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

Report Author

Tanja Bekker
MSc. Environmental Management
Certified EAPSA; PrSci. Reg. 400198/09

19 July 2017

PO Box 22014 | Helderkruin | 1733
tanja@envirogistics.co.za
082 412 1799
086 551 5233

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

Report Title	KHUMANI IRON ORE MINE LOW GRADE ROM SORTER PLANT & SILO RELOCATION
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
Client Signoff	Client comments received and incorporated	14 July 2017

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
Tanja Bekker (from Philip de Weerdt & Quentin Hall)	Incorporation of Client Comments	7 June 2017	Electronic
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.

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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
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

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.

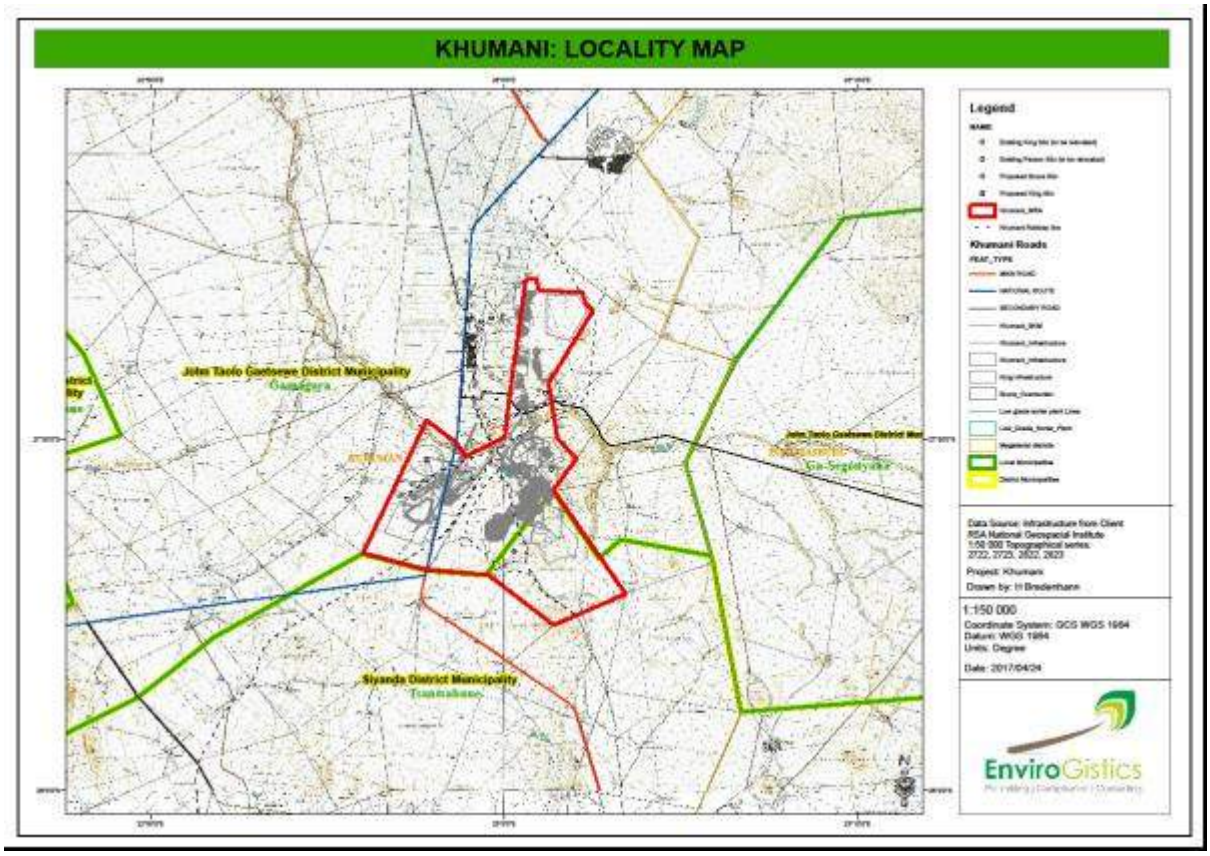


Figure 1: Local Setting of Khumani Iron Ore Mine

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.

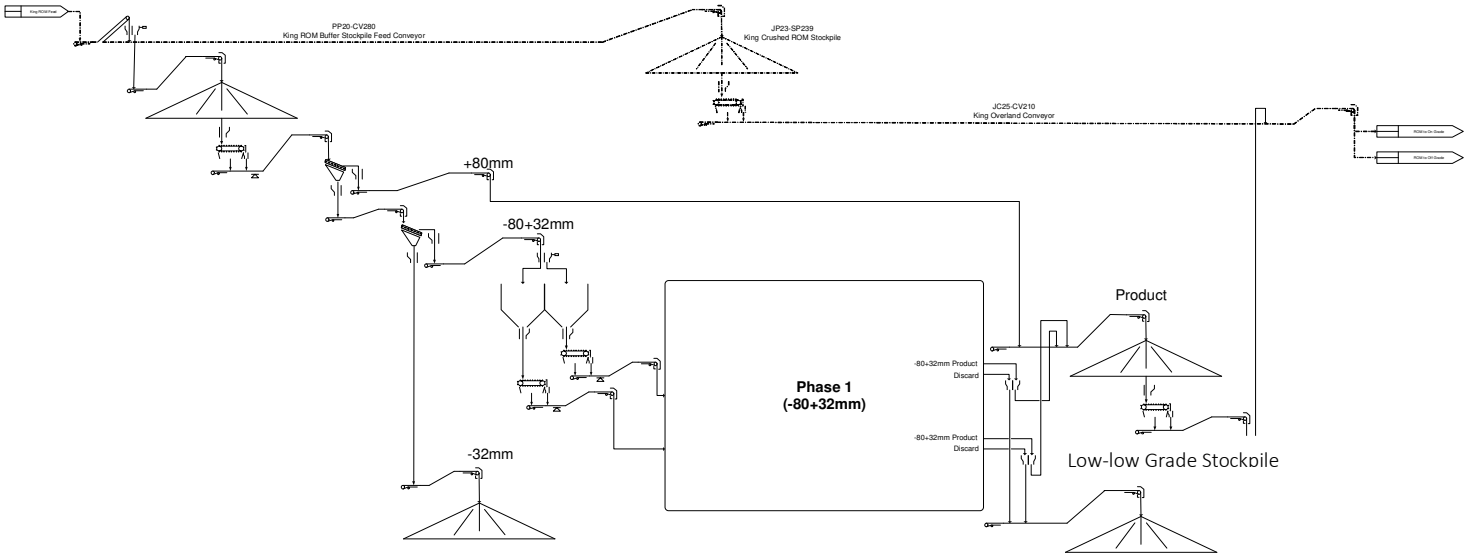


Diagram 1: Phase 1 Flow Diagram.

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.

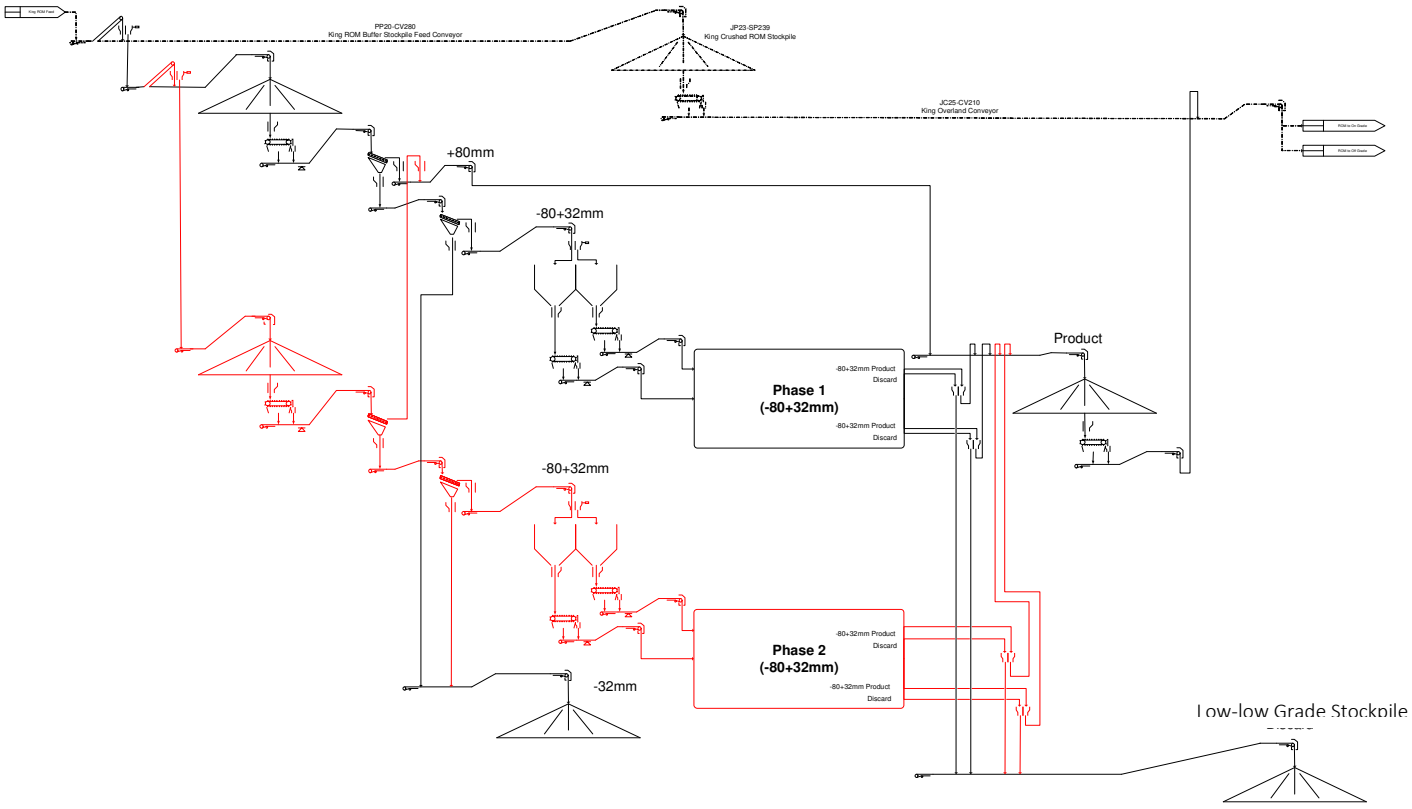


Diagram 2: Phase 2 Flow Diagram (black: phase 1; red: phase 2)

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.

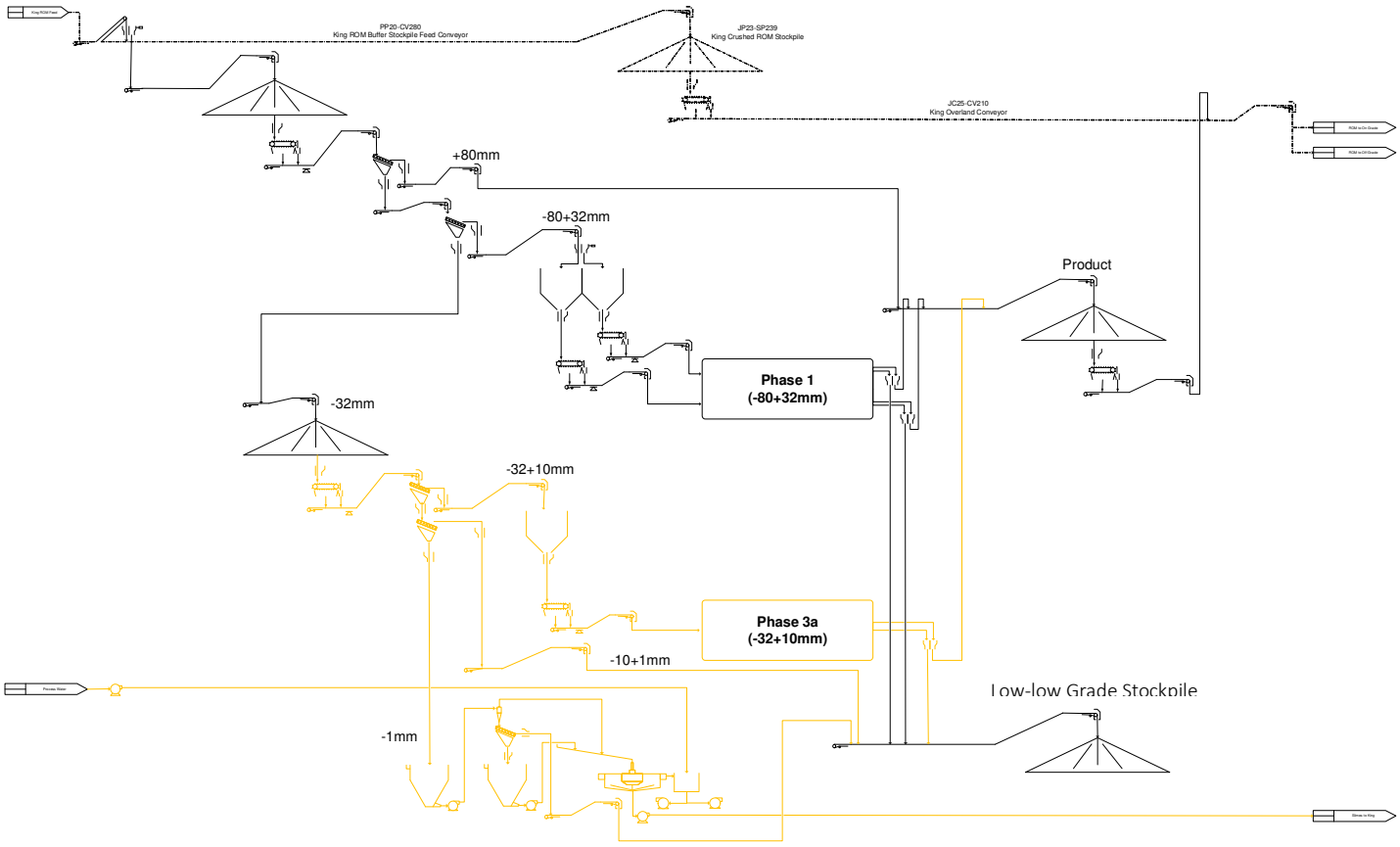


Diagram 3: Phase 3a Flow Diagram (black: phase 1 & 2; yellow: phase 3)

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.

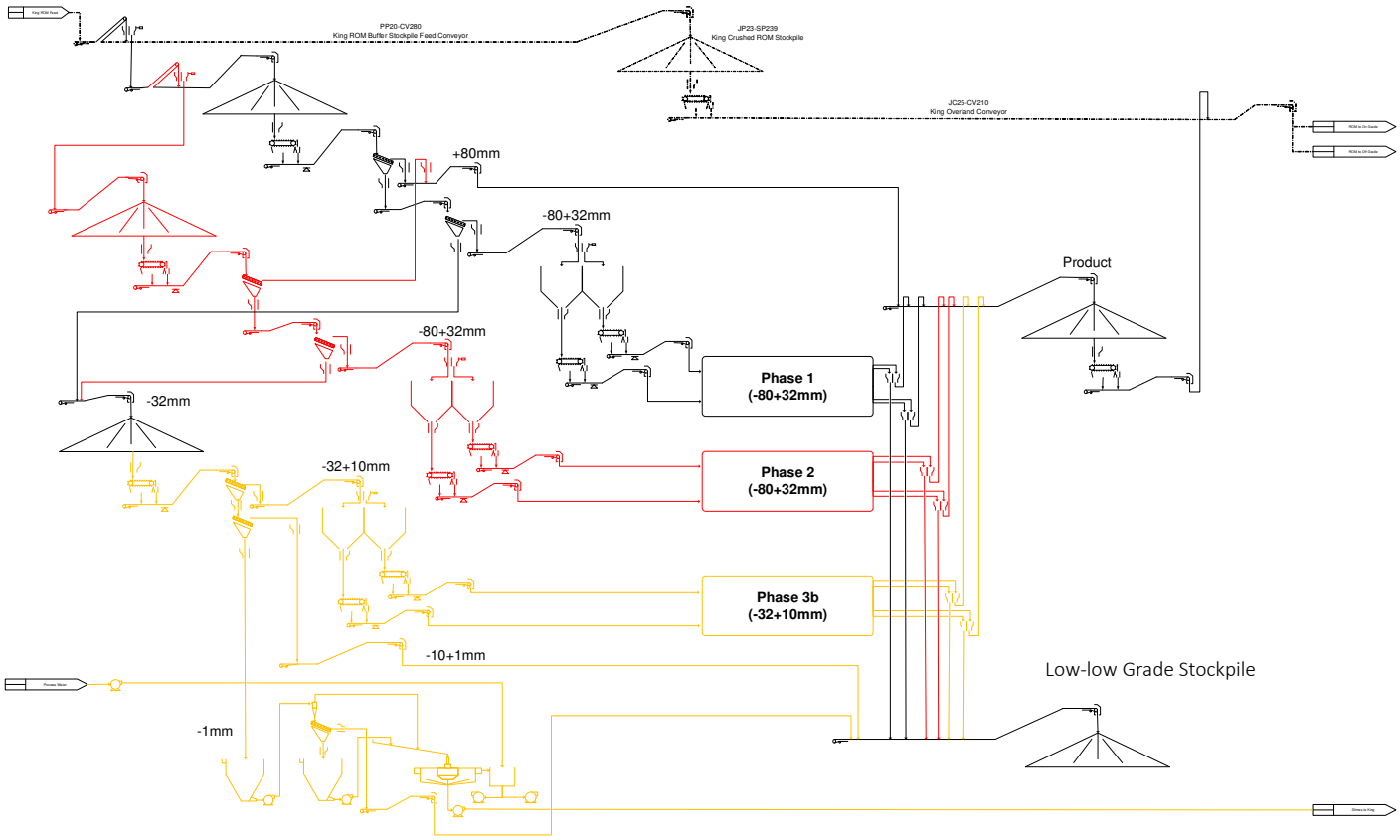


Diagram 4: Phase 3 Flow Diagram (black: phase 1; red: phase 2, yellow phase 3, dotted lines, and existing infrastructure)

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.

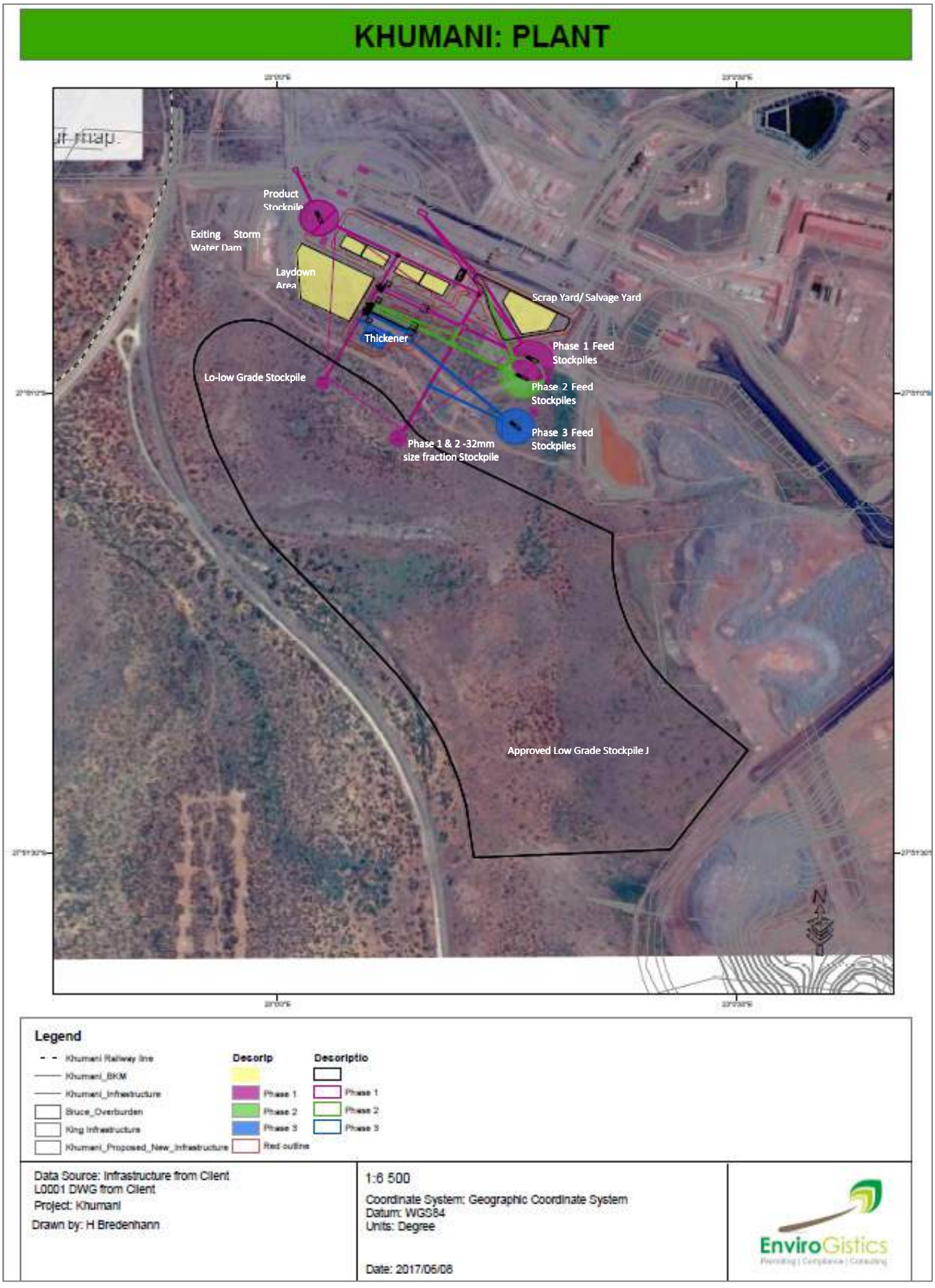


Figure 2: Low Grade ROM Sorter Plant Location (updated drawing to be presented as part of the final BAR)

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].

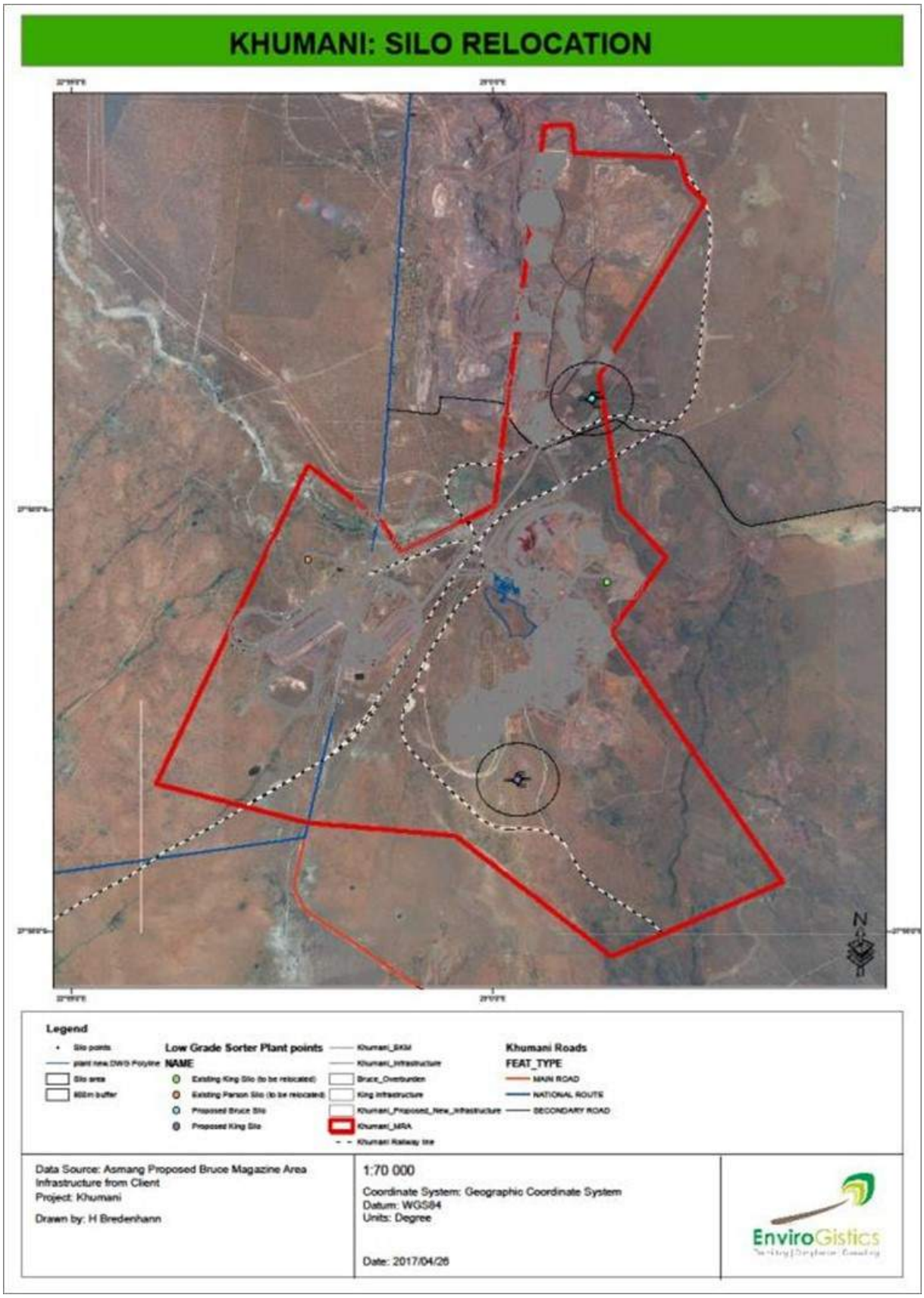


Figure 6: Location of the Silos and Relocation Areas

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.

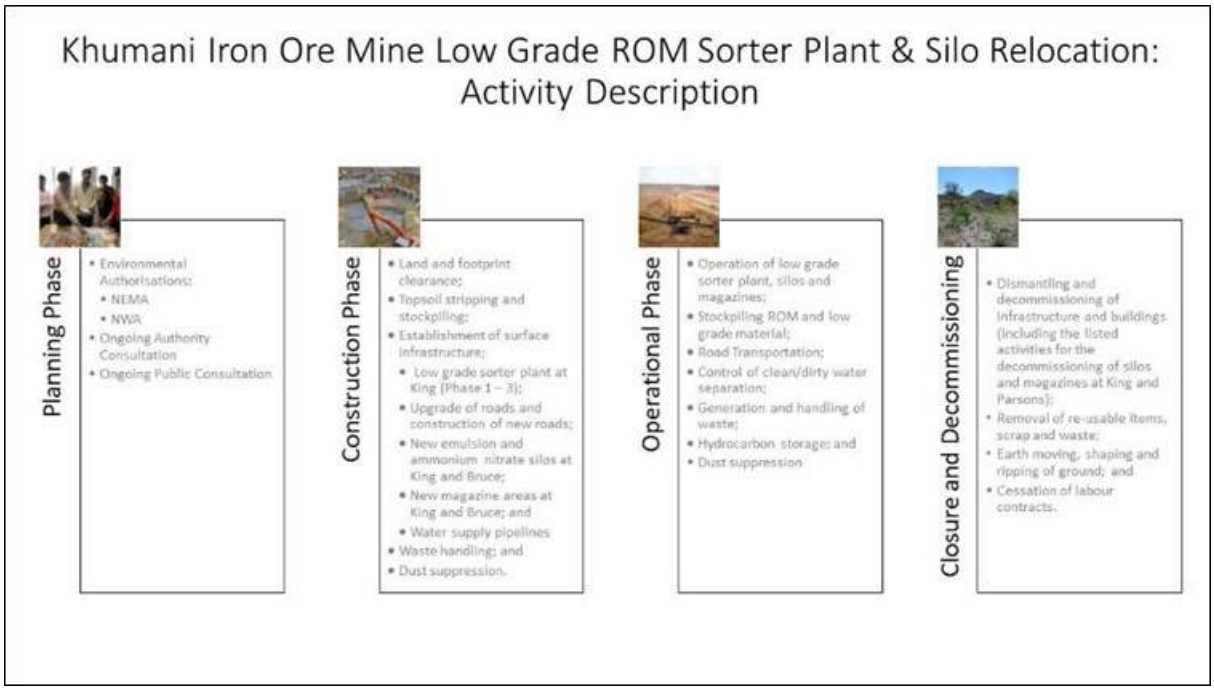
The activities associated with this project should not trigger any WULs, due to the following:

- 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

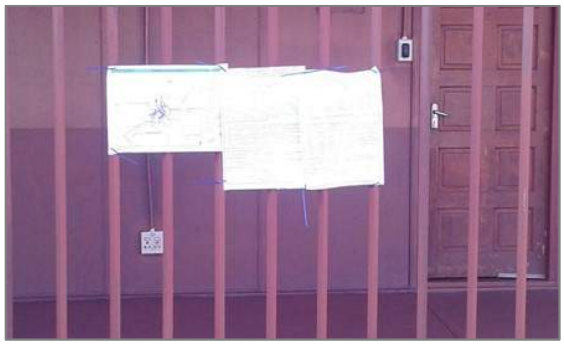
In order to inform surrounding communities and adjacent landowners of the proposed project, five (5) site notices were erected on site (on 8 May 2017) and at visible locations close to the site.

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.

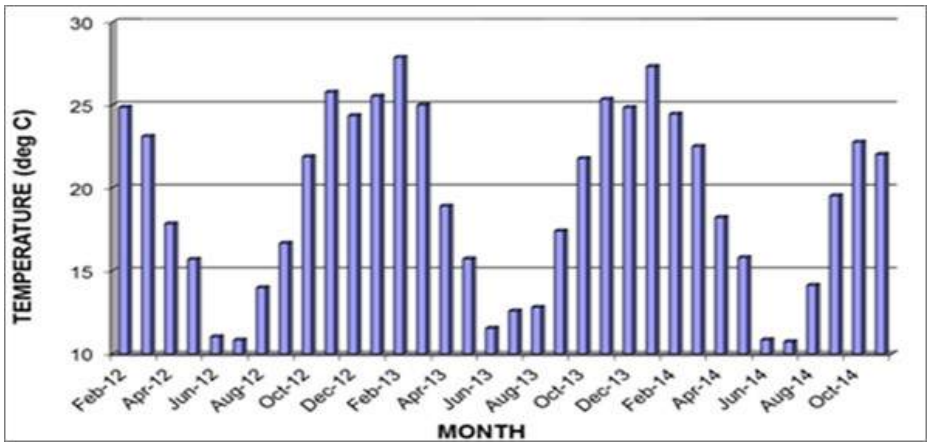


Table 8: Mean monthly Minimum and Maximum temperatures

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.

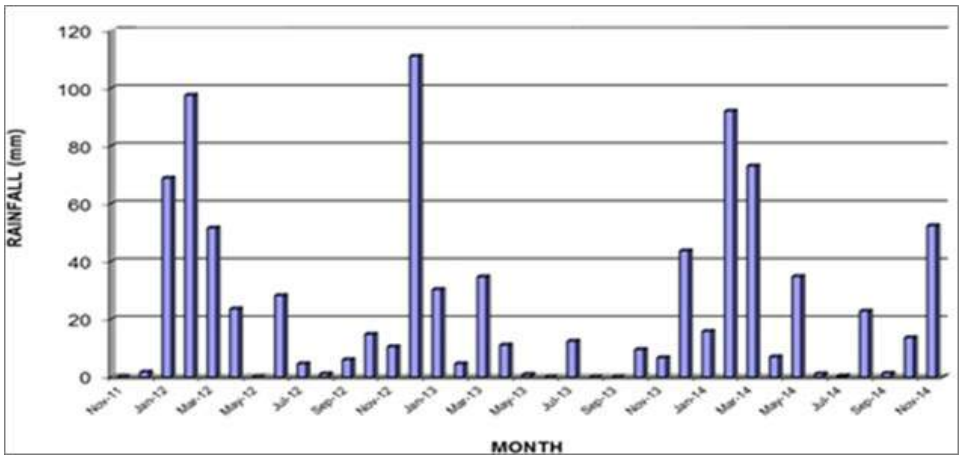


Figure 9: Total Annual Rainfall measured at Parsons Weather Station (2012-2014)

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.

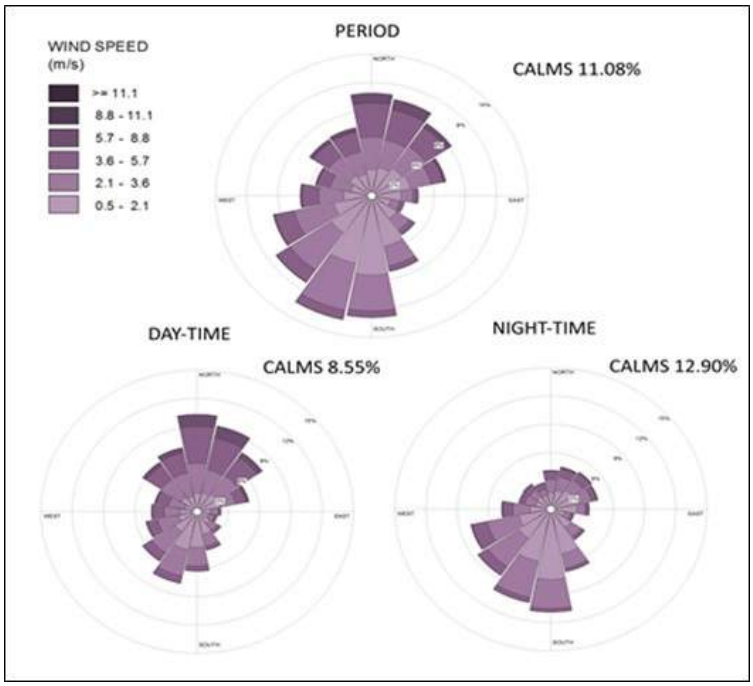


Figure 10: Period wind roses measured at Parsons Weather Station (2012-2014)

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.

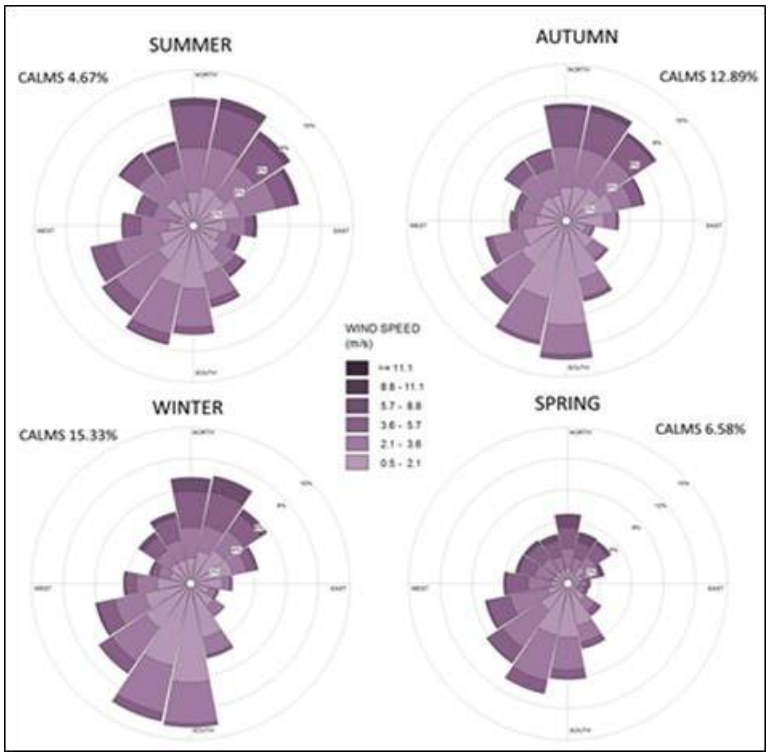


Figure 11: Seasonal wind roses measured at Parsons Weather Station (2012-2014)

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.

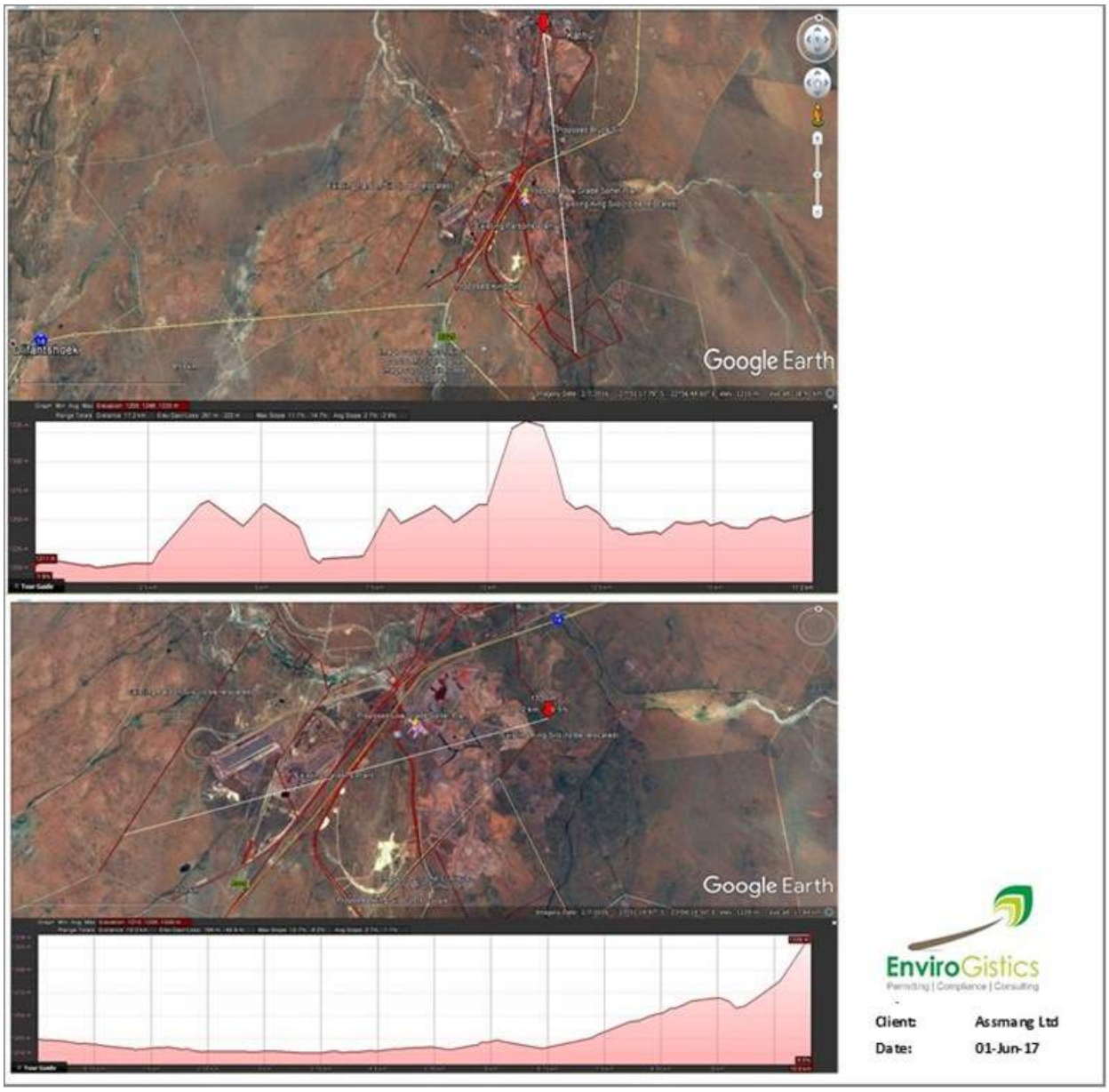


Figure 12: Topographical Setting of Khumani Iron Ore Mine

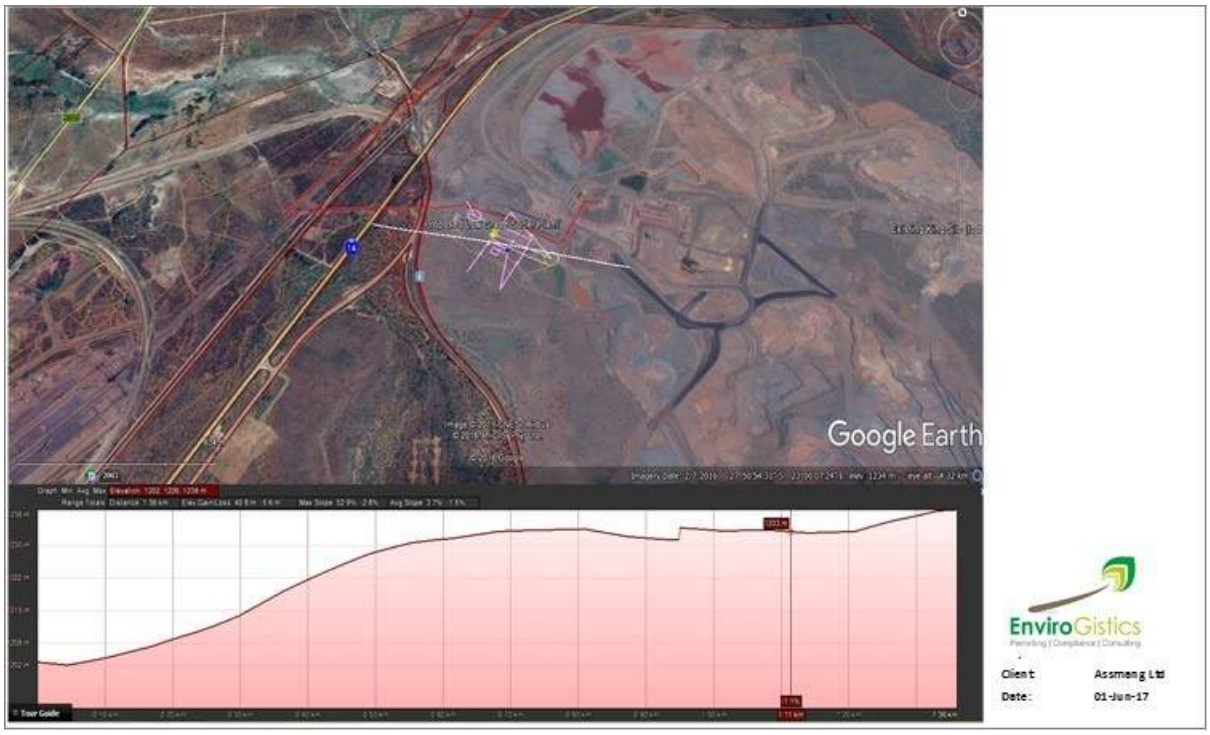


Figure 13: Topographical Setting of Low Grade ROM Stockpile

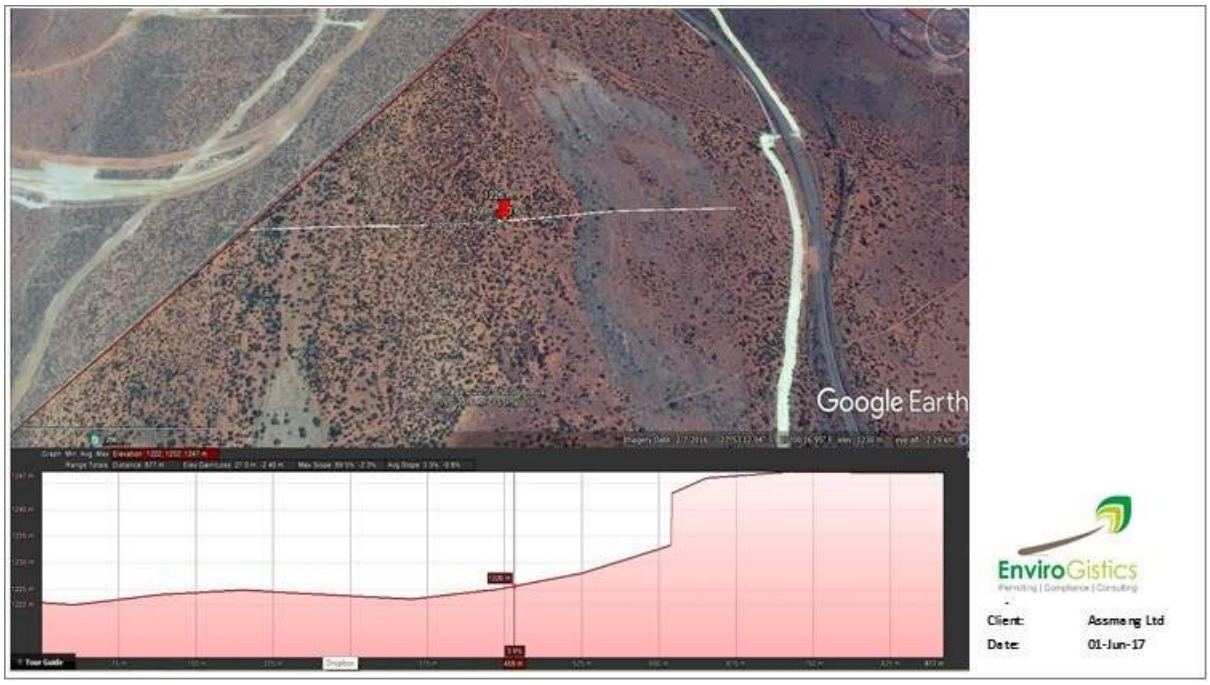


Figure 14: Topographical Setting of King Silo

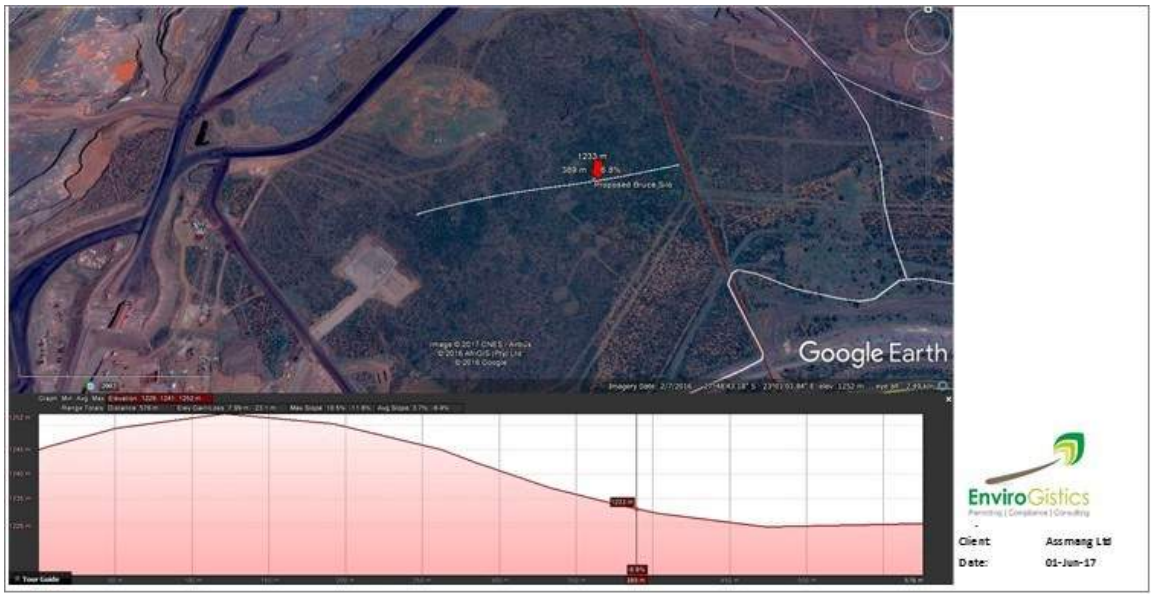


Figure 15: Topographical Setting of Bruce Silo

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.

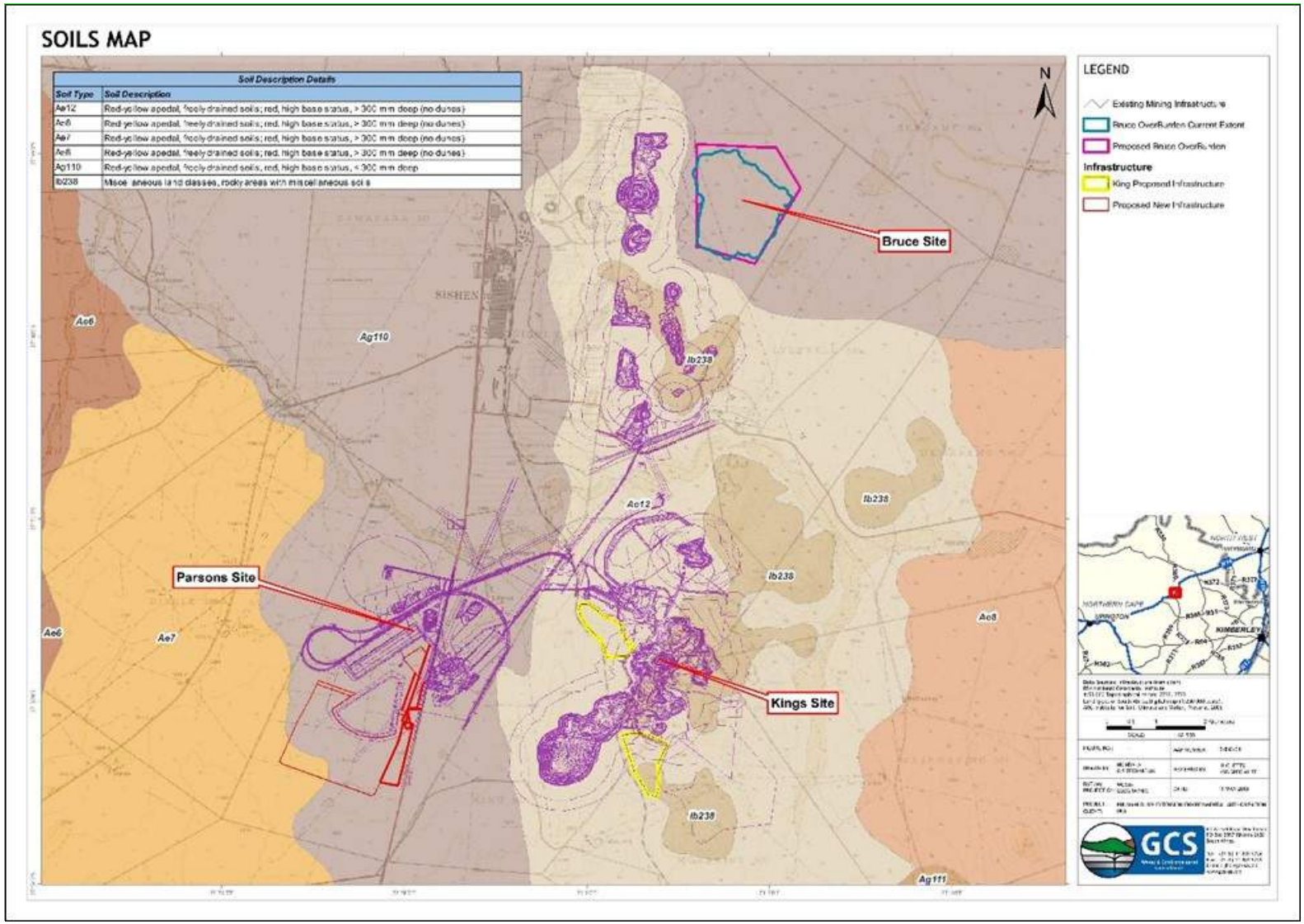


Figure 16: Soils map of Khumani

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.

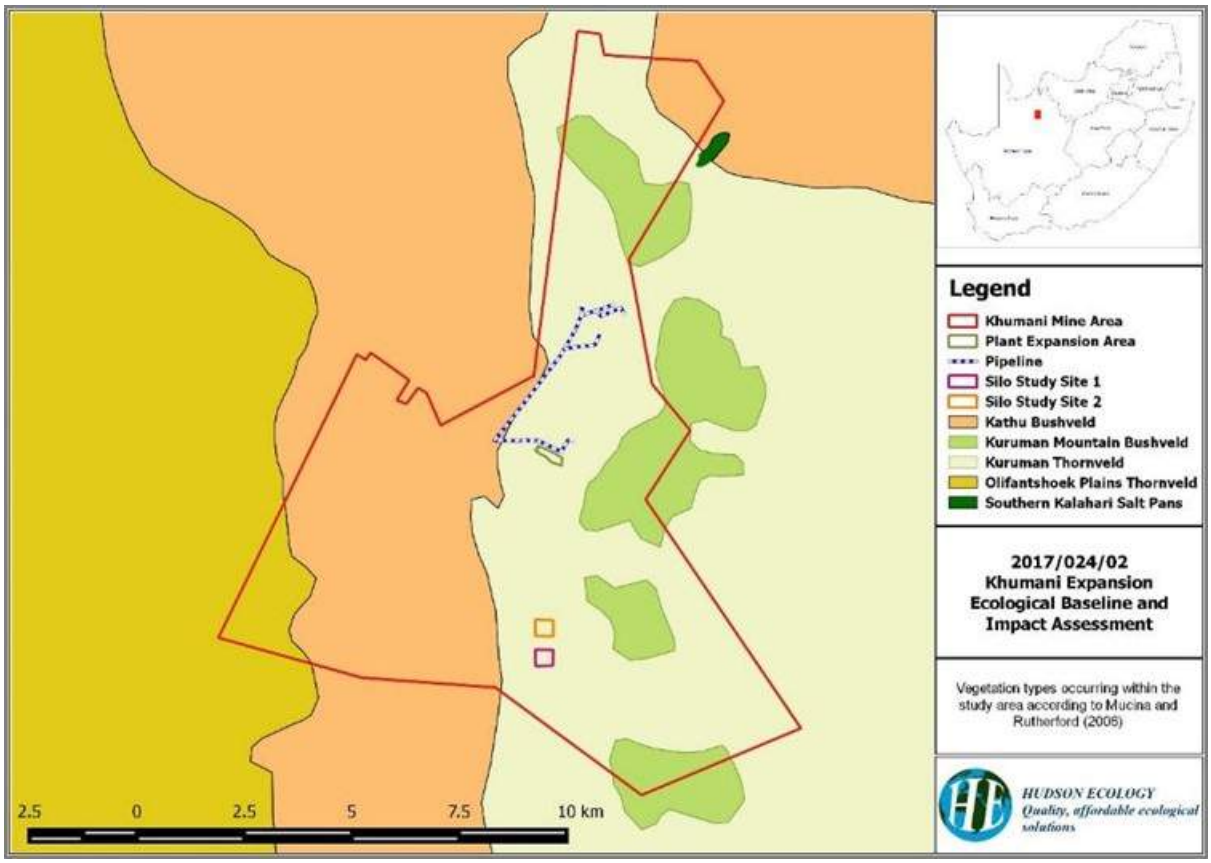


Figure 17: Vegetation Types

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.

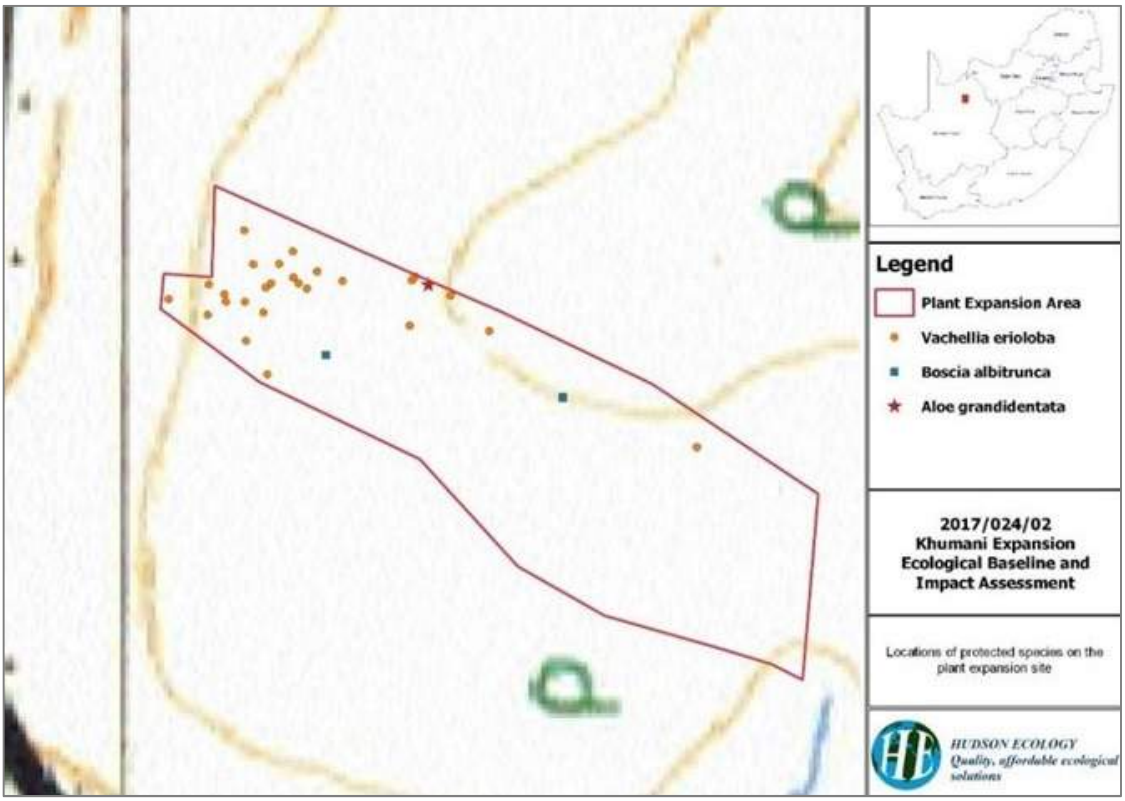


Figure 18: Locations of species of conservation importance in the plant expansion area

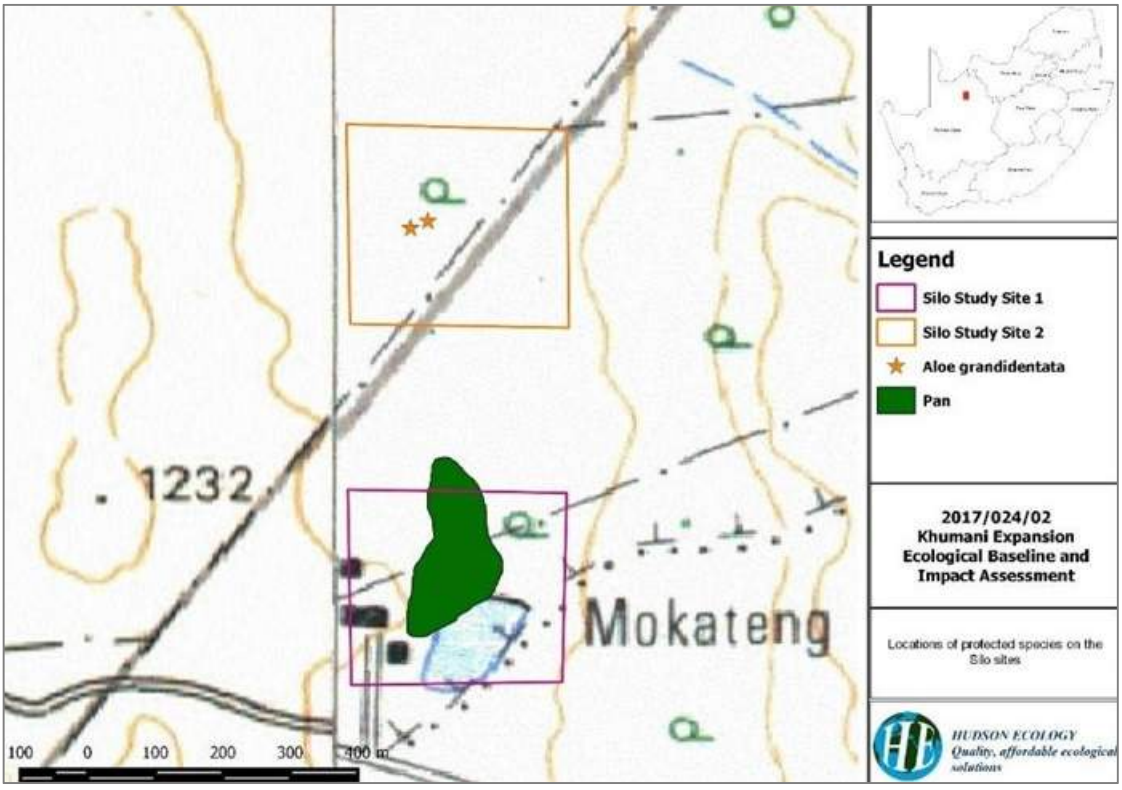


Figure 19: Locations of species of concern and sensitive habitats for the silo sites

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.

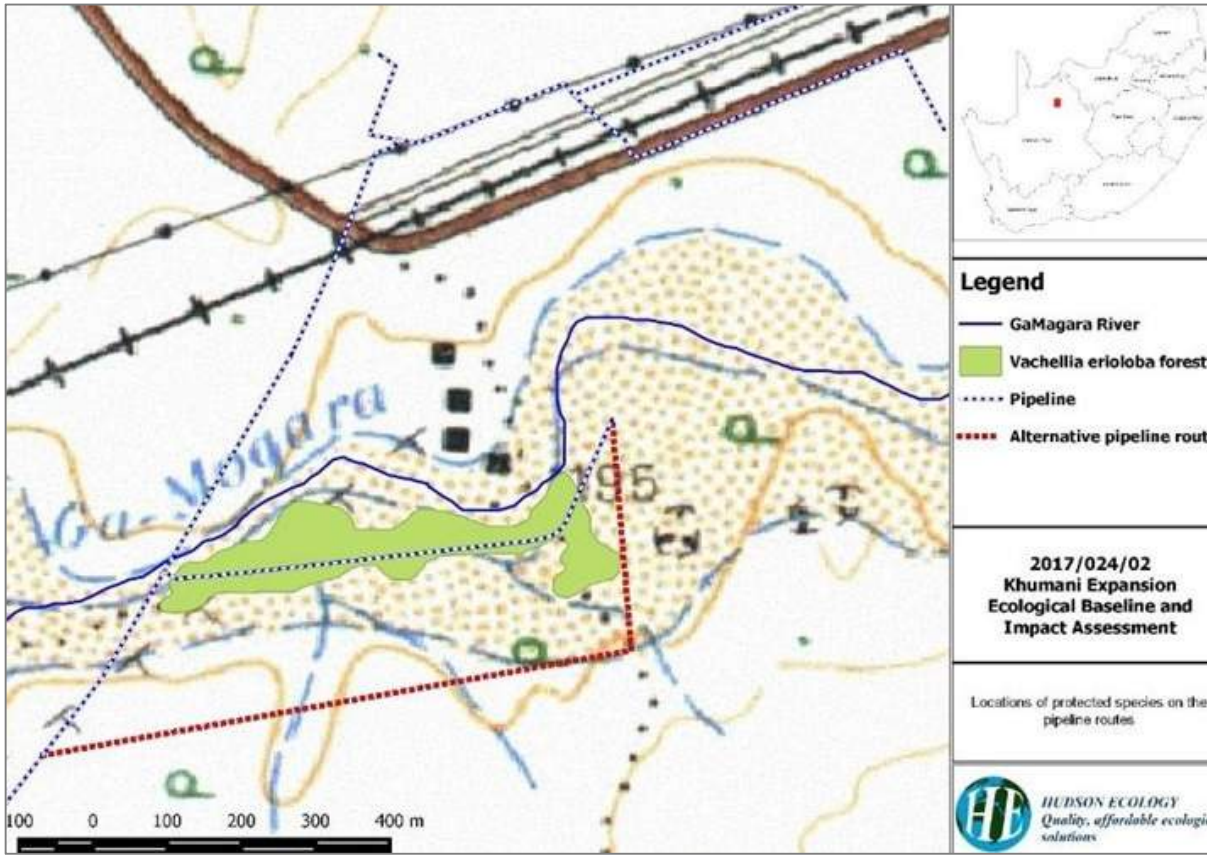


Figure 20: Species of concern associated with the pipeline routes

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.

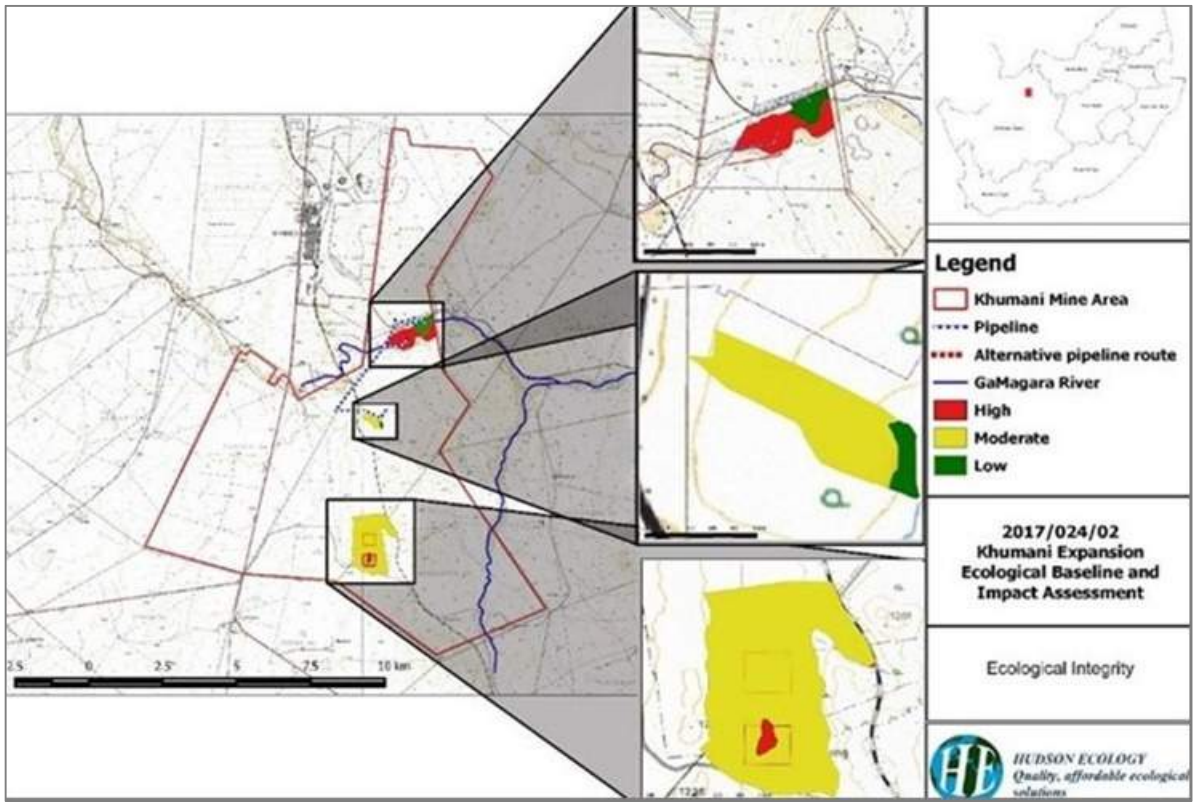


Figure 21: Ecological Integrity of Study Area

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.

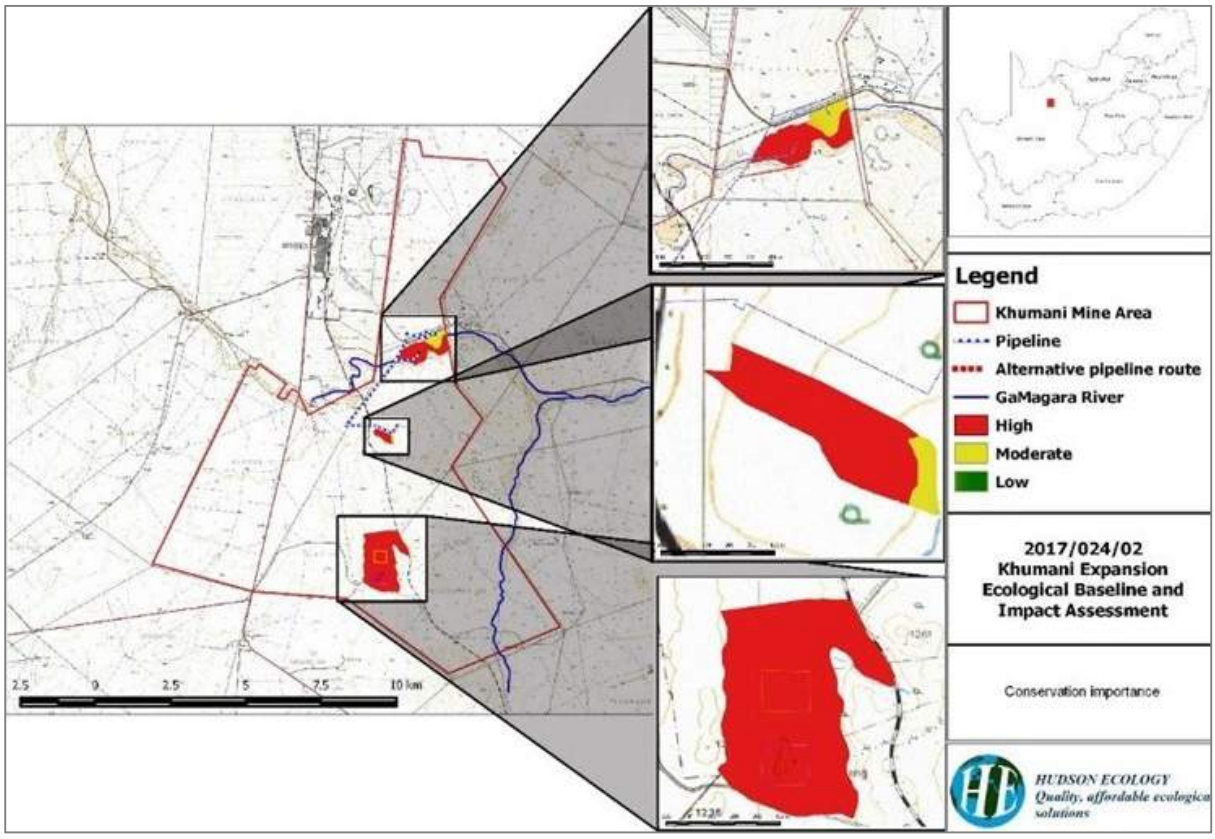


Figure 22: Conservation Importance of Study Area

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.

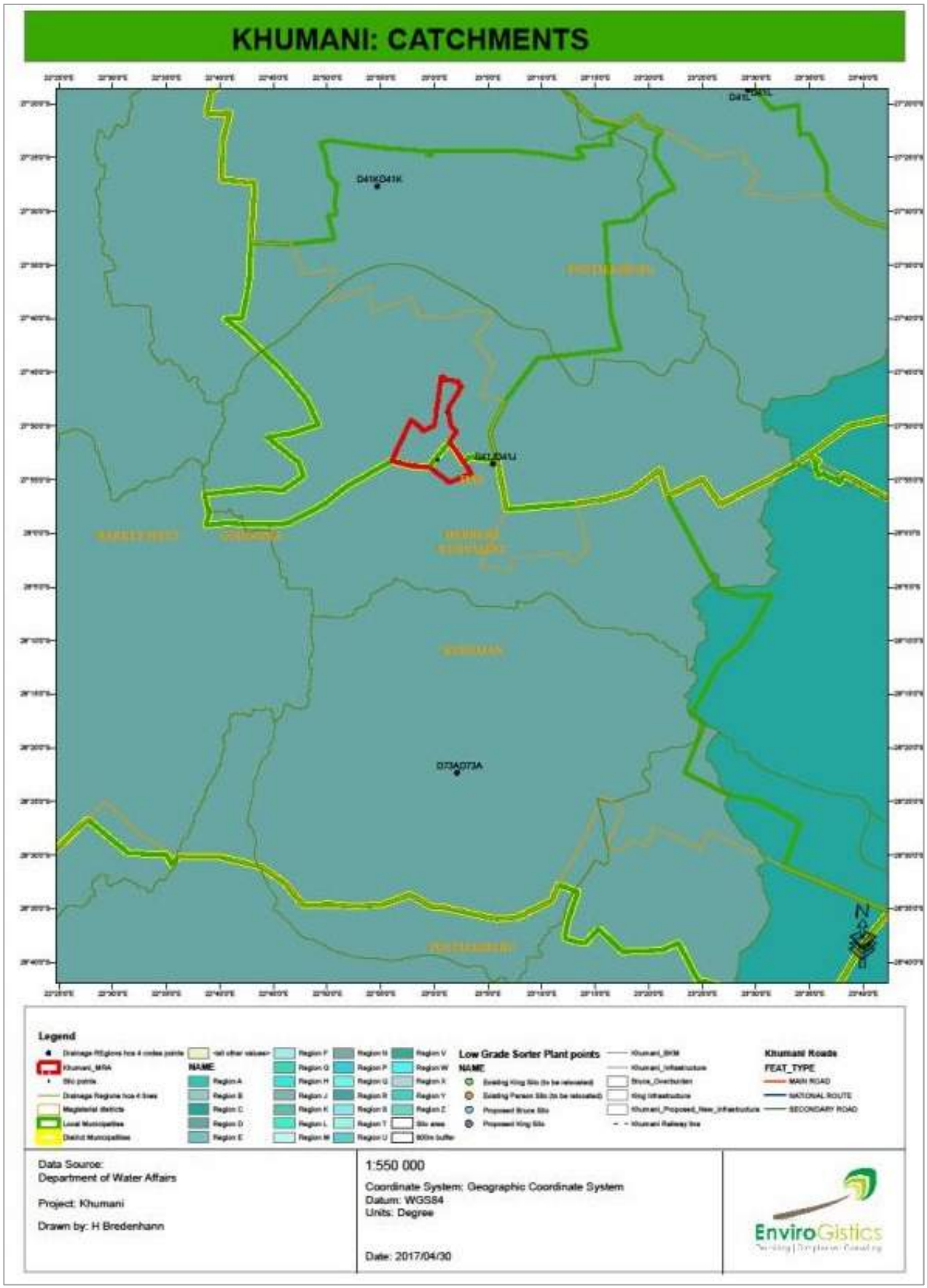


Figure 23: Catchments

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.

