	No direct impact	-	-	-	-	-	-	-
	Noise	No direct impact	-	-	-	-	-	-	-
	Socio-Economic	Plant, store and workshop areas could benefit the local community.	Instead of demolition of certain areas, these areas could be sold off as commercial property for use in the local community.	Optimally utilise buildings and infrastructure.	Safe disposal and lawful operation of infrastructure.	Socio-Economic Character	Engage in consultation with municipalities and local industries to determine the need and recycling of existing infrastructure.	SHEQ Department.	Ongoing consultation prior to demolition.
		Loss of Employment.	The mine should continue with the skills development programme and Social and Labour Plan commitments to empower the workforce to undertake other economically viable activities.	Ensuring successful skills development to allow for continued economically active people and opportunities in the area post mining.	Successful implementation of skills development and opportunities on site.	Socio-Economic Character	Compliance with the Social and Labour Plan.	HR Department	Biannually up until closure has been achieved.
Waste Management	Groundwater	Handling or Hazardous Waste within workshops and general mine area.	Clean and Dirty water separation systems should be incorporated in terms of the 2016 SWMP. Waste management training must be implemented on site.	Protect the groundwater resources to ensure that limited to no impact on groundwater resources occur as a	Achieve 100% compliance to the water quality objectives as agreed to between the mine and the DWS based on the discussions within this IWWMP.	Groundwater Pollution and potential trends.	The groundwater quality (constituents listed in the WUL) must be monitored monthly and records must be	SHEQ Department	Quarterly

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Activities	Impact Area		Mitigation Measures			Impacts Requiring Monitoring Programmes	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency
			Clear signs informing staff of waste management practices must be implemented on site.	result of the mining operations.	Maintain a 100% safe disposal record on the disposal of hazardous waste.		kept of these result in a centralised system. Analysis of results must be undertaken by an accredited laboratory		
			Hazardous waste handling should only take place within bunded and/or lined areas.						
			Hazardous waste should be removed by a licenced removal company and taken to a suitable and licenced landfill site.						
			Documentation of removal and safe disposal must be available on site.						
		Handling of Building Rubble	All infrastructure will be removed and rehabilitated, should no alternative use be found for the structures.						
			Foundations will be removed to a depth of 1m below surface.						
			All building rubble will follow the waste hierarchy and will therefore either be sold for reuse where possible, disposed of within opencast pits (with the necessary approvals in place by the regulatory authority for the disposal of building rubble and as per the 2009 EMP) and as a last option be disposed of at a licensed facility suitable for such waste.		Implement and operate a detailed waste manifest on site and maintain a 100% safe disposal record on the disposal of waste on site.				
		Handling and Storing of Domestic Waste	Clean and Dirty water separation systems should be incorporated in terms of the 2016 SWMP.		Achieve 100% compliance to the water quality objectives as agreed to between the mine and the DWS based on the discussions within this IWWMP.				
			Waste management training must be implemented on site.						
			Clear signs informing staff of waste management practices must be implemented on site.		Maintain a 100% compliance with the conditions of the ECA				

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Activities	Impact Area		Mitigation Measures			Impacts Requiring Monitoring Programmes	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency
			The landfill site at Khumani must be operated in line with the Environmental Authorisation requirements and conditions.		permit for the landfill site.				
			Recycling practices must be investigated and implemented on site.		Maintain a 100% accurate recording of waste and submission of such recording to the Department.				
			Ongoing rehabilitation of the landfill site must be undertaken, by covering and shaping the facility.						
			Groundwater monitoring must be undertaken in such a manner as to ensure that any potential impacts from the landfill site can be detected.		Maintain daily covering of the landfill site.				
	Surface Water	Handling of Hazardous Waste within workshops and general mine area could contaminate the dirty water storage areas. The water is then reused in the system and could have impacts on the integrity of the storm water system and also the production.	Clean and Dirty water separation systems should be incorporated in terms of the 2016 SWMP.	Develop the area to its intended final land use.	Maintain the SWMP on site.	Surface Water Pollution & Soil Assessments.	To ensure a proactive approach, the SHEQ department should undertake ongoing site monitoring to determine whether activities on site are undertaken in accordance with the EMP Requirements. The water quality (constituents listed in the WUL) of the dam must be monitored monthly and records must be kept of these result in a centralised system. Analysis	SHEQ Department	Assessments: Weekly. Monitoring: Monthly
			Waste management training must be implemented on site.		Maintain a 100% no-spill record.				
			Clear signs informing staff of waste management practices must be implemented on site.		Clean spills, if occur witan 24 hours.				
			Hazardous waste handling should only take place within bunded and/or lined areas.		Maintain a 100% safe disposal record on the disposal of hazardous waste.				
			Hazardous waste and contaminated materials should be removed by a licenced removal company and taken to a suitable and licenced landfill site.		Provide training to all staff on best practices regarding waste management every year.				
			Documentation of removal and safe disposal must be available on site.						
			Weekly inspections of Storm Water Management Systems must be undertaken. Any blockages or maintenance requirements must be documented and an action plan developed.						

