Assmang Ltd

Khumani Iron Ore Mine

Bruce Barrier Pillar EMP Amendment

[in terms of the Mineral and Petroleum Resources Development Act (Act 28 of 2002)]

Project Number: IV.ARM.07.005

April 2007

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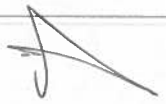
Document Authorisation	Andrew Johnstone		10/4/07.

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EXECUTIVE SUMMARY

Introduction and Background

Assmang Limited (hereafter referred to as Assmang), an established mining company, mines manganese and iron ore in the Northern Cape Province and chrome ore in the Mpumalanga Province. The company also produces manganese alloys at its works in Cato Ridge in the KwaZulu-Natal Province and chrome alloys at its works in Machadodorp in the Mpumalanga Province. The company is controlled jointly by African Rainbow Minerals (ARM), which owns 50% and Assore Limited, which holds 50%. Both holding companies are listed on the Johannesburg Security Exchange (JSE).

Assmang's mining operations in the Northern Cape Province includes Beeshoek Iron Ore Mine, Black Rock Mine, and the newest addition, the Khumani Iron Ore Mine (hereafter referred to as Khumani). The Khumani is situated 15km south of Kathu. Neighbouring towns and villages include Olifantshoek, Beeshoek, Postmasburg, and Dingleton.

Assmang is the holder of new order mining rights in respect of high-grade hematite iron ore deposits on the farms Bruce, King and Mokaning, which forms part of the Khumani, neighbouring the Sishen Mine.

Project Description

In order to ensure stability and safety between mining operations it is required by the Department of Minerals and Energy and associated legislation that a Barrier Pillar of approximately 9m to each side of a mine boundary be left between operations (in this case between the Khumani and the Sishen Mine). This Barrier Pillar between the Khumani and Sishen has however resulted in the sterilisation of an area of approximately 400m along the boundary.

As a result Assmang and Kumba Resources (Sishen) wishes to mine the Barrier Pillar between the Khumani and the Sishen Mine, which is situated on the farms Bruce and Sishen. This report addresses six (6) areas to be mined in the Bruce Barrier Pillar. Areas 2, 4 and 5 is planned to be mined by Sishen from within the Sishen mining rights area into the Khumani mining area and the remaining three by Assmang from within the Khumani Mining area into the Sishen mining area. Assmang wishes to include the mining of the Barrier Pillar in the future. In order to mine the portion of Lylyveld, it is required that Sishen first obtain approval for mining activities on this farm, as Khumani has approval to mine on the Bruce portion neighbouring Lylyveld.

Sishen wishes to start mining operations of Areas 2, 4 and 5 during the middle of 2007 and continue to mine for a period of five years. After this five year period Assmang will commence mining Areas 1, 3 and 6. For the purpose of managing environmental liabilities the two companies will dispose waste from within the Sishen mining rights area onto their waste rock dumps and vice versa. The same principle will be applied by Khumani.

Legal Assessment

Mining currently falls within the jurisdiction of the Department of Minerals and Energy (DME) and the associated Mineral and Petroleum Resources Development Act (Act No. 28 of 2002) (MPRDA). In addition, mining is included as part of the Schedule 2 Activities [requiring a full Environmental Scoping Report and Environmental Impact Assessment (EIA) Report] of the National Environmental Management Act (Act No. 107 of 1998) (NEMA) EIA Regulations (promulgated on 3 July 2006), but will only come into effect during the middle of 2007 (date still to be gazetted).

Introductory authorities meetings were held with the DME and the Department of Tourism, Environment and Conservation (DTEC) on 11 January 2007 to identify the required process to be followed to fulfill the requirements of both the NEMA as well as the MPRDA requirements. The outcomes of the meetings were

that an EIA according to NEMA will not be required as the developments will be situated within the Mining Area of the Khumani Mine and no significant changes, if any, will occur on scheduled activities as previously applied for under the Environment Conservation Act (Act No. 73 of 1989).

In order to commence with the project, Assmang has to obtain a positive authorisation from the DME in terms of the MPRDA. The environmental authorisation process normally involves the submission of an Environmental Scoping, EIA and EMP Report. As the mine has an approved EMP in terms of the MPRDA, it is required by the DME that the document be amended to include the new mining activities, identify potential impacts and define all the management measures to ensure that the potential impacts associated with the project is reduced and/or preferably eliminated. Due to the extent of this project, the DME has exempted Assmang from the Scoping Phase of the environmental authorisation process.

Purpose of this Report

Neither of the two (2) mines has included the Barrier Pillar reserves into the approved Environmental Impact Assessment and Management Programmes. The two (2) mines have however obtained the consent from the Department of Minerals and Energy (DME) to commission an Environmental Management Programme Amendment process to include the mining of this pillar in to the EMP, which was approved by DME, Northern Cape Province. This report has been undertaken in terms of the MPRDA.

The project does not involve the establishment of any new mining infrastructure. The only addition to the approved mining right of Khumani is the expansion of the existing opencast operations on the Bruce property and will result in an increase of approximately 4ha. Although the opencast operations will increase by approximately 4ha, no increase in the capacity of the approved Overburden and Low-grade ROM Stockpiles will be required due to planned reclaiming activities of these stockpiles as per the approved EMP, as well as the mine philosophy of ongoing backfilling. A slight increase of approximately 7% is expected on the Paste Disposal Facility, as well as the Discard Stockpile. This slight increase will however not result in an increase in the footprint area and will be accommodated within the existing planned structures and therefore no impacts were assessed in this regard.

Environmental Impact Assessment

The environmental impact assessment for this project was undertaken with the view of a slight expansion of an existing brown fields operation. To ensure uniformity, the assessment of potential impacts was addressed in a standard manner so that all impacts are comparable. Each impact identified was assessed in terms of probability (likelihood of occurring), extent (spatial scale), intensity (severity) and duration (temporal scale). To enable a scientific approach to the determination of the impact significance (importance), a numerical value was linked to each rating scale of which the sum of the numerical values defined the significance. The main impacts associated with this project are:

- Continuation of existing mining operations without disruptions due to the mining of the Barrier Pillar;
- The management of storm water in terms of the mutual opencast pits; and
- The management of air quality in terms of the mutual opencast pits.

Environmental Management Programme

The EIA ensured that the needs of the environment (biophysical and socio-economic) are identified. The EMP in turn provided a tool for meeting the objective to reduce or avoid negative environmental impacts associated with a project within a certain environment by providing detailed mitigation and management commitments and the associated action plans as a legal commitment by the applicant (in terms of this project Assmang, Khumani). Limited additional management measures were required for the expansions to the approved opencast pits as this project will be managed in terms of the approved EMP (Khumani EMP, January 2007). However as the project will result in six (6) large opencast pits crossing over two mining right

areas (i.e. Khumani Iron Ore and Sishen) it is essential that mutual management measures be implemented especially in terms of surface water, and dust monitoring. Some of the additional management measures recommended for this project include:

- The mine plans of the two (2) mining companies will be structured in such a way to ensure that no mining activities associated with the Barrier Pillar takes place within a 500m radius of planned or existing opencast operations;
- The two (2) mining companies will establish a mutual storm water management system upstream of the mutual opencast pits;
- Sharing of information in terms of air quality between the two (2) mining companies will be undertaken;
- An external air quality specialist will be appointed to assess the existing air quality management procedures and amend it where possible;
- A holistic air quality report will be compiled annually by an external qualified person and will be submitted to the relevant authorities;
- Mutual agreements will be put in place to establish safety features around the entire mutual opencast pits; and
- The financial provision for closure will be amended to accommodate the expansion of the 4ha opencast pits area.

It is the opinion of the independent environmental consultant that this project, if properly managed between the two (2) mining companies, will not have a significant impact on the environment and where potential impacts could occur sufficient management measures have been identified to mitigate these.

1 BACKGROUND AND INTRODUCTION

1.1 Background

Assmang Limited (hereafter referred to as Assmang), an established mining company, mines manganese and iron ore in the Northern Cape Province and chrome ore in the Mpumalanga Province. The company also produces manganese alloys at its works in Cato Ridge in the KwaZulu-Natal Province and chrome alloys at its works in Machadodorp in the Mpumalanga Province. The company is controlled jointly by African Rainbow Minerals (ARM), which owns 50% and Assore Limited, which holds 50%. Both holding companies are listed on the Johannesburg Security Exchange (JSE).

Assmang's mining operations in the Northern Cape Province includes Beeshoek Iron Ore Mine, Black Rock Mine, and the newest addition, the Khumani Iron Ore Mine (hereafter referred to as Khumani). The Khumani is situated 15km south of Kathu. Neighbouring towns and villages include Olifantshoek, Beeshoek, Postmasburg, and Dingleton.

Assmang is the holder of new order mining rights in respect of high-grade hematite iron ore deposits on the farms Bruce, King and Mokaning, which forms part of the Khumani, neighbouring the Sishen Mine.

Refer to Figure 1 for the location of the Khumani Iron Ore Mine.

1.2 Brief Project Description

In order to ensure stability and safety between mining operations it is required by the Department of Minerals and Energy and associated legislation that a Barrier Pillar of approximately 9m to each side of a mine boundary be left (in this case between the Khumani and the Sishen). This Barrier Pillar between the Khumani and Sishen has however resulted in the sterilisation of an area of approximately 400m along the mine boundary.

Both Assmang and Kumba Resources, who owns and operates the Sishen (hereafter referred to as Sishen) wishes to mine the Barrier Pillar between the Khumani and the Sishen, which is situated on the farms Bruce and Sishen. Neither of the two (2) mining companies has included the Barrier Pillar reserves into the approved Environmental Impact Assessment and Management Programmes. The two (2) mines have obtained the consent from the Department of Minerals and Energy (DME) to commission an Environmental Management Programme Amendment (EMP Amendment) process to include the mining of this Barrier Pillar into the approved mining rights.

Six (6) areas of potential feasibility have been identified to be mined within this Barrier Pillar. Three (3) of these areas (Areas 2, 4 and 5) are planned to be mined by Sishen and the remaining three (3) by Assmang (Areas 1, 3 and 6). Sishen wishes to start mining Area 2 during the middle of 2007 and continue to mine the remaining two (2) areas over a period of five (5) years. After this five (5) year period Assmang will start mining Areas 1, 3 and 6. The area will be mined layer by layer as the areas involved are small (the area on Khumani mining rights area only comprises of approximately 4ha). Sishen's waste will be deposited on the existing Sishen's dumps and Assmang's waste will be deposited on the approved Overburden and Low-grade Run of Mine (ROM) Stockpiles (which will also form part of reclaiming of low-grade iron ore in the near future) (refer to Figure 2 and Figure 3).