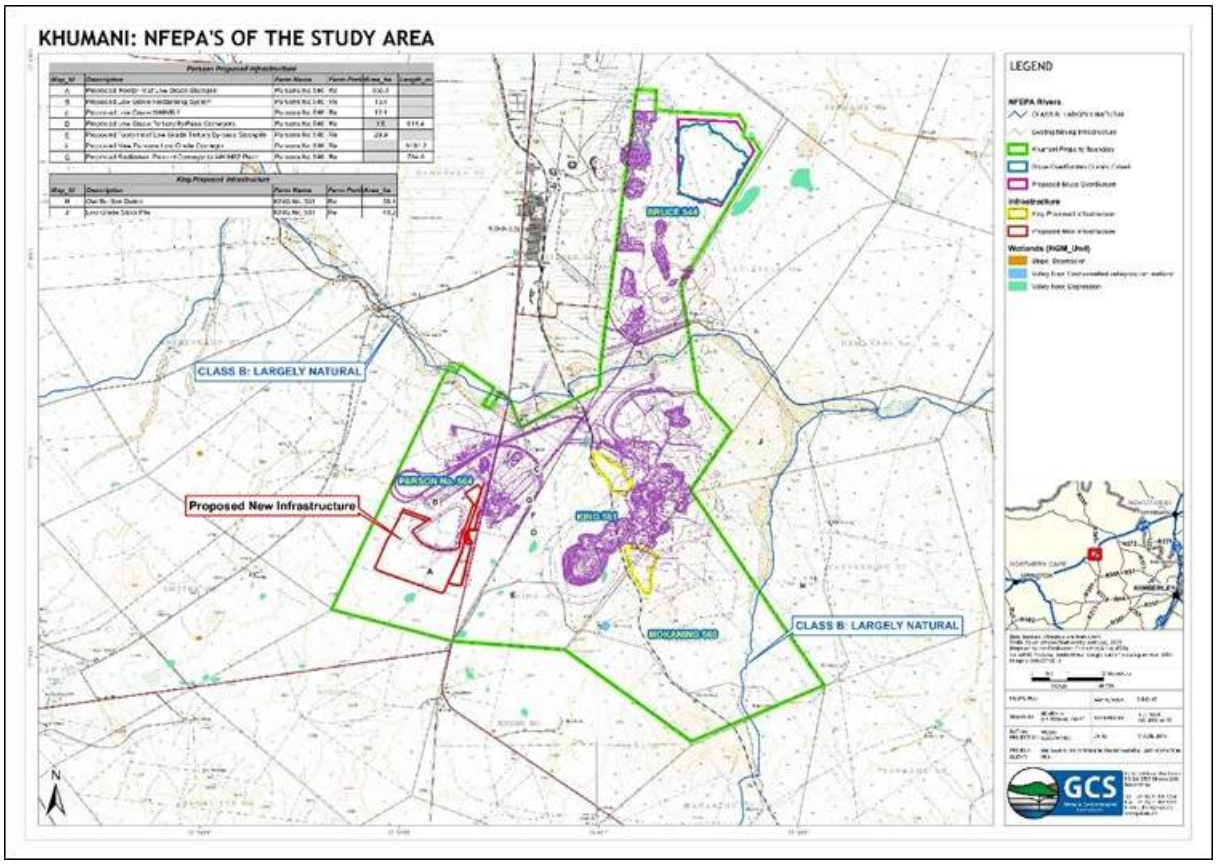


Figure 24: NFEPA Wetlands and Rivers

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

Heritage Assessment

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

Stone Age

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%.

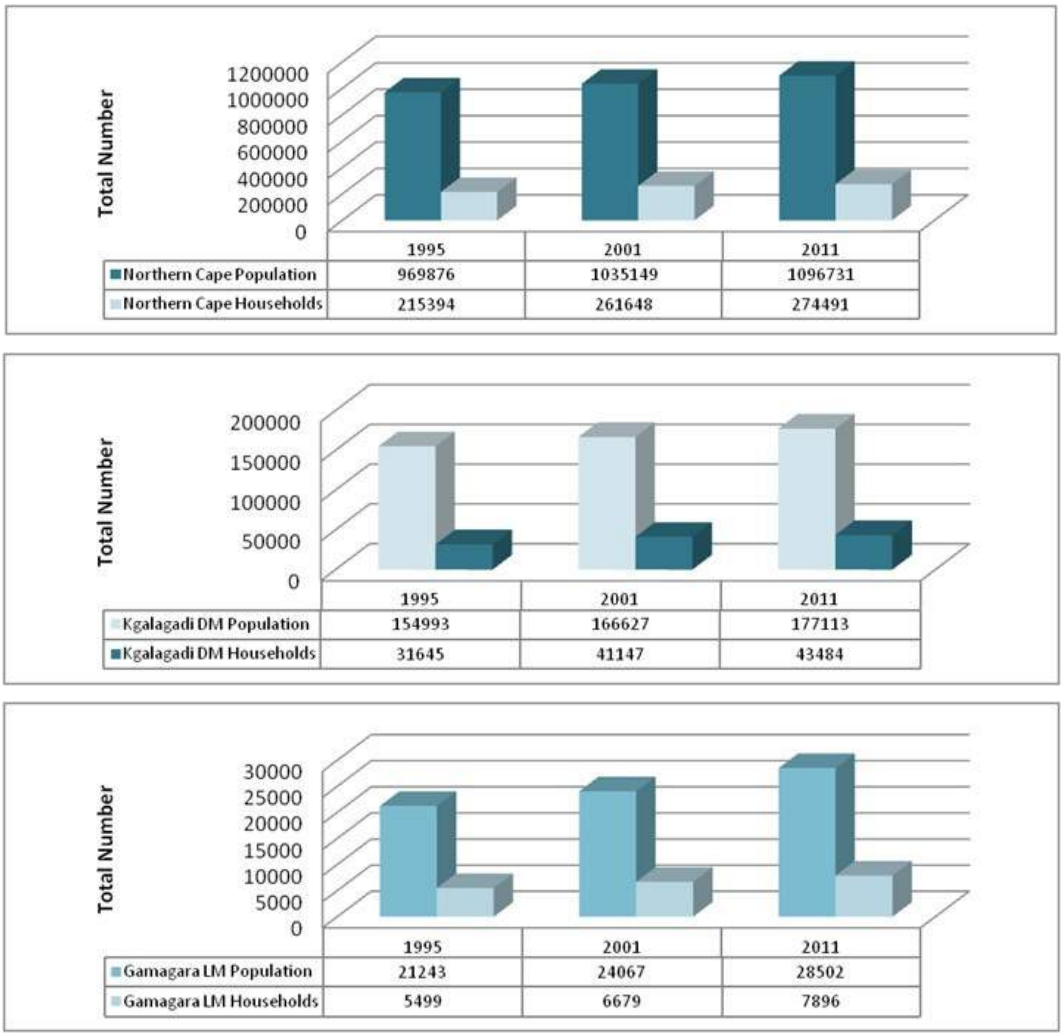


Figure 25: Population and household size (1995 – 2011) Age

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.

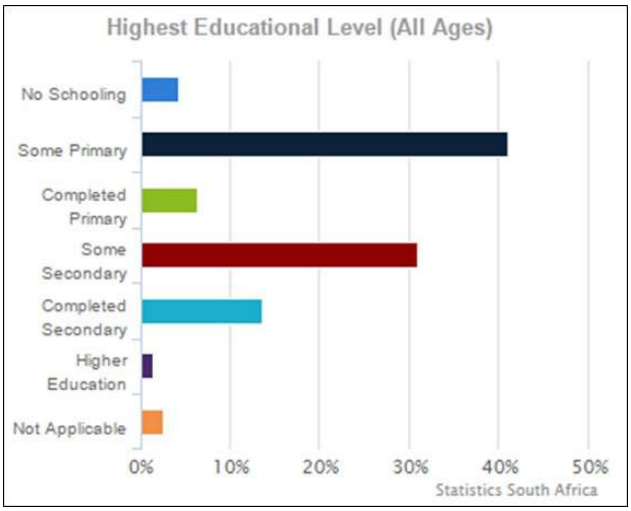


Figure 26: Education Level (2011)

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.

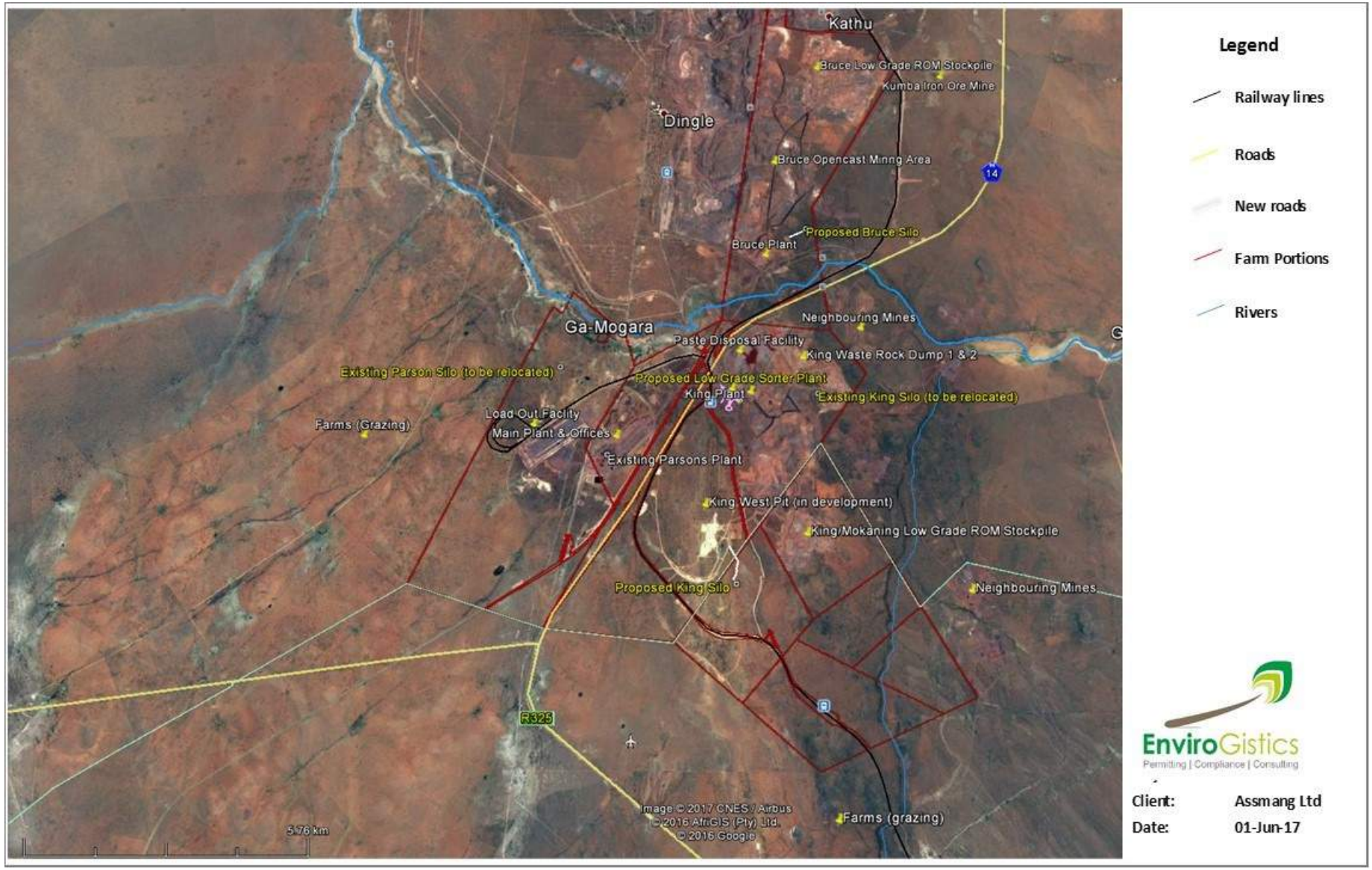


Figure 27: Project Location within overall Land Use Setting

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							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
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		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	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. 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.	x	x		
	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. Strictly enforced speed limits on haul roads	Recording of dust fall out to determine trends.	Meeting ambient dust fall out limits in terms of applicable NEM:AQA Regulations.				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
				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 **Decommissioning Activities:** The existing King and Parson Emulsion Silos, Ammonium Nitrate Silos and explosive magazines will be decommissioned. The decommissioning	Geology	No direct impact	-	-	-	-	-	-	-	-
	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.						
			Speed control measures will be implemented by the mine through the placement of adequate signage.		Remain within the National Environmental Management: Air Quality Act, 2004 Dust Regulation guidelines for rural communities.				
			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.			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.		Maintain a 100% safe disposal record on the disposal of hazardous waste.				
			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

Annexure 1: Proof of NEMA Application Submission and DMR Acknowledgment of Receipt

mineral resources
Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

Private Bag X 6093 Kimberley, 8300; Tel: 0538071700; Fax: 0538328593
65 Phakamile Mabija, 1st Floor Permanent Building, Kimberley 8300

Enquiries: H.D. Mashau Ref No: NC 30/5/1/2/2/ (070) MR
E-mail address: humbulani.mashau@dmr.gov.za
Mine Environmental Management

BY REGISTERED MAIL

The Directors
Assmang (Pty) Ltd
P.O Box 22014
Helderkruin
1733

Attention: Tanja Bekker **Email:** 086 551 5233

ACKNOWLEDGEMENT OF AN APPLICATION FOR ENVIRONMENTAL AUTHORISATION LODGED IN TERMS OF SECTION 24 OF NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 (ACT 107 OF 1998) READ WITH REGULATION 19 OF THE ENVIRONMENTAL IMPACT ASSESSMENT (EIA) REGULATIONS, 2014 FOR MINING RIGHT AND RELATED INFRASTRUCTURAL ACTIVITIES ON THE FARM KING 561, PORTION OF REMAINDER OF FARM MOKANING 260, PORTION 1 OF FARM PARSON 564, PORTION OF REMAINDER OF PARSON 564, PORTION 9 OF FARM BRICE 544, SITUATED IN THE MAGISTERIAL DISTRICT OF KURUMAN NORTHERN CAPE REGION.

1. I refer to the abovementioned matter and confirm that your application for an Environmental Authorisation herein referred to as "EA" lodged on **12th June 2017** is hereby acknowledged.
2. Acknowledgement of your application does not grant you permission to commence with mining activities. Commencement of a listed activity without an environmental authorisation constitutes an offence in terms of Section 49A (1) (a) of NEMA, 1998 (Act 107 of 1998) as amended and upon conviction for such an offence, a person

is liable to a fine not exceeding R10 million or to imprisonment for a period not exceeding ten years, or to both such fine and such imprisonment.

3. NB: Regulation 45 of 2014 EIA Regulations stipulates that "an application in terms of these Regulations lapses and a competent authority will deem the application as having lapsed, if the applicant fails to meet any of the time-frames prescribed in terms of these Regulations, unless extension has been granted in terms of regulation 3(7)."

Hope that this letter will receive your utmost attention.

.....

REGIONAL MANAGER: MINERAL REGULATION
NORTERN CAPE REGION
DATE..19/06/2017.....

Please quote this office file number for any correspondence as reference

Annexure 2: EAP Curriculum Vitae

EnviroGistics
Permitting | Compliance | Consulting

Curriculum vitae: Ms Tanja Bekker

Name	:	Bekker, Tanja
Date of Birth	:	23 June 1980
Profession/Specialisation	:	Environmental Project Manager / Cert. Environmental Assessment Practitioner
Nationality	:	South African
Years' Experience	:	14 Years

Key qualifications

Ms Tanja Bekker has more than 14 years' working experience in the Environmental Consultancy Industry. Her key focus is environmental management and compliance with extensive experience in the mining industry. Project Management and Coordination form a critical component of her duties, which include environmental gap analysis, 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 assisting the client and engineering team in adding value to develop a project in and environmental sustainable manner, considering client costs and liabilities, as well as the implication of environmental regulatory requirements and conditions 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 Impact Assessments, Environmental Management Plans and implementation and auditing of Environmental Management Plans and Authorisations.

Ms Bekker has significant experience in integrated environmental management processes, such as Environmental Scoping Assessment, Environmental Impact Assessments (EIAs) and Basic Assessment Reports (BARs), and the development of Environmental Management Plans (EMP). Her experience further spans into the formulation and management of Water Use License Applications and Integrated Water and Waste Management Plans. Her experience and professional registrations has resulted in her capabilities to act as a Project Manager and Peer Reviewer for Environmental Authorisation Projects ensuring the independence of such projects, as well as Project undertaken in terms of IFC/World Bank Requirements.

She has comprehensive experience and thorough understanding of the National Environmental Act, 1998 and subsequent Regulations; National Environmental Management: Waste Act, 2008; National Environmental Management: Air Quality Act, 2004; National Water Act, 1998 and the Mineral and Petroleum Resources Development Act, 2002. She is a certified ISO 14001 Lead Auditor and has been involved in conducting environmental audits and site assessments, implementing of EMPs, as well as assessing environmental compliance. She has acted as the Large Account Manager for various mining companies including Total Coal South Africa (involved for 7 year), as well as for Assmang's Ferrous Division (involved for 12 years).

Ms. Bekker acts as a Guest Lecturer at the University of Johannesburg at the Department of Geography and Environmental Management, where she lectures 3rd and 4th year students on matters regarding Environmental Management and the implementation of knowledge into the Environmental Consulting Field.

Ms Bekker is a registered Professional Natural Scientist with the South African Council of Natural Science Professional Board and is also a Certified Environmental Assessment Practitioner with the interim Certification Body of Environmental Practitioner Association of South Africa (EPASA) a legal requirement of the National Environmental Management Act, 1998.

PO Box 22014 | Helderkruin | 1733
tanja@envirogistics.co.za
082 412 1799
086 551 5233

Employment Record

02/2015 to current:	EnviroGistics – Owner
01/2007 to 04/2014:	GCS (Pty) Ltd – Project Manager; Environmental Unit Manager
06/2006 to 12/2006:	WSP Environmental (Pty) Ltd – Environmental Scientist
09/2003 to 05/2006:	GCS (Pty) Ltd – Environmental Scientist
08/2002 to 08/2003:	Digby Wells and Associates – Junior Environmental Scientist
04/2001 to 07/2002 (Part time):	UWP Engineers – Part Time Digitizer – GIS (Arc View)

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).

Languages

	Reading	**Writing**	**Speaking**
English	Excellent	Excellent	Excellent
Afrikaans	Excellent	Excellent	Excellent

Experience Record

1. **National Water Act, 1998**

- Water Use License Application in terms of the National Water Act, 1998 – Compilation of the Water Use License Application for Eden Districts Municipality (2004)
- Senior Review of the Total Coal South Africa, DCM East Water Use License Application (2011)
- Assmang Ltd, Khumani Iron Ore Mine, Senior Project Manager in the application for a holistic Water Use License for the Khumani Iron Ore Mine (2012)
- Assmang Ltd, Beeshoek Iron Ore Mine, Senior Project Management in the application for a holistic Water Use License for the Beeshoek Iron Ore Mine (2013)
- Assmang Ltd, Khumani Iron Ore Mine, Senior Project Manager in the amendment of approved Water Use License with the inclusion of strategic water uses to streamline the application process (2013)
- Senior Consultant in the addressing the appeal of the Total Coal South Africa, DCM East Water Use License Application (2013)
- Water Use License Application for Dwarsrivier Chrome Mine (2016);
- Water Use License Application for Beeshoek Iron Ore Mine (2016);
- Water Use License Application for NWK Liquid Fertiliser (2016);
- Water Use Licence Application for emergency water abstraction for Khumani Iron Ore Mine (2016-current).
- Formulation of Integrated Water and Waste Management Plan for Beeshoek Iron Ore Mine (2016)
- Formulation of Integrated Water and Waste Management Plan for Dwarsrivier Chrome Mine (2016)

- Management of Risk Assessment for a General Authorisation of River Crossings in the Steelpoort area (2017- current)

2. Mineral and Petroleum Resources Development Act, 2002

- Prospecting Right Application and Environmental Management Plan – Project manager and coordination of the environmental authorisation process on the farm McCarthy for Assmang Ltd for the prospecting of iron ore in the Northern Cape Province. Responsibilities included the overall management of the project with the compilation of the application and subsequent Environmental Management Plan (2004)
- Prospecting Right Application and Environmental Management Plan – Project manager and coordination of the environmental authorisation process on the farm Doornfontein for Assmang Ltd for the prospecting of iron ore in the Northern Cape Province. Responsibilities included the overall management of the project with the compilation of the application and subsequent Environmental Management Plan (2004)
- Prospecting Right Application – Main responsibility involved the compilation and submission of a Prospecting Right Application and associated Environmental Management Plan for Rovic (Pty) Ltd on the farm Rietkuil (2005)
- Prospecting Right Application – Main responsibility involved the compilation and submission of a Prospecting Right Application and associated Environmental Management Plan for Rovic (Pty) Ltd on the farms Ou Damplaats, Mineside, Redhills, Woolcott and Prospect (2005)
- Prospecting Right Application – Project manager for the environmental authorisation process for a Prospecting Right Application for Khusela Womens Investments (Pty) Ltd on the farm Loopspruit in the Mpumalanga Province. Main responsibility involved the coordination of the public participation process and associated Environmental Management Plan (2005)
- Prospecting Right Application – Project manager for the environmental authorisation process for a Prospecting Right Application for Khusela Womens Investments (Pty) Ltd on the farm Van Kolderskop in the Mpumalanga Province. Main responsibility involved the coordination of the public participation process and associated Environmental Management Plan (2005)
- Mining Right Application, Environmental Authorisation and Rehabilitation Fund - Project manager and co-ordination of the environmental authorisation process for the green fields Khumani Iron Ore Mine for Assmang Ltd. Main responsibilities involved the application for the Mining Right Application and subsequent liaison with the relevant authorities; coordination and management of sub consultants; liaison with the relevant stakeholders, which included the consultation in terms of purchasing of land and utilisation of bulk services; coordination and management of the public participation process; overview of the Water Use License Application; Environmental Feasibility Reporting; Site Selection process for the location of a paste disposal facility; Scoping Reporting, interpreting of specialist investigations and results and Environmental Impact Assessment and Management Reporting and the compilation of the rehabilitation fund (2006)
- Environmental Programme Addendum – Project manager and coordination of the addendum of the Harmony Randfontein Operation's approved Environmental Management Programme to alight the report with the requirements of the Mineral and Petroleum Resources Development Act, 2002, as well as the undertaking of the relevant public participation process
- Environmental Programme Addendum – Project manager and coordination of the addendum of the Harmony Randfontein Operation's approved Environmental Management Programme to align the report with the requirements of the Mineral and Petroleum Resources Development Act, 2002, as well as the undertaking of the relevant public participation process (2006)
- Environmental Programme Amendment - Project manager and coordination of the Merensky Environmental Management Programme Amendment for Anglo Platinum in Amandelbult. Main responsibilities involved the coordination of sub consultants, interpreting of specialist investigations and results, quality control, coordination of the public participation process and client liaison (2006)
- Environmental Programme Amendment - Project manager and coordination of the UG2 Environmental Management Programme Amendment for Anglo Platinum in Amandelbult. Main responsibilities involved the coordination of sub consultants, interpreting of specialist investigations and results, quality control, coordination of the public participation process and client liaison (2006)

- Environmental Programme Amendment - Project manager and coordination of the Khumani Iron Ore Mine Amendment for the inclusion of the mining of the barrier pillar between the mine and Sishen Iron Ore Mine for Assmang Limited. Main responsibilities involved the coordination and management of the project, interpreting of specialist investigations and results, quality control, coordination of the public participation process and client liaison, as well as the formulation of the financial closure cost (2007)
- Mining Right Application and Environmental Management Programme - Project manager and coordination for a mega tailings dam extension for Mine Waste Solutions, First Uranium South Africa in the Northwest Province. Main responsibilities involved the coordination and management of the project, quality control, coordination of the public participation process and client liaison, as well as the formulation of the financial closure cost (2007)
- Environmental Management Programme - Project manager and coordination of the green fields East Mine Expansion Project for Total Coal South Africa for the establishment of new opencast and underground operations with the associated plant and ancillary infrastructure, including a railway line link to the Richard Bay Coal Terminal. Main responsibilities involved the coordination and management of the project, compilation of the environmental feasibility report, interpreting of specialist investigations and results, site selection for a co-disposal facility and new railway line, quality control, coordination of the public participation process and client liaison, as well as the formulation of the financial closure cost (2008)
- Environmental Programme Amendment – Project manager and coordination of the amendment of the Harmony Kalgold Operation's approved Environmental Management Programme to align the report with the requirements of the Mineral and Petroleum Resources Development Act, 2002. Main responsibilities involved the coordination and management of the project, quality control, coordination of the public participation process and client liaison, as well as the formulation of the financial closure cost, as well as the undertaking of the relevant public participation process (2008)
- Environmental Management Programme Amendment - Project manager and coordination of the East Mine Option 1 Project for Total Coal South Africa for the establishment of conveyor line link to the Richard Bay Coal Terminal. Main responsibilities involved the coordination and management of the project, interpreting of specialist investigations and results, quality control, and client liaison, as well as the formulation of the financial closure cost (2009 and ongoing)
- Environmental Management Programme Amendment - Project manager and coordination of the West Mine Project for Total Coal South Africa for the establishment of new opencast and underground operations with the associated plant and ancillary infrastructure. Main responsibilities involved the coordination and management of the project, interpreting of specialist investigations and results, quality control and client liaison (2009)
- Environmental Management Programme Amendment – Project manager and coordination of the Black Rock Manganese Mines for Assmang Ltd to align the report with the requirements of the Mineral and Petroleum Resources Development Act, 2002 and to include activities such as a new plant, water treatment facility, footprint increases, etc. Main responsibilities involved the coordination and management of the project, quality control, coordination of the public participation process and client liaison, as well as the formulation of the financial closure cost (2009)
- Total Coal Service Level Agreement – Responsible for the coordination of the environmental projects and legal requirements for the Total Coal operations (2010 to current)
- Environmental Management Programme Amendment - Project manager and coordination of the Khumani Iron Ore Amendment project (2012)
- Environmental Management Programme Amendment (Low Grade Stockpile) – Project Management and coordination for the Khumani Iron Ore Mine (2014 ongoing)
- Environmental Management Programme Amendment – Project Management and coordination for Beeshoek Iron Ore Mine (2014 ongoing)
- Mukulu PFS Planning Project with Hatch - Project Management and coordination (2013 ongoing)
- DRA Project Planning and Client Advisory Role – Ad Hoc Appointment (2013 ongoing)
- Sable Metal and Minerals, Sandbult Prospecting Right Application Environmental Management Plan (2014)
- Sable Metal and Minerals, Bierkraal Prospecting Right Application Environmental Management Plan (2014)
- Sable Metal and Minerals, Doornpoort Prospecting Right Application Environmental Management Plan (2014)

3. Closure Assessments and Financial Provision in terms of the Mineral and Petroleum Resources Development Act, 2002

- Glossam Closure Assessment - Project manager of the historic Glossam Mine operations for Assmang Ltd to obtain closure in terms of the requirements of the Mineral and Petroleum Resources Development Act, 2002 Main responsibilities involve the coordination and management of the project, quality control, client liaison, as well as the formulation of the financial closure cost (2009)
- Japiesrus Closure Assessment - Project manager of the historic Glossam Mine operations for Assmang Ltd to obtain closure in terms of the requirements of the Mineral and Petroleum Resources Development Act, 2002 Main responsibilities involve the coordination and management of the project, quality control, client liaison, as well as the formulation of the financial closure cost (2011)
- Financial Provision Assessment – Responsible for the assessment of and reporting on the financial closure cost for Assmang Ltd for the Beeshoek Iron Ore Mine, Northern Cape (2007)
- Financial Provision Assessment – Responsible for the assessment of and reporting on the financial closure cost for Simmer and Jack Ltd for the Buffelsfontein Gold Mine, Northwest Province (2007)
- Financial Provision Assessment – Responsible for the assessment of and reporting on the financial closure cost for Simmer and Jack Ltd for the Buffelsfontein Gold Mine, Northwest Province (2008)
- Financial Provision Assessment – Responsible for the assessment of and reporting on the financial closure cost for Assmang Ltd for the Beeshoek Iron Ore Mine, Northern Cape (2009)
- Financial Provision Assessment – Responsible for the assessment of and reporting on the financial closure cost for Assmang Ltd for the Khumani Iron Ore Mine, Northern Cape (2009)
- Financial Provision Assessment – Responsible for the assessment of and reporting on the financial closure cost for Assmang Ltd for the Black Rock Manganese Mine, Northern Cape (2009)
- Financial Provision Assessment – Responsible for the assessment of and reporting on the financial closure cost for Simmer and Jack Ltd for the Buffelsfontein Gold Mine, Northwest Province (2009)
- Financial Provision Assessment - Responsible for the assessment of and reporting on the financial closure cost for Total Coal South Africa for the Dorstfontein East Project, Mpumalanga (2009)
- Financial Provision Assessment - Responsible for the assessment of and reporting on the financial closure cost for Total Coal South Africa for the Forzando West Project, Mpumalanga (2011)
- Financial Provision Assessment - Responsible for the assessment of and reporting on the financial closure cost for Khumani Iron Ore Mine (2014)
- Financial Provision Assessment - Responsible for the assessment of and reporting on the financial closure cost for Sable Metals and Minerals, Bierkraal Prospecting Area (2014)
- Financial Provision Assessment - Responsible for the assessment of and reporting on the financial closure cost for Sable Metals and Minerals, Sandbult Prospecting Area (2014)
- Financial Provision Assessment - Responsible for the assessment of and reporting on the financial closure cost for Sable Metals and Minerals, Doornpoort Prospecting Area (2014)
- Financial Provision Assessment for Beeshoek Iron Ore Mine 2015;
- Financial Provision Assessment for Khumani Iron Ore Mine, 2015;
- Financial Provision Assessment for Petra Diamonds Prospecting Right, 2016;
- Financial Provision Assessment for Beeshoek Iron Ore Mine, 2016;
- Financial Provision Assessment for Khumani Iron Ore Mine, 2016;
- Financial Provision Assessment in terms of the NEMA Regulations for the ARM Ferrous Operations, Northern Cape, 2016.

4. Environmental Conservation Act, 1989

- Environmental Authorisation - Project manager and co-ordination of the environmental authorization process for the green fields Khumani Iron Ore Mine for Assmang Ltd to obtain approval for listed activities (2005)
- Environmental Authorisation – Compilation of the Environmental Impact Assessment Report for the Gerus-Murani Power line in Namibia for NamPower (2006)

- Environmental Authorisation – Project manager and co-ordination of the environmental authorization for Blue Horisons Investments for the Paarl eco-estate development in Lephalale, Limpopo Province. Main responsibilities involved the coordination of sub consultants, quality control, coordination of the public participation process and client liaison (2006)
- Environmental Authorisation – Project manager and co-ordination of the environmental authorization for Blue Horisons Investments for the Madulakgogo eco-estate development in Burgersford, Mpumalanga Province. Main responsibilities involved the coordination of sub consultants, quality control, coordination of the public participation process and client liaison (2006)

5. **National Environmental Management Act, 1998**

- Environmental Authorisation for listed activities - Project manager and coordination for a mega tailings dam extension and associated listed activities (linear, plant, areas greater than 20ha, etc.) for Mine Waste Solutions, First Uranium South Africa in the Northwest Province. Main responsibilities involved the coordination and management of the project, interpreting of specialist investigations and results, quality control, coordination of the public participation process and client liaison, as well as the formulation of the financial closure cost (2007)
- Environmental Authorisation for listed activities - Project manager and coordination of the green fields East Mine Expansion Project for Total Coal South Africa for the authorisation of listed activities that included areas greater than 20ha, railway lines, conveyors, mining within wetland and watercourse areas, etc. Main responsibilities involved the coordination and management of the project, interpreting of specialist investigations and results, site selection for a co-disposal facility and new railway line, quality control, coordination of the public participation process and client liaison, as well as the formulation of the financial closure cost (2008)
- Basic Assessment for listed activities - Project manager and coordination for Assmang Ltd for the Khumani Iron Ore Mine for the temporary storage of diesel along the railway line. Main responsibilities involved the coordination and management of the project, site selection for a co-disposal facility and new railway line, interpreting of specialist investigations and results, quality control, coordination of the public participation process and client liaison, as well as the formulation of the financial closure cost (2008)
- Basic Assessment for listed activities - Project manager and coordination for Harmony Gold Mines Limited for the Evander Operations for the closure of a domestic waste disposal site. Main responsibilities involved the coordination and management of the project, interpreting of specialist investigations and results, coordination of specialists, closure alternatives, quality control, coordination of the public participation process and client liaison (2008)
- Environmental Authorisation for listed activities - Project manager and coordination of the West Mine Expansion Project for Total Coal South Africa for the authorisation of listed activities that included areas greater than 20ha, conveyors, mining within wetland and watercourse areas, etc. Main responsibilities involved the coordination and management of the project, interpreting of specialist investigations and results, quality control, coordination of the public participation process and client liaison (2009)
- Environmental Authorisation for listed activities - Project manager and coordination of the of the East Mine Option 1 Project for Total Coal South Africa for the authorisation of listed activities that involve conveyors, activities within wetland and watercourse areas, etc. Main responsibilities involved the coordination and management of the project, interpreting of specialist investigations and results, quality control, and client liaison, as well as the formulation of the financial closure cost (2009)
- Environmental Authorisation for listed activities - Project manager and coordination of the Black Rock Manganese Mines for Assmang Ltd for the authorisation of listed activities that included diesel storage and generation etc. Main responsibilities involved the coordination and management of the project, quality control, coordination of the public participation process and client liaison (2009)
- Environmental Authorisation for listed activities - Project manager and coordination of the Black Rock Manganese Mines for Assmang Ltd for the authorisation of listed activities, which include a new Eskom power line. Main responsibilities involve the coordination and management of the project, quality control, coordination of the public participation process and client liaison (2009)

- Environmental Management Programme Amendment - Project manager and coordination of the Khumani Iron Ore Amendment project (2011)
- Risk Assessments for current Total Coal Operations
- Khumani Low Grade Stockpile Environmental Authorisation – Peer Review and Overall Advisory Capacity (2014 and ongoing)
- Nederburg (Distell Ltd) Mixed Land Use Environmental Authorisation – Principal Environmental Practitioner (2014 -2015)
- Basic Assessment Application for the upgrade of a Storm Water Dam for Beeshoek Iron Ore Mine, 2016;
- Basic Assessment Application for a Prospecting Right Application for Barkley West, Petra Diamonds, 2015;
- Basic Assessment Application for a Prospecting Right Application for Carter Block, Petra Diamonds, 2015;
- Basic Assessment Application for a Prospecting Right Application for Farm 87&88, Petra Diamonds, 2015;
- Environmental Impact Assessment for the storage of dangerous goods for NWK Liquid Fertiliser, 2016.
- Basic Assessment Application for an upgrade to a Storm Water Dam on an Iron Ore Mine, 2016.
- Basic Assessment Application for the expansion of mining activities and infrastructure at the Khumani Iron Ore Mine, 2017-current.
- Basic Assessment Application for a Prospecting Application near Loeriesfontein, 2017-current.

6. Crack Surveys

- Mining Related Crack Survey – Responsible for the establishment of the potential impact on surrounding farm houses for Assmang Ltd for the Khumani Iron Ore Mine with relation to blasting activities. Main responsibility was the establishment of methodology and associated consultation with relevant specialists in the field and the associated reporting (2005)
- Residential Crack Survey – Responsible for determining the current status of houses in an area earmarked for business expansion in Hyde Park For Impafa Technologies (2006)

7. Air Emission Licenses

- Khumani Iron Ore Mine, Diesel Tank Atmospheric Emission License (2014)
- Coordination of LDAR Monitoring at the Khumani Iron Ore Mine (2017)
- Assistance in NAIES Reporting for the Assmang Chrome Machadodorp Operations (2017)

8. Audits, Gap Analysis and Due Diligence

- Due Diligence - Formed part of the audit team to assess the environmental liabilities as part of two Phase 1 Environmental Site Assessments for both the manufacturing site, as well as the warehouse. Main responsibility was the assessment of the environmental legal compliance in terms of the national, provincial and municipal legislation (2004)
- Participated as part of the audit team. The audit involved an ISO 14000 assessment in terms of the environmental, health and safety. Main areas of responsibility were to provide guidance in terms of the environmental statues of the South African Legislation (2005)
- Expert Summary on Environmental Legal Issues - The Total vs. Tavistock Arbitration assessment involved the environmental legal assessment of the two companies in question's legal status in terms of environmental compliance with specific reference to legal administration and water management. Main responsibly was the provision of an expert summary regarding the environmental legal compliance in terms of the South African Legislation (2006)
- Environmental Audits as part of the requirements of the Environmental Conservation Act, 1989 and the Mineral and Petroleum Resources Development Act, 2002 - Responsible for the formulation of the audit protocols and feedback procedures for the implementation of the environmental management programme for the Khumani Iron Ore Mine, Northern Cape. The assessment involved six month audit programme during the start of the operational phase of the

mine. As part of the assessment the responsibilities involve the provision of action plans to address areas of definite and potential non compliance. The performance assessments were later extended into the operational phase (2007 and ongoing)

- Environmental, Health and Safety Audit - Participated as the lead auditor for eight mining operations within South Africa for African Rainbow Minerals. The audit addressed all aspects of environmental, safety and financial closure cost within the South African Legislation. The assessment involved the formulation of the audit protocols and audit papers (2007)
- Performance Assessment as part of the requirements of the Mineral and Petroleum Resources Development Act, 2002 - Participated as part of the audit team for Assmang Ltd, the Black Rock Manganese Mine, Northern Cape. Responsible for assessing the compliance to environmental aspects in terms of the broader South African Legislation, as well as the assessment of the financial rehabilitation fund (2007)
- Performance Assessment as part of the requirements of the Mineral and Petroleum Resources Development Act, 2002 - Participated as part of the audit team for Total Coal South Africa for the Forzando North and South Mine Operations. Main responsibility was the assessment of the financial rehabilitation fund (2008).
- Performance Assessment as part of the requirements of the Mineral and Petroleum Resources Development Act, 2002 - Annual environmental audit for Assmang Ltd, the Khumani Iron Ore Mine, Northern Cape. Responsible for assessing the compliance to environmental aspects on site (2008)
- Performance Assessment as part of the requirements of the Environmental Conservation Act, 1989 – Annual environmental audits for Assmang Ltd, the Khumani Iron Ore Mine, Northern Cape. Responsible for assessing the compliance to environmental aspects on site (2008)
- Environmental Implementation for the Assmang Khumani Irion Ore Operations (2010 and contract to 2014)
- Performance Assessments for the Total Coal South Africa Operations (2009 to current – part of Service Level Agreement)
- Mooihoek Due Diligence (2013) for RSV Enco
- Gap Analysis in terms of IFC and World Bank Operational Policies for Greenfield Madagascar Graphite Mine (2013/2014)
- Khumani Iron Ore Mine Environmental Performance (NEMA, NEM:WA, NWA and MPRDA) Assessments (2014)
- Northam Platinum: Zondereinde Division Environmental Performance (NEMA, MPRDA and NWA) Assessments (2014)
- Northam Platinum: Zondereinde Division Environmental Performance (NEM:WA) Assessments (2014)
- Dwarsrivier Platinum Mine: Water Management Gap Analysis (2014 and ongoing)
- Khumani Iron Ore Mine Dust Monitoring Gap Analysis (2014)
- DRA Global (2014): Molo Greenfields Mine IFC and World Bank Gap Analysis and project scope formalisation;
- GEM Diamonds Botswana: Ghaghoo Diamond Mine (2015): Waste Management Gap Analysis and Action Plan formalisation
- ASA Metals WUL Performance Assessment, 2015;
- Khumani Iron Ore Mine Environmental Performance (NEMA, NEM:WA, NWA and MPRDA) Assessments (2015);
- Beeshoek Iron Ore Mine Environmental Performance (NEMA, NEM:WA, NWA and MPRDA) Assessments (2015)
- GEM Diamonds Botswana: Ghaghoo Diamond Mine (2015): SEIA Performance Assessment;
- Petra Diamonds Prospecting Right Application Annual Performance Assessment, 2016;
- Glencore WUL Audit,2016;
- Beeshoek Iron Ore Mine Environmental Performance (NEMA, NEM:WA, NWA and MPRDA) Assessments (2016);
- Khumani Iron Ore Mine Environmental Performance (NEMA, NWA and MPRDA) Assessments (2016);
- Beeshoek Iron Ore Mine Environmental Performance (NEMA, NWA and MPRDA) Assessments (2016)
- Dwarsrivier Chrome Mine Environmental Performance (NEMA, NWA and MPRDA) Assessments (2016)
- Sable Metals (2016) Waste Management Gap Analysis and project scope formalisation.

- Glencore Magareng, Thorncliffe and Helena Performance Assessments (NEMA, NEM:WA, NWA) (2016)
- Glencore Wonderkop Performance Assessment (NWA) (2016)
- Transvaal Gold Mining Enterprises Performance Assessment (NEMA and NWA) (2017)

9. Guest Lecture

- 11 August 2015: Environmental Impact Assessment Practices and Principles
- 26 August 2016: Environmental Impact Assessment Practices and Principles

10. Environmental Coordination

- Environmental Coordination for Assmang Chrome Machadodorp Works Operation to ensure the effective implementation of environmental compliance 2015-2016 & renewed for 2016-2017.

Annexure 3: List of Environmental Authorisations

the dme

Department:
Minerals and Energy
REPUBLIC OF SOUTH AFRICA

Private Bag X6093, Kimberley, 8300, Tel: (053) 8300 800, Fax: (053) 8325 631
First Floor, Liberty Corner, 29-31 Currey Street, Kimberley 8301

From: Directorate Mineral Regulation: Northern Cape
Enquiries: Mr. N.B Matodzi **E-mail:** Bethuel.Matodzi@dme.gov.za

Sub Directorate: Mine Environmental Management **Ref:** (NC) 30/5/1/2/3/2/1/070EM

REGISTERED MAIL
The Manager
Assmang Limited
P.O BOX Mancorp Mine
Postmansburg
8423

Dear Sir/Madam

APPROVAL OF ENVIRONMENTAL MANAGEMENT PROGRAMME IN TERMS OF SECTION 39 (4) (A) (I – III) OF THE MINERAL AND PETROLEUM RESOURCES DEVELOPMENT ACT, 2002 (ACT 28 OF 2002) IN RESPECT OF THE MINING RIGHT ON REMAINDER AND PORTION 1 OF KING NO. 561, RE OF MOKANING, PORTION 1 (PRO RATA OF MOKANING NO. 580), PTN 2 (MOKANING B) OF MOKANING NO. 580, PTN 3 (MOKANING C) OF MOKANING NO. 580, PTN 4 (PORTION OF MOKANING B) OF MOKANING NO. 580, AND PTN 5 OF MOKANING NO. 580 AND REMAINDER AND PTN 5 OF BRUCE NO. 544, SITUATED IN THE MAGISTERIAL DISTRICT OF KURUMAN BY ASSMANG LIMITED.

Please find an approved EMProgramme for your operation. Kindly note that the EMProgramme stipulates Environmental Management and has been approved under the following conditions:

1. This approval doesn't purport to absolve **Assmang Limited** from its common law obligations towards the owner (s) of the surface of land affected.

2. This approval provides no relief from the provisions of any other relevant statutory or contractual obligations.

3. All available topsoil must be stripped and stockpiled separately prior to any surface disturbance.

4. Environmental management must conform to the Environmental Management Programme as approved.

5. Mining activities must conform to all legislation and such other conditions as may be imposed by the Regional Manager or any other official of this office, duly authorized thereto.

6. The Department of Public Works, Roads and Transport is responsible for all surface disturbances on the mining area, which includes all historical surface disturbances.

7. The financial provision provided in terms of section 41 and Regulation 53 of the Act must be periodically reviewed and adjusted {Regulation 54 (2) refers} to conform to the above-mentioned mining activities.

8. Any alteration or deviation from the Plan must be reported to the Regional Manager for his approval or consideration.

9. The approved Environmental Management Programme that is attached is for implementation and compliance to the conditions stipulated therein.

10. Note that a copy of the approved Environmental Management Programme must always be available on the mining premises for inspection by duly authorized officers.

11. The plan must be updated on a regular basis with regard to the actual progress of the establishment of surface infrastructure, mining operations and rehabilitation

12. No mining activities and infrastructure are allowed within the 1:50 year flood line or 100m from the edge of the river whatever is the greatest, without the necessary authorization from DWAF.

13. No mining waste will be allowed to be deposited in a natural drainage lines, erosion gullies and or dongas, unless agreed thereto in writing with the Regional Manager.

14. Monitoring must be conducted on a continuous basis.

15. Performance assessment report as contemplated in regulation 55(1)(c) must be submitted annually (from the date on which the right was granted) to the Regional Manager: Mineral Regulation.

.....

M.J MNDAWENI
REGIONAL MANAGER
NORTHERN CAPE REGION

DATE:.....

the dme

Department:
Minerals and Energy
REPUBLIC OF SOUTH AFRICA

By Hand

From: Directorate Mineral Development: Northern Cape
Private Bag X 6093, Kimberley, 8300, Tel: 053 – 8300 800, Fax: 053 – 832 5631
Liberty Life Building, 29 –31 Currey Street, Kimberley, 8301

Enquiries: Mr. N.A. Tshivhandekano: aubrey.tshivhandekano@dme.gov.za

Sub Directorate: Mine Environmental Management **Ref:** (NC) 30/5/1/2/3/2/1/070EM

REGISTERED MAIL
The Manager
Assmang Ltd
PO Box Mancorp Mine
Postmansburg
8423

Dear Sir/Madam

APPROVAL OF ENVIRONMENTAL MANAGEMENT PROGRAMME IN TERMS OF SECTION 39 (4) (A) (I – III) OF THE MINERAL AND PETROLEUM RESOURCES DEVELOPMENT ACT, 2002 (ACT 28 OF 2002) IN RESPECT OF THE MINING RIGHT FOR IRON ORE ON REMAINDER AND PORTIONS 1 OF KING NO.561, RE OF MOKANING, PORTION 1 (PRORATA OF MOKANING NO.580), POTION 2 (MOKANING B) OF MOKANING NO.580, PORTION 3 (MOKANING C) OF MOKANING NO.580, PORTION 4 (PORTION OF MOKANING B) OF MOKANING NO.580, AND PORTION 5 OF MOKANING NO.580 AND REMAINDER AND PORTION 5 OF BRUCE NO. 544 SITUATED IN THE MAGISTERIAL DISTRICT OF KURUMAN BY ASSMANG LTD.

Please find an approved Environmental Management Programme (EMP) for your operation. Kindly note that the EMP stipulates Environmental Management and has been approved under the following **conditions:**

1. This approval doesn't purport to absolve **Assmang Ltd** from its common law obligations towards the owner (s) of the surface of land affected.
2. This approval provides no relief from the provisions of any other relevant statutory or contractual obligations.
3. All available topsoil must be stripped and stockpiled separately prior to any surface disturbance.
4. Environmental management must conform to the Environmental Management Programme as approved.

5. Mining activities must conform to all legislation and such other conditions as may be imposed by the Regional Manager or any other official of this office, duly authorized thereto.

6. The company is responsible for all surface disturbances on the Mining area, which includes all historical surface disturbances.

7. The financial provision provided in terms of section 41 and Regulation 53 of the Act must be periodically reviewed and adjusted {Regulation 54 (2) refers} to conform to the above-mentioned mining activities.

8. Any alteration or deviation from the Environmental Management Programme must be reported to the Regional Manager for his approval or consideration.

9. The approved Environmental Management Programme that is attached is for implementation and compliance to the conditions stipulated therein.

10. Note that a copy of the approved Environmental Management Programme must always be available on the mine premises for inspection by duly authorized officers.

11. The Environmental Management Programme must be updated on a regular basis with regard to the actual progress of the establishment of surface infrastructure, mining operations and rehabilitation

12. No Mine waste will be allowed to be deposited in a natural drainage lines, erosion gullies and or dongas, unless agreed thereto in writing with the Regional Manager.

13. Monitoring must be conducted on a continuous basis in line with regulation 55.

14. Performance assessment report as contemplated in regulation 55(1)(c) must be submitted annually (from the date on which the right was granted) to the Regional Manager: Mineral Development

Approved as an amendment to the EMP by

J. M. MNDAWENI
REGIONAL MANAGER
NORTHERN CAPE REGION

DATE: 25/01/2007

mineral resources
Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

Private Bag X6093, Kimberley, 8300,
Tel: (053) 807 1700, Fax: (053) 8325 631
First Floor, Liberty Corner, 29-31 Currey Street, Kimberley
8301

From: Directorate Mineral Regulation: Northern Cape
Enquiries: Ms Linah Tshikororo **E-Mail**:Tshisikhawe.Tshikororo@dmr.gov.za
Sub Directorate: Mine Environmental Management **Ref:** NC 30/5/1/2/3/2/1/070 EM

REGISTERED MAIL

The Director
Assmang Limited
P.O Box 782058
Sandton
2146

Dear Sir

APPROVAL OF AN ENVIRONMENTAL MANAGEMENT PROGRAMME AMENDMENT IN TERMS OF SECTION 102 OF THE MINERAL AND PETROLEUM RESOURCES DEVELOPMENT ACT, 2002 (ACT 28 OF 2002) FOR RAILWAY DIVERSION AND ESTABLISHMENT OF A LOCAL RAILWAY SIDING IN RESPECT OF REMAINDER AND PORTION 1 OF KING NO. 561, REMAINDER OF MOKANING, PORTION 1 (PRO RATA OF MOKANING NO. 580), PORTION 2 (MOKANING B) OF MOKANING NO. 580, PORTION 3 (MOKANING C) OF MOKANING NO.580, PORTION 4 (PORTION OF MOKANING B) OF MOKANING NO. 580, AND PORTION 5 OF MOKANING NO. 580, AND REMAINDER AND PORTION 5 OF BRUCE NO. 544 SITUATED IN THE MAGISTERIAL DISTRICT OF KURUMAN NORTHERN CAPE PROVINCE BY ASSMANG LIMITED.

Please find your approved Environmental Management Plan for your attention and appropriate action. Kindly note that the Environmental Management Plan stipulates Environmental Management and has been approved under the following conditions:

1. This approval doesn't purport to absolve **Assmang Limited** from its common law obligations towards the owner(s) of the surface of land affected.

2. Mining activities must conform to all legislation and such other conditions as may be imposed by the Regional Manager or any other official of this office, duly authorized thereto.

3. The company is responsible for all surface disturbances on the mining area, which includes all historical surface disturbances.

4. The financial provision provided in terms of section 41 and Regulation 53 of the Act must be annually reviewed and adjusted (Regulation 54 (2) refers) to conform to the above-mentioned mining activities.

5. Note that a copy of the approved Environmental Management Plan must always be available on the mining site for inspection by duly authorized officers.

6. No mining waste will be allowed to be deposited in a natural drainage lines, erosion gullies and or dongas, unless agreed thereto in writing with the Regional Manager.

7. Performance assessment report as contemplated in regulation 55 (1) (c) must be submitted every 2 (two) years (from the date on which the right was granted) to the Regional Manager: Mineral Regulation.

Regards,

.....

P SWART

REGIONAL MANAGER

NORTHERN CAPE REGION

DATE: 17/2/2011

ANNEXURE "A"

mineral resources

Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

Mineral Regulation: Northern Cape Region
Mine Environmental Management
Ref: (NC) 30/5/1/2/3/2/1/070 EM

Below is specific additional requirements that have been set for your operation by the Regional Manager: Mineral Regulation, Northern Cape Region

1. Before any drilling, prospecting, mining or trenching takes place a Heritage Impact Assessment (HIA) must be done to determine if there are any archaeological and/ or palaeontological sites that may be impacted upon by the proposed prospecting activities (Act 25 of 1999).
2. In terms of section 21 of the National Water Act, 1998 (Act 36 of 1998), all water uses must be licensed and all mining related sections of Water Act must still be met and strictly adhered to including the commitments stipulated in the above mentioned Environmental Management plan, any deviations must be communicated to this office.
3. The regulations on the use of water for mining and related activities aimed at the protection of the water resources as published in the Government Notice No.704, and Government Gazette No.20119 must be complied with.
4. No mining activities are allowed within the 1:100 year flood line of a water resource.
5. No mining may be carried out or within a horizontal distance of 100m from the following structures: servitude, buildings, roads, railways and reserves. If a person prospects or mine within a horizontal distance of 100m, a risk assessment must be conducted and approved by the Principal Inspector of Mines.

I, ...A. A. Mostert..... the undersigned and duly authorised thereto by...Assmang Khumani.... hereby duly undertake to adhere to the requirements set above.

Signed at ...Kimberley... this ...24.....day of ...February....2011

Signature..... Designation

Approved in terms of Section 39(4) of the Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002)

Signed at ...Kimberley.....this....17th..day of .....February...2011

REGIONAL MANAGER
NORTHERN CAPE REGION

UNDERTAKING

I, A.A. Mostert, the undersigned and duly authorised thereto by Assmang: Khumani, hereby declare that the contents of this document is true and correct. I undertake to implement the measures as described herein. I understand that this undertaking is legally binding and failure to give the effect hereto will render me liable for prosecution in terms of Section 98 (b) and 99 (1)(g) of the Mineral and Petroleum Resources Development Act, (Act 28 of 2002). I am also aware that the Regional Manager may, at any time, make such changes to this plan as he/she may deem necessary.

Signed at Kimberley on this 24 day of February 2011

.....
Signature of applicant

APPROVED / NOT APPROVED

I, Pieter Swart, the undersigned and duly authorised thereto by the Department of Minerals and Energy, have studied and approved the contents of this document.

Signed at Kimberley On this 17th day of February 2011

.....
REGIONAL MANAGER
MINERAL REGULATION: NORTHERN CAPE REGION

THE REGIONAL MANAGER
NORTHERN CAPE REGION

DEPARTMENT OF TOURISM, ENVIRONMENT AND CONSERVATION

ISEBE LEZOKHENKETHO, INDALO NOLONDOLOZO

LEFAPHA LA BOJANALA, TIKOLOGO LE TSHOMARELO

DEPARTEMENT VAN TOERISME, OMGEWING EN BEWARING

224 Du Toitspan Road
Private Bag X6102
KIMBERLEY
8300

224 Du Toitspan Road
Kgetsanaposo X6102
KIMBERLEY
8300

224 Du Toitspan Road
Inqxowa yeposi X6102
KIMBERLEY
8300

Du Toitspanweg 224
Privaatsak X6102
KIMBERLEY
8300

Tel. (053) 807-4800

Fax (053) 831-3530

Enquiries : S.Mbanjwa
Dipatlisiso :
Imibuzo :
Navrae :

Date : 29th July 2009
Letlha :
Umhla :
Datum :

Reference : NNO 25/19
Tshupelo :
Isalathiso : NC/SIY/ASS3/41/08
Verwysings :

Mr. Pierre Becker
Khumani Iron ore Mine
Private Bag X503
Kathu
8446

Fax: 053 311 4310

Dear Sir/ Madam

APPLICATION FOR AUTHOURISATION: THE PROPOSED EXPANSION OF CAPACITY, RAILWAY DIVERSION AND ESTABLISHMENT OF A LOCAL RAILWAY SIDING AT KHUMANI IRON ORE MINE SIYANDA DISTRICT MUNICIPALITY, NORTHREN CAPE PROVINCE.

By virtue of the powers conferred to me by the National Environmental Management Act, 1998 (Act No. 107 of 1998) and the Environmental Impact Regulations, 2006, the Department hereby grants authorisation to/for ***APPLICATION FOR AUTHOURISATION: THE PROPOSED EXPANSION OF CAPACITY, RAILWAY DIVERSION AND ESTABLISHMENT OF A LOCAL RAILWAY SIDING AT KHUMANI IRON ORE MINE SIYANDA DISTRICT MUNICIPALITY, NORTHREN CAPE PROVINCE.*** A detailed description of the activity is given in the **Scoping Report dated January 2009,** subject to the conditions listed in the environmental authorisation. The environmental authorisation and reasons for the decision are attached herewith.

In terms of regulation 10(2) of the Environmental Impact Assessment Regulations, 2006, you are instructed to notify all registered interested and affected parties, in writing and within seven (7) calendar days of receiving of this letter, of the Department's decision in respect of your application as well as the provisions regarding the making of appeals that are provided for in the regulations.

Permit No 47/2009

Your attention is drawn to Chapter 7 of the Regulations which regulates appeal procedures. Should you / any person affected by this decision wish to appeal any aspect of the decision, you or a person affected by this decision must, *inter alia,* lodge a notice of intention to appeal, as prescribed in regulation 62 of Environmental Impact Assessment Regulations, 2006, with the Member of the Executive Council, Ministry of Tourism, Environment and Conservation within 10 days of receiving this letter, by means of one of the following methods:

By facsimile:	(053) 832 1026;
By post:	Private Bag x 6102, Kimberley, 8300 or
By hand:	T-Floor, Metlife Towers, Kimberley, 8300.

Should you decide to appeal, you must serve a copy of your notice of intention to appeal on all registered interested and affected parties as well as a notice indicating where, and for what period, the appeal submission will be available for inspection.

Yours faithfully

Mr J.J. Mutyorauta
DIRECTOR: ENVIRONMENTAL MANAGEMENT

DATE OF DECISIONS: 29th July 2009

Cc: Ivuzi
(011) 803 5726

Northern Cape Province
DEPARTMENT OF TOURISM, ENVIRONMENT & CONSERVATION

Porofensi Ya Kapa Bokone
LEFAPHA LA BOJANALA, TIKOLOGO LE SHOMARELO

ENVIRONMENTAL AUTHORISATION

in terms of National Environmental Management Act, 1998 (Act No. 107 of 1998) and the Environmental Impact Assessment Regulations, 2006

Authorisation Register Number:	Permit 47/2009
Reference Number:	NC/SIY/ASS3/41/08
Last Amended:	N/A
Holder of Authorisation:	ASSMANG LIMITED
Location of activity:	Khumani Iron Ore, Tsatsabane/Gamagara Local Municipality, Siyanda/John Taolo Gaetsewe District Municipality respectively

DEFINITIONS

- **Activity** – means an activity identified in Government Notice No. R.386 and No. R387 of 2006 as a listed activity.
- **Applicant** – means a person who ha submitted or intends to submit an application.
- **Application** – means an application for an environmental authorisation in terms of Chapter 3 of the Environmental Impact Assessment Regulations of 2006
- **Basic Assessment** – means a process contemplated in regulation 22 of the Environmental Impact Assessment Regulations of 2006.
- **Basic Assessment Report** – means a report contemplated in regulation 23 of the Environmental Impact Assessment Regulations of 2006.
- **EAP** – means an environmental assessment practitioner as identified in the Environmental Impact Assessment Regulations of 2006
- **EIA** – Environmental Impact Assessment means an environmental plan in relation to identified or specified activities envisaged in chapter 5 of the Act and described in regulation 34 of the Environmental Impact Assessment Regulation of 2006.
- **Interested and Affected party** – means any group of persons or organisation interested or affected by an activity and any organ of state that may have jurisdiction over any aspect of the activity.
- **Public Participation Process** – means a process in which potential interested and affected parties are given an opportunity to comment on, or raise issues relevant to specific matters.
- **The Act** – means the National Environmental Management Act, 1998 (Act No. 107 of 1998).

DECISION

The Department is satisfied, on the basis of information available to it and subject to compliance with conditions of this environmental authorisation, that the applicant should be authorised to undertake the activity specified below.

Details regarding the basis on which the Department reached this decision are set out in Annexure 1.

ACTIVITIES AUTHORISED

By virtue of the powers conferred on it by the National Environmental Management Act, 1998 (Act No. 107 of 1998) and the Environmental Impact Assessment Regulations, 2006 the Department hereby authorises –

ASSMANG Limited

With the following contact details –
Mr. Pierre Becker
Private Bag X503
Kathu
8446
Tel 053 311 6600

to undertake the following activity (hereafter referred to as "the activity")

the expansion of the capacity, railway diversion and the establishment of a local railway siding as listed Government Notice 387, 1c and 1s in portion 1,2,3,5 &remainder of the farm Mokaning 560

RD, Portion 1, 2, 3 & remainder of the farm king 561, Portion 2, 6, & Remainder of the farm parson 564 RD and Remainder of the farm Bruce 544RD situated in both Gamagara and Tsatsabane in the districts of John Taolo Gaetsewe and Siyanda District Municipality respectively, Northern Cape, hereafter referred to as the "property".

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The granting of this environmental authorisation is subject to the conditions set out below.

CONDITIONS

Scope of authorisation:

1. Authorisation of the activity is subject to the conditions contained in this authorisation, which conditions form part of the environmental authorisation and are binding on the holder of the authorisation.

2. The holder of the authorisation shall be responsible for ensuring compliance with the conditions by any person acting on his or her behalf, including but not limited to, an agent, sub-contractor, employee or person rendering a service to the holder of the authorisation.

3. The activity(s) which is authorised may only be carried out at the property indicated above.

4. Any changes to, or deviations from, the project description set out in this authorisation must be approved, in writing, by the Department before such changes or deviations may be effected. In assessing whether to grant such approval or not, the Department may request such information as it deems necessary to evaluate the significance and impacts of such changes or deviations and it may be necessary for the holder of the authorisation to apply for further authorisation in terms of the regulations.

5. This authorisation does not negate the holder of the authorisation's responsibility to comply with any other statutory requirements that may be applicable to the undertaking of the activity.

General conditions:

6. A copy of this authorisation must be kept at the property where the activity will be undertaken. The authorisation must be produced to any authorised official of the Department who requests to see it and must be made available for inspection by any employee or agent of the holder of the authorisation who works or undertakes work at the property.

7. Where any of the applicant's contact details change, including the name of the responsible person, the physical or postal address and/ or telephonic details, the applicant must notify the Department as soon as the new details become known to the applicant.

8. In all other cases, the holder of the authorisation must notify the Department, in writing, within 7 days if a condition of this authorisation is not adhered to. Any notification in terms of this condition must be accompanied by reasons for the non-compliance.

9. Non-compliance with a condition of this authorisation may result in criminal prosecution or other actions provided for in the National Environmental Management Act, 1998 and the regulations.

10. This authorization is subject to the approval by the relevant local authorities i.e. in terms of any relevant legislation administered by those local authorities.

11. The activity may not commence without the necessary permits/licenses/approvals and/or service agreements, where it is relevant, from or with the relevant regulatory authorities whether national, provincial or local (these include but are not limited to National Department of Environmental Affairs & Tourism, National Department of Agriculture, Department of Housing & Local Government, Department of Water Affairs & Forestry, Department of Minerals and Energy, Department of Transport, Roads & Public Works, Department Arts, Sports & Culture, South African Heritage Resources Agency, South African Civil Aviation Authority).

12. The activity, including site preparation, may not commence before the thirty (30) day appeal period expires or until such time as the Department has considered any appeals that have been lodged.

13. One week's written notice must be given to the Department before commencement with the activity.
    a. Such notice shall make clear reference to the site location details and the reference number given above.

14. The applicable conditions of this authorization must form part of all contractors' and sub-contractors' conditions of contract. A performance-based requirement with regard to environmental impact management must be included in all contracts related to any aspect of this authorization.

15. The applicant must carry out regular environmental audits to establish compliance with the conditions of this authorization and contracts.

16. Records relating to the compliance/non-compliance with the conditions of the authorization and contracts must be kept in good order. Such records must be made available to the Department within 7 (seven) days of receipt of a written request by the Department for such records.

17. Any complaints regarding the said development must be brought to the attention of the Department within 24 hours after receiving the complaint. A complaints register must be kept up to date for inspection by the Department.

18. Officials in the employ of the Department shall be given access to the property as described above (see detailed description of the activity) for the purposes of assessing and/or monitoring compliance with the conditions contained in this Record of Decision. Where the activity is located on a third party's property the applicant shall be responsible to arrange access for departmental officials.

19. This Department may add to, change and/or amend any of the conditions in this authorization if, in the opinion of the Department, the addition, change of amendment is environmentally justified. In event that such impacts exceed its significance as predicted in the independent consultant's environmental scoping report and supporting documentation, the authorization may be withdrawn after proper procedures were followed.

20. In the event of any dispute concerning the significance of a particular impact, the opinion of this department in respect of its significance will prevail.

21. This Department and any national department, provincial department, local authorities or committees appointed in terms of the conditions of this application or any other public authority or organization shall not be held responsible for any damage of losses suffered by the applicant or his successor in title in any instance where construction or operation subsequent to construction be temporarily or

permanently stopped for reasons of non-compliance by the applicant with the conditions of approval as set out in this document or any other subsequent document emanating from these conditions of approval.

22. The applicant shall be responsible for all costs necessary to comply with the above conditions unless otherwise specified.

23. The applicant must apply the principle of best practicable environmental option for all technologies used/ implemented during construction.

Appeal of authorisation:

24. The holder of the authorisation must notify every registered interested and affected party, in writing and within 7 (SEVEN) calendar days, of receiving notice of the Department's decision to authorise the activity.

25. The notification referred to in 23 must –
    - specify the date on which the authorisation was issued;
    - inform the interested and affected party of the appeal procedure provided for in Chapter 8 of the regulations; and
    - Advise the interested and affected party that a copy of the authorisation and reasons for the decision will be furnished on request.

26. If the applicant should appeal against this record of decision, he/she must inform all interested and affected persons that such an appeal is being lodged with the MEC and if requested, the applicant/appellant must provide those persons with reasonable access to a full copy of the appeal within a reasonable time before expiry of the thirty day appeal period.

Management of activity:

27. An Environmental Management Plan ("EMP") attached to the Environmental Impact Assessment Report should be adhered to.

Monitoring

28. The applicant must appoint an Environmental Control Officer (ECO) that will have the responsibility of implementing the approved EMP.

Recording and Reporting to the Department:

29. The holder of the authorization must submit an environmental audit report to the Department on request and it must be compiled by and independent Auditor to avoid biasness.

Commissioning of the activity

30. Seven (7) days written notice must be given to the Department that the activity will commence. Commencement for the purposes of this condition includes site preparation. The notice must include a date on which it is anticipated that the activity will commence.
31. Any waste generated during construction and operation phases must be disposed off at a waste disposal site licensed for such waste.
32. All hazardous waste (oils, effluent from corrosion protection activities) must be disposed off at the registered site.

33. It is recommended that no threatened or protected species should be destroyed. Fauna and flora (including protected or endemic species) relocation or destruction should only be done if there is authorization by Department of Water affairs and forestry and directorate of the Department of Tourism Environment and conservation.
34. Should protected trees and other vegetation be destructed, relocated and/or disturbed, permits must be obtained from Department of Water Affairs and Forestry (DWAF) and Department of Tourism, Environment and Conservation (DTEC).
35. Should any archaeological artifacts, graves or protected and endangered biota be found on site, the operation must be suspended and construction should only continue after consultation with South African Heritage Resource Agency (SAHRA).
36. Toilet facilities must be provided for workers.
37. Relevant Occupational Health and Safety Standards should be observed at all times.
38. The safety of the participants must be ensured by:
    - 38.1 Involving qualified engineer in the design and erection and installation of railway diversion and the local railway siding.
    - 38.2 Having regular safety inspections and ensuring participants are equipped with necessary safety equipment.
39. The construction process must ensure that the necessary safety signage and personal protective clothing is in place. The regulations pertaining to the Occupational Health and Safety Act must be adhered to at all times.
40. Access roads to the construction site must be watered regularly to mitigate the dust impacts.
41. Disturbed areas must be rehabilitated progressively to minimize total open area.
42. Noise generation during construction must be mitigated by ensuring that all regulations relating to noise generation are observed and by restricting work to normal working hours.
43. All machines must be equipped with appropriate noise reduction equipment and all vehicles must be roadworthy.
44. Proper road signage must be strategically placed in the area of the construction site.
45. No vehicle or construction machinery may be extensively repaired on-site.
46. Mixing of concrete in areas where excess material could enter drainage systems must be avoided.

Operation of the activity:

47. The railway diversion and the local railway siding must well be maintained and kept in good order at all times.
48. All proposed mitigations for the Operational Phase as outlined on the EIR must be implemented.
49. General waste must be transported and disposed off at the registered waste disposal site.
50. All hazardous substances spillages must reported to the Department of Water Affairs and Forestry within 48 hrs of the incident.
51. Effluents containing oil, grease or other industrial substances must be collected in a suitable receptacle and removed from site to an approved waste disposal site licensed for such waste.
52. Spills must be cleaned up and managed effectively to ensure that groundwater does not become contaminated.
53. There must be procedures in place for the regular inspection and maintenance of the railway diversion and the local railway siding.
54. To ensure that environmental degradation is prevented possible measures should be put in place so that impacts arising from operation are mitigated

Site Closure and Decommissioning

55. Should the activity ever cease or become redundant the applicant shall undertake the required actions as prescribed by legislation at the time and comply with all relevant legal requirements administered by any relevant and competent authority at the time.

56. No alien or invasive species must be introduced during rehabilitation.

57. All decommissioning phase mitigations outlined in the EMP should be implemented.

DURATION AND PERIOD OF VALIDITY

This activity(s) must commence within a period of three (3) years from the date of issue. If commencement of the activity does not occur within that period, the authorisation lapses and a new application for environmental authorisation must be made in order for the activity to be undertaken.

APPEAL

In terms of Chapter 7 of Environmental Impact Assessment Regulations, 2006, if the applicant or a person affected by this Decision wishes to appeal this decision, a notice of intention to appeal must be lodged within ten (10) days of being notified of the decision, and an appeal must **be lodged within thirty (30) days** of lodging of the notice to appeal to:

The Member of the Executive Council
Ministry of Tourism, Environment & Conservation
Private Bag X6102
Kimberley
8300
Fax: (053) 8321032

Appeals must comply with the provisions of Chapter 7 of Environmental Impact Assessment Regulations, 2006 Government Notice No. R. 385 of 21 April 2006.

Mutyoraita

MR. JJ MUTYORAUTA
DIRECTOR: ENVIRONMENTAL MANGEMENT
Department of Tourism, Environment & Conservation

Date Of Environmental Authorisation: 29th July 2009

ANNEXURE 1: REASONS FOR DECISION

1. Background

The applicant, ASSMANG LIMITED applied for authorization to carry on the following activity:

the expansion of the capacity, railway diversion and the establishment of a local railway siding as listed Government Notice 387, 1c and 1s in portion 1,2,3,5 &remainder of the farm Mokaning 560 RD, Portion 1, 2, 3 & remainder of the farm king 561, Portion 2, 6, & Remainder of the farm parson 564 RD and Remainder of the farm Bruce 544RD situated in both Gamagara and Tsatsabane in the districts of John Taolo Gaetsewe and Siyanda District Municipality respectively, Northern Cape

The applicant appointed IVUZI Consultants in water, Environmental and applied earth Sciences to undertake an Environmental impact assessment process.

2. Information considered in making the decision

In reaching its decision, the Department took, *inter alia,* the following into consideration -

a) The information contained in the Scoping Report dated January 2009.
b) The comments received from interested and affected parties as included in the Relevant information contained in the Departmental information base including –
   - Public Participation Guideline
   - EIA Regulations, 2006
c) The objectives and requirements of relevant legislation, policies and guidelines, including section 2 of the National Environmental Management Act, 1998 (Act No. 107 of 1998)
d) The findings of the site visit undertaken by Ndindani HH on 25 February 2009.

3. Key factors considered in making the decision

All information presented to the Department was taken into account in the Department's consideration of the application. A summary of the issues which, in the Department's view, were of the most significance is set out below.

a) The legal and procedural requirements have been complied with and the information contained in the Scoping Report dated January 2009 and Appendices is to the satisfaction of this Department.
b) The Environmental Impact Report's findings, given the nature of the project and the selected site there are no significant environmental impact for the following project.

4. Findings

After consideration of the information and factors listed above, the Department made the following findings -

a) All legal and procedural requirements have been met.
b) The proposed development is compatible with the proposed site for the development.
c) Adequate assessment of the main identified issues and impact have been done.

In view of the above, the Department is satisfied that, subject to compliance with the conditions contained in the environmental authorization, the proposed activity will not conflict with the general objectives of integrated environmental management laid down in Chapter 5 of the National Environmental Management Act, 1998 and that any potentially detrimental environmental impacts resulting from the proposed activity can be mitigated to acceptable levels. The application is accordingly granted.

DEPARTMENT OF TOURISM, ENVIRONMENT AND CONSERVATION
ISEBE LEZOKHENKETHO, INDALO NOLONDOLOZO
LEFAPHA LA BOJANALA, TIKOLOGO LE TSHOMARELO
DEPARTEMENT VAN TOERISME, OMGEWING EN BEWARING

224 Du Toitspan Road
Private Bag X6102
KIMBERLEY
8300

224 Du Toitspan Road
Kgetsenapoco X6102
KIMBERLEY
8300

224 Du Toitspan Road
Ingxowa yeposi X6102
KIMBERLEY
8300

Du Toitspanweg 224
Privaatsak X6102
KIMBERLEY
8300

Tel. (053) 807-4800

Fax (053) 831-3530

Enquiries :
Dipatlisiso :
Imbuzo :
Navrae :
S.G Mbanjwa

Date :
Letlha :
Umhla :
Datum :
12 June 2006

Reference :
Tshupelo :
Iselathiso :
Verwysinge :
NNO 25/19
NC/SIY1/04

Assmang Ltd
P.O.Box Mancorp Mine
Postmasburg
8420

ATTENTION: Mr Alex Mostert
Fax 053-3114642

Dear: Mr. A. Mostert

APPLICATION FOR AUTHORIZATION: THE DEVELOPMENT OF IRON ORE OPENCAST MINE WITH ALL ASSOCIATED INFRASTRUCTURE.