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Activities	Impact Area		Mitigation Measures			Impacts Requiring Monitoring Programmes	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency
			Clean and Dirty water separation systems should be incorporated in terms of the 2016 SWMP.				of results must be undertaken by an accredited laboratory.		
			Waste management training must be implemented on site.						
			Weekly inspections of Storm Water Management Systems must be undertaken. Any blockages or maintenance requirements must be documented and an action plan developed.		Maintain a 100% compliance with the conditions of the ECA permit for the landfill site.				
			Clear signs informing staff of waste management practices must be implemented on site.						
		Handling and Storing of Domestic Waste should have no impact on the surface water resources due to the location of the facility. However, incorrect disposal of waste could hamper the integrity of the storm water system.	The landfill site at Khumani must be operated in line with the Environmental Authorisation requirements and conditions.						
			Building rubble must be disposed of in line with the requirements of the NEM:WA.		Maintain daily covering of the landfill site up until final covering.				
			Access control must be strictly enforced.						
			The berm around upstream of the facility must be maintained.						
			Recycling practices must be investigated and implemented on site.		Self-succession of vegetation should establish within the first rainy season after construction has been completed.				
			Ongoing rehabilitation of the landfill site must be undertaken, by covering and shaping the facility.						
			Groundwater monitoring must be undertaken in such a manner as to ensure that any potential impacts from the landfill site can be detected.						
	Air Quality	The area is located within the mining area and neighbouring the Village Opencast Pit. Dust emissions is not	Dust suppression should be undertaken where and when dust is present.	Remain within the designated area demarcated for activities. Remain within the	Remain within the regulated guidelines and limits.	Dust dispersion.	Dust dispersion will be monitored as part of the overall mine dust	SHEQ Department.	Monthly Monitoring with Annual Reporting.

Name of Activity	Impact Area	Potential Impacts	Mitigation Type	Performance Objectives (Mitigation Objective)	Goals (Standards to be Achieved)	Monitoring Requirements			
Activities	Impact Area		Mitigation Measures			Impacts Requiring Monitoring Programmes	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency
		considered to be significant but can occur during excavation and construction activities.		National Environmental Management: Air Quality Act, 2004 Dust Regulation guidelines for rural communities.			monitoring programme.		
	Noise	The area is located within the mining area and neighbouring the Village Opencast Pit. Noise impacts are not considered to be significant but can occur during excavation and construction activities.	Equipment will be well maintained to reduce excessive noise creation. Activities will be restricted to the day time.	Remain within the designated area demarcated for activities. Remain within the National Environmental Management: Air Quality Act, 2004 Dust Regulation guidelines for rural communities.	Remain within the regulated guidelines and limits.	Noise Monitoring.	Adjacent landowners will be informed of the planned dates of the significant demolition activities where applicable. Daily noise monitoring will be undertaken in the areas where high levels of noise take place during decommissioning.	SHEQ Department.	Ongoing consultation with surrounding landowners. Daily noise monitoring.

1.f.i.1.h Mechanisms for Monitoring Compliance with the Performance Assessment against the Environmental Management Programme, including Monitoring and Reporting Frequency

Please refer to Table 28 for the monitoring compliance including the responsible persons, implementation period, and mechanist for monitoring compliance.