Please note that all volumes and tonnages associated with the mining activities as presented within this document (i.e. iron ore and waste material) are estimations based on initial planning studies and cannot be utilised for mining purposes or detailed designs.

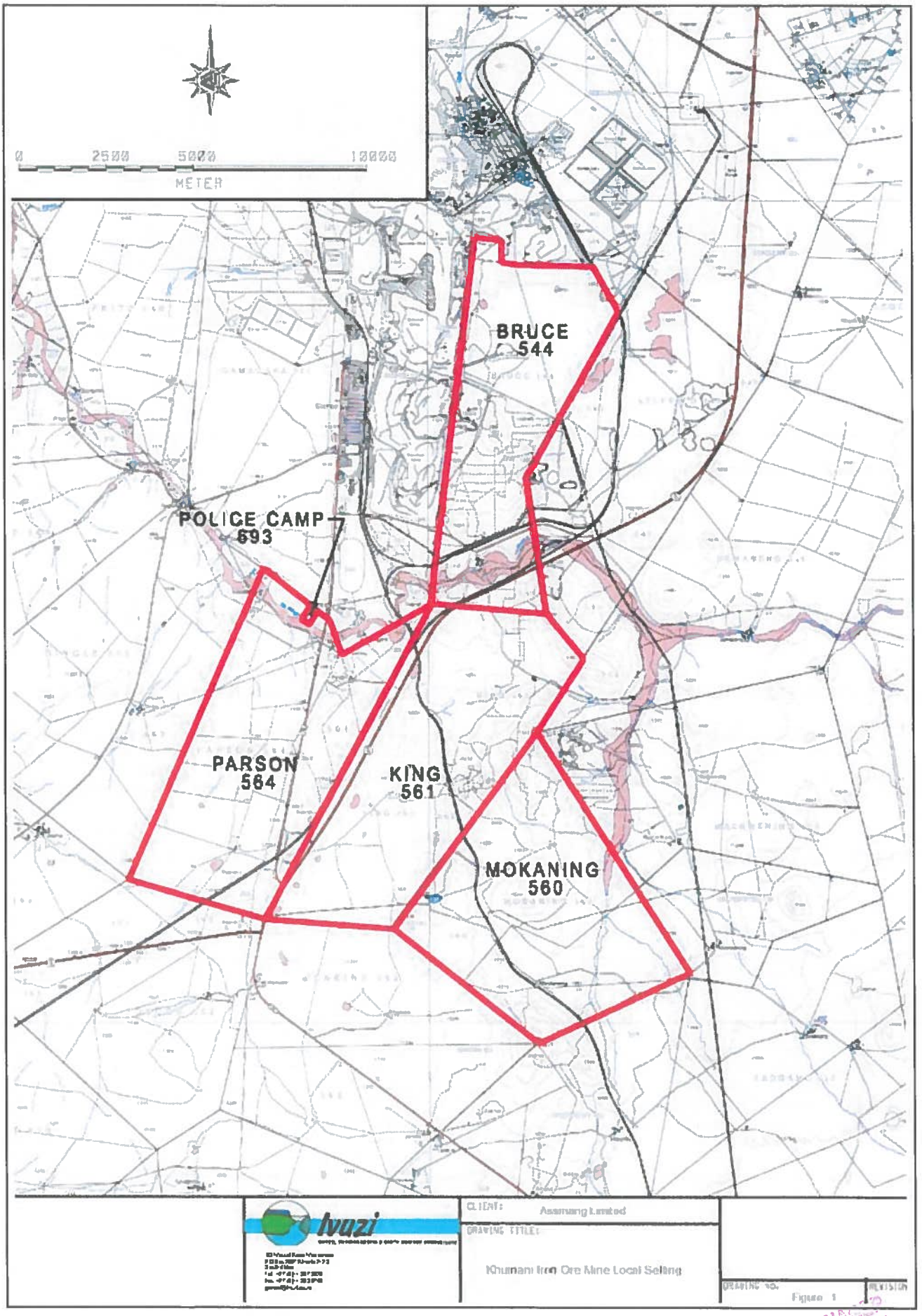

Figure 1: Location of the Khumani Iron Ore Mine

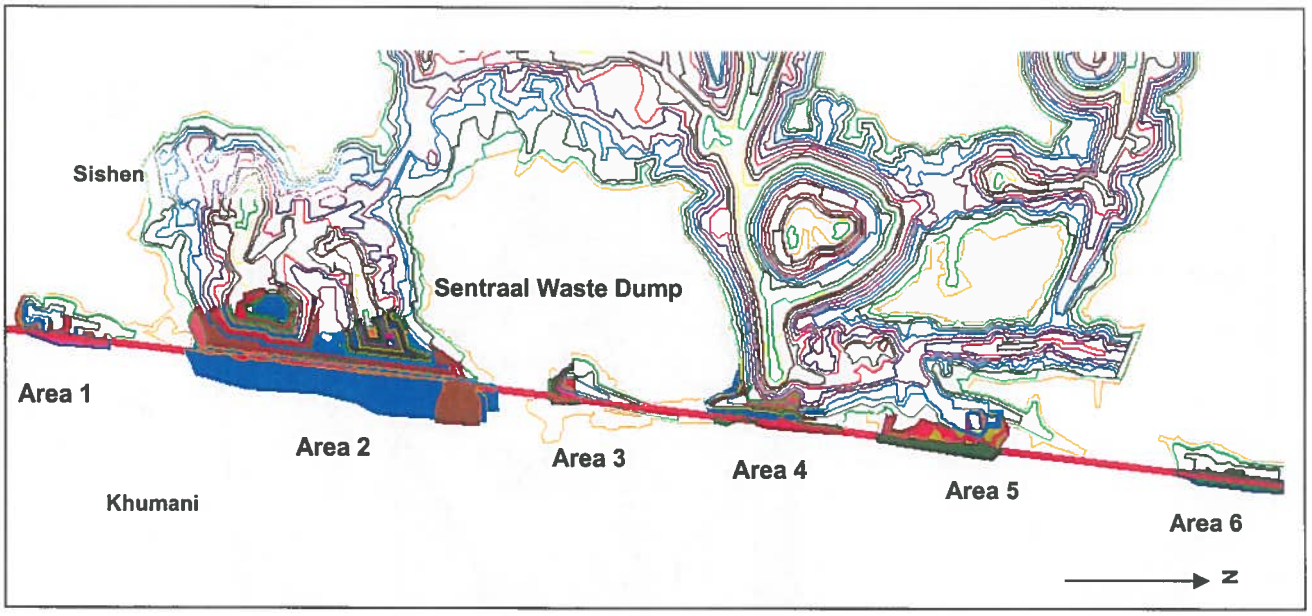

Figure 2: Location of the proposed mining areas

1.3 Ownership and Contact Details

1.3.1 Name and Address of the Owner of the Land and the Title Deed Description

The new order mining rights, as well as the surface rights to the affected area are owned by Assmang.

Farm Name	Size	Title Deed	Portion	Activity
Bruce 544 IQ	1891.2995Ha	No. 349 of 1954	Remaining Extent (RE)	Mining (Expansion of approved opencast pit operations)

1.3.2 Address of Mine

The name of the mine to which the project relates is the Khumani Iron Ore Mine.

Postal Address	PO Box Mancorp Mine Postmasburg 8423
Telephone Number	053 311 6666
Facsimile	053 311 4642

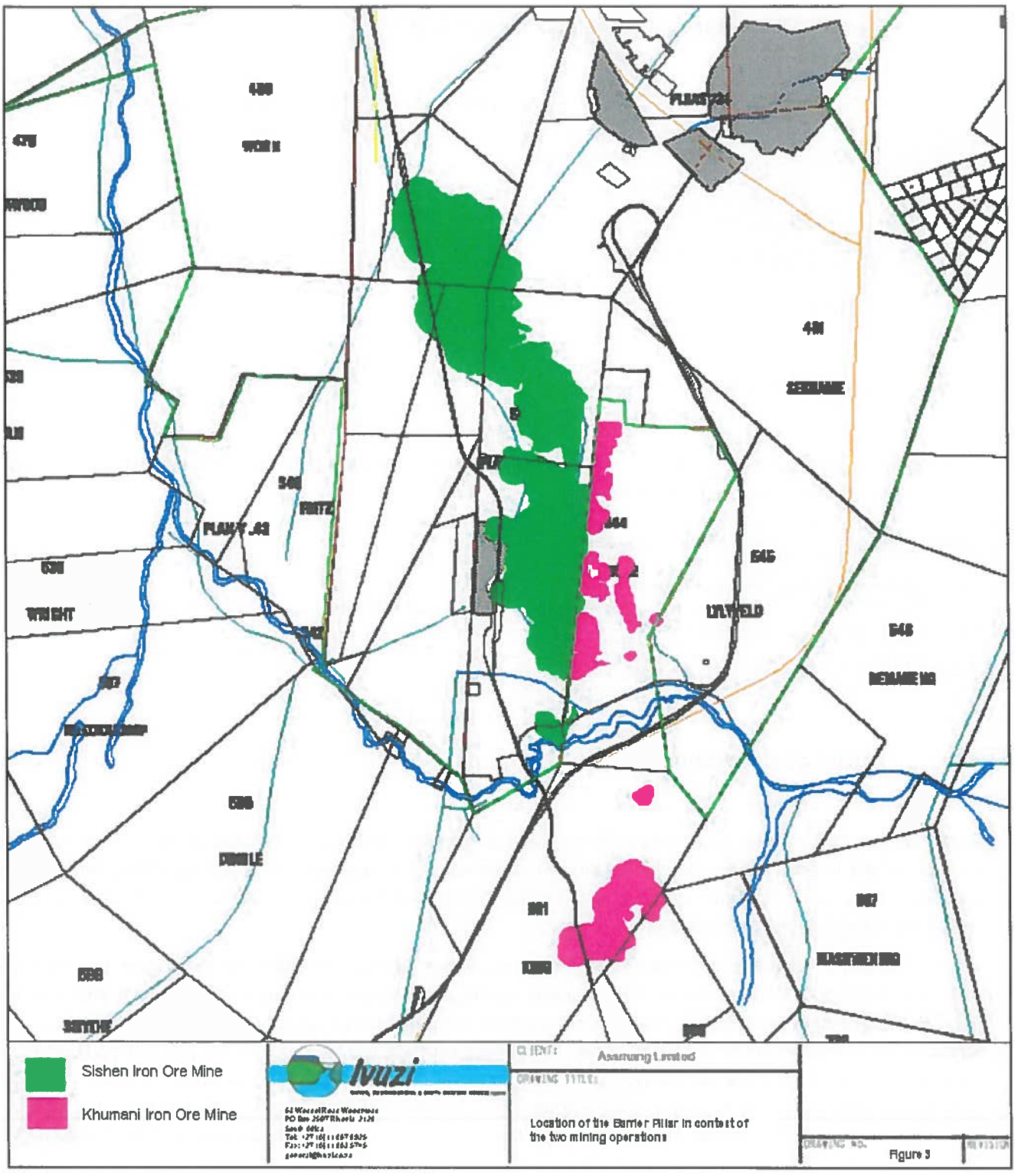

Figure 3: Location of the Barrier Pillar in context of the two (2) mining operations

1.3.3 Owner of Mine, Surface Rights and Mineral Rights

The owner of Khumani is Assmang Ltd they also own the surface and mineral rights.