By virtue of the powers delegated to me in terms of Section 33(1) of the Environment Conservation Act, 1989 (Act No. 73 of 1989), I hereby in terms of Section 22(3) of the Act authorize: ***Application for Authorization: THE DEVELOPMENT OF IRON ORE OPENCAST MINE WITH ALL ASSOCIATED INFRASTRUCTURE*** Schedule *1/2* of Government Notice No. R. 1182: activity1 (a), activity1(c), activity1 (d), activity1 (i), activity1 (k), activity1 (n), activity1 (o), activity2(c), activity 8: a detailed description of the activities is given in the final ***scoping report*** dated (December 2005), subject to the conditions listed in the record of decision.

The record of decision including the conditions under which the application is authorized is attached. This authorization is valid for a period of *(5)* years from the date of issue and if the activity is not undertaken within this period the authorization will be invalidated.

An appeal against this authorization or conditions of authorization may be lodged in writing with: The Member of the Executive Council, Ministry of Tourism, Environment & Conservation, Private Bag X6102, Kimberley 8300, Fax. (053) 8321026, within 30 calendar days from the date issue of this authorization, setting the grounds of appeal and including all relevant documentation as required by Section 35 of the Environment Conservation Act, 1989 (Act No. 73 of 1989).

Yours Faithfully

Mrs. P. M. N. Mokhali
HOD: DEPARTMENT OF TOURISM, ENVIRONMENT AND CONSERVATION
Date: 06. 06. 13

Permit No 432006

Northern Cape Province
DEPARTMENT OF TOURISM, ENVIRONMENT & CONSERVATION

Porofensi Ya Kapa Bokone
LEFAPHA LA BOJANALA, TIKOLOGO LE SHOMARELO

RECORD OF DECISION

In terms of Section 22(3) of the Environment Conservation Act, 1989 (Act No 73 of 1989) with regard to the undertaking of the activity described below as required by Government Notice No R. 1183 of 5 September 1997

Reference number: NC/SIY1/2004 **Permit number: 43/2006**

Project title:	Proposed Khumani Iron Ore Mine (BKM) project, Assmang Limited
Brief description of project:	Assmang limited owns substantial high grade iron ore deposit North of the Beeshoek Mine on the farms Bruce, King, Mokaning, adjacent to Sishen Mine. Assmang Intend to increase its iron ore sales by utilizing the available iron ore reserves on the farms Bruce, King and Mokaning and utilize the farm Parson for the establishment of surface infrastructure.
Project location:	The BKM project falls within two Local and Districts Municipalities in the Northern Cape province. The farm Mokaning falls within the Tsantsabane Local Municipality (NC085), which forms part of Siyanda District Municipality. The farms Parson, King and Bruce are situated within Gamagara Local Municipality (NC01B1), which forms part of the Kgalagadi District Municipality. The BKM project is situated in the D41 catchments of the Gamagara River, the quaternary catchments being D41J

Co-ordinates showing location of activities authorized:	**Latitude**	**Longitude**
The storage for diesel and oil close to the plant site	27° 51'43"	22° 58'26"
Railways	27° 50'57"	22° 57'18"
	27° 51'22"	22° 59'22"
	27° 50'24"	22° 59'50"
	27° 54'13"	23° 01'00"
Conveyors	27° 51'41"	22° 57'39"
	27° 51'13"	22° 57'45"
	27° 51'06"	22° 59'14"
	27° 48'59"	23° 01'01"
Portable water dam	27° 51'13"	22° 58'52"
Sewage treatment plant at Bruce opencast	27° 47'10"	23° 01'00"

Sewage treatment plant at King/Mokaning	27° 51'36"	23° 01'12"
Sewage treatment plant at Beneficiation Plant	27° 51'13"	22° 58'53"
Explosives Magazine to store explosives	27° 50'18"	22° 57'43"
Bruce Overburden and Low grade ROM stockpile	27° 46'12"	23° 01'42"
King Overburden and Low grade ROM stockpile	27° 51'47"	23° 01'12"
Paste Disposal facility	27° 50'17"	23° 01'10"
Discard Stockpile	27° 52'08"	22° 57'24"

District Municipality:	Kgalagadi and Siyanda District Municipalities			
Local authority/municipality:	Gamagara and Tsantsabane Local Municipalities			
Name of Properties:	Bruce, King and Mokaning Farms			
Farm/Erven Names and Numbers:	Bruce No. 544, King No. 561, Mokaning No. 580 and Parson No. 564			
Size of Property:				
Closest City/Town:	Kathu	Distance (In km)	10	
Project Applicant:	Assmang Limited			
Business Reg. No./ID No.	1935/4007343/06			
Contact person:	Alex Mostert			
Postal Address:	P. O. Box Mancrop Mine, Postmasburg			
Telephone:	(053) 3116666		Cell:	N/A
Email:	alexm@assmang.co.za		Fax:	(011) 8035745
Environmental Consultant(s):	Ivuzi (Pty) Ltd			
Contact person:	Tanja Thorius			
Postal Address:	P. O. Box 2597, Woodmead, Rivonia, 2128			
Telephone:	(011) 8035725		Cell:	
Email:	tanja@ivuzi.co.za		Fax:	(011) 8035745
Site visit	Yes	x	No	
Persons present: M.R. Moseki (EO) and Freddie Human (Project Manager)				

DECISION

After due consideration of the facts presented to the Northern Cape Department of Tourism, Environment & Conservation (hereafter referred to as the Department), authorization is hereby granted in terms of Section 22(3) of the Environment Conservation Act, 1989 (Act No 73 of 1989) for the **BKM Mine and associated infrastructure.** Schedule 1 of Government Notice No R.1182:

Activity 1(a): the construction or upgrading of facility for commercial electricity generation and supply;

Activity1(c): the construction or upgrading of transportation routes and structures, and manufacturing, storage, handling or processing facilities for any substance which is considered as dangerous or hazardous and is controlled by national legislation;

Activity 1(d): the construction or upgrading of roads, railways, airfields and associated infrastructures and activities outside the borders of town planning schemes;

Activity 1(i): the construction or upgrading of canals and channels, including diversions of the normal flow of water in a river bed and water transfer schemes between water catchments and impoundments;

Activity 1(k): the construction or upgrading of reservoirs for public water supply;

Activity 1(n): the construction or upgrading of sewerage treatment plans and associated infrastructure;

Activity 1(o): the construction or upgrading of building structures for industrial and storage of explosives or ammunitions or for testing or disposal of such explosives or ammunition;

Activity 2(c): the change of land use from agriculture or undetermined land use to any other land use;

Activity 8: the disposal of waste as required in terms of section 20 of the Environment Conservation Act, 1989

The authorization is granted subject to the following conditions:

CONDITIONS

General conditions:

1. This authorization is granted only in terms of Section 22(3) of the Environment Conservation Act, 1989 (Act No 73 of 1989) and does not exempt the holder thereof from compliance with any other legislation.
2. This authorization refers only to the project as specified and described in the scoping report dated February 2006. Any other activity listed under Section 21 of the Environment Conservation Act, 1989 (Act No 73 of 1989) which is not specified above, is not covered by this authorization and a separate application will have to be launched and must therefore comply with the requirements of the Environment Conservation Act, 1989 (Act No 73 of 1989) and Government Notice No. R. 1183 of 5 September 1997 and its amendments.
3. This authorization is subject to the approval by the relevant local authorities i.e. in terms of any relevant legislation administered by those authorities.
4. No development may take place on the area of concern without the necessary permits/approvals and/or service agreements, where it is relevant, from or between the following authorities, including:
    - National Department of Environmental Affairs & Tourism
    - National Department of Agriculture
    - Department of Housing & Local Government
    - Department of Water Affairs & Forestry.
    - Department of Minerals & Energy
    - Department of Transport, Roads & Public Works
    - McGregor Museum
    - South African Heritage Resources Agency
    - Civil Aviation Authority, and
    - Any other relevant authority whether national, provincial or local

5. The applicant shall within 5 (five) days of receipt of this authorization, provide all interested and affected parties identified during the public consultation process, with copies of this authorization, including all the conditions attached thereto.
6. One week written notice must be given to the Department before commencement with construction activities.
   6.1 Such notice shall make clear reference to the site location details and the reference number given above.
   6.2 The notice must include proof of compliance with the following conditions described herein: i.e. conditions: 5 & 14
7. An Environmental Control Officer (ECO) must be appointed to oversee the implementation of the EMP, and to ensure the implementation of mitigation measures. The ECO or his representative must visit the site at least once a week for the duration of the construction phase.
8. Environmental Control Officer must ensure that changes in the project resulting in significant environmental impacts and that differ from what was authorized by the Department, must be submitted to this Department for approval prior to such changes being effected.
9. The applicant must notify this Department, in writing, within 24 hours thereof if conditions of the authorization are not complied with.
10. The Department must be notified of any change of address of the applicant.
11. The Environmental Management Plan (EMP) for construction and management of activities relating to the protection of the natural environment during the construction phase and must be adhered to at all times unless stated differently in this ROD.
12. The conditions of the authorization should be brought to the attention of all persons (employees, sub-consultants, etc) associated with the undertaking of this activity and the applicant should take such measures necessary to bind such persons to these conditions.
13. A copy of the authorization shall be available on site during construction. The applicable conditions of this authorization must form part of all contractors' and sub-contractors' conditions of contract.
14. The applicant must apply the principle of best practicable environmental option for all technologies used/ implemented during construction.
15. No plants must be removed other than required for the layout of the site. However, if the affected plant(s) is endangered or protected, permission must be sought from Northern Cape Department of Tourism, Environment & Conservation for the removal thereof.
16. All forms of pollution must be prevented, or where it cannot, should be minimized or remedied.
17. Records relating to the compliance/non-compliance with the conditions of the authorization must be kept in good order. Such records must be made available to the Department within 7 (seven) days of receipt of a written request by the Department for such records and also included in the Environmental Audit report.
18. Any complaints regarding the said development must be brought to the attention of the Department within 24 working hours after receiving the complaint. A complaints register must be kept up to date for inspection by the Department.
19. This Department may add to, change and/or amend any of the conditions in this authorization if, in the opinion of the department, the addition, change of amendment is environmentally justified. In event that such impacts exceed its significance as predicted in the independent consultant's environmental scoping report and supporting documentation, the authorization may be withdrawn after proper procedures were followed.
20. In the event of any dispute concerning the significance of a particular impact, the opinion of this department in respect of its significance will prevail.
21. The Department must be notified, within 30 days thereof, of any change of ownership and/or project developer. Conditions imposed in this ROD must be made known to the new owner and/ or developer and are binding on the new owner and/or developer.
22. In the event of sharing the Conditions imposed in this ROD must be made known to the sharing party. All conditions in this ROD are binding on the sharing party. The applicant is responsible to ensure that all these conditions are complied with.

23. If the applicant is not the landowner, the Department must be supplied with an approval from the landowner giving consent for the applicant to proceed with the project, before construction/upgrading takes place.
24. The applicant must take reasonable measures to suppress dust.

Special conditions:

1. All mitigation measures and recommendations as laid down in the Environmental Impact Assessment and Environmental Management Plan submitted in terms of Mineral and Petroleum Resources Development Act No. 28 of 2002(DME Ref No. NC30/5/1/2/3/2/1/070) and Scoping Report by **Ms Tanja Thorius (IVUZI)** dated **December 2005** (including proposed amendments) are binding and must be implemented, unless stated differently in this ROD.
2. No activity must take place within 50m of the pans and other sensitive areas.
3. An environmental management plan and environmental impact assessment must be amended to incorporate specialist studies on fauna, flora and archaeological investigations, and identify impact and develop mitigation measures before the end of July 2006. An environmental management plan for the offset area shall be compiled in consultation with SANPARKS, WESSA, and other interested and affected parties and shall be completed before the end of November 2006, and must be approved by this Department.
4. Informal settlement must be strictly prohibited.
5. Fuel and other petrochemicals must be stored in receptacles that comply with SANS100-1:2003 (SABS 089-1:2003) standards.
6. Contaminated soil must be removed for bioremediation or disposed of at licensed facility for the substance concerned. And the disturbed land must be rehabilitated and seeded with vegetation naturally occurring on the site.
7. Specific area must be demarcated for fueling and workshop services. And such area must be bunded to reduce possibility of soil and water contamination.
8. Storm water drainage must be designed in a way that clean water does not mix with dirty water.
9. Chemical toilets must be made available for workers on site during construction phase, and sewerage waste must be disposed the Municipal sewerage plant on a weekly basis.
10. Employees must be supplied with earplugs to reduce the impact of noise.
11. General waste must be collected in containers, and disposed of weekly at a licensed landfill site, and recyclable waste may be recovered for recycling purposes. No temporary dumping is allowed on site.
12. Should any archeological artifacts, graves or protected and endangered biota be found on site, the operation must be suspended and construction should only continue after consultation with South African Heritage Resources Agency (SAHRA) and the necessary procedure are followed as prescribed by SAHRA.
13. Untreated sewage water must not be discharged directly into the natural environment.
14. Movement of construction vehicles must be avoided on sensitive areas.
15. It recommended that local people must be employed.
16. Employees must not be housed on site during both construction and operation phases.
17. Relevant Occupational Health and Safety Standards shall be observed at all times.
18. The contractor shall leave the construction site free from erosion, silting, pollution and / or unwanted material.
19. In the event of an accidental spill, the total spillage must be cleaned and the area must be rehabilitated to the satisfaction of the Department of Tourism, Environment and Conservation, and the Department of Water Affairs and Forestry.
20. The applicant must include ground water monitoring programme as part of the environmental management plan.
21. All mitigation measures and recommendations as laid down by the Department of Water Affairs and Forestry on the comments dated 20 April 2006 must be adhered to at all times.
22. Lighting technology that provide sufficient light where required while preventing light spillage elsewhere must be made available, and must be installed in the lighting entrances, roads and

squares where required. Sportlight and lighting of areas outside the mining boundaries must be avoided.

23. Surface water runoff re-directors along major wash off zones must be constructed.
24. The stockpiling of the installation materials should, as far as possible, be confined to a dedicated site and the excess materials thereof must be limited to the disturbed areas
25. Open fire is strictly prohibited on site. Firebreaks should be established in terms of the requirements and conditions of the National Veld and Forest Fires Act, 1998 (Act No. 101 of 1998) to prevent uncontrolled burning and destruction of habitats, and special attention must be paid to the offset and mining areas.
26. Erosion must be controlled as specified in the Conservation of Agricultural Resources Act 1983 (Act No. 43 of 1983) and be mitigated accordance to the approved EMP.
27. The applicant must ensure that contractors, mine employees, and any other personnel involved in this project understand and comply with the conditions of this record of decision, and the environmental management plan. It is the applicant's responsibility to ensure that the employees, contractors and subcontractors receive the necessary environmental training to deal with fire emergency issues and comply with this record of decision effectively from the date of issue of this ROD.
28. All powerlines, telephone lines and farm reservoir shall be made raptor-friendly by the 23 June 2006. New overhead line shall be equipped with bird diverters at the time of construction, and the existing overhead lone before the end of June 2006.
29. The offset area of similar size, habitat and biodiversity to the area to be disturbed by the proposed Khumani Iron Ore Mine must be established, and must be used for the relocation of fauna and flora (threatened or endemic species). An offset area, in consultation with this Department, Wildlife and Environment Society of SA (WESSA), I&APs and NGOs, must be established before the end of November 2006, and decision regarding such site must be started before the end of June 2006.
30. It is recommended that threatened or protected species should not be destroyed even if there is need for their removal, and it must be relocated to an appropriate site or offset area of similar biodiversity. Fauna and flora (including protected or endemic species) relocation or destruction must only be done if there is the authorization by Department of Water Affairs and Forestry and the nature conservation directorate of the Department of Tourism, Environment and Conservation. Ongoing sweeps shall be taken of areas where relocation has been undertaken prior to construction.
31. Invader species must be controlled, and such control should be linked on categorization of the invader species immediately and throughout the life of the mine.
32. The applicant must ensure that sterilization or culling of domestic cats is undertaken to prevent interbreeding with wild cats on ongoing basis.
33. On closure of the mine, grass or other plant species for rehabilitation must consist of endemic seed mix or endemic grass or plant species, and investigation of the impact of the final pit lakes on the groundwater levels shall be undertaken and potential impact on final post-closure hydrogeological regime should be quantified, and the result should be forwarded to this Department.
34. Commitments made through Ivuzi (Pty) Ltd and approved by WESSA on letter dated 9 June 2006 must be complied with and are binding (Ivuzi Reference: 1V.04.05.044).
35. There is the statutory 30 days appeal period in which no activities, including site preparation, may commence.
36. Should the appeal against this Decision be received, this record of decision is automatically suspended until the decision on the appeal process is made by the Member of Executive Council of this Department.

NON-COMPLIANCE

1. The applicant shall be responsible for all costs necessary to comply with the above conditions unless otherwise specified.
2. It is the applicant's responsibility to ensure that contractors, subcontractors and employees comply with duty of care as provided in section 28 of NEMA.

3. Non-compliance with, or any deviation from, the conditions set out in this authorization constitutes a failure in compliance with the authorization. Such failure in compliance is regarded as an offence and will be dealt with in terms of Sections 29, 30 and 31 of the Environment Conservation Act, 1989 (Act No. 73 of 1989), as well as any other appropriate legal mechanisms.
4. If any condition imposed in terms of this authorization is not being complied with, the authorization may be withdrawn after 30 days written notice to the applicant in terms of Section 22 (4).
5. National government, provincial government, local authorities or committees appointed in terms of the conditions of this application or any other public authority or organization shall not be held responsible for any damage of losses suffered by the applicant or his successor in title in any instance where construction or operation subsequent to construction be temporarily or permanently stopped for reasons of non-compliance by the applicant with the conditions of approval as set out in this document or any other subsequent document emanating from these conditions of approval.

KEY FACTORS AFFECTING THE DECISION

- The Department's authorization is based upon a review of the Environmental Impact Assessment and Environmental Management Plan submitted in terms of Mineral and Petroleum Resources Development Act No. 28 of 2002(DME Ref No. NC30/5/1/2/3/2/1/070) and Scoping Report submitted in terms of Environment Conservation Act No. 73 of 1989 (Ref. No. NC/SIY1/2004) by Ms Tanja Thorius (IVUZI) dated December 2005 and appendices;
- The Environmental Impact Report and Scoping Report findings, given the nature of the projects and the selected sites and study area, concludes that the potential impacts associated with the proposed development are of a nature and extent that can be reduced, limited and eliminated by the introduction of appropriate mitigation measures;
- Comments from the Department of Water Affairs and Forestry;
- Comments letter from Wildlife and Environment Society of SA on a letter dated 23 May 2006;
- Letter (dated 9 June 2006) written by Ivuzi (Pty) Ltd (acting on behalf of Assmang) and signed and approved by WESSA responding to issues raised by WESSA on a letter dated 23 May 2006;
- Letter of support from the Gamagara Municipality dated 9 June 2006;
- The legal and procedural requirements have been complied with and the information contained in the Scoping Report and appendices is to the satisfaction of the Department;
- The Legal and procedural requirements have been complied with and the information contained in the Scoping Report and appendices to the satisfaction of this Department;
- The Constitution of South Africa Act No. 108 of 1996 and Section 2 of the National Environmental Management Act No. 107 of 1998 were considered; and
- The project may have a positive socio-economic impact such as improvement of neighbourhood amenities.

PERIOD OF VALIDITY AND RENEWAL OF AUTHORIZATION

The construction phase of this authorization is valid for 5 (five) years from the date of issue and must be renewed 6 (six) months prior to the expiry date. The Department reserves the right to review and amend the conditions of the authorization at any given time.

APPEAL

The applicant must, within 5 calendar days of receipt of this record of decision (ROD) inform all interested and affected parties registered during the EIA process of at least the following:

1. That an authorization has been issued to the applicant to proceed with the construction and operation of the facilities.
2. That any appeal in terms of the Section 10 (1) of regulation 11 of the environmental assessment regulations (Government Notice No R. 1183 of 5 September 1997) against the issuing of the authorization must be lodged with the MEC for Tourism, Environment & Conservation within 30 (thirty) days from the date on which the ROD has been issued to the applicant and at the address stipulated in the authorization.
3. Include the date on which the ROD was issued to the applicant in terms of regulation 10 (1) and the date by which the appeals must reach the MEC.
4. Indicate where copies of the authorization and ROD can be viewed / obtained.

Yours Faithfully

06. 06. 13

Mrs. P.M.N. Mokhali
HOD: DEPARTMENT OF TOURISM, ENVIRONMENT AND CONSERVATION

DEPARTMENT OF MINERAL RESOURCES
REPUBLIC OF SOUTH AFRICA
Tel: 053 807 7100
Fax: 053 832 5631

FAX COVER SHEET

DATE: 14 September 2012

TO:	The Manager
ORGANISATION:	Assmang Limited
FAX:	053 311 6666 / 011 803 - 5745

FROM:	Mmboneni Kevin Mutheiwana	
TEL:	053 807 1700.	Office number 133/ Permanent Building
FAX:	053 832 5631	
E-Mail:	mmboneni.mutheiwana@dmr.gov.za	
NO PAGES:	02 including cover page	

SUBJECT:

Please find the attached letter

Regards

M.K Mutheiwana

mineral resources
Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

29-31 Currey Street Private Bag X6093
Kimberley Kimberley
8301 8300

Tel: (053) 807 1700
Fax: (053) 832 5631
Email: mmboneni.mutheiwana@dmr.gov.za

Enquiries: **M.K Mutheiwana**
Tel No: **(053) 807 1700**
Fax No: **(053) 832 5631**
Ref. No: **(NC)30/5/1/2/2/070 MR**

Assmang Limited
PO Mancorp Mine
Postmasburg
8420

Fax No: 053 311 6666

Dear Sir

APPLICATION FOR CONSENT IN TERMS OF SECTION 102 OF THE MINERAL AND PETROLEUM RESOURCES DEVELOPMENT ACT, 2002 (ACT 28 OF 2002) (HEREINAFTER REFERRED TO AS "the Act"): TO AMEND THE ENVIRONMENTAL MANAGEMENT PROGRAMME (EMP) IN RESPECT OF THE MINING RIGHT.

This serves to inform you that after careful consideration of your application in terms of section 102 to amend your EMP in respect of your mining right has been granted. The Regional office will contact you for execution of the relevant Deed of Amendment.

.....
DEPUTY DIRECTOR-GENERAL:
MINERAL REGULATION
DATE: 14/05/2012

the denc

Department:
Environment & Nature Conservation
NORTHERN CAPE PROVINCE
REPUBLIC OF SOUTH AFRICA

Private Bag X6102, Kimberley, 8300, Metlife Towers, T-Floor, Tel: 053 807 7300, Fax: 053 807 7328

Equiries : Dipatlisilo Navrae : Imibuzo Mr. S. G. Mbanjwa

Date: Letlha: Datum Umhla: 27th November 2013

Reference Tshupelo Verwysing Isalathiso NC/EIA/JTG/JOE/KAT1/2013
NCP/EIA/0000174/2012

Alex Mostert
Assmang Limited
Private Bag x 503
Kathu
8446

Fax: 053 311 4642
Email: alexm@assmang.co.za

Dear Sir/Madam

THE GRANTING OF THE ENVIRONMENTAL AUTHORISATION FOR: LISTED ACTIVITIES: GNR 545: ACTIVITY 15: KHUMANI INRON ORE: OFF GRADE 2 PLANT PROJECT, KATHU, JOE MOROLONG LOCAL MUNICIPALITY, JOHN TAOLO GAETSEWE DISTRICT MUNICIPALITY, NORTHERN CAPE PROVINCE.

By virtue of the powers delegated to me by the National Environmental Management Act, 1998 (Act No. 107 of 1998) and the Environmental Impact Regulations, 2010, **THE DEPARTMENT HEREBY GRANT THE ENVIRONMENTAL AUTHORISATION FOR: LISTED ACTIVITIES: GNR 545: ACTIVITY 15: KHUMANI INRON ORE: OFF GRADE 2 PLANT PROJECT, KATHU, JOE MOROLONG LOCAL MUNICIPALITY, JOHN TAOLO GAETSEWE DISTRICT MUNICIPALITY, NORTHERN CAPE PROVINCE.** A detailed description of the activity is given in the **Environmental Impact Assessment Report dated September 2013** subject to the conditions listed in the environmental authorization and reasons for the decision are attached herewith.

In terms of regulation 10(2) of the Environmental Impact Assessment Regulations, 2010, you are instructed to notify all registered interested and affected parties, in writing and within seven (7) calendar days of receiving of this letter, of the Departments decision in respect of your application as well as the provisions regarding the making of appeals that are provided for in the regulations.

Your attention is drawn to Chapter 7 of the Regulations which regulates appeal procedures. Should you / any person affected by this decision wish to appeal any aspect of the decision, you or a person affected by this decision must, *inter alia*, lodge a notice of intention to appeal, as prescribed in regulation 62 of Environmental Impact Assessment Regulations, 2010, with the Member of the Executive Council, Ministry of Environment and Nature Conservation within 10 days of receiving this letter, by means of one of the following methods:

By facsimile:	(053) 832 1026;
By post:	Private Bag x 6102, Kimberley, 8300 or
By hand:	T-Floor, Metlife Towers, Kimberley, 8300.

Should you decide to appeal, you must serve a copy of your notice of intention to appeal on all registered interested and affected parties as well as a notice indicating where, and for what period, the appeal submission will be available for inspection.

Yours faithfully

Mr. S. Mbanjwa
ACTING DIRECTOR: ENVIRONMENTAL QUALITY MANAGEMENT

DATE OF DECISIONS: 10/12/2013

CC : Estie Retief – GCS (Pty) Ltd
Fax : 011 803 5745
Email : estie@gcs-sa.biz

Northern Cape Province
DEPARTMENT OF
ENVIRONMENT & NATURE
CONSERVATION

Porofensi Ya Kapa Bokone
LEFAPHA LA TIKOLOGO LE
TSHOMARELO YA THLAGO

ENVIRONMENTAL AUTHORISATION
in terms of National Environmental Management Act, 1998 (Act No. 107 of 1998) and the Environmental Impact Assessment Regulations, 2010

Authorisation Register Number:	Permit 56/2013
Reference Number:	NC/EIA/JTG/JOE/KAT1/2012
Last Amended:	N/A
Holder of Authorisation:	Assmang Limited
Location of activity:	Khumani mining area,remainder of Parson 564 RD and portion 2 of Parson 564 RD, Gamagara Local Municipality, John Taolo Gaetsewe Northern Cape Province

DEFINITIONS

Activity means an activity identified in Government Notice No. R. 544 and No. R. 545 of 2010 as a listed activity.
Applicant means a person who has submitted an application.
Application means an application for an environmental authorization in terms of chapter 3 of the Environmental Impact Assessment Regulations of 2010.
Basic assessment report means a report contemplated in regulation 22.
Environmental Impact Report means a report contemplated in regulation 31 of the Environmental Impact Assessment Regulations of 2010.
EAP means an environmental assessment practitioner as defined in section 1 of the Act.
Interested and affected party means a interested and affected party contemplated in section 24(4)(d) of the Act, and which in terms of that section includes:

- Any person, group of persons or organisation interested in or affected by an activity, and
- Any organ of state that may have jurisdiction over any aspect of the activity.

Public participation process means a process in which potential interested and affected parties are given an opportunity to comment on, or raise issues relevant to, specific matters.
The Act means the National Environmental Management Act, 1998 (Act No. 107 of 1998).

DECISION

The Department is satisfied, on the basis of information available to it and subject to compliance with conditions of this environmental authorisation, that the applicant should be authorised to undertake the activity specified below.

Details regarding the basis on which the Department reached this decision are set out in Annexure

ACTIVITIES AUTHORISED

By virtue of the powers conferred on it by the National Environmental Management Act, 1998 (Act No. 107 of 1998) and the Environmental Impact Assessment Regulations, 2010 the Department hereby authorises –

Assmang Limited

with the following contact details –

Alex Mostert
Private Bag X 503
Kathu
Northern Cape

Tel: 053 311 6666
Fax: 053 311 4642

to undertake the following activity (hereafter referred to as "the activity")

Activity No. 15 of GN. R.545 of 18 June 2010:

Physical alteration of undeveloped, vacant or derelict land for residential, retail, commercial, recreational, industrial or institutional use where the total area to be transformed is 20 hectares or more; except where such physical alteration takes place for:

(i) linear development activities; or
(ii) agriculture or afforestation where activity 16 in this Schedule will apply.

The development of a off-grade plant at Khumani Mine, Gamagara local Municipality, John Taolo Gaetsewe District Municpality, Northern Cape Province, with the coordinates Latitude (27° 51' 45.13")S and Longitude (22° 58" 56.3")E, will hereafter be referred to as "the property".

The granting of this Environmental Authorisation is subject to the conditions set out below.

CONDITIONS

Scope of authorisation:

1. Authorisation of the activity is subject to the conditions contained in this authorisation, which conditions form part of the environmental authorisation and are binding on the holder of the authorisation.

2. The holder of the authorisation shall be responsible for ensuring compliance with the conditions by any person acting on his or her behalf, including but not limited to, an agent, sub-contractor, employee or person rendering a service to the holder of the authorisation.

3. The activity(s) which is authorised may only be carried out at the property indicated above.

4. Any changes to, or deviations from, the project description set out in this authorisation must be approved, in writing, by the Department before such changes or deviations may be effected. In assessing whether to grant such approval or not, the Department may request such information as it deems necessary to evaluate the significance and impacts of such changes or deviations and it may be necessary for the holder of the authorisation to apply for further authorisation in terms of the regulations.

5. This authorisation does not negate the holder of the authorisation's responsibility to comply with any other statutory requirements that may be applicable to the undertaking of the activity.

General conditions:

6. A copy of this authorisation must be kept at the property where the activity will be undertaken. The authorisation must be produced to any authorised official of the Department who requests to see it and must be made available for inspection by any

employee or agent of the holder of the authorisation who works or undertakes work at the property.

7. Where any of the applicant's contact details change, including the name of the responsible person, the physical or postal address and/ or telephonic details, the applicant must notify the Department as soon as the new details become known to the applicant.

8. The holder of the authorisation must notify the Department, in writing and within 24 (TWENTY FOUR) hours, if condition 16 of this authorisation cannot be or is not adhered to. In all other cases, the holder of the authorisation must notify the Department, in writing, within 7 (SEVEN) if a condition of this authorisation is not adhered to. Any notification in terms of this condition must be accompanied by reasons for the non-compliance.

9. Non-compliance with a condition of this authorisation may result in criminal prosecution or other actions provided for in the National Environmental Management Act, 1998 and the regulations.

10. This authorization is subject to the approval by the relevant local authorities i.e. in terms of any relevant legislation administered by those local authorities.

11. The activity may not commence without the necessary permits/licenses/approvals and/or service agreements, where it is relevant, from or with the relevant regulatory authorities whether national, provincial or local (these include but are not limited to National Department of Environmental Affairs, National Department of Agriculture, Forestry and Fisheries, Department of Housing & Local Government, Department of Water Affairs & Forestry, Department of Minerals Resources, Department of Transport, Roads & Public Works, Department Arts, Sports & Culture, South African Heritage Resources Agency, South African Civil Aviation Authority).

12. The activity, including site preparation, may not commence before the thirty (30) day appeal period expires or until such time as the Department has considered any appeals that have been lodged.

    a. One week's written notice must be given to the Administration clerk (Impact Management Unit) before commencement with the activity.
    b. Such notice shall make clear reference to the site location details and the reference number given above.
    c. The said notice must also include proof of compliance with the following conditions described herein:
        i. Conditions: 11 and 23

13. The applicable conditions of this authorization must form part of all contractors' and sub-contractors' conditions of contract. A performance-based requirement with regard to environmental impact management must be included in all contracts related to any aspect of this authorization.

14. The applicant must carry out regular environmental audits to establish compliance with the conditions of this authorization and contracts.

15. Records relating to the compliance/non-compliance with the conditions of the authorization and contracts must be kept in good order. Such records must be made available to the Department within 7 (seven) days of receipt of a written request by the Department for such records.

16. Any complaints regarding the said development must be brought to the attention of the Department within 24 hours after receiving the complaint. A complaints register must be kept up to date for inspection by the Department

17. Officials in the employ of the Department shall be given access to the property as described above (see detailed description of the activity) for the purposes of assessing and/or monitoring compliance with the conditions contained in this Environmental Authorisation. Where the activity is located on a third party's property the applicant shall be responsible to arrange access for departmental officials

18. This Department may add to, change and/or amend any of the conditions in this authorization if, in the opinion of the Department, the addition, change of amendment is environmentally justified. In event that such impacts exceed its significance as predicted in the independent consultant's Basic assessment Report and supporting documentation, the authorization may be withdrawn after proper procedures were followed.

19. In the event of any dispute concerning the significance of a particular impact, the opinion of this department in respect of its significance will prevail.

20. This Department and any national Department, provincial department, local authorities or committees appointed in terms of the conditions of this application or any other public authority or organization shall not be held responsible for any damage of losses suffered by the applicant or his successor in title in any instance where construction or operation subsequent to construction be temporarily or permanently stopped for reasons of non-compliance by the applicant with the conditions of approval as set out in this document or any other subsequent document emanating from these conditions of approval.

21. The applicant shall be responsible for all costs necessary to comply with the above conditions unless otherwise specified.

22. The applicant must apply the principle of best practicable environmental option for all technologies used/ implemented

Appeal of authorisation:

23. The holder of the authorisation must notify every registered interested and affected party, in writing and within 12 (TWELVE) calendar days, of receiving notice of the Department's decision to authorise the activity.

24. The notification referred in 23 must –
    - specify the date on which the authorisation was issued;
    - inform the interested and affected party of the appeal procedure provided for in Chapter 7 of the regulations; and

- advise the interested and affected party that a copy of the authorisation and reasons for the decision will be furnished on request.

25. If the applicant should appeal against this Environmental Authorisation, he/she must inform all interested and affected persons that such an appeal is being lodged with the MEC and if requested, the applicant/appellant must provide those persons with reasonable access to a full copy of the appeal within a reasonable time before expiry of the thirty day appeal period.

Management of activity:

26. The Environmental Management Programme ("EMPr") submitted as part of the application for environmental authorisation must be implemented.

27. All areas disturbed during the commissioning of the activity must be rehabilitated.

28. Best practice of waste avoidance, minimisation and disposal of waste at an appropriate facility must be implemented.

Monitoring

29. The applicant must appoint a suitably experienced Environmental Control Officer (ECO) for the construction phase of the development that will have the responsibility to ensure that the mitigation / rehabilitation measures and recommendations referred to in this authorisation are implemented.

30. The monitoring monitoring of the constructors, compliance with conditions of this Environmental Authorization is essential and must be done on a weekly basis. Any deviances from the conditions of this Environmental Authorization must be rectified immediately.

31. The ECO shall be appointed before commencement of any land clearing or construction activities.

32. The ECO shall keep record of all activities on site, problems identified, transgressions noted and a task schedule of tasks undertaken by the ECO.

33. The ECO shall remain employed until all rehabilitation measures, as required for implementation due to construction damage, are completed and the site is ready for operation.

34. Records relating to monitoring and auditing must be kept on site and made available for inspection to any relevant and competent authority in respect of this development.

Recording and Reporting to the Department:

35. Where any of the applicant's contact details change, including the name of the responsible person, the physical or postal address and/or telephonic details, the applicant must notify the Department as soon as the new details become known to the applicant.

36. In all other cases, the holder of the authorisation must notify the Department, in

writing, within 7 days if a condition of this authorisation is not adhered to. Any notification in terms of this condition must be accompanied by the reason for non-compliance.

37. Records relating to the compliance/non-compliance with the conditions of the authorisation and contracts must be kept in good order. Such records must be made available to the Department within 7 days of receipt of a written request by the Department for such records.

38. Any complaints regarding the said development must be brought to the attention of the Department within 24 hours after receiving the complaint. A complaints register must be kept up to date for inspection by the Department.

Commissioning of the activity:

39. 14 days written notice must be given to the Department that the activity will commence. Commencement for the purposes of this condition includes site preparation. The notice must include a date on which it is anticipated that the activity will commence.

40. The authorised activity shall not commence within thirty (30) days of the date of signature of the authorisation.

41. Should you be notified by the minister of a suspension of the authorisation pending appeal procedures, you shall not commence with the activity unless authorised by the minister in writing.

42. All hazardous waste (oil, effluent from corrosion protective activities) must be disposed off at the registered site.

43. General waste must be collected in containers disposed of regularly at a permitted landfill site. Recyclable waste must be recovered for recycling purpose. NB: No temporary dumping of waste is allowed on site. Precautionary measures should be taken to prevent refuse from spreading from or on the site.

44. It is recommended that no threatened or protected species should be destroyed. Fauna and flora (including protected or endemic species) relocated or destroyed should only be done if there is authorised by Department of Agriculture, Forestry and Fisheries (DAFF) and Department of Environment and Nature Conservation.

45. The Northern Cape Nature Conservation Act. (No.9 of 2009) must be taken into consideration, as any listed species in this Act. which requires removal, will need the necessary permits form Department of Environment and Nature Conservation.

46. Should any archaeological artefacts, graves or protected and endangered biota be found on site, the operation must be suspended and construction should only continue after consultation with South African Heritage Resources Agency (SAHRA).

47. The safety of the participants must be ensured by:
    - involving qualified engineers in the design and construction of the proposed Structure and associated infrastructure.
    - Having regular safety inspections and ensuring participants are equipped with necessary safety equipment.

48. The construction process must ensure that the necessary safety signage and personal protective clothing is in place. The regulations pertaining Occupational Health and Safety Act must be adhered to at all times.

49. Any stockpiled soils should have storm water management measures implemented.

50. Topsoil removed during excavations must be kept separate from other material. Topsoil must be placed above other material during backfilling.

51. No vehicle or construction machinery may be extensively repaired on-site.

52. The holder of this Environmental Authorization must conduct the environmental awareness with the contractors.

53. Any complaint from the public during the construction and operation of this project must be attended to by the holder of this authorisation as soon as possible to the satisfaction of parties concerned.

54. Spillage of petroleum products (fuel and lubricants) must be avoided. Temporary storage of petrochemical products and servicing of machinery and vehicles on site will be allowed except at a site specifically designed for that purpose. In terms of accidental spillage, contaminated soil must be removed for bioremediation or disposed of at a recognized facility for the substance concerned. Disturbed land must be rehabilitated and seeded with vegetation seed naturally occurring on the site.

55. The applicant must be made aware of roles and responsibility in terms of the National Veld and Forest Fire Act, Act 101 of 1998 (NVFFAA), due to the location of the development site located on an international boundary, note must be taken of section 14 of NVFFA

56. Chemical toilets must be available for workers on site during construction phase only, i.e. sewage waste must be disposed off at the Municipal sewage plant on a regular basis. No "long drop" toilets will be allowed. No open space or surrounding bush shall be used as toilet facility under any circumstances.

57. It is the holder of this authorization's responsibility to ensure that an ongoing management and monitoring of the impacts of the activity on the Environment throughout the life cycle of the activity is put into practice.

58. All the areas (e.g. stockpiling of material, machines, workshop. etc) in the construction site must be clearly defined.

59. It is the contractor's responsibility that all staff/employees are familiar with all the emergency procedures. The contractor must also ensure that emergency numbers are visible and available and always updated.

60. The contractor must take all the necessary precautionary measures to ensure that no fires are caused as a result of construction activities.

61. The central waste collection point must be specific -where it will be situated to ensure that no soil or underground water contamination takes place, this should be done at least on weekly basis.

Operation of the activity:

62. The detailed mitigation as outlined in the EMP should be implemented.

63. General waste must be collected in drums containers disposed of weekly at a permitted Municipal landfill site. Recyclable waste must be recovered for recycling purpose. No temporary dumping of waste is allowed on site. Precautionary measure should be taken to prevent refuse from spreading from or on the site.

64. All hazardous substances spillages must be reported to the Department of Environmental Affairs within 48 hrs of the incident.

65. There must be procedures in place for the regular inspection and maintenance of the structure and associated infrastructure to ensure that environmental degradation is prevented and possible measures are put in place so that impacts arising from operation are mitigated.

Site closure and decommissioning:

66. All temporary facilities used in the construction phase must be decommissioned in a responsible manner and the place be rehabilitated.

67. The applicant must undertake simultaneous rehabilitation of the area to ensure that the remaining area is kept in a good and stable condition.

68. Soil that has become compacted through the activities of the development must be loosened to an appropriate depth to allow seed germination.

69. Should the activity ever cease or become redundant the applicant shall undertake the required actions as prescribed by legislation at the time and comply with all relevant legal requirements administered by any relevant and competent authority at the time.

70. All construction and storage sites and all areas disturbed by the project must be rehabilitated to their former or better condition. Those sites and areas must be re-vegetated with indigenous plants upon completion of the proposed development and must take place where necessary.

71. Should the project be abandoned or decommissioned, a Closure Management Plan must be compiled and the holder of the Environmental Authorization must rehabilitate the site to the satisfaction of this Department.

Non-compliance:

72. In the event of non-compliance by employees and contractors during the construction, operation and decommissioning phases of the project the applicant will be held liable.

73. The applicant shall be responsible for all the costs necessary to comply with the above conditions unless otherwise stated.

74. Provincial Government, Local Authority or committees appointed in terms of the application or any other public authority or organization shall not be held responsible for any damages or losses suffered by the developer or his/her successor in title in

any instance where construction or operation subsequent to construction are to be temporarily or permanently stopped for reasons of non-compliance by the developer with conditions of approval as set out in the document or any other subsequent document emanating from this approval.

DURATION AND PERIOD OF VALIDITY

This activity(s) must commence within a period of three (3) years from the date of issue. If commencement does not occur within that period and the intention is to extend the validity period of the authorisation, an application for amendment to extend the validity period must launched at least six months before the validity period lapses. If commencement of the activity does not occur within that period, the authorisation lapses and a new application for environmental authorisation must be made in order for the activity to be undertaken.

APPEAL

In terms of Chapter 7 of Environmental Impact Assessment Regulations, 2010, if the applicant or a person affected by this Decision wishes to appeal this decision, a notice of intention to appeal must be lodged within Twenty (20) days after date of the decision, and an appeal must **be lodged within thirty (30) days after lapsing of 20 days contemplated in regulation 60 (1)** of lodging of the notice to appeal to:

The Member of the Executive Council
Ministry of Environment & Nature Conservation
Private Bag X6102
Kimberley
8300
Fax: (053) 8321032

Appeals must comply with the provisions of Chapter 7 of Environmental Impact Assessment Regulations, 2010 Government Notice No. R. 543 of 18 June 2010.

MR S. MBANJWA
ACTING DIRECTOR ENVIRONMENTAL QUALITY MANAGEMENT
DEPARTMENT OF ENVIRONMENT & NATURE CONSERVATION

DATE OF ENVIRONMENTAL AUTHORISATION: 10/12/2013

ANNEXURE 1: REASONS FOR DECISION

1. Background

The applicant, **Assmang Limited**, applied for authorisation to carry on the following activity –

The development of a off grade plant, Gamagara local Municipality, John Taolo Gaetsewe District Municpality, Northern Cape Province

Activity No. 15 of GN. R.545 of 18 June 2010:

Physical alteration of undeveloped, vacant or derelict land for residential, retail, commercial, recreational, industrial or institutional use where the total area to be transformed is 20 hectares or more; except where such physical alteration takes place for:

(i) linear development activities; or
(ii) agriculture or afforestation where activity 16 in this Schedule will apply.

A Full EIA Process was followed.

2. Information considered in making the decision

In reaching its decision, the Department took, *inter alia,* the following into consideration -

a) The information contained in the Application for Environmental Authorisation.
b) The information contained in the Scoping and Final EIA report
c) The Biodiversity: faunal and floral specialist studies and action plan by Stephen van Staden and Natasha van de Haar Dated February 2012.
d) Biodiversity monitoring and rehabilitation action plans dated February 2012.
e) The objectives and requirements of relevant legislation, policies and guidelines, including section 2 of the National Environmental Management Act, 1998 (Act No. 107 of 1998) and
f) The findings of the site visit undertaken by Mr. M.H. Mathews and Tanja Bekker on 08 October 2013

3. Key factors considered in making the decision

All information presented to the Department was taken into account in the Department's consideration of the application. A summary of the issues which, in the Department's view, were of the most significance is set out below.

a) The legal and procedural requirements have been complied with the information contained in the scoping, EIA report and Appendices are to the satisfaction of the Department.
b) Comments by interested and affected parties and other stakeholders.

4. Findings

After consideration of the information and factors listed above, the Department made the following findings –

a) The process was satisfactory in terms of the Regulation 36 of the EIA 2010 regulations.
b) Minimum requirements for Public Participation Process has been met.
c) The legal and procedural requirements have been complied with and the information contained in the Environmental Assessment Report and Appendices is to the satisfaction of this Department.

In view of the above, the Department is satisfied that, subject to compliance with the conditions contained in the environmental authorisation, the proposed activity will not conflict with the general objectives of integrated environmental management laid down in Chapter 5 of the National Environmental Management Act, 1998 and that any potentially detrimental environmental impacts resulting from the proposed activity can be mitigated to acceptable levels. The application is accordingly granted.

the denc

Department:
Environment & Nature Conservation
NORTHERN CAPE PROVINCE
REPUBLIC OF SOUTH AFRICA

Private Bag X6102, Kimberley, 8300, SASKO Building, Tel: 053-807 7430, Fax: 053-831 3530

Enquiries : Ms T Wessels
Reference : S2.4

Date : 05 December 2013

Mr SG Mbanjwa
Department of Environment and Nature Conservation
Private Bag X6102
KIMBERLEY
8300

Dear Sir

ACTING DIRECTOR: ENVIRONMENTAL QUALITY MANAGEMENT ON THE 09TH UNTIL THE 31ST DECEMBER 2013

You are hereby appointed as Acting Director: Environmental Quality Management (EQM) for the said period.

Your authority as Acting Director: EQM will be as follows:

1. Approval of motivations of single spending authorizations of only up to R30 000 each;

2. Signing of Environmental Authorizations, Waste Management and Air Quality Management Licences.

We wish to express our sincere appreciation for your willingness to take up the extra responsibilities.

Yours sincerely

MR D VAN HEERDEN 20131205
HEAD OF DEPARTMENT
DEPARTMENT OF ENVIRONMENT AND NATURE CONSERVATION

Accepted / ~~Not Accepted~~

MR S MBANJWA
DEPUTY DIRECTOR: IMPACT MANAGEMENT

6/12/2013
DATE

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the denc

Department:
Environment & Nature Conservation
NORTHEN CAPE PROVINCE
REPUBLIC OF SOUTH AFRICA

Enquiries :
Dipatlisilo :
Navrae :
Imibuzo :
T.S Tsimakwane

Date :
Letlha:
Datum :
Umhla:
04th March 2016

Reference :
Tshupelo :
Verwysing:
Isalathiso :
25/4/2 (02/03/13)

The Senior General Manager
Assmang Khumani Mine Pty Ltd
Private Bag X503
Khathu
8446

Per Email: david.selemo@assmang.co.za

Attention: Mr David Selemo

Dear Sir

WITHDRAWAL LETTER OF THE AMENDMENT APPLICATION FOR THE CONSTRUCTION OF THE STORAGE WATER DAM: ASSMANG IRON ORE KHUMANI IN THE JOHN TAOLO DISTRICT.

Your email correspondence dated 29 February 2016 refers.

The Compliance and Enforcement Unit has had discussions with the Impact Management Section on how best to resolve your case. Kindly note, that this letter is in response to the construction of the storage water dam at the mine. Should there be any alterations to the approved layout plan you are urged to liaise with the Department of Mineral Resources.

The Department hereby withdraws your amendment application. Kindly quote the above-mentioned reference number in any future correspondence in respect of this withdrawal letter.

Professionally yours

T. Tsimakwane
Assistant Director: Compliance and Monitoring
Grade 2 Environmental Management Inspector (EMI)

the denc

Department:
Environment & Nature Conservation
NORTHERN CAPE PROVINCE
REPUBLIC OF SOUTH AFRICA

Private Bag X6102, Kimberley, 8300, Metlife Towers, T-Floor, Tel: 053 807 7300, Fax: 053 807 7328

Enquiries
Dipatlisilo
Navrae :
Imibuzo : T.S Tsimakwane

Date :
Letlha :
Datum :
Umhla : 28 March 2014

Reference :
Tshupelo :
Verwysing :
Isalathiso : 25/4/2 (02/03/13)

The Senior General Manager
Assmang Khumani Mine Pty Ltd
Private Bag X503
Khathu
8446

Per Email:

Attention: Mr David Selemo

Dear Sir

RESPONSE TO ASSMANG IRON ORE KHUMANI MINE'S REQUEST FOR THE CONTINUATION OF THE PROCESS WATER STORAGE DAM IN THE JOHN TAOLO DISTRICT.

Assmang Khumani Mine's request to utilise the process water storage dam dated 16-10-2013 refers.

The Department wish to apologise on the delay of not responding to your request timeously. The Department also appreciates the measures you undertook to ensure that the principles of the National Environmental Management Act 107 of 1998 are applied in your mining operations.

The delay from the Department was brought upon the fact that Khumani Mine's decision to go ahead with an illegal activity was viewed at the time as deliberate and the Department had to apply its mind before making any decision.

In response to the above-mentioned you indicated that Khumani Mine has no access to ground water resources due to the underlying aquifer has been dewatered by surrounding mining operations, as such the mine is reliant on the water purchased from the Sedibeng Water Board.

You also indicated the new location within the Parson's farm for the process water storage dam was chosen as it was deemed suitable because the area has already been disturbed also because the location of the process dams will contain runoff from the proposed Off grade 2 Plant.

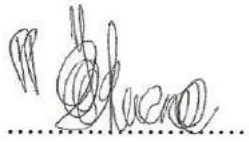
After considering your request the Department hereby grants you permission to continue with the construction of the process water dam with immediate effect.

The reasons for the decision is that the site is already disturbed, and also that the sitting of the dams is in close proximity to the plant which will ensure that the associated infrastructure are aligned to the dams. The positioning of the dams are also of a shorter distance making maneuvering within the plant much easier.

Furthermore, your activities have an environmental authorisation issued by the competent authority which renders your intended activities of constructing the process water dam lawful.

You are advised to liaise with the Impact Management Directorate to can finalise your amendment application.

Professionally yours



O.T Gaoraelwe

Acting Director: Compliance and Enforcement

Grade 1 Environmental Management Inspector (EMI)

Department of Environment and Nature Conservation

Lefapha La , Tikologo
Le Tshomarelo

Departement van Omgewing en Natuur Bewaring

Isebe Indalo Nolondolozo

Metlife Towers
T-Floor
Private Bag X6102
KIMBERLEY
8300
Isakhiwo se Metlife
T-Floor
Inqowa yeposi X6102
KIMBERLEY
8300

Moago wa Metlife
T-Floor
Kgetsanaposo X6102
KIMBERLEY
8300
Metlife Towers
T-Vloer
Privaatsak X6102
KIMBERLEY
8300

Tel: (053) 807 -7430

Fax: (053) 831 3530

Enquiries :
Dipatlisiso : Mr S.G Mbanjwa
Imibuzo :
Navrae :

Date :
Leshupelo : 23rd July 2012
Umhla :
Datum :

Reference :
Tshupelo : NC/EIA/JTG/GAM/KAT01/2010
Isalathiso : NCP/EIA/0000158/2012
Verwysings

Mr. Alex Mostert
Assmang Limited
Private Bag X503
Kathu
8446

Fax: 053 311 4642

Dear Sir/Madam

THE GRANTING OF THE ENVIRONMENTAL AUTHORISATION FOR: LISTED ACTIVITIES GNR 544: ACTIVITIES: 3, 15, 19, 20, 13, 11, 12 AND 22: THE EXPANSION OF DIESEL STORAGE AND A SILO FOR EXPLOSIVES, THE CONSTUCTION OF A TAR ROAD ADDITIONAL REFEULING STATION STROMWATER DAMS AND STORAGE TANKS, KGALAGADI DISTRICT MUNICIPALITY, SIYANDA DISTRICT MUNICIPALTIY, NORTHERN CAPE PROVINCE

By virtue of the powers delegated to me by the National Environmental Management Act, 1998 (Act No. 107 of 1998) and the Environmental Impact Regulations, 2010, **THE DEPARTMENT HEREBY GRANT THE ENVIRONMENTAL AUTHORISATION FOR: LISTED ACTIVITIES GNR 544: ACTIVITIES: 3, 15, 19, 20, 13, 11, 12 AND 22: THE EXPANSION OF DIESEL STORAGE AND A SILO FOR EXPLOSIVES, THE CONSTUCTION OF A TAR ROAD ADDITIONAL REFEULING STATION STROMWATER DAMS AND STORAGE TANKS, KGALAGADI DISTRICT MUNICIPALITY, SIYANDA DISTRICT MUNICIPALTIY, NORTHERN CAPE PROVINCE.** A detailed description of the activity is given in the **Final Scoping Report dated November 2011,** subject to the conditions listed in the environmental authorization and reasons for the decision are attached herewith.

In terms of regulation 10(2) of the Environmental Impact Assessment Regulations, 2010, you are instructed to notify all registered interested and affected parties, in writing and within seven (7) calendar days of receiving of this letter, of the Departments decision in respect of your application as well as the provisions regarding the making of appeals that are provided for in the regulations.

Your attention is drawn to Chapter 7 of the Regulations which regulates appeal procedures. Should you / any person affected by this decision wish to appeal any aspect of the decision, you or a person affected by the decision must, *inter alia*, lodge a notice of intention to appeal, as prescribed in regulation 62 of Environmental Impact Assessment Regulations, 2010, with the Member of the Executive Council, Ministry of Environment and Nature Conservation within 10 days of receiving this letter, by means of one of the following methods:

By facsimile:	(53) 832 1026;
By post:	Private Bag x 6102, Kimberley, 8300 or
By hand:	Floor, Metlife Towers, Kimberley, 8300.

Should you decide to appeal, you must serve a copy of your notice of intention to appeal on all registered interested and affected parties as well as a notice indicating where, and for what period, the appeal submission will be available for inspection.

Yours faithfully

Mutyorauta

Mr J.J. Mutyorauta
DIRECTOR: ENVIRONMENTAL QUALITY MANAGEMENT

DATE OF DECISIONS: 23rd July 2012

CC : Pieter Snyders – GCS (Pty) Ltd
Fax : 011 803 5745

Northern Cape Province
DEPARTMENT OF
ENVIRONMENT & NATURE
CONSERVATION

Porofensi Ya Kapa Bokone
LEFAPHA LA TIKOLOGO LE
TSHOMARELO YA THLAGO

ENVIRONMENTAL AUTHORISATION
In terms of National Environmental Management Act, 1998 (Act No. 107 of 1998) and the Environmental Impact Assessment Regulations, 2010

Authorisation Register Number:	Permit 37/2012
Reference Number:	NC/EIA/JTG/GAM/JTG/GAM/KAT1/2010
Last Amended:	N/A
Holder of Authorisation:	Assmang Limited
Location of activity:	Portion 1,4,5 and the remainder of the farm Mokaning,560 Rd; Portion 1,2,3 and the remainder of the farm King 561 Rd; Portion 2,6 and the remainder of the farm portion 564 Rd; Portion 3,4,5 and the remainder of the Bruce 544 Rd

DEFINITIONS

"Activity" means an activity identified in Government Notice No. R. 544 and No. R. 545 of 2010 as a listed activity.

"Applicant" means a person who has submitted an application.

"Application" means an application for an environmental authorization in terms of chapter 3 of the Environmental Impact Assessment Regulations of 2010.

"EAP" means an environmental assessment practitioner as defined in section 1 of the Act.

"Environmental Impact Assessment" relates to an application to which scoping must be applied, means the process of collecting, organising, analysing, interpreting and communicating information that is relevant to the consideration of that application.

"Environmental Impact Report" means a report contemplated in regulation 31 of the Environmental Impact Assessment Regulations of 2010.

"Environmental Management Plan" means an environmental management plan in relation to identified or specified activities envisaged in chapter 5 of the Act and described in regulation 33 of Government Notice No. 33306

"Interested and affected party" means a interested and affected party contemplated in section 24(4)(d) of the Act, and which in terms of that section includes:

- Any person, group of persons or organisation interested in or affected by an activity, and
- Any organ of state that may have jurisdiction over any aspect of the activity.

"Public participation process" means a process in which potential interested and affected parties are given an opportunity to comment on, or raise issues relevant to, specific matters.

"Scoping" means a process contemplated in regulation 28(e)

"Scoping report" means a report contemplated in regulation 29

"The Act" means the National Environmental Management Act, 1998 (Act No. 107 of 1998).

DECISION

The Department is satisfied, on the basis of information available to it and subject to compliance with conditions of this environmental authorisation, that the applicant should be authorised to undertake the activity specified below.

Details regarding the basis on which the Department reached this decision are set out in Annexure 1.

ACTIVITIES AUTHORISED

By virtue of the powers conferred on it by the National Environmental Management Act, 1998 (Act No. 107 of 1998) and the Environmental Impact Assessment Regulations, 2010 the Department hereby authorises –

Assmang Limited

with the following contact details –

Mr Alex Mostert
Private Bag X 503
8446
E-mail: alexm@assmang.co.za.

Tel: 053 311 6666
Fax: 053 311 4642

to undertake the following activity (hereafter referred to as "the activity")

The expansion of diesel storage and silo for explosion, the construction of a tar road, additional refuelling station, storm water dams and storage tanks. The establishment and expansion of borrow pits and the establishment of two waste rock dumps at Khumani Iron Ore mine.

Portion 1,4,5 and the remainder of the farm Mokaning,560Rd, Portion 1,2,3 and the remainder of the a farm King 561 Rd, Portion 2,6 and the remainder of the farm portion 564 RD, Portion 3,4,5 and the remainder of the Bruce 544Rd, the site is located 15Km from Kathu, 70 km from Postmasburg and is situated in the jurisdiction of both Tsantsabane and the Gamagara Local Municipalities, with the following co-ordinates (Longitude (E) 23° 04' 03.27", Latitude (S) 28° 19' 04.20") hereafter referred to as "the property".

CONDITIONS

Scope of authorisation:

1. Authorisation of the activity is subject to the conditions contained in this authorisation, which conditions form part of the environmental authorisation and are binding on the holder of the authorisation.

2. The holder of the authorisation shall be responsible for ensuring compliance with the conditions by any person acting on his or her behalf, including but not limited to, an agent, sub-contractor, employee or person rendering a service to the holder of the authorisation.

3. The activity(s) which is authorised may only be carried out at the property indicated above.

4. Any changes to, or deviations from, the project description set out in this authorisation must be approved, in writing, by the Department before such changes or deviations may be effected. In assessing whether to grant such approval or not, the Department may request such information as it deems necessary to evaluate the significance and impacts of such changes or deviations and it may be necessary for the holder of the authorisation to apply for further authorisation in terms of the regulations.

5. This authorisation does not negate the holder of the authorisation's responsibility to comply with any other statutory requirements that may be applicable to the undertaking of the activity.

General conditions:

6. A copy of this authorisation must be kept at the property where the activity will be undertaken. The authorisation must be produced to any authorised official of the Department who requests to see it and must be made available for inspection by any employee or agent of the holder of the authorisation who works or undertakes work at the property.

7. Where any of the applicant's contact details change, including the name of the responsible person, the physical or postal address and/ or telephonic details, the applicant must notify the Department as soon as the new details become known to the applicant.

8. The holder of the authorisation must notify the Department, in writing and within 24 (TWENTY FOUR) hours, if condition 16 of this authorisation cannot be or is not adhered to. In all other cases, the holder of the authorisation must notify the Department, in writing, within 7 (SEVEN) days if a condition of this authorisation is not adhered to. Any notification in terms of this condition must be accompanied by reasons for the non-compliance.

9. Non-compliance with a condition of this authorisation may result in criminal prosecution or other actions provided for in the National Environmental Management Act, 1998 and the regulations.

10. This authorization is subject to the approval by the relevant local authorities i.e. in terms of any relevant legislation administered by those local authorities.

11. The activity may not commence without the necessary permits/licenses/approvals and/or service agreements, where it is relevant, from or with the relevant regulatory authorities whether national, provincial or local (these include but are not limited to National Department of Water and Environmental Affairs , National Department of Agriculture, Forestry and Fisheries, Department of Cooperative Governance and Human settlement, Department of Water Affairs, Department of Minerals and Resources, Department of Energy Department of Roads & Public Works, Department of Transport, Department Arts & Culture, Department of Sports and Recreation, South African Heritage Resources Agency, South African Civil Aviation Authority).

12. The activity, including site preparation, may not commence before the thirty (30) day appeal period expires or until such time as the Department has considered any appeals that have been lodged.

    a. One week's written notice must be given to the Administration clerk (Impact Management Unit) before commencement with the activity.
    b. Such notice shall make clear reference to the site location details and the reference number given above.
    c. The said notice must also include proof of compliance with the following conditions described herein:
        i. Conditions: 11 and 23

13. The applicable conditions of this authorization must form part of all contractors' and sub-contractors' conditions of contract. A performance-based requirement with regard to environmental impact management must be included in all contracts related to any aspect of this authorization.

14. The applicant must carry out regular environmental audits to establish compliance with the conditions of this authorization and contracts.

15. Records relating to the compliance/non-compliance with the conditions of the authorization and contracts must be kept in good order. Such records must be made available to the Department within 7 (seven) days of receipt of a written request by the Department for such records.

16. Any complaints regarding the said development must be brought to the attention of the Department within 24 hours after receiving the complaint. A complaints register must be kept up to date for inspection by the Department.

17. Officials in the employ of the Department shall be given access to the property as described above (see detailed description of the activity) for the purposes of assessing and/or monitoring compliance with the conditions contained in this Record of Decision. Where the activity is located on a third

party's property the applicant shall be responsible to arrange access for departmental officials.

18. This Department may add to, change and/or amend any of the conditions in this authorization if, in the opinion of the Department, the addition, change of amendment is environmentally justified. In event that such impacts exceed its significance as predicted in the independent consultant's environmental scoping report and supporting documentation, the authorization may be withdrawn after proper procedures were followed.

19. In the event of any dispute concerning the significance of a particular impact, the opinion of this department in respect of its significance will prevail.

20. This Department and any national department, provincial department, local authorities or committees appointed in terms of the conditions of this application or any other public authority or organization shall not be held responsible for any damage of losses suffered by the applicant or his successor in title in any instance where construction or operation subsequent to construction be temporarily or permanently stopped for reasons of non-compliance by the applicant with the conditions of approval as set out in this document or any other subsequent document emanating from these conditions of approval.

21. The applicant shall be responsible for all costs necessary to comply with the above conditions unless otherwise specified.

22. The applicant must apply the principle of best practicable environmental option for all technologies used/ implement.

23. The integrity of the Gamagara River and associated tributaries must be protected, by the prevention of any pollutant, leachate and siltation from reaching the river.

24. The applicant must establish a borehole and watercourse monitoring program as prescribed in the EMP, and the provision of water quality data to the Department of Water Affairs.

Appeal of authorisation:

25. The holder of the authorisation must notify every registered interested and affected party, in writing and within 7 (SEVEN) calendar days, of receiving notice of the Department's decision to authorise the activity.

26. The notification referred must –
    - specify the date on which the authorisation was issued;
    - inform the interested and affected party of the appeal procedure provided for in Chapter 7 of the regulations; and

- Advise the interested and affected party that a copy of the authorisation and reasons for the decision will be furnished on request.

27. If the applicant should appeal against this Environmental Authorisation, he/she must inform all interested and affected persons that such an appeal is being lodged with the MEC and if requested, the applicant/appellant must provide those persons with reasonable access to a full copy of the appeal within a reasonable time before expiry of the thirty day appeal period.

Monitoring:

26. The applicant must appoint a suitably experienced Environmental Control Officer (ECO) for the construction phase of the development that will have the responsibility to ensure that the mitigation / rehabilitation measures and recommendations referred to in this authorisation are implemented.

27. The ECO shall be appointed before commencement of any land clearing or construction activities.

28. The ECO shall keep record of all activities on site, problems identified, transgressions noted and a task schedule of tasks undertaken by the ECO.

29. The ECO shall remain employed until all rehabilitation measures, as required for implementation due to construction damage, are completed and the site is ready for operation.

30. Records relating to monitoring and auditing must be kept on site and made available for inspection to any relevant and competent authority in respect of this development.

Recording and Reporting to the Department:

31. Where any of the applicant's contact details change, including the name of the responsible person, the physical or postal address and/ore telephonic details, the applicant must notify the Department as soon as the new details become known to the applicant.

32. In all other cases, the holder of the authorisation must notify the Department, in writing, within 7 days if a condition of this authorisation is not adhered to. Any notification in terms of this condition must be accompanied by the reason for non-compliance.

33. Records relating to the compliance/non-compliance with the conditions of the authorisation and contracts must be kept in good order. Such records must be made available to the Department within 7 days of receipt of a written request by the Department for such records.

34. Any complaints regarding the said development must be brought to the attention of the Department within 24 hours after receiving the complaint. A

complaints register must be kept up to date for inspection by the Department.

Commissioning of the activity:

35. 14 days written notice must be given to the Department that the activity will commence. Commencement for the purposes of this condition includes site preparation. The notice must include a date on which it is anticipated that the activity will commence.

36. The authorised activity shall not commence within thirty (30) days of the date of signature of the authorisation.

37. Should you be notified by the minister of a suspension of the authorisation pending appeal procedures, you shall not commence with the activity unless authorised by the minister in writing.

38. Permits must first be obtained from the Department of Agriculture, Forestry and Fisheries for the cutting, damaging and removal of any protected flora

39. Any permits required for the removal of fauna must be obtained from the Department of Environment and Nature Conservation before removal.

Operation of the activity:

40. Fourteen (14) days written notice must be given to the Department that the activity operational phase will commence.

41. During operational phase of the development storm-water drainage must be monitored. Possible ground water contamination must also be monitored over time.

42. The construction area must be demarcated, no construction activities should be allowed outside proposed footprint.

DURATION AND PERIOD OF VALIDITY

This activity(s) must commence within a period of three (3) years from the date of issue. If commencement of the activity does not occur within that period, the authorisation lapses and a new application for environmental authorisation must be made in order for the activity to be undertaken.

APPEAL

In terms of Chapter 7 of Environmental Impact Assessment Regulations, 2010, if the applicant or a person affected by this Decision wishes to appeal this decision, a notice of intention to appeal must be lodged within Twenty (20) days after date of the decision, and an appeal must **be lodged within thirty (30) days after lapsing of 20 days contemplated in regulation 60 (1)** of lodging of the notice to appeal to:

The Member of the Executive Council
Ministry of Environment & Nature Conservation
Private Bag X6102
Kimberley
8300
Fax: (053) 8321032

Appeals must comply with the provisions of Chapter 7 of Environmental Impact Assessment Regulations, 2010 Government Notice No. R. 543 of 18 June 2010.

MR J.J MUTYORAUTA
DIRECTOR ENVIRONMENTAL QUALITY MANAGEMENT
DEPARTMENT OF ENVIRONMENT & NATURE CONSERVATION

DATE OF ENVIRONMENTAL AUTHORISATION: 23rd July 2012

ANNEXURE 1: REASONS FOR DECISION

1. Background

The applicant, **Assmang Limited**, applied for authorisation to carry on the following activity –.

The expansion of diesel storage and silo for explosion, the construction of a tar road, additional refuelling station, storm water dams and storage tanks. The establishment and expansion of borrow pits and the establishment of two waste rock dumps at Khumani Iron Ore mine.

Activity No. 11 of GN. R.544 of 18 June 2010:

The construction of:
(i) canals;
(ii) channels;
(iii) bridges;

(iv) dams;
(v) weirs;
(vi) bulk storm water outlet structures;
(vii) marinas;
(viii) jetties exceeding 50 square metres in size;
(ix) slipways exceeding 50 square metres in size;
(x) buildings exceeding 50 square metres in size; or
(xi) infrastructure or structures covering 50 square metres or more
where such construction occurs within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse, excluding where such construction will occur behind the development setback line.

Activity No. 12 of GN. R.544 of 18 June 2010:

The construction of facilities or infrastructure for the off-stream storage of water, including dams and reservoirs, with a combined capacity of 50000 cubic metres or more, unless such storage falls within the ambit of activity 19 of Notice 545 of 2010;

Activity No. 13 of GN. R.544 of 18 June 2010:

The construction 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 but not exceeding 500 cubic metres;

Activity No. 15 of GN. R.545 of 18 June 2010:

Physical alteration of undeveloped, vacant or derelict land for residential, retail, commercial, recreational, industrial or institutional use where the total area to be transformed is 20 hectares or more;

except where such physical alteration takes place for:
(i) linear development activities; or
(ii) agriculture or afforestation where activity 16 in this Schedule will apply.

Activity No. 20 of GN. R.545 of 18 June 2010:

Any activity requiring a mining permit in terms of section 27 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) or renewal thereof.

Activity No. 22 of GN. R.545 of 18 June 2010:

The construction of a road, outside urban areas,
(i) with a reserve wider than 13,5 meters or,
(ii) where no reserve exists where the road is wider than 8 metres, or
(iii) 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 Notice 545 of 2010.

The applicant appointed **GCS (Pty) Ltd** to undertake an environmental impact assessment process.

A Full Environmental Impact Assessment process was followed.

2. Information considered in making the decision

In reaching its decision, the Department took, *inter alia,* the following into consideration -

a) The information contained in the Scoping and the EIR.
b) The objectives and requirements of relevant legislation, policies and guidelines, including section 2 of the National Environmental Management Act, 1998 (Act No. 107 of 1998) and
c) The findings of the site visit undertaken by Mr. Marvin Mathews on 14 May 2012.

3. Key factors considered in making the decision

All information presented to the Department was taken into account in the Department's consideration of the application. A summary of the issues which, in the Department's view, were of the most significance is set out below.

a) The application process.
b) The Scoping Report and Environmental Management Report.
c) The legal and procedural requirements have been complied with and the information contained in the Environmental Management Report and Appendices is to the satisfaction of this Department.
d) Stormwater hydrological study by Justin Porteous dated March 2009.
e) The soil/pedological, land capacity and land use assessment study compiled by Ian Jones and Lynn Fitchen dated January 2005.
f) The flora and fauna report by GCS dated 2004.
g) Surface water study compiled by DJ Grant Stuart of Knight Piesold (Pty) Limited Dated Frebruary 2005.
h) Geohydrological study compiled by Gerhard Steenekamp of Clean Stream Groundwater Services dated December 2004.
i) Air quality report compiled by H Liebenberg-Enslin, G Petzer, T Resane, RM Watson of Airshed Planning Professionals (Pty) Ltd dated February 2005.
j) Noise impact study compiled F le R Malherbe dated March 2005.
k) Archaeological assessment report by David Morris dated February 2005.

4. Findings

After consideration of the information and factors listed above, the Department made the following findings –

a) The application process was satisfactory in terms of the Regulation 36 of the EIA 2010 regulations.
b) Adequate Public Participation Process took place.
c) The legal and procedural requirements have been complied with and the information contained in the Basic Assessment Report and Appendices is to the satisfaction of this Department.

In view of the above, the Department is satisfied that, subject to compliance with the conditions contained in the environmental authorisation, the proposed activity will not conflict with the general objectives of integrated environmental management laid down in Chapter 5 of the National Environmental Management Act, 1998 and that any potentially detrimental environmental impacts resulting from the proposed activity can be mitigated to acceptable levels. The application is accordingly granted.

environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

Ref. 12/9/11/L812/8
Enquiries: Mr Mpho Tshitangoni
Tel: (012) 310-3380 **Fax:** (012) 310-3753 **Email:** mtshitangoni@environment.gov.za
www.environment.gov.za

LICENCE NUMBER:	12/9/11/L812/8
CLASS:	H:H & G:C:B· (HAZARDOUS WASTE STORAGE AND GENERAL WASTE DISPOSAL FACILITIES)
WASTE MANAGEMENT FACILITY:	KHUMANI IRON ORE MINE WASTE MANAGEMENT FACILITIES
LOCATION:	REMAINDER OF THE FARM PARSON 564 RD, KHATHU SIYANDA DISTRICT MUNICIPALITY, NORTHERN CAPE PROVINCE
LICENCE HOLDER:	ASSMANG LIMITED
ADDRESS:	PRIVATE BAG X 503, KHATU, 8446
CONTACT PERSON:	MR PIERRE BECKER
CONTACT DETAILS:	TEL: 053 311 6600, FAX: 053 311 4310

LICENCE IN TERMS OF SECTION 49 (1)(a) OF THE NATIONAL ENVIRONMENTAL MANAGEMENT: WASTE ACT, 2008 (ACT NO. 59 OF 2008)

In terms of National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) read with the Environmental Impact Assessment Regulations, 2006, published in Government Notice No.R.385 of 21 April 2006 (the Regulations), the Deputy Director General: Environmental Quality and Protection, acting under delegation, hereby grants Assmang Limited a Waste Management Licence for the following waste management activities as listed in Category A of Government Notice No 718 dated 03 July 2009:

(2) The storage including the temporary storage of hazardous waste at a facility that has the capacity to store in excess of 35m^3 of hazardous waste at any one time, excluding the storage of hazardous waste in lagoons.