1.f.i.1.i Mechanisms for Monitoring Compliance with the Performance Assessment against the Environmental Management Programme, including Responsible Persons

Please refer to Table 28 for the monitoring compliance including the responsible persons, implementation period, and mechanist for monitoring compliance.

1.f.i.1.j Mechanisms for Monitoring Compliance with the Performance Assessment against the Environmental Management Programme, including Time Period for Implementing Impact Management Actions

Please refer to Table 28 for the monitoring compliance including the responsible persons, implementation period, and mechanist for monitoring compliance.

1.f.i.1.k Mechanisms for Monitoring Compliance with the Performance Assessment against the Environmental Management Programme, including Mechanism for Monitoring Compliance

Please refer to Table 28 for the monitoring compliance including the responsible persons, implementation period, and mechanist for monitoring compliance.

1.f.i.1.l Indicate the Frequency of the Submission of the Performance Assessment/Environmental Audit Report

Annual performance assessments must be undertaken on this facility as part of the overall EMP, which will consider and incorporate the conditions as presented in this EMP. This report must also include the overall mine assessment of the financial provision. The report should be submitted to the DMR.

1.f.i.1.m Environmental Awareness Plan

1.f.i.1.m.1 Manner in which the Applicant intends to inform his or her Employees of any Environmental Risk which may result from their work

An Environmental Awareness and Risk Assessment Schedule have been developed and is outline in Table 31. The purpose of this schedule is to ensure that employees are not only trained but that the principles are continuously re-enforced.

Table 31: Environmental Training and Awareness Schedule

Type of Forum	Frequency	Time allocation	Objective
Internal Management Meetings	Monthly	One hour workshop	A workshop session in which the following is discussed: 1. Current status of environmental compliance; 2. Environmental concerns and non-compliances recorded; 3. Weekly, monthly, quarterly, annually and 5 year mine plan; 4. Environmental risks and requirements; 5. Action plan.
Induction (all staff and workers)	Prior to first time site access, and biannually thereafter	1 hour training on environmental awareness training as part of site induction	1. Develop an understanding of what is meant by the natural environmental and social environment and establish a common language as it relates to environmental, health, safety and community aspects. 2. Establish a basic knowledge of the environmental legal framework and consequences of non-compliance. 3. Clarify the content and required actions for the implementation of the EMP. 4. Confirm the spatial extent of areas regarded as sensitive and clarify restrictions. 5. Provide a detailed understanding of the definition, the method for identification and required response to emergency incidents.
Awareness Talks (all staff and workers)	Weekly	30 minute awareness talks	1. Current status of environmental compliance; 2. Environmental concerns and non-compliances recorded; 3. Based on actual identified risks and incidents (if occurred) reinforce legal requirements, appropriate responses and measures for the adaptation of mitigation and/or management practices.
Risk Assessments (supervisor and workers involved in task)	Daily	Daily task based risk assessment	1. Establish an understanding of the risks associated with a specific task and the required mitigation and management measures on a daily basis as part of daily tool box talks.

1.f.i.1.m.2 Manner in which Risks will be dealt with in order to avoid Pollution or the Degradation of the Environment

As prescribed in Table 31, Task / Issue Based Risk Assessments must be undertaken with all worker involved in the specific task in order to establish an understanding of the risks associated with a specific task and the required mitigation and management measures.

1. Environmental Awareness Training Content – Induction Training: Activity Specific

The following environmental awareness training will be provided to all staff and workers who will be involved in activities at Khumani. This training will be developed to be specific to the areas in which the contractors or employees operate (i.e. construction of the plant and silos, as well as the decommissioning) and will include:

- Description of the approved activities where the parties operate and content of the Environmental Authorisation and EMP;
- An overview of the applicable legislation and regulations as it relates to environmental, health, safety and community including (but not limited to):
  - General Environmental Legal Principles and Requirements
  - Air Quality Management
  - Water and Wastewater Management
  - Hazardous Substances