Postal Address	PO Box Mancorp Mine Postmasburg 8423
Telephone Number	053 311 6666
Facsimile	053 311 4642

1.3.4 Responsible Person

The following responsible persons have been identified to ensure that the contents within this EMP Amendment are adhered to and implemented.

Mine Manager	Willem Grobbelaar
Technical Services Manager	Alex Mostert
Telephone Number	053 311 6666
Facsimile	053 311 4642

1.4 Terms of Reference

Assmang have appointed Ivuzi (Pty) Ltd as the independent environmental consultant to undertake an Environmental Impact Assessment (EIA) and Environmental Management Programme (EMP) Amendment (hereafter referred to as EMP Amendment) for the environmental authorisation to mine the Barrier Pillar within the Khumani mining rights area.

Areas 2, 4 and 5, which are planned to be mined by Sishen during July 2007 (depending on the approval from the DME) are situated within the Khumani mining rights area and therefore it is required that the approved EMP (approved during January 2007) for the Khumani be amended to reflect the changes to it in terms of the Barrier Pillar mining operations. The same process will be required for the Sishen EMP once Assmang mines into the Sishen mining rights area on Areas 1, 3 and 6. Some portions of Areas 1, 3, and 6 are also situated within the Khumani mining rights area, and are included as part of this report. It is planned that areas 1, 3 and 6 is mined in approximately five (5) years following the commissioning of the mining operations in July 2007.

The project will therefore result in six (6) mutual opencast pits within the Khumani and Sishen mining rights area and it is because of the mutual pits that this EMP Amendment is essential to address the potential mutual liabilities between the two (2) mining companies.

The EMP Amendment process will be undertaken in terms of the Mineral and Petroleum Resources Development Act (Act No 28 of 2002) (MPRDA) and will place strong emphasis on the requirements of the National Environmental Management Act (Act No. 107 of 1998) (NEMA) in terms of the rating of impacts.

As the mining operations of Sishen and Assmang will result in cumulative and interlinked environmental impacts it is essential that the two environmental processes for the amendment of the approved EMPs of both mines be undertaken in parallel to ensure that effective management programmes be defined for the

cumulative impact (e.g. dust management programme) and therefore the introductory meetings with the authorities and the feedback meetings with authorities will be undertaken simultaneously by both mining companies.

For the purpose of this project the following should be noted:

- There will be no new infrastructure (i.e. roads, offices, conveyors, power lines, etc.) (refer to Section 5.1);
- There will be no increase in the capacity of the existing waste rock dumps (refer to Section 5.2.2);
- There will be a slight increase in the capacity of the Paste Disposal Facility and Discard Dump (approximately 7% respectively) (refer to Section 5.2.3), but will not result in a footprint increase or a significant volume increase; and
- No additional clean and dirty water systems will be required, except for the extension of the approved systems upslope of the opencast pits (refer to Section 5.3).

The Terms of Reference for the environmental investigations for this project as required by Assmang, as well as the DME were as follows:

- No public participation was required, other than an introductory meeting and feedback meeting with the relevant government authorities;
- Submit a complete EMP Amendment for the mining of the Barrier Pillar to the DME for review and authorisation;
- Ensure that the Sishen and Khumani EMP Amendments are coherent with one other; and
- Ensure that gaps are identified and commitments clearly stated in the EMP Amendment to ensure ease implementation during the project life cycle.

1.4.1 Legislation

Mining activities currently fall under the jurisdiction of the Department of Minerals and Energy (DME) and the associated (MPRDA). In addition mining is included as part of the Schedule 2 Activities [requiring a full Environmental Scoping Report and Environmental Impact Assessment (EIA) Report] of the National Environmental Management Act (Act No. 107 of 1998) (NEMA) EIA Regulations (promulgated on 3 July 2006), but will only come into effect during the middle of 2007 (date still to be gazetted).

Introductory authorities meetings were held with the DME and the Department of Tourism, Environment and Conservation (DTEC) on 11 January 2007 to identify the required process to be followed to fulfill the requirements of both the NEMA as well as the MPRDA requirements. The outcomes of the meetings were that an EIA according to NEMA will not be required as the developments will be situated within the Mining Area of the Khumani Mine and no significant changes, if any, will occur on scheduled activities as previously applied for under the Environment Conservation Act (Act No. 73 of 1989).

1.4.2 Purpose

In terms of Section 24 of the Constitution of the Republic of South Africa (Act No. 108 of 1996) everyone has the right to an environment that is not harmful to their health or well-being and to have the environment protected, for benefit of present and future generations, through reasonable legislation and other measures that prevent pollution and ecological degradation, promote conservation and secure ecologically sustainable development and use of natural resources while prompting justifiable economic and social development.

It is therefore essentially required that the needs of the environment (both bio-physical and socio-economic), should be integrated into overall environmental and project management during the planning and operational phase up until closure in order to fulfill the requirements of Section 24 of the Constitution.

In order to commence with the project as described in Section 0, Assmang has to obtain authorisation from the DME in terms of the MPRDA, which includes the acceptance of the project by the other regulatory Authorities namely:

- Department of Tourism, Environment and Conservation (DTEC);
- Department of Water Affairs and Forestry (DWAF);
- National Department of Agriculture (NDA); and
- South African Heritage Resources Agency (SAHRA).

The environmental authorisation process generally involves the submission of three (3) reports, i.e. Environmental Scoping, EIA and EMP Reports. As the mine has an approved EMP in terms of the MPRDA, it is required by the DME that the document be amended to include the expansion of the mining activities within the mining right area, identify potential impacts and define all the management measures to ensure that the potential impacts associated with the project is reduced and/or preferably eliminated/avoided. Due to the extent of this project (approximate expansion of 4ha within the Khumani mining right area), the DME has exempted Assmang from undertaking the Scoping Phase of the environmental authorisation process.

For the purpose of environmental authorisation by the DME and other relevant authorities, the following is required by the MPRDA:

- EIA Report;
- EMP Amendment Report; and
- Approval of the EMP Amendment.

This report has incorporated both the EIA and EMP Amendment and serves to fulfill the purpose and requirements of the EIA Report and EMP Report as prescribed in Section 50 and Section 51 respectively of the MPRDA.

1.4.3 Objective

In accordance with the requirements of the MPRDA, an EMP Amendment needs to be submitted to the DME. The objectives of this Report are to:

- Provide a description of the environment in which the project is situated;
- Assess and do a comparative assessment on all potential alternatives that exist for the proposed project and determine which are the most feasible on an environmental, social and economical level if relevant to the project;
- Provide feedback on the stakeholder (Authorities) consultation undertaken for the proposed project;
- Identification of the impacts, which could occur as a result of the proposed project based on the nature, extent, duration, probability and significance of the impacts;
- Description of the arrangements for monitoring and management of environmental impacts;
- Identify the required management measures to address the identified impacts; and
- Identify knowledge gaps and report on the adequacy of predictive methods, underlying assumptions and uncertainties encountered in compiling the required information.

The above is accomplished by assessing and utilising the comments received from all stakeholders as well as the investigations undertaken by the environmental consultants to identify all the impacts, which could occur as a result of the proposed project and the required management measures to mitigate these impacts.

1.5 Methodology

1.5.1 EIA and EMP Amendment Process

The methodology applied for conducting the EMP Amendment consisted of the following activities and steps:

- An Introductory Authorities Meeting was held individually with the DME and the DTEC on 11 January 2007 (refer to Appendix 2);
- An Scoping Meeting was held with all authorities to discuss the mining of the Barrier Pillar and the potential way forward on 28 February 2007 (refer to Appendix 2);
- The EIA and EMP Amendment report was compiled with input from the various stakeholders (including Sishen). The following information has been included in the report:
  - The environments likely to be affected by the project were assessed without management in place, including cumulative impacts
  - The identified potential environmental, social, cultural and cumulative impacts were identified and assessment with management in place
- The EMP Amendment was submitted to the DME and other regulatory authorities on 13 April 2007;
- All the comments received from the DME, DTEC, DWAF, NDA and SAHRA will be incorporated within the final EMP Amendment; and
- A record of decision will be issued by DME.

1.5.2 Specialist Studies

The Khumani Barrier Pillar project is considered as an expansion of the existing opencast operations on the Bruce property (brown fields project) and all activities will be undertaken within an already approved mining area. No additional infrastructure will be established outside of already impacted areas (except for the 9m to be mined of the Barrier Pillar to each side of the mine boundary, approximately 4ha) and therefore the overall impact of this project will not be significant.

Detailed specialist studies have been undertaken in the project area as part of the approved EMP (January 2007) and this information was utilised for the purposes of compiling this report.

1.5.3 Environmental Impact Rating

The Environmental Impact Rating was undertaken according to the IVUZI (Pty) Ltd rating scale (refer to Section 7.1).