(15) The disposal of general waste to a land covering an area of more than 50m^2 but less than 200m^2 and with a total capacity not exceeding 25 000 tons.

(18) The construction of activities listed under Category A of this Schedule.

In this Licence, "Director" means the Director: Authorisations and Waste Disposal Management of the National Department of Environmental Affairs, who may be contacted at the address below:

Director: Authorisations and Waste Disposal Management
Department of Environmental Affairs
Private Bag X 447
PRETORIA
0001

In this Licence, "Director: RPW" means the Director: Resource Protection and Waste: Department of Water Affairs (DWA) who may be contacted at the address below:

Director: Resource Protection and Waste
Department of Water Affairs
Private Bag X 313
PRETORIA
0001

1 SITE DETAILS

1.1 LOCATION

1.1.1 This Licence authorises the construction and operation of hazardous waste storage and general waste disposal facilities on the Remainder of the Farm Parson 564 RD in Khathu within the jurisdiction of Siyanda District Municipality in Northern Cape Province (hereinafter referred to as "the Site").

1.1.2 The location of the site must be according to co-ordinates indicated on the Licence application form, which is defined as follows:

A) General Waste Disposal Site

Number of corner	Latitude	Longitude
1a	22.98178	27.84902
1b	22.9846	27.85241
1c	22.98096	27.85363
1d	22.97975	27.85456
1e	22.97779	27.85287

B) Hazardous Waste Storage Facility

Number of corner	Latitude	Longitude
2a	22.9787	27.85304
2b	22.97915	27.85304
2c	22.97915	27.85349
2d	22.9787	27.85349

1.2 DOCUMENTS CONSIDERED

1.2.1 The Basic Assessment Report For Khumani Iron Ore Mine compiled by GCS, hereinafter referred to as the "Report"; and

1.2.2 The Waste Management Licence Application Form, dated 29 April 2009.

LICENCE CONDITIONS

1.3 SITE SECURITY AND ACCESS CONTROL

1.3.1 The Licence Holder must ensure effective access control of the Waste Management Site to prevent unauthorised entry. Weatherproof, durable and legible signs in at least three official languages applicable in the area must be displayed at each entrance to the Site. The signs must indicate the risks involved in entering the Site, state the hours of operation and the name, address and telephone number of the Licence Holder and the person responsible for the operation of the Site.

1.3.2 The Licence Holder must prevent the storage and disposal of waste that is not authorised at the Site as per condition 3.1 below.

2 MANAGEMENT

2.1 GENERAL MANAGEMENT

2.1.1 The activities must be managed and operated:

(a) In accordance with a documented Environmental Management System (EMS), that inter alia, identifies and minimises risks of pollution, including those arising from operations, maintenance, accidents, incidents and non-conformances as well as those drawn to the attention of the Licence Holder as a result of complaints;

(b) In accordance with conditions of this Licence and any other written instruction by the Director; and

(c) By an adequate, competent staff complement.

2.1.2 Any persons having duties that are or may be affected by this Licence must have convenient access to a copy thereof, which copy must be kept at or near the place where those duties are carried out.

2.1.3 A copy of this Licence may be published on any website deemed fit by the Department, in its discretion, on any website or other media.

2.2 DESIGNATION OF WASTE MANAGEMENT CONTROL OFFICER

2.2.1 A Waste Management Control Officer (WMCO) must be designated to monitor and ensure compliance and correct implementation of all mitigation measures and provisions as stipulated in the Licence and standard operation procedures. The WMCO must:

a) Report any non-compliance with any Licence conditions or requirements or provisions of NEM: WA to the licensing authority.

2.2.2 The duties and responsibility of the WMCO should not be seen as exempting the Licence Holder from the legal obligations in terms of the NEM:WA.

2.3 EMERGENCY PREPAREDNESS PLAN

2.3.1 The Licence Holder must maintain and implement emergency preparedness plan and review it annually when conducting an audit, after each emergency incident and major accident. The plan must, amongst others, include measures to address:

a) Power failure;
b) Equipment malfunction;
c) Site fire;
d) Spillage (en route and on sites);
e) Natural disasters such as floods; and
f) The plan must include contact details of the nearest police station, ambulance service and emergency centre.

3 PERMISSIBLE WASTE

3.1 Any portion of the Site which has been constructed or developed according to condition 4 below may be used for the storage of hazardous waste and disposal of general waste. See Annexure III for waste streams prohibited for disposal unless they form less than 3 per cent of the waste stream from residential areas.

3.2 The classification, acceptance and disposal criteria as listed in the latest edition of the document "Minimum Requirements for Handling, Classification and Disposal of Hazardous Waste, Waste Management Series, Department of Water Affairs and Forestry or its successor must be conformed to.

4 CONSTRUCTION OF THE FACILITY

4.1 The site plan must only be changed under the supervision of a registered professional engineer and upon approval by the Director.

4.2 The construction and further development of the Site must be carried out under the supervision of a registered professional engineer. The waste disposal site liner design must adhere liner requirements in the Minimum Requirements.

4.3 After construction of the Site or further development within the Site, the Licence Holder must notify the Director and the registered professional engineer must submit a certificate or alternatively a letter to the Director that the construction of the Site and further development within the Site is in accordance with recognised civil engineering practice before disposal may commence on the site.

4.4 The waste storage areas must have firm and impermeable floors to prevent contamination of ground water.

4.5 All liquid waste containers that are not stored under a roofed area must be coated and sealed to prevent sunlight and rain water from getting in contact with the waste.

4.6 The waste disposal Site must be constructed in accordance with recognised civil engineering practice to ensure that the Site remains stable.

4.7 The slopes of the sides of the Site must be constructed such that little or no erosion occurs from the Site.

4.8 The Licence Holder must construct and maintain on a continuous basis, drainage and containment system capable of collecting and storing all contaminated runoff water arising from the site in the event of 1:50 year rain event. The system must under the said rainfall event, maintain a freeboard of half a metre.

4.9 The runoff water from the Site shall comply with the quality requirements of the General Standard, as published in Government Notice 991 of 18 May 1984, or with such quality requirements as may be determined from time to time by the Minister and shall be drained from the site in a legal manner.

5. GENERAL IMPACT MANAGEMENT AND OPERATION

5.1 IMPACT MANAGEMENT

5.1.1 Waste, which is not permissible under condition 3, must be dealt with according to relevant legislation or the Department's policies and practices.

5.1.2 The Licence Holder must prevent spillages; where they happen nonetheless, condition 2.3.1 above shall apply and the Licence Holder must ensure the effective and safe cleaning of such spillages.

5.1.3 The Licence Holder must prevent the occurrence of nuisance conditions or health hazards.

5.1.4 The Licence Holder must ensure that all wastes collected are sent to waste management facilities licenced to handle such wastes.

5.1.5 The Licence Holder must ensure that emissions from the activities shall be free from odour at levels likely to cause annoyance.

5.1.6 Waste deposited on site must not be allowed to burn and suitable measures must be implemented to prevent fires on the site or extinguish fires which may occur.

5.1.7 Waste disposed on the site may be reclaimed under roofed area provided the reclamation activity does not add any negative impact on the environment and that safety precautions are adhered to.

5.1.8 The Licence Holder must ensure that all personnel who work with hazardous waste are trained to deal with these potential hazardous situations so as to minimise the risks involved. Records of training and verification of competence must be kept by Licence Holder.

5.2 OPERATION

5.2.1 Licence Holder must ensure that records in terms of volume/weight, source and nature of all wastes received; reclaimed and landfilled are maintained and reported as per Annexure II hereafter on annual basis.

5.2.2 Waste disposed of on the site must be compacted and covered as and when necessary with a minimum of 150 millimetres of soil or other material approved by the Director.

5.2.3 Licence Holder must ensure that scavenging animals, scavenging birds and other pests does not cause pollution.

5.2.4 Licence Holder must ensure that litter and mud arising from the activities must be cleared from affected areas outside the site as soon as practicable and wind-blown waste and litter must be picked up and removed from fences and vegetation on a daily basis.

5.2.5 The Licence Holder must ensure that the liquid waste storage facility is surrounded by an interception trench with a sump or outlet valve for intercepting and recovering potential spills.

5.2.6 All liquid wastes must be stored in leak resistant containers and must be routinely inspected for leaks.

5.2.7 The Licence Holder must ensure that the integrity of the waterproof base and infrastructure are routinely monitored and corrective measures are taken before containment integrity is breached.

6 MONITORING

6.1 MONITORING METHODS AND PARAMETERS

6.1.1 The Licence holder must carry out all tests required in terms of this Licence in accordance with published laboratory analysis methods or those prescribed by and obtainable from the South African Bureau of Standards (SABS), referred to in the Standards Act, 2008 (Act 08 of 2008).

6.1.2 The Licence Holder may only use another method of analysis if approved by the Department.

6.2 WATER QUALITY MONITORING

6.2.1 Surface water monitoring shall be performed in all storm water drains on and adjacent to the Site at the locations selected in conjunction with the Department of Water Affairs and at such a frequency as determined by the responsible authority.

6.3 INVESTIGATIVE MONITORING

6.3.1 If, in the opinion of the Director or Director: RPW, a water quality variable at any monitoring point referred to in condition 6.2.1 above shows an increasing trend, the Licence Holder shall report in terms of condition 9 below.

7 INVESTIGATIONS

7.1 If, in the opinion of the Director, environmental pollution, nuisances or health risks may be or are occurring on the Site, the Licence Holder must initiate an investigation into the cause of the problem or suspected problem.

7.2 If, in the opinion of the Director and/or Director: RPW, water pollution may be or is occurring the Licence Holder must initiate an investigation into the cause of the problem or suspected problem. Such investigation must include the monitoring of the water quality variables, at those monitoring points and such frequency as may be specified by the Director: RPW.

7.3 Should the investigation carried out as per conditions 7.1 and 7.2 above reveal any unacceptable levels of pollution, the Licence Holder must submit mitigation measures to the satisfaction of the Director.

8 RECORDS

8.1 The Licence Holder must keep records and update all the information referred to in Annexure II and submit this information to the Director on an annual basis.

8.2 All records required or resulting from activities required by this Licence must:

a) Be legible;
b) Be made as soon as reasonably practicable and should form part of the external audit report;
c) If amended, be amended in such a way that the original and any subsequent amendments remain legible and are easily retrievable; and
d) Be retained in accordance with documented procedures.

8.3 Records demonstrating compliance with condition 2.1.1 must be maintained for five years.

9 REPORTING

9.1 The Licence Holder must, within 24 hours, notify the Director of the occurrence or detection of any incident on the Site, or incidental to the operation of the site, which has the potential to cause, or has caused pollution of the environment, health risks, nuisance conditions or water pollution.

9.2 The Licence Holder must, within 14 days, or a shorter period of time, if specified by the Director from the occurrence or detection of any incident referred to in condition 9.1, submit an action plan, which must include a detailed time schedule, and resource allocation signed off by top management, to the satisfaction of the Director and/or the Director: RPW of measures taken to –

a) Correct the impact resulting from the incident;
b) Prevent the incident from causing any further impact; and
c) Prevent a recurrence of a similar incident.

9.3 In the event that measures have not been implemented within 21 days of the incident to address impacts caused by the incident referred to in condition 9.1, or measures which have been implemented are inadequate, the Director may implement the necessary measures at the cost and risk of the Licence Holder.

9.4 The Licence Holder must keep an incident report and complaints register, which must be attached available to the external audit report, and made available to the Departmental auditors.

9.5 The Department must be notified without delay in the case of the following:

a) Any malfunction, breakdown or failure of equipment or techniques, accident or fugitive emission which has caused , is causing or may cause significant pollution;
b) The breach of this Licence ; and
c) Any significant adverse environmental and health effects.

9.6 The Department must be notified within 14 days of the following changes:

a) Licence Holder's trading name, registered name or registered office address;
b) Particulars of the Licence Holder's ultimate holding company (including details of an ultimate holding where a Licence Holder has become a subsidiary; and
c) Steps taken with a view to the Licence Holder , or any one of them, going into bankruptcy, entering into arrangement with creditors, or ,in the case of them being in a partnership, dissolving the partnership.

9.7 Each external audit report referred to in condition 10.2 below must be submitted to the Director within 30 days from the date on which the external auditor finalised the audit.

10 AUDITING

10.1 INTERNAL AUDITS

10.1.1. Internal audits must be conducted annually by the Licence Holder and on each audit occasion an official report must be compiled by the relevant auditor to report the findings of the audits, which must be made available to the external auditor specified in condition 10.2.1.

10.2 EXTERNAL AUDITS

10.2.1 The Licence Holder must appoint an independent external auditor to audit the site biennially and this auditor must compile an audit report documenting the findings of the audit, which must be submitted by the Licence Holder according to condition 9.7, above.

10.2.2 The audit report must:

a) Specifically state whether conditions of this licence are adhered to;
b) Include an interpretation of all available data and test results regarding the operation of the site and all the impacts on the environment;
c) Specify target dates for the implementation of the recommendations by the Licence Holder to achieve compliance;
d) Contain recommendations regarding non-compliance or potential non-compliance and must specify target dates for the implementation of the recommendations by the Licence Holder and whether corrective action taken for the previous audit non conformities was adequate; and
e) Show monitoring results graphically and conduct trend analysis.

10.3 DEPARTMENTAL AUDITS AND INSPECTIONS

10.3.1 The Department reserves the right to audit and/or inspect the Site without prior notification at any time and at such frequency as may be determined by the Director.

10.3.2 The Licence Holder must make any records or documentation available to the Director upon request, as well as any other information he/she may require.

11 LEASING AND ALIENATION OF THE SITE

11.1 Should the Licence Holder want to alienate or lease the site, he/she shall notify the Director in writing of such an intention at least 120 days prior to the said transaction for approval.

11.2 Should the approval be granted, the subsequent Licence Holder shall remain liable for compliance with all Licence conditions.

12 TRANSFER OF A WASTE MANAGEMENT LICENCE

12.1 Should the Licence Holder want to transfer the Licence, he/she must apply in terms of Section 52 of the National Environmental Management: Waste Act, 2008 (Act No 59 of 2008).

12.2 Any subsequent Licence Holder shall be bound by conditions of this Licence.

13. GENERAL

13.1 The construction of the licenced activity may not commence within twenty (20) days of the date of signature of this Licence.

13.2 Should the Licence Holder be notified by the Minister in writing of a suspension of the licence pending any appeals decision, you may not commence with the activities licenced by the Minister.

13.3 After an appeal period has expired and no good cause to extend the appeal period has been submitted, the activity may commence provided a notice has been submitted to the Department. The notice must include a date on which it is anticipated that the activity will commence.

13.4 The activity must commence within a period of two (2) years from the date of issue if commencement of the activity does not occur within that period, the Licence lapses and new application for Licence must be made in order for the activity to be undertaken.

13.5 If Licence Holder anticipates that commencement of the activity would not occur within two (2) year period, he/she must apply and show good cause for an extension of the licence six (6) months prior to its expiry date.

13.6 This Licence shall not be transferable unless such transfer is subject to condition 12.1

13.7 This Licence shall not be construed as exempting the Licence Holder from compliance with the provisions of the National and Provincial Legislation and any relevant Ordinance, Regulation, By-laws and relevant National Norms and Standards.

13.8 Transgression of any condition of this Licence could result in the Licence being withdrawn by the Department.

13.9 Non-compliance with a condition of this license may result in criminal prosecution or other actions provided for in Section 67(1) of the National Environmental Management: Waste Act, 2008.

13.10 In terms of section 28 and 30 of the National Environmental Management Act No. 107 of 1998, and section 19 and 20 of the National Water Act No. 36 of 1998, any costs incurred to remedy environmental damage must be borne by the person responsible for the damage. It is therefore imperative that the Licence Holder reads through and understands the legislative requirements pertaining to the project. It is the Applicant's responsibility to take reasonable measures which include informing and educating contractors and employees about environmental risks of their work and training them to operate in an environmental acceptable manner.

13.11 This Licence is valid for a period of twenty (20) years and shall be reviewed every ten (10) years from the date of issue at any time before or after that date. Based on the results of the review, especially compliance to Licence conditions or recommendations from audit reports and or changing legislation, the Licence could be amended or withdrawn or validity thereof extended.

14 APPEAL OF LICENCE

14.1 The licence holder must notify every registered interested and affected party, in writing and within ten (10) days, of receiving the Department's decision.

14.2 The notification referred to in 14.1 must –

14.2.1 Specify the date on which the Licence was issued;

14.2.2 Inform the registered interested and affected party of the appeal procedure provided for in Chapter 7 of GN No. R 385 of 21 April 2006 in terms of National Environmental Management Act, 1998, as amended (see Annexure 1);

14.2.3 Advise the interested and affected party that a copy of a Licence will be furnished on request; and

14.2.4 An appeal against the decision must be lodged in terms of chapter 7 of GN No. R 385 of 21 April 2006 in terms of NEMA 1998, as amended; from the date of this license, with: The Minister, Department of Environmental Affairs, Private Bag X 447, PRETORIA, 0001, Tel No.: (012) 310 3705, Fax No.: (012) 320 7561

Mr. Sonnyboy Bapela
ACTING DEPUTY DIRECTOR-GENERAL: ENVIRONMENTAL QUALITY AND PROTECTION
DATE: 27 – 03 – 2015

ANNEXURE I

APPEALS PROCEDURE IN TERMS OF CHAPTER 7 OF R. 385 OF 2006 TO BE FOLLOWED BY THE APPLICANT AND INTERESTED AND AFFECTED PARTIES UPON RECEIPT OF NOTIFICATION OF A WASTE MANAGEMENT LICENCE

APPLICANT	INTERESTED AND AFFECTED PARTIES (IAPs)
1. Receive a notification of a Waste Management Licence from the relevant Competent Authority	1. Receive a notification of a Waste Management Licence from Applicant/Consultant
2. Within 10 days of receipt of notification, notify the relevant Competent Authority and all IAPs of intention to appeal	2. Within 10 days of receipt of notification, notify the relevant Competent Authority of intention to appeal
3. Notification served by the Applicant must include: 3.1. A copy of the notice of intention to appeal; and 3.2. A notice indicating where and for what period the appeal submission will be available for inspection by all IAPs	3. Appellant must serve on the Applicant 3.1. A copy of the notice of intention to appeal 3.2. A notice indicating where and for what period the appeal submission will be available for inspection by the applicant
4. The appeal must be submitted to the relevant Competent Authority or delegated organ of State within 30 days of lodging of the notice of intention to appeal	4. The appeal must be submitted to the relevant Competent Authority or delegated organ of State within 30 days of lodging of the notice of intention to appeal
5. A person or organ of state that receives notice of an appeal may submit a responding statement to the relevant Competent Authority or delegated organ of state within 30 days from the date that the appeal submission was made available for inspection by the appellant	5. An Applicant that receives notice of an appeal may submit a responding statement to the relevant Competent Authority or delegated organ of State within 30 days from the date the appeal submission was made available for inspection by the appellant

NOTES:

1. An appeal against a decision must be lodged with:-

a) The Minister of Water and Environmental Affairs if the decision was issued by the Director- General of the Department of Environmental Affairs (or another official) acting in his/ her capacity as the delegated Competent Authority;

b) The delegated organ of state where relevant.

2. An appeal lodged with:-

a) The Minister of Water and Environmental Affairs must be submitted to the Department of Environmental Affairs by means of one of the following methods:

By facsimile: (012) 320 7561
By post Private Bag X 447, Pretoria, 0001; or
By hand: 2nd Floor, Fedsure Forum Building, North Tower, cnr. Pretorius and van der Walt Streets, Pretoria.

b) The delegated organ of state, where relevant, must be submitted to the delegated organ of state.

3. An appeal must be:-

a) On an official form obtainable or published by the relevant department;
b) Accompanied by:

- a statement setting out the grounds of appeal;
- supporting documentation which is referred to in the appeal and is not available to the relevant Competent Authority;
- a statement that the appellant has complied with regulation 62 (2) or (3) together with copies of the notices referred to in regulation 62;
- The prescribed appeal fee, if any.

4. A copy of the official appeal form can be obtained from:

Mr TH Zwane
Senior Legal Administration (Appeals)
Tel: 012 310 3929
tzwane@environment.gov.za ; or

Mr TR Rambuda
Legal Administration Officer (Appeals)
Tel: 012 310 1758
trambuda@environment.gov.za

ANNEXURE II
INFORMATION WHICH SHALL BE SUBMITTED ON AN ANNUAL BASIS CONDITION 8.1

* = *Indicate with an X. Please print legibly.*

NAME OF SITE: _____ DATE OF REPORT: _____(y/m/d)

1. Registered owner(s) of property on which the waste management facility is situated:

Name	Telephone	
Postal Address	Fax	
	Postal Code	

2. Operator in control of waste management facility:

Name		Telephone	
Identity number		Tel. After hours	
Educational Qualifications			
Other Relevant competencies:			

3. Indicate the type of waste and approximate quantities of waste stored and transferred for recycling, treatment, recovery or disposal during the year:

Type of waste (Specify)	Quantity (m^3 annum^{-1})	Source
TOTAL		

4. Indicate the type and approximate quantities of waste disposed on site during the year:

Type of waste	Quantity (m^3 annum^{-1})	Stored, sorted, or recycled
TOTAL		

I, the undersigned, declare that the information stated above below is to my knowledge a true reflection of the status at the _____waste management facility.

Signature: _____

Name: _____

Capacity: _____

Place: _____ Date_____

ANNEXURE III

WASTE WHICH MAY NOT BE ACCEPTED ON THE SITE: Condition 3.1

1. Waste where specific control has been established in terms of the Nuclear Energy Act, 1999 (Act 46 of 1999).

2. Waste types controlled in terms of the Minerals and Petroleum Resources Development Act, 2002 (Act 28 of 2002) and the Electricity Act, 1987 (Act 41 of 1987), Nuclear Energy Act, 1999 (Act 46 of 1999), unless written permission has been obtained from the Director.

3. Waste which is defined, according to the Minimum Requirements, as an extreme hazard or Hazard Group 1 (HG1); high hazard or Hazard Group 2 (HG2); moderate hazard or Hazard Group 3 (HG3) and low hazard or Hazard Group 4 (HG4), unless an application for delisting has been successfully submitted to the Manager: Waste Discharge and Disposal through the Regional Director and written approval was obtained from the Manager: Waste Discharge and Disposal for the disposal of this waste on the Site.

4. Flammable wastes, with a closed cup flash point less than 61°C.

5. Corrosive substances, as defined and described in the Minimum Requirements as Class 8 (1998 edition: page 6-8, Diagram III).

6. Oxidising substances and organic peroxides, as defined and described in the Minimum Requirements as Class 5 (1998 edition: page 6-8, Diagram III).

7. Any waste with a substance which is a Group A and/or Group B carcinogen/mutagen. Group A carcinogens/mutagens have been proven in humans, both clinical and epidemiological. Group B carcinogens/mutagens have been proven without doubt in laboratory animals.

8. Any waste with a substance at a concentration greater than 1% where the substance is a Group C and/or Group D carcinogen/mutagen. Group C carcinogens/mutagens have shown limited evidence in animals. Group D carcinogen/mutagen - the available data is inadequate and doubtful.

9. Any infectious waste which is generated during the diagnosis, treatment or immunisation of humans or animals; in the research pertaining to this; in the manufacturing or testing of biological agents including blood, blood products and contaminated blood products, cultures, pathological wastes, sharps, human and animal anatomical wastes and isolation wastes that contain infectious substances.

10. All materials which fall in Class 1 (explosives), Class 2 (compressed gases) and Class 7 (radioactive materials), as defined and described in the Minimum Requirements.

11. Any waste with a pH less than 6 or greater than 12.

12. Any waste which is difficult to analyse and classify.

13. Any complexes of heavy metal cations, paint and paint sludges, or laboratory chemicals.

14. Organic or inorganic element or compound which may have a definite acute or chronic negative effect on human health and/or the environment, due to its toxic, physical, chemical or persistent characteristics;

15. Health Care Risk waste; and

16. Scheduled pharmaceutical products registered in terms of the Medicines and Related Substances Control Act, 1965 (Act 101 of 1965) or associated containers, are disposed of on the Site.

the denc

Department:
Environment & Nature Conservation
NORTHERN CAPE PROVINCE
REPUBLIC OF SOUTH AFRICA

Private Bag X6102, Kimberley, 8300, Metlife Towers, T-Floor, Tel: 053 807 7300, Fax: 053 807 7328

Equiries : Mr. O Riba
Dipatlisilo :
Navrae :
Imibuzo
Reference
Tshupelo : NC/EIA/11/JTG/GAM/KAT2/2014
Verwysing
Isalathiso

Date :
Letlha : 27th June 2016
Datum :
Umhla :

Assmang Limited – Khumani Ore Mine
Marius Burger
Khumani Iron Ore Mine, Mancorp Mine
Postmasburg
Private Bag X503
Kathu
8423

dirk.coetzee@assmang.co.za
083 459 7580

Dear Sir/Madam

THE GRANTING OF THE ENVIRONMENTAL AUTHORISATION FOR GN.R 544: ACTIVITY: 11(xi), 22, 28 & GN. R545: ACTIVITY 5, 15 & GN. R5456: ACTIVITIES: 14: THE PROPOSED KHUMANI, PARSONS AND KING INFRASTRUCTURE EXPANSION PROJECT, PARSONS (PORTION 2, 6 AND REMAINDER OF PARSONS 564), KING (PORTIONS 1, 2, 3 AND THE REMAINDER OF KING NO.561), BRUCE (PORTIONS 3, 4, 5 AND REMAINDER OF BRUCE NO. 544) AND MOKANING (PORTIONS 1, 2, 3, 4, 5 AND REMAINDER OF MOKANING NO. 560) KATHU, GAMAGARA LOCAL MUNICIPALITY, JOHN TAOLO GAETSEWE DISTRICT MUNICIPALITY, NORTHERN CAPE PROVINCE.

By virtue of the powers conferred to me by the National Environmental Management Act, 1998 (Act No. 107 of 1998) and the Environmental Impact Regulations, 2010, **THE DEPARTMENT HEREBY GRANTS THE ENVIRONMENTAL AUTHORISATION FOR: GN.R 544: ACTIVITY: 11(xi), 22, 28 & GN. R545: ACTIVITY 5, 15 & GN. R5456: ACTIVITIES: 14: THE PROPOSED KHUMANI, PARSONS AND KING INFRASTRUCTURE EXPANSION PROJECT, PARSONS (PORTION 2, 6 AND REMAINDER OF PARSONS 564), KING (PORTIONS 1, 2, 3 AND THE REMAINDER OF KING NO.561), BRUCE (PORTIONS 3, 4, 5 AND REMAINDER OF BRUCE NO. 544) AND MOKANING (PORTIONS 1, 2, 3, 4, 5 AND REMAINDER OF MOKANING NO. 560) KATHU, GAMAGARA LOCAL MUNICIPALITY, JOHN TAOLO GAETSEWE DISTRICT MUNICIPALITY, NORTHERN CAPE PROVINCE.** A detailed description of the activity is given in the Environmental Impact Assessment Report dated November 2015 subject to the conditions listed in the environmental authorisation and reasons for the decision are attached herewith. In terms of regulation 4(2) of the Environmental Impact Assessment Regulations, 2010, you are instructed to notify all registered interested and affected parties, in writing and within fourteen (14) days of receiving of this letter, of the Department's decision in respect of your application as well as the provisions regarding the making of appeals that are provided for in the regulations.

Your attention is drawn to Chapter 2 of the National Appeal Regulations which regulates appeal procedures. Should you / any person affected by this decision wish to appeal any aspect of the decision, you or a person affected by this decision must, *inter alia,* lodge an appeal, as prescribed in regulation 4 of the National Appeal Regulations, 2010, with the Member of the Executive Council, Ministry of Environment and Nature Conservation within 20 days of receiving this letter, by means of one of the following methods:

By facsimile:	(053) 832 1026;
By post:	Private Bag x 6102, Kimberley, 8300 or
By hand:	T-Floor, Metlife Towers, Kimberley, 8300.

Should you decide to appeal, you must serve a copy of your notice of intention to appeal on all registered interested and affected parties as well as a notice indicating where, and for what period, the appeal submission will be available for inspection.

Yours faithfully

MR. B FISHER – DIRECTOR
ENVIRONMENTAL QUALITY MANAGEMENT
DEPARTMENT OF ENVIRONMENT AND NATURE CONSERVATION

DATE OF DECISION: 06 July 2016

Cc: **GCS Water & Environmental (Pty) Ltd**
janem@gcs-sa.biz
jaco@gcs-sa.biz
011 – 803 5745

Northern Cape Province
DEPARTMENT OF
ENVIRONMENT & NATURE
CONSERVATION

Porofensi Ya Kapa Bokone
LEFAPHA LA TIKOLOGO LE
TSHOMARELO YA THLAGO

ENVIRONMENTAL AUTHORISATION
in terms of National Environmental Management Act, 1998 (Act No. 107 of 1998) and the Environmental Impact Assessment Regulations, 2010

AUTHORISATION REGISTER NUMBER:	**PERMIT 21/2016**
REFERENCE NUMBER:	**NC/EIA/17/JTG/GAM/KAT2/2014**
LAST AMENDED:	**N/A**
HOLDER OF AUTHORISATION:	**ASSMANG LIMITED-KHUMANI ORE MINE**
LOCATION OF ACTIVITY:	**PARSON 564, KING 561, BRUCE 544 AND MOKANING 560**

DEFINITIONS

Activity means an activity identified in Government Notice No. R. 544 and No. R. 545 of 2010 as a listed activity.

Applicant means a person who has submitted an application.

Application means an application for an environmental authorization in terms of chapter 3 of the Environmental Impact Assessment Regulations of 2010.

Basic assessment report means a report contemplated in regulation 22.

Environmental Impact Report means a report contemplated in regulation 31 of the Environmental Impact Assessment Regulations of 2010.

EAP means an environmental assessment practitioner as defined in section 1 of the Act.

Interested and affected party means an interested and affected party contemplated in section 24(4) (d) of the Act, and which in terms of that section includes:

- Any person, group of persons or organisation interested in or affected by an activity, and
- Any organ of state that may have jurisdiction over any aspect of the activity.

Public participation process means a process in which potential interested and affected parties are given an opportunity to comment on, or raise issues relevant to, specific matters.

The Act means the National Environmental Management Act, 1998 (Act No. 107 of 1998).

DECISION

The Department is satisfied, on the basis of information available to it and subject to compliance with conditions of this environmental authorisation, that the applicant should be authorised to undertake the activity specified below.

Details regarding the basis on which the Department reached this decision are set out in Annexure 1.

ACTIVITIES AUTHORISED

By virtue of the powers conferred on it by the National Environmental Management Act, 1998 (Act No. 107 of 1998) and the Environmental Impact Assessment Regulations, 2010 the Department hereby authorises –

Assmang Limited- Khumani Ore Mine

with the following contact details –

Director Technical Services
Marius Burger
Khumani Iron Ore Mine, Mancorp Mine Postmasburg, 8423
Private Bag X503
Kathu
8446

Tel: (053) 723 8090
Fax: (053) 723 8599
Cell: 083 459 7580
E-Mail: Dirk.coetzee@assmang.co.za

to undertake the following activities (hereafter referred to as "the activity")

Proposed Khumani, Parsons, and King Infrastructure Expansion Project.

Activity No. 11 (xi) of GN. R.544 of 18 June 2010

The construction of:

(xi) infrastructure or structures covering 50 square metres or more where such construction occurs within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse, excluding where such construction will occur behind the development setback line.

Activity No. 22 of GN. R.544 of 18 June 2010

The construction of a road, outside urban areas,

(i) with a reserve wider than 13,5 meters or,
(ii) where no reserve exists where the road is wider than 8 metres, or
(iii) 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 Notice 545 of 2010.

Activity No. 28 of GN. R.544 of 18 June 2010

The expansion of or changes to existing facilities for any process or activity where such expansion or changes to will result in the need for a permit or license in terms of national or provincial legislation governing the release of emissions or pollution, excluding where the facility, process or activity is included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case that Act will apply.

Activity No. 5 of GN. R.545 of 18 June 2010

The construction of facilities or infrastructure for any process or activity which requires a permit or license in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent and which is not identified in Notice No. 544 of 2010 or included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case that Act will apply.

Activity No. 15 of GN. R.545 of 18 June 2010

Physical alteration of undeveloped, vacant or derelict land for residential, retail, commercial, recreational, industrial or institutional use where the total area to be transformed is 20 hectares or more; except where such physical alteration takes place for:

(i) linear development activities; or
(ii) agriculture or afforestation where activity 16 in this Schedule will apply.

Activity No. 14 of GN. R.546 of 18 June 2010

The clearance of an area of 5 hectares or more of vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation, except where such removal of vegetation is required for:

(1) purposes of agriculture or afforestation inside areas identified in spatial instruments adopted by the competent authority for agriculture or afforestation purposes;

Phased activities for all activities listed in this schedule, which commenced on or after the effective date of this schedule, where any one phase of the activity may be below a threshold but where a combination of the phases, including expansions or extensions, will exceed the specified threshold.

From Parson (Portions 2, 6 and the Remainder of Parson No. 564),
King (Portions 1, 2, 3 and the Remainder of King No. 561),
Bruce (Portions 3, 4, 5 and the Remainder of Bruce No. 544)
Mokaning (Portions 1, 2, 3, 4, 5 and the Remainder of Mokaning No. 560)

(Latitude (S) 27° 51′ 48.844″ Longitude (E) 22° 57′ 2.451″)
(Latitude (S) 27° 52′ 16.977″ Longitude (E) 22° 58′ 4.276″)
(Latitude (S) 27° 51′ 30.393″ Longitude (E) 23° 0.′ 12.603″)

hereafter referred to as "the property".

The granting of this Environmental Authorisation is subject to the conditions set out below.

CONDITIONS

Scope of authorisation:

1. Authorisation of the activity is subject to the conditions contained in this authorisation, which conditions form part of the environmental authorisation and are binding on the holder of the authorisation.

2. The holder of the authorisation shall be responsible for ensuring compliance with the conditions by any person acting on his or her behalf, including but not limited to, an agent, sub-contractor, employee or person rendering a service to the holder of the authorisation.

3. The activity(s) which is authorised must only be carried out at the property indicated above.

4. Any changes to, or deviations from, the project description set out in this authorisation must be approved, in writing, by the Department before such changes or deviations may be effected. In assessing whether to grant such approval or not,

the Department may request such information as it deems necessary to evaluate the significance and impacts of such changes or deviations and it may be necessary for the holder of the authorisation to apply for further authorisation in terms of the regulations.

5. This authorisation does not negate the holder of the authorisation's responsibility to comply with any other statutory requirements that may be applicable to the undertaking of the activity.

General conditions:

6. A copy of this authorisation must be kept at the property where the activity will be undertaken. The authorisation must be produced to any authorised official of the Department who requests to see it and must be made available for inspection by any employee or agent of the holder of the authorisation who works or undertakes work at the property.

7. Where any of the applicant's contact details change, including the name of the responsible person, the physical or postal address and/ or telephonic details, the applicant must notify the Department as soon as the new details become known to the applicant.

8. The holder of the authorisation must notify the Department, in writing and within 24 (TWENTY FOUR) hours, if condition 16 of this authorisation cannot be or is not adhered to. In all other cases, the holder of the authorisation must notify the Department, in writing, within 7 (SEVEN) days if a condition of this authorisation is not adhered to. Any notification in terms of this condition must be accompanied by reasons for the non-compliance.

9. Non-compliance with a condition of this authorisation may result in criminal prosecution or other actions provided for in the National Environmental Management Act, 1998 and the regulations.

10. This authorization is subject to the approval by the relevant local authorities i.e. in terms of any relevant legislation administered by those local authorities.

11. The activity may not commence without the necessary permits/licenses/approvals and/or service agreements, where it is relevant, from or with the relevant regulatory authorities whether national, provincial or local (these include but are not limited to National Department of Environmental Affairs, National Department of Agriculture, Forestry and Fisheries, Department of Housing & Local Government, Department of Water and Sanitation, Department of Mineral Resources, Department of Transport,

Department of Roads & Public Works, Department Arts, Sports & Culture, South African Heritage Resources Agency, South African Civil Aviation Authority).

12. The activity, including site preparation, may not commence before the thirty (30) day appeal period expires or until such time as the Department has considered any appeals that have been lodged.

    a. One week's written notice must be given to the Administration clerk (Impact Management Unit) before commencement with the activity.
    b. Such notice shall make clear reference to the site location details and the reference number given above.
    c. The said notice must also include proof of compliance with the following conditions described herein:
        i. Conditions: 11 and 23.

13. The applicable conditions of this authorization must form part of all contractors' and sub-contractors' conditions of contract. A performance-based requirement with regard to environmental impact management must be included in all contracts related to any aspect of this authorization.

14. The applicant must carry out regular environmental audits to establish compliance with the conditions of this authorization and contracts.

15. Records relating to the compliance/non-compliance with the conditions of the authorization and contracts must be kept in good order. Such records must be made available to the Department within 7 (seven) days of receipt of a written request by the Department for such records.

16. Any complaints regarding the said development must be brought to the attention of the Department within 24 (twenty four) hours after receiving the complaint. A complaints register must be kept up to date for inspection by the Department.

17. Officials in the employ of the Department shall be given access to the property as described above (see detailed description of the activity) for the purposes of assessing and/or monitoring compliance with the conditions contained in this Environmental Authorization. Where the activity is located on a third party's property the applicant shall be responsible to arrange access for departmental officials.

18. This Department may add to, change and/or amend any of the conditions in this authorization if, in the opinion of the Department, the addition, change of amendment is environmentally justified. In event that such impacts exceed its significance as predicted in the independent consultant's environmental scoping

report and supporting documentation, the authorization may be withdrawn after proper procedures were followed.

19. In the event of any dispute concerning the significance of a particular impact, the opinion of this department in respect of its significance will prevail.

20. This Department and any national department, provincial department, local authorities or committees appointed in terms of the conditions of this application or any other public authority or organization shall not be held responsible for any damage of losses suffered by the applicant or his successor in title in any instance where construction or operation subsequent to construction be temporarily or permanently stopped for reasons of non-compliance by the applicant with the conditions of approval as set out in this document or any other subsequent document emanating from these conditions of approval.

21. The applicant shall be responsible for all costs necessary to comply with the above conditions unless otherwise specified.

22. The applicant must apply the principle of best practicable environmental option for all technologies used/ implemented.

Appeal of authorisation:

23. The holder of the authorisation must notify every registered interested and affected party, in writing and within 7 (SEVEN) calendar days, of receiving notice of the Department's decision to authorise the activity.

24. The notification referred in 23 must –

- specify the date on which the authorisation was issued;
- inform the interested and affected party of the appeal procedure provided for in Chapter 7 of the regulations; and
- advise the interested and affected party that a copy of the authorisation and reasons for the decision will be furnished on request.

25. If the applicant should appeal against this Environmental Authorisation, he/she must inform all interested and affected persons that such an appeal is being lodged with the MEC and if requested, the applicant/appellant must provide those persons with reasonable access to a full copy of the appeal within a reasonable time before expiry of the thirty day appeal period.

Management of activity:

26. The Environmental Management Programme ("EMPr") submitted as part of the application for environmental authorisation must be implemented.

27. The Environmental Management Programmes is a living document and must be updated as determined or required.

28. The disturbance of the environment must be restricted to the absolute minimum.

Monitoring and Recording

26. A site monitoring must be instituted to the satisfaction of this Department, access routes must be monitored during routine site maintenance visits.

27. This Department retains the right to inspect or monitor the proposed project during both construction and operation, to ensure that it complies with the legislation and the conditions stipulated in this Environmental Authorisation.

28. The holder of the authorisation must submit an environmental audit report to the Department upon the completion of the construction and rehabilitation of the activities. The environmental audit report must-

    - Indicate the date of the audit, the name of the auditor and the outcome of the audit.

    - Records relating to the monitoring and auditing must be kept on site and made available for inspection to any relevant and competent authority in respect of this development.

29. The applicant must appoint a suitably experienced Environmental Control Officer (ECO) for the construction phase of the development that will have the responsibility to ensure that the mitigation / rehabilitation measures and recommendations referred to in this authorisation are implemented.

30. The ECO shall be appointed before commencement of any land clearing or construction activities.

31. The ECO shall keep record of all activities on site, problems identified, transgressions noted and a task schedule of tasks undertaken by the ECO.

32. The ECO shall remain employed until all rehabilitation measures, as required for implementation due to construction damage, are completed and the site is ready for operation.

33. Records relating to monitoring and auditing must be kept on site and made available for inspection to any relevant and competent authority in respect of this development.

Commissioning of the activity:

34. Fourteen (14) days written notice must be given to the Department that the activity will commence. Commencement for the purposes of this condition includes site preparation. The notice must include a date on which it is anticipated that the activity will commence.

35. The authorised activity shall not commence within thirty (30) days of the date of signature of the authorisation.

36. Should you be notified by the minister of a suspension of the authorisation pending appeal procedures, you shall not commence with the activity unless authorised by the minister in writing.

Operation of the activity:

37. Fourteen (14) days written notice must be given to the Department that the activity operational phase will commence.

38. Clearing of vegetation must be kept to a minimum and all areas that are used as laydown or construction camps must be rehabilitated.

39. The removal of natural vegetation must be limited to the footprint of the proposed activity.

40. Any waste generated during construction and operation phase must be disposed of at a waste disposal site licensed for such waste.

41. No on-site burning or burying of solid waste is permitted.

42. No development must occur within 32 metres of any drainage lines.

43. The applicant must ensure that good environmental management practices are followed to ensure that the construction phase of the activity does not negatively affect drainage lines.

44. The individual of all plant species protected by any legislation must not be disturbed. Alternatively a permit for the removal of any protected species must be applied for and granted by the relevant authority.

45. The intentional and accidental killing of fauna must be avoided at all times. No poaching is permitted.

46. Habitat fragmentation must be avoided were possible.

47. The necessary flora permits must applied for and granted by the Northern Cape Department of Environment and Nature Conservation for all plant species protected under the Northern Cape Nature Conservation Act (Act No. 9 of 2009) should they be found existing on site.

48. The applicant must ensure use of existing access roads as far as possible.

49. Storm water control works must be constructed and maintained in a sustainable manner throughout the project.

50. The expansion projects must be according to the illustrations in the final Environmental Impact Assessment Report dated 12 February 2016, submitted to the department in respect of this application.

51. The applicant must ensure that during the construction phase soil erosion management controls are followed to reduce soil erosion.

52. In the event were the holder of this Environmental Authorisation considers to implement any other deviations to the expansion projects (other than the alternatives illustrated in the final Environmental Impact Assessment report, dated 12 February) this department must be notified immediately prior to the implementation of such deviations.

53. Any spillages of diesel and oil must be reported and cleared up immediately. In the event of oil or diesel spills, the contaminated soil must be placed in a waste skip and disposed-off at a licensed land fill site for such material.

54. Dust control measures must be implemented during clearing phase and must comply with the dust regulations promulgated under the Air Quality Act, 2004 (Act 39 of 2004).

55. All construction activities must operate within the normal working (day hours). In the event were construction extends beyond working hours, the neighbouring land occupants must be notified of the intention to work after hours.

56. The holder of this authorisation must appoint health and safety officers to enhance health and safety on site. The health and safety induction must be conducted to ensure the safety of all workers on site.

57. If any new evidence of archaeological sites or artefacts, paleontological fossils, graves or other heritage resources is found during development or construction, SAHRA and an archaeologist and/or palaeontologist, depending on the nature of the resources found, must be alerted immediately.

58. The spreading of declared weedy and alien invasive plant species must be controlled and monitored at all times.

59. All mitigation measures detailed in the Environmental Management Programme report must be implemented.

Site closure and decommissioning:

60. In case of decommissioning of the project, the holder of the Environmental Authorisation must properly rehabilitate the site to the satisfaction of the Directorate: Environmental Quality Management.

61. The ecosystem integrity must be promoted at all times.

DURATION AND PERIOD OF VALIDITY

This activity(s) must commence within a period of three (3) years from the date of issue. If commencement does not occur within that period and the intention is to extend the validity period of the authorisation, an application for amendment to extend the validity period must launched at least six months before the validity period lapses. If commencement of the activity does not occur within that period, the authorisation lapses and a new application for environmental authorization must be made in order for the activity to be undertaken.

APPEAL

In terms of Chapter 7 of Environmental Impact Assessment Regulations, 2010, if the applicant or a person affected by this Decision wishes to appeal this decision, a notice of intention to appeal must be lodged within Twenty (20) days after date of the decision, and an appeal must **be lodged within thirty (30) days after lapsing of 20 days contemplated in regulation 60 (1)** of lodging of the notice to appeal to:

The Member of the Executive Council
Ministry of Environment & Nature Conservation
Private Bag X6102
Kimberley
8300
Fax: (053) 832 1026

Appeals must comply with the provisions of Chapter 7 of Environmental Impact Assessment Regulations, 2010 Government Notice No. R. 543 of 18 June 2010.

MR B. FISHER
DIRECTOR ENVIRONMENTAL QUALITY MANAGEMENT
DEPARTMENT OF ENVIRONMENT & NATURE CONSERVATION

DATE OF ENVIRONMENTAL AUTHORISATION: 06 July 2016

ANNEXURE 1: REASONS FOR DECISION

1. Background

The applicant, **Assmang Limited -Khumani Ore Mine,** applied for authorization to carry on the following activity –

Proposed Khumani, Parsons, and King Infrastructure Expansion Project.

Activity No. 11 (xi) of GN. R.544 of 18 June 2010

The construction of:

(xi) infrastructure or structures covering 50 square metres or more where such construction occurs within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse, excluding where such construction will occur behind the development setback line.

Activity No. 22 of GN. R.544 of 18 June 2010

The construction of a road, outside urban areas,

(i) with a reserve wider than 13,5 meters or,
(ii) where no reserve exists where the road is wider than 8 metres, or
(iii) 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 Notice 545 of 2010.

Activity No. 28 of GN. R.544 of 18 June 2010

The expansion of or changes to existing facilities for any process or activity where such expansion or changes to will result in the need for a permit or license in terms of national or provincial legislation governing the release of emissions or pollution, excluding where the facility, process or activity is included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case that Act will apply.

Activity No. 5 of GN. R.545 of 18 June 2010

The construction of facilities or infrastructure for any process or activity which requires a permit or license in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent and which is not identified in Notice No. 544 of 2010 or included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case that Act will apply.

Activity No. 15 of GN. R.545 of 18 June 2010

Physical alteration of undeveloped, vacant or derelict land for residential, retail, commercial, recreational, industrial or institutional use where the total area to be transformed is 20 hectares or more; except where such physical alteration takes place for:

(i) linear development activities; or
(ii) agriculture or afforestation where activity 16 in this Schedule will apply.

Activity No. 14 of GN. R.546 of 18 June 2010

The clearance of an area of 5 hectares or more of vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation, except where such removal of vegetation is required for:

(1) purposes of agriculture or afforestation inside areas identified in spatial instruments adopted by the competent authority for agriculture or afforestation purposes;

Phased activities for all activities listed in this schedule, which commenced on or after the effective date of this schedule, where any one phase of the activity may be below a threshold but where a combination of the phases, including expansions or extensions, will exceed the specified threshold.

From Parson (Portions 2, 6 and the Remainder of Parson No. 564),
King (Portions 1, 2, 3 and the Remainder of King No. 561),
Bruce (Portions 3, 4, 5 and the Remainder of Bruce No. 544)
Mokaning (Portions 1, 2, 3, 4, 5 and the Remainder of Mokaning No. 560)

(Latitude (S) 27° 51' 48.844" Longitude (E) 22° 57' 2.451")
(Latitude (S) 27° 52' 16.977" Longitude (E) 22° 58' 4.276")
(Latitude (S) 27° 51' 30.393" Longitude (E) 23° 0.' 12.603")

hereafter referred to as "the property".

The granting of this Environmental Authorisation is subject to the conditions set out below.

The applicant appointed **GCS** Water & Environmental Consultants to undertake an environmental impact assessment process.

Scoping & full Environmental Impact Assessment was followed.

2. Information considered in making the decision

In reaching its decision, the Department took, *inter alia,* the following into consideration -

a) The objectives and requirements of relevant legislation, policies and guidelines, including section 2 of the National Environmental Management Act, 1998 (Act No. 107 of 1998).

b) The relevant information contained in the Departmental informational base including-

- Public Participation Guideline 2010.
- Environmental Impact Management Assessment Regulations promulgated in terms of the new Environmental Management Act (No. 107 of 1998).

c) The findings of the specialist reports (ecological report and heritage report) conducted and the recommended mitigation measures.

d) The methodology used in assessing the potential impacts in the Scoping & full Environmental Impact Assessment Report (S & EIR) and the specialist study has been adequately indicated.

3. Key factors considered in making the decision

All information presented to the Department was taken into account in the Department's consideration of the application. A summary of the issues which, in the Department's view, were of the most significance is set out below.

a) The legal and procedural requirements have been complied and the information contained in the Scoping & full Environmental Impact Assessment report is to the satisfaction of the Department.

b) The Scoping & full Environmental Impact Assessment report findings given the nature of the project, concludes that the potential impact associated with the proposed development area of a nature and extent that can be reduced to an acceptable level.

c) The public participation process was adequately done in accordance with regulation 54 of GNR 543 of 18 June 2010.

4. Findings

After consideration of the information and factors listed above, the Department made the following findings –

a) The environmental impacts associated with the proposed project can be reduced to acceptable levels if properly managed.

b) Adequate Public Participation Process took place.
c) The legal and procedural requirements have been complied with and the information contained in the Scoping & full Environmental Impact Assessment Report and Appendices is to the satisfaction of the Department.

In view of the above, the Department is satisfied that, subject to compliance with the conditions contained in the environmental authorisation, the proposed activity will not conflict with the general objectives of integrated environmental management laid down in Chapter 5 of the National Environmental Management Act, 1998 and that any potentially detrimental environmental impacts resulting from the proposed activity can be is mitigated to acceptable levels. The application accordingly granted.a

water affairs
Department:
Water Affairs
REPUBLIC OF SOUTH AFRICA

Private Bag X313, Pretoria, 0001, Sedibeng Building, 185 Schoeman Street, Pretoria, Tel: (012) 336-7500, Fax: (012) 326-4472/ (012) 326-2715

LICENCE IN TERMS OF CHAPTER 4 OF THE NATIONAL WATER ACT, 1998 (ACT NO 36 OF 1998) (THE ACT)

I, ***Trevor Balzer*** in my capacity as a Director-General (Acting) in the Department of Water Affairs and acting under authority of the powers delegated to me by the Minister of Water and Environmental Affairs, hereby authorize the following water uses in respect of this licence.

SIGNED: _____

DATE: 16/03/2013

LICENCE NO: 10/D41J/BC1J/2122
FILE NO: 27/2/2/D941/111/1

1.	**Licensee**	**Assmang (Khumani) Iron Ore Mine**
	Postal Address	Private Bag X503 KATHU 8446

2. Water uses

2.1	Section 21(a) of the Act:	Taking of water from a water resource, subject to the conditions set out in Appendices I and II.
2.2	Section 21(b) of the Act:	Storing of water, subject to conditions set out in Appendices I and III.
2.3	Section 21(c) of the Act:	Impeding or diverting the flow of water in a watercourse, subject to the conditions set out in Appendices I and IV.
2.4	Section 21(g) of the Act:	Disposing of waste in a manner which may detrimentally impact on a water resource, subject to the conditions as set out in Appendices I and V.
2.5	Section 21(i) of the Act:	Altering the bed, banks or characteristics of a watercourse, subject to the conditions as set out in Appendices I and IV.

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2.6 Section 21(j) of the Act: Removing, discharging or disposing of water found underground for the efficient continuation of an activity or for the safety of people, subject to the conditions set out in Appendices I and VI.

3. Properties in respect of which this licence is issued

Table 1: Properties of water uses

NO	PROPERTY NAME	WATER USES	TITLE DEED NO	OWNER
3.1	King Farm 561, Portion 1.	Section 21 (g)	T1447/1993	Assmang (Pty) Ltd
3.2	Bruce 544 Kuruman RD, Portion 0.	Section 21 (g)	FT2375-KQ3/15	Assmang (Pty) Ltd
3.3	Mokaning 560 Kuruman RD, Portion 3.	Section 21 (g)	T442/1936	Assmang (Pty) Ltd
3.4	Parson 564 Kuruman RD, portion 0.	Section 21 (b), (c), (g) and (i).	FT2044-VQ18/10	Assmang (Pty) Ltd
3.5	King 561 Kuruman RD, Portion 0.	Section 21 (b) and (g)	FT2287-KQ3/6A	Assmang (Pty) Ltd

4. Registered owner of the Properties

4.1 Assmang Ltd, Khumani Iron Ore Mine

5. Licence and Review Period

5.1 This licence is valid for a period of twenty eight (28) years, the 1st review in (1) one year after the date of issuance and thereafter may be reviewed after every (5) five years.

6. Definitions

"Any terms, words and expressions as defined in the National Water Act, 1998 (Act 36 of 1998) shall bear the same meaning when used in this licence."

"The Regional Head" means the Regional Chief Director: Northern Cape, Department of Water Affairs, Private Bag X6101, Kimberly, 8800.

"Report" refers to the reports entitled:

- Environmental Management Report approved by the Departments of Mineral Resources and Tourism, Environment and Conservation for Khumani Iron Ore Mine compiled by GCS consultants (DENC Ref: NC/EIA/JTG/GAM/KAT1/2010) dated October 2011;
- Holistic Khumani Iron Ore Mine Environmental Management Programme Report incorporating the expansion of capacity, railway diversion and establishment of a local railway siding (Ref no: NC/SIY/ASS3/41/08) dated April 2009;
- Storm Water Management Plan by DRA dated November 2010;
- Hydrological Assessment by GCS dated January 2009;
- Air Quality Impact Assessment and Management Plan for BKM Mine (Ref no: APP/05/IVUZI-01 Rev 0) dated February 2005;

- Report on Soil/Pedological, Land Capability and Land use assessment study (Ref no: IV.04.05.044.JHB) dated 14 August 2004;
- Motivational Report for Water Use Licence (Ref no 04.03.163) dated 28 February 2006;
- Evaluation of the Hydrogeological Data at Khumani mine and the development of a Groundwater Management Plan compiled by Geo Pollution Technologies (GPT Ref no: Kum-09-403) dated June 2010.

As well as other related documentation and communication (email, letters and phone calls).

7. Description of the application

The applicant, Assmang (Pty) Ltd – Khumani Iron Ore Mine, applied for an integrated water use licence in terms of Section 21 (b), (c), (g) and (j) of the National Water Act (NWA), 1998 (Act 36 of 1998) to undertake Iron Ore mining operations and railway diversion in order to increase production for the local market in the already mentioned properties on table 1.

APPENDIX I

General conditions for the licence

1. This licence is subject to all provisions of the National Water Act, 1998 (Act 36 of 1998).

2. The responsibility for complying with the provisions of the licence is vested in the licensee and not any other person or body.

3. The Licensee must immediately inform the Regional Head of any change of name, address, premises and/or legal status.

4. If the property/ies in respect of which this licence is issued is subdivided or consolidated, the Licensee must provide full details of all changes in respect of the properties to the Regional Head of the Department within 60 days of the said change taking place.

5. If a water user association is established in the area to manage the resource, membership of the Licensee to this association is compulsory.

6. The Licensee shall be responsible for any water use charges or levies imposed by a responsible authority.

7. While effect must be given to the Reserve as determined in terms of the Act, where a desktop determination of the Reserve has been used in issuance of a licence, when a comprehensive determination of the Reserve has finally been made; it shall be given effect to.

8. The licence shall not be construed as exempting the licensee from compliance with the provisions of any other applicable Act, Ordinance, Regulation or By-law.

9. The licence and amendment of this licence are also subject to all the applicable procedural requirements and other applicable provisions of the Act, as amended from time to time.

10. The Licensee shall conduct an annual internal audit on compliance with the conditions of licence. A report on the audit shall be submitted to the Regional Head within one month of finalization.

11. The Licensee shall appoint an independent external auditor to conduct an annual audit on compliance with the conditions of this licence. The first audit must be conducted within 3 (three) months of the date of this licence and a report on the audit shall be submitted to the Regional Head within one month of finalization.

12. Flow metering, recording and integrating devices shall be maintained in a sound state of repair and calibrated by a competent person at intervals of not more than two years. Calibration certificates shall be available for inspection by the Regional Head or his/her representative upon request.

13. Any incident that causes or may cause water pollution must be reported to the Regional Chief Director or his/her designated representative within 24 hours.

APPENDIX II

Section 21(a) of the Act: Taking water from a water resource

1. The Licensee is authorised to abstract a maximum quantity in cubic metres per annum (m^3/a) of water from groundwater resources for construction as indicated in Table 2 below:

Table 2: Volumes of water to be abstracted from groundwater resources

Abstraction point	Property Name	Coordinates	Volume in (m^3/a)	Date of the application and status
PBE 01	Parson 564 Portion 2 RE	S27° 51' 03.2" E22° 59' 02.6"	14 832	2008 Licence Authorisation water use
PBW 02	Parson 564 RE	S26° 2' 9.88" E29° 9' 7.00"	5 820	2008 Licence Authorisation water use

2. The quantity of water authorised to be taken in terms of this licence may not be exceeded without prior authorisation by the Minister.

3. This licence does not imply any guarantee that the said quantities and qualities of water will be available at present or at any time in the future.

4. The above mentioned volumes may be reduced when the licence is reviewed.

5. The Licensee must continually investigate new and emerging technologies and put into practice water efficient devices or apply technique for the efficient use of water containing waste, in an endeavour to conserve water at all times.

6. The Licensee must be responsible for any water use charges or levies, which may be imposed from time to time by the Department or responsible authority in terms of the Department's Raw Water Pricing Strategy.

7. The Department accepts no liability for any damage, loss or inconvenience, of whatever nature, suffered as a result of:

   7.1 Shortage of water;
   7.2 Inundations or flood;
   7.3 Siltation of the resource; and
   7.4 Required reserve releases.

8. The Licensee must establish and implement a continual process of raising awareness amongst itself, its workers and stakeholders with respect to Water Conservation and Water Demand Management initiatives.

APPENDIX III

Section 21 (b) of the Act: Storing of water

This licence authorises Section 21(b) water use activities as set out in Table 3 below and in the water use licence application reports submitted to the Department.

Table 3: Section 21 (b) water use storage facilities.

Name of storage facility	Storage capacity	Type of water to be stored and its source	Property	Coordinates	Date of the application and status
9.Dust Suppression Dam	4000 m^3	Clean water for dust suppression from Sedibeng Dam	King 561 Kuruman RD, portion 0	27° 50' 53.2"S 23° 00' 53.9"E	2011 application
17.Diversion Catchment Dam 1	49 500 m^3	Catchment water	King 561 Kuruman RD, portion 0	27° 53' 10.6"S 23° 00' 02.3"E	Amendment to the existing licence
18.Diversion Catchment Dam 2	19 500 m^3	Catchment water	King 561 Kuruman RD, portion 0	27° 53' 23.9"S 23° 00' 07.7"E	Amendment to the existing licence
19.Diversion Catchment Dam 3	43 500 m^3	Catchment water	King 561 Kuruman RD, portion 0	27° 53' 46.5"S 23° 00' 08.0"E	Amendment to the existing licence

1. STORING OF WATER

1.1 The Licensee is authorised to store a maximum quantity of water as indicated in table 3 above in cubic meters per annum (m^3 /a) in the facilities located on King 561 Kuruman RD, portion 0; Parson 564 Kuruman RD, portion 2; and Bruce 544 Kuruman RD, portion 0.

1.2 The Licensee must obtain any proprietary rights or servitudes at their own cost.

1.3 The Licensee is not exempted from compliance with any applicable Dam Safety Regulations.

2. Monitoring Requirements

2.1 The Licensee is not indemnified from any detrimental effect that the dam(s) may have on other properties. The Department does not accept any responsibility or liability for any damages or losses that may be suffered by any other party as a result of the construction and utilisation of the dams.

2.2 The Licensee shall establish a monitoring programme and the date and time of monitoring in respect of each sample taken shall be recorded together with the results of the analysis.

2.3 The quantity of water stored shall be recorded as at the last day of each month.

3. Dam Safety Requirements

The Licensee is not exempted from compliance with the provisions of the Regulations published under Government Notice R139 of 24 February 2012, read with Chapter 12 of the Act.

4. Construction of Dam(s)

The as-built plans and specifications of the dam(s) must be submitted to the Regional Head for his/her records and the following applies:

a. Construction of the dam(s) may not commence before authorisation in terms of the Environment Conservation Act, 1989 (Act 73 of 1989) is issued; and
b. The Government reserves the right to construct storage works at any time in any stream and to store all surplus water reaching the dam(s) and to control the allocation of such water.

APPENDIX IV

Section 21(c) of the Act: **Impeding or diverting the flow of water in a watercourse**
And
Section 21(i) of the Act: **Altering the bed, banks, course or characteristics of a watercourse**

1. GENERAL

1.1 This licence authorises Section 21(c) and (i) water use activities as set out in Table 4 & 5 below and in the water use licence application reports submitted to the Department in 2009 and 2011.

Table 4: Section 21 (c) and (i) water uses.

Name of water resource affected	Parameters	Purpose of the water use	Property	Coordinates	Date of the application and status
1.Small non perennial tributary (King Culvert A)	2.5 m height, width is 3 m and length is 3 m (impeding (S21 c))	Allow water to flow under the haul roads	King 561 Kuruman RD, portion 0	27° 49' 55.2"S 23° 00' 36"E	2011 application
2.Small non perennial tributary (King Culvert A)	2.5 m height, width is 3 m and length is 3 m (impeding (S21 i))	Allow water to flow under the haul road	King 561 Kuruman RD, portion 0	27° 49' 55.2"S 23° 00' 36"E	2011 application
3.Small non perennial tributary (King Culvert B)	2.5 m height, width is 3 m and length is 3 m (impeding (S21 c))	Allow water to flow under the haul road	King 561 Kuruman RD, portion 0	27° 49' 51.5"S 23° 00' 43.2"E	2011 application
4.Small non perennial tributary (King Culvert B)	2.5 m height, width is 3 m and length is 3 m (impeding (S21 i))	Allow water to flow under the haul road	King 561 Kuruman RD, portion 0	27° 49' 51.5"S 23° 00' 43.2"E	2011 application
5.Small non perennial tributary (King Culvert C)	2.5 m height, width is 3 m and length is 3 m (impeding (S21 c))	Allow water to flow under the haul road	King 561 Kuruman RD, portion 0	27° 49' 44.4"S 23° 00' 50.3"E	2011 application
6.Small non perennial tributary (King Culvert C)	2.5 m height, width is 3 m and length is 3 m (impeding (S21 i))	Allow water to flow under the haul road	King 561 Kuruman RD, portion 0	27° 49' 44.4"S 23° 00' 50.3"E	2011 application
7.Non perennial small tributary of the Gamagara river	1.0 m height, width is 3 m and length is 3 m (impeding (S21 c))	Railway Crossing 1	Parson 564 Kuruman RD, portion 2	27° 50' 39.0"S 22° 58' 55.1"E	2009 application
8.Non perennial small tributary of the Gamagara river	1.0 m height, width is 3 m and length is 3 m (impeding (S21 i))	Railway Crossing 1	Parson 564 Kuruman RD, portion 2	27° 50' 39.0"S 22° 58' 55.1"E	2009 application

Name of water resource affected	Parameters	Purpose of the water use	Property	Coordinates	Date of the application and status
9.Non perennial small tributary of the Gamagara river	1.0 m height, width is 3 m and length is 3 m (impeding (S21 c))	Railway Crossing 2	Parson 564 Kuruman RD, portion 2	27° 50' 34.7"S 22° 59' 05.9"E	2009 application
10.Non perennial small tributary of the Gamagara river	1.0 m height, width is 3 m and length is 3 m (impeding (S21 i))	Railway Crossing 2	Parson 564 Kuruman RD, portion 2	27° 50' 34.7"S 22° 59' 05.9"E	2009 application
11.Non perennial small tributary of the Gamagara river	2.5 m height, width is 3 m and length is 3 m (impeding (S21 c))	Railway Crossing 3	Parson 564 Kuruman RD, portion 2	27° 50' 23.9"S 22° 59' 40.1"E	2009 application
12.Non perennial small tributary of the Gamagara river	2.5 m height, width is 3 m and length is 3 m (impeding (S21 i))	Railway Crossing 3	Parson 564 Kuruman RD, portion 2	27° 50' 23.9"S 22° 59' 40.1"E	2009 application

1.2 This licence also incorporates the following 2008 Section 21 (c) and (i) Water Use Licence Authorisation (WULA) issued on 21 November 2008:

Table 5: Summary of section 21 (c) & (i) water uses in the 2008 existing licence.

Name of water resource affected	Purpose of the water use	Coordinates	Date of the application and status
1.Watercourse No 1	King/Mokaning Diversion	27° 54' 26.2"S 23° 00' 46.7"E and 27° 53' 31.2"S 22° 59' 11.9"E	2008 water use Existing Licence Authorisation.
2.Gamagara River	Conveyor Crossing	27° 49' 38.8"S 22° 00' 20.0"E	2008 water use Existing Licence Authorisation.
3.Gamagara River	Haul Road Crossing	27° 49' 12.3"S 23° 01' 15.0"E	2008 water use Existing Licence Authorisation
4.Watercourse No. 2	Railway Crossing 2	27° 50' 58.6"S 22° 59' 45.0"E	2008 water use Existing Licence Authorisation
5.Watercourse No 2	Conveyor Crossing 1	27° 50' 58.6"S 22° 59' 45.0"E	2008 water use Existing Licence Authorisation

6.Watercourse No 2	Railway Crossing 1	27° 54' 05.1"S 22° 59' 45.0"E	2008 water use Existing Licence Authorisation

1.3 The Licensee must carry out and complete all the activities listed under Appendix IV according to the reports.

1.4 The conditions of the authorisation must be brought to the attention of all persons (employees, sub-consultants, contractors etc.) associated with the undertaking of these activities and the licensee must take such measures that are necessary to bind such persons to the conditions of this licence.

1.5 A copy of the water use licence and reports must be on site at all times.

1.6 A suitably qualified person/s, appointed by the licensee, and approved in writing by the Regional Head must be responsible for ensuring that the activities are undertaken in compliance with the specifications as set out in reports submitted to the Department and the conditions of this licence.

2. FURTHER STUDIES AND INFORMATION REQUIREMENTS

2.1 For water use activities set out in Table 4 & 5, an environmental audit addressing how the characteristics of the watercourses have been affected must be submitted to the Regional Head for a written approval within one (1) year of the date of issuance of this licence. The audit must be accompanied by a remediation plan and programme for any post construction impacts identified in the audit.

2.2 For water use activities outlined in Table 4 & 5:

2.2.1. A more legible Master Plan/s of watercourse crossings in particular must be compiled indicating all temporary and permanent infrastructure, 1:100 year floodlines, watercourses, riparian habit, pan boundaries and proposed water uses. Alternatives to be shown on the Master Plan and clarity to be provided to what degree pits can be filled. All this information must be submitted to DWA within six (6) month of the date of this licence issuance.

2.2.2. Work method statements, site plan/s and detailed design drawings for the construction of all infrastructure of impeding and/or diverting flow of watercourses as well as alterations to watercourses on the property/ies must be submitted to the Regional Head for a written approval and implementation as directed before construction. The foregoing must indicate the regulated activities, marking the limits of disturbance in relation to the impacted watercourses; morphology of the watercourses; site specific impacts; and environmental management, particularly erosion and sediment, controls and measures.

2.2.3. No fundamental alterations of the work method statements, site plan/s and drawings are allowed, unless a modification is requested and granted by the Regional Head in writing.

2.2.4. No site activities must occur beyond the proposed site location of the erosion and sedimentation controls and marked limits of disturbance.

2.3 For water use activities outlined in Table 4 & 5, the following information must be submitted to the Regional Head for written approval before these activities commence:

2.3.1. A site level environmental impact assessment (EIA) addressing how the characteristics of the watercourses must be affected by the aforementioned activities in Table 4 & 5.

2.3.2. The loss of biodiversity offset mitigation measure as determined in the EIA.

2.3.3. An environmental management plan (EMP) including rehabilitation strategies.

2.4 An EMP for the decommissioning of the water use activities listed in Table 4 & 5 must be submitted five (5) years before commencing with closure to the Regional Head for a written approval.

2.5 The Gamagara river is a losing system due to the dewatering impacts of the mine. A full aquatic study is required to determine the impacts on the characteristics (flow, quality, habitat and biota) of all impacted watercourses and the mitigation thereof.

2.6 Dust control at sensitive areas like crossings and pans and floodplains must be at 85% control efficiency. There must be an absence of visual dust plume as best indicator according to the Dust Management Plan. Dust suppression activities shall not contaminate and/or pollute any watercourse and the Licensee must conduct six (6) month soil monitoring events to determine the impact of dust suppression on the receiving environment. Soil samples shall at least be analyzed for pH, Electrical conductivity (mS/M), Calsium (Ca) (mg/l), magnesium (mg) (mg/l), Potassium (K) (mg/l), Sodium (Na) (mg/l), Chloride (Cl) (mg/l), Sulphate (SO_4) (mg/l), Aluminium (Al) (mg/l), Iron (Fe) (mg/l), Manganese (mg/l), BTEX & TPH (mg/l), and nitrate (NO_3 as N) (mg/l). Soil samples to be compared with a reference site. The monitoring reports and recommended actions must be submitted within thirty (30) days after completion of the report(s) to the Regional Head for a written comments.

3. PROTECTIVE MEASURES

Storm Water Management

3.1 Storm water management practices must be constructed, operated and maintained in a sustainable manner throughout the project and for the water use activities set out in Appendix IV and must include but are not limited to the following:

3.1.1. Increased runoff due to vegetation clearance and/or soil compaction must be managed, and steps must be taken to ensure that storm water does not lead to bank instability and excessive levels of silt entering the watercourse/s.

3.1.2. Storm water must be diverted from construction works, mining areas, and roads must be managed in such a manner as to disperse runoff and to prevent the concentration of storm water flow.

3.1.3. The velocity of storm water discharges must be attenuated and the banks of the watercourses protected.

3.1.4. Storm water leaving the Licensee's premises must in no way be contaminated by any substance, whether such substance is a solid, liquid, vapour or gas or a combination thereof which is produced, used, stored, dumped or spilled on the premises.

3.1.5. Stormwater drains should be made as ecologically friendly as possible. Where relevant include grass drains and adhere to the specifications of the engineer drawings where the use of Armorflex and gabion structures is specified and vegetate the side slopes of drains to create natural streams.

3.2 Side slopes of Stormwater Management trenches, dams, canals, berms, channels, diversions, waste rock dumps, paste (tailings) facilities and other earthworks must be shaped to 1:3, protected with rockor erosion protection measure, topsoiled at least 250 mm within the rock protection and vegetated with indigenous grass for safety, aesthetics, ease of vegetation and less erosion. Clean water channel/berm slopes must be protected against erosion and vegetated with indigenous vegetation and details of Plant Species Plans and implementation thereof submitted to the Regional Head. Surrounding indigenous grass and tree seeds can be harvested and used. Dirty water slopes must be lined as approved by Civil Design. Design drawings of 1:1.5 and 1:2 slopes must be changed to at least 1:3 slopes.

Structures, Construction Plant and Materials

3.3 The height, width and length of structures must be limited to the minimum dimension necessary to accomplish the intended function.

3.4 1:100 year floodlines must be determined for the crossings and sufficient culverts must be included not to change floodlines. Structures must not be damaged by floods exceeding the magnitude of floods occurring on average once in every 100 years.

3.5 Structures must be non-erosive, structurally stable and must not induce any flooding or safety hazard.

3.6 Structures must be inspected regularly for accumulation of debris, blockage, erosion of abutments and overflow areas - debris must be removed and damages must be repaired and reinforced immediately.

3.7 The construction plant and materials must be recovered and removed one month after construction/commencement has been completed.

Water Quality

3.8 In-stream water quality must be analysed on a two-weekly basis during construction otherwise monthly at monitoring points both upstream and downstream of the activities for the following variables:

3.8.1. pH.
3.8.2. Electrical conductivity (mS/M).
3.8.3. Suspended solids (mg/l).
3.8.4. Total dissolved solids (mg/l).

3.9 Discharge qualities and proof of adherence to WULA licence conditions in terms of water quality must be submitted to the Department within six (6) months of issuance of this licence.

3.10 Monitoring must continue for five years after the cessation of the activities listed in Appendix IV.

3.11 Activities that lead to elevated levels of turbidity of any watercourse must be minimised. Operation and maintenance activities must be scheduled to take place during the dry seasons when flows are lowest where reasonably possible. If this is not possible and if management measures have not been provided for in the reports submitted to the Department, the Licensee must submit such to the Regional Head for written approval before these activities commence. Natural instream hydrology is to be used to determine which months constitute the low flow months.

3.12 The Licensee must ensure that the quality of the water to downstream water users does not decrease because of the water use activities listed under Appendix IV.

3.13 Pollution of and disposal/spillage of any material into the watercourse must be prevented, reduced, or otherwise remediated through proper operation, maintenance and effective protective measures.

3.14 Vehicles and other machinery must be serviced well above the 1:100 year flood-line or outer edge of the riparian habitat whichever is the greatest. Oils and other potential pollutants must be disposed off at an appropriate licensed site, with the necessary agreement from the owner of such a site.

3.15 Any hazardous substances must be handled according to the relevant legislation relating to transport, storage and use of the substance.