- Hydrocarbon management and spill management
- Non-Mining-Related Waste Management
- The Appropriate Remediation Strategies & Deteriorated Water Resources
- Biodiversity
- Weeds and Invader Plants
- Rehabilitation
- Contractors and Tenants
- Energy & Conservation
- Heritage Resources
- General Health and Safety Matters
- Basic Conditions of Employment
- Compensation for Occupational Injuries and Diseases
- General Mine Health and Safety Matters
- Smoking in the Workplace
- Noise & Hearing Conservation
- Handling, Storage and use of Hazardous Substances
- Weapons and Firearms

- Content and implementation of the approved Environmental Management Plan
  - Allocated responsibilities and functions
  - Reporting Procedures;
  - Management and Mitigation Measures
  - Identification of risks and requirements adaptation
- Sensitive environments and features
  - Description of environmentally sensitive areas and features
  - Prohibitions as it relates to activities in or in proximity to such areas
- Emergency Situations and Remediation
  - Methodology for the identify areas where accidents and emergency situations may occur, communities and individuals that may be impacted
  - Reporting procedures;
  - An overview of the response procedures,
  - Equipment and resources
  - Designate of responsibilities
  - Communication, including communication with potentially Affected Communities
  - Training schedule to ensure effective response.

2. Development of procedures and checklists

The following procedures will be developed and all staff and workers will be adequately trained on the content and implementation thereof.

3. Emergency Preparedness and Response

The procedure will be developed to specifically include risk identification, preparedness, response measures and reporting. The procedure will specifically include spill and fire risk, preparedness and response measures. The appropriate emergency control centres (fire department, hospitals) will be identified and the contact numbers obtained and made available on site. The procedure must be developed in consultation with all potentially affected landowners. In the event that risks are identified which may affected adjacent landowners (or other persons), the procedure will include the appropriate communication strategy to inform such persons and provide response measures to minimize the impact.

4. Incident Reporting Procedure

Incident reporting will be undertaken in accordance with an established incident reporting procedure to (including but not limited to):

- Provide details of the responsible person including any person who: (i) is responsible for the incident; (ii) owns any hazardous substance involved in the incident; or (iii) was in control when the incident occurred;
- Provide details of the incident (time, date, location);
- The details of the cause of the incident;
- Identify the aspects of the environment impacted;

- The details corrective action taken, and
- The identification of any potential residual or secondary risks that must be monitored and corrected or managed.

5. Environmental and Social Audit Checklist

An environmental audit checklist will be established to include the environmental and social mitigation and management measures as developed and approved as part of the EMP. Non-conformances will be identified and corrective action taken where required.

1.f.i.1.n Specific Information required by the Competent Authority

To date no specific information was required by the Competent Authority.

2 UNDERTAKEN

The EAP herewith confirms:

2.a	The correctness of the Information provided in the Reports
2.b	The inclusion of Comments and Inputs from Stakeholders and I&APs
2.c	The inclusion of Inputs and Recommendations from the Specialist Reports where relevant
2.d	That the Information provided by the EAP to I&APs and any Responses by the EAP to Comments and Inputs made by I&AP are correctly reflected herein

Signature of the Environmental Assessment Practitioner

EnviroGistics (Pty) Ltd

Name of company

21/07/2017

Date

Undertaking by the client:

Herewith I, the person whose name and identity number is stated below, confirm that I am the person authorised to act as representative of the applicant in terms of the resolution submitted with the application, and confirm that the above report comprises EIA and EMP compiled in accordance with the guideline on the Departments official website and the directive in terms of sections 29 and 39 (5) in that regard, and the applicant undertakes to execute the Environmental management plan as proposed.

DIRK JOHAN COETZEE

Full Names and Surname

7404225088084

Identity Number

SUPERINTENDENT ENVIRONMENTAL SERVICES

Designation

Signature

21/07/2017

Date

Annexures

Annexure 1: Proof of NEMA Application Submission and DMR Acknowledgment of Receipt

Annexure 2: EAP Curriculum Vitae

Annexure 3: List of Environmental Authorisations

Annexure 4: Title Deeds

Annexure 5: Stakeholder Consultation Documentation

Annexure 6: Ecological Assessment

Annexure 7: Heritage and Paleontological Assessment

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Database

BID

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Annexure 6: Ecological Study

Annexure 7: Heritage Study