1.6 Report Structure

The report has been structured to comply with the MPRDA. The contents are as follows:

- Section 1: Background and Introduction;
  - This chapter provides a description of the location and the land ownership of the mine, as well as the purpose, approach and methodology followed for the completion of this project
- Chapter 2: Pre-Project Environmental description;
  - This chapter provides a description of the current environment (which includes the bio-physical and socio-economic components) prior to the commencing of the proposed project
- Chapter 3: Project Alternatives;
  - This chapter details the project alternative considered for the project and conducts a comparative assessment to indicate why the final option was decided if required
- Chapter 4: Project Motivation
  - This chapter provides a brief motivation for the proposed project, focussing on the impacts of a no-go decision or a positive approval.
- Chapter 5: Detailed Project Description;
  - This chapter provides a detailed description of the intended project and how it is planned to be initiated and operated should this report be approved
- Chapter 6: PUblic Participation Process;
  - This chapter details the process undertaken for stakeholder engagement and provides a discussion on the issues raised and how these have been addressed
- Chapter 7: Impact assessment and management programme;
  - This chapter assesses and rates the potential impacts on the environment, without considering the necessary management measures. This chapter further details the required management measures to be implemented during the construction, operational, decommissioning and closure phase. Should this report be approved this section would become legally binding on the mine
- Chapter 8: environmental Awareness plan;
  - The chapter presents the Environmental Awareness Plan to be followed in terms of this project
- Chapter 9: Emergency preparedness and response Programme;
  - This chapter presents the Emergency Response and Preparedness Programme to be followed in terms of this project
- Chapter 10: Monitoring and management of environmental impacts;
  - This chapter indicates the monitoring and management measures of environmental impacts (i.e. surface water monitoring, groundwater monitoring, air quality monitoring etc.) for the way forward should this project be approved
- Chapter 11: submission of information;
  - This chapter presents the commitment of the mine in terms of the submission of information as feedback on the approved EMP
- Chapter 12: Financial Provision for Closure;
  - This chapter presents the process followed to calculate the required financial provision in terms of this project and how the mine will fund this provision

- Chapter 13: Identification of Gaps;
  - During the EMP Amendment process various gaps have been identified. This chapter serves to indicate which gaps have been identified and how these should be addressed
- Chapter 14: Conclusion.
  - The conclusion provides a brief discussion on the findings in the report and an opinion on whether this project should be approved or rejected

2 PRE-PROJECT ENVIRONMENTAL DESCRIPTION

This chapter provides a summarised description of the current environmental status on which the proposed project is to be commissioned. For more detail please refer to the approved EMP Report of Khumani (BKM), dated January 2007.

2.1 Geology

The iron ore in this area is preserved in chemical and clastic sediments of the Proterozoic Transvaal Supergroup, deposited between about 2 500 and 1 800 million years ago. The stratigraphy has been deformed by thrusting from the west and has also undergone extensive karstification. The thrusting has produced a series of open, north to south plunging, anticlines, synclines and grabens. Karstification has been responsible for the development of deep sinkholes in this area.

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 Campbellrand Formation and in turn is overlain by the Sishen shale. Dolomites of the Campbell Supergroup occur as irregular outcrops in the east and isolated outcrops in the south-western area of the Khumani (refer to Figure 4).

The Doornfontein Conglomerate Member of the Gamagara Formation unconformably overlies the Manganore Iron Formation. This member consists of conglomerate, gritstones and interbedded shales. The shale units associated with the iron-rich conglomerates and gritstones may be iron rich and form part of the ore body.

Above the Doornfontein Conglomerate Member is a zone of interbedded white, red and black shales. These shales form the Sishen Shale Member. This shale is impersistent along strike and thins and pinches over paleo-hills along the Gamagara unconformity. On Bruce outcrops of this shale member can be found on either side of the iron ore outcrops. Purple and white coloured, cross-bedded quartzite of the Marthaspoort Member outcrop is found in the south-western part of the farm. Younger sediments consisting of clay, calcrete and sand of the Kalahari Formation cover the northern part of Bruce. Iron ore rubble covers large areas around the iron ore outcrops.

Lenticular and irregular low tonnage laminated iron ore in the banded ironstone of the Manganore Iron Formation is known as Thabazimbi ("Thaba")-type ore. The laminated Manganore-type constitutes the bulk of the ore reserve in Bruce. It varies from a massive to thickly laminated ore. Manganore-type ore can be brecciated to form breccia ore. The massive Manganore-type and Thaba-type ores can be difficult to distinguish except for their different stratigraphical relationships.

Two types of iron ores are found in the Gamagara Formation, these are the conglomeratic-type and the laminated-type. Both are found in the Doornfontein Conglomerate Member. The conglomeratic-type ore consists of rounded hematite clasts in a hematite matrix. The conglomerate ore can grade into gritty hematite ore containing hematite granules in a fine-grained platy hematite matrix. The difference between the conglomerate ores of the Gamagara Formation and the breccia ores of the Manganore Iron Formation can be found in the roundness and type of clasts and the degree of sorting. Clasts in the former are better rounded; polymictic as far as types of hematite ore concerned and some degree of sorting can be seen. The massive ore is usually fine to very fine grained and sand to silt sized hematite grains in a platy hematite matrix. The ore is often faintly laminated. The Gamagara (conglomeratic) ore types are not abundantly found at Bruce.

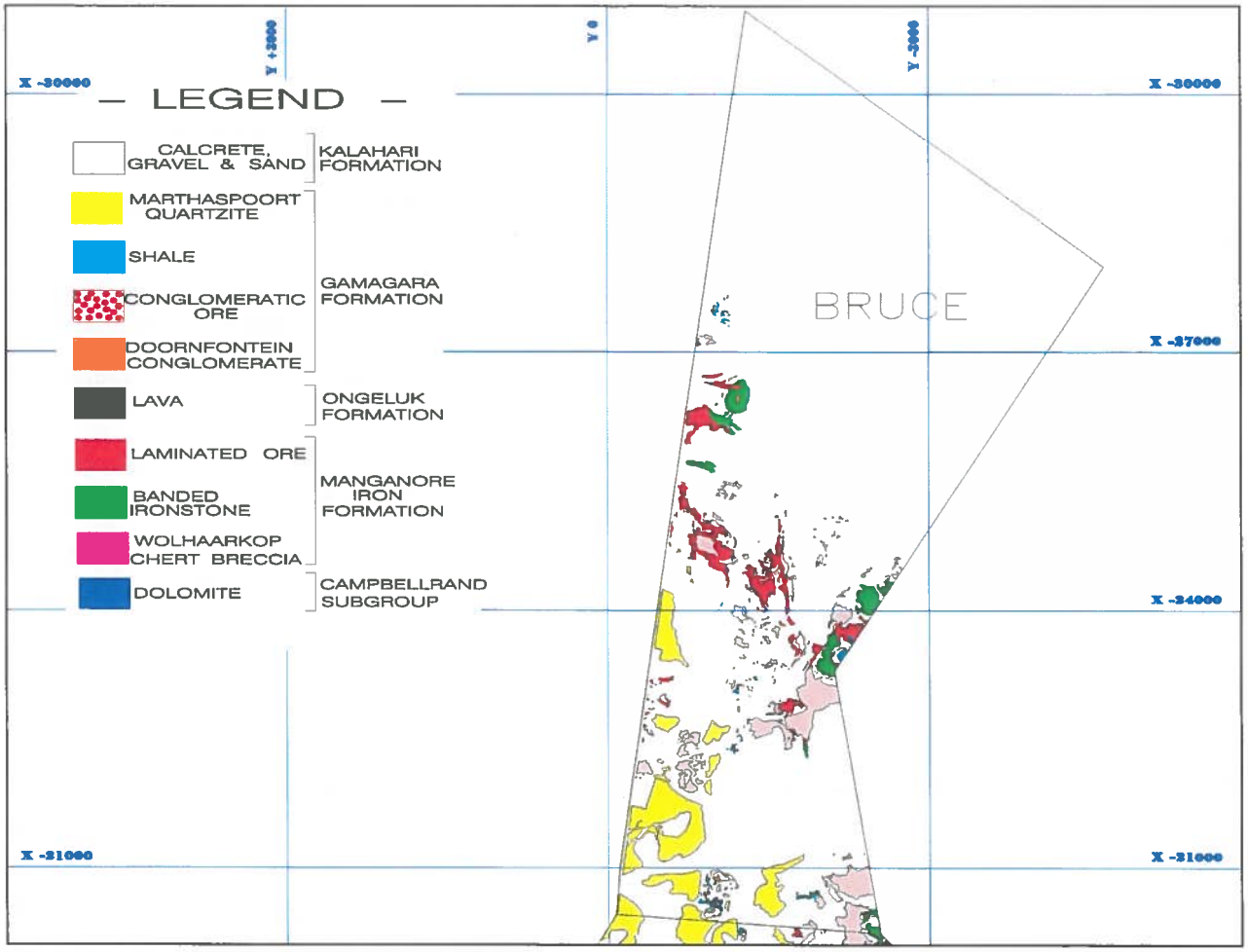

Figure 4: Bruce, King and Mokaning deposit

The Sishen iron deposit is trough shaped striking north, north-west to south, south-east. The ore is best developed along the axis. Thick units of both Manganore (laminated) and Gamagara (conglomeratic) ores are developed in the basins. Lithologies of the Gamagara Formation often pinch out on paleo-highs. The Manganore Iron Formation is more deformed than the Gamagara strata. This together with the geometry of the Gamagara Formation implies that the predominant basin and dome structures developed prior to the deposition of the Gamagara strata. The basins represent paleo-sinkhole structures. Dissolution of the carbonates below the Kuruman (Manganore) Iron-Formation resulted in slumping of the interbedded cherts and overlying iron-formations. This dissolution may have been joint controlled explained by lineaments shown on structural contour maps compiled by Sishen.

Deformation of the strata increases to the east. A younger erosion cycle of probably the Karoo and / or pre-Kalahari in age could cause this deformation. The local slumping of Kalahari sediments into sinkhole structures could be related to deformation in recent times. Smaller scale open folding in the outcrops at Bruce could be related to the low angle thrusting further west.