3.16 All reagent storage tanks and reaction units must be supplied with a banded area built to the capacity of the facility and provided with sumps and pumps to return the spilled material back into the system. The system must be maintained in a state of good repair and standby pumps must be provided.

Flow

3.17 The Licensee must determine flood lines (1:50 and 1:100 year) prior to construction to ensure risks are adequately managed. Flood lines must be clearly indicated on the site plan/s and drawings along with all wetland boundaries.

3.18 The activities must be conducted in a manner that does not negatively affect catchment yield, hydrology and hydraulics. The Licensee must ensure that the overall magnitude and frequency of flow in the watercourse/s does not decrease, other than for natural evaporative losses and authorised attenuation volumes.

3.19 Base flow that is extracted by the mine must be treated and returned to the river to support its ecological requirements and other water users requirements.

Riparian and Instream Habitat (Vegetation and Morphology)

3.20 Activities must start up-stream and proceed into a down-stream direction, so that the recovery processes can start immediately, without further disturbance from upstream works.

3.21 Operation and storage of equipment within the riparian habitat must only take place within the approved limits of disturbance indicated in the site plans and work method statements.

3.22 Activities must not occur in sensitive riffle habitats.

3.23 Indigenous riparian vegetation, including dead trees, outside the limits of disturbance indicated in the site plans referred, must not be removed from the area.

3.24 Alien and invader vegetation must not be allowed to further colonise the area, and all new alien vegetation recruitment must be sustainable eradicated or controlled.

3.25 Existing vegetation composition must be maintained or improved by maintaining the natural variability in flow fluctuations.

3.26 Recruitment and maintaining of a range of size classes of dominant riparian species in perennial channels must be stimulated.

3.27 Encroachment of additional exotic species and terrestrial species in riparian zones must be discouraged.

3.28 Accumulation of woody debris on terraces by periodic flooding must be discouraged.

3.29 Existing flood terraces and deposition of sediments on these terraces to ensure optimum growth, spread and recruitment of these species must be maintained.

3.30 All reasonable steps must be taken to minimise noise and mechanical vibrations in the vicinity of the watercourses.

3.31 Necessary erosion prevention mechanisms must be employed to ensure the sustainability of all structures and activities and to prevent instream sedimentation.

3.32 Soils that have become compacted through the water use activities must be loosened to an appropriate depth to allow seed germination.

3.33 Slope/bank stabilisation measures must be implemented.

3.34 Stockpiling of removed soil and sand must be stored outside of the 1:100 flood line or riparian habitat, whichever is the greater, to prevent being washed into the river and must be covered to prevent wind and rain erosion.

3.35 Topsoil must be stripped and stockpiled for rehabilitation work after completion of construction in any given area.

3.36 Rehabilitation must be concurrent with construction.

3.37 Wetlands must be rehabilitated in accordance with the specialist wetland report specifications.

3.38 The indiscriminate use of machinery within the instream and riparian habitat must lead to compaction of soils and vegetation and must therefore be strictly controlled.

3.39 The overall macro-channel structures and mosaic of cobbles and gravels must be maintained by ensuring a balance (equilibrium) between sediment deposition and sediment conveyance. A natural flooding and sedimentation regime must thus be ensured as far as reasonably possible.

Biota

3.40 The Licensee must take all reasonable steps to allow movement of aquatic species, including migratory species.

3.41 All reasonable steps must be taken not to disturb the breeding, nesting and/or feeding habitats and natural movement patterns of aquatic biota.

3.42 The current level of diversity of biotopes and communities of animals, plants and microorganisms must be maintained.

Other Water Users

3.43 The Licensee must attempt to prevent adverse effect on other water users. All complaints must be investigated by a suitable qualified person and if investigations prove that the Licensee has impaired the rights of other water users, the Licensee must initiate suitable compensative measures.

Rehabilitation and Management

3.44 A comprehensive and appropriate rehabilitation and management programme to restore the watercourse/s to be environmentally acceptable and sustainable conditions after construction must be developed and submitted to the Regional Head for written approval within three months from the date of issuance of this licence.

3.45 The licensee must embark on a systematic long-term rehabilitation programme to restore the watercourse/s to environmentally acceptable and sustainable conditions after completion of the activities, which must include, but not be limited to the rehabilitation of disturbed and degraded riparian areas to restore and upgrade the riparian habitat integrity to sustain a bio-diverse riparian ecosystem.

3.46 The cone of depression impacts of the aquifer system due to the pits must be addressed holistically with surrounding mines like Sishen within a year and mitigation measures implemented.

3.47 Proof of addressing the EIA environmental authorisation condition of determining and implementing offset mitigation measures for the loss of biodiversity must be addressed within six (6) months.

3.48 An updated Mine Rehabilitation Plan that includes landscape development, plant species plans, wetland management, eradication of bush encroachment and alien species and the methods employed with proof of a dedicated rehabilitation team and equipment with reference to the past and current rehabilitation standards, statistics, maps, and compliance must be submitted within six (6) month of the date of this licence issuance to the Regional Head.

4. MONITORING AND REPORTING

4.1 The Regional Head must be notified in writing one week prior to commencement of the licensed activity/ies and again upon completion of the activity/ies;

4.2 A comprehensive and appropriate environmental (including bio-monitoring) assessment and monitoring programme to determine the impact, change, deterioration and improvement of the

aquatic system associated with the activities listed under Appendix IV as well as compliance to these water use licence conditions must be developed and submitted to the Regional Head for a written approval before commencement and must subsequently be implemented as directed;

4.3 Six (6) monthly monitoring reports must be submitted to the Regional Head or until otherwise agreed in writing with the Regional Head.

4.4 A qualified environmental management specialist must be retained by the Licensee who must give effect to the various licence conditions and to ensure compliance thereof pertaining to all activities impeding and/or diverting the flow of watercourses as well as alterations to watercourses on the property/ies as set out in Appendix IV.

4.5 The Licensee must conduct on a two yearly basis an internal audit on compliance with the conditions of this licence. A report on the audit must be submitted to the Regional Head within one month of finalisation of the audit. A qualified independent auditor must undertake this audit.

4.6 The audit reports must include but are not limited to:

4.6.1. Reporting in respect of the monitoring programme referred to in condition 4.2 (Appendix IV).

4.6.2. A record of implementation of all mitigation measures including a record of corrective actions.

4.6.3. Compensation measures for damage where mitigation measures have failed to adequately protect the in-stream and riparian habitat or any other characteristic of the watercourses.

4.7 The Licensee must apply in writing to the Regional Head for alternative reporting arrangements for which written approval must be provided.

5. PLANT AREAS AND CONVEYANCES

5.1 Pollution caused by spills from the conveyances must be prevented through proper maintenance and effective protective measures especially near all stream crossings.

5.2 All reagent storage tanks and reaction units must be supplied with a banded area built to the capacity of the facility and provided with sumps and pumps to return the spilled material back into the system. The system shall be maintained in a state of good repair and standby pumps must be provided.

5.3 Any hazardous substance must be handled according to the relevant legislation relating to the transport, storage and use of the substance.

5.4 Any access road or temporary crossing must be:

5.4.1 Non-erosive, structurally stable and shall not induce any flooding or safety hazard.

5.4.2 Be repaired immediately to prevent further damage.

6. CONTINGENCIES

6.1 Accurate and up-to-date records shall be kept of all system malfunctions resulting in non-compliance with the requirements of this licence. The records shall be available for inspection by the Regional Head upon request. Such malfunctions shall be tabulated under the following headings with a full explanation of all the contributory circumstances:

6.1.1. Operating errors.
6.1.2. Mechanical failures (including design, installation or maintenance).
6.1.3. Environmental factors (e.g. flood).
6.1.4. Loss of supply services (e.g. power failure).
6.1.5. Other causes.

6.2 The Licensee must, within 24 hours, notify the Regional Head of the occurrence or potential occurrence of any incident which has the potential to cause, or has caused water pollution, pollution of the environment, health risks or which is a contravention of the licence conditions.

6.3 The Licensee must, within 14 days, or a shorter period of time, as specified by the Regional Head, from the occurrence or detection of any incident referred above, submit an action plan which must include a detailed time schedule to the satisfaction of the Regional Head of measures taken to:

6.3.1 Correct the impacts resulting from the incident.
6.3.2 Prevent the incident from causing any further impacts.
6.3.3 Prevent a recurrence of a similar incident.

7. AUDITING

7.1 The Licensee shall conduct an annual internal audit on compliance with the conditions of this licence. A report on the audit shall be submitted to the Regional Head within one month of finalisation of the report, and shall be made available to an external auditor, should the need arise.

7.2 The Licensee shall appoint an independent external auditor to conduct an annual audit on compliance with the conditions of this licence. The first audit must be conducted within six (6) months of the date this licence was issued and a report on the audit shall be submitted to the Regional Head within one month of finalisation of the report.

APPENDIX V

Section 21 (g) of the Act: Disposing of waste in a manner which may detrimentally impact on a water resource

1. CONSTRUCTION AND OPERATION

1.1 The Licensee shall carry out and complete all the activities, including the construction and operation of the facilities listed below in Table 6, according to the Report and according to the final plans submitted with the Integrated Water Use Licence Application as approved by the Regional Head.

Table 6: Summary of section 21 (g) water uses.

Name of disposal facility	Disposal quantity/ capacity	Type of waste to be disposed and source	Property	Coordinates	Date of the application & status
1.Bruce ROM Buffer S/P	10 m^3/a	Stockpile for processing	Bruce 544 Kuruman RD, portion 0	27° 49' 06.0"S 23° 00' 36.5"E	2009 application
2.Bruce Wash Bay	100 000 m^3/a	Washbay for vehicles and machinery	Bruce 544 Kuruman RD, portion 0	27° 49' 5.5"S 23° 00' 35.9"E	2009 application
3.Bruce Evaporation Pond	30 000 m^3/a	Crusher water plus runoff	Bruce 544 Kuruman RD, portion 0	27° 48' 55.8"S 23° 00' 41.3"E	2009 application
4.Dirty Water Dam	160 444 m^3/a	Water from the PCD for dust suppression	Bruce 544 Kuruman RD, portion 0	27° 48' 40.1"S 23° 00' 44.6"E	2011 application
5.Bruce Dust Suppression and (BC04 Dam)	672 000 m^3/a	Water from Dust suppression Dam and BC04 Dam	Bruce 544 Kuruman RD, portion 0	27° 49' 03.1"S 23° 00' 17.8"E	2011 application
6.Bruce Banded Iron Stone Dump	20 m^3/a	Waste Rock	Bruce 544 Kuruman RD, portion 0	27° 48' 31.8"S 23° 00' 38.7"E	2009 application
7.Bruce Quartz Dump	10 m^3/a or 20 000 m^3/a	Waste Rock	Bruce 544 Kuruman RD, portion 0	27° 48' 48.4"S 23° 00' 27.1"E	2009 application
8. Decant Dam	1 152 094 m^3/a	Storm water from paste facility and overflow from secondary thickner stored in decant lined dam	King 561 Kuruman RD, portion 0	27° 50' 36.9"S 23° 00' 45.0"E	2009 application
9.Paste Facility Return Water Dams	5 878 281 m^3/a	Return Water Dams as part of closed circuit	King 561 Kuruman RD, portion 0	27° 50' 45.2"S 23° 00' 25.0"E	2009 application
10.Secondary Thickener Tank 1	3 600 000 m^3/a	Process Water from Thickener 2	King 561 Kuruman RD, portion 0	27° 50' 44.2"S 23° 00' 24.2"E	2009 application

Name of disposal facility	Disposal quantity/ capacity	Type of waste to be disposed and source	Property	Coordinates	Date of the application & status
11.Secondary Thickener Tank 2	3 600 000 m^3/a	Process Water from Thickener 1	King 561 Kuruman RD, portion 0	27° 50' 44.8"S 23° 00' 23.7"E	2009 application
12.King Pollution Control Dam	12 946 m^3/a	Process Circuit Water	King 561 Kuruman RD, portion 0	27° 51' 00.5"S 23° 00' 20.1"E	2009 application
13.King Wash Bay	100 000 m^3/a	Wash water from vehicles and machinery	King 561 Kuruman RD, portion 0	27° 51' 00.5"S 23° 00' 20.1"E	2009 application
14.New stockpile dam	6 121 m^3/a	Stockpile dirty water containment	King 561 Kuruman RD, portion 0	27° 50' 47.5"S 22° 59' 59.2"E	2009 application
15.King Buffer ROM S/P	105 000 m^3/a	Product S/P	King 561 Kuruman RD, portion 0	27° 50' 45.6"S 23° 00' 03.4"E	2009 application
16.WHIMS Process Water Tank	24 000 72 2 m^3/a	Process Circuit Water	Parson 564 Kuruman RD, portion 2	27° 51' 39.9"S 22° 58' 33.5"E	2011 application
17.WHIMS Gland Services Tank (Process water clarifier)	1 800 428 m^3/a	Plant Circuit Water	Parson 564 Kuruman RD, portion 2	27° 51' 41.9"S 22° 58' 37.5"E	2011 application
18.ROM Stockpile Area	144 m^3/a	Parson overland Product S/P	Parson 564 Kuruman RD, portion 2	27° 51' 35.7"S 22° 58' 48.7"E	2009 application
19.Wash bay Ponds	1 000 m^3/a	Vehicle and Machine wash water	Parson 564 Kuruman RD, portion 2	27° 51' 47.1"S 22° 58' 29.2"E	2009 application
20.Dirty Water Dam	84 004 33 1 m^3/a	Process Circuit Water	Parson 564 Kuruman RD, portion 2	27° 51' 43.5"S 22° 58' 28.6"E	2009 application
21.Process Water Dam	175 321 8 75 m^3/a	Process Circuit Water	Parson 564 Kuruman RD, portion 2	27° 51' 44.5"S 22° 58' 27.3"E	2009 application
22.Parson Semi Fines Product S/P 1	10 m^3/a	Product S/P	Parson 564 Kuruman RD, portion 2	27° 51' 38"S 22° 58' 22.1"E	2009 application
23.Parson Semi Fines Product S/P 2	10 m^3/a	Product S/P	Parson 564 Kuruman RD, portion 2	27° 51' 40.8"S 22° 58' 21.4"E	2009 application
24.Fines Stockpile	10 m^3/a	Product S/P	Parson 564 Kuruman RD, portion 2	27° 51' 33.5"S 22° 58' 34.1"E	2009 application
25.Parsons Thickener Phase 2	90 002 33 6 m^3/a	Mining waste from process circuit water	Parson 564 Kuruman RD, portion 2	27° 51' 44"S 22° 58' 24"E	2009 application
26.Parson Lumpy Product	10 m^3/a	Product S/P	Parson 564 Kuruman	27° 51' 33.2"S 22° 58' 37.1"E	2009 application

Name of disposal facility	Disposal quantity/ capacity	Type of waste to be disposed and source	Property	Coordinates	Date of the application & status
S/P			RD, portion 2		
27.Process Water Recovery Dam 1	5 233 m^3/a	Recycled Process Water	Parson 564 Kuruman RD, portion 2	27° 51' 48.9"S 22° 58' 47.5"E	2011 application
28.Process Water Recovery Dam 2	5 233 m^3/a	Recycled Process Water	Parson 564 Kuruman RD, portion 2	27° 51' 46.8"S 22° 58' 49.7"E	2011 application
29.Parson Lumpy Buffer Stockpile	10 m^3/a	Product S/P	Parson 564 Kuruman RD, portion 2	27° 51' 56.1"S 22° 58' 29.7"E	2011 application
30.Fines Buffer Stockpile	10 m^3/a	Product S/P	Parson 564 Kuruman RD, portion 2	27° 51' 56.3"S 22° 58' 32.5"E	2011 application
31.Limpy Jigs 2 Feed Stockpile	10 m^3/a	Product S/P	Parson 564 Kuruman RD, portion 2	27° 51' 48.5"S 22° 58' 51.3"E	2011 application
32.Limpy Jigs 2 Feed Stockpile	10 m^3/a	Product S/P	Parson 564 Kuruman RD, portion 2	27° 51' 50.9"S 22° 58' 50.2"E	2011 application
33.HPGR 2 Semi Fines Stockpile	10 m^3/a	Product S/P	Parson 564 Kuruman RD, portion 2	27° 52' 02.1"S 22° 58' 44.1"E	2011 application
34.HPGR 2 Middlings Stockpile	10 m^3/a	Product S/P	Parson 564 Kuruman RD, portion 2	27° 52' 04.4"S 22° 58' 42.5"E	2011 application
35.Primary Thickener	90 002 33 6 m^3/a	Process circuit water	Parson 564 Kuruman RD, portion 2	27° 51' 59.6"S 22° 58' 36.1"E	2011 application
36.Process Water Tank 2	90 590 62 0 m^3/a	Process circuit water	Parson 564 Kuruman RD, portion 2	27° 51' 56.5"S 22° 58' 36.2"E	2011 application
37.Dirty Water Tank 2	84 004 33 1 m^3/a	Process circuit water	Parson 564 Kuruman RD, portion 2	27° 51' 55.6"S 22° 58' 37.9"E	2011 application
38.Parson Load out Stockpile	264 m^3/a	Product S/P	Parson 564 Kuruman RD, portion 0	27° 51' 26.8"S 22° 57' 48.1"E	2009 application
39.Low Grade Stockpile	17 375 m^3/a	Waste Rock from the plant	Parson 564 Kuruman RD, portion 0	27° 52' 02.2"S 22° 57' 40.3"E	2009 application
40.Mokaning Waste Dump	69.5 m^3/a	Waste Rock from the plant	Mokaning 560 Kuruman RD, portion 3	27° 52' 33.54"S 23° 00' 51.42"E	2009 application
41.Parson Storm water Dam 2	8 175 m^3/a	Storm water	Parson 564 Kuruman RD, portion 0	27° 50' 58.1"S 22° 58' 43.9"E	2011 application
42.Bruce crusher	11 520 m^3	Contaminated storm water	Bruce 544 Kuruman	27° 49' 09.8"S 23° 00' 35.1"E	2008 Licence Authorisation

Name of disposal facility	Disposal quantity/ capacity	Type of waste to be disposed and source	Property	Coordinates	Date of the application & status
pollution control dam		runoff	RD, portion 0		water use
43.King crusher pollution control dam	11 520 m^3	Contaminated storm water runoff	King 561 Kuruman RD, portion 0	27° 50' 55.3"S 23° 00' 10.08"E	2008 Licence Authorisation water use
44.Bruce Overburden and low grade ROM stockpile	6 643 333 m^3	Mine residue	Bruce 544 Kuruman RD, portion 0	27° 46' 12.0"S 23° 01' 42.0"E	2008 Licence Authorisation water use
45.King Paste Disposal Facility	1 920 000 m^3	Mine Plant Tailings	King 561 Kuruman RD, portion 0	27° 50' 16.6"S 23° 00' 51.4"E	2008 Licence Authorisation water use
46.Return Water Dam	44 484 m^3	Water draining from the Tailings	King 561 Kuruman RD, portion 0	27° 50' 38.7"S 23° 00' 44.4"E	2008 Licence Authorisation water use
47.King Overburden dump	7 000 000 t	Mine residue	King 561 Kuruman RD, portion 0	27° 51' 47.0"S 23° 01' 12.0"E	2008 Licence Authorisation water use
48.King Waste Rock Dump	40 000 000 t	Mine Plant Tailings	King 561 Kuruman RD, portion 0	27° 50' 40.7"S 23° 01' 22.1"E	2008 Licence Authorisation water use
49.Mokaning Overburden and low grade ROM stockpile	2 600 000 m^3	Mine residue	Mokaning 560 Kuruman RD, portion 3	27° 52' 41.2"S 23° 01' 28.2"E	2008 Licence Authorisation water use
50.Parson Process Water Dam	20 131 m^3	Process Water	Parson 564 Kuruman RD, portion 0	27° 51' 49.1"S 22° 58' 31.33"E	2008 Licence Authorisation water use
51.Parson Plant Pollution Control Dam	20 160 m^3	Polluted Process Water	Parson 564 Kuruman RD, portion 0	27° 51' 19.2"S 22° 58' 34.5"E	2008 Licence Authorisation water use
52.Parson Production Stockpile Pollution Control Dam	20 000 m^3	Contaminated Water	Parson 564 Kuruman RD, portion 0	27° 51' 16.9"S 22° 58' 09.5"E	2008 Licence Authorisation water use
53.Diversion Waste Rock Dump	2 880 000 m^3	Waste Rock from the plant	King 561 Kuruman RD, portion 0	27° 53' 03.00"S 23° 00' 10.6"E	Amendment to the existing licence
54.Evaporation Pond 1	1075 m^3	Capture runoff to ensure open pit safety	King 561 Kuruman RD, portion 0	27° 52' 44.7"S 23° 00' 8.8"E	2011 application
55.Evaporation Pond 2	2 554 m^3	Capture runoff to ensure open pit safety	King 561 Kuruman RD, portion 0	27° 53' 24.9"S 23° 00' 5.7"E	2011 application

1.2 The Licensee must ensure that the disposal of waste water, operation, and maintenance of the system are done according to the provisions in the Report.

1.3 The waste facilities listed in Table 6 shall be operated and maintained to have a minimum freeboard of 0.8 metres above full supply level and all other water systems related thereto shall be operated in such a manner that it is at all times capable of handling the 1:50 year flood-event on top of its mean operating level.

1.4 The tailings and pollution control dams must be designed in such a manner that any spillage can be contained and reclaimed at an early stage without any impact on the surrounding environment.

2. STORAGE OF WATER CONTAINING WASTE

The Licensee is authorised to dispose of the amount of volumes as stipulated on table 7 of waste/waste water emanating from the Iron Ore mining activities.

3. QUALITY OF WASTE WATER TO BE DISPOSED

3.1 The quality of waste water disposed of into the waste water facilities.

Table 7: Quality of waste water to be disposed into the waste facilities

Variable	Quality of Slurry
pH	8.1
Alkalinity (mg/l)	160
Calcium (mg/l)	53
Cadmium (mg/l)	6.000667
Chloride (mg/l)	59
Chromium (mg/l)	0.08664
Copper (mg/l)	0.04294
Fluoride (mg/l)	0.3
Iron (mg/l)	2.313
Magnesium (mg/l)	18
Manganese (mg/l)	0.2176
Potassium (mg/l)	9.2
Sodium (mg/l)	34
Sulphate (mg/l)	45
Total Dissolved Solids (mg/l)	360
Vanadium (mg/l)	0.01869

4. MONITORING

4.1 The Licensee shall monitor on monthly basis the water resources at surface water monitoring points and Ground water monitoring points to determine the impact of the facility and other activities on the water quality by taking samples at the monitoring points as indicated in the hydrogeological study as on tables 8 and table 9.

Table 8: Summary of monitoring boreholes in the mining area.

Borehole	Location		Farm	Farm Owner	Parameter	Frequency
	X	Y				
1.Wright 3	22.92230	-27.79459	Wright	Stephanie Cornellisen	Water Levels	Quarterly
2.SEK 0023	23.0705	-27.7235	Sekagame	Khumba	Water Levels	Quarterly

Borehole	Location		Farm	Farm Owner	Parameter	Frequency
	X	Y				
3.BEST 2	23.09101	-27.68138	Bestwood	Fred Viljoen	Water Levels	Quarterly
4.MOK 2	23.04974	-27.91066	Mokaning	Nic Steyn	Water Levels	Quarterly
5.Mashwenin	23.0485	-27.88725	-	Assmang	Water Levels	Quarterly
6.Mashwenin	23.0566	-27.89595	-	Assmang	Water Levels	Quarterly
7.Mokaning 1	23.0296	-27.88651	-	Assmang	Water Levels	Quarterly
8.Mokaning 2	23.0351	-27.89274	-	Assmang	Water Levels	Quarterly
9.King 3	22.9954	-27.8496	-	Assmang	Water Levels	Quarterly
10.King 2	23.0012	-27.85562	-	Assmang	Water Levels	Quarterly
11.King 1	22.9881	-27.87321	-	Assmang	Water Levels	Quarterly
12.BKM 1	23.0146	-27.77299	-	Assmang	Water Levels	Quarterly
13.BKM 3D	22.991	-27.88483	-	Assmang	Water Levels	Quarterly
14.PBW 01	22.9693	-27.84925	-	Assmang	Water Levels	Quarterly
15.Parsons 1	22.9848	-27.85842	-	Assmang	Water Levels	Quarterly
16.Parsons 8	22.9844	-27.85207	-	Assmang	Water Levels	Quarterly
17.Parsons 9	22.9849	-27.85231	-	Assmang	Water Levels	Quarterly
18.AGK2/87	22.9868	-27.8875	-	Assmang	Water Levels	Quarterly
19.AIK1/45	23.0011	-27.8858	-	Assmang	Water Levels	Quarterly
20.VK2/81	22.9837	-27.8695	-	Assmang	Water Levels	Quarterly
21.VK1/49	22.9827	-27.8677	-	Assmang	Water Levels	Quarterly
22.WK2/35	22.9959	-27.8672	-	Assmang	Water Levels	Quarterly
23.QK4/55	22.9959	-27.8636	-	Assmang	Water Levels	Quarterly
24.QK4/70	22.9985	-27.8641	-	Assmang	Water Levels	Quarterly
25.QK2/9	22.998	-27.857	-	Assmang	Water Levels	Quarterly
26.ZR3/24	23.0208	-27.808	-	Assmang	Water Levels	Quarterly
27.ABK2/42	22.9944	-27.8767	-	Assmang	Water Levels	Quarterly
28.ZR3/2	23.0198	-27.8072	-	Assmang	Water Levels	Quarterly
29.AMK1/47	22.9923	-27.8943	-	Assmang	Water Levels	Quarterly
30.AGK1/89	22.9832	-27.8871	-	Assmang	Water Levels	Quarterly
31.AAK2/45	22.9862	-27.8763	-	Assmang	Water Levels	Quarterly
32.WK4/70	22.999	-27.8728	-	Assmang	Water Levels	Quarterly
33.VK3/67A	22.9822	-27.8727	-	Assmang	Water Levels	Quarterly
34.KM3/24	23.0005	-27.8893	-	Assmang	Water Levels	Quarterly
35.ALK3/22	22.9796	-27.8979	-	Assmang	Water Levels	Quarterly
36.AKK4/26	22.9761	-27.8984	-	Assmang	Water Levels	Quarterly
37.ABK2/46	22.9964	-27.8767	-	Assmang	Water Levels	Quarterly
38.AAK3/27	22.9817	-27.8803	-	Assmang	Water Levels	Quarterly
39.ALK2/49	22.9878	-27.8948	-	Assmang	Water Levels	Quarterly
40.PBE01	22.9836	-27.8513	-	Assmang	Water Levels, Chemistry	Quarterly
41.PBW01	22.9617	-27.843	-	Assmang	Water Levels, Chemistry	Quarterly
42.PBW02	22.9618	-27.8587	-	Assmang	Water Levels, Chemistry	Quarterly
43.PBW03	22.9669	-27.8523	-	Assmang	Water Levels, Chemistry	Quarterly
44.PBW04	22.9585	-27.8692	-	Assmang	Water Levels, Chemistry	Quarterly
45.BKM1	23.0146	-27.7731	-	Assmang	Water Levels	Quarterly
46.BKM2	23.0185	-27.847	-	Assmang	Water Levels, Chemistry	Quarterly
47.BKM3D	22.9793	-27.8777	-	Assmang	Water Levels	Quarterly
48.BKM4	23.0265	-27.8674	-	Assmang	Water Levels	Quarterly

Table 9: Summary of proposed drilling sites for monitoring wells.

Farm	Location		Comments/Recommendations
	X	Y	
1.Roscoe Traverse 1	22.959499	-27.904714	Drill to 200 metres
2.Roscoe Traverse 1	22.959652	-27.904132	Drill to 200 metres
3.Roscoe Traverse 4	22.9225861	-27.917794	Drill to 200 metres
4.Roscoe Traverse 4	22.921821	-27.917160	Drill to 200 metres
5.Macarthy Traverse 3	23.050261	-27.910937	Drill to 200 metres
6.Macarthy Traverse 3	23.0501229	-27.910414	Drill to 200 metres
7.Macarthy Traverse 2	23.0412922	-27.939500	Drill to 200 metres
8.Macarthy Traverse 2	23.0418146	-27.939866	Drill to 200 metres

4.2 The date, time and monitoring point in respect of each sample taken shall be recorded together with the results of the analysis.

4.3 Monitoring points shall not be changed prior to notification to and written approval by the Regional Head.

4.4 An Aquatic Scientist approved by the Regional Head must establish a monitoring programme for the following indices: Invertebrate Habitat Assessment System (IHAS) and the latest SASS (South African Scoring System). Sampling must be done once during summer season and once during the winter season, annually, to reflect the status of the river upstream and downstream of the mining activities.

4.5 Analysis shall be carried out in accordance with methods prescribed by and obtainable from the South African Bureau of Standards (SABS), in terms of the Standards Act, 1982 (Act 30 of 1982).

4.6 The methods of analysis shall not be changed without prior notification to and written approval by the Minister.

4.7 A total of 95 boreholes were identified in the surrounding area during hydro-census, it is therefore, of utmost importance to ensure the proposed mining activities at Khumani Iron Ore Mine do not impact on the water quality and quantity of the area as all farms surrounding the site rely heavily on groundwater for both domestic and livestock watering purposes. Should the monitoring results indicate an impact on these groundwater users, the applicant must ensure in advance that alternative water supply is provided.

4.8 Groundwater monitoring programme must be updated incorporating proposed additional boreholes and forwarded to this Department within six month of issuance of the licence.

4.9 Groundwater model must be calibrated as more information becomes available. This will add significant value in terms of groundwater management and better understanding of the aquifer behaviour.

5. WATER RESOURCE PROTECTION

5.1 The impact of the activities of the mine waste water quality containment facilities shall not exceed the groundwater quality objectives detailed in Table 10 in the water quality reserve for the area.

Table 10: Water resource quality objectives of D41J groundwater.

Substance/parameter	Limit
pH	7.95
Electrical conductivity (Ec) in mS/m	71.50
Chlorides (Cl) in mg/l	33.66
Sulphate (SO_4) in mg/l	24.55
Sodium (Na) in mg/l	20.88
Calcium (Ca) in mg/l	68.48
Magnesium (Mg) in mg/l	41.39
Nitrate and Nitrate (NO_3 and NO_2) in mg/l	2.29
Fluoride (mg/l)	0.23
Total Alkalinity ($CaCO_3$) mg/l	307.79

5.2 The Gamagara River located in the study area is an important water resource. Reasonable and sound groundwater protection measures are required to ensure that no cumulative pollution affects the river and the aquifer, even in the long term.

5.3 Diesel tanks must be placed in a bunded area and oil detection system must be installed to prevent the chemicals from reaching groundwater resources resulting in groundwater pollution.

5.4 It is evident from the report that the mine is situated in a dolomitic area. Dolomite aquifers are known to be highly vulnerable to pollution and difficult to remediate. There is possibility of sinkholes and cavities development, therefore; dolomite instability must be investigated and a dolomite risk management plan must be established within one year of issuance of this licence.

6. REPORTING (REVIEW)

6.1 The Licensee shall update the water and salt balance annually and calculate the loads of waste emanating from the activities. The Licensee shall determine the contribution of their activities to the mass balance for the water resource and must furthermore co-operate with other water users in the catchment to determine the mass balance for the water resource reserve compliance point.

6.2 The Licensee shall submit the report on results of analysis after monitoring requirements to the Regional Head on a quarterly basis under Reference number 27/2/2/C192/111/1.

7. STORM WATER MANAGEMENT

7.1 Storm water leaving the Licensee's premises shall in no way be contaminated by any substance, whether such substance is a solid, liquid, vapour or gas or a combination thereof which is produced, used, stored, dumped or spilled on the premises.

7.2 Increase runoff due to vegetation clearance and/or soil compaction must be managed, and steps must be taken to ensure that storm water does not lead to bank instability and excessive levels of silt entering the stream.

7.3 Storm-water shall be diverted from the mine complex site and roads and shall be managed in such a manner as to disperse runoff and concentrating the storm-water flow.

7.4 Where necessary, works must be constructed to attenuate the velocity of any storm-water discharge and to protect the banks of the affected watercourses.

7.5 Storm-water control works must be constructed, operated and maintained in a sustainable manner throughout the impacted area.

7.6 Increased runoff due to vegetation clearance and/or soil compaction must be managed, and steps must be taken to ensure that storm-water does not lead to bank instability and excessive levels of silt entering the streams.

7.7 All storm-water that would naturally run across the pollution areas shall be diverted via channels and trapezoidal drains designed to contain the 1:50 year flood.

7.8 The polluted storm water system shall be designed and implemented to provide suitable routing and pumping capacity for contaminated storm water from the individual facilities to the respective storm water dams in accordance with the design specifications as contained in the Integrated Water Use License Application report.

7.9 The polluted storm water captured in the storm water control dams shall be pumped to the process water treatment plant for re-use and recycling.

8. PLANT AREAS AND CONVEYANCES

8.1 Pollution caused by spills from the conveyances must be prevented through proper maintenance and effective protective measures especially near all stream crossings.

8.2 All reagent storage tanks and reaction units must be supplied with a bunded area built to the capacity of the facility and provided with sumps and pumps to return the spilled material back into the system. The system shall be maintained in a state of good repair and standby pumps must be provided.

8.3 Any hazardous substances must be handled according to the relevant legislation relating to the transport, storage and use of the substance.

8.4 Any access roads or temporary crossings must be:

8.4.1 Non-erosive, structurally stable and shall not induce any flooding or safety hazard and
8.4.2 Be repaired immediately to prevent further damage.

9. ACCESS CONTROL

9.1 Strict access procedures must be followed in order to gain access to the property.

9.2 Access to the pollution control dams, coal slurry discard dumps, storm water dam and return water dam must be limited to authorised employees of the Licensee and their contractors only.

9.3 Notices prohibiting unauthorised persons from entering the controlled access areas as well as internationally acceptable signs indicating the risks involved in case of an unauthorised entry must be displayed along the boundary fence of these areas.

10 CONTINGENCIES

10.1 Accurate and up-to-date records shall be kept of all system malfunctions resulting in non-compliance with the requirements of this licence. The records shall be available for inspection by the Regional Head upon request. Such malfunctions shall be tabulated under the following headings with a full explanation of all the contributory circumstances:

10.1.1 Operating errors.
10.1.2 Mechanical failures (including design, installation or maintenance).
10.1.3 Environmental factors (e.g. flood).
10.1.4 Loss of supply services (e.g. power failure).
10.1.5 Other causes.

10.2 The Licensee must, within 24 hours, notify the Regional Head of the occurrence or potential occurrence of any incident which has the potential to cause, or has caused water pollution, pollution of the environment, health risks or which is a contravention of the licence conditions.

10.3 The Licensee must, within 14 days, or a shorter period of time, as specified by the Regional Head, from the occurrence or detection of any incident referred above, submit an action plan, which must include a detailed time schedule, to the satisfaction of the Regional Head of measures taken to:

10.3.1 Correct the impacts resulting from the incident.
10.3.2 Prevent the incident from causing any further impacts.
10.3.3 Prevent a recurrence of a similar incident.

11. AUDITING

11.1 The Licensee shall conduct an annual internal audit on compliance with the conditions of this licence. A report on the audit shall be submitted to the Regional Head within one month of finalisation of the report, and shall be made available to an external auditor should the need arise.

11.2 The Licensee shall appoint an independent external auditor to conduct an annual audit on compliance with the conditions of this licence. The first audit must be conducted within 6 (six) months of the date this licence is issued and a report on the audit shall be submitted to the Regional Head within one month of finalisation of the report.

12. INTEGRATED WATER AND WASTE MANAGEMENT

12.1 The Licensee must do an Integrated Water and Waste Management Plan (IWWMP) and submit it to the Regional Head for approval within one (1) year from the date of issuance of this licence.

12.2 The IWWMP and RSIP shall thereafter be updated and submitted to the Regional Head for approval, annually.

12.3 The Licensee must, at least 180 days prior to the intended closure of any facility, or any portion thereof, notify the Regional Head of such intention and submit any final amendments of the IWWMP and RSIP as well as a final Closure Plan, for approval.

12.4 The Licensee shall make full financial provision for all investigations, designs, construction, operation and maintenance for a water treatment plant should it become a requirement as a long-term water management strategy.

APPENDIX VI

Section 21 (j) of the Act: Removing, discharging or disposing of water found underground if it is necessary for the continuation of an activity or for safety of people (2008 Water Use Licence Authorisation).

1. REMOVING WATER FOUND UNDERGROUND.

1.1 The Licensee is authorised to remove a total volume of four hundred and thirty two thousand cubic metres per annum (432 000 m^3/a) of water found underground from King/Bruce pits based on average of one thousand two hundred cubic metres per day (1 200 m^3/d) for disposal into Pollution Control Dams and for mining purpose or for treatment before being discharged into Gamagara River.

1.2 Should the water authorised to be removed in terms of Appendix VI of this licence be required for storage and mining, the Licensee shall also apply and obtain a Section 21 (a) water use as defined in the National Water Act, Act No 36 of 1998 before commencement of the Section 21 (j) water use.

1.3 Should the water authorised to be removed in terms of Appendix VI of this licence be required to be treated and discharged into Gamagara River, the Licensee shall also apply and obtain a Section 21 (f) water use as defined in the National Water Act, Act No 36 of 1998 before commencement of the Section 21 (j) water use.

1.4 Water use authorised in terms of Appendix VI of this licence shall only commence when mining intersects groundwater, which is expected to occur in 2027. The Regional Head must be notified of the date dewatering will commence.

1.5 No more water shall be removed for dewatering than the minimum required for effective dewatering.

1.6 The quantity of water removed underground must be metered and recorded on a daily basis.

1.7 The groundwater levels shall be monitored every month.

1.8 Self registering flow metres must be installed in the delivery lines at easily accessible positions near the points of abstraction.

1.9 The flow metering devices shall be maintained in a sound state of repair and calibrated by a competent person at intervals of not less than once in two years. Calibration certificates shall be available for inspection by the Regional Head or his/her representative upon request.

1.10 Calibration certificates in respect of the pumps must be submitted to the Regional Head after installation thereof and thereafter at intervals of two years.

1.11 The Licensee must routinely check if the pumps are in a working order. A contingency plan should be in place in cases of failure of pumps.

THIS LICENCE SUPRECEDES LICENCE NO.719242 DATED 21 NOVEMBER 2008.

[END OF LICENCE]

Annexure 4: Title Deeds

Property Enquiry Details

Property enquiry results for "kuruman RD, 544" in the Deeds Registry at "VRYBURG "

Property detail:

Deeds registry	VRYBURG
Property type	FARM
Farm name	BRUCE
Farm number	544
Portion	0 (REMAINING EXTENT)
Province	NORTHERN CAPE
Registration division/Administrative district	KURUMAN RD
Local authority	KALAHARI SDR
Previous description	-
Diagram deed number	FT2375-KQ3/15
Extent	2346.8639 H
LPI Code	C04100000000054400000

Title Deeds detail:

Document	Registration date	Purchase date	Amount	Microfilm reference	Document copy?
T349/1954	19540511	-	-	-	Not available

Owners detail:

Document	Full name	Identity Number	Share	Person Enquiry?
T349/1954	ASSMANG LTD	193500734306	-	Yes

Endorsements / Encumbrances:

Endorsement / Encumbrance	Holder	Amount	Microfilm reference	Document copy?
EX12/1983	-	-	-	Not available
EX15/1978-T349/1954	-	-	-	Not available

EX15/1980-T349/1954	-	-	-	Not available
EX16/1980-T349/1954	-	-	-	Not available
K125/1976S	-	-	-	Not available
K14/1970S	-	-	-	Not available
K18/1970S	-	-	-	Not available
K20/1966S	-	-	-	Not available
K32/1978S	-	-	-	Not available
K35/2008RM	ASSMANG LTD	-	-	Not available
K36/1965S	-	-	-	Not available
K39/1976S	-	-	-	Not available
K41/1966S	-	-	-	Not available
K72/1976S	-	-	-	Not available
KAART NR OD 1555	-	-	-	Not available
VORIGE GROOTTE 2442,	8322HA	-	-	Not available

History:

Document	Holder	Amount	Microfilm reference	Document copy?
T349/1954	ASSOCIATED MANGANESE MINES OF SOUTH AFRICA LTD	-	-	Not available

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Requested by **A0013901** with user reference **dm** on: Thursday, 05 March 2009 15:53

DeedsWeb Version 4.0.0

Property Enquiry Details

Property enquiry results for "kuruman rd, 560" in the Deeds Registry at "VRYBURG "

Property detail:

Deeds registry	VRYBURG
Property type	FARM
Farm name	MOKANING
Farm number	560
Portion	1
Province	NORTHERN CAPE
Registration division/Administrative district	KURUMAN RD
Local authority	KALAHARI SDR
Previous description	-
Diagram deed number	T440/1936
Extent	652.3696 M
LPI Code	C04100000000056000001

Title Deeds detail:

Document	Registration date	Purchase date	Amount	Microfilm reference	Document copy?
T572/1968	19680717	-	-	-	Not available

Owners detail:

Document	Full name	Identity Number	Share	Person Enquiry?
T572/1968	ASSMANG LTD	193500734306	-	Yes

Endorsements / Encumbrances:

Endorsement / Encumbrance	Holder	Amount	Microfilm reference	Document copy?
EX1/1966	-	-	-	Not available
EX51/1974	-	-	-	Not available
K70/1979S	-	-	-	Not available

K8/1965RM	-	-	-	Not available
K9/1975S	-	-	-	Not available

History:

Document	Holder	Amount	Microfilm reference	Document copy?
T572/1968	ASSOCIATED MANGANESE MINES OF SOUTH AFRICA LTD	-	-	Not available

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Requested by **A0013901** with user reference **dm** on: Thursday, 05 March 2009 15:57

DeedsWeb Version 4.0.0

Property Enquiry Details

Property enquiry results for "kuruman rd, 560" in the Deeds Registry at "VRYBURG "

Property detail:

Deeds registry	VRYBURG
Property type	FARM
Farm name	MOKANING
Farm number	560
Portion	2
Province	NORTHERN CAPE
Registration division/Administrative district	KURUMAN RD
Local authority	KALAHARI SDR
Previous description	-
Diagram deed number	T441/1936
Extent	326.1869 M
LPI Code	C04100000000056000002

Title Deeds detail:

Document	Registration date	Purchase date	Amount	Microfilm reference	Document copy?
T572/1968	19680717	-	-	-	Not available

Owners detail:

Document	Full name	Identity Number	Share	Person Enquiry?
T572/1968	ASSMANG LTD	193500734306	-	Yes

Endorsements / Encumbrances:

Endorsement / Encumbrance	Holder	Amount	Microfilm reference	Document copy?
K35/2008RM	ASSMANG LTD	-	-	Not available

K70/1979S	-	-	-	Not available
K8/1965RM	-	-	-	Not available
K9/1975S	-	-	-	Not available
KAART NR OD 1891	-	-	-	Not available

History:

Document	Holder	Amount	Microfilm reference	Document copy?
T572/1968	ASSOCIATED MANGANESE MINES OF SOUTH AFRICA LTD	-	-	Not available

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Requested by **A0013901** with user reference **dm** on: Thursday, 05 March 2009 15:58

DeedsWeb Version 4.0.0

Property Enquiry Details

Property enquiry results for "kuruman rd, 560" in the Deeds Registry at "VRYBURG "

Property detail:

Deeds registry	VRYBURG
Property type	FARM
Farm name	MOKANING
Farm number	560
Portion	3
Province	NORTHERN CAPE
Registration division/Administrative district	KURUMAN RD
Local authority	KALAHARI SDR
Previous description	-
Diagram deed number	T442/1936
Extent	652.3733 M
LPI Code	C04100000000056000003

Title Deeds detail:

Document	Registration date	Purchase date	Amount	Microfilm reference	Document copy?
T572/1968	19680717	-	-	-	Not available

Owners detail:

Document	Full name	Identity Number	Share	Person Enquiry?
T572/1968	ASSMANG LTD	193500734306	-	Yes

Endorsements / Encumbrances:

Endorsement / Encumbrance	Holder	Amount	Microfilm reference	Document copy?
K35/2008RM	ASSMANG LTD	-	-	Not available

K70/1979S	-	-	-	Not available
K8/1965RM	-	-	-	Not available

History:

Document	Holder	Amount	Microfilm reference	Document copy?
T572/1968	ASSOCIATED MANGANESE MINES OF SOUTH AFRICA LTD	-	-	Not available

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Requested by **A0013901** with user reference **dm** on: Thursday, 05 March 2009 15:59

DeedsWeb Version 4.0.0

Property Enquiry Details

Property enquiry results for "KURUMAN RD, 561" in the Deeds Registry at "VRYBURG "

Property detail:

Deeds registry	VRYBURG
Property type	FARM
Farm name	KING
Farm number	561
Portion	0 (REMAINING EXTENT)
Province	NORTHERN CAPE
Registration division/Administrative district	KURUMAN RD
Local authority	KALAHARI SDR
Previous description	-
Diagram deed number	FT2287-KQ3/6A
Extent	2320.3077 H
LPI Code	C04100000000056100000

Title Deeds detail:

Document	Registration date	Purchase date	Amount	Microfilm reference	Document copy?
T349/1954	19540511	-	-	-	Not available

Owners detail:

Document	Full name	Identity Number	Share	Person Enquiry?
T349/1954	ASSMANG LTD	193500734306	-	Yes

Endorsements / Encumbrances:

Endorsement / Encumbrance	Holder	Amount	Microfilm reference	Document copy?
EX15/1978-T349/1954	-	-	-	Not available

EX24/1968-T349/1954	-	-	-	Not available
EX6/1981-T349/1954	KAAPSE PROVINSIALE ADMINISTRASIE DEPARTEMENT VAN PAAIE	-	-	Not available
I-1067/1992LG-T349/1	954	-	-	Not available
KAART NR OD 4846	-	-	-	Not available
VORIGE GROOTTE 2325,	9672HA	-	-	Not available

History:

Document	Holder	Amount	Microfilm reference	Document copy?
T349/1954	ASSOCIATED MANGANESE MINES OF SOUTH AFRICA LTD	-	-	Not available

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Requested by **A0013901** with user reference **dm** on: Thursday, 05 March 2009 15:56

DeedsWeb Version 4.0.0

Property Enquiry Details

Property enquiry results for "kuruman rd, 564" in the Deeds Registry at "VRYBURG "

Property detail:

Deeds registry	VRYBURG
Property type	FARM
Farm name	PARSON
Farm number	564
Portion	0 (REMAINING EXTENT)
Province	NORTHERN CAPE
Registration division/Administrative district	KURUMAN RD
Local authority	KALAHARI SDR
Previous description	-
Diagram deed number	FT2044-VQ18/10
Extent	1878.8259 H
LPI Code	C04100000000056400000

Title Deeds detail:

Document	Registration date	Purchase date	Amount	Microfilm reference	Document copy?
T193/2006	20060127	20050818	R5101641.00	-	Not available

Owners detail:

Document	Full name	Identity Number	Share	Person Enquiry?
T193/2006	ASSMANG LTD	193500734306	-	Yes

Endorsements / Encumbrances:

Endorsement / Encumbrance	Holder	Amount	Microfilm reference	Document copy?
I-1656/1981C-K58/197	7PC	-	-	Not available
I-2432/1996-B284/199	1	-	-	Not available

I-2433/1996-T70/1988	-	-	-	Not available
K25/2001RM	SISHEN IRON ORE COMPANY PTY LTD	-	-	Not available
KAART NR OD 1935	-	-	-	Not available

History:

Document	Holder	Amount	Microfilm reference	Document copy?
B284/1991	-	-	-	Not available
B982/1999	-	-	-	Not available
T70/1988	MORIA BOERDERY CC	-	-	Not available
T70/1988	MORIA BOERDERY CC	-	-	Not available

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Requested by **A0013901** with user reference **dm** on: Tuesday, 14 April 2009 11:11

DeedsWeb Version 4.0.1

Property Enquiry Details

Property enquiry results for "kuruman rd, 564" in the Deeds Registry at "VRYBURG "

Property detail:

Deeds registry	VRYBURG
Property type	FARM
Farm name	PARSON
Farm number	564
Portion	2 (REMAINING EXTENT)
Province	NORTHERN CAPE
Registration division/Administrative district	KURUMAN RD
Local authority	KALAHARI SDR
Previous description	-
Diagram deed number	T371/1938
Extent	426.8606 H
LPI Code	C04100000000056400002

Title Deeds detail:

Document	Registration date	Purchase date	Amount	Microfilm reference	Document copy?
T3907/2005	20050803	20040923	R1500000.00	-	Not available

Owners detail:

Document	Full name	Identity Number	Share	Person Enquiry?
T3907/2005	ASSMANG LTD	193500734306	-	Yes

Endorsements / Encumbrances:

Endorsement / Encumbrance	Holder	Amount	Microfilm reference	Document copy?
K61/1994RM	-	-	-	Not available
K72/1990RM	-	-	-	Not available
K9/1985RM	-	-	-	Not available

KAART NR OD 4826	-	-	-	Not available
VORIGE GROOTTE 428,2	678HA	-	-	Not available

History:

Document	Holder	Amount	Microfilm reference	Document copy?
B923/1996	ABSA BANK LTD	R71000.00	-	Not available
B124/2004	-	-	-	Not available
T71/1985	ZYL PETRONELLA JACOBA DAWLINA	-	-	Not available
T71/1985	ZYL STEFANUS ADRIAAN VAN	-	-	Not available
T2995/1995	EERSTE BEGIN BOERDERY CC	R80000.00	-	Not available

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Requested by **A0013901** with user reference **dm** on: Tuesday, 14 April 2009 11:12

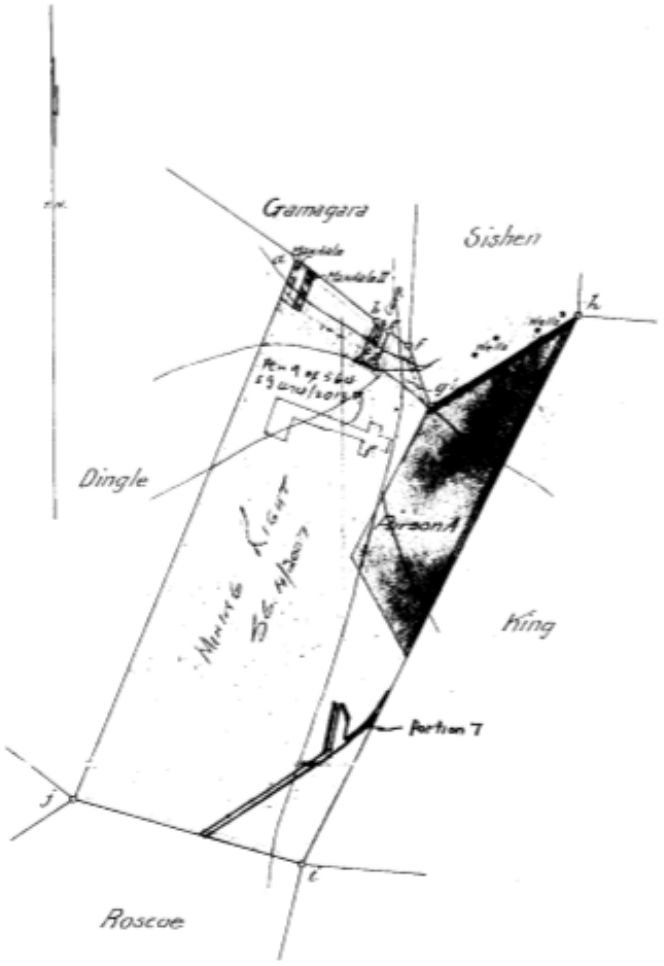
DeedsWeb Version 4.0.1

V. 9. 18-10

The numerical data of this diagram are sufficiently consistent.
No. 7153. 1898.

V: 9 18-10

Examiner.



Sides.

a b =	351·19	C.R.
b c =	144·09	"
c d =	64·73	"
d e =	180·28	"
e f =	88·01	"
f g =	214·53	"
g h =	596·67	"
h i =	2105·54	"
i j =	918·15	"
j a =	2004·48	"

Angles.

a =	74°	56′	10″
b =	104	20	10
c =	269	58	30
d =	270	16	0
e =	76	27	20
f =	146	56	50
g =	281	55	0
h =	32	15	20
i =	100	46	50
j =	68	30	30

Co-ordinates.

	Y		X
a =	−3164·93	=	4608·45
b =	−2889·30	=	4726·02
~~c = −2967·79 = 4857·71~~			
d =	−2897·79	=	4879·98
e =	−2845·34	=	4760·72
f =	−2779·40	=	4812·77
g =	−2710·76	=	5016·02
h =	−2197·75	=	4712·89
i =	−3159·14	=	6586·15
j =	−3944·06	=	6355·55

THE FARM Parson No. 564

KURUMAN

LANGEBERG Confiscated Lands

~~For subdivisions of this diagram see sheet~~ V. 1 II-10.

SCALE 400 CAPE ROODS—1 INCH

The above Diagram lettered a b c d e f g h i j represents 2735 morgen 139 sq. roods of CROWN LAND, being Lot No. 46 called **PARSON** situate in the Field Cornetcy No. 12 Division of VRYBURG.

Bounded NE. by Gamagara and Sishen and Police Camp
S. by Roscoe
SE. by King, and Police Camp
NW. by Dingle and Sishen and Police Camp

C 6/6

Beacons pointed out to

Framed from actual survey by me.

Government Land Surveyor.

M.4352.
5733.

I certify that this diagram belongs to the title deed this day issued in favour of P. B. J. Swanepoel

Surveyor-General's Office.
17/8/1905

W. P. Rickard
for acting Surveyor-General

For list of

OFFSET-AREA:

±15km WEST

Watermeyer No.789

SISHEN No.543
REMAINDER

PORTION No. 5
(Owned by Kumba, but we have the Mining Rights)

PORTION No. 1
(Kumba)

PORTION No. 2

SEKGAME
REMAINDER

PORTION No. 1
(Kumba)

PORTION No. 4

BRUCE NO.544
REMAINDER

SISHEN No.543
PORTION 1

LYLYVELD No.545
REMAINDER

GAMAGARA No.541
PORTION 2

Portion 2 LYLYVELD NO.545

N 14

Kuruman

Portion 3 BRUCE NO.544

Portion 8 BRUCE NO.544

Remainder BRUCE NO.544

Portion 7 BRUCE NO.544

REMAINDER

Portion 6 KING NO.561

Portion 3 KING NO.561

Remainder KING NO.561

Portion 5 KING NO.561

Portion 7 KING NO.561

Portion 1 KING NO.561

Portion 10 KING NO.561

Portion 8 PARSONS NO.564

Portion 8 KING NO.561

Remainder KING NO.561

Portion 6 PARSONS NO.564

SISHEN No.543
PORTION 24

PORTION No. 5

PORTION No. 4

No.693

Portion No.9

DINGLE No.565
REMAINDER

PARSON No.564
REMAINDER OF PORTION No. 2

Portion 2 KING NO.561

Remainder KING NO.561

Portion 10 KING NO.561

Portion 9 KING NO.561

KING NO.561
REMAINDER

DEMANENG No.546
PORTION No.2

MASHWENING No.557
REMAINDER

PARSON No.564
REMAINDER

Remainder KING NO.561

MASHWENING No.557
PORTION No.4
(Rust en vrede)

KING NO.561

Portion 10 KING NO.561

PORTION No. 10

MOKANING No.560

PORTION No. 3

PORTION No. 1

PARSON NO.564 Portion 1

Portion 4 KING NO.561

PARSON No.564
REMAINDER

REMAINDER

PORTION No.6
(a Portion of Portion No.1)

Portion 8 MOKANING NO.560

HELPBIETJIE No.738

PORTION No. 2

N 14

Olifantshoek

Portion 7 MOKANING NO.560

PORTION No. 1

PORTION No. 4

REMAINDER

HELPBIETJIE No.738
(Waterkoning)

Portion 5 MOKANING NO.560

REMAINDER

Portion 2
(Vlakwater)

Portion 1
(Mooihoek)

ROSCOE No.563
REMAINDER

KADGAME No.558
PORTION No.4

JENKINS No.562
REMAINDER

Mc'CARTHY No.559
REMAINDER

Mc'CARTHY No.559

KADGAME No.558
REMAINDER

Postmasburg

PORTION No.1
(Boskop)

PORTION No.2

LEGEND:

- KHUMANI MINING RIGHTS
- KHUMANI SURFACE RIGHTS
- OWNED BY TRANSNET (Khumani has no Mining Rights)
- TRANSNET HAS THE SURFACE RIGHTS
- OWNED BY SANRAL (Khumani has no Mining Rights)
- FARM BOUNDARIES
- FARM PORTION BOUNDARIES
- EXISTING RAILWAY LINES
- DECOMMISSIONED RAILWAY LINES

ASSMANG IRON ORE KHUMANI MINE
Assmang Limited
Khumani Iron Ore Mine
Private Bag X503
Kathu
8446
Tel : (053) 723-8000

ASSMANG LIMITED
KHUMANI IRON ORE MINE

DRAWING DESCRIPTION

KHM_SURVEY_218 - Servitude Information

PLAN

Date:
February 2017

Annexure 5: Stakeholder Consultation

Database

I&AP Database: Application for an Environmental Authorisation for a Basic Assessment Process at **KHUMANI IRON ORE MINE**, near Kathu, Northern Cape

SECTOR	CONTACT PERSON	TELEPHONE/MOBILE	EMAIL	COMMENT
Local Authority: Mgcawu District Municipality	Municipal Mayor	054 337 2800	admin@zfm-dm.gov.za	
Local Authority: Gamagara Local Municipality	Municipal Mayor	053 723 6000	info@gamagara.gov.za	
Local Authority: Tsantsabane Local Municipality	Municipal Mayor	053 313 7300	mm@tsantsabane.gov.za	
Local Authority Tsantsabane Local Municipality	S Henge	053 313 7300	solomzi.henge@gmail.com	
Provincial Authority	SAN PARKS: H Bezuidenhout:	053 832 5488	hugob@sanparks.org	
Provincial Authority	H.F. Harding	053 562 0015	harding@wol.co.za	
Provincial Authority	M Matthews	053 773 1239	Marmatza@gmail.com	
Provincial Authority	Dept of Water Affairs: Ms L Mokhoantle		mokhoantle@dwa.gov.za	
Provincial Authority	M Ramakulukusha	053 773 1239	mramakulukusha@yahoo.com	
Landowner and Adjacent Landowners King 561, Portion RE	ASSMANG			
Landowner and Adjacent Landowner Mokaning 260, Portion 1	ASSMANG			
Landowner and Adjacent Landowner:	ASSMANG			

SECTOR	CONTACT PERSON	TELEPHONE/MOBILE	EMAIL	COMMENT
Parson 564, Portion RE				
Landowner and Adjacent Landowner: Bruce 544. Portion RE	ASSMANG – Dirk Coetzee		Dirk.coetzee@assmang.co.za	
Interested and Affected Parties	Adele - Heritage Contracts and Archaeological Consulting CC	082 974 6301	contracts.heritage@gmail.com	BID was submitted to Adele as per her e-mail.
Interested and Affected Parties	Alfrede Markram	083 998 4001	amarkram0@gmail.com	Please can you register me as an interested and affected party and provide me with a copy of the BID. Mr Markram was registered on the project database and a copy of the BID was submitted.
Interested and Affected Parties	M van der Merwe	053 313 2462	mornem@botken.co.za	
Interested and Affected Parties	Mr Cornelissen	053 724 2129	wright@polka.co.za	
Interested and Affected Parties	Ms W Swart		wilna@host4u.co.za	
Interested and Affected Parties	N Steyn	053 331 0973	steynkathu@gmail.com	
Interested and Affected Parties	Mr Makgoka		cindsmak@ovi.com	
Interested and Affected Parties	Mr Pienaar		noordkaapprimer@gmail.com	
Interested and Affected Parties	J Rossouw	0710303903	jrossouw3@gmail.com	

SECTOR	CONTACT PERSON	TELEPHONE/MOBILE	EMAIL	COMMENT
Interested and Affected Parties	Mr G Steenkamp	053 739 3824	gert.steenkamp@angloamerican.com	
Interested and Affected Parties	Mr. Fourie	054 322 3642	macroplan@mweb.co.za	
Interested and Affected Parties	Ms T Anderson	083 2567402	spothil@gmail.com	
Parastatals	Transnet: Ms Sonia Munn	053 838 3039	sonia.munn@transnet.net	
Parastatals	André Bodenstein Geo-Spatial (Inland) Transnet Property	051-408 2111	andre.bodenstein@transnet.net	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. The information was submitted to Transnet
Parastatals	ESKOM: E Lennox		LennoxEC@eskom.co.za	Acknowledge receipt of email in order to submit comments
Parastatals	ESKOM: L Motsis		MotsisL@eskom.co.za	Acknowledge receipt of email in order to submit comments

BID

Assmang Limited:

BASIC ASSESSMENT PROCESS AT THE KHUMANI IRON ORE MINE, NEAR KATHU, NORTHERN CAPE PROVINCE

Background Information Document

Notice of Environmental Application in terms of The National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) amendments of 2017 (Regulation 326 and Regulation 327), the National Heritage Resources Act (Act No. 25 of 1999) (NHRA), and the National Water Act, 1998 (Act No. 36 of 1998) (NWA).

Notification Status:	Final
Applicant:	Assmang Limited
DMR Reference:	070MR
EnviroGistics Ref.:	**21707**
Date of Publication:	12 May 2017

Purpose of this Background Information Document

The purpose of this document is to:

- Provide all Interested and Affected Parties (I&APs) with information about the additional activities proposed at the Khumani Iron Ore Mine ,
- Introduce, explain and initiate the Public Participation Process that is prescribed by the National Environmental Management Act, 1998 (Act No.107 of 1998) (NEMA) and the Mineral and Petroleum Resources Development Act, Act 28 of 2002 (MPRDA)

We invite all I&APs to comment on:

- The environmental (bio-physical) and socio-economical environmental and/or considerations
- The proposed Public Participation Process to be followed
- The proposed Environmental Application Process being followed
- Any other suggestions, comments or recommendations.

PO Box 22014 | Helderkruin | 1733
tanja@envirogistics.co.za
082 412 1799
086 551 5233

Introduction

Assmang Limited - has lodged an application to initiate certain additional activities at the Khumani Iron Ore Mine. These will include the establishment of a Low-Grade ROM (Run of Mine) 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

The applicant is now required to prepare and submit a Basic Assessment and the associated Environmental Management Plan and undertake stakeholder consultation in accordance with the National Environmental Management Act, 1998 (Act No. 107 of 1998) ("NEMA"). The Department will review the Environmental Management Plan and the stakeholder consultation information prior to making a decision on whether to grant the Environmental Authorisation.

Project Location

The additional activities will be situated on the RE Portion of the Farm King 561, Portion 1 of the Farm Mokaning 260, RE Portion of the Farm Parson 564 and the RE of the Portion of the Farm Bruce 544. The application does not involve any mining or prospecting activities, but only additional listed activities within a Mining Rights Area.

The mine falls within two Local and District Municipalities within the Northern Cape Province. 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 farm's 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). The entrance to the Bruce Mine (part of Khumani Iron Ore) 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. The overall area applied for is approximately 38ha, of which 9.6ha forms part of the existing activities to be demolished.

Project Description

It is the intention of the mine to initiate certain additional activities on site. These will include the establishment of a Low Grade ROM (Run of Mine) 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.

The first project: 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 phased approach. Phase 1 will involve the processing of 700tph ROM through a sorter plant. Phase 2 will be the doubling-up of Phase 1, with the addition of another 700tph ROM along with a second sorter plant. During Phase 3, the -32mm size fraction will be processed.

The intention is to beneficiate a product which is currently not being processed by the current plant at Khumani Iron Ore Mine (KIOM). One of the aims at KIOM is to beneficiate as much product as possible and this particular project continues with the overall programme which includes the process applied for during 2015/2016, and which was approved as part of the February 2016 Environmental Management Programme (EMP).

In terms of the NEM:WA, 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 NEM:WA 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 to rework its Low Grade ROM Stockpiles on site through the approved February 2006 and the February 2016 EMPs and as a result a Waste Management License will not be required as the activity is lawful.

The second project: The mine will decommission the existing silos at King and Parson Mines. The purpose of the decommissioning is:

At King Mine, the Silos will be moved away from the mining infrastructure and encroaching mining activities. The new silos will be established on the Mokaning farm, which forms part of the King 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 with 200 cases at each magazine.

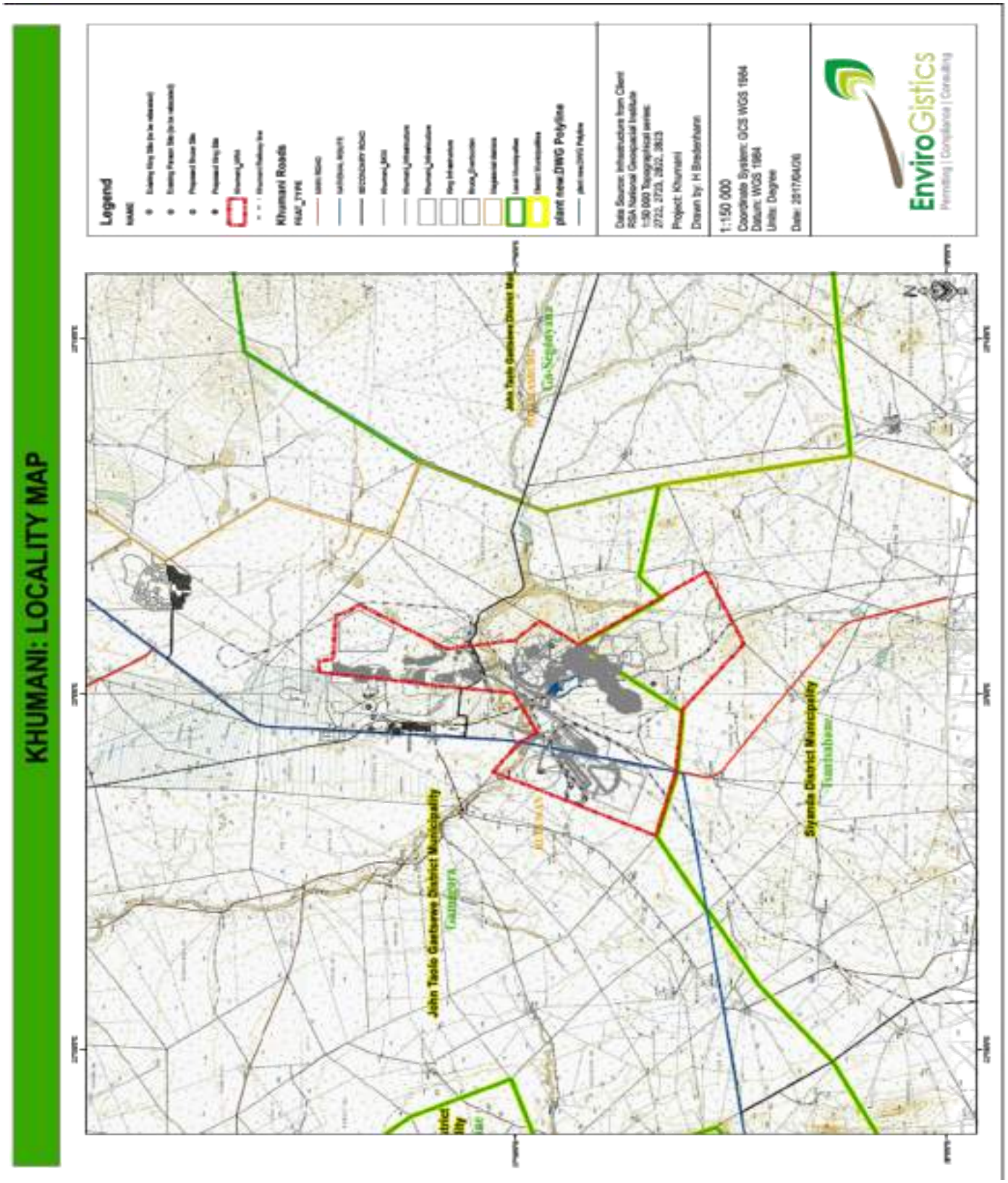


Figure 1: Khumani Locality Map

Required Authorisations

National Environmental Management Act, 1998

Section 16 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) requires, upon request by the Minister that an Environmental Management Plan be submitted and that the applicant must notify and consult with Interested and Affected Parties (I&APs). Section 24 of the NEMA requires that activities, which may impact on the environment must obtain an environmental authorisation from a relevant authority before commencing with the activities. Such activities are listed under Regulations Listing Notice 1 Government Notice Regulation 326 and Regulation 327 (dated April 2017) of NEMA. The proposed operations at Khumani triggers the following activities:

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

Environmental Authorisation Process and Required Reporting

Project Manager and Environmental Assessment Practitioner: EnviroGistics (Pty) Ltd

EAP: Ms. Tanja Bekker

Qualification: MSc. Environmental Management (RAU, now Johannesburg University)

Professional Registrations: Certified member of the EAPASA (October 2013); SACNASP: Pr.Sci.Nat. Reg No. 400198/09

Experience: 13 Years

The Purpose of an Environmental Impact Assessment Report and Management Plan

The National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) provides for the identification of listed activities in terms of Section 24. These activities are promulgated under Regulation 326 and Regulation 327 (dated April 2017). The listed activities require an environmental authorisation, granted by the competent authority prior to commencement of these activities. The impacts of any listed activities must be investigated, assessed and reported to the competent authority before authorisation to commence with such listed activities can be granted. These activities depending on the Listing Notice triggered may require either a Basic Assessment Process (for Listing Notice 1 and 3) or a full Environmental Impact Assessment (for Listing Notice 2).

The said project will trigger activities listed under Listing Notice 1 which makes provision for a Basic Assessment Process. The NEMA prescribes the processes to be followed when compiling the Basic Assessment and the Environmental Management Plan (EMP), in respect of listed activities that forms the legal basis of this authorisation.

The purpose of an Environmental Assessments is to predict the potential impacts associated with any project. These impacts can be both positive and negative. The assessment has to determine the most suitable management measures to reduce adverse impacts, develop project in consultation with all stakeholders and present the outcomes to the decision makers for consideration. The outcome of the assessment should define the Best Practical Environmental Option (BPEO), which is defined in the NEMA as “the option that provides the most benefit or causes the least damage to the environment as a whole, at a cost acceptable to society, in the long-term as well as in the short-term”.

Public Participation Process or Stakeholder Consultation

Purpose of Stakeholder Consultation

The purpose of the stakeholder consultation process is to:

- Engage with stakeholders as part of a process to identify the potential social and environmental impacts which may result from the planned activities.
- Develop an understanding of the views, concerns and expectations of stakeholders.
- Engage with stakeholders to determine the specific management requirements.

Stakeholder Consultation Process

The key objective of public participation during an Environmental Authorisation process is to assist stakeholders to identify issues of concern and suggestions for enhanced benefits, and to comment on the findings of the EIA. The Public Participation Process is an integral part of the EIA process, and continues throughout the EIA process, for this purpose the process is presented in a systematic approach:

- Step 1: Identify of Stakeholders and/or I&APs. Key stakeholders have been identified including:
  - Landowners and/or occupiers of affected land portions.
  - Landowners and/or occupiers located on land portions directly adjacent to the farms where the activities will take place.
  - Government bodies / organs of state that have jurisdiction over the area where the activities will take place.
  - Ward Councillors are consulted to ensure that host communities in proximity to the site are afforded the opportunity to participate.
  - The Department of Rural Development and Land Reform are contacted to confirm land claims and if applicable, land claimants will be registered as stakeholders.
  - Associations and non-governmental organisations that might have an interest in the area.
- Step 2: Notification of Stakeholder and or I&APs of the proposed project, via adverts, notices, BIDs to request these parties to register (please see the section on "Be an Integral Part of the Environmental Assessment Process").
- Step 3: All stakeholders are afforded the opportunity to share their views, raise concerns and clarify their expectations as it relates to the planned activities. Comments and concerns can be submitted in writing via email or fax to the details provided in this document. A written record of the stakeholder engagement process, the stakeholder comments and concerns will be compiled into a Report on Results of Consultation, and will be submitted to the DMR for consideration. All registered stakeholders will be provided with written feedback to address any questions and concerns.
- Step 4: I&APs are provided with the opportunity to review documents and comments on these. I&APs will be provided with 30 days to comment on the draft reports.
- Step 5: All registered stakeholders will be informed of the department's decision regarding whether an environmental authorisation was granted or not.

Be an Integral Part of the Environmental Impact Assessment Process

Public involvement is an essential part of any environmental assessment process. All comments will be recorded and presented to the project team and regulatory authorities. You will receive feedback on how your comments have been taken into account and the outcome of the assessment. You will further receive updates on the status of the project.

How to Register and get involved?

Parties wishing to register as Interested and Affected Parties ("I&APs"), who wish to participate by contributing comments, or require additional information, should please register or submit their correspondence in writing to BATHO EARTH Environmental Consulting. Please refer to the Registration Form attached. All relevant comments will be incorporated into a draft anf final Basic Assessment Report, which will be made available to all registered I&APs for review and comment.

Project Timeframes and Opportunities for Involvement

Action	On or Before	Comment
Register as a stakeholder	**5 May to 8 June 2017**	While care has been taken to I&APs, should there be other stakeholders you would like to be involved in the process, please send their details to the email address above
Review of Basic Assessment Report and Environmental Management Plan	**15 June 2017 to 14 July 2017**	All registered stakeholders will be afforded the opportunity to review and comment on the Draft Report.
Submit comments and concerns	**15 July 2017**	All comments and concerns submitted by this date will be accepted, responded to and included in the Report on Results of Consultation
Submit all received comments to the DMR.	**21 July 2017**	-

Registration Form

Name:		Surname:	
Title:		Initials:	
Organisation / interest:		Capacity (e.g. Chairperson):	
Postal / Residential address			
	Area:		Code:
Contact details	Tel:	( )	
	Fax:	( )	
	Mobile:	( )	
	Email:		

Please mark with an **X** to indicate whether you would like to participate in the process:						Yes / No
Preferred method of communication	Email		Fax		Post	
Date commented	(DD / MM / YYYY)					

What is your main area of interest with regard to the proposed project?

What are your points of concern or support for this project?

Please indicate in which aspects you would require more information

Please indicate the contact details of any I&APs whom you think should be contacted

Name:		Surname:	
Tel:	( )	Fax:	( )
Mobile:	( )	Email:	

In order to be registered as an I&AP for this project, fax, mail, or e-mail the completed registration form to BATHO EARTH:

Contact Details: Ms Diana Verster.
Postnet Private Suit 415, Private Bag x8, ELARDUSPARK, 0047
Fax: 087 807 4536
Mobile: 073 157 7362 (Diana)
E-mail: dianav@lantic.net

Thank you for your participation.

Advertisement

OLIFANTSHOEK

Escapee rearrested

The police in Olifantshoek have rearrested a 22-year-old burglary business suspect who escaped from holding cells.

The escapee, Brendon Ganya of 233 Diepkloof location in Olifantshoek was rearrested through information from the community after an appeal was made. The escapee's rearrest was welcomed by the Provincial Commissioner, Lieutenant General Risimati Peter Shivuri. The Provincial Commissioner thanked the community's assistance. He reiterated that the community's involvement in fighting crime cannot be overemphasised.

The suspect is expected to appear before Kathu Magistrates' Court on Monday, 08 May 2017 on a charge of escape from lawful custody and burglary business. Police investigations continue.

SAPS SAPD

KATHU

Dagga

The South African Police Service of Kathu is investigating a case of Possession of dagga after Constable Xavier Jantjies arrested a suspect in possession of dagga. Constable Jantjies was busy with patrol duties when he saw the suspect at the Shoprite parking area, and stopped and searched him. Allegedly he found a black silky pouch in the suspect's pocket. The suspect alleged that it is a cloth he is using for washing vehicles. Whilst Constable Jantjies was busy opening the bag, the suspect tried to run away but was caught again and was arrested for Possession of dagga, after 0.070 gr dagga was found in the bag. The case is still under investigation.

Possession of stolen goods

The South African Police Service of Kathu is investigating a case of Possession of possibly stolen goods. On Saturday 6 May 2017 at about 00:15, Warrant Officer Neville Ruiter and Seargeant Eugene Eilers of Kathu Crime Prevention Unit, were busy with patrol duties in Mapoteng area. At the back of the clinic in Mapoteng they saw two persons carrying a black and orange compressor and a 30m electrical cord with adapter. They stopped and asked them about the compressor and the two suspects were not able to give a reasonable explanation with regard to the compressor in their possession. They were both arrested for Possession of stolen goods, and appeared in court on Monday 8 May 2017. Investigation is still ongoing.

POSTMASBURG

TADS publieke vergadering

Mimi Swart

Die bestuur van TADS op Postmasburg. Vlnr : Mnre C Itweleng (Tesourier) en P Oliphant (Ondervoorsitter), K Matilo (Kolomelamyn), Me M Koloi (Kolomela), Me Marina de Lange (Direkteur Sanpark), Pastoor Mabe (Visesekretaris), Mnre W Potgieter (addisonele lid), Gerhardt Smith (addisionele lid), A Jonas (Sekretaris), Me M Makwene (Bestuurder) en heelagter Me H English (Voorsitter).

Op 8 Mei 2017 het die Tsantsabane Alcohol and Drug Services (TADS) 'n gemeenskapsvergadering vir die breë publiek in die stadsaal van Postmasburg gehou. Kennis van die vergadering is op verskeie wyses oor die hele gebied gekommunikeer.

TADS vier dié jaar sy derde bestaansjaar.

Mev Marina de Lange, die Direkteur van Sanpark Sentrum in Klerksdorp, wat gemoeid is met die voorkoming en behandeling van alkohol-en-dwelmafhanklikheid spesifiek in die Noord-Wesstreek, het die monitering van TADS in Postmasburg hanteer.

In 2011 het Kolomelamyn 'n konsultant aangestel en 'n sosio-impakstudie te onderneem. Na die behoefte bepaal is, is in vennootskap met SANCA Upington gegaan en later met Sanpark Klerksdorp. Met dié samewerking is 'n kantoor in Postmasburg in Julie 2013 begin en 'n interim komitee is saamgestel om dié inisiatief te aktiveer onder leiding en mentorskap van Sanpark.

Kolomelamyn, wat 'n belangrike rol gespeel het in die stigting van dié diens, was verteenwoordig deur Mnr Keabola Matilo. Hy het sy gelukwense uitgespreek in die poging tot voorkoming van 'n euwel wat die gemeenskap as 'n geheel bedreig.

'n Finansiële uiteensetting is voorgelê en verskeie persone het menings gelug oor moontlike leemtes wat nog bestaan en aandag regverdig. Kennis is geneem en antwoorde is deur die voorsitter, Me H English, verskaf.

Daar was 'n eenstemmige mening dat die drank- en-dwelmprobleem gesamentlike en daadwerklike optrede van 'n totale gemeenskap, kerke, die SAPD, maatskaplike instansies, skole en individue verg, aangesien dit 'n wesenlike en maatskaplike probleem geword het.

Gevalle van kinders wat weier om skool by te woon en desperate ouers wat bang vir hul kinders geword het, is ontstellend - 'n diepgaande ondersoek wat tot die kern van die euwel deurdring is aan almal gerig. Ook volwassenes wat met hierdie groot probleem worstel, moet inskakel vir die regte hulp en bystand. TADS moet genader word vir hulp. Hulle kantoor is geleë in Endstraat 713 (langs die hospitaal). Posbus 653 Postmasburg 8420 telefoonnommer 074 124 6428.

Daar was 'n algemene gevoel dat die behoefte om 'n sentrum te kry waar die bewaring en versorging van persone onder behandeling kan plaasvind, hoog op die prioriteitslys is.

APPLICATION FOR AN ENVIRONMENTAL AUTHORISATION FOR A BASIC ASSESSMENT PROCESS AT THE KHUMANI IRON ORE MINE, NEAR KATHU, NORTHERN CAPE PROVINCE

In terms of the: Mineral and Petroleum Resources Development Act, Act 28 of 2002 (MPRDA) - DMR Ref No: 070MR

INVITATION TO REGISTER AS AN INTERESTED AND AFFECTED PARTY

Project Background: Assmang Limited - has lodged an application to initiate certain additional activities at the Khumani Iron Ore Mine. These will include the establishment of a Low Grade ROM (Run of Mine) 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. The additional activities will be situated on the RE Portion of the Farm King 561, Portion 1 of the Farm Mokaning 260, RE Portion of the Farm Parson 564 and the RE of the Portion of the Farm Bruce 544. The application does not involve any mining or prospecting activities, but only additional listed activities within a Mining Rights Area.

The mine falls within two Local and District Municipalities within the Northern Cape Province. 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).The entrance to the Bruce Mine (part of Khumani Iron Ore) 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. The overall area applied for is approximately 38ha, of which 9.6ha forms part of the existing activities to be demolished.

Application for Environmental Authorization to undertake the following activities:

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

Regulatory Authority: Department of Mineral Resources (DMR), Kimberley, Northern Cape Province.

Notice is hereby given of a Public Participation Process in terms of:

- The National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) amendments of 2017 (Regulation 326 and Regulation 327), the National Heritage Resources Act (Act No. 25 of 1999) (NHRA), and the National Water Act, 1998 (Act No. 36 of 1998) (NWA).

Independent Environmental Consultant: EnviroGistics (Pty) Ltd.
Parties wishing to register as Interested and Affected Parties ("I&APs"), who wish to participate by contributing comments, or require additional information, should please register or submit their correspondence in writing. All relevant comments will be incorporated into the EIA Process, which will be made available to all registered I&APs for review.

Date of Publication of Advertisement: 05 May 2017

To register as an I&AP or obtain more information about the project, should please contact:
BathoEarth - Ms Diana Verster

Postnet Private Suit 415, Private Bag x8, ELARDUSPARK, 0047
Fax: 087 807 4536 / Mobile: 073 157 7362 (Diana)
E-mail: dianav@lantic.net

AANSOEK VIR N OMGEWINGSIMPAKSTUDIE VIR N BASIESE ASSESSERINGSPROSES BY DIE HUIDIGE KHUMANI YSTERERTS MYN, NABY KATHU, NOORD-KAAP PROVINSIE

Ingevolge die: Mineraal en Petroleum Hulpbronne Ontwikkelingswet, Wet No. 28 van 2002 ('MPRDA) - DMR Verw: 070MR

UITNODIGING OM TE REGISTREER SOOS 'N BELANGHEBBENDE EN GEAFFEKTEERDE PARTY

Projek Agtergrond: Assmang Beperk - het 'n aansoek ingedien om sekere bykomende aktiwiteite by die Khumani Ysterertsmyn in te stel. Dit sluit in die vestiging van 'n laergraad-ROM (Run of Mine) sorteringsplant suidwes van die bestaande Kingmynplant, die verwydering van die bestaande magasyne en silo's op die mynarea, en die vestiging van twee nuwe Silos / Magasyn-areas op die perseel.. Die addisionele aktiwiteite sal geleë word op die RE-gedeelte van die Plaas King 561, Gedeelte 1 van die Plaas Mokaning 260, RE Gedeelte van die Plaas Parson 564 en die RE van die Gedeelte van die Plaas Bruce 544. Die aansoek behels geen myn- of prospekteeraktiwiteite nie, maar slegs addisionele gelyste aktiwiteite binne die goedgekeurde Mynregte-gebied.

Die projek is geleë in die landdrosdistrik van John Taolo Gaetsewe en Siyanda Distriksmunisipaliteit onder die jurisdiksie van die Gamagara en Tsantsabane Plaaslike Munisipaliteit onderskeidelik, van die Noord-Kaap Provinsie. Die ingang van die Brucemyn (deel van Khumani-ystererts) en Parson Silo-toegangspad is onderskeidelik 16 km en 23 km suid van Kathu, met die ingang na Kingmyn ongeveer 13 km suid van Kathu. Die totale gebied waarvoor aansoek gedoen word, is ongeveer 38ha, waarvan 9.6ha deel uitmaak van die bestaande aktiwiteite wat gesloop moet word.

Aansoek om Omgewingsmagtiging om die volgende aktiwiteite te onderneem:

- NEMA Regeringskennisgewing 327, Noteringskennisgewing 1: GNR327 (Notering 1)
- Aktiwiteit 34: "Die uitbreiding of veranderinge aan bestaande fasiliteite vir enige proses of aktiwiteit waar sodanige uitbreiding of veranderinge sal lei tot die noodsaaklikheid van 'n permit of lisensie of 'n gewysigde permit of lisensie ingevolge nasionale of provinsiale wetgewing wat die vrystelling van emissies Of besoedeling "
- Aktiwiteit 24: "Die ontwikkeling van 'n pad - met 'n reserwe wyer as 13,5 meter, of waar geen reserwe bestaan waar die pad wyer as 8 meter is
- Aktiwiteit 56: "Die verbreding van 'n pad met meer as 6 meter of die verlenging van 'n pad met meer as 1 kilometer- (ii) waar geen reserwe bestaan nie, waar die bestaande pad groter as 8 meter is; Uitgesluit waar verbreding of verlenging plaasvind in stedelike gebiede.
- Aktiwiteit 27: "Die opruiming van 'n oppervlakte van 1 hektaar of meer, maar minder as 20 hektaar inheemse plantegroei ....."
- Aktiwiteit 14: "Die ontwikkeling en verwante bedryf van fasiliteite of infrastruktuur, vir die berging, of vir die berging en hantering van 'n gevaarlike goed, waar sodanige berging plaasvind in houers met 'n gesamentlike kapasiteit van 80 kubieke meter of meer, maar nie Meer as 500 kubieke meter "
- Aktiwiteit 13: Die uitdiensstelling van bestaande fasiliteite, strukture of infrastruktuur vir- (v) enige aktiwiteit, ongeag die tyd waarop die aktiwiteit begin het, waar sodanige aktiwiteit: a) op soortgelyke wyse gelys is vir 'n aktiwiteit in (i) [,] of li) [, of (iii)] hierbo; En b) is steeds in werking of ontwikkeling is nog aan die gang

Regulerende Owerheid: Departement van Minerale Hulpbronne (DMH), Noord-Kaap Provinsie.

Kennis word hiermee gegee van 'n gesamentlike Openbare Deelnameproses ingevolge:

- Die Nasionale Omgewingsbestuurswet, 1998 (Wet No. 107 van 1998) (NEMA) wysigings van 2017 (Regulasie 326 en Regulasie 327).

Onafhanklike Omgewingskonsultant: EnviroGistics (Pty) Ltd.

Partye wat wil registreer as Belanghebbende en Geaffekteerde Partye ("B & GPe"), wat wil deelneem deur kommentaar te lewer, of addisionele inligting benodig, moet hulle skriftelik registreer of hulle korrespondensie indien. Alle relevante kommentaar sal opgeneem word in die OIS-proses, wat beskikbaar gestel sal word aan alle geregistreerde B & GPe vir hersiening.

Datum van Publikasie van Advertensie: 05 Mei 2017

Om as 'n B & GP te registreer, of om meer inligting oor die projek te verkry, kontak asseblief:
BathoEarth
Ms Diana Verster

Postnet Private Suit 415, Privaatsak X8,
ELARDUSPARK, 0047
Faks: 087 807 4536
Sel: 073 157 7362 (Diana)
E-pos: dianav@lantic.net

Annexure 6: Ecological Study

HUDSON ECOLOGY PTY LTD
Reg. No. 2014/268110/07

P.O. Box 19287
Noordbrug
2522
South Africa
280 Beyers Naude Ave, Potchefstroom, 2531
Tel +27 (0) 18 2945448
Mobile +27 (0)82 344 2758
http://www.hudsonecology.co.za

HUDSON ECOLOGY
Quality, affordable ecological solutions

June 2017

REPORT ON

ECOLOGICAL BASELINE AND IMPACT ASSESSMENT REPORT FOR THE PROPOSED PLANT EXTENSION, PIPELINE ROUTE AND SILOS FOR THE KHUMANI IRON ORE MINE NEAR KATHU IN THE NORTHERN CAPE PROVINCE

Report Number: 2017/024/02/01

Submitted to:

Envirogistix Pty Ltd

P.O.Box 22014
Helderkruin
1733

DISTRIBUTION:

1 Copy - Envirogistix Pty Ltd

1 Copy – Hudson Ecology Pty Ltd Library

1 Copy – Project Folder

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Executive Summary

Hudson Ecology (Pty) Ltd was commissioned by Envirogistix Pty Ltd to conduct an ecological assessment of ecosystems associated with the proposed plant extension, pipeline routes and silo site of the Khumani Iron Ore Mine, south of Kathu in the Northern Cape Province.

Khumani Mine is proposing to extend their existing plant, lay additional water pipelines as well as erect additional silos at their mine in the Northern Cape Province, South Africa. The study area is situated approximately 10km south of the town of Kathu.

In order to obtain Environmental Authorisation for the proposed project, Khumani is required to conduct an Basic Assessment (BA) in terms of GN R. 982 of the National Environmental Management Act, 1998 (Act 107 of 1998) (as amended).

The proposed project will consist of approximately 8km of pipeline, most of which will be laid in the road reserve, and extension to the existing plant (approximately 10ha) and a silo (area of investigation approximately 13ha,but the silo footprint will be considerably smaller). For the purposes of this study a survey of the 23ha was conducted but the cumulative impacts determined, will take into account the entire existing development, as well as other similar developments in the area.

The objectives in this study can be summarised as follows:

1. Location of the proposed development;
2. Description of the policy and legislative context applicable to the proposed development;
3. Methodologies employed during the study;
4. Description of the receiving ecological environment; and
5. Description and mitigation of impacts associated with the development.

The scope of work for this project included:

- Review of existing literature on biodiversity of the area;
- A site investigation for the purposes of the study (conducted from the 11th to the 14th of April 2017); and
- Compilation of a baseline and impact assessment report comprising of the information described in the aims and objectives section above.

The proposed development area (study area) is situated approximately 15km, bearing 195° (South south-east) of the town of Kathu. The study area is straddles the N14 national road, and is bisected by the Gamagara River. The area investigated covers a total of approximately 20ha on the Khumani Mining Rights Area (Figure 1). The site falls within the 2722DD and 2723CC quarter degree grid squares. No alternative route is currently being considered for the proposed pipeline. It must be noted that the entire mining lease area will include approximately 9000ha, which will be included in the determination of the cumulative impacts.

Flora assessments were conducted during the latter part of the wet season (April 2017). Based on species composition, physiognomy, moisture regime, rockiness, slope and soil properties, six vegetation communities were recorded within the areas studied, namely:

1. *Tarchonanthus – Vachellia* Open Shrubland
2. *Vachellia mellifera* Thicket
3. Pan Vegetation
4. Floodplain Vegetation

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 (APPENDIX A). 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 (Table 11). 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 lowkey 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.

The impact assessment determined that seven main impacts are likely to occur due to the development, namely:

1. Vegetation clearing and subsequent loss of species of concern;
2. Spillage of harmful or toxic substances;
3. Disturbance of biodiversity due to vibration and noise;
4. Habitat degradation and fauna impacts due to dust;
5. Effects on local migrations;
6. Increased prevalence of exotic invasive species; and
7. Increased erosion.

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1 INTRODUCTION

Hudson Ecology (Pty) Ltd was commissioned by Envirogistix Pty Ltd to conduct an ecological assessment of ecosystems associated with the proposed plant extension, pipeline routes and silo site of the Khumani Iron Ore Mine, south of Kathu in the Northern Cape Province.

Khumani Mine is proposing to extend their existing plant, lay additional water pipelines as well as erect additional silos at their mine in the Northern Cape Province, South Africa. The study area is situated approximately 10km south of the town of Kathu.

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The proposed project will consist of approximately 8km of pipeline, most of which will be laid in the road reserve, and extension to the existing plant (approximately 10ha) and a silo (area of investigation approximately 13ha,but the silo footprint will be considerably smaller). For the purposes of this study a survey of the 23ha was conducted but the cumulative impacts determined, will take into account the entire existing development, as well as other similar developments in the area.

2 LEGISLATIVE CONTEXT

This section provides a brief overview of both the national and international requirements that must be met by this report. It includes international conventions and agreements, as well as the IFC Standards and the Equator Principles.

2.1 National Environmental Management Act

This report has been prepared in terms the EIA Regulations 2014 (South Africa, 2014) promulgated under the National Environmental Management Act No. 107 of 1998 (NEMA) and is compliant with Regulation 982. Specialist reports and reports on specialised processes under the Act. Relevant clauses of the above regulation are quoted below and reflect the required information in the ―Control sheet for specialist report‖ given above.

Appointment of EAPs and specialists

12. (1) A proponent or applicant must appoint an EAP at own cost to manage the application.

(2) In addition to the appointment of an EAP, a specialist may be appointed, at the cost of the proponent or applicant, if the level of assessment is of a nature requiring the appointment of a specialist.

(3) The proponent or applicant must

(a) take all reasonable steps to verify whether the EAP and specialist complies with regulation 13(1)(a) and (b); and

(b) provide the EAP and specialist with access to all information at the disposal of the proponent or applicant regarding the application, whether or not such information is favourable to the application.

General requirements for EAPs and specialists

13. (1) An EAP and a specialist, appointed in terms of regulation 12(1) or 12(2), must-

(a) be independent;

(b) have expertise in conducting environmental impact assessments or undertaking specialist work as required, including knowledge of the Act, these Regulations and any guidelines that have relevance to the proposed activity;

(c) ensure compliance with these Regulations;

(d) perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the application;

(e) take into account, to the extent possible, the matters referred to in regulation 18 when preparing the application and any report, plan or document relating to the application; and

(f) disclose to the proponent or applicant, registered interested and affected parties and the competent authority all material information in the possession of the EAP and, where applicable, the specialist, that reasonably has or may have the potential of influencing-

(i) any decision to be taken with respect to the application by the competent authority in terms of these Regulations; or

(ii) the objectivity of any report, plan or document to be prepared by the EAP or specialist, in terms of these Regulations for submission to the competent authority; unless access to that information is protected by law, in which case it must be indicated that such protected information exists and is only provided to the competent authority.

(2) In the event where the EAP or specialist does not comply with subregulation (1)(a), the proponent or applicant must, prior to conducting public participation as contemplated in chapter 5 of these Regulations, appoint another EAP or specialist to externally review all work undertaken by the EAP or specialist, at the applicant's cost.

(3) An EAP or specialist appointed to externally review the work of an EAP or specialist as contemplated in subregulation (2), must comply with subregulation (1).

In terms of Appendix 6 of the Regulations (South Africa, 2014) the specialist report must contain:

(a) details of-

(i) the specialist who prepared the report; and

(ii) the expertise of that specialist to compile a specialist report including a curriculum vitae;

(b) a declaration that the specialist is independent in a form as may be specified by the competent authority;

(c) an indication of the scope of, and the purpose for which, the report was prepared;

(d) the date and season of the site investigation and the relevance of the season to the outcome of the assessment;

(e) a description of the methodology adopted in preparing the report or carrying out the specialised process;

(f) the specific identified sensitivity of the site related to the activity and its associated structures and infrastructure;

(g) an identification of any areas to be avoided, including buffers;

(h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;

(i) a description of any assumptions made and any uncertainties or gaps in knowledge;

(j) a description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives on the environment;

(k) any mitigation measures for inclusion in the EMPr;

(l) any conditions for inclusion in the environmental authorisation;

(m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;

(n) a reasoned opinion-

(i) as to whether the proposed activity or portions thereof should be authorised; and

(ii) if the opinion is that the proposed activity or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;

(o) a description of any consultation process that was undertaken during the course of preparing the specialist report;

(p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto.

2.2 Further South African legislation considered in the compilation of this report

2.2.1 National Environmental Management Act, Act No. 107 of 1998 (NEMA)

NEMA requires, inter alia, that:

- Development must be socially, environmentally, and economically sustainable;
- Disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimised and remedied; and
- A risk-averse and cautious approach is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions.

NEMA states that ―the environment is held in public trust for the people, the beneficial use of environmental resources must serve the public interest and the environment must be protected as the people's common heritage.‖

2.2.2 Environment Conservation Act No 73 of 1989 Amendment Notice No R1183 of 1997 (ECA)

The ECA states that:

Development must be environmentally, socially, and economically sustainable. Sustainable development requires the consideration of inter alia the following factors:

- That pollution and degradation of the environment is avoided, or, where they cannot be altogether avoided, are minimised and remedied;
- That the use and exploitation of non-renewable natural resources is responsible and equitable, and takes into account the consequences of the depletion of the resource;
- That the development, use and exploitation of renewable resources and the ecosystems of which they are part do not exceed the level beyond which their integrity is jeopardised; and
- That negative impacts on the environment and on peoples'environmental rights be anticipated and prevented, and where they cannot be altogether prevented are minimised and remedied.

The developer is required to undertake Environmental Impact Assessments (EIA) for all projects listed as a Schedule 1 activity in the EIA regulations in order to control activities which might have a detrimental effect on the environment. Such activities will only be permitted with written authorisation from a competent authority.

2.2.3 National Forests Act (Act no 84 of 1998)

2.2.3.1 Protected trees

According to this act, the Minister may declare a tree, group of trees, woodland or a species of trees as protected. The prohibitions provide that no person may cut, damage, disturb, destroy or remove any protected tree, or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a licence granted by the Minister'.

2.2.3.2 Forests

Prohibits the destruction of indigenous trees in any natural forest without a licence.

2.2.4 National Environmental Management: Biodiversity Act (Act No 10 of 2004)

In terms of the Biodiversity Act, the developer has a responsibility for:

- The conservation of endangered ecosystems and restriction of activities according to the categorisation of the area (not just by listed activity as specified in the EIA regulations).
- Promote the application of appropriate environmental management tools in order to ensure integrated environmental management of activities thereby ensuring that all development within the area are in line with ecological sustainable development and protection of biodiversity.
- Limit further loss of biodiversity and conserve endangered ecosystems.

2.2.5 Conservation of Agricultural Resources (Act No. 43 of 1983) as amended in 2001

Declared Weeds and Invaders in South Africa are categorised according to one of the following categories:

- Category 1 plants: are prohibited and must be controlled.
- Category 2 plants: (commercially used plants) may be grown in demarcated areas providing that there is a permit and that steps are taken to prevent their spread.
- Category 3 plants: (ornamentally used plants) may no longer be planted; existing plants may remain, as long as all reasonable steps are taken to prevent the spreading thereof, except within the floodline of watercourses and wetlands.

2.2.6 National Water Act

Wetlands, riparian zones, and watercourses are defined in the Water Act as a water resource and any activities that are contemplated that could affect the wetlands requires authorisation (Section 21 of the National Water Act of 1998). A "watercourse" in terms of the National Water Act (act 36 of 1998) means:

- River or spring;
- A natural channel in which water flows regularly or intermittently;
- A wetland, lake or dam into which, or from which, water flows; and

Any collection of water which the Minister may, by notice in the gazette, declare to be a watercourse, and a reference to a watercourse includes, where relevant, its bed and banks.

2.2.7 The Northern Cape Nature Conservation Act No. 9 of 2009

The Northern Cape Nature Conservation Act No. 9 of 2009 (NCNCA) legislates, provincially, on issues concerning permiting, provincially threatened or protected species andinvasive species, relative to this study.

2.3 Key authorities for the EIA application

The DEA will be the final decision-making authority for the environmental authorisation process, which is being undertaken in terms of the NEMA.

2.4 International Conventions and Agreements

Relevant environmental and social international conventions and agreements to which South Africa is a party are presented in Table 1.

Table 1: Relevant international conventions to which South Africa is a party Convention Summary of objectives or relevant conditions South African Status

Convention	Summary of objectives or relevant conditions	South AfricanStatus
CITES Convention (1 July 1975)	CITES (the Convention on International Trade in Endangered Species of Wild Fauna and Flora) is an international agreement between governments. Its aim is to ensure that international trade in specimens of wild animals and plants does not threaten their survival.	Party to

Convention on Biological Diversity (29 December 1993)	Develop strategies, plans or programs for conservation and sustainable use of biological diversity or adapt for this purpose existing strategies, plans or programs which shall reflect, inter alia, the measures set out in this Convention.	Party to.
Convention on Wetlands of International Importance (Ramsar) (21 December 1975)	To stem the progressive encroachment and loss of wetlands now and in the future.	Party to.
United Nations Convention to Combat Desertification (26 December 1996)	To combat desertification and mitigate the effects of drought through national action programs.	Party to.
Stockholm Convention on Persistent Organic Pollutants (POPs) (17 May 2004)	This convention seeks to ban the production and use of persistent organic chemicals but allow the use of some of these banned substances, such as DDT, for vector control.	Party to.

3 AIMS AND OBJECTIVES

The aim of this study was to provide a description of the receiving ecological environment, which may be impacted upon by the proposed project, and identify possible ecological issues and red flags associated with the ecology of the study area and surrounds.

The objectives in this study can be summarised as follows:

8. Location of the proposed development;
9. Description of the policy and legislative context applicable to the proposed development;
10. Methodologies employed during the study;
11. Description of the receiving ecological environment; and
12. Description and mitigation of impacts associated with the development.

4 SCOPE OF WORK

The scope of work for this project included:

- Review of existing literature on biodiversity of the area;
- A site investigation for the purposes of the study (conducted from the 11th to the 14th of April 2017); and
- Compilation of a baseline and impact assessment report comprising of the information described in the aims and objectives section above.

5 STUDY AREA

The proposed development area (study area) is situated approximately 15km, bearing 195° (South south-east) of the town of Kathu. The study area is straddles the N14 national road, and is bisected by the Gamagara River. The area investigated covers a total of approximately 20ha on the Khumani Mining Rights Area (Figure 1). The site falls within the 2722DD and 2723CC quarter degree grid squares. No alternative route is currently being considered for the proposed pipeline. It must be noted that the entire mining lease area will include approximately 21000ha, which will be included in the determination of the cumulative impacts.

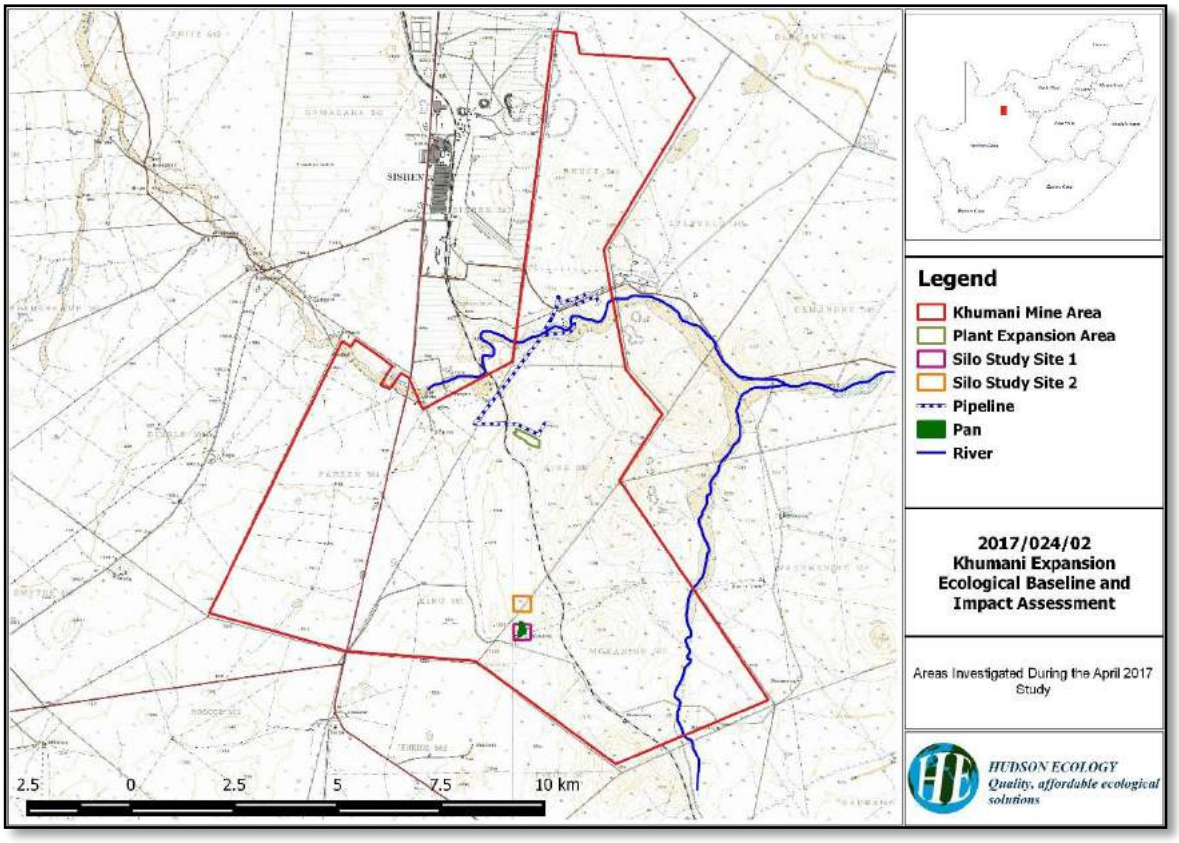


Figure 1: Locality of the study area

6 METHODOLOGY

6.1 Desktop review of relevant documentation

A number of literature sources were reviewed for the purposes of this report. These include, *inter alia*, vegetation descriptions, field guides and atlases for the various flora and fauna taxa, and scientific articles in order to determine species lists for the area. Previous studies conducted in the area and scientific online literature.

6.2 Methodologies

Nine study sites were selected within the study area (Figure 2).These study sites were chosen to correspond with the following aspects of the study:

1. Five sites within the plant expansion area;
2. One site at each of the pipeline routes traversing semi-natural habitat; and
3. One site at each of the silo sites.

. In order to enable a characterization of the environment, as well as floral and faunal species that may be impacted by the proposed construction activities, faunal and floral groups were investigated. These species were then used in order to determine the possible magnitude of the impact of the proposed activities. The following taxa were investigated:

1. Vegetation;
2. Arthropoda;
3. Herpetofauna (Reptiles);

4. Amphibia;
5. Avifauna; and
6. Mammalia.

All methods implemented during this investigation are based on accepted scientific investigative techniques and principles, and were performed to accepted standards and norms, whilst taking the limitations of this investigation into consideration. The Precautionary Principle (COMEST, 2005) was applied throughout the assessments.

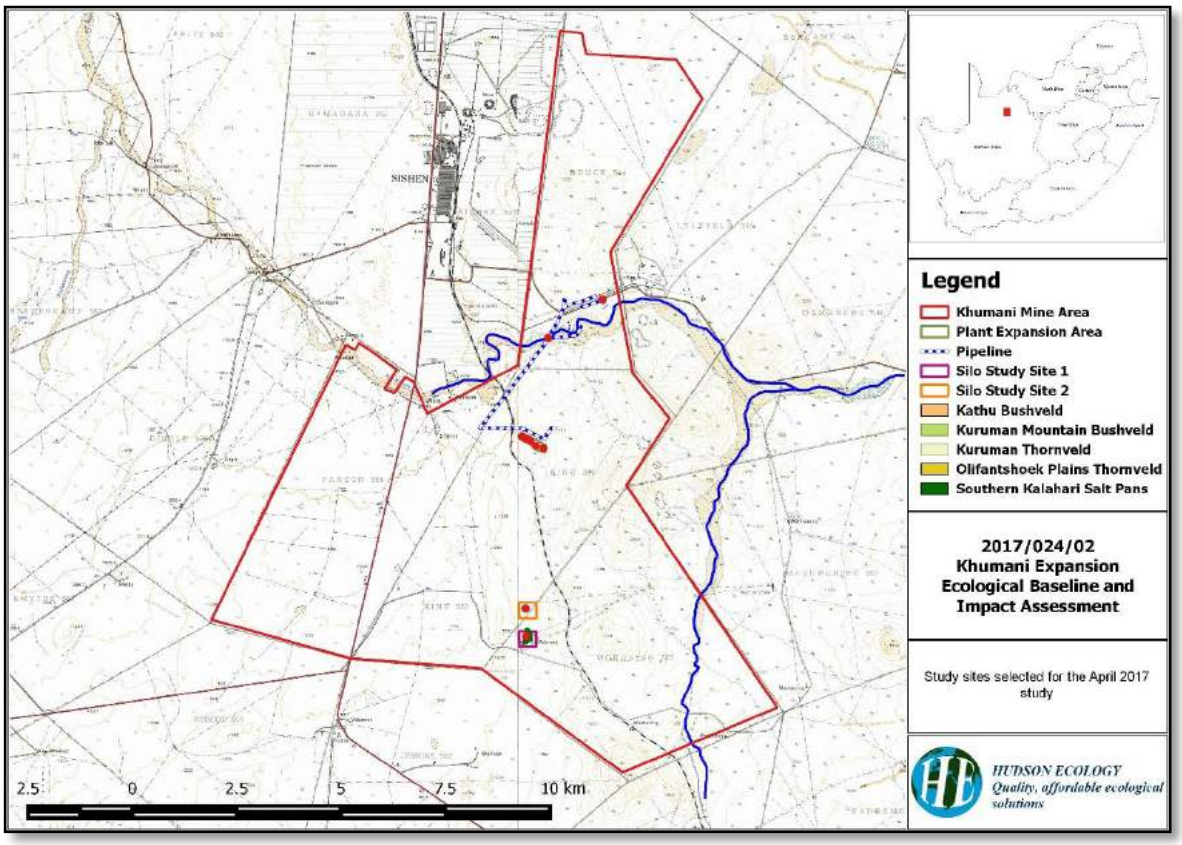


Figure 2: Terrestrial ecology study sites (TESS)

6.2.1 General Floristic Attributes

The vegetation assessment was based on a variation of the Braun-Blanquet method (Mueller-Dombois & Ellenberg, 1974; Westhoff & Van der Maarel, 1978) whereby vegetation is stratified, by means of aerial or satellite imagery with physiognomic characteristics as a first approximation. Stratification was further augmented by sites being selected to represent each of the areas that will be impacted by the current development footprint. Representative areas within these stratifications are then surveyed by means of line-point transects for grasses, sedges and forbs, as well as belt transects for shrubs and trees. Data obtained from these surveys are then subject to analysis to establish differences or similarities between observed units. Results and species lists provided should be interpreted with the above mentioned survey limitations in mind.

During the floral surveys conducted during the April 2017 survey, cognisance was taken of the following environmental attributes and general information:

- Biophysical environment (geology, topography, aspect, slope etc.);
- Regional vegetation;

- Current status of habitats;
- Red Data habitat suitability;
- Digital photographs; and
- GPS reference points.

Phytosociological data accumulated include the following:

- Plant species and growth forms;
- Dominant plant species;
- Cover abundance values; and
- Samples or digital images of unidentified plant species.

The statistical analysis of data was used to establish differences or similarities between vegetation communities, which were then described in terms of floristic species composition as well as driving environmental parameters. Results and species lists provided should be interpreted with the abovementioned survey limitations in mind.

6.2.2 Red Data Floral Assessment

- Compared data collected during the surveys and the IUCN Red Data plant species list, South African Threatened and Protected species (TOPS) list and NCNCA lists of protected species, to compile a list of plant species of concern that may potentially occur within the study area and that were recorded in the study area.
- A survey of this kind (instantaneous sampling bout or "snapshot" investigations) poses limitations to the identification of Red Data plant species. Therefore, emphasis was placed on the identification of habitat that would be suitable for sustaining Red Data plant species, by associating available habitat to known habitat requirements of Red Data plant species.

6.2.3 Floristic Sensitivity Analysis

Floristic sensitivity analysis was determined by taking two factors into account namely ecological function and conservation importance. This sensitivity was quantified by subjectively assessing the ecological function and conservation importance of the vegetation. These were defined as follows:

Ecological Function:

- High ecological function: Sensitive ecosystems with either low inherent resistance or resilience towards disturbance factors or highly dynamic systems considered to be stable and important for the maintenance of ecosystems integrity (e.g. pristine grasslands, pristine wetlands and pristine ridges);
- Medium ecological function: Relatively important ecosystems at gradients of intermediate disturbances. An area may be considered of medium ecological function if it is directly adjacent to sensitive/pristine ecosystem; and
- Low ecological function: Degraded and highly disturbed systems with little or no ecological function.

Conservation Importance:

- High conservation importance: Ecosystems with high species richness and usually provide suitable habitat for a number of threatened species. Usually termed 'no-go' areas and unsuitable for development, and should be protected;
- Medium conservation importance: Ecosystems with intermediate levels of species diversity without any threatened species. Low-density development may be allowed, provided the current species diversity is conserved; and

- Low conservation importance: Areas with little or no conservation potential and usually species poor (most species are usually exotic).

The Precautionary Principle was applied throughout this investigation (COMEST, 2005).

6.2.4 General Faunal Attributes

6.2.4.1 Arthropoda

At each of the study sites, active searching for arthropods was conducted. Picker, et al. (2002) was used as a field guide for arthropod species.

6.2.4.2 Reptilia

Suitable areas were identified and sampled using active search and capture methods, searches were concentrated in rocky areas and disused ant hills were investigated for the presence of snakes. Snakes and other reptiles are identified visually and only captured if visual identification was hampered by swift-moving snakes or if the snake was obscured from view. Branch (1996) and Broadley (1971) were used as identification guides, where necessary.

6.2.4.3 Amphibia

Suitable areas for frogs were sampled by means of active search and capture and acoustic identification methods, especially at night when highest amphibian activity is expected. Du Preez and Carruthers (2009) was used to confirm identification, where necessary.

6.2.4.4 Avifauna

Avifauna were surveyed by means point counts (Bibby, et al., 1993) and visual identification and the calls of bird species were used to identify species. Wherever possible, visual identification was used to confirm call identifications. Bird ranges were confirmed using Harrison *et al* (1997). Other guides were also utilised (Hockey, et al., 2005) (BirdLife International, 2000) (Sinclair & Ryan, 2003)

6.2.4.5 Mammalia

Visual sightings and ecological indications were used to identify the small mammal inhabitants of the study area. Scats, spoor and signs of presence were also utilised for identification of nocturnal small mammals. A number of reference sources *inter alia* Stuart and Stuart (2007) and Smithers (1983) were used for identification purposes.

6.2.5 Red Data Faunal Assessment

The following parameters were used to assess the Probability of Occurrence of each Red Data species:

- Habitat requirements (HR) – Most Red Data animals have very specific habitat requirements and the presence of these habitat characteristics in the study area was evaluated;
- Habitat status (HS) – The status or ecological condition of available habitat in the area is assessed. Often a high level of habitat degradation prevalent in a specific habitat will negate the potential presence of Red Data species (this is especially evident in wetland habitats); and
- Habitat linkage (HL) – Movement between areas for breeding and feeding forms an essential part of the existence of many species. Connectivity of the study area to surrounding habitat and the adequacy of these linkages are evaluated for the ecological functioning of Red Data species within the study area.

Probability of occurrence is presented in four categories, namely:

- Low;
- Medium;
- High; and
- Recorded.

In order to assess the status of fauna species of concern in the study area, the following sources were used:

- IUCN Red List Categories and Criteria (IUCN, 2001);
- IUCN Red List of Threatened Species (IUCN, 2011); and
- South African Threatened and Protected species (TOPS) list (Republic of South Africa, 2004).

7 IMPACT ASSESSMENT METHODOLOGY

7.1 Determination of Impacts

The Environmental Impact Assessment methodology that has been used in the evaluation of the overall effect of a proposed activity on the environment includes an assessment of the significant direct, indirect, and cumulative impacts. The significance of environmental impacts is to be assessed by means of the criteria of extent (scale), duration, magnitude (severity), probability (certainty) and direction (negative, neutral or positive).

The nature of the impact refers to the causes of the effect, what will be affected and how it will be affected.

Significance (S) - Rating of low, medium or high. Significance is determined through a synthesis of the characteristics described above where:

$$\boldsymbol{S = (E + D + M) \times P}$$

The significance weighting should influence the development project as per Table 2.

Table 2: Significance ratings of impacts and influence on the project

Significance	Influence on the project
Low significance (significance weighting: <30 points)	If the negative impacts have little real effects, it should not have an influence on the decision to proceed with the project. In such circumstances, there is a significant capacity of the environmental resources in the area to respond to change and withstand stress and they will be able to return to their pre-impacted state within the short-term.
Medium significance (significance weighting: 30 – 60 points)	If the impact is negative, it implies that the impact is real and sufficiently important to require mitigation and management measures before the proposed project can be approved. In such circumstances, there is a reduction in the capacity of the environmental resources in the area to withstand stress and to return to their pre-impacted state within the medium to long-term.
High significance (significance weighting: >60 points)	The environmental resources will be destroyed in the area leading to the collapse of the ecosystem pattern, process and functioning. The impact strongly influences the decision whether or not to proceed with the project. If mitigation cannot be effectively implemented, the proposed activity should be terminated.

The extent (E) of the impact indicates the spatial scale, of the impact in question, in relation to the development site. The rating scores of the extent of an impact are given in Table 3:

Table 3: Ratings for the extent (E) of impacts

Extent of impact	Rating Score
Development site only	1
Local (within 5km of development site)	2
Regional	3
National	4
Global	5

The duration (D) of the impact indicates the temporal scale, of the impact in question. The rating scores of the extent of an impact are given in Table 4:

Table 4: Ratings for the duration (D) of impacts

Duration	Rating Score
Very short term – up to 1 year	1
Short term – >1 – 5 years	2
Moderate term - >5 – 15 years	3
Long term – >15 years	4
Permanent	5

Magnitude (M) describes the severity of the impact in question. The ratings scores for the severity of an impact are given in Table 5:

Table 5: Ratings for the magnitude (M) of impacts

Magnitude	Rating Score
Small impact – the ecosystem pattern, process and functioning are not affected	0
Minor impact - a minor impact on the environment and processes will occur	2
Low impact - slight impact on ecosystem pattern, process and functioning	4
Moderate intensity – valued, important, sensitive or vulnerable systems or communities are negatively affected, but ecosystem pattern, process and functions can continue albeit in a slightly modified way	6
High intensity – environment affected to the extent that the ecosystem pattern, process and functions are altered and may even temporarily cease. Valued, important, sensitive or vulnerable systems or communities are substantially affected	8
Very high intensity – environment affected to the extent that the ecosystem pattern, process and functions are completely destroyed and may permanently cease	10

Probability (P) describes the probability or likelihood of the specific impact actually occurring, and is rated as shown in Table 6:

Table 6: Ratings for the duration (D) of impacts

Probability (P)	Rating Score
Very improbable – where the impact will not occur, either because of design or because of historic experience	1
Improbable – where the impact is unlikely to occur (some possibility), either because of design or historic experience	2
Probable - there is a distinct probability that the impact will occur (<50% chance of occurring)	3
Highly probable - most likely that the impact will occur (50 – 90% chance of occurring)	4
Definite – the impact will occur regardless of any prevention or mitigating measures (>90% chance of occurring).	5

7.2 Determination of cumulative impacts

The assessment of cumulative impacts is required in terms of Regulations 2 (c) and 3 (j) of Appendix 3 of the EIA Regulations 2014.

"Cumulative Impact", in relation to an activity, means the past, current and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity that, in itself, may not be significant, but may become significant when added to existing and reasonably foreseeable impacts eventuating from similar or diverse activities.

The role of the cumulative assessment is to test if such impacts are relevant to the proposed project in the proposed location (i.e. whether the addition of the proposed project in the area will increase the impact). This section should address whether the proposed development will result in:

1. Unacceptable risk
2. Unacceptable loss
3. Complete or wholescale changes to the environment or sense of place
4. Unacceptable increase in impact

7.3 Determination of Mitigation Measures

A common approach to describing mitigation measures for critical impacts is to specify a range of targets with a predetermined acceptable range and an associated monitoring and evaluation plan. To ensure successful implementation, mitigation measures will be unambiguous statements of actions and requirements that are practical to execute. The following summarise the different approaches that will be used in prescribing and designing mitigation measures:

7.3.1 Avoidance

Mitigation by not carrying out the proposed action on the specific site, but rather on a more suitable site.

7.3.2 Minimization

Mitigation by scaling down the magnitude of a development, reorienting the layout of the project or employing technology to limit the undesirable environmental impact.

7.3.3 Rectification

Mitigation through the restoration of environments affected by the action.

7.3.4 Reduction

Mitigation by taking maintenance steps during the course of the action.

7.3.5 Offsetting

Mitigation by identification of an alternative site with similar attributes that can be protected in order to ensure a gain of biodiversity after all mitigation measures have been implemented..

8 ASSUMPTIONS AND LIMITATIONS

- Accuracy of the maps, ecosystems, routes and desktop assessments were made using Google earth and converting the .kml files to .shp files and are subject to the accuracy of Google Earth imagery with some loss of accuracy during the conversion process;
- GPS co-ordinates are accurate to within 10m and lines drawn on maps can only be assumed to be accurate to within a distance of 100m;
- Data obtained from published articles, reference books, field guides, official databases or any other official published or electronic sources are assumed to be correct and no review of such data was undertaken by Hudson Ecology Pty Ltd;
- Satellite imagery obtained was limited to imagery on Google Earth, thus the ability to accurately map vegetation communities was limited;

- Time and budget constraints do not allow for an intensive survey of the entire study area, and as with any survey of this kind, rare and cryptic species may be overlooked during the study; and
- Every possible precaution was taken to reduce the effect of the above-mentioned limitations on the data collected for this study.
- The fact that a species or Red Data species is not recorded during a survey cannot support the assumption that the species in question does not occur in the area, it can only indicate a decreased probability of the species occurring in the area. This is particularly pertinent if the species has been recently or historically recorded in the area; and
- Ecological studies should be undertaken over a number of seasons in order to obtain long term ecological data. Studies are usually conducted in this way in order to eliminate the effects of unusual climatic conditions or other unusual conditions prevailing at the study area during the time of study. The results of this study are based on a literature review and a single wet season field survey, conducted in early March 2016.

9 RESULTS

This section provides a discussion of the terrestrial ecology baseline environment and context in which the proposed project will take place.

9.1 Physical Setting

According to Musina and Rutherford (2006), The Khumani Mine falls within four vegetation types (Figure 3) 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 3).

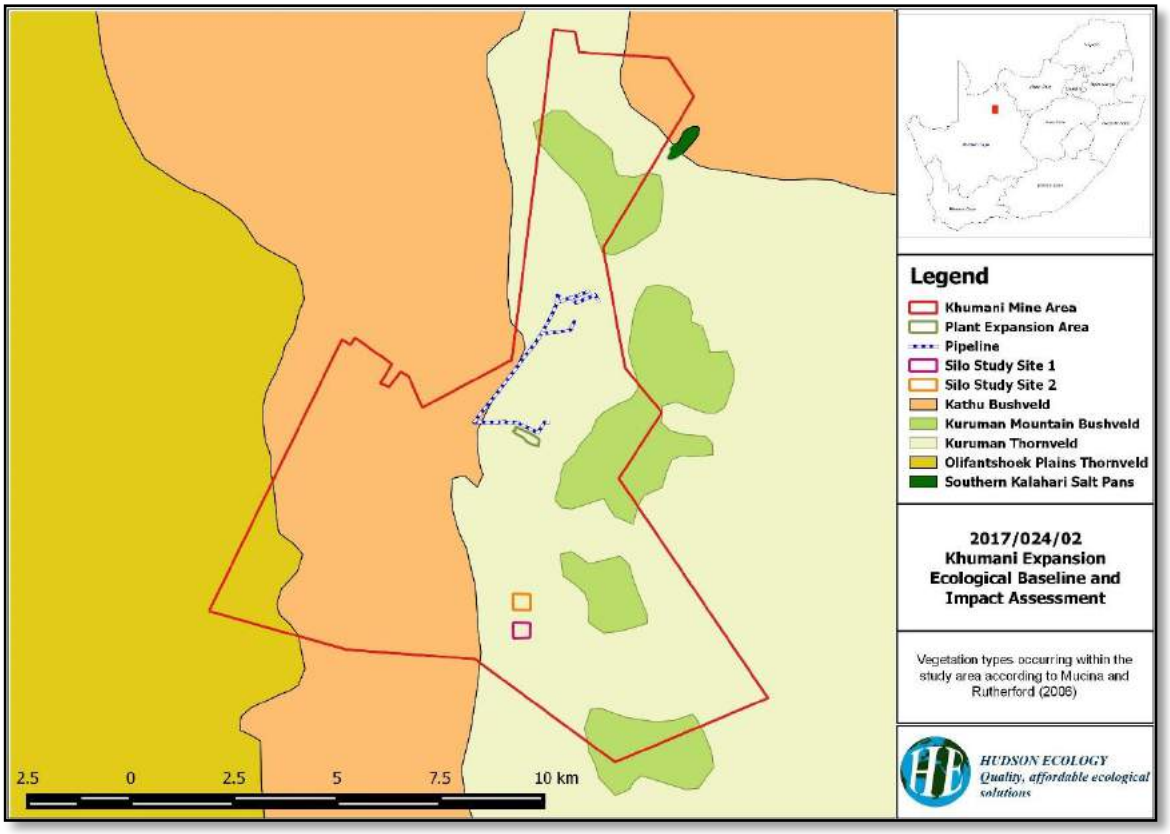


Figure 3: Vegetation types occurring in the study area

9.1.1 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 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 in *Figure* 4.

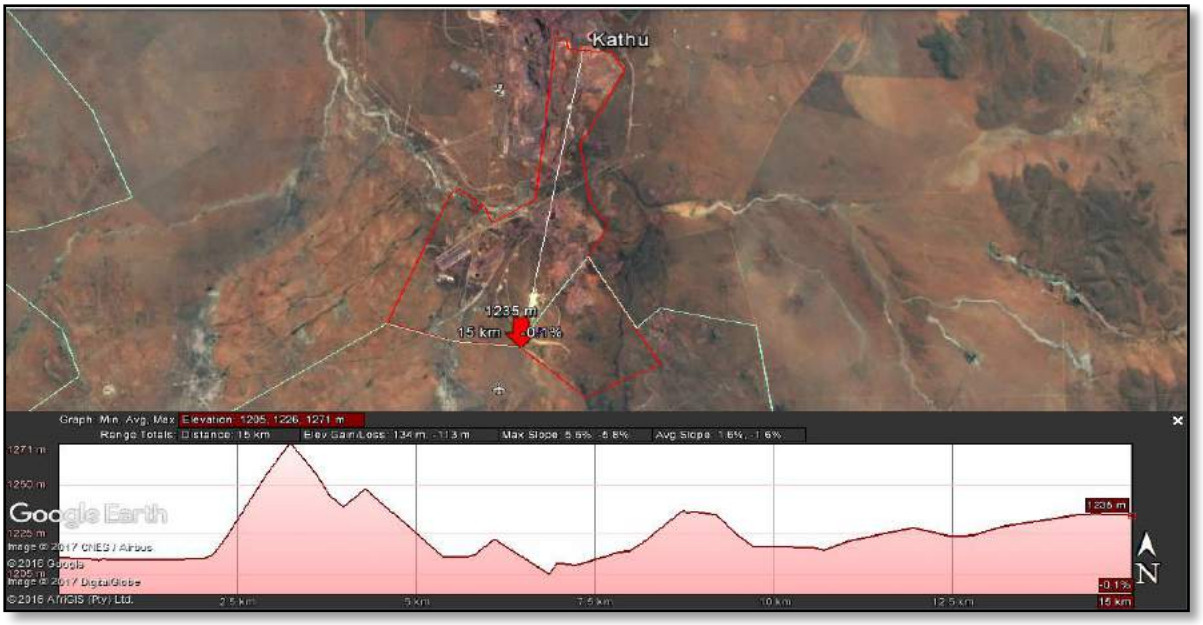


Figure 4: Topography of the study area (reproduced from Google Earth)

9.1.2 Geology & Soils

Geology of the area consists of some Campbell Group dolomite and chert and mostly younger, superficial Kalahari Group sediments, with red wind-blown (0.3–1.2 m deep) sand. Locally, rocky pavements are formed in places and the most important land types are Ae, Ai, Ag and Ah, with Hutton soil forms common in the area. (Mucina & Rutherford, 2006). The Hutton Form soils are dystrophic and non-luvic in the B1- horizon, indicative of Lillieburn Family soils, while the Plooysburg Form soils are non luvic. Brakkies family and the Augrabies Form soils have a red A horizon and are non-luvic, distinctive of the Khubus Family. The Hutton and Plooysburg Form soils on site comprise dry, yellowish red to red, apedal, loose, fine sands, with little differentiation between the topsoil and the B1-horizon sandy loams.

9.1.3 Climate

The study area falls within a summer and autumn rainfall area and is characterised by with very dry winters. The mean annual precipitation (MAP) is about 300–450 mm. The mean annual temperature is 17.5°C and varies from well above 30°C in summer to below 0°C in winter and, in winter, frost very frequent. Mean monthly maximum and minimum temperatures are 35.9°C and –3.3°C for January and June, respectively (Mucina & Rutherford, 2006). See the climate diagram for SVk 9 Kuruman Thornveld given in Figure 5.

9.1.4 Biome and 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 (399 600 km2) and 74.2% of Swaziland (12 900 km2). 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)

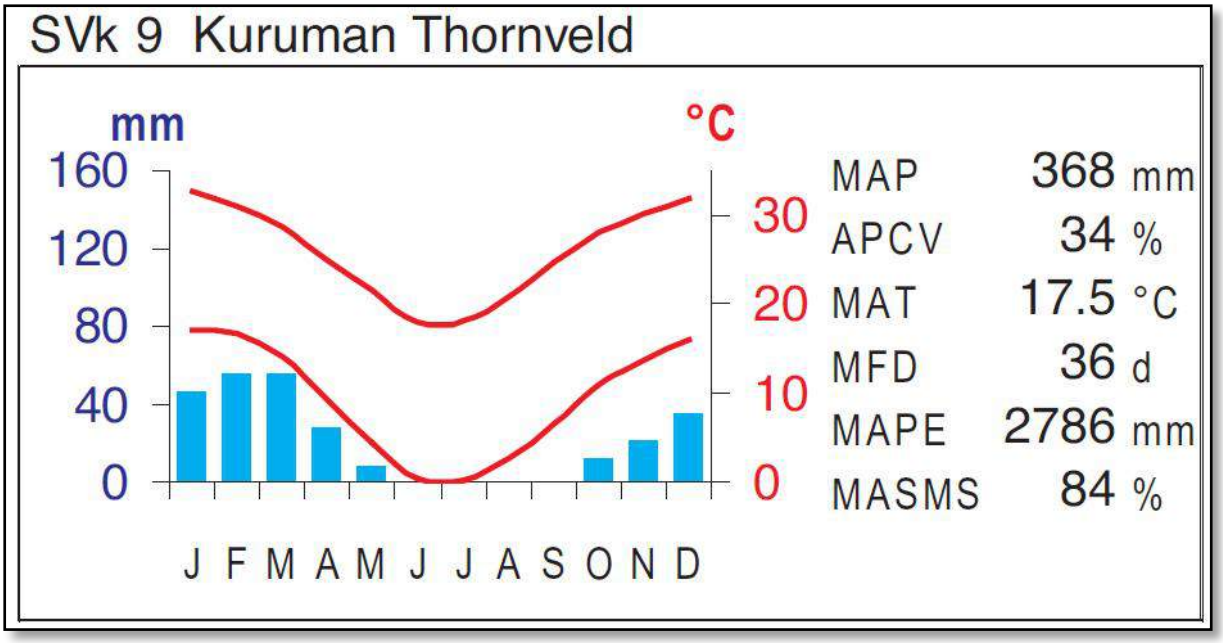


Figure 5: Climate for SVk 9 Kuruman Thornveld (reproduced form Mucina and Rutherford (2006))

9.1.4.1 Kuruman Thornveld SVk 9

Distribution

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 & 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).

Biogeographically Important Taxa

([GW]Griqualand West endemic, [K]Kalahari endemic, [S]Southernmost 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
This vegetation type is classified as least threatened. It has a conseration 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)

9.2 Flora Assessment

9.2.1 Vegetation Communities

Flora assessments were conducted during the latter part of the wet season (April 2017). Based on species composition, physiognomy, moisture regime, rockiness, slope and soil properties, six vegetation communities were recorded within the areas studied, namely:

5. *Tarchonanthus – Vachellia* Open Shrubland
6. *Vachellia mellifera* Thicket
7. Pan Vegetation
8. Floodplain Vegetation

The vegetation communities that are impacted by the various aspects of the development are given in Figure 6.

A list of plant species known to occur in the region, according to the Precis Database, are given in APPENDIX A this species list was however found to be incomplete and many of the species recorded are not found in this species list.

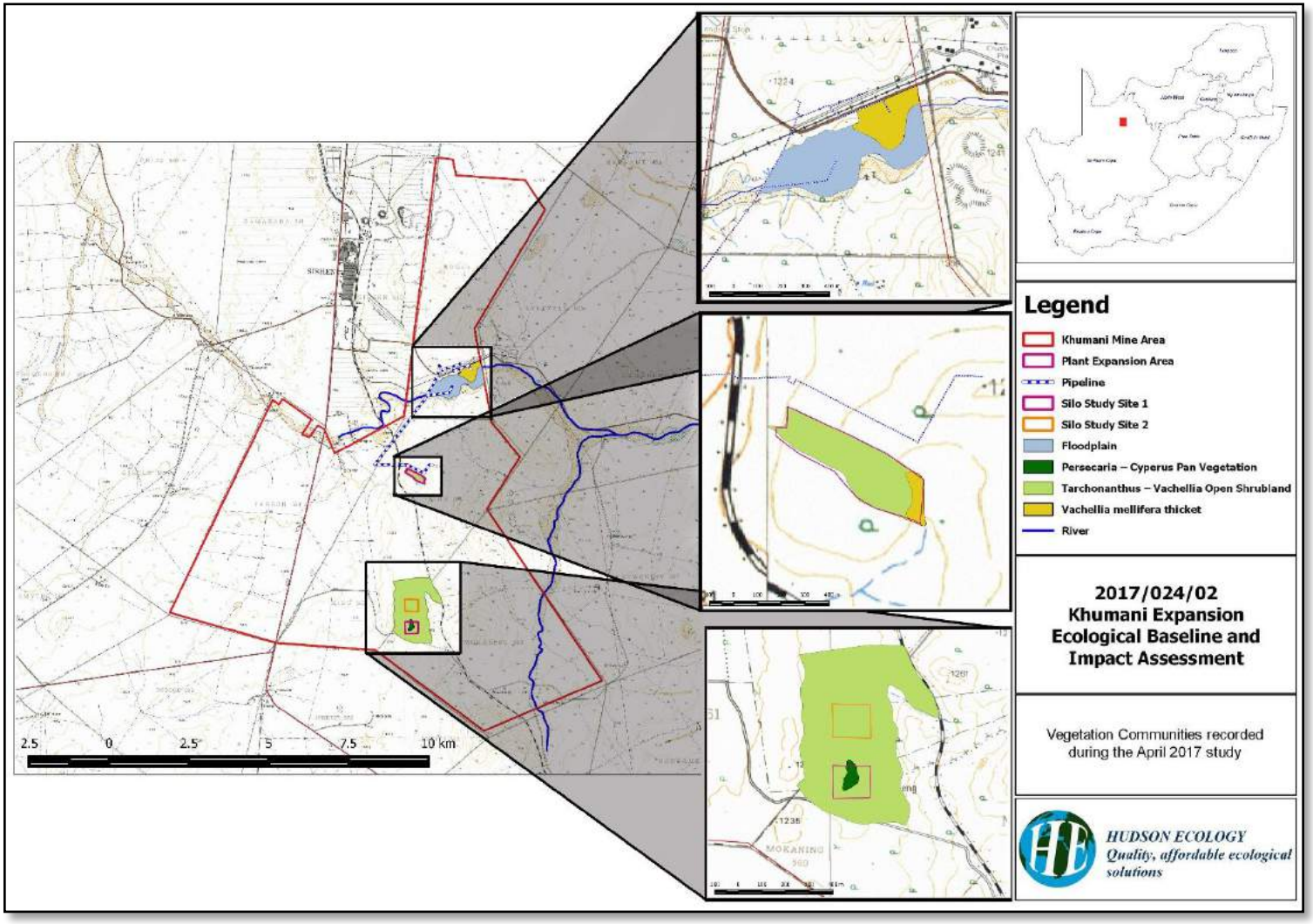


Figure 6: Vegetation communities affected by the development

9.2.1.1 *Tarchonanthus – Vachellia Open Shrubland*

This vegetation community occurs in the plant expansion area, and the two silo sites (Figure 6), and shows significant variation at the different sites surveyed during the April 2017 study. The variations appear to be driven by substrate, variation in fire regime, grazing pressure and other anthropogenic impacts. The tree layer of this vegetation community is dominated by *Vachellia erioloba* and, to a lesser extent, *Boscia albitrunca*.

At Silo site 2 the tree layers is less well defined and *Vachellia erioloba* and *Boscia albitrunca* are rare. At silo site 1 and the plant expansion sites *Vachellia erioloba* is abundant while *Boscia albitrunca* are present, but less abundant.

The shrub layer is characterised by, *Tarchonanthus camphoratus, Euclea undulata, Grewia flava, Rhigozum trichotomum, Lycium cinereum, Rhigozum obovatum, Vachellia mellifera, Searsia ciliata, Salsola rabieana, Ziziphus mucronata* and *Vachellia hebeclada.*

At the plant expansion site the shrub layer is denser and, in most areas, lower than at the silo sites where the shrub layer is taller and can be described as more open shrubland.

Grasses recorded in this vegation community include *Aristida stipitata, Eragrostis pallens, E. lehmanniana, E. viscosa, Schmidtia pappophoroides, Stipagrostis ciliata* and *Tricholaena monachne,* with the less abundant *Aristida congesta* subsp. *congesta, A. stipitata, Cenchrus ciliaris, Melinis repens* and *Pogonarthria squarrosa.* The forb layer characterised by *Geigeria ornativa, Oxalis semiloba, Hermannia tomentosa, Indigofera alternans, Monechma divaricatum, Aloe grandidentata, Pentzia* sp., *Asparagus* sp. and *Senna italica.*

The graminoid and forb layers are poorly defined at the plant expansion site, conversely these layers, particularly the grass layer, are well defined at the silo sites. Figure 7 shows the variation in this vegetation community at the different sites investigated during the 2017 study.

Figure 7: Tarchonanthus – Vachellia Open Shrubland at (from left to right) the Plant expansion site, Silo site 1 and Silo site 2

Recorded species

Plant species recorded in the study area are given in Table 7:

Table 7: Recorded species in the *Tarchonanthus – Vachellia* Open Shrubland

Trees and shrubs	Forbs	Grasses
Vachellia erioloba	*Acanthosicyos naudinianus*	*Aristida congesta var congesta*
Vachellia mellifera	*Adenogramma aethiopicum*	*Aristida stipitata*
Boscia albitrunca	*Cleome angustifolia*	*Aristida diffusa*
Aptosimum procumbens	*Geigeria ornativa*	*Aristida meridionalis*
Aptosimum spinescens	*Gisekia pharnacoides*	*Cenchrus ciliaris*
Asparagus retrofractus	*Hermbstaedtia fleckii*	*Cymbopogon plurinodis*
Barleria rigida	*Hermannia tormentosa*	*Cyndon dactylon*
Chrysocoma ciliata	*Limeum aethipoicum*	*Digitaria eriantha*
Elephantorrhiza elephantina	*Senna italica*	*Eragrostis echinochoidea*
Grewia flava	*Sesamum triphyllum*	*Eragrostis lehmanniana*
Lycium cinereum	*Tribulus terrestris*	*Eragrostis nindens*

Pentzia incana	*Aloe grandidentata*	*Eragrostis pallens*
Pollichia campestris	*Oxalis semiloba*	*Eragrostis plana*
Prosopis glandulosa	*Indigofera alternans*	*Eragrostis viscosa*
Searsia ciliata	*Monechma divaricatum*	*Eragrostis trichophora*
Tarconanthus camphoratus	*Pentzia sp*	*Fingeruthia africana*
Ziziphus mucronata	*Asparagus sp.*	*Stipagrostis ciliata*
Zygophyllum pubescens	*Senna italica*	*Heterepogon contortus*
Euclea undulata	*Ledebouria sp.*	*Melinis repens*
Rhigozum trichotomum	*Nerine laticoma*	*Paspalum dilitatum*
Rhigozum obovatum	*Ornithogalum sp.*	*Schmitia papporophoroides*
Salsola rabieana	*Schizocarphus nervosus*	*Setaria verticilata*
	Cucumis africanus	*Tragus berteronianus*
	Kohautia cynanchica	*Pogonarthria squarrosa*

Recorded species include two climber species, 20 shrub species, 24 graminoid species, 24 herb species, one succulent species and two tree species. Species of conservation importance recorded in this vegetation community area *Vachellia erioloba, Boscia albitrunca* and *Aloe grandidentata*.

Sensitivity aspects

- This vegetation community has been moderately disturbed;
- Moderate species diversity;
- Floristic status of this variation is moderate;
- Suitability of the habitat for flora and fauna species of concern is moderate;
- Ecological integrity of this community is Moderate; and
- The Conservation importance of this community is High due to the presence of protected tree species *Vachellia erioloba* and *Boscia albitrunca* as well as the presence of *Aloe grandidentata*.

9.2.1.2 Vachellia mellifera Thicket

This vegetation community occurs along the pipeline route and in the plants expansion area (Figure 6). The tree layer in this vegetation community is dominated by *Vachellia mellifera* (Figure 8). This species forms an impenetrable thicket and other than scattered *Tarchonanthus camphoratus, Ziziphus mucronata* and very few *Vachellia erioloba*, most other tree or shrub species have been exluded from this vegetation community, thus resulting in a poorly developed tree layer and low diversity in the shrub layer.

Although surveying in between the thicket was impossible, due to its impenetrable nature, the following information could be gleaned on site: the grass layer is typically covered by sparse grass between or under the thicket elements, with *Eragrostis lehmanniana, Themeda triandra, Aristida adscensionis, A. congesta, A. stipitata, Enneapogon cenchroides, Eragrostis superba, E. obtusa, E. nindensis, Fingerhuthia africana, Heteropogon contortus, Sporobolus fimbricatus, Tragus racemosus, Geigera filifolia, Barleria macrostegia, Eragrostis nindensis, Eragrostis trichophora, Pogonarthria squarrosa, Schmidtia pappophoroides* and, *Stipagrostis uniplumis*.

The forb layer is sparse and dominated by *Cucumis africanus, Hermannia tormentosa, Tribulus terrestris, Asparagus sp., Senna italic, Schizocarphus nervosus and Kohautia cynanchica.*

Figure 8: Vachellia mellifera Thicket recorded within the study area

Recorded species

Plant species recorded in the study area are given in Table 8:

Table 8: Recorded species in the *Vachellia mellifera* Thicket Vegetation community

Trees	Forbs	Grasses
Vachellia mellifera	*Cucumis africanus*	*Andropogon eucomus*
Tarchonanthus camphoratus	*Hermannia tormentosa*	*Panicum coloratum*
Ziziphus mucronata	*Tribulus terrestris*	*Urochloa panicoides*
Vachellia erioloba	*Asparagus sp.*	*Cynodon dactylon*
	Senna italica	*Juncus effusus*
	Schizocarphus nervosus	*Eragrostis lehmanniana*
	Kohautia cynanchica	*Eragrostis echinocloidea*
		Hyparrhenia hirta

Recorded species include three shrub species, 8 graminoid species, 7 herb species, one succulent species and two tree species. *Vachellia erioloba were* recorded in this vegetation community.

Sensitivity aspects

- This vegetation community has been severely disturbed, due to previous impacts and subsequent encroachment;
- This vegetation community exhibits Low species diversity;
- Floristic status of this variation is low;
- Suitability of the habitat for flora and fauna species of concern is low;
- Ecological integrity of this community is low; and

- The Conservation importance of this community is moderate.

9.2.1.3 *Persecaria – Cyperus Pan Vegetation community*

This vegetation community occurs in Silo site 1 only (Figure 6).The vegetation community associated with the pan located at the Silo site 1 (Figure 9) can be stratified into two vegetation sub-communities, namely the aquatic and terrestrial sub communities. The aquatic community is dominated mainly by *Persicaria lapathifolia*in the aquatic environment itself and *Juncus effuses, Scirpoides dioecus, Cyperus exculentus, Kyllinga alba* and *Miscanthus junceus* along the marginal areas. The the areas around the pan, between the marginal areas and surrounding vegetation communities are characterised by the presence of *Vachellia mellifera, Panicum coloratum, Cynodon dactylon, Eragrostis lehmanniana, Eragrostis echinocloidea, Hyparrhenia hirta* and *Centhrus ciliaris*. The exotics *Prosopis glandulosa, Eucalyptus camaldulensis, Datura stramonium* and *Verbesina encelioides* are also present in this area in significant numbers.

Figure 9: Persecaria – Cyperus Pan Vegetation community at Silo site 1

Recorded species

Plant species recorded in the *Persecaria – Cyperus* Pan Vegetation community are given in Table 9:

Table 9: Recorded species in the *Persecaria – Cyperus* Pan Vegetation community

Trees	Forbs	Cyperoids/Sedges	Grasses
*Prosopis glandulosa**	*Persicaria lapathifolia*	*Juncus effusus*	*Andropogon eucomus*
*Eucalyptus camaldulensis**	*Datura stramonium**	*Scirpoides dioecus*	*Panicum coloratum*
Vachellia mellifera	*Verbesina encelioides**	*Cyperus exculentus*	*Urochloa panicoides*
		Kyllinga alba	*Cynodon dactylon*
			Juncus effusus
			Eragrostis lehmanniana
			Eragrostis echinocloidea

			Hyparrhenia hirta *Centhrus ciliaris* *Miscanthus junceus* *Pogonarthria squarrosa* *Diplachne fusca*

Recorded species include four cyperoid species, 12 graminoid species, 3 herb species and three tree species. No species of concern were recorded within this vegetation community but the inherent conservation importance of this vegetation community is elevated due to its status as a wetland.

Sensitivity aspects

- This vegetation community has been slightly disturbed, mainly due to herbivory;
- Moderate species diversity;
- Floristic status of this variation is moderate;
- Suitability of the habitat for flora and fauna species of concern is moderate;
- Ecological integrity of this community is high; and
- The Conservation importance of this community is high.