The iron ore outcrops are discontinuous and irregular in shape. Although striking north-south is recognised on the western part of Bruce, it is poorly developed and discontinuous. Basin-and domelike structures are developed. The regional dip of the strata is 5 to 10 degrees to the west. A north south trending thrust, which has thrust the Ongeluk Lava over the above sequence, is located to the west. A number of north-south trending dykes are present.

Laminated iron ore of the Manganore Formation is well developed in these basins. Thinner lenses of the clastic Gamagara-type iron ore occur higher up in the basins and the Doornfontein Member is thicker. Basins with no iron ore filled with Gamagara and Kalahari sediments are developed further east. The latter basinal development was also found at Sishen.

2.2 Climate

The Khumani is located in a low rainfall area. Most of the rainfall in this semi-arid region occurs in summer and early autumn during the months of November to April. The month of July experiences on average, the lowest rainfall with an average monthly rainfall for the Postmasburg, Kuruman and Sishen Weather Stations respectively of 0.85mm, 0.55mm and 2.00mm.

The month of February experiences on average the highest rainfall with an average monthly rainfall for the Postmasburg, Kuruman and Sishen Weather Stations respectively of 65.65mm, 57.60mm and 56.00mm.

The predominant wind direction is from the north-north-west to west with frequent winds also occurring from the north and south.

High summer temperatures cause atmospheric instability and turbulence, which leads to the development of thunderstorms. The temperature in the area varies between -9°C and 42°C, with an average of 19.2°C.

Evaporation in the region recorded by the Sishen Weather Station is 2026mm per year. The evaporation is approximately five (5) times higher than the mean annual precipitation.

2.3 Topography

The general topography of the area in which the Khumani mining operations are situated is characterised by generally flat terrain with no steep inclines except for the two mountain ranges to the west (Langberg range) and a smaller range to the east (Kuruman Heuwels).

The area surrounding the Barrier Pillar area consists of relatively flat river valleys in the south to flat uncultivated land in the north. Altitudes range from approximately 1200 metres above mean sea level (mamsl) in the south, where the Gamagara River flows, as well as the north of the property, with the land gradually increasing in gradient to approximately 1260mams in the centre of the project area.

The Gamagara River flows in a northern direction through the eastern portion of the Mokaning and King farms, crossing the southern portion of Bruce farm (to the south of the project area), flowing in a westerly direction.

2.4 Soil, Land Use and Land Capability

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 outcrop characterises the topographic highs of the area. The outcrops generally comprise quartzites and the iron ore bearing ironstones. These outcrops form prominent hills/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 much as 1m deep. The very shallow soils and rock outcrop are classified as Mispah Form, with the pockets comprising Hutton Form.

The shallower soils that are present to the north eastern portion of the project area are classified as Augrabies Form. They cannot be classified as Mispah or Glenrosa Form due to their red colouring.

On the lower slopes neighbouring the Mispah Form are Hutton Form. These areas are characterised by numerous surface boulders derived from the outcrop upslope.

The Mispah Form is non bleached and non-calcareous in the A-horizon, characteristic of the Myhill Family. The Hutton Form are characteristically dystrophic and non-luvic in the B1-horizon, indicative of Lillieburn Family soils (Brakkies family and the Augrabies Form soils have a non-bleached red A horizon and are non-luvic, characteristic of the Khubus Family).

The Hutton Form examined on site comprise dry, yellowish red to red, apedal, loose, fine sands, with little observed differentiation between the topsoil and the B1-horizon sandy loams. The topsoil of the Mispah Form and Augrabies Form are also very similar in structure.

It should be noted that the soil physical and chemical characteristics suggest that they are of wind blown origin rather than in situ weathering of the bedrock.

Table 1: Soil forms and families

Soil Form	Soil Family	Code	Diagnostic Horizons
Mispah	Myhill	Ms-1100	Orthic A Hard Rock
Hutton	Lillieburn	Hu-1100	Orthic A Red Apedal B
Augrabies	Khubus	Ag-1210	Orthic A Neocarbonate B

The soils are generally considered to be poor agricultural soils due to the absence of structure, the low to very low clay content resulting in poor available moisture capacity due to very rapid drainage. This is exacerbated by the semi-arid climate of the area. The physical characteristics of these soils can be summarised as follows:

- Available moisture capacity: poor;
- Intake rate: good;
- Drainage: good;
- Erosion hazard: moderate; and
- Tillage constraints: moderate -presence of scattered boulders and outcrop.

2.5 Flora

A detailed flora assessment was undertaken over the Khumani during June 2006 by Ms Karien van der Merwe of GCS (Pty) Ltd. For the purposes of this study the areas applicable to the proposed project area are presented. A detailed report is available from Assmang Ltd.

The study area is located in the Kalahari Plains Thorn Bushveld Vegetation Type (Type No. 30), which is located in the Savanna Biome of southern Africa (Van Rooyen & Bredenkamp, 1998:35).

The vegetation of the Kalahari Plains Thorn Bushveld Vegetation Type is characterised by a fairly well-developed tree stratum. Camel Thorn *Acacia erioloba* and Shepherd's Tree *Boscia albitrunca* are dominant in the area, while scattered individuals of Belly Thorn *Acacia luederitzii* and Silver Clusterleaf *Terminalia sericea* may be locally conspicuous. The moderately developed shrub layer contains species such as Black Thorn *Acacia mellifera*, Weeping Candle Thorn *Acacia hebeclada*, Karee-thorn *Lycium hirsutum*, Velvet Raisin *Grewia flava* and Grey Camel Thorn *Acacia haematoxylon*. The extent of the grass cover is dependent on the amount of rainfall received during the rainy season and may include species such as Lehmann's Lovegrass *Eragrostis lehmanniana*, Sour Bushmangrass *Schmidtia kalihariensis* and Silky Bushman Grass *Stipagrostis uniplumis* (Van Rooyen & Bredenkamp, 1998:35).

Avifauna is well represented with unusual species for the area such as Black-winged Stilt and Common Sandpiper observed at pans holding water.

The following main vegetation communities are present in the specific project area:

- *Pennisetum setaceum* Short Sparse Grassland

This is located on a mine dump within the borders of the farm Bruce and is characterised by the following plant species:

  - Trees: Prosopis glandulosa var. torreyana
  - Shrubs: Acacia mellifera, Grewia flava, Tarchonanthus camphoratus, Ziziphus mucronata
  - Grasses: Aristida adscensionis, Aristida congesta subsp. barbicollis, Aristida stipitata, Eragrostis lehmanniana, Melinis repens, Pennisetum setaceum

- *Acacia mellifera* Tall Closed Shrubland

The *Acacia mellifera* Tall Closed Shrubland is located on the Mispah Soil Form and rocky outcrop areas of the farms Bruce, King, Parson and Mokaning (Figure 3) and is characterised by the following plant species:

  - Trees: Acacia erioloba (small), Boscia albitrunca
  - Shrubs: Acacia hebeclada, Acacia mellifera, Aloe grandidentata, Aloe hereroensis, Amaranthus praetermissus, Cadaba aphylla, Ehretia rigida, Euclea undulata, Grewia flava, Lycium spp., Rhigozum trichotomum, Rhus burchelli, Rhus ciliata, Tarchonanthus camphoratus, Ziziphus mucronata
  - Forbs/Parasites: Asclepias burchelli, Babiana hypogea, Datura ferox, Felicia muricata, Geigeria pectidia, Hoodia gordonii[1], Indigofera alternans, Kalanchoe paniculata, Kleinia longiflora, Pentzia spp., Pergularia daemia var. daemia, Protasparagus spp. Viscum rotundifolium
  - Grasses: Aristida adscensionis, Aristida congesta subsp. barbicollis, Aristida congesta subsp. congesta, Aristida diffusa, Aristida stipitata, Cymbopogon excavatus, Cymbopogon plurinodis, Digitaria eriantha, Enneapogon desvauxii, Eragrostis lehmanniana, Eragrostis trichophora, Melinis repens, Pogonarthria squarrosa, Schmidtia pappophoroides, Stipagrostis uniplumis

- *Acacia erioloba* Tall Open Woodland

The *Acacia erioloba* Tall Open Woodland is located on the Augrabies Soil Form in the northern parts of the farm Bruce, the eastern side of the farm Mokaning[2] and the central and northern parts of the farm King and is characterised by the following plant species:

  - Trees: Acacia erioloba, Acacia haematoxylon[3], Agave americana[4], Ziziphus mucronata
  - Shrubs: Acacia hebeclada, Acacia mellifera, Cadaba aphylla, Grewia flava, Gymnosporia buxifolia, Lycium spp., Tarchonanthus camphoratus
  - Forbs: Acanthosicyos naudinianus, Amaranthus praetermissus, Felicia muricata, Geigeria pectidia, Harpagophytum procumbens subsp. procumbens, Indigofera alternans, Oxalis semiloba subsp. semiloba, Pentzia spp., Pergularia daemia var. daemia, Polichia campestris, Protasparagus setaceus, Protasparagus spp., Selago dinteri subsp. pseudodinteri, Senna italica, Tribulus terrestris
  - Grasses: Aristida congesta subsp. barbicollis, Aristida congesta subsp. congesta, Aristida diffusa, Aristida stipitata, Eragrostis lehmanniana, Eragrostis trichophora, Pogonarthria squarrosa, Schmidtia pappophoroides, Stipagrostis uniplumis

[1] Individuals of Hoodia gordonii were only recorded in the northern areas of the farm King.

[2] Please note that the borders between the Augrabies Soil Form and Mispah Soil Form (rocky outcrops) on the farm Mokaning do not seem to be as clear-cut as indicated on Figure 3. Instead, these two areas seem to continually flow into and out of each other.

[3] Please note that individuals of *Acacia haematoxylon* were only recorded within this vegetation community on the farms King and Mokaning.

[4] Individuals of *Agave americana* were only recorded on the farm King.

The Khumani is currently in the process of establishing an Offset Area as part of complying with their approved EMP, January 2007, of which the purpose is to conserve an area with a similar ecological structure than the one being impacted upon at Khumani.

2.6 Fauna

A detailed fauna assessment was undertaken over the Khumani during April 2006 by P.C. Anderson and B.Y. Wilson of the McGregor Museum in Kimberley. For the purposes of this study the areas applicable to the proposed project is presented. A detailed report is available from Assmang Ltd.