9.2.1.4 Floodplain Vegetation Community

This vegetation community occurs along the pipeline route only (Figure 6). The GaMagara River and the tributaries within the existing and proposed development area are normally dry and only flow for comparatively short periods after significant rainfall events. The tree layer in this vegetation community is dominated by *Vachellia erioloba.* The shrub layer is dominated by *Vachellia mellifera, Tarchonanthus camphoratus, Aptosimum lineare, Pechuel-Loeschea leubnitziae* and *Ziziphus mucronata.* Notable species in the forb layer include: *Amaranthus dinteri, Boerhavia repens, Cucumis africanus, Geigeria ornativa, Heliotropium lineare, Indigofera alternans, Kohautia cynanchica, Lotononis platycarpa, Tribulus terrestris,* while the graminoid layer is dominated by *Cenchrus ciliaris, Chloris virgata, Enneapogon desvauxii, Eragrostis annulata, E. bicolor, Odyssea paucinervis, Panicum coloratum, Eragrostis porosa, Panicum impeditum, Sporobolus nervosus, Setaria verticillata , Enneapogon scaber, Oropetium capense, Stipagrostis uniplumis* and *Tragus racemosus.*

Figure 10: Tarchonanthus - Ziziphus Shrubland within which the study area is situated

Recorded species

Plant species recorded in the study area are given in Table 7:

Table 10: Recorded species in the Tarchonanthus - Ziziphus Shrubland

Trees and Shrubs	Forbs	Graminoids
Vachellia erioloba	*Amaranthus dinteri*	*Cenchrus ciliaris*
Vachellia mellifera	*Boerhavia repens*	*Chloris virgata*
Tarchonanthus camphoratus	*Cucumis africanus*	*Enneapogon desvauxii*
Aptosimum lineare	*Geigeria ornativa*	*Eragrostis annulata*
Pechuel-Loeschea leubnitziae	*Heliotropium lineare*	*Eragrostis bicolor*
Ziziphus mucronata	*Indigofera alternans*	*Odyssea paucinervis*
	Kohautia cynanchica	*Panicum coloratum*
	Lotononis platycarpa	*Eragrostis porosa*
	Tribulus terrestris	*Panicum impeditum*
		Sporobolus nervosus
		Setaria verticillata
		Enneapogon scaber
		Oropetium capense
		Stipagrostis uniplumis
		Tragus racemosus
		Cynodon dactylon
		Juncus effusus
		Eragrostis lehmanniana
		Eragrostis echinocloidea

Recorded species 19 graminoid species, nine forb species, four shrub species and two tree species. Although only *Vachellia erioloba* was recorded during study area itself, it is possible that *Boscia albitrunca*

and *Aloe grandidentata* were found in other areas of the same vegetation community and therefore can be considered as having a high probability of occurrence in this vegetation community and the study area.

Sensitivity aspects

- This vegetation community has been slightly disturbed, mainly due to herbivory;
- Moderate species diversity;
- Floristic status of this variation is high;
- Suitability of the habitat for flora and fauna species of concern is high;
- Ecological integrity of this community is high; and
- The Conservation importance of this community is high.

9.2.2 Flora species of concern

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 (APPENDIX A). 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 (Table 11).

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.

The quantity and quality of floristic data for the study area is poor. There are few taxonomic collections and relatively little floristic information for the area (Van Wyk & Smith, 2001). Areas associated with calcareous soils and heavy metals are likely to have high numbers of species of restricted distribution.

Table 11: Red Data floral species possibly occurring in the area

Species	Red Data Status	TOPS Status	Provicial	National Forestry Act	Probability of
Gnaphalium nesonii	Rare	Critically Endangered	Protected		Low
Rennera stellata	Vulnerable				Moderate
Lithops lesliei	Near Threatened	Endangered	Protected		Low
Boscia albitrunca				Protected	Recorded
Vachellia erioloba				Protected	Recorded
Vachellia haematoxylon				Protected	Moderate
Ammocharis coranica			Protected		Recorded
Brunsvigia radulosa		Vulnerable	Protected		High
Crinum crassicaule		Vulnerable	Protected		Moderate
Nerine laticoma		Vulnerable	Protected		High
Brachystelma dimorphum subsp.		Vulnerable	Protected		Low
Brachystelma foetidum		Vulnerable	Protected		Moderate
Ceropegia crassifolia var. crassifolia		Vulnerable	Protected		Low
Hoodia pilifera subsp. annulata		Vulnerable	Protected		Low
Stapelia grandiflora var. grandiflora			Protected		Low
Boophane distichia			Protected		
Aloe grandidentata			Protected		Recorded
Aloe zebrina			Protected		Moderate
Chortolirion angolense			Protected		Low
Babiana bainesii			Protected		Low

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 11. 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.

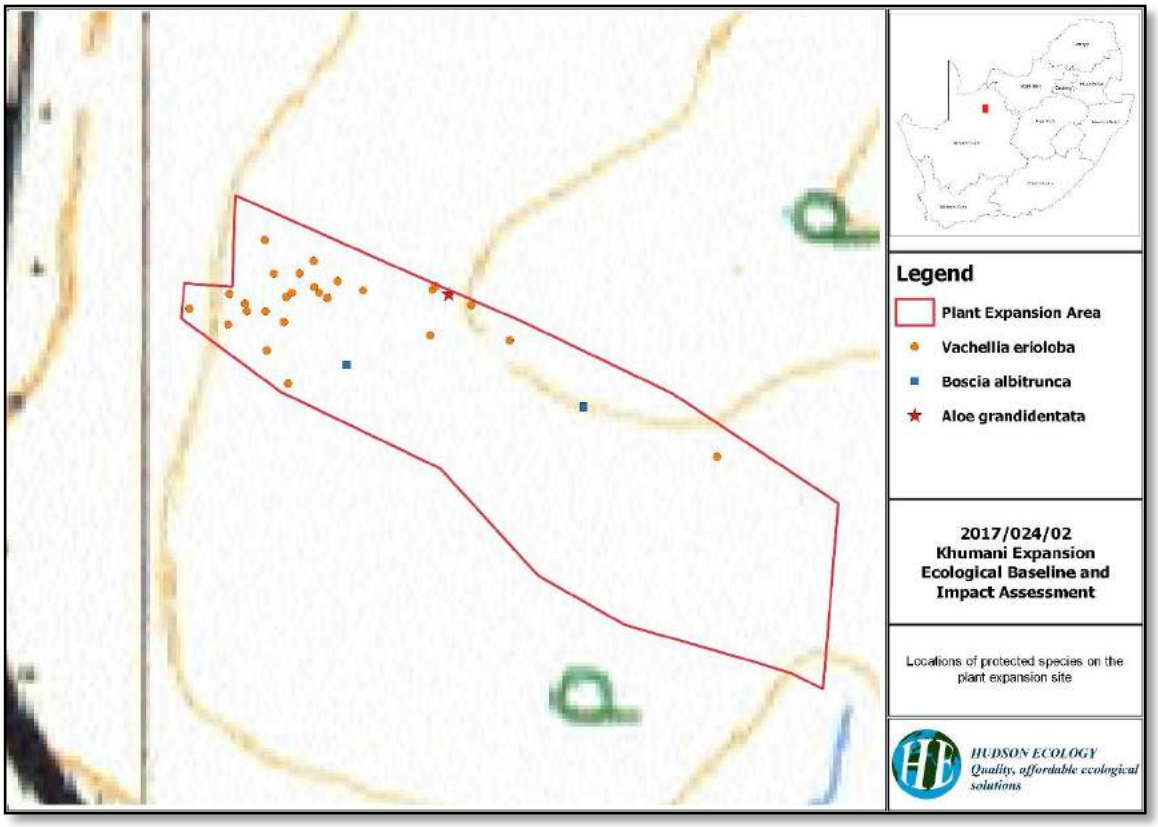


Figure 11: Locations of species of conservation importance in the plant expansion area

Only two locations of *Aloe grandidentata* were recorded in Silo site 2 and will need to be relocated the locations are given in Figure 12. 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 12).

The pipeline route, as it is presently proposed, runs through a Vachellia erioloba forest on the floodlains of the GaMagara River (Figure 13). 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 13.

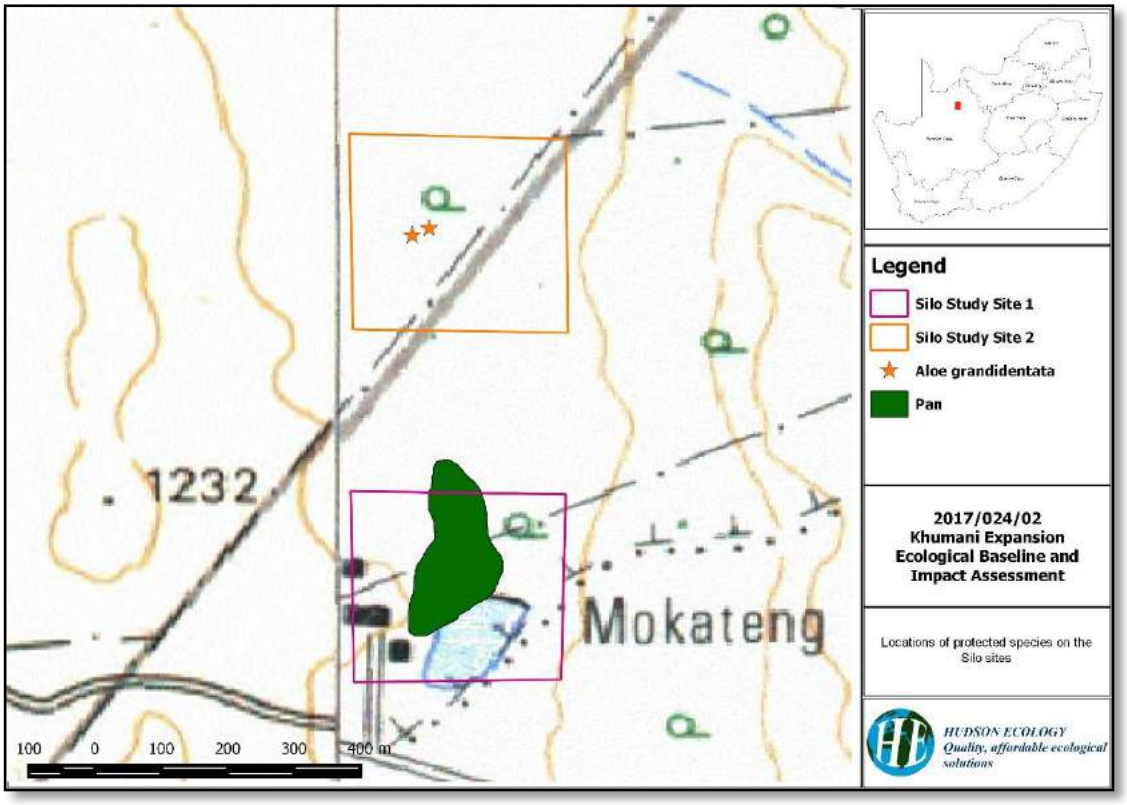


Figure 12: Locations of species of concern and sensitive habitats for the silo sites

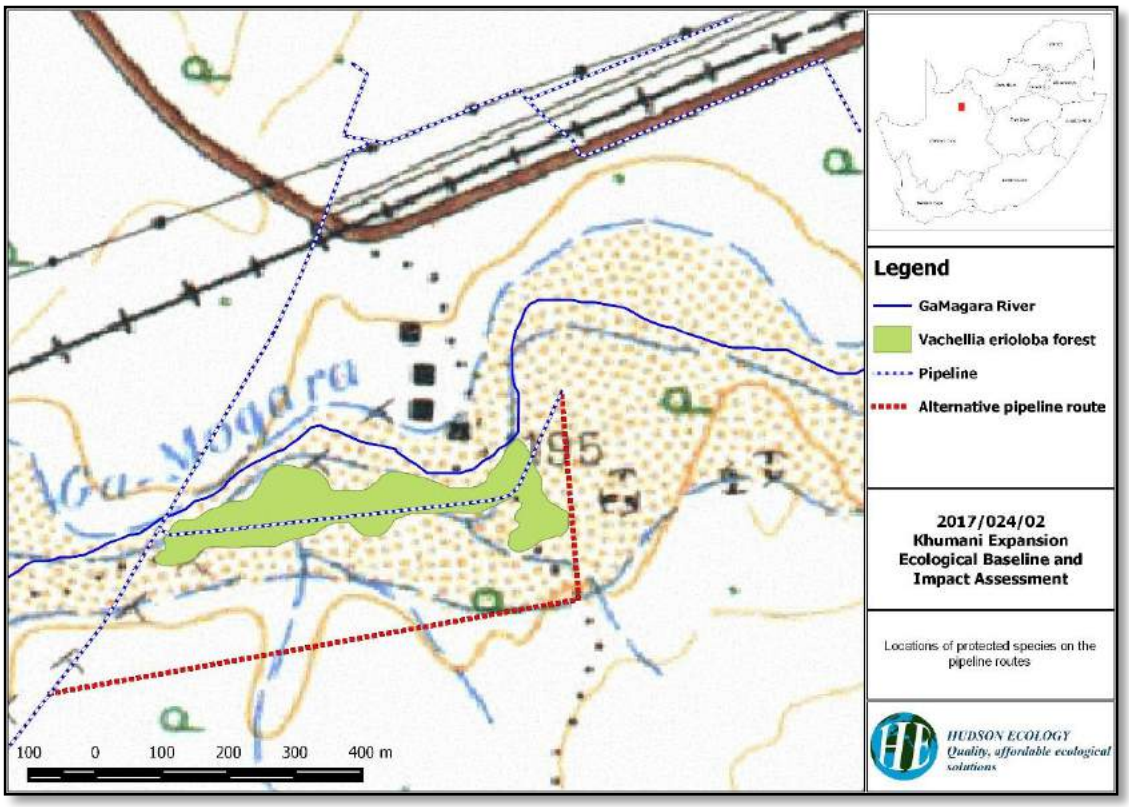


Figure 13: Species of concern associated with the pipeline routes

9.2.3 Exotic species assessment

Exotic species were not numerous in the study areas although a number of exotic species were recorded in low abundances. These species are given in **Table** 12 below:

Table 12: Exotic species recorded in the study area

Scientific name	Common name	Category
Prosopis glandulosa	Honey Mesquite	Category 2
Conyza bonariensis	Flax leaf fleabane	N/A
Sesamum triphyllum	Wild sesame	N/A
Opuntia sp.	Prickly pear	Category 1
Datura stramonium	Common thorn apple	Category 1
Verbesina encelioides	Golden crownbeard	N/A
Tragus berteronianus	Carrotseed Grass	N/A

9.2.4 Medicinal plant assessment

Medicinal plants recorded as well as their uses are given in Table 13 below:

Table 13: Medicinal plants recorded during the April 2017 surveys

Scientific name	Common name	Plant part used	Uses
Senna italica	Wild senna	Roots	Used to treat influenza, indigestion, liver and gall bladder complaints, gastrointestinal disorders, dysmenorrhoea and uterine pain.
Acacia erioloba	Camel thorn	Pods, roots	Ground pods are used to treat ear infections. Roots are used to treat headache, Tuberculosis and also tooth ache.
Elephantoriza elephantina	Elandsbean	Underground rhizomes.	This is a traditional remedy for a wide range of ailments, including diarrhoea and dysentery, stomach disorders, haemorrhoids and perforated peptic ulcers, and as emetics. It is popular for the treatment of skin diseases and acne.
Ziziphus mucronata	Buffalo-thorn	Roots, bark and leaves	Warm bark infusions are used as expectorants in cough and chest problems, while root infusions are popular as a remedy for diarrhoea and dysentery. Decoctions of roots and leaves are applied externally to boils, sores and glandular swellings, not only to promote healing bur also for pain relief.

Boophone disticha	Bushman poison bulb	Bulb scales	The outer scales of the bulb are used as an outer dressing after circumcision and are also applied to boils or septic wounds to alleviate pain and to draw out the pus. Weak decoction of the bulb scales are administered by mouth or as an enema for various complaints such as headaches, abdominal pain, weakness and eye conditions. In the Karoo near Touws River there is an old belief that sleeping on a mattress filled with bulb scales will relieve hysteria and insomnia. Very weak decoction is used as an effective sedative. Higher doses induce visual hallucinations which are sometime used for divination and even higher doses can be fatal.
Datura stramonium	Common thorn apple	Leaves and fresh green fruit	Used for the relief of asthma and to reduce pain. Weak infusions are used as hypnotics by the elderly and as aphrodisiacs by adults. The fresh warm leaves may be used as a poultice to relive the pain of rheumatism, gout, boils, abscesses and wounds. The fresh green fruit is sometimes applied locally for toothache, a sore throat and tonsillitis. The leaf is rolled up and smoked to relieve asthma and bronchitis.
Tarconanthus camphoratus	Wild camphor bush	Leaves and twigs	Infusions and tinctures of the leaves and twigs are used for stomach trouble, abdominal pain, headache, toothache, asthma, bronchitis and inflammation. A hot poultice on the chest is said to give relief from headache, asthma, bronchitis, and inflammation. Smoke or fumes from the fresh and dried plant are inhaled for asthma, headache and rheumatism.

9.3 Fauna Assessment

The faunal assessment was conducted in the latter part of the wet season during the month of April 2017.

9.3.1 Recorded Faunal Species

9.3.1.1 Arthropoda

The invertebrate assessment conducted was a general assessment with the purpose of identifying common species and taxa in the study area. The invertebrate assessment, therefore, cannot be seen an indication of the complete invertebrate diversity of the study area. A representation of commonly encountered families that were observed during the assessment is listed in Table 14. Species have been identified to a minimum of family level and, where possible, species been identified to genus and species level.

No threatened invertebrate species are listed for the QDS (Animal Demography Unit) and, after completion of the study, 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.

Table 14: Arthropod species recorded during the April 2017 study

ORDER	FAMILY	SPECIES NAME
Lepidoptera	NYMPHALIDAE	*Vanessa cardui*
		Danaus chrysippus aegyptius
		Acraea eponina eponina
		Junonia hierta cebrene
	PIERIDAE	*Mylothris rueppellii haemus*
		Colotis subfasciatus
		Colotis lais
		Eurema brigitta
		Pontia helice
	CRAMBIDAE	*Glyphodes bicolor*
	HESPIRIIDAE	*Leucochitonea levubu*
Coleoptera	COCCINELLIDAE	*Henosepilachna bifasciata*
	TENEBRIONIDAE	*Psammodes bertolonii*
Thysanura	LEPISMATIDAE	*Lepisma saccharina*
Odonata	PROTONEURIDAE	1 species
	LIBELLULIDAE	*Trithemis arteriosa*
Blattodea	BLATTIDAE	*Periplaneta americana*
Isoptera	HODOTERMITIDAE	*Hodotermes mossambicus*
	HODOTERMITIDAE	*Microhodotermes viator*
Orthoptera	GRYLLIDAE	1 species
	ACRIDIDAE	1 species
Phasmatodea	BACILLIDAE	1 species
Diptera	MUSCIDAE	*Musca domestica*
	CULICIDAE	*Culex* sp. 2 species
	TABANIDAE	*Haematopota* sp.
Hymenoptera	VESPIDAE	*Belonogaster dubia*
	APIDAE	*Apis mellifera*
	ANTHOPHORIDAE	*Amegilla caelestina*
	FORMICIDAE	*Pachycondyla tarsata*
		Dorylus helvolus
	HODOTERMITIDAE	*Microhodotermes viator*
Spirostreptida	SPIROSTREPTIDAE	*Archispirostreptus gigas*

9.3.1.2 Herpetofauna

Reptile diversity in the area is high with approximately 38 reptile species (APPENDIX C) occurring in the area and reptile endemism is especially high in the region with 10 species (24%) being endemic. The herpetofauna assessment conducted was a general assessment with the purpose of identifying common species and taxa in the study area. The herpetofauna assessment, therefore, cannot be seen as an indication of the complete herpetofauna diversity of the study area, nonetheless, eight species were confirmed during the site visit (Table 15). The Red Data reptiles' which may occur in the study area, are discussed below. No exotic herpetofauna species are expected to occur on the study site.

Table 15: Reptile species recorded during the March 2016 surveys

FAMILY	BIOLOGICAL NAME	COMMON NAME	ENDEMIC
TESTUDINAE	Psammobates oculifer	Serrated or Kalahari Tent Tortoise	E
COLUBRIDAE	Lamprophis fuliginosus	Brown House Snake	
	Psammophylax tritaeniatus	Striped Skaapsteker	

ELAPIDAE	Bitis arietans	Puff Adder	
SCINCIDAE	Mabuya striata	Striped Skink	
	Mabuya varia	Variable Rock Skink	
	Agama aculeata	Ground Agama	
	Agama atra	Southern Rock Agama	E

9.3.1.3 Amphibia

Much of the the study area is a fair distance from any permanent open water bodies. However, at the pan and GaMagara River the area was investigated for amphibian species, furthermore the good rains at the time and the large amount of standing water was conducive to frogging. The amphibian assessment conducted was a general assessment with the purpose of identifying common species and taxa in the study area. The amphibian assessment, therefore, cannot be seen as an indication of the complete amphibian diversity of the study area. Only thirteen species are expected to occur in the study area (APPENDIX D), and due to the conducive conditions at the time of the survey, six 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 (Table 16).

Table 16: Amphibian species recorded during the March 2016 Surveys

FAMILY	SPECIES	COMMON NAME
Bufonidae	*Amietophrynus garmani*	Eastern Olive Toad
Hyperoliidae	*Kassina senegalensis*	Bubbling Kassina
Microhylidae	*Breviceps adspersus*	Desert Rain Frog
Pipidae	*Xenopus laevis*	Common Platana
Pyxicephalidae	*Tomopterna cryptotis*	Tremolo Sand Frog
Pyxicephalidae	*Amieta angolensis*	Common River Frog

9.3.1.4 Avifauna

The study area provides a relatively wide diversity of avifaunal habitat namely wetland, open veld and woodland in the vicinity of *Acacia erioloba* trees. Each of these areas would host its own unique avifaunal community. The majority of the species identified are listed as protected species by the NCNCA (Act 9 of 2009). Using a number of bird atlases and field guides (Harrison, et al., 1997; Sinclair, et al., 2002; Hockey, et al., 2005; Maclean, 1993; Hockey, et al., 2005) it was determined that avifauna diversity in the area is high with approximately 332 avifauna species (APPENDIX E) occurring in the region. Of these species 8 (6%) area listed as endemic and 26 (7%) are listed as being Red Data species. The avifauna assessment conducted was a general assessment with the purpose of identifying common species and taxa in the study area. The avifauna assessment, therefore, cannot be seen as an indication of the complete avifauna diversity of the study area and during the study, recorded avifauna species diversity and abundance was low with only 39 species being recorded during the site visit.

ROBERTS 6	FULL NAME	SCIENTIFIC NAME
181	Rock Kestrel	*Falco rupicolus*
183	Lesser Kestrel	*Falco naumanni*
239.1	Northern Black Korhaan	*Afrotis afraoides*
354	Cape Turtle Dove	*Streptopelia capicola*
355	Laughing Dove	*Streptopelia senegalensis*
356	Namaqua Dove	*Oena capensis*
411	Common Swift	*Apus apus*
438	European Bee-eater	*Merops apiaster*
464	Black-collared Barbet	*Lybius torquatus*
465	Acacia Pied Barbet	*Tricholaema leucomelas*
473	Crested Barbet	*Trachyphonus vaillantii*
494	Rufous-naped Lark	*Mirafra africana*
495.2	Eastern clapper Lark	*Mirafra fasciolata*

497	Fawn-coloured Lark	*Calendulauda africanoides*
498	Sabota Lark	*Calendulauda sabota*
507	Red-capped Lark	*Calandrella cinerea*
515	Chestnut-backed Sparrow-lark	*Eremopterix leucotis*
526	Greater Striped Swallow	*Cecropis cucullata*
532	Sand Martin	*Riparia riparia*
567	African Red-eyed Bulbul	*Pycnonotus nigricans*
589	Familiar Chat	*Cercomela familiaris*
595	Ant-eating Chat	*Myrmecocichla formicivora*
615	Kalahari Scrub Robin	*Erythropygia paena*
664	Zitting Cisticola	*Cisticola juncidis*
665	Desert Cisticola	*Cisticola aridulus*
695	Marico flycatcher	*Bradornis mariquensis*
713	Cape Wagtail	*Motacilla capensis*
732	Southern (Common) Fiscal	*Lanius collaris*
739	Crimson-breasted Shrike	*Laniarius atrococcineus*
743	Brown-crowned Tchagra	*Tchagra australis*
799	White-browed Sparrow-Weaver	*Plocepasser mahali*
803	Cape Sparrow	*Passer melanurus*
804	Southern Grey-headed Sparrow	*Passer diffusus*
829	White-winged Widowbird	*Euplectes albonotatus*
845	Violet-eared Waxbill	*Uraeginthus granatinus*
846	Common Waxbill	*Estrilda astrild*
860	Pin-tailed Whydah	*Vidua macroura*
878	Yellow Canary	*Crithagra flaviventris*
884	Golden-breasted Bunting	*Emberiza flaviventris*

9.3.1.5 Mammalia

Of the 67 mammal species expected to occur in the study area, according to historic recordings (APPENDIX F), only 11 were confirmed during the site visit (Table 17). The mammal assessment conducted was a general assessment with the purpose of identifying common species and taxa in the study area. The mammal assessment, therefore, cannot be seen as an indication of the complete mammal diversity of the study area. Furthermore a number of factors may contribute to the low species diversity and abundance recorded in the mammal population, these include overgrazing, local extinctions and the degraded condition of much of the study area.

Table 17: Mammal species recorded during the March 2016 surveys

FAMILY	BIOLOGICAL NAME	COMMON NAME
LEPORIDAE (Hares and Rabbits)	*Lepus saxatillis*	Scrub Hare
HERPESTIDAE (Mongooses)	*Cynictis penicillata*	Yellow mongoose
HERPESTIDAE (Mongooses)	*Galerella sanguinea*	Slender mongoose
HYSTRICIDAE (Porcupine)	*Hystrix africaeaustralis*	Cape Porcupine
MURIDAE (Rats and Mice)	*Saccostomus campestris*	Pouched Mouse
	Michaelamys namaquensis	Namaqua Rock Mouse
	Rhabdomys pumilio	Four-striped Grass Mouse
	Mastomys natalensis	Natal Multimammate Mouse
SORICIDAE (Shrews)	*Crocidura cyanea*	Reddish-grey musk shrew
ORYCTEROPODIDAE	*Orycteropus afer*	Aardvark
RUMINANTIA	*Raphicerus campestris*	Steenbok

All eleven 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 lowkey prosecution, all species

are capable of maintaining their presences in remote areas such as the site and surrounding properties. The nearby roads are a main source of fatalities – carcasses were recorded during transit to and from the study area.

9.3.2 Red Data Faunal Species

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. Table 18 describes the habitat requirements and probability of occurrence of fauna species of concern identified as likely to occur in the study area.

Table 18: Red Data Faunal Species

COMMON NAME	TAXON	HABITAT	STATUS	LIKELIHOOD OF OCCURRENCE
African Hedgehog	Atelerix frontalis	Although these hedgehogs can be found in most environments, they prefer grass and Bushveld that is not too damp and with a good covering of leaves and other debris.	VU	**MODERATE**, overall geographical distribution includes this area, habitat is suitable.
Honey badger	Mellivora capensis	Wide variety of habitats. Probably only in natural habitats.	NT	**MODERATE**, overall geographical distribution includes this area, habitat is suitable.
Darling's horseshoe bat	Rhinolophus darlingii	Savanna, rossting in caves and sub-terranean habitats	NT	**MODERATE**, recorded in nearby grid, on edge of distribution; suitable habitat may occur on site.
Dent's horseshoe bat	Rhinolophus denti	Savanna, nama-Karoo, succulent Karoo, and distribution follows rivers. Caves and subterranean habitats. Aerial insectivore.	NT	**LOW**, on edge of distribution; suitable habitat may occur on site or may be vagrant from Orange River valley.
Reddish-grey musk shrew	Crocidura cyanea	Wide variety of habitats. Nocturnal, terrestrial.	DD	**MODERATE**, previously recorded in nearby grid and geographical distribution includes this area.
Secretarybird	*Sagittarius serpentarius*	This species is uncommon to locally fairly common, favouring open grasslands with scattered trees and shrubs. Although considered resident, it is not sedentary, with highly nomadic movements across	VU	**MODERATE,** previously recorded in nearby grid and geographical distribution includes this area.

		their large home range (up to 230km^2)		
Martial Eagle	*Polemaetus bellicosus*	This species is widespread, although generally uncommon in South Africa, tolerating a wide range of habitat types, including open grassland, scrub and woodland. This species requires exceptionally large home ranges (in excess of 130 km2), making use of large trees and electricity pylons to provide nest sites – which are often a limiting factor concerning this species.	EN	**MODERATE,** previously recorded in nearby grid and geographical distribution includes this area
Lanner Falcon	*Falco biarmicus*	This species has a fairly high tolerance regarding habitat requirements, being found across southern Africa in most habitat types excluding forest. The Lanner Falcon is generally a cliff nester and its distribution is closely associated with mountainous areas. However, and especially in the Karoo, the increasing number of pylon towers has offered alternative nesting opportunities for this species.	VU	**HIGH,** previously recorded in this grid reference and geographical distribution includes this area
Red-footed Falcon	*Falco vespertinus*	This is a diurnal bird of open country with some trees, often near water. They tend to migrate far south for the winter, including in areas of Africa. The red-footed falcon tends not to make their own nests, but tend to use abandoned nests made by other birds such as the hooded crow, rook, and magpie. The nests that are chosen tend to be higher than the majority of the other nests; the nests tend to be 13–20 m above the ground and within 3–4 m of the tree top. Most of these nests tend to be near the edge of woods, avoiding nesting on solitary trees.	NT	**HIGH,** previously recorded in this grid reference and geographical distribution includes this area

Kori Bustard	*Ardeotis kori*	This species is considered uncommon to locally common, favouring open savannah woodland, dwarf shrubland and occasionally grassland. Although a sedentary resident, this species is locally nomadic in response to rainfall and the subsequent flush of small invertebrates.	NT	**MODERATE,** previously recorded in nearby grid and geographical distribution includes this area
Giant Bullfrog	Pyxicephalus adspersus	Widely distributed in southern Africa, mainly at higher elevations. Inhabits a variety of vegetation types where it breeds in seasonal, shallow, grassy pans in flat, open areas; also utilises non-permanent vleis and shallow water on margins of waterholes and dams. Prefer sandy substrates although they sometimes inhabit clay soils.	NT	**MODERATE,** previously recorded in nearby grid and geographical distribution includes this area.
African Rock Python	Python sebae natalensis	Occurs in most wet and dry woodland and tall shrubland communities.	NT	**HIGH,** overall geographical distribution includes this area; suitability of habitat on site appears favourable**.**

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.

9.4 Ecological Integrity

The ecological integrity of the study area (

Figure 14.) 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 the reduction of important ecological patterns and processesdue 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 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.

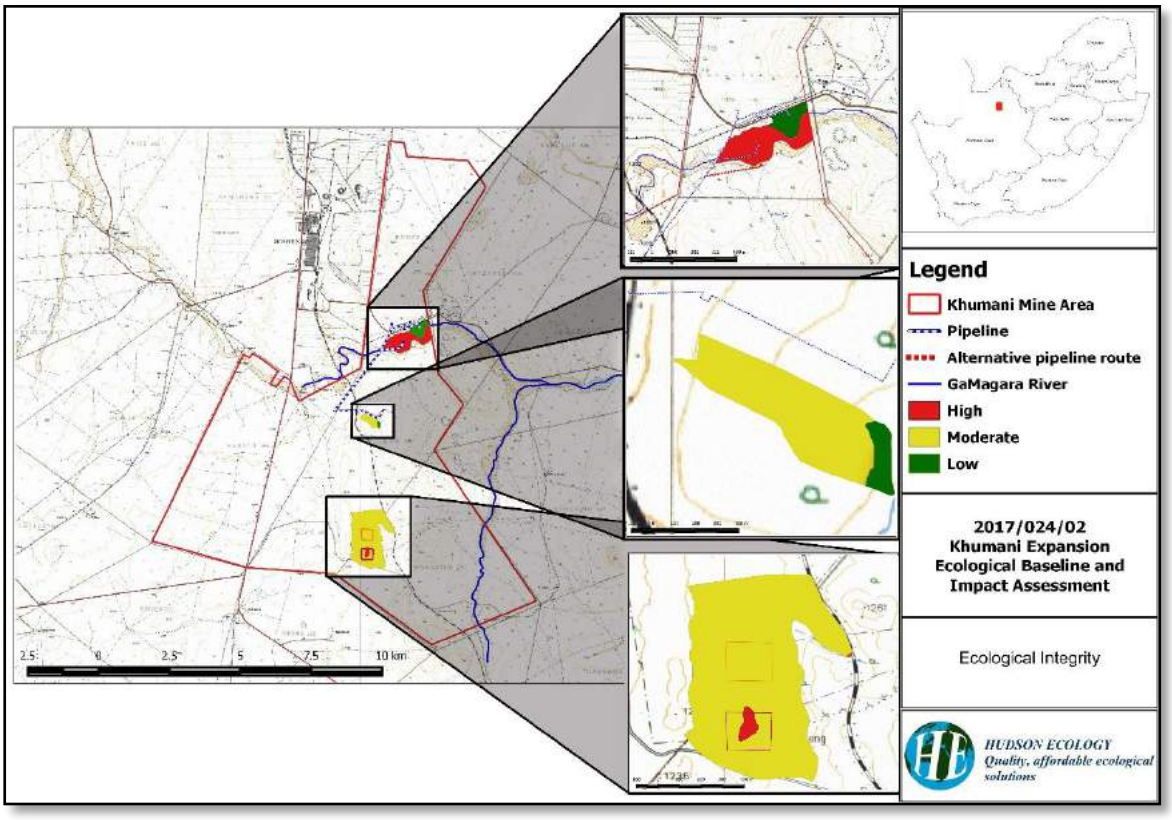


Figure 14: Ecological integrity within the study area

9.5 Conservation Importance

The conservation importance of the study area (Figure 15) ranges between miderate 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 comservation 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.

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

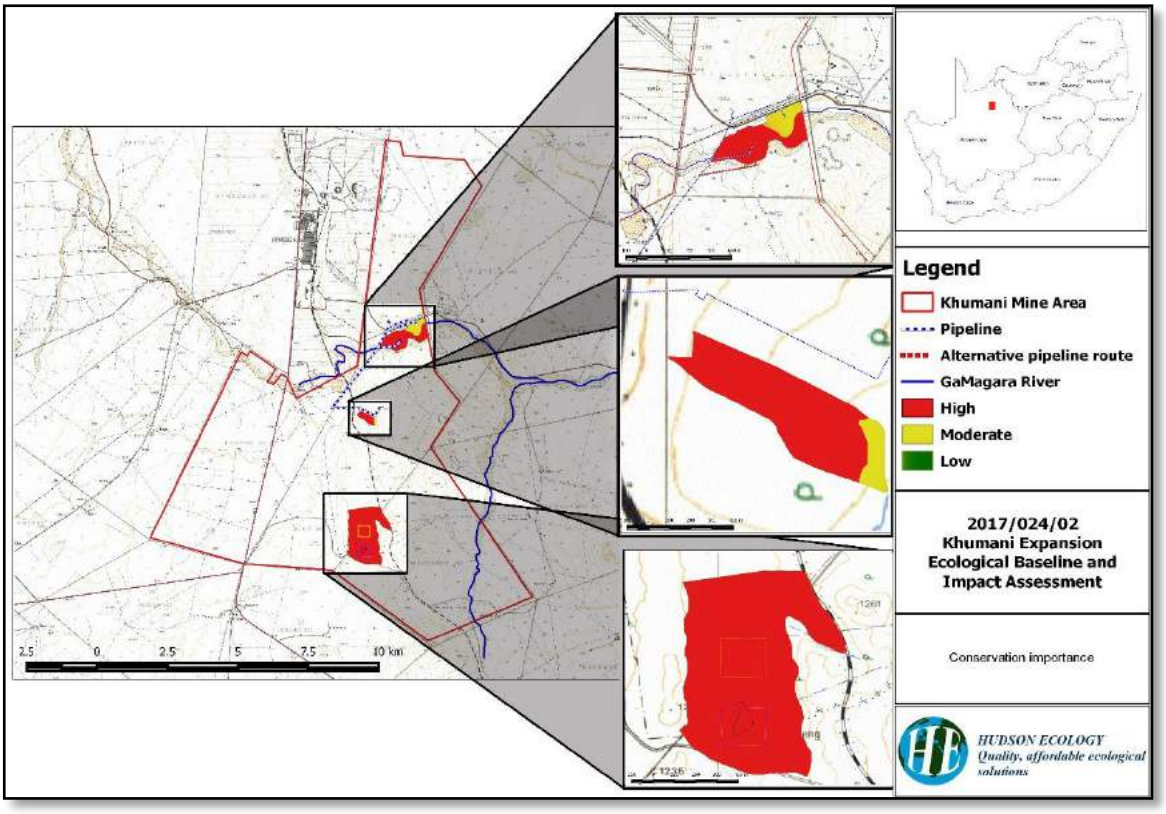


Figure 15: Conservation importance within the study area

10 ECOLOGICAL IMPACT ASSESSMENT

The impact assessment determined that seven main impacts are likely to occur due to the development, namely:

9. Vegetation clearing and subsequent loss of species of concern;
10. Spillage of harmful or toxic substances;
11. Disturbance of biodiversity due to vibration and noise;
12. Habitat degradation and fauna impacts due to dust;
13. Effects on local migrations;
14. Increased prevalence of exotic invasive species; and
15. Increased erosion.

Preliminary impacts and mitigations are discussed in the tables below:

Impact 1: Vegetation Clearing				
Vegetation clearing is likely to be the greatest impact on the vegetation communities affected by the proposed activities.				
	Without Mitigation		With Mitigation	
Extent (E)	2	Site only	2	Site only
Duration (D)	4	>15 years	4	>15 years
Magnitude (M)	6	Moderate Intensity	2	Minor Intensity

Probability (P)	4	Highly Probable	2	Improbable
Significance (S = [E+D+M]xP)	48	Moderate	16	Low
Status (Positive, negative or neutral)	Negative		Negative	
Reversibility	Yes		Yes	
Irreplaceable loss of resources	Yes		Yes	
Mitigability	Yes		Yes	
Mitigation measures:				
Vegetation clearing is inevitable and unavoidable. Mitigation of this impact can, however, be implemented by keeping the area cleared to a minimum and careful removal and replanting of plants and trees of conservation importance. Seed collection, propagation and re-planting of saplings to make up for lost species should also be applied. A nursery should be started as a community project. The impact of vegetation clearing is likely to be a long term impact, but through careful planning and rehabilitation can be greatly reduced.				
Cumulative impacts:				
There are a number of facilities already in existence in the MRA. All these areas have been cleared and servitudes are maintained and vegetation clearing conducted as fire breaks there will thus be a cumulative impact in the area.				
Residual impacts:				
Localised loss of vegetation				

Impacts 2: Spillage of harmful or toxic substances				
Harmful or toxic substances that may affect the biota of the area if they were to enter the system include: diesel, hypoid oil, motor oil, polluted water used during the operations and chemicals transported to and from site and used in the operations. The spillage of harmful or toxic substances may impact on the fauna and flora of the area in a number of ways. Direct pathways include ingestion of the substances by fauna species resulting in toxicity in that individual, uptake of toxic chemicals by the roots plants which may lead to toxicity in the plants and the chemicals entering the plant or animals system due to contact (through the skin, leaves or stems). Indirect pathways include the ingestion of contaminated plants or animals by other herbivorous or predatory species. The predation of contaminated animals by both other animals and humans is a common occurrence during chemical contamination due to these animals being sluggish, and less likely to escape predation, due to chemical toxicity.				
	Without Mitigation		With Mitigation	
Extent (E)	1	Low	1	Low
Duration (D)	4	>15 years	1	<5 years

Magnitude (M)	6	Moderate Intensity	4	Low Intensity
Probability (P)	4	Highly Probable	2	Improbable
Significance (S = [E+D+M]xP)	44	Moderate	12	Low
Status (Positive, negative or neutral)	Negative		Negative	
Reversibility	Yes		Yes	
Irreplaceable loss of resources	Yes		Yes	
Mitigability	Yes		Yes	
Mitigation measures:				
The spillage of harmful or toxic substances can be mitigated by the implementation of a sound emergency spillage containment plan, which can be implemented as soon as a spill of harmful or toxic substances occurs.				
Cumulative impacts:				
None with mitigation				
Residual impacts:				
None with mitigation				

Impacts 3: 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 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				
	Without Mitigation		With Mitigation	
Extent (E)	2	local	2	local
Duration (D)	4	>15 years	1	<5 years
Magnitude (M)	6	Moderate Intensity	4	Low Intensity
Probability (P)	4	Highly Probable	2	Improbable

Significance (S = [E+D+M]xP)	48	Moderate	14	Low
Status (Positive, negative or neutral)	Negative		Negative	
Reversibility	Yes		Yes	
Irreplaceable loss of resources	Yes		Yes	
Mitigability	Yes		Yes	
Mitigation measures:				
Vibration and noise from heavy machinery can be kept to a minimum by reducing the movement of heavy vehicles to a minimum necessary for operations. Placing the vehicle yard as close to the construction area as possible will also reduce the scale of impact of vibration.				
Cumulative impacts:				
None with mitigation				
Residual impacts:				
None with mitigation				

Impacts 4: 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.				
	Without Mitigation		With Mitigation	
Extent (E)	2	Local	2	Local
Duration (D)	3	5-15 years years	1	<5 years
Magnitude (M)	6	Moderate Intensity	2	Minor Intensity
Probability (P)	4	Highly Probable	2	Improbable
Significance (S = [E+D+M]xP)	44	Moderate	10	Low
Status (Positive, negative or neutral)	Negative		Negative	
Reversibility	Yes		Yes	

Irreplaceable loss of resources	Yes	Yes
Mitigability	Yes	Yes
Mitigation measures:		
The following methods can be used to prevent conditions conducive to dust generation and suppress dust should it occur: • Dust suppression on roads by water bowsers; • Adjacent paved areas and roads used for construction traffic can be maintained free of tracked soil or fill materials. At minimum, paved traffic areas, can be cleaned on a daily basis by wet sweeping and/or washing. More frequent cleaning can be provided as necessary. Adjacent paved areas and roads can be left clean at the end of each day; • Exposed excavations, disturbed ground surfaces, and unpaved traffic areas can be maintained in a moist condition; • During non-working hours, the site can be left in a condition that will prevent dust from being generated. At the end of each work day, disturbed areas can be wetted down and security fencing can be installed and or inspected to prevent access and additional disturbance; • Provide temporary cover and daily maintenance for soil stockpiles and keep active surfaces moist; • A temporary decontamination pad and/or a stabilized construction entrance can be provided at active site entrance/egress locations to keep adjacent paved areas clean; and • Construction activities should be conducted using methods that minimize dust generation. The following Best Management Practices (BMPs) can also be followed to help minimize and control dust emissions at the Site to the greatest extent possible: • All onsite traffic can be restricted to specific designated roads. Off-road travel can only be authorized on a case-by-case basis (e.g. access to a remote monitoring well, etc.). Traffic speed can also be restricted to an appropriate level on all designated roads. All designated roads can be considered as high potential dust source areas, and as such, can be a priority for dust controls utilizing water and/or gravel. • This plan can be in effect during all hours of operation at the site. During non-business hours, there can be no activities generating dust; therefore, dust control actions can be restricted to hours of operation only. However, as a best management practice, if high winds are evident at the close of a business day (or immediately prior to a weekend, holiday, etc.), site personnel should evaluate vulnerable areas and implement controls, as appropriate, to minimize off-hours emissions.		
Cumulative impacts:		
None with mitigation		
Residual impacts:		
None with mitigation		

Impact 5: 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.				
	Without Mitigation		With Mitigation	
Extent (E)	1	Low	1	Low
Duration (D)	2	<5 years years	1	<5 years

Magnitude (M)	6	Moderate Intensity	2	Minor Intensity
Probability (P)	4	Highly Probable	2	Improbable
Significance (S = [E+D+M]xP)	22	Low	8	Low
Status (Positive, negative or neutral)	Negative		Negative	
Reversibility	Yes		Yes	
Irreplaceable loss of resources	Yes		Yes	
Mitigability	Yes		Yes	
Mitigation measures:				
• 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; • 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; and • A low speed limit can be strictly enforced in order to reduce collisions with animals on the roads.				
Cumulative impacts:				
None with mitigation				
Residual impacts:				
None with mitigation				

Impact 6: 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.				
	Without Mitigation		With Mitigation	
Extent (E)	3	Regional	1	Site only
Duration (D)	4	>15 years years	4	<5 years
Magnitude (M)	8	Moderate Intensity	2	Minor Intensity
Probability (P)	4	Highly Probable	2	Improbable
Significance (S = [E+D+M]xP)	60	Moderate	14	Low
Status (Positive, negative or neutral)	Negative		Negative	

Reversibility	Yes	Yes
Irreplaceable loss of resources	Yes	Yes
Mitigability	Yes	Yes
Mitigation measures:		
Mitigation: An exotic/invasive species monitoring and management plan should be put in place to manage exotic and invasive species.		
Cumulative impacts:		
None with mitigation		
Residual impacts:		
None with mitigation		

Impact 7: 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.				
	Without Mitigation		With Mitigation	
Extent (E)	1	Low	1	Low
Duration (D)	4	>15 years	4	>15 years
Magnitude (M)	6	Moderate Intensity	2	Minor Intensity
Probability (P)	4	Highly Probable	2	Improbable
Significance (S = [E+D+M]xP)	44	Low	14	Low
Status (Positive, negative or neutral)	Negative		Negative	
Reversibility	Yes		Yes	
Irreplaceable loss of resources	Yes		Yes	
Mitigability	Yes		Yes	
Mitigation measures:				
An erosion monitoring and mitigation plan should be put in place.				
Cumulative impacts:				
None with mitigation				
Residual impacts:				
None with mitigation				

11 DISCUSSION AND CONCLUSIONS

Flora assessments were conducted during the latter part of the wet season (April 2017). Based on species composition, physiognomy, moisture regime, rockiness, slope and soil properties, six vegetation communities were recorded within the areas studied, namely:

16. *Tarchonanthus – Vachellia* Open Shrubland
17. *Vachellia mellifera* Thicket
18. Pan Vegetation
19. Floodplain Vegetation

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 lowkey 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.

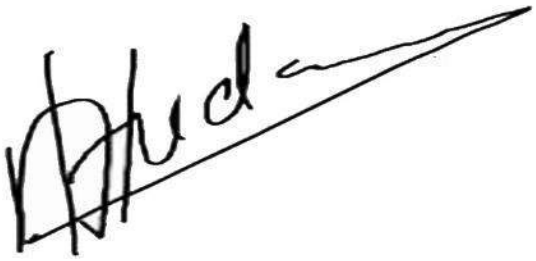
The ecological integrity of the study area ranges between low in the *Vachellia mellifera* Thicket to moderate in the *Tarchonanthus – Vachellia* Open Shrubland vegetation and high in the pan and floodplain vegetation systems. The conservation importance of the study area ranges between moderate in the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

The impact assessment determined that seven main impacts are likely to occur due to the development, namely:

20. Vegetation clearing and subsequent loss of species of concern;
21. Spillage of harmful or toxic substances;
22. Disturbance of biodiversity due to vibration and noise;
23. Habitat degradation and fauna impacts due to dust;
24. Effects on local migrations;
25. Increased prevalence of exotic invasive species; and
26. Increased erosion.

12 LIST OF ACRONYMS AND ABBREVIATIONS

BGIS	Biodiversity Geographic Information Systems
EAP	Environmental Assessment Practitioner
EIS	Ecological Importance and Sensitivity
CARA	Conservation of Agricultural Resources Act
DWA	Department of Water Affairs
GIS	Geographic Information System
NFEPA	National Freshwater Ecosystem Priority Areas
PES	Present Ecological State
REC	Recommended Ecological Category
SANBI	South African National Biodiversity Institute
SCC	Species of Conservation Concern
Sp.	Species
DEA	Department of Environmental Affairs
DSR	Draft Scoping Report
DWS	Department of Water and Sanitation
EIA	Environmental Impact Assessment
EMP	Environmental Management Programme
GN	General Notice
ha	Hectares
I&APs	Interested and affected parties
IFC	International Finance Corporation
km	Kilometre
m	metres
NEMA	National Environmental Management Act, 1998 (Act 107 of 1998)
PS	Performance Standards
SG	Surveyor General



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Adrian Hudson (Senior Ecologist)

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APPENDIX A

Plant species recorded as historically occurring in the relevant QDS according to the SANBI database

Family	Naturalised	Species	Threat status	SA Endemic	Lifecycle	Growth forms
ACANTHACEAE		Blepharis diversispina (Nees) C.B.Clarke	LC	No	Perennial	Dwarf shrub, herb, shrub
ACANTHACEAE		Dicliptera minor C.B.Clarke subsp. minor	LC	No	Annual	Herb
AMARYLLIDACEAE		Nerine laticoma (Ker Gawl.) T.Durand & Schinz	LC	No	Perennial	Geophyte
ASTERACEAE		Cotula anthemoides L.	LC	No	Annual	Herb
ASTERACEAE		Helichrysum argyrosphaerum DC.	LC	No	Annual	Herb
BURSERACEAE		Commiphora glandulosa Schinz	LC	No	Perennial	Shrub, tree
CARYOPHYLLACEAE		Corrigiola litoralis L. subsp. litoralis var. litoralis	LC	No	Annual	Herb
CELASTRACEAE		Gymnosporia senegalensis (Lam.) Loes.	LC	No	Perennial	Shrub, tree
COMBRETACEAE		Terminalia prunioides M.A.Lawson	LC	No	Perennial	Shrub, tree
CONVOLVULACEAE		Ipomoea crassipes Hook. var. crassipes	LC	No	Perennial	Herb, succulent
CONVOLVULACEAE		Merremia kentrocaulos (C.B.Clarke) Rendle	LC	No	Perennial	Climber
EUPHORBIACEAE		Croton megalobotrys Müll.Arg.	LC	No	Perennial	Tree
FABACEAE		Faidherbia albida (Delile) A.Chev.	LC	No	Perennial	Tree
FABACEAE		Indigastrum costatum (Guill. & Perr.) Schrire subsp. macrum (E.Mey.) Schrire	LC	No	Annual	Herb
FABACEAE		Neorautanenia mitis (A.Rich.) Verdc.	LC	No	Perennial	Dwarf shrub, herb, succulent
FABACEAE		Otoptera burchellii DC.	LC	No	Perennial	Climber, herb, shrub
FABACEAE		Philenoptera violacea (Klotzsch) Schrire	LC	No	Perennial	Tree
FABACEAE		Sesbania sesban (L.) Merr. subsp. sesban var. nubica Chiov.	LC	No	Perennial	Shrub, tree
MALVACEAE		Gossypium herbaceum L. subsp. africanum (Watt) Vollesen	LC	No	Perennial	Shrub

MENISPERMACEAE	*	Cocculus hirsutus (L.) Diels	Not Evaluated	No	Perennial	Climber
MOLLUGINACEAE		Limeum fenestratum (Fenzl) Heimerl var. fenestratum	LC	No	Annual	Herb
PEDALIACEAE		Dicerocaryum senecioides (Klotzsch) Abels	LC	No	Perennial	Herb
PEDALIACEAE		Holubia saccata Oliv.	LC	No	Annual or biennial	Herb, succulent
PHYLLANTHACEAE		Flueggea virosa (Roxb. ex Willd.) Voigt subsp. virosa	LC	No	Perennial	Shrub, tree
POACEAE		Brachiaria deflexa (Schumach.) C.E.Hubb. ex Robyns	LC	No	Annual	Graminoid
POACEAE		Eragrostis lehmanniana Nees var. lehmanniana	LC	No	Perennial	Graminoid
POACEAE		Eriochloa meyeriana (Nees) Pilg. subsp. meyeriana	LC	No	Perennial	Graminoid
POACEAE		Ischaemum afrum (J.F.Gmel.) Dandy	LC	No	Perennial	Graminoid
POACEAE		Panicum coloratum L. var. coloratum	LC	No	Perennial	Graminoid
POACEAE	*	Polypogon monspeliensis (L.) Desf.	Not Evaluated	No	Annual	Graminoid
POACEAE		Sporobolus ioclados (Trin.) Nees	LC	No	Perennial	Graminoid
POTAMOGETONACEAE		Potamogeton crispus L.	LC	No	Perennial	Herb, hydrophyte
SAPINDACEAE		Cardiospermum halicacabum L. var. halicacabum	LC	No	Perennial	Climber, shrub
SOLANACEAE		Withania somnifera (L.) Dunal	LC	No	Perennial	Dwarf shrub, herb, shrub
ZYGOPHYLLACEAE		Tribulus zeyheri Sond. subsp. zeyheri	LC	No	Perennial	Dwarf shrub, herb

APPENDIX B

Reptile species occurring in the region of the study area

ORDER	SUBORDER	FAMILY	FAMILY	BIOLOGICAL NAME	COMMON NAME	ENDEMIC
Chelonii	Pleurodira	Testudinae		Psammobates oculifer	Serrated or Kalahari Tent Tortoise	E
		Pelomedusidae		Pelomedusa subrufa	Marsh or Helmeted Terrapin	
Squamata	Serpentes (Ophidia)	Leptotyphlopidae		Typhlops bibronii	Bibron's Blind Snake	E
				Rhinotyphlops lalandei	Delalande's Blind Snake	E
				Leptotyphlops scutifrons	Peter's Thread Snake	
		Colubridae	Boadontinae	Python sebae	African Rock Python	
				Lamprophis fuliginosus	Brown House Snake	
				Lycophidion capense	Common Wolf Snake	
				Pseudoaspis cana	Mole Snake	
			Psammophinae	Prosymna bivittata	Two-striped Shovel-snout	E
				Psammophylax tritaeniatus	Striped Skaapsteker	
				Psammophis trinasalis	Kalahari Sand Snake	
				Psammophis siblians	Leopard and Short snouted Grass snakes	
				Psammophis crucifer	Crossed Whip Snake	E
				Atractaspis bibronii	Southern or Bibron's Burrowing Asp	
				Xenocalamus bicolor	Bicoloured Quill-snouted Snake	
				Dasypeltis scabra	Rhombic Egg Eater	

				Crotaphopeltis hotamboeia	Herald Snake	
				Telescopus semiannulatus	Eastern Tiger Snake	
		Elapidae	Najinae	Naja nivea	Cape Cobra	E
			Viperinae	Bitis arietans	Puff Adder	
	Sauria (Lacertillia)	Scincidae	Lygosomatiinae	Monopeltis capensis	Cape Spade-snouted Worm Lizard	
				Monopeltis sphenorhyncus	Slender Spade-snouted Worm Lizard	
				Dalophia pistillum	Blunt-tailed Worm Lizard	
				Acontias gracilicauda	Thin-tailed Legless Skink	E
				Trachylepis capensis	Cape Skink	
				Mabuya striata	Striped Skink	
				Mabuya varia	Variable Rock Skink	
				Ichnotropis squamulosa	Common Rough-scaled Lizard	
				Nucras intertexta	Spotted Sandveld Lizard	E
				Nucras taeniolata	Ornate Sandveld Lizard	
				Gerrhosaurus flavigularis	Yellow-throated Plated Lizard	
				Cordylus polyzous	Karoo Girdled Lizard	E
			Agamidae	Agama aculeata	Ground Agama	
				Agama atra	Southern Rock Agama	E
				Chamaeleo dilepis	Flap-neck Chamaeleon	

		Gekkonidae	Agamidae	Lygodactylus capensis	Cape Dwarf Gecko	
				Pachydactylus capensis	Cape Gecko	

APPENDIX C

Amphibian species historically occurring in the region of the study area

FAMILY	SPECIES	COMMON NAME	ENDEMIC STATUS	REVISED STATUS
Bufonidae	Schismaderma carens	Red Toad	0	NL
	Amietophrynus gutteralis	Gutteral Toad	0	NL
	Amietophrynus garmani	Eastern Olive Toad	0	NL
	Amietophrynus poweri	Western /olive Toad	0	NL
Hyperoliidae	Kassina senegalensis	Bubbling Kassina	0	NL
Microhylidae	Breviceps adspersus	Desert Rain Frog	0	NL
	Phrynomantis bifasciatus	Marbled Rubber Frog	0	NL
Pipidae	Xenopus laevis	Common Platana	0	NL
Pyxicephalidae	Cacosternum boettgeri	Boettger's Caco	0	NL
	Tomopterna cryptotis	Tremolo Sand Frog	0	NL
	Pyxicephalus adspersus	Giant Bulfrog	0	NT
	Tomopterna tandyi	Tandy's Sand Frog	0	NL
	Amieta angolensis	Common River Frog	0	NL

Species list for the region spanning South Africa, Lesotho and Swaziland. Endemic status:

0 indicates no endemism to southern Africa

1 indicates endemism to southern Africa;

2 indicates endemism to the region (South Africa, Lesotho and Swaziland).

The relevant IUCN status categories are:

Critically Endangered (CR)

Endangered (EN)

Vulnerable (VU)

Near Threatened (NT)

Data Deficient (DD)

Least Concern (LC)

All species without a category are shown as Not Listed (NL)

APPENDIX D

Avifauna species historically occurring in the region of the study area

Roberts 6 Sort	Full Name	*Scientific Name*	RD (Regional, Global)	S	E
1	Common Ostrich	*Struthio camelus*			
55	White-breasted Cormorant	*Phalacrocorax lucidus*			
58	Reed Cormorant	*Phalacrocorax africanus*			
60	African Darter	*Anhinga rufa*			
62	Grey Heron	*Ardea cinerea*			
64	Goliath Heron	*Ardea goliath*			
65	Purple Heron	*Ardea purpurea*			
66	Great Egret	*Egretta alba*			
67	Little Egret	*Egretta garzetta*			
68	Yellow-billed Egret	*Egretta intermedia*			
69	Black Heron	*Egretta ardesiaca*			
71	Western Cattle Egret	*Bubulcus ibis*			
72	Squacco Heron	*Ardeola ralloides*			
74	Green-backed Heron	*Butorides striata*			
76	Black-crowned Night Heron	*Nycticorax nycticorax*			
78	Little Bittern	*Ixobrychus minutus*			
81	Hamerkop	*Scopus umbretta*			
83	White Stork	*Ciconia ciconia*			
84	Black Stork	*Ciconia nigra*	VU, LC		
85	Abdim's Stork	*Ciconia abdimii*	NT, LC		
89	Marabou Stork	*Leptoptilos crumeniferus*	NT, LC		
90	Yellow-billed Stork	*Mycteria ibis*	EN, LC		
91	African Sacred Ibis	*Threskiornis aethiopicus*			
93	Glossy Ibis	*Plegadis falcinellus*			
94	Hadeda Ibis	*Bostrychia hagedash*			
95	African Spoonbill	*Platalea alba*			
96	Greater Flamingo	*Phoenicopterus roseus*	NT, LC		
97	Lesser Flamingo	*Phoeniconaias minor*	NT, NT		
99	White-faced Whistling Duck	*Dendrocygna viduata*			
100	Fulvous Whistling Duck	*Dendrocygna bicolor*			
101	White-backed Duck	*Thalassornis leuconotus*			
102	Egyptian Goose	*Alopochen aegyptiaca*			
103	South African Shelduck	*Tadorna cana*			
104	Yellow-billed Duck	*Anas undulata*			
105	African Black Duck	*Anas sparsa*			
106	Cape Teal	*Anas capensis*			
107	Hottentot Teal	*Anas hottentota*			
108	Red-billed Teal	*Anas erythrorhyncha*			

112	Cape Shoveler	*Anas smithii*			
113	Southern Pochard	*Netta erythrophthalma*			
115	Knob-billed Duck	*Sarkidiornis melanotos*			
116	Spur-winged Goose	*Plectropterus gambensis*			
117	Maccoa Duck	*Oxyura maccoa*	NT, NT		
118	Secretarybird	*Sagittarius serpentarius*	VU, VU		
122	Cape Vulture	*Gyps coprotheres*	EN, VU		
123	White-backed Vulture	*Gyps africanus*	EN, EN		
124	Lappet-faced Vulture	*Torgos tracheliotos*	EN, VU		
126	Black Kite	*Milvus migrans*			
127	Black-shouldered Kite	*Elanus caeruleus*			
132	Tawny Eagle	*Aquila rapax*	EN, LC		
135	Wahlberg's Eagle	*Hieraaetus wahlbergi*			
136	Booted Eagle	*Hieraaetus pennatus*			
140	Martial Eagle	*Polemaetus bellicosus*	EN, VU		
142	Brown Snake Eagle	*Circaetus cinereus*			
143	Black-chested Snake Eagle	*Circaetus pectoralis*			
148	African Fish Eagle	*Haliaeetus vocifer*			
149	Common (Steppe) Buzzard	*Buteo buteo*			
152	Jackal Buzzard	*Buteo rufofuscus*			(*)
156	Ovambo Sparrowhawk	*Accipiter ovampensis*			
157	Little Sparrowhawk	*Accipiter minullus*			
159	Shikra	*Accipiter badius*			
161	Gabar Goshawk	*Melierax gabar*			
162	Pale Chanting Goshawk	*Melierax canorus*			
165	African Marsh Harrier	*Circus ranivorus*	EN, LC		
166	Montagu's Harrier	*Circus pygargus*			
167	Pallid Harrier	*Circus macrourus*	NT, NT		
169	African Harrier-Hawk	*Polyboroides typus*			
170	Western Osprey	*Pandion haliaetus*			
171	Peregrine Falcon	*Falco peregrinus*			
172	Lanner Falcon	*Falco biarmicus*	VU, LC		
178	Red-necked Falcon	*Falco chicquera*			
179	Red-footed Falcon	*Falco vespertinus*	NT, NT		
180	Amur Falcon	*Falco amurensis*			
181	Rock Kestrel	*Falco rupicolus*			
182	Greater Kestrel	*Falco rupicoloides*			
183	Lesser Kestrel	*Falco naumanni*			
188	Coqui Francolin	*Peliperdix coqui*			
189	Crested Francolin	*Dendroperdix sephaena*			

193	Orange River Francolin	*Scleroptila gutturalis*			
199	Swainson's Spurfowl	*Pternistis swainsonii*			
200	Common Quail	*Coturnix coturnix*			
201	Harlequin Quail	*Coturnix delegorguei*			
203	Helmeted Guineafowl	*Numida meleagris*			
205	Common (Kurrichane) Buttonquail	*Turnix sylvaticus*			
208	Blue Crane	*Anthropoides paradiseus*	NT, VU		
210	African Rail	*Rallus caerulescens*			
212	African Crake	*Crecopsis egregia*			
213	Black Crake	*Amaurornis flavirostra*			
215	Baillon's Crake	*Porzana pusilla*			
223	African (Purple) Swamphen	*Porphyrio madagascariensis*			
226	Common Moorhen	*Gallinula chloropus*			
228	Red-knobbed coot	*Fulica cristata*			
230	Kori Bustard	*Ardeotis kori*	NT, NT		
237	Red-crested Korhaan	*Lophotis ruficrista*			
239.1	Northern Black Korhaan	*Afrotis afraoides*			
240	African Jacana	*Actophilornis africanus*			
242	Greater Painted-snipe	*Rostratula benghalensis*	VU, LC		
245	Common Ringed Plover	*Charadrius hiaticula*			
246	White-fronted Plover	*Charadrius marginatus*			
248	Kittlitz's Plover	*Charadrius pecuarius*			
249	Three-banded Plover	*Charadrius tricollaris*			
252	Caspian Plover	*Charadrius asiaticus*			
255	Crowned Lapwing	*Vanellus coronatus*			
258	Blacksmith Lapwing	*Vanellus armatus*			
262	Ruddy Turnstone	*Arenaria interpres*			
264	Common Sandpiper	*Actitis hypoleucos*			
266	Wood Sandpiper	*Tringa glareola*			
269	Marsh Sandpiper	*Tringa stagnatilis*			
270	Common Greenshank	*Tringa nebularia*			
272	Curlew Sandpiper	*Calidris ferruginea*			
274	Little Stint	*Calidris minuta*			
284	Ruff	*Philomachus pugnax*			
287	Black-tailed Godwit	*Limosa limosa*	NA, NT	V	
294	Pied Avocet	*Recurvirostra avosetta*			
295	Black-winged Stilt	*Himantopus himantopus*			
297	Spotted Thick-knee	*Burhinus capensis*			
299	Burchell's Courser	*Cursorius rufus*	VU, LC		

300	Temminck's Courser	*Cursorius temminckii*			
301	Double-banded Courser	*Rhinoptilus africanus*			
303	Bronze-winged Courser	*Rhinoptilus chalcopterus*			
305	Black-winged Pratincole	*Glareola nordmanni*	NT, NT		
315	Grey-headed Gull	*Chroicocephalus cirrocephalus*			
322	Caspian Tern	*Sterna caspia*	VU, LC		
338	Whiskered Tern	*Chlidonias hybrida*			
339	White-winged Tern	*Chlidonias leucopterus*			
344	Namaqua Sandgrouse	*Pterocles namaqua*			
347	Double-banded Sandgrouse	*Pterocles bicinctus*			
348	Rock Dove	*Columba livia*			
349	Speckled Pigeon	*Columba guinea*			
350	African Olive Pigeon	*Columba arquatrix*			
352	Red-eyed Dove	*Streptopelia semitorquata*			
354	Cape Turtle Dove	*Streptopelia capicola*			
355	Laughing Dove	*Streptopelia senegalensis*			
356	Namaqua Dove	*Oena capensis*			
373	Grey Go-away-bird	*Corythaixoides concolor*			
374	Common Cuckoo	*Cuculus canorus*			
375	African Cuckoo	*Cuculus gularis*			
377	Red-chested Cuckoo	*Cuculus solitarius*			
378	Black Cuckoo	*Cuculus clamosus*			
380	Great Spotted Cuckoo	*Clamator glandarius*			
381	Levaillant's Cuckoo	*Clamator levaillantii*			
382	Jacobin Cuckoo	*Clamator jacobinus*			
385	Klaas's Cuckoo	*Chrysococcyx klaas*			
386	Diederik Cuckoo	*Chrysococcyx caprius*			
391	Burchell's Coucal	*Centropus burchellii*			
392	Western Barn Owl	*Tyto alba*			
395	Marsh Owl	*Asio capensis*			
396	African Scops Owl	*Otus senegalensis*			
398	Pearl-spotted Owlet	*Glaucidium perlatum*			
401	Spotted Eagle-Owl	*Bubo africanus*			
402	Verreaux's Eagle-Owl	*Bubo lacteus*			
404	European Nightjar	*Caprimulgus europaeus*			
406	Rufous-cheeked Nightjar	*Caprimulgus rufigena*			
408	Freckled Nightjar	*Caprimulgus tristigma*			
411	Common Swift	*Apus apus*			
412	African Black Swift	*Apus barbatus*			

415	White-rumped Swift	*Apus caffer*			
416	Horus Swift	*Apus horus*			
417	Little Swift	*Apus affinis*			
418	Alpine Swift	*Tachymarptis melba*			
421	African Palm Swift	*Cypsiurus parvus*			
425	White-backed Mousebird	*Colius colius*			
426	Red-faced Mousebird	*Urocolius indicus*			
428	Pied Kingfisher	*Ceryle rudis*			
429	Giant Kingfisher	*Megaceryle maxima*			
431	Malachite Kingfisher	*Alcedo cristata*			
432	African Pygmy Kingfisher	*Ispidina picta*			
435	Brown-hooded Kingfisher	*Halcyon albiventris*			
437	Striped Kingfisher	*Halcyon chelicuti*			
438	European Bee-eater	*Merops apiaster*			
440	Blue-cheeked Bee-eater	*Merops persicus*			
443	White-fronted Bee-eater	*Merops bullockoides*			
444	Little Bee-eater	*Merops pusillus*			
445	Swallow-tailed Bee-eater	*Merops hirundineus*			
446	European Roller	*Coracias garrulus*	NT, NT		
447	Lilac-breasted Roller	*Coracias caudatus*			
449	Purple Roller	*Coracias naevius*			
451	African Hoopoe	*Upupa africana*			
452	Green Wood-hoopoe	*Phoeniculus purpureus*			
454	Common Scimitarbill	*Rhinopomastus cyanomelas*			
457	African Grey Hornbill	*Tockus nasutus*			
459	Southern Yellow-billed Hornbill	*Tockus leucomelas*			
464	Black-collared Barbet	*Lybius torquatus*			
465	Acacia Pied Barbet	*Tricholaema leucomelas*			
470	Yellow-fronted Tinkerbird	*Pogoniulus chrysoconus*			
473	Crested Barbet	*Trachyphonus vaillantii*			
474	Greater Honeyguide	*Indicator indicator*			
476	Lesser Honeyguide	*Indicator minor*			
481	Bennett's Woodpecker	*Campethera bennettii*			
483	Golden-tailed Woodpecker	*Campethera abingoni*			
486	Cardinal Woodpecker	*Dendropicos fuscescens*			
487	Bearded Woodpecker	*Dendropicos namaquus*			
493	Monotonous Lark	*Mirafra passerina*			
494	Rufous-naped Lark	*Mirafra africana*			
495.2	Eastern clapper Lark	*Mirafra fasciolata*			
497	Fawn-coloured Lark	*Calendulauda africanoides*			

498	Sabota Lark	*Calendulauda sabota*			
501	Short-clawed Lark	*Certhilauda chuana*	NT, LC		
506	Spike-heeled Lark	*Chersomanes albofasciata*			
507	Red-capped Lark	*Calandrella cinerea*			
508	Pink-billed Lark	*Spizocorys conirostris*			
515	Chestnut-backed Sparrow-lark	*Eremopterix leucotis*			
516	Grey-backed Sparrow-lark	*Eremopterix verticalis*			
518	Barn Swallow	*Hirundo rustica*			
520	White-throated Swallow	*Hirundo albigularis*			
523	Pearl-breasted Swallow	*Hirundo dimidiata*			
524	Red-breasted Swallow	*Cecropis semirufa*			
526	Greater Striped Swallow	*Cecropis cucullata*			
528	South African Cliff Swallow	*Petrochelidon spilodera*			BSLS
529	Rock Martin	*Hirundo fuligula*			
530	Common House Martin	*Delichon urbicum*			
532	Sand Martin	*Riparia riparia*			
533	Brown-throated Martin	*Riparia paludicola*			
534	Banded Martin	*Riparia cincta*			
541	Fork-tailed Drongo	*Dicrurus adsimilis*			
543	Eurasian Golden Oriole	*Oriolus oriolus*			
547	Cape Crow	*Corvus capensis*			
548	Pied crow	*Corvus albus*			
552	Ashy Tit	*Parus cinerascens*			
558	Grey Penduline-Tit	*Anthoscopus minutus*			
560	Arrow-marked Babbler	*Turdoides jardineii*			
563	Southern Pied Babbler	*Turdoides bicolor*			
567	African Red-eyed Bulbul	*Pycnonotus nigricans*			
577.1	Karoo Thrush	*Turdus smithi*			(*)
580	Groundscraper Thrush	*Turdus litsitsirupa*			
583	Short-toed Rock Thrush	*Monticola brevipes*			
586	Mountain Wheatear	*Oenanthe monticola*			
587	Capped Wheatear	*Oenanthe pileata*			
589	Familiar Chat	*Cercomela familiaris*			
591	Sickle-winged Chat	*Cercomela sinuata*			(*)
593	Mocking Cliff Chat	*Thamnolaea cinnamomeiventris*			
595	Ant-eating Chat	*Myrmecocichla formicivora*			
596	African StoneChat	*Saxicola torquatus*			
601	Cape Robin-Chat	*Cossypha caffra*			
602	White-throated Robin-Chat	*Cossypha humeralis*			

615	Kalahari Scrub Robin	*Erythropygia paena*			
619	Garden Warbler	*Sylvia borin*			
620	Common Whitethroat	*Sylvia communis*			
621	Chestnut-vented Tit-Babbler	*Sylvia subcaerulea*			
625	Icterine Warbler	*Hippolais icterina*			
628	Great Reed Warbler	*Acrocephalus arundinaceus*			
633	Marsh Warbler	*Acrocephalus palustris*			
634	Sedge Warbler	*Acrocephalus schoenobaenus*			
635	Lesser Swamp Warbler	*Acrocephalus gracilirostris*			
638	Little Rush Warbler	*Bradypterus baboecala*			
643	Willow Warbler	*Phylloscopus trochilus*			
651	Long-billed crombec	*Sylvietta rufescens*			
653	Yellow-bellied Eremomela	*Eremomela icteropygialis*			
657.1	Grey-backed Camaroptera	*Camaroptera brevicaudata*			
658	Barred Wren-Warbler	*Calamonastes fasciolatus*			
664	Zitting Cisticola	*Cisticola juncidis*			
665	Desert Cisticola	*Cisticola aridulus*			
666	Cloud Cisticola	*Cisticola textrix*			(*)
667	Wing-snapping Cisticola	*Cisticola ayresii*			
672	Rattling Cisticola	*Cisticola chiniana*			
677	Levaillant's Cisticola	*Cisticola tinniens*			
679	Lazy Cisticola	*Cisticola aberrans*			
681	Neddicky	*Cisticola fulvicapilla*			
683	Tawny-flanked Prinia	*Prinia subflava*			
685	Black-chested Prinia	*Prinia flavicans*			
688	Rufous-eared Warbler	*Malcorus pectoralis*			
689	Spotted flycatcher	*Muscicapa striata*			
695	Marico flycatcher	*Bradornis mariquensis*			
697	Chat Flycatcher	*Bradornis infuscatus*			
698	Fiscal Flycatcher	*Sigelus silens*			(*)
701	Chinspot Batis	*Batis molitor*			
703	Pririt Batis	*Batis pririt*			
706	Fairy Flycatcher	*Stenostira scita*			(*)
710	African Paradise Flycatcher	*Terpsiphone viridis*			
711	African Pied Wagtail	*Motacilla aguimp*			
713	Cape Wagtail	*Motacilla capensis*			
714	Western Yellow Wagtail	*Motacilla flava*			
716	African Pipit	*Anthus cinnamomeus*			
717	Long-billed Pipit	*Anthus similis*			

718	Plain-backed Pipit	*Anthus leucophrys*			
719	Buffy Pipit	*Anthus vaalensis*			
720	Striped Pipit	*Anthus lineiventris*			
727	Cape Longclaw	*Macronyx capensis*			
731	Lesser Grey Shrike	*Lanius minor*			
732	Southern (Common) Fiscal	*Lanius collaris*			
733	Red-backed Shrike	*Lanius collurio*			
736	Southern Boubou	*Laniarius ferrugineus*			
739	Crimson-breasted Shrike	*Laniarius atrococcineus*			
741	Brubru	*Nilaus afer*			
743	Brown-crowned Tchagra	*Tchagra australis*			
746	Bokmakierie	*Telophorus zeylonus*			
758	Common Myna	*Acridotheres tristis*		I	
760	Wattled Starling	*Creatophora cinerea*			
765	Greater Blue-eared Starling	*Lamprotornis chalybaeus*			
772	Red-billed Oxpecker	*Buphagus erythrorhynchus*			
779	Marico Sunbird	*Cinnyris mariquensis*			
787	White-bellied Sunbird	*Cinnyris talatala*			
788	Dusky Sunbird	*Cinnyris fuscus*			
792	Amethyst Sunbird	*Chalcomitra amethystina*			
796	Cape White-eye	*Zosterops virens*			(*)
798	Red-billed Buffalo Weaver	*Bubalornis niger*			
799	White-browed Sparrow-Weaver	*Plocepasser mahali*			
800	Sociable Weaver	*Philetairus socius*			
801	House Sparrow	*Passer domesticus*		I	
802	Great Sparrow	*Passer motitensis*			
803	Cape Sparrow	*Passer melanurus*			
804	Southern Grey-headed Sparrow	*Passer diffusus*			
806	Scaly-feathered Finch	*Sporopipes squamifrons*			
813	Cape Weaver	*Ploceus capensis*			(*)
814	Southern Masked Weaver	*Ploceus velatus*			
821	Red-billed Quelea	*Quelea quelea*			
824	Southern Red Bishop	*Euplectes orix*			
826	Yellow-crowned Bishop	*Euplectes afer*			
829	White-winged Widowbird	*Euplectes albonotatus*			
831	Red-collared Widowbird	*Euplectes ardens*			
832	Long-tailed Widowbird	*Euplectes progne*			
834	Green-winged Pytilia	*Pytilia melba*			
841	Jameson's Firefinch	*Lagonosticta rhodopareia*			

842	Red-billed Firefinch	*Lagonosticta senegala*			
844	Blue Waxbill	*Uraeginthus angolensis*			
845	Violet-eared Waxbill	*Uraeginthus granatinus*			
846	Common Waxbill	*Estrilda astrild*			
847	Black-faced Waxbill	*Estrilda erythronotos*			
852	African Quail-finch	*Ortygospiza fuscocrissa*			
854	Orange-breasted Waxbill	*Amandava subflava*			
856	Red-headed Finch	*Amadina erythrocephala*			
860	Pin-tailed Whydah	*Vidua macroura*			
861	Shaft-tailed Whydah	*Vidua regia*			
862	Long-tailed Paradise Whydah	*Vidua paradisaea*			
867	Village Indigobird	*Vidua chalybeata*			
869	Yellow-fronted Canary	*Crithagra mozambica*			
878	Yellow Canary	*Crithagra flaviventris*			
884	Golden-breasted Bunting	*Emberiza flaviventris*			
885	Cape Bunting	*Emberiza capensis*			
886	Cinnamon-breasted Bunting	*Emberiza tahapisi*			
887	Lark-like Bunting	*Emberiza impetuani*			
126.1	Yellow-billed Kite	*Milvus aegyptius*			

Red Data (RD); Regional*, Global	**Status in South Africa (S)**	**Endemism in south Africa (E)**
CR = Critically Endangered	V = vagrant	Endemism in South Africa (E) (not southern Africa as in field guides)
EN = Endangered	I = introduced	
VU = Vulnerable		* = endemic
NT = Near Threatened		
LC = Least Concern		SLS = endemic to South Africa, Lesotho and Swaziland
EX = Extinct (regionally)		(*) = near endemic (i.e. ~70% or more of population in RSA)
DD= Data Deficient		B* = breeding endemic

APPENDIX E

Mammal species occurring in the region of the study area

FAMILY	SUBFAMILY	BIOLOGICAL NAME	COMMON NAME
ERINACEIDAE (Hedgehogs)		Atelerix frontalis	Southern African Hedgehog
SORICIDAE (Shrews)		Crocidura fuscomurina	Tiny Musk Shrew
		Crocidura cyanea	Reddish-grey Musk Shrew
		Crocidura hirta	Lesser Red Musk Shrew
NYCTERIDAE (Slit-faced Bats)		Nycteris thebiaca	Egyptian Slit-faced Bat
RHINOLOPHIDAE (Horseshoe Bats)		Rhinolophus clivosus	Geoffroy's Horseshoe Bat
VESPERTILIONIDAE (Vesper Bats)	MINIOPTERINAE	Miniopterus schriebersii	Schrieber's Long-fingered Bat
	VESPERTILIONINAE	Neoromicia capensis	Cape Serotine Bat
		Tadarida aegyptiaca	Egyptian Free-tailed Bat
CERCOPITHECIDAE (Baboons and Monkeys)		Papio cynocephalus ursinus	Savanna Baboon
MANIDAE (Pangolins)		Manis temminckii	Ground Pangolin
LEPORIDAE (Hares and Rabbits)		Lepus capensis	Cape Hare
		Lepus saxatillis	Scrub Hare
SCIURIDAE (Squirrels)		Xerus inauris	Southern African Ground Squirrel
PEDETIDAE (Springhares)		Pedetes capensis	Springhare
BATHYERGIDAE (Rodent Moles / Mole Rats)		Cryptomys hottentotus	Common (African) Mole-rat
HYSTRICIDAE (Porcupine)		Hystrix africaeaustralis	Cape Porcupine
MURIDAE (Rats and Mice)		Mystromys albicaudatus	White-tailed Mouse
		Saccostomus campestris	Pouched Mouse
		Steatomys krebsii	Krebb's Fat Mouse
		Malacothrix typica	Gerbil Mouse

	GERBILLINAE	Desmodillus auricularis	Cape Short-tailed Gerbil
		Gerbillurus paeba	Hairy-footed Gerbil
		Tatera leucogaster	Bushveld Gerbil
		Tatera brantsii	Highveld Gerbil
		Michaelamys namaquensis	Namaqua Rock Mouse
		Aethomys chrysophilus	Red Veld Rat
		Rhabdomys pumilio	Four-striped Grass Mouse
		Mus musculus	House Mouse
		Thallomys paedulcus	Vachellia Rat
		Thallomys nigricaudatus	Black-tailed Tree Rat
		Mastomys natalensis	Natal Multimammate Mouse
		Mastomys coucha	Southern Multimammate Mouse
		Rattus rattus	House Rat
		Otomys angoniensis	Angoni Vlei Rat
		Otomys irroratus	Vlei Rat
CARNIVORA: Canidae		Vulpes chama	Cape Fox
		Canis mesomelas	Black-backed Jackal
Mustelidae (Otters, Badger, Weasel and Polecat)		Mellivora capensis	Honey Badger
		Poecilogale albinucha	African Striped Weasel
		Ictonyx striatus	Striped Polecat
		Galerella pulverulenta	Small Grey Mongoose
		Gallerella sanguinea	Slender Mongoose

		Cynictis penicillata	Yellow Mongoose
Viverridae		Genetta genetta	Small-spotted Genet
Hyaenidae		Parahayaena brunnea	Brown Hyaena
Protelidae		Proteles cristatus	Aardwolf
Felidae		Felis sylvestris lybica	African Wild Cat
		Felis nigripes	Small Spotted Cat
		Caracal caracal	Caracal
Orycteropodidae		Orycteropus afer	Aardvark
		Connochaetes gnou	Black Wildebeest
		Damaliscus pygargus phillipsi	Blesbok
		Raphicerus campestris	Steenbok

APPENDIX F

Details of Specialist

Appointment of specialist

Hudson Ecology Pty Ltd was commissioned by Envirogistix Pty Ltd to provide specialist consulting services for the Basic Impact Assessment for the proposed developments at the Khumani Mine near Kathu in the Northern Cape Province. The consulting services comprise an assessment of potential impacts on the flora, fauna, vegetation and ecology in the study area by the proposed project.