- Mammals

Available literature and the McGregor Museum mammal database suggest a total composition of approximately 64 mammal species for the Kalahari Thornveld complex, most of which fall within the small mammal category. This survey, combined with previous investigations, indicated the presence of 8 mammal species, which accounts for 13% of the overall total (refer to Table 2 for the species applicable to the entire Bruce farm). It must be taken into account, however, that all large ungulate species, except for Kudu, were encountered outside, but in close proximity, to the earmarked areas. The Ground Pangolin (historical record) is the only Red Data Book (RDB) species recorded and is currently listed as Vulnerable. Two former RDB species, namely the Aardvark (*Orycteropus afer*) and African Wild Cat (*Felis silvestris*), were also recorded. They were removed from the RDB list in 2004. Mr Alfred Markram, a farmer who resided at Parsons, reported the historical record of Pangolin.

- Birds

According to available literature and the McGregor Museum museum bird database, a total of approximately 204 bird species could be encountered in the areas earmarked for possible further development. The three-day survey, in combination with previous assessments, indicated the presence of 34 bird species (17%), two of which appear in the avifauna RDB series, namely the Kori Bustard (*Ardeotis kori*) and Martial Eagle (*Polemaetus bellicosus*). Both are classified as Vulnerable (refer to Table 3 for the species applicable to the entire Bruce farm). It must be kept in mind that all raptor (birds of prey) species, over and above a possible RDB status, are categorised as protected wild animals in the Northern Cape Province. The presence of water-associated birds could be attributed to the water-filled ephemeral pans following the substantial rains that were experienced in the Kalahari. Parson showed by far the greatest diversity in birds, which can directly be attributed to the large section of the land flanking the Gamagara River. Five of the more common species, namely the Rock Martin, Little Swift, Greater Striped Swallow, Rock Kestrel and African Grey Hornbill were found to be breeding.

- Herpetofauna

An approximate total of 40 reptile and six (6) amphibian species, none of which appear in the current RDB, may be encountered in the area of proposed further development and immediate surrounds. The Rock Monitor is considered Vulnerable outside conservation areas, while all tortoise species enjoy protected status. Two (2) reptile species (0.05%) were recorded during this and previous survey periods (refer to Table 4 for the species applicable to the entire Bruce farm). The recorded amphibians and Marsh Terrapin were encountered in the ephemeral pan systems.

Table 2: Composition of the mammalifauna that may be encountered on the Bruce property

Species	Scientific Name	Kathu surr. (26)	Bruce (8)	RDB Status
Baboon, Chacma	*Papio hamadryas*	PR	✓	
Hare, Cape	*Lepus capensis*	PR	✓	
Hyrax, Rock	*Procavia capensis*		✓	
Mole-rat, African	*Cryptomus hottentotus*	PR	✓	
Mongoose, Yellow	*Cynictis penicillata*	PR	✓	
Mouse, Namaqua Rock	*Micaelamys namaquensis*		✓	
Porcupine, Cape	*Hystrix africaeaustralis*	PR	✓	
Squirrel, South African Ground	*Xerus inauris*	PR	✓	

PR, Previously Recorded; H, Historical report/evidence; R, Reported, usually by locals; Kathu surr. = Kathu area outside, but near to, the areas currently surveyed, Vul, Vulnerable. Number in brackets indicates the total number of species encountered

Table 3: Composition of the avifauna that may be encountered on the Bruce property

Species	Scientific Name	Kathu surr. (122)	Bruce (34)	RDB Status
Bulbul, African Red-eyed	*Pycnonotus nigricans*	PR	✓	
Canary, Yellow	*Serinus flaviventris*	PR	✓	
Chat, Familiar	*Cercomela familiaris*	PR	✓	
Crombec, Long-billed	*Sylvietta rufescens*		✓	
Crow, Pied	*Corvus albus*		✓	
Dove, Cape Turtle	*Streptopelia capicola*	✓	✓	
Dove, Laughing	*Streptopelia senegalensis*	PR	✓	
Dove, Namaqua	*Oena capensis*	PR	✓	
Finch, Scaly-feathered	*Sporopipes squamifrons*		✓	
Goose, Egyptian	*Alopochen aegyptiaca*	PR	✓	
Hornbill, African Grey	*Tockus nasutus*	PR	✓	
Kestrel, Rock	*Falco rupicolus*		✓	
Lapwing (Plover), Blacksmith	*Vanellus armatus*	✓	✓	
Lark, Eastern Clapper	*Mirafra fasciolata*	PR	✓	
Martin, Rock	*Hirundo fuligula*	PR	✓	
Mouse-bird, White-backed	*Colius colius*	PR	✓	
Mouse-bird, Red-faced	*Urocolius indicus*	PR	✓	
Neddicky	*Cisticola fulvicapilla*		✓	
Owl, Barn	*Tyto alba*	✓	✓	
Owl, Spotted Eagle	*Bubo africanus*	PR	✓	
Pigeon, Speckled (Rock)	*Columba guinea*	PR	✓	
Prinia, Black-chested	*Prinia flavicans*	PR	✓	
Scimitarbill, Common	*Rhinopomastus cyanomelas*	PR	✓	
Shrike, Common Fiscal	*Lanius collaris*	PR	✓	
Sparrow, Cape	*Passer melanurus*	PR	✓	
Starling, Pale-winged	*Onychognathus nabouroup*		✓	
Swallow, Barn (European)	*Hirundo rustica*	✓	✓	
Swift, Little	*Apus affinis*	✓	✓	
Tchagra, Brown-crowned	*Tchagra australis*		✓	
Tit-babbler, Chestnut-vented	*Parisoma subcaeruleum*	PR	✓	
Wagtail, Cape	*Motacilla capensis*	PR	✓	
Weaver, Southern Masked-	*Ploceus velatus*	PR	✓	
Whydah, Pin-tailed	*Vidua macroura*	PR	✓	
Whydah, Shaft-tailed	*Vidua regia*		✓	

PR, Previously Recorded; H, Historical report/evidence; R, Reported, usually by locals; Kathu surr. = Kathu area outside, but near to, the areas currently surveyed, Vul, Vulnerable. Number in brackets indicates the total number of species encountered

Table 4: Composition of the herpetofauna that may be encountered in the proposed areas of development

Species	*Scientific Name*	Kathu surr. (12)	Bruce (2)
Agama, Ground	*Agama a. aculeata*	PR	✓
Terrapin, Marsh / Helmeted	*Pelomedusa subrufa*		✓

PR, Previously Recorded; H, Historical report/evidence; R, Reported, usually by locals; Kathu surr. = Kathu area outside, but near to, the areas currently surveyed, Vul, Vulnerable. Number in brackets indicates the total number of species encountered

2.7 Surface Water

The Khumani is situated within the Lower Vaal Water Management Area (No. 10). The area is situated in the D41 catchment of the Gamagara River, the quaternary catchment being D41J.

The site is located on a gently sloping to hilly terrain with rivers flowing in a north-westerly direction. The major river traversing the Khumani is the Gamagara River, which flows from the east to west across the site, approximately 500m south of the proposed mining operations. The river then flows north to join up with the Kuruman River.

The Gamagara River is normally dry and only flow for comparatively short periods after significant rainfall events. There is no normal dry weather flow that would be impacted by the mining development.

There are no significant surface water users downstream of the proposed mining development due to the unreliability of flow in the Gamagara River and its tributaries. The only significant water users would be the aquatic ecosystem, which relies on occasional storm flow and flushing action in the watercourses.

Majority of other users (primarily the farming community) rely on groundwater abstraction for livestock watering and domestic consumption.

The Khumani is situated in the jurisdiction of the Northern Cape Department of Water Affairs and Forestry (DWAF).

2.8 Groundwater

Regional static groundwater levels around the Khumani vary between 8 meters below surface (mbs) in the plains outside the compartments where dewatering impacts, to a maximum of 150mbs near Sishen where the dewatering impact is the most significant. Because of the existing dewatering impact from Sishen, the groundwater level no longer follows the trend of the surface topography. The highest static water level elevations are about 1 260mamsl and occur in the topographically higher regions namely to the south of the proposed pits on the farms King and Mokaning. The lowest elevations (not induced by mine dewatering) are at approximately 1 140mamsl in the downstream direction (north-west) where the Gamagara River exits the Sishen mining area. Average water levels are indicated in Table 5.

Table 5: Average water levels on the Bruce property (2004)

Location (farm)	Water Level (mbs)
Bruce North	130
Bruce South	120

The natural flow direction for groundwater differs locally but as a generalisation could be described as towards the north-north-east.

The cone of depression from the Sishen dewatering program extends well past the Khumani opencast pits, although spreading of the cone is effectively contained by relatively impermeable dolerite dykes. The dewatering is thus limited to a large aquifer compartment that stretches from the central parts of Sishen to approximately 3.3km south of the southernmost opencast pit on the farm King. The dimensions of the compartment are roughly 19km north-south by 8km east-west for a total area of approximately 152km^2.

Recharge in the Khumani mining area and surrounds is estimated to be between two (2) and four (4) % of MAP. Based on this estimate, the average recharge to the modelled area (Khumani mining boundary and surrounds) is 28 300m^3/d (10 300 000m^3/y). Numerical modelling at Sishen has shown that effective recharge could easily increase to more than 30% of MAP in the open pit areas where aquifer host rock is exposed and all drainage is captured in the opencast pit.

Around the proposed Khumani mining area most of the boreholes display good groundwater quality with the exception of relatively high hardness.

The hydrocensus and water user survey showed that groundwater from boreholes and wells is used only for domestic supply and livestock watering. Farmers often tap the shallow calcrete/clay aquifer in which borehole yields vary between 0.3 and 2 l/s.

2.9 Sensitive Landscapes

Sensitive landscapes occur in the form of pans and river floodplains within the Khumani. The Pans and riparian zones are classified as wetlands and therefore have legal protection based on conservation status. Various pans occur in the Khumani Iron Ore Mining area; however none are present within the proposed project area.

The Gamagara River forms a sensitive habitat and a corridor for animal movement through the ecosystem.

Protected species like the *Acacia erioloba* is present in the riverbed and on the banks of the Gamagara River. Many sections of the Gamagara River have been severely disturbed (agriculture) and invaded by mesquite, and there are probably few sections of this river left undisturbed. It is therefore highly important to protect the sections of the Gamagara, which fall within the mining area. Therefore, no mining activities will be conducted within the 1:100 year flood line of the Gamagara River.

2.10 Air Quality

Particulates represent the main pollutant of concern in the assessment of opencast mining operations. Particulate matter is classified as a *criteria* pollutant, with air quality guidelines and standards having been established by various countries to regulate ambient concentrations of this pollutant. Particulates in the atmosphere may contribute to visibility reduction, pose a threat to human health, or simply be a nuisance due to their soiling potential.

The town of Kathu is located on the northern periphery of the Khumani mining rights area. Dingleton is directly on the western border with the mine (approximately 2.5km to the west of Bruce) with Vlakwater, Mooihoek and Weltevreden located to the south of the mine boundary. Other nearby towns include Olifantshoek (approximately 26km west of King and Mokaning, and 25km west of Parsons) and Kuruman (approximately 8km north of Bruce). These have been included in the air quality study conducted for Khumani as sensitive receptor areas.

There are not many sources of air pollution within the region besides the mining operations. The main types of sources include:

- Fugitive emissions from mining operations (Sishen, BKM (Khumani Mine and other smaller mines);
- Vehicle tailpipe emissions (the R27 running on the eastern and southern side of the mining property area and various smaller roads);
- Household fuel combustion (particularly coal and wood used by smaller communities);
- Biomass burning (veld fires in agricultural areas within the region); and
- Various miscellaneous fugitive dust sources (agricultural activities, wind erosion of open areas, vehicle-entrainment of dust along paved and unpaved roads).

Sishen has an existing ambient air monitoring network and dust fallout network, which have been in place since 2002. The network records PM10 concentrations at six (6) locations around the Sishen mining rights area, mainly within residential areas (Liebenberg-Enslin, et.al., 2005). The dust fallout network comprises directional dust buckets (collecting dust from the four predominant wind directions) at eleven sites around the mining boundary with two sites within the mining property. In addition, a dust fallout network comprising of 10 single dust fallout buckets has been installed at the Khumani. The locations of the dust fallout buckets for both Sishen and Khumani and the PM10 samplers are indicated in Figure 5.

The main objectives of the monitoring network at Sishen Mine are to assess temporal and spatial trends, and to track progress made by control measures, provided the monitoring periods are on average over a 14-day period for both PM10 concentrations and dust fallout levels (Liebenberg-Enslin, et.al., 2005). The dust fallout network at Khumani serves as compliance assessment monitoring, to assist in source apportionment once the mine is operational and reflect both spatial and temporal trends.

Monitoring for dust deposition data at Sishen was undertaken during the period September 2002 to January 2005 at 11 sites and measurements are being continued at these sites. Dust deposition data from these sites was analysed by Gerry Kuhn consultants. It has been observed that for all eleven stations around the Sishen, the dust fallout levels are within the moderate (250 mg/m²/day to 500 mg/m²/day) to VERY HEAVY (> 1 200 mg/m²/day) fallout categories as specified by DEAT. The highest levels are recorded at the Mobile Unit, which is onsite next to the main haul road. There is no change in main contributing wind direction at each station, just like the scenarios at Sishen (Liebenberg-Enslin, et.al., 2005). However, most of the monitoring sites depicted dust fallout above the DME threshold level for action.

Compliance monitoring at Khumani Mine started during October 2006 and is done at 12 sampling points numbered BKM01 to BKM12. Please refer to the attached map which depicts the position of the sampling points. Three (3) of the 12 sampling points are directional systems and the remaining nine (9) are single systems.

Export/Import dust fall-out rate is determined using directional systems and single systems are used to determine fall-out rate at a specific location. The following categories for Particulate Matter are applicable:

- Dust-fall rate (mg/m^2/day): < 600 - Permissible for residential and light commercial;
- Dust-fall rate (mg/m^2/day): 600 to 1200 - Permissible for heavy commercial and industrial;
- Dust-fall rate (mg/m^2/day): 1200 to 2400 - Requires investigation and remediation; and
- Dust-fall rate (mg/m^2/day): > than 2400 - Immediate action and remediation required.

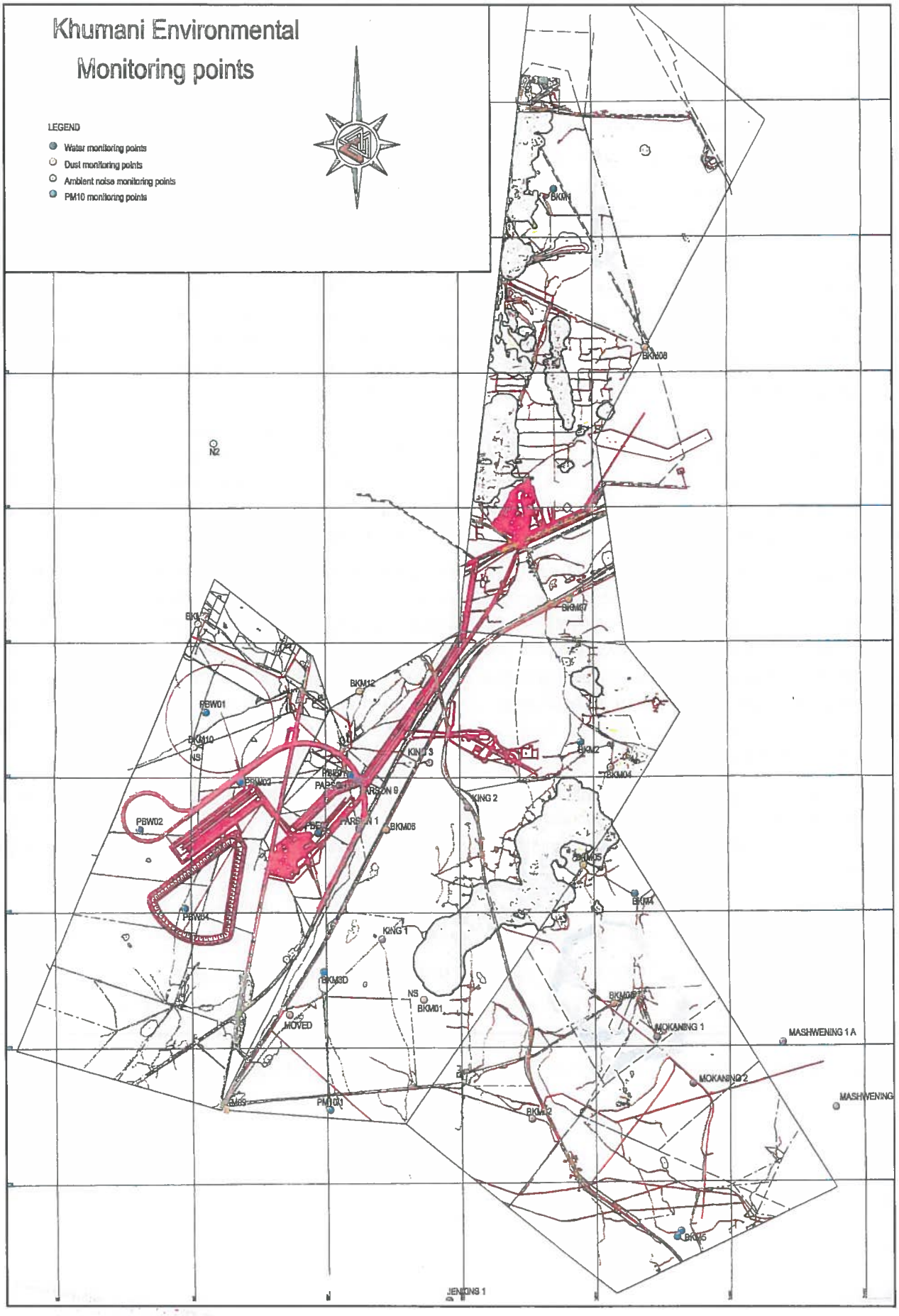

Figure 5: Location of monitoring points for Khumani

October/November Results (Construction Phase)

Fall-out rate at point BKM11 indicated an export quantity of 17.78 mg/m²/day. At point KBM12, import quantity was 12.04 mg/m²/day. At all points, fall-out is very low and all samples contained a lot of organic matter.

Points BKM05, BKM07 and BKM09 could not be analysed as there was too much insect residue in the samples. Weather data was also not reliable as the stations orientation was in question (refer to Figure 6, Figure 7, Figure 8 and Figure 9).

December/January

During the December/January monitoring period, all monitoring points indicated an increase in dust levels. BKM12 and BKM11 situated at Hoffman and Markram's farm indicated an increase in export dust levels which can be attributed to the predominately south wind direction and high environmental dust levels. This was verified by BKM02 which indicated that the south bucket (import dust) increased by almost 150 mg/m²/day. None of the monitoring points exceeded the limit as indicated above. All samples contained a lot of organic matter (refer to Figure 6, Figure 7, Figure 8 and Figure 9.

February/March

With reference to the single bucket graph all points indicated a decrease in dust levels. At all points fall-out levels are well below permissible limits.

All samples contained a lot of organic matter (refer to Figure 6, Figure 7, Figure 8 and Figure 9.