Details of specialist

Adrian Hudson
Hudson Ecology Pty Ltd
P.O. Box 19287
Noordbrug
Potchefstroom
2522
Telephone: 018 294 5448
Cell: 082 344 2758
Email: adrian@hudsonecology.co.za

Summary of expertise

Adrian Hudson is the owner, director and senior ecologist Hudson Ecology Pty Ltd. In this role, he provides assessments which encompass all aspects of terrestrial and wetland ecological studies including (but not limited to) baseline ecological assessments, ecological impact assessments and biodiversity management plans. He also has considerable experience in conservation, and conducted studies in veld management, stocking rates (wildlife and domestic) for a number of companies and organisations. Projects, unless otherwise requested by the client, are conducted according to the IFC Performance standard 6 criteria and Adrian Hudson is, therefore, *au fait* with the requirements and criteria of the Standard. Adrian has reviewed a number of projects throughout Africa for IFC Performance Standard 6 compliance, including Hassai Gold Mine in Sudan and Konkola North Copper mine in Zambia.

Adrian Hudson is a qualified ecologist and ornithologist who holds a Master's of Science degree in Ecology from the North West University and is currently completing his PhD in Ecology at the same institution. Adrian is currently still closely associated with the university as a supervisor for Honours and Masters degree students, lecturing of short courses at the university and co-authoring of scientific articles with faculty members of the university. Adrian is a member of the Zoological Society of Southern Africa and the International Society of Conservation Biology. Adrian is also a member of the Department of Environmental Affairs and Tourism (South African Government Department) roster of experts on ecology and desertification and a reviewer for a number of internationally accredited scientific journals. He is also accredited with authorship of a number of articles published in scientific journals.

Before founding Hudson Ecology Pty Ltd. in September 2014, Adrian worked for 18 years for a diverse range of organizations, including Natal Parks Board, North West University, United Nations Environmental Program /Global Environment Facility, ECOSUN cc and Golder Associates Africa Pty Ltd. In these roles, Adrian was responsible for anti- poaching, lecturing, research and consulting respectively. Thus far Adrian has worked as a consulting ecologist on more than 90 projects in 20 countries, including projects in Angola, South Africa, Lesotho, Swaziland, Namibia, Botswana, Mozambique, Zambia, Tanzania, Central African Republic, Democratic Republic of Congo, Sudan, Guinea, Guinea-Bissau, Uzbekistan and Liberia.

Independence

Hudson Ecology Pty Ltd and its Directors have no connection with Assmang Mining. Hudson Ecology Pty Ltd is not a subsidiary, legally or financially, of the proponent. Remuneration for services by the proponent in relation to this project is not linked to approval by decision-making authorities responsible for authorising this proposed project and the consultancy has no interest in secondary or downstream developments as a result of the authorisation of this project. Adrian Hudson is an independent consultant to Envirogistix Pty Ltd and has no business, financial, personal or other interest in the activity, application or appeal in respect of which he was appointed other than fair remuneration for work performed in connection with the activity, application or appeal. There are no circumstances that compromise the objectivity of this specialist performing such work. The percentage work received directly or indirectly from the proponent in the last twelve months is approximately 0% of turnover.

Scope and purpose of report

The scope and purpose of the report are reflected in the Terms of reference section of this report

Conditions relating to this report

This report as well as the information contained therein remains the property of Hudson Ecology Pty Ltd until such time as Hudson Ecology Pty Ltd has been remunerated in full for the report and preceding field investigation. As such, until payment is received this report may not be used for insertion in orther reports, placed in the public domain or be passed on to- or reproduced for any third party.

The findings, results, observations, conclusions and recommendations given in this report are based on the author's best scientific and professional knowledge as well as available information. HudsonEcology Pty Ltd and its staff reserve the right to modify aspects of the report, including the recommendations, if and when new information may become available from ongoing research or further work in this field, or pertaining to this investigation.

This report must not be altered or added to without the prior written consent of the author. This also refers to electronic copies of this report which are supplied for the purposes of inclusion as part of other reports, including main reports. Similarly, any recommendations, statements or conclusions drawn from or based on this report must make reference to this report. If these form part of a main report relating to this investigation or report, this report must be included in its entirety as an appendix or separate section to the main report.

APPENDIX G

CONTROL SHEET FOR SPECIALIST REPORT

The table below lists the specific requirements for specialist studies, according to the 2014 EIA Regulations (South Africa, 2014)

Activity	Yes	No	Comment
Details of: i the peson who prepared the report; and	√		
ii the expertise of that person to carry out the specialist study or specialised process	√		
	√		
ii. the expertise of that person to carry out the specialist study or specialised process	√		
A declaration that the person is independent in a form as may be specified by the competent authority	√		
An indication of the scope of, and the purpose for which, the report was prepared	√		
A description of the methodology adopted in preparing the report or carrying out the specialised process	√		
A description of any assumptions made and any uncertainties or gaps in knowledge	√		
A description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives, on the environment	√		
Recommendations in respect of any mitigation measures that should be considered by the applicant and the competent authority	√		
A description of any consultation process that was undertaken during the course of carrying out the study	√		
A summary and copies of any comments that were received during any consultation process	√		
Any other information requested by the competent authority	√		

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P.O. Box 19287
Noordbrug
2522
South Africa

280 Beyers Naude Ave
Potchefstroom
2531

Tel +27 (0) 18 2945448

Mobile +27 (0)82 344 2758

http://www.hudsonecology.co.za

Annexure 7: Heritage Study

Palaeontological desktop study of a 10 ha expansion of the Khumani low grade mine at Sishen, Northern Cape Province.

Report prepared by Palaeo Field Services, PO Box 38806 Langenhovenpark 9330.

28 June 2017

Summary

The desktop investigation indicates that the development footprint is underlain by Palaeoproterozoic Gamagarra Formation sediments that are not considered to be palaeontologically 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.

Introduction

The report is a preliminary assessment of potential palaeontological impact with regard to proposed expansion covering approximately 10 ha located on the Farm King 561 near Shishen in the Northern Cape Province (**Fig. 1 & 2**).

Site Coordinates:

A) 27°50'50.27"S 23° 0'1.34"E

B) 27°50'59.52"S 23° 0'19.64"E

C) 27°51'4.35"S 23° 0'18.70"E

D) 27°50'58.53"S 23° 0'8.52"E

E) 27°50'52.89"S 22°59'59.33"E

Methodology

The assessment was carried out in accordance with National Heritage Resources Act 25 of 1999 with the aim to assess the potential impact on palaeontological heritage resources that may result from the proposed development. The palaeontological significance of the affected areas were evaluated through a desktop study and carried out on the basis of existing field data, database information and published literature.

Assumptions and Limitations

The assessment provided within this report is based upon a desktop study without the benefit of a site visit. As such, the presentation of geological units present within the study area is derived from the 1:1 000 000 scale map of South Africa and the 1:250 000 scale geological map 2722 Kuruman, which may vary in their accuracy. It is also assumed, for the sake of prudence, that fossil remains are always uniformly distributed in fossil-bearing rock units, although in reality their distribution may vary significantly.

Background

The proposed development footprint is located on degraded terrain that is underlain by Palaeoproterozoic sediments of the locally ferrugenised Gamagarra Formation (Olifantshoek Supergroup) (**Fig. 3**). The Gamagarra Formation consists of shales with interbedded quartzite that are underlain by a basal haemitite-pebble conglomerate (Moen 2006). The formation is not considered to be palaeontologically sensitive. Palaeontologally significant superficial deposits in the region are largely represented by pan deposits, such as the nearby Kathu Pan dolines (centre c. 27° 39'50"S, E3° 0'30"E) that were developed within the Tertiary sequence of the Kalahari Group (Butzer *et al.,* 1978; Beaumont *et al.,* 1984; Beaumont 2004).

Impact Statement Recommendation

The desktop investigation indicates that the development footprint is underlain by Gamagarra Formation sediments that are 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 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 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.

References

Beaumont, P.B., 2004. Kathu Pan and Kathu Townlands/Uitkoms. McGregor Museum. In: Morris, D., Beaumont, P.B. (Eds.), *Archaeology in the Northern Cape: Some Key Sites. Southern African Association for Archaeologists* Postconference Excursion, Kimberley, pp. 50–53.

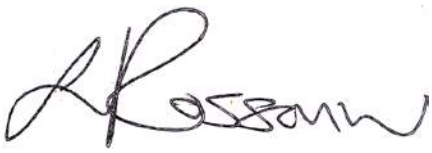
Beaumont, P.B., Van Zinderen Bakker, E.M., Vogel, J.C., 1984. Environmental changes since 32,000 BP at Kathu Pan, Northern Cape. In: Vogel, J.C. (Ed.), *Late Cenozoic Palaeoclimates of the Southern Hemisphere*. Balkema, Rotterdam, pp. 329–338.

Butzer, K.W., Struckenrath, R., Bruzewicz, A.J., Helgren, D.M., 1978. Late Cenozoic paleoclimates of the Ghaap Escarpment, Kalahari margin, South Africa. *Quaternary Research* 10, 310–339.

Moen, H.F.G. 2006 The Olifantshoek Supergroup **In**: Johnson, M.R, Anhaeusser, C.R. and Thomas, R.J. (Eds.) *The geology of South Africa*, pp. 237-260. Geological Society of South Africa, Johannesburg & the Council for Geoscience, Pretoria.

DECLARATION OF INDEPENDENCE

I, Lloyd Rossouw, declare that I act as an independent specialist consultant. I do not have or will not have any financial interest in the undertaking of the activity other than remuneration for work as stipulated in the terms of reference. I have no interest in secondary or downstream developments as a result of the authorization of this project and have no conflicting interests in the undertaking of the activity.



28 / 06 / 2017

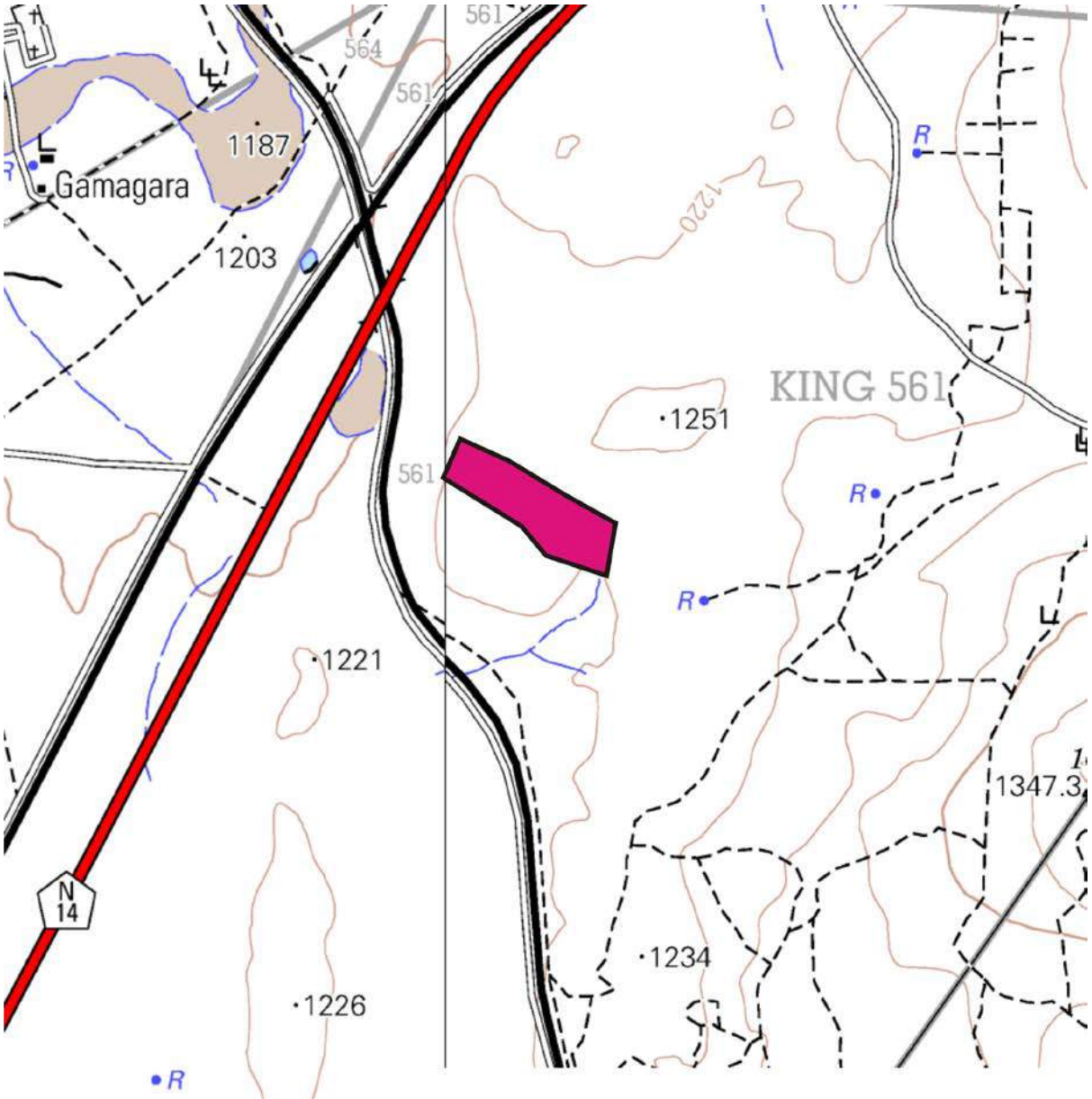


Figure 1. Map of the development footprint at Sishen (portion of 1:50 000 scale topographic 2723CC Ga-Thlose).

Figure 2 Aerial view and layout of the study area.

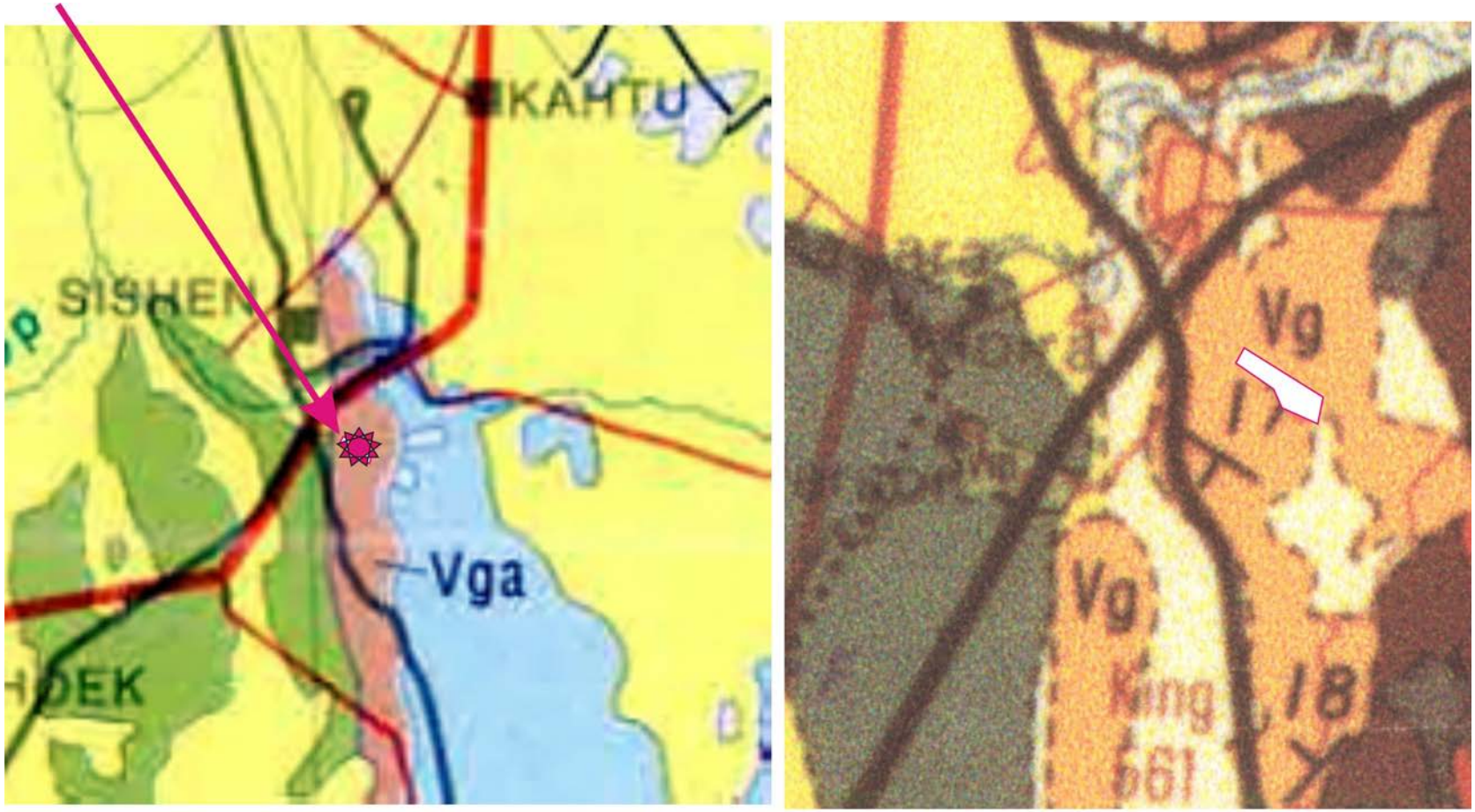


Figure 3. According to the 1:1 Ma scale geological map of SA and the 1:250 000 scale geological map 2722 Kuruman, the study area is underlain by ferrugenised sediments of the Palaeoproterozoic Gamagarra Formation (Olifantshoek Supergroup, *Vga*, *Vg*).

HERITAGE IMPACT ASSESSMENT

(REQUIRED UNDER SECTION 38(8) OF THE NHRA (No. 25 OF 1999)

FOR THE PROPOSED KHUMANI IRON ORE MINE PROJECT, SISHEN, NORTHERN CAPE

Type of development:

Mine infrastructure development

Client:

Envirogistics

Client info:

Tanja Bekker

E – mail: tanja@envirogistics.co.za

Developer: DRA Khumani

HCAC - Heritage Consultants

Private Bag X 1049

Suite 34

Modimolle

0510

Tel: 082 373 8491

Fax: 086 691 6461

E-Mail: jaco.heritage@gmail.com

Report Author:

Mr. J. van der Walt

Project Reference:

HCAC Project number 2170511

Report date:

May 2017

APPROVAL PAGE

Project Name	**Khumani Mine**
Report Title	Heritage Impact Assessment Khumani Mine
Authority Reference Number	TBC
Report Status	Final Report
Applicant Name	DRA Khumani

	Name	**Signature**	**Qualifications and Certifications**	**Date**
Document Compilation	Jaco van der Walt		MA Archaeology ASAPA #159	May 2017

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Date	Report Reference Number	Description of Amendment

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The findings, results, observations, conclusions and recommendations given in this report are based on the author's best scientific and professional knowledge as well as available information. The report is based on survey and assessment techniques which are limited by time and budgetary constraints relevant to the type and level of investigation undertaken and HCAC reserves the right to modify aspects of the report including the recommendations if and when new information becomes available from ongoing research or further work in this field, or pertaining to this investigation.

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- The technology described in any report; and
- Recommendations delivered to the client.

Should the applicant wish to utilise any part of, or the entire report, for a project other than the subject project, permission must be obtained from HCAC to do so. This will ensure validation of the suitability and relevance of this report on an alternative project.

REPORT OUTLINE

Appendix 6 of the GNR 326 EIA Regulations published on 7 April 2017 provides the requirements for specialist reports undertaken as part of the environmental authorisation process. In line with this, Table 1 provides an overview of Appendix 6 together with information on how these requirements have been met.

Table 1. Specialist Report Requirements.

Requirement from Appendix 6 of GN 326 EIA Regulation 2017	Chapter
(a) Details of - (i) the specialist who prepared the report; and (ii) the expertise of that specialist to compile a specialist report including a curriculum vitae	Section a Section 12
(b) Declaration that the specialist is independent in a form as may be specified by the competent authority	*Declaration of Independence*
(c) Indication of the scope of, and the purpose for which, the report was prepared	Section 1
(cA)an indication of the quality and age of base data used for the specialist report	Section 3.4 and 7.1.
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	9
(d) Duration, Date and season of the site investigation and the relevance of the season to the outcome of the assessment	Section 3.4
(e) Description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used	Section 3
(f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	Section 8 and 9
(g) Identification of any areas to be avoided, including buffers	Section 9
(h) Map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers	Section 8
(I) Description of any assumptions made and any uncertainties or gaps in knowledge	Section 3.7
(j) a description of the findings and potential implications of such findings on the impact of the proposed activity **including identified alternatives on the environment** or activities;	Section 9
(k) Mitigation measures for inclusion in the EMPr	Section 9 and 10
(l) Conditions for inclusion in the environmental authorisation	Section 9 and 10
(m) Monitoring requirements for inclusion in the EMPr or environmental authorisation	Section 9 and 10
(n) Reasoned opinion - (i) as to whether the proposed activity, activities or portions thereof should be authorised; (iA) regarding the acceptability of the proposed activity or activities; and (ii) if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan	Section 10.2
(o) Description of any consultation process that was undertaken during the course of preparing the specialist report	Section 6
(p) A summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	Refer to BA report
(q) Any other information requested by the competent authority	Section 10

Executive Summary

DRA Khumani appointed Envirogistics to conduct a Basic Assessment for a new Sorter Plant and the establishment of two new Silos/Magazines (King and Bruce Silos) at Khumani Mine, in the Northern Cape. HCAC was appointed to conduct a Heritage Impact Assessment of these three project components to determine the presence of cultural heritage sites and the impact of the proposed development on these non-renewable resources. The study areas were assessed both on desktop level and by a field survey. The field survey was conducted as a non-intrusive pedestrian survey to cover the extent of the development footprint.

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.

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.

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Declaration of Independence

Specialist Name	Jaco van der Walt
Declaration of Independence	I declare, as a specialist appointed in terms of the National Environmental Management Act (Act No 108 of 1998) and the associated 2014 Environmental Impact Assessment (EIA) Regulations, that I: • I act as the independent specialist in this application; • I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant; • I declare that there are no circumstances that may compromise my objectivity in performing such work; • I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity; • I will comply with the Act, Regulations and all other applicable legislation; • I have no, and will not engage in, conflicting interests in the undertaking of the activity; • I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority; • All the particulars furnished by me in this form are true and correct; and • I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.
Signature	
Date	25/05/2017

a) Expertise of the specialist

Jaco van der Walt has been practising as a CRM archaeologist for 15 years. He obtained an MA degree in Archaeology from the University of the Witwatersrand focussing on the Iron Age in 2012 and is a PhD candidate at the University of Johannesburg focussing on Stone Age Archaeology with specific interest in the Middle Stone Age (MSA) and Later Stone Age (LSA). Jaco is an accredited member of ASAPA (#159) and have conducted more than 500 impact assessments in Limpopo, Mpumalanga, North West, Free State, Gauteng, KZN as well as he Northern and Eastern Cape Provinces in South Africa.

Jaco has worked on various international projects in Zimbabwe, Botswana, Mozambique, Lesotho, DRC Zambia and Tanzania. Through this he has a sound understanding of the IFC Performance Standard requirements, with specific reference to Performance Standard 8 – Cultural Heritage.

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ABBREVIATIONS

AIA: Archaeological Impact Assessment
ASAPA: Association of South African Professional Archaeologists
BGG Burial Ground and Graves
BIA: Basic Impact Assessment
CFPs: Chance Find Procedures
CMP: Conservation Management Plan
CRR: Comments and Response Report
CRM: Cultural Resource Management
DEA: Department of Environmental Affairs
EA: Environmental Authorisation
EAP: Environmental Assessment Practitioner
ECO: Environmental Control Officer
EIA: Environmental Impact Assessment*
EIA: Early Iron Age*
EIA Practitioner: Environmental Impact Assessment Practitioner
EMP: Environmental Management Programme
ESA: Early Stone Age
ESIA: Environmental and Social Impact Assessment
GIS Geographical Information System
GPS: Global Positioning System
GRP Grave Relocation Plan
HIA: Heritage Impact Assessment
LIA: Late Iron Age
LSA: Late Stone Age
MEC: Member of the Executive Council
MIA: Middle Iron Age
MPRDA: Mineral and Petroleum Resources Development Act
MSA: Middle Stone Age
NEMA National Environmental Management Act, 1998 (Act No. 107 of 1998)
NHRA National Heritage Resources Act, 1999 (Act No. 25 of 1999)
NID Notification of Intent to Develop
NoK Next-of-Kin
PRHA: Provincial Heritage Resource Agency
SADC: Southern African Development Community
SAHRA: South African Heritage Resources Agency

**Although EIA refers to both Environmental Impact Assessment and the Early Iron Age both are internationally accepted abbreviations and must be read and interpreted in the context it is used.*

GLOSSARY

Archaeological site (remains of human activity over 100 years old)
Early Stone Age (~ 2.6 million to 250 000 years ago)
Middle Stone Age (~ 250 000 to 40-25 000 years ago)
Later Stone Age (~ 40-25 000, to recently, 100 years ago)
The Iron Age (~ AD 400 to 1840)
Historic (~ AD 1840 to 1950)
Historic building (over 60 years old)

1 Introduction and Terms of Reference:

Heritage Contracts and Archaeological Consulting CC (**HCAC)** has been contracted by Envirogistics to conduct a heritage impact assessment of the proposed infrastructure (plant and two silos) at the exisitng Khumani Mine. The report forms part of the Basic Assessment Report (BAR) and Environmental Management Programme Report (EMPR) for these additional activities at the existing Khumani Mine.

The aim of the study is to survey the proposed development footprint to identify cultural heritage sites, document, and assess their importance within local, provincial and national context. It serves to assess the impact of the proposed project on non-renewable heritage resources, and to submit appropriate recommendations with regard to the responsible cultural resources management measures that might be required to assist the developer in managing the discovered heritage resources in a responsible manner. It is also conducted to protect, preserve, and develop such resources within the framework provided by the National Heritage Resources Act of 1999 (Act No 25 of 1999). The report outlines the approach and methodology utilized before and during the survey, which includes: Phase 1, review of relevant literature; Phase 2, the physical surveying of the area on foot and by vehicle; Phase 3, reporting the outcome of the study.

During the survey, no heritage sites were identified. General site conditions and features on sites were recorded by means of photographs, GPS locations, and site descriptions. Possible impacts were identified and mitigation measures are proposed in the following report. SAHRA as a commenting authority under section 38(8) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) require all environmental documents, complied in support of an Environmental Authorisation application as defined by NEMA EIA Regs section 40 (1) and (2), to be submitted to SAHRA. As such the Basic Assessment report and its appendices must be submitted to the case as well as the EMPr, once it's completed by the Environmental Assessment Practitioner (EAP).

1.1 Terms of Reference

Field study

Conduct a field study to: (a) locate, identify, record, photograph and describe sites of archaeological, historical or cultural interest; b) record GPS points of sites/areas identified as significant areas; c) determine the levels of significance of the various types of heritage resources affected by the proposed development.

Reporting

Report on the identification of anticipated and cumulative impacts the operational units of the proposed project activity may have on the identified heritage resources for all 3 phases of the project; i.e., construction, operation and decommissioning phases. Consider alternatives, should any significant sites be impacted adversely by the proposed project. Ensure that all studies and results comply with the relevant legislation, SAHRA minimum standards and the code of ethics and guidelines of ASAPA.

To assist the developer in managing the discovered heritage resources in a responsible manner, and to protect, preserve, and develop them within the framework provided by the National Heritage Resources Act of 1999 (Act No 25 of 1999).

Table 2: Project Description

Size of farm and portions	The additional activities will be situated on the RE Portion of the Farm King 561, Portion 1 of the Farm Mokaning 260, RE Portion of the Farm Parson 564 and the RE of the Portion of the Farm Bruce 544 (Figure 1 and 2)..
Magisterial District	Gamagara Local Municipality which forms part of the John Taolo Gaetsewe Districts Municipality
1: 50 000 map sheet number	2722DD
Central co-ordinate of the development	Plant 27° 50' 56.9845" S, 23° 00' 10.0585" E Bruce Silo 27° 48' 40.1111" S, 23° 01' 10.5022" E King Silo 27° 53' 12.2659" S, 23° 00' 17.2975" E

Table 3: Infrastructure and project activities

Type of development	Mining infrastructure developments
Project size	Less than 5 hectares
Project Components	It is the intention of the mine to initiate certain additional activities on site. These will include the establishment of a Low Grade ROM (Run of Mine) 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. The first project: 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 phased approach. Phase 1 will involve the processing of 700tph ROM through a sorter plant. Phase 2 will be the doubling-up of Phase 1, with the addition of another 700tph ROM along with a second sorter plant. During Phase 3, the -32mm size fraction will be processed. The intention is to beneficiate a product which is currently not being processed by the current plant at Khumani Iron Ore The second project: The mine will decommission the existing silos at King and Parson Mines. The purpose of the decommissioning is: At King Mine, the Silos will be moved away from the mining infrastructure and encroaching mining activities. The new silos will be established on the Mokaning farm, which forms part of the King 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 with 200 cases at each magazine.

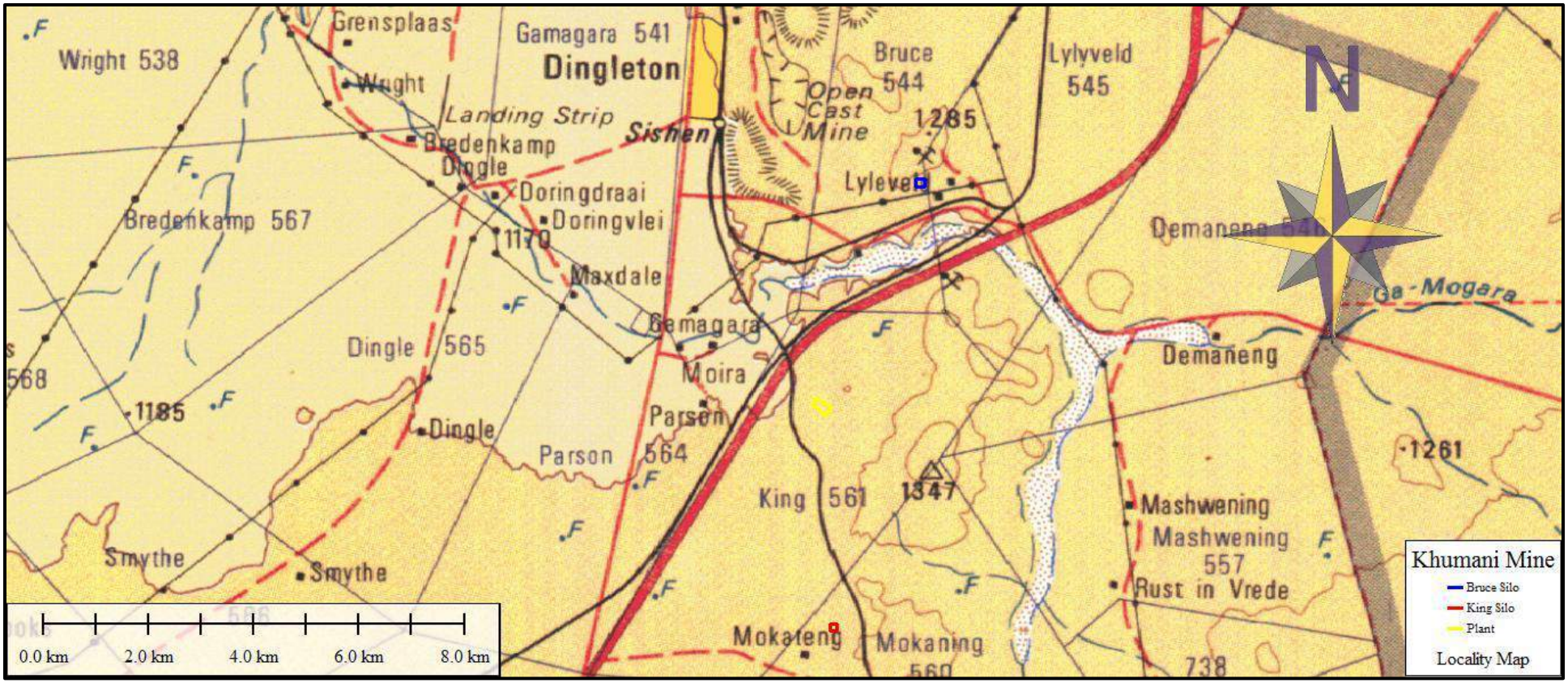

Figure 1. Provincial locality map (1: 250 000 topographical map)

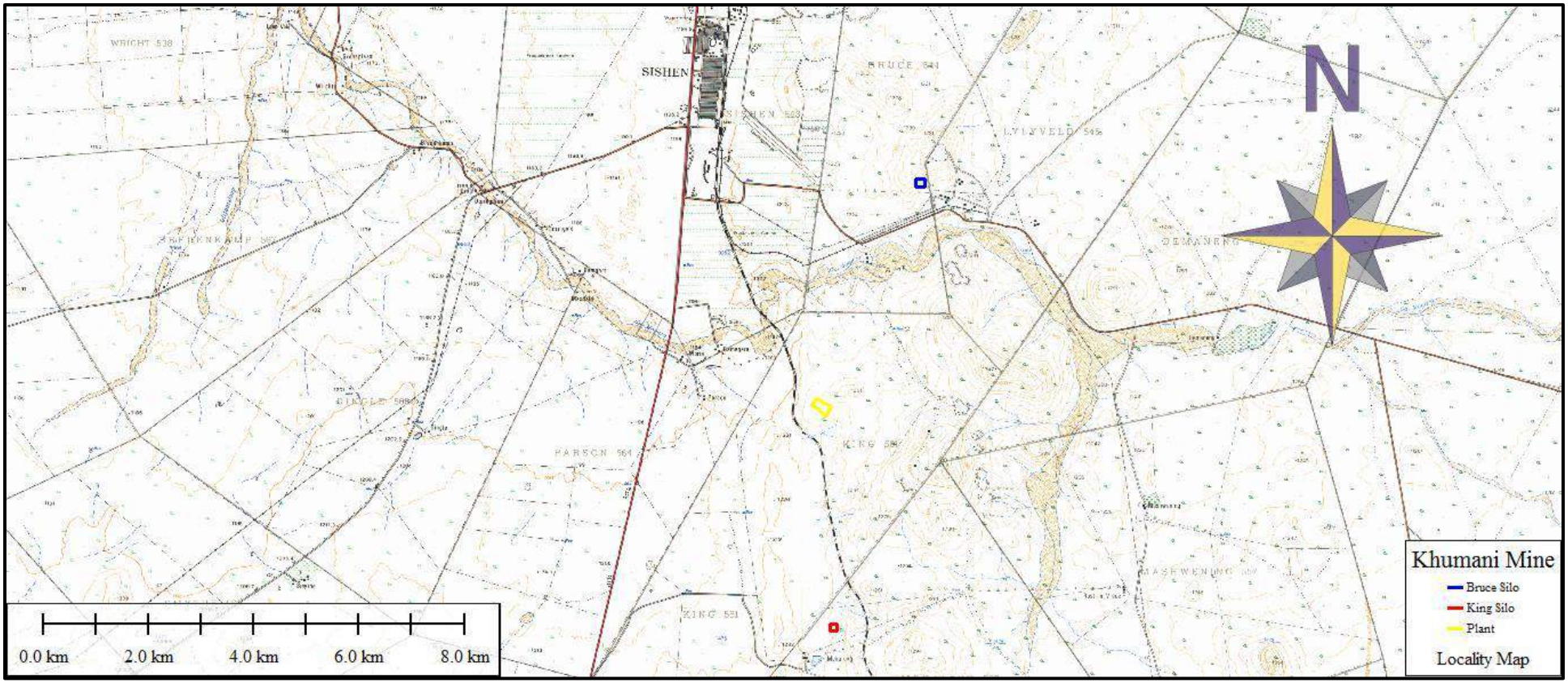

Figure 2: Regional locality map (1:50 000 topographical map).

Figure 3. Satellite image indicating Bruce Silo (Google Earth 2016).

Figure 4. Satellite image of the King Silo study area.

Figure 5. Satellite image indicating the plant area

2 Legislative Requirements

The HIA, as a specialist sub-section of the EIA, is required under the following legislation:

- National Heritage Resources Act (NHRA), Act No. 25 of 1999)
- National Environmental Management Act (NEMA), Act No. 107 of 1998 - Section 23(2)(b)
- Mineral and Petroleum Resources Development Act (MPRDA), Act No. 28 of 2002 - Section 39(3)(b)(iii)

A Phase 1 HIA is a pre-requisite for development in South Africa as prescribed by SAHRA and stipulated by legislation. The overall purpose of heritage specialist input is to:

- Identify any heritage resources, which may be affected;
- Assess the nature and degree of significance of such resources;
- Establish heritage informants/constraints to guide the development process through establishing thresholds of impact significance;
- Assess the negative and positive impact of the development on these resources; and
- Make recommendations for the appropriate heritage management of these impacts.

The HIA should be submitted, as part of the impact assessment report or EMPr, to the PHRA if established in the province or to SAHRA. SAHRA will ultimately be responsible for the professional evaluation of Phase 1 AIA reports upon which review comments will be issued. 'Best practice' requires Phase 1 AIA reports and additional development information, as per the impact assessment report and/or EMPr, to be submitted in duplicate to SAHRA after completion of the study. SAHRA accepts Phase 1 AIA reports authored by professional archaeologists, accredited with ASAPA or with a proven ability to do archaeological work.

Minimum accreditation requirements include an Honours degree in archaeology or related discipline and 3 years post-university CRM experience (field supervisor level). Minimum standards for reports, site documentation and descriptions are set by ASAPA in collaboration with SAHRA. ASAPA is based in South Africa, representing professional archaeology in the SADC region. ASAPA is primarily involved in the overseeing of ethical practice and standards regarding the archaeological profession. Membership is based on proposal and secondment by other professional members.

Phase 1 AIA's are primarily concerned with the location and identification of heritage sites situated within a proposed development area. Identified sites should be assessed according to their significance. Relevant conservation or Phase 2 mitigation recommendations should be made. Recommendations are subject to evaluation by SAHRA.

Conservation or Phase 2 mitigation recommendations, as approved by SAHRA, are to be used as guidelines in the developer's decision making process.

Phase 2 archaeological projects are primarily based on salvage/mitigation excavations preceding development destruction or impact on a site. Phase 2 excavations can only be conducted with a permit, issued by SAHRA to the appointed archaeologist. Permit conditions are prescribed by SAHRA and includes (as minimum requirements) reporting back strategies to SAHRA and deposition of excavated material at an accredited repository.

In the event of a site conservation option being preferred by the developer, a site management plan, prepared by a professional archaeologist and approved by SAHRA, will suffice as minimum requirement.

After mitigation of a site, a destruction permit must be applied for with SAHRA by the applicant before development may proceed.

Human remains older than 60 years are protected by the National Heritage Resources Act, with reference to Section 36. Graves older than 60 years, but younger than 100 years fall under Section 36 of Act 25 of 1999 (National Heritage Resources Act), as well as the Human Tissues Act (Act 65 of 1983), and are the jurisdiction of SAHRA. The procedure for Consultation Regarding Burial Grounds and Graves (Section 36[5]) of Act 25 of 1999) is applicable to graves older than 60 years that are situated outside a formal cemetery administrated by a local authority. Graves in this age category, located inside a formal cemetery administrated by a local authority, require the same authorisation as set out for graves younger than 60 years, in addition to SAHRA authorisation. If the grave is not situated inside a formal cemetery, but is to be relocated to one, permission from the local authority is required and all regulations, laws and by-laws, set by the cemetery authority, must be adhered to.

Human remains that are less than 60 years old are protected under Section 2(1) of the Removal of Graves and Dead Bodies Ordinance (Ordinance No. 7 of 1925), as well as the Human Tissues Act (Act 65 of 1983), and are the jurisdiction of the National Department of Health and the relevant Provincial Department of Health and must be submitted for final approval to the office of the relevant Provincial Premier. This function is usually delegated to the Provincial MEC for Local Government and Planning; or in some cases, the MEC for Housing and Welfare. Authorisation for exhumation and reinternment must also be obtained from the relevant local or regional council where the grave is situated, as well as the relevant local or regional council to where the grave is being relocated. All local and regional provisions, laws and by-laws must also be adhered to. To handle and transport human remains, the institution conducting the relocation should be authorised under Section 24 of Act 65 of 1983 (Human Tissues Act).

3 METHODOLOGY

3.1 Literature Review

A brief survey of available literature was conducted to extract data and information on the area in question to provide general heritage context into which the development would be set. This literature search included published material, unpublished commercial reports and online material, including reports sourced from the South African Heritage Resources Information System (SAHRIS).

3.2 Genealogical Society and Google Earth Monuments

Google Earth and 1:50 000 maps of the area were utilised to identify possible places where sites of heritage significance might be located; these locations were marked and visited during the field work phase. The database of the Genealogical Society was consulted to collect data on any known graves in the area.

3.3 Public Consultation and Stakeholder Engagement:

Stakeholder engagement is a key component of any BAR process, it involves stakeholders interested in, or affected by the proposed development. Stakeholders are provided with an opportunity to raise issues of concern (for the purposes of this report only heritage related issues will be included). The aim of the public consultation process was to capture and address any issues raised by community members and other stakeholders during key stakeholder and public meetings. The process involved:

- Placement of advertisements and site notices
- Stakeholder notification (through the dissemination of information and meeting invitations);
- Stakeholder meetings undertaken with I&APs;
- Authority Consultation
- The compilation of a Basic Assessment Report (BAR).

Please refer to section 6 for more detail.

3.4 Site Investigation

Conduct a field study to: a) systematically survey the proposed project area to locate, identify, record, photograph and describe sites of archaeological, historical or cultural interest; b) record GPS points of sites/areas identified as significant areas; c) determine the levels of significance of the various types of heritage resources recorded in the project area.

Table 4: Site Investigation Details

	Site Investigation
Date	23 May 2017
Season	Early winter –vegetation in the study area is low with good archaeological visibility. The impact area was sufficiently covered (Figure 6 - 8) to adequately record the presence of heritage resources.

Figure 6: Track logs of the survey in black (Bruce Silo area)

Figure 7. Track logs of the survey in the King Silo area.

Figure 8. Track logs of the survey in the plant area

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3.5 Site Significance and Field Rating

Section 3 of the NHRA distinguishes nine criteria for places and objects to qualify as 'part of the national estate' if they have cultural significance or other special value. These criteria are:

- Its importance in/to the community, or pattern of South Africa's history;
- Its possession of uncommon, rare or endangered aspects of South Africa's natural or cultural heritage;
- Its potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage;
- Its importance in demonstrating the principal characteristics of a particular class of South Africa's natural or cultural places or objects;
- Its importance in exhibiting particular aesthetic characteristics valued by a community or cultural group;
- Its importance in demonstrating a high degree of creative or technical achievement at a particular period;
- Its strong or special association with a particular community or cultural group for social, cultural or spiritual reasons;
- Its strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa;
- Sites of significance relating to the history of slavery in South Africa.

The presence and distribution of heritage resources define a 'heritage landscape'. In this landscape, every site is relevant. In addition, because heritage resources are non-renewable, heritage surveys need to investigate an entire project area, or a representative sample, depending on the nature of the project. In the case of the proposed project the local extent of its impact necessitates a representative sample and only the footprint of the areas demarcated for development were surveyed. In all initial investigations, however, the specialists are responsible only for the identification of resources visible on the surface. This section describes the evaluation criteria used for determining the significance of archaeological and heritage sites. The following criteria were used to establish site significance with cognisance of Section 3 of the NHRA:

- The unique nature of a site;
- The integrity of the archaeological/cultural heritage deposits;
- The wider historic, archaeological and geographic context of the site;
- The location of the site in relation to other similar sites or features;
- The depth of the archaeological deposit (when it can be determined/is known);
- The preservation condition of the sites; and
- Potential to answer present research questions.

In addition to this criteria field ratings prescribed by SAHRA (2006), and acknowledged by ASAPA for the SADC region, were used for the purpose of this report. The recommendations for each site should be read in conjunction with section 10 of this report.

FIELD RATING	***GRADE***	***SIGNIFICANCE***	***RECOMMENDED MITIGATION***
National Significance (NS)	Grade 1	-	Conservation; national site nomination
Provincial Significance (PS)	Grade 2	-	Conservation; provincial site nomination
Local Significance (LS)	Grade 3A	High significance	Conservation; mitigation not advised
Local Significance (LS)	Grade 3B	High significance	Mitigation (part of site should be retained)
Generally Protected A (GP.A)	-	High/medium significance	Mitigation before destruction
Generally Protected B (GP.B)	-	Medium significance	Recording before destruction
Generally Protected C (GP.C)	-	Low significance	Destruction

3.6 Impact Assessment Methodology

The criteria below are used to establish the impact rating on sites:

- The **nature**, which shall include a description of what causes the effect, what will be affected and how it will be affected.
- The **extent**, wherein it will be indicated whether the impact will be local (limited to the immediate area or site of development) or regional, and a value between 1 and 5 will be assigned as appropriate (with 1 being low and 5 being high):
- The **duration**, wherein it will be indicated whether:
  - the lifetime of the impact will be of a very short duration (0-1 years), assigned a score of 1;
  - the lifetime of the impact will be of a short duration (2-5 years), assigned a score of 2;
  - medium-term (5-15 years), assigned a score of 3;
  - long term (> 15 years), assigned a score of 4; or
  - permanent, assigned a score of 5;
  - The **magnitude**, quantified on a scale from 0-10 where; 0 is small and will have no effect on the environment, 2 is minor and will not result in an impact on processes, 4 is low and will cause a slight impact on processes, 6 is moderate and will result in processes continuing but in a modified way, 8 is high (processes are altered to the extent that they temporarily cease), and 10 is very high and results in complete destruction of patterns and permanent cessation of processes.
  - The **probability of occurrence**, which shall describe the likelihood of the impact actually occurring. Probability will be estimated on a scale of 1-5 where; 1 is very improbable (probably will not happen), 2 is improbable (some possibility, but low likelihood), 3 is probable (distinct possibility), 4 is highly probable (most likely) and 5 is definite (impact will occur regardless of any prevention measures).
  - The **significance**, which shall be determined through a synthesis of the characteristics described above and can be assessed as low, medium or high; and
  - the **status**, which will be described as either positive, negative or neutral.
  - the degree to which the impact can be reversed.
  - the degree to which the impact may cause irreplaceable loss of resources.
  - the *degree* to which the impact can be mitigated.

The **significance** is calculated by combining the criteria in the following formula:

S=(E+D+M)P

S = Significance weighting

E = Extent

D = Duration

M = Magnitude

P = Probability

The **significance weightings** for each potential impact are as follows:

- < 30 points: Low (i.e., where this impact would not have a direct influence on the decision to develop in the area),
- 30-60 points: Medium (i.e., where the impact could influence the decision to develop in the area unless it is effectively mitigated),
- 60 points: High (i.e., where the impact must have an influence on the decision process to develop in the area).

3.7 Limitations and Constraints of the study

The authors acknowledge that the brief literature review is not exhaustive on the literature of the area. Due to the subsurface nature of archaeological artefacts, the possibility exists that some features or artefacts may not have been discovered/recorded during the survey and the possible occurrence of unmarked graves and other cultural material cannot be excluded. Similarly, the depth of the deposit of heritage sites cannot be accurately determined due its subsurface nature. This report only deals with the footprint area of the proposed development and consisted of non-intrusive surface surveys. This study did not assess the impact on medicinal plants and intangible heritage as it is assumed that these components would have been highlighted through the public consultation process if relevant. It is possible that new information could come to light in future, which might change the results of this Impact Assessment.

4 Description of Socio Economic Environmental

The following information was obtained from an EIA conducted in 2015 by GCS:

"Population and Household
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%.

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.

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.

Employment and Labour
The largest sector of employment in the Local Municipality is the mining sector, supplying just over a third of the jobs in the area. Followed by wholesale and retail trade jobs, which make up around 12% of the total employment. The main reason for this distribution are mines, like Sishen and Khumani in the area that are the largest employers in the municipality. The main average income of households in the Gamagara Local Municipality is between R9,601 and R307,600 as derived from the census 2011 data. It should however be noted that around 10% of the population in the municipality do not earn an income."

5 Description of the Physical Environment:

The plant area measures approximately 5 ha in size and is situated to the south of the existing King Mine operations. The site is relatively flat and covered with grass and bushes. The site is disturbed by mining related activities and the establishment of infrastructure like sewer pipes, roads and power lines (Figure 9 & 10).

Bruce Silo measures less than 1 hectare in size and is situated to the east of the existing Bruce Mine operations. The proposed site is relatively flat and located at the foot of a low ridge. The site is partially impacted on by what could have been exploration roads. The site is highly overgrown with *Senegalia erubescens* (Figure 11 & 12).

King Silo measures less than 1 hectare in size and is situated well to the south of the existing King Mine operations. The proposed site is relatively flat and located to the west of a low ridge. The site is characterised by Aeolian sand with sparse grass cover and a few low bushes (Figure 13 & 14).

The vegetation and landscape is described by Mucina and Rutherford (*The Vegetation of South Africa, Lesotho and Swaziland*, South African National Biodiversity Institute, Kirstenbosch, August 2006) as Kuruman Mountain Bushveld. The geological forms in the study area is described as Transvaal,Rooiberg and Griqualand-West

.

Figure 9. General Site conditions in the plant area.

Figure 10. General site conditions in the plant area.

Figure 11. General site conditions – Bruce Silo

Figure 12. General site conditions – Bruce silo

Figure 13. General site conditions – King silo

Figure 14. General site conditions – King silo.

6 Results of Public Consultation and Stakeholder Engagement:

6.1.1 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.

6.1.2 Notification

Stakeholders were notified by means of the following systems:

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

Proof of email submissions can be requested from the EAP.

6.1.3 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.

6.1.4 Background Information Documents

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

6.1.5 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.

6.1.6 Document Review

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

7 Literature / Background Study:

7.1 Literature Review

The following reports were conducted in the immediate vicinity of the study area and were consulted for this report:

Author	Year	Project	Findings
Kruger, N.	2015	Sishen Iron Ore Company (SIOC): Proposed Lyleveld North Waste Rock Dump Expansion and Lyleveld South Haul Road Extension Project, Sishen Mine, Northern Cape Province	2 Stone Age occurrences and 1 site attributed to mechanical weathering.
Morris, D.	2005	Archaeological Impact assessment of mining areas on the farms Bruce, King, Mokaning and Parson between Postmasburg and Kathu in the Northern Cape.	4 Cemeteries and Stone Age artefacts were identified.
Beaumont, P.	2005	Heritage Assessment for an EMPR amendment relating to a proposed crusher at Sishen Iron Ore Mine near Kathu in the Northern Cape province.	No sites were identified.

7.1.1 Genealogical Society and Google Earth Monuments

No known grave sites are indicated in the study area.

7.2 General History of the area

7.2.1 Archaeology of the area

The archaeological record for the greater study area consists of the Stone Age and Iron Age.

7.3. Stone Age

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.

7.4. 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).

7.4.1. Anglo-Boer War

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

7.4.2. Cultural Landscape

The Khumani 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.

8. Findings of the Survey

It is important to note that only the development footprint of each project was surveyed. The study area was surveyed over a period of 1 day in the company of mine officials. The proposed plant area is situated to the south and adjacent to the existing King Mine operations. The site is relatively flat and covered with grass and bushes. The site is disturbed by mining related activities and the establishment of infrastructure like sewer pipes, roads and power lines that would have impacted on any surface indications of heritage sites.

Bruce Silo is situated to the east of the existing Bruce Mine operations. The proposed site is relatively flat and located at the foot of a low ridge. The site is partially impacted on by what could have been exploration roads and is highly overgrown with *Senegalia erubescens*. King Silo is situated well to the south of the existing King Mine operations in a green field's area. The proposed site is relatively flat and located to the west of a low ridge. The site is characterised by Aeolian sand with sparse grass cover and a few low bushes with no raw material suitable for knapping.

In terms of the national estate as defined by the NHRA no sites of significance were found during the survey as described below.

8.3. Built Environment (Section 34 of the NHRA)

No standing structures older than 60 years occur in the study area.

8.4. Archaeological and palaeontological resources (Section 35 of the NHRA)

No archaeological sites or material was recorded during the survey. Therefore, no further mitigation prior to construction is recommended in terms of the archaeological component of Section 35 of the NHRA for the proposed development to proceed. According to the SAHRIS palaeontological sensitivity map the study area is of palaeontological sensitivity and a Paleontological study was commissioned for the study area.

8.5. Burial Grounds and Graves (Section 36 of the NHRA)

In terms of Section 36 of the Act no burial sites were recorded.

8.6. Cultural Landscapes, Intangible and Living Heritage.

Long term impact on the cultural landscape is considered to be negligible as the surrounding area consists of an area that has been subjected to extensive mining activities from 2006 onwards. Visual impacts to scenic routes and sense of place are also considered to be low due to the extensive developments in the area.

8.7. Battlefields and Concentration Camps

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

8.8. Potential Impact

The chances of impacting unknown archaeological sites in the study area is considered to be negligible. Any direct impacts that did occur would be during the construction phase only and would be of very low significance. Cumulative impacts occur from the combination of effects of various impacts on heritage resources. The importance of identifying and assessing cumulative impacts is that the whole is greater than the sum of its parts. In the case of the development, it will, with the recommended mitigation measures and management actions, not impact any heritage resources directly. However, this and other projects in the area could have an indirect impact on the larger heritage landscape. The lack of any heritage resources in the immediate area and the extensive existing mining activities minimises additional impact on the landscape.

8.8.1. Pre-Construction phase:

It is assumed that the pre-construction phase involves the removal of topsoil and vegetation as well as the establishment of infrastructure needed for the construction phase. These activities can have a negative and irreversible impact on heritage sites. Impacts include destruction or partial destruction of non-renewable heritage resources.

8.8.2. Construction Phase

During this phase, the impacts and effects are similar in nature but more extensive than the pre-construction phase. These activities can have a negative and irreversible impact on heritage sites. Impacts include destruction or partial destruction of non-renewable heritage resources.

8.8.3. Operation Phase:

No impact is envisaged for the recorded heritage resources during this phase.

Table 5. Impact Assessment table.

Nature: During the construction phase activities resulting in disturbance of surfaces and/or sub-surfaces may destroy, damage, alter, or remove from its original position archaeological material or objects.		
	Without mitigation	**With mitigation (Preservation/ excavation of site)**
Extent	Local (1)	Local (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	Low (2)	Low (2)
Probability	Not probable (2)	Not probable (2)
Significance	**16 (Low)**	**16 (Low)**
Status (positive or negative)	Negative	Negative
Reversibility	Not reversible	Not reversible
Irreplaceable loss of resources?	No resources were recorded	No resources were recorded.
Can impacts be mitigated?	Yes, a chance find procedure should be implemented.	Yes
Mitigation: Due to the lack of apparent significant archaeological resources no further mitigation is required prior to construction.		
Cumulative impacts: A Chance Find Procedure should be implemented for the project should any sites be identified during the construction process.		

Residual Impacts:
If sites are destroyed this results in the depletion of archaeological record of the area. However, if sites are recorded and preserved or mitigated this adds to the record of the area.

9. Conclusion and recommendations

HCAC was appointed to conduct a Heritage Impact Assessment for a new Sorter Plant and the establishment of two new Silos/Magazines (King and Bruce Silos) at Khumani Mine, close to Sishen in the Northern Cape. The proposed plant area is situated to the south and adjacent to the existing King Mine operations. The site is relatively flat and covered with grass and bushes. The site is disturbed by mining related activities and the establishment of infrastructure like sewer pipes, roads and power lines that would have impacted on any surface indications of heritage sites. Bruce Silo is situated to the east of the existing Bruce Mine operations. The proposed site is relatively flat and located at the foot of a low ridge. The site is partially impacted on by what could have been exploration roads and is highly overgrown. King Silo is situated well to the south of the existing King Mine operations in a green field's area. The proposed site is relatively flat and located to the west of a low ridge. The site is characterised by Aeolian sand with sparse grass cover and a few low bushes with no raw material suitable for knapping.

During the survey, no archaeological sites or material was recorded. Therefore, no further mitigation prior to construction is recommended in terms of the archaeological component of Section 35 for the proposed development to proceed. According to the SAHRIS palaeontological sensitivity map the study area is of palaeontological sensitivity and a Paleontological study was commissioned for the study area.

In terms of the built environment of the area (Section 34), no standing structures older than 60 years occur within the study area. 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 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.

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 chance find procedure are implemented as part of the EMPr and based on approval from SAHRA

9.1. Chance Find Procedures

The possibility of the occurrence of subsurface finds cannot be excluded. Therefore, if during construction any possible finds such as stone tool scatters, artefacts or bone and fossil remains are made, the operations must be stopped and a qualified archaeologist must be contacted for an assessment of the find and therefor chance find procedures should be put in place as part of the EMP. A short summary of chance find procedures is discussed below.

This procedure applies to the developer's permanent employees, its subsidiaries, contractors and subcontractors, and service providers. The aim of this procedure is to establish monitoring and reporting procedures to ensure compliance with this policy and its associated procedures. Construction crews must be properly inducted to ensure they are fully aware of the procedures regarding chance finds as discussed below.

- If during the pre-construction phase, construction, operations or closure phases of this project, any person employed by the developer, one of its subsidiaries, contractors and subcontractors, or service provider, finds any artefact of cultural significance or heritage site, this person must cease work at the site of the find and report this find to their immediate supervisor, and through their supervisor to the senior on-site manager.
- It is the responsibility of the senior on-site Manager to make an initial assessment of the extent of the find, and confirm the extent of the work stoppage in that area.
- The senior on-site Manager will inform the ECO of the chance find and its immediate impact on operations. The ECO will then contact a professional archaeologist for an assessment of the finds who will notify the SAHRA.

10. References

Beaumont, P. 2005. Heritage Assessment for an EMPR amendment relating to a proposed crusher at Sishen Iron Ore Mine near Kathu in the Northern Cape province.
Kruger, N. 2015 . Sishen Iron Ore Company (SIOC): Proposed Lyleveld North Waste Rock Dump Expansion and Lyleveld South Haul Road Extension Project, Sishen Mine, Northern Cape Province
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Shillington, K. 1985. The Colonisation of the Southern Tswana, 1870-1900. Braamfontein: Ravan Press.
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11. Appendices:

Curriculum Vitae of Specialist

Jaco van der Walt
Archaeologist

jaco.heritage@gmail.com
+27 82 373 8491
+27 86 691 6461

Education:

Particulars of degrees/diplomas and/or other qualifications:

Name of University or Institution:		University of Pretoria
Degree obtained	**:**	BA Heritage Tourism & Archaeology
Year of graduation	**:**	2001
Name of University or Institution:		University of the Witwatersrand
Degree obtained	**:**	BA Hons Archaeology
Year of graduation	**:**	2002
Name of University or Institution	**:**	University of the Witwatersrand
Degree Obtained	**:**	MA (Archaeology)
Year of Graduation	:	2012
Name of University or Institution	**:**	University of Johannesburg
Degree	**:**	PhD
Year	:	Currently Enrolled

EMPLOYMENT HISTORY:

2011 – Present:	**Owner – HCAC (Heritage Contracts and Archaeological Consulting CC)**.
2007 – 2010 :	**CRM Archaeologist,** Managed the Heritage Contracts Unit at the University of the Witwatersrand.
2005 - 2007:	**CRM Archaeologist**, Director of Matakoma Heritage Consultants
2004:	**Technical Assistant**, Department of Anatomy University of Pretoria
2003:	**Archaeologist**, Mapungubwe World Heritage Site
2001 - 2002:	**CRM Archaeologists,** For R & R Cultural Resource Consultants, Polokwane
2000:	**Museum Assistant**, Fort Klapperkop.

Countries of work experience include:

Republic of South Africa, Botswana, Zimbabwe, Mozambique, Tanzania, The Democratic Republic of the Congo, Lesotho and Zambia.

SELECTED PROJECTS INCLUDE:

Archaeological Impact Assessments (Phase 1)

Heritage Impact Assessment Proposed Discharge Of Treated Mine Water Via The Wonderfontein Spruit Receiving Water Body Specialist as part of team conducting an Archaeological Assessment for the Mmamabula mining project and power supply, Botswana

Archaeological Impact Assessment Mmamethlake Landfill

Archaeological Impact Assessment Libangeni Landfill

Linear Developments

Archaeological Impact Assessment Link Northern Waterline Project At The Suikerbosrand Nature Reserve

Archaeological Impact Assessment Medupi – Spitskop Power Line,

Archaeological Impact Assessment Nelspruit Road Development

Renewable Energy developments

Archaeological Impact Assessment Karoshoek Solar Project

Grave Relocation Projects

Relocation of graves and site monitoring at Chloorkop as well as permit application and liaison with local authorities and social processes with local stakeholders, Gauteng Province.

Relocation of the grave of Rifle Man Maritz as well as permit application and liaison with local authorities and social processes with local stakeholders, Ndumo, Kwa Zulu Natal.

Relocation of the Magolwane graves for the office of the premier, Kwa Zulu Natal

Relocation of the OSuthu Royal Graves office of the premier, Kwa Zulu Natal

Phase 2 Mitigation Projects

Field Director for the Archaeological Mitigation For Booysendal Platinum Mine, Steelpoort, Limpopo Province. Principle investigator Prof. T. Huffman

Monitoring of heritage sites affected by the ARUP Transnet Multipurpose Pipeline under directorship of Gavin Anderson.

Field Director for the Phase 2 mapping of a late Iron Age site located on the farm Kameelbult, Zeerust, North West Province. Under directorship of Prof T. Huffman.

Field Director for the Phase 2 surface sampling of Stone Age sites effected by the Medupi – Spitskop Power Line, Limpopo Province

Heritage management projects

Platreef Mitigation project – mitigation of heritage sites and compilation of conservation management plan.

MEMBERSHIP OF PROFESSIONAL ASSOCIATIONS:

- Association of Southern African Professional Archaeologists. Member number 159

  Accreditation:
  - Field Director Iron Age Archaeology
  - Field Supervisor Colonial Period Archaeology, Stone Age Archaeology and Grave Relocation
- Accredited CRM Archaeologist with SAHRA
- Accredited CRM Archaeologist with AMAFA
- Co-opted council member for the CRM Section of the Association of Southern African Association Professional Archaeologists (2011 – 2012)

PUBLICATIONS AND PRESENTATIONS

- A Culture Historical Interpretation, Aimed at Site Visitors, of the Exposed Eastern Profile of K8 on the Southern terrace at Mapungubwe.
  - J van der Walt, A Meyer, WC Nienaber
  - Poster presented at Faculty day, Faculty of Medicine University of Pretoria 2003
- 'n Reddingsondersoek na Anglo-Boereoorlog-ammunisie, gevind by Ifafi, Noordwes-Provinsie. South-African Journal for Cultural History 16(1) June 2002, with A. van Vollenhoven as co-writer.
- Fieldwork Report: Mapungubwe Stabilization Project.
  - WC Nienaber, M Hutten, S Gaigher, J van der Walt
  - Paper read at the Southern African Association of Archaeologists Biennial Conference 2004
- A War Uncovered: Human Remains from Thabantšho Hill (South Africa), 10 May 1864.
  - M. Steyn, WS Boshoff, WC Nienaber, J van der Walt
  - Paper read at the 12th Congress of the Pan-African Archaeological Association for Prehistory and Related Studies 2005
- Field Report on the mitigation measures conducted on the farm Bokfontein, Brits, North West Province .
  - J van der Walt, P Birkholtz, W. Fourie
  - Paper read at the Southern African Association of Archaeologists Biennial Conference 2007
- Field report on the mitigation measures employed at Early Farmer sites threatened by development in the Greater Sekhukhune area, Limpopo Province. J van der Walt
  - Paper read at the Southern African Association of Archaeologists Biennial Conference 2008
- Ceramic analysis of an Early Iron Age Site with vitrified dung, Limpopo Province South Africa.
  - J van der Walt. Poster presented at SAFA, Frankfurt Germany 2008

- Bantu Speaker Rock Engravings in the Schoemanskloof Valley, Lydenburg District, Mpumalanga (*In Prep)*
    - J van der Walt and J.P Celliers
- Sterkspruit: Micro-layout of late Iron Age stone walling, Lydenburg, Mpumalanga. W. Fourie and J van der Walt. A Poster presented at the Southern African Association of Archaeologists Biennial Conference 2011
- Detailed mapping of LIA stone-walled settlements' in Lydenburg, Mpumalanga. J van der Walt and J.P Celliers
    - Paper read at the Southern African Association of Archaeologists Biennial Conference 2011
- Bantu-Speaker Rock engravings in the Schoemanskloof Valley, Lydenburg District, Mpumalanga. J.P Celliers and J van der Walt
    - Paper read at the Southern African Association of Archaeologists Biennial Conference 2011
- Pleistocene hominin land use on the western trans-Vaal Highveld ecoregion, South Africa, Jaco van der Walt.
    - J van der Walt. Poster presented at SAFA, Toulouse, France. Biennial Conference 2016

REFERENCES:

1. Prof Marlize Lombard Senior Lecturer, University of Johannesburg, South Africa
   E-mail: mlombard@uj.ac.za
2. Prof TN Huffman Department of Archaeology Tel: (011) 717 6040
   University of the Witwatersrand
3. Alex Schoeman University of the Witwatersrand
   E-mail:Alex.Schoeman@wits.ac.za