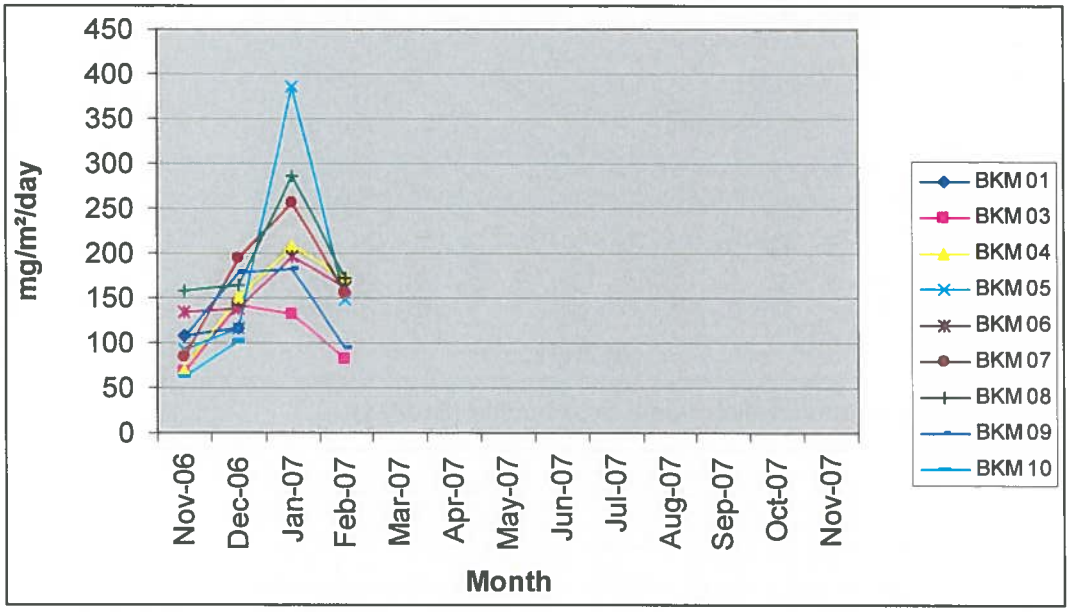

Figure 6: Monitoring results of single buckets

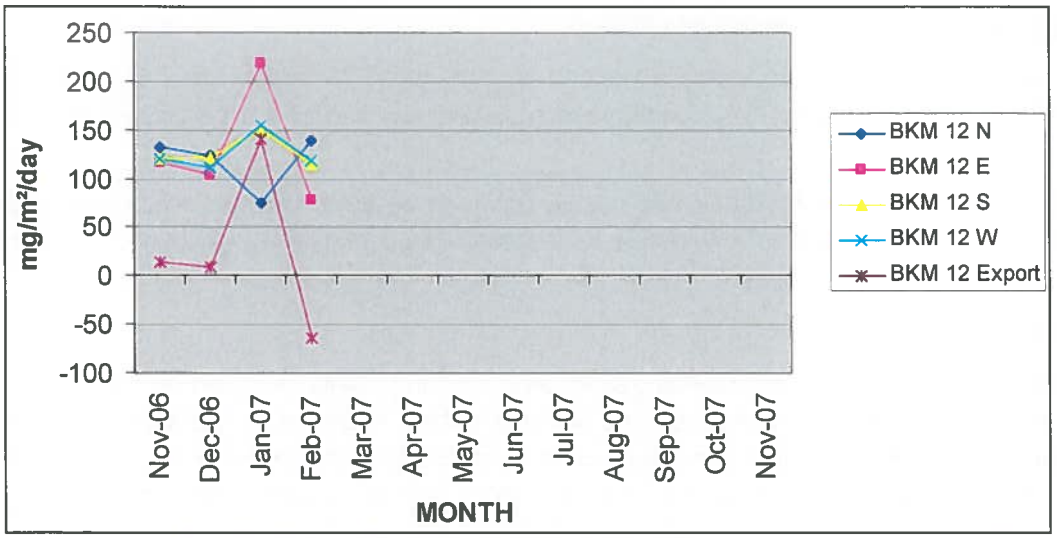

Figure 7: Monitoring results of directional dust bucket (BKM12)

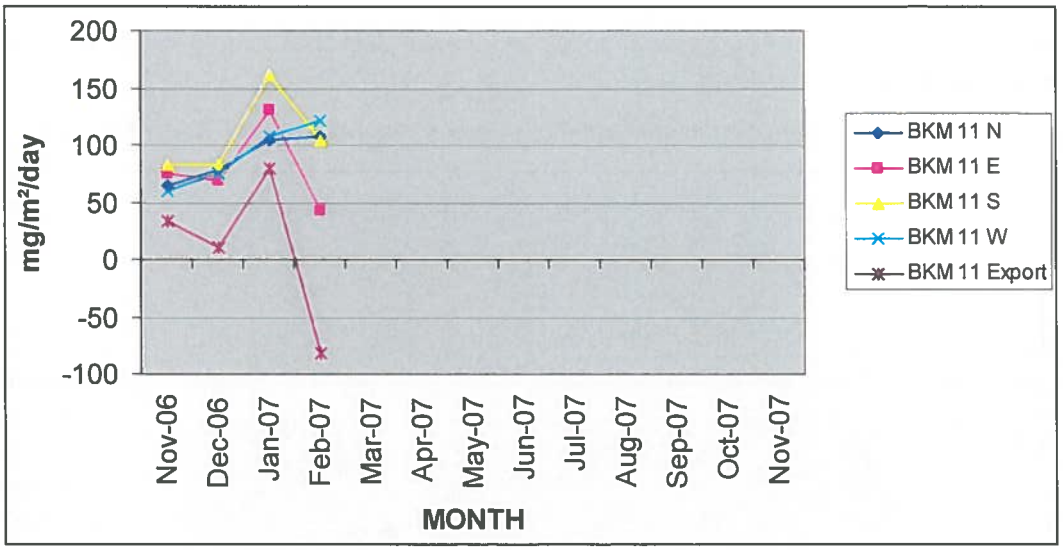

Figure 8: Monitoring results of directional dust bucket (BKM11)

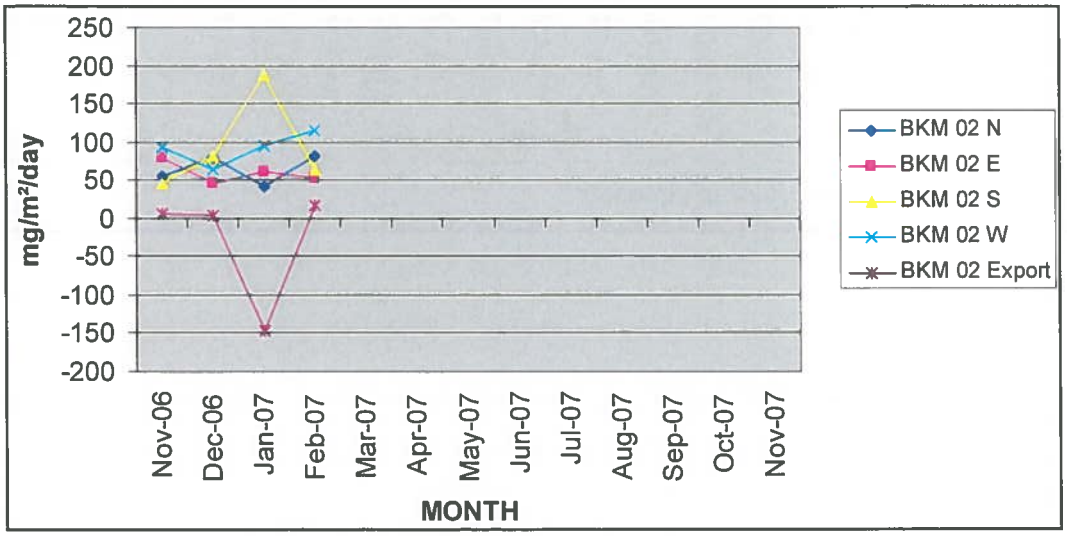

Figure 9: Monitoring results of directional dust bucket (BKM02)

2.11 Sites of Historical and Cultural Importance

An archaeological investigation was conducted for Khumani during August 2004. No sites of historical and/or cultural importance are present in the area of the proposed project.

2.12 Noise

Based on studies undertaken during 2004, the following pre-development ambient noise levels were assumed for the Khumani (refer to the approved EMPR):

- Day-time: 42 dBA; and
- Night-time: 41 dBA.

Noise monitoring is currently being undertaken as part of the Khumani construction activities. The results of the monthly monitoring are depicted in Table 6 (refer to Figure 5).

Table 6: Noise monitoring results (February 2007)

Measurement points	Period	October/November 2006 (dBA)	December 2006 /January 2007 (dBA)
N 1	Day	45.8	40.0
N 1	Night	(41.6) Baseline	(41.6) Baseline
N2	Day	41.8	39.2
N2	Night	(39.9) Baseline	(39.9) Baseline

2.13 Visual

A visual impact assessment was conducted for the Khumani during 2004.

The study area for the assessment was defined as a 15km radius about the proposed project sites. Beyond 15km the visual impact of the proposed project will have diminished to insignificant. The landscape impact of the Khumani was measured as the change to the fabric and character of the landscape caused by the physical presence of the mining activities. Visual impacts are a subset of landscape impacts. They relate solely to changes in available views of the landscape, and the effects of those changes on people. The intensity of that change (i.e. visual impact) is the degree to which the change compromises, enhances or maintains the visual quality of a particular area.

Presently, the Sishen mine dumps can be seen from distances of 15 to 20km, both from the west and east along the N14. To the south of the proposed mine, along the Postmasburg road, are extensive areas where mining activities (current and past) are evident. The construction activities associated with the Khumani Iron Ore Mine is also present from the N14.

These 'intrusions' into the landscape therefore contribute and to a large extent define the sense of place and landscape characteristics of the study area i.e. on leaving the area the enduring image that will remain is of the dumps protruding above the horizon line.

Sensitive viewing areas include:

- N14;
- R325; and
- Western periphery of Kathu.

2.14 Socio-Economic Conditions

The largest part of the Khumani is situated under the jurisdiction of the Gamagara Local Municipality which forms part of the Kgalagadi District Municipality.

The geographical area of the municipality is 467,92005km^2 of semi desert, straddling both the north-eastern section of the Northern Cape and the western area of the North West Province. The nearest town is Kathu, surrounded by Dingleton and Sesheng. Kathu is located approximtely15km north of the centre of the Khumani.

The total population of the Kgalagadi Districts Municipality is 176 909 on a sparsely populated area, making the population density low. In 1994, the density had increased to an average density of 1,27 persons per inhabitable km^2. Forty-eight percent of the population of Gamagara is African, while 25% are Coloured and 27% White. Most common languages spoken are Afrikaans (54%) and Setswana (39%).

Sishen is located directly to the west of the Khumani Iron Ore Project. Dingleton, Kathu and Sesheng emerged as a result of the mining activities at Sishen, which began in the early 1950s. The towns are dependant on Sishen Mine, which provides potable water and variety additional services, including a fire station, housing for employees and training facilities. With a workforce of more than 3 000 people and 1 500 contract workers, the mine is also a significant source of local employment (Social and Labour Plan, 2005).

The largest provider of employment in the Gamagara is the Mining sector (34%), followed by Community/Social/Personal Services (13%) and Manufacturing (10%). More than 85% of the population of Kathu and Dingleton is associated with Sishen Iron Ore Mine and related activities (such as employment in support services and trades). The local municipality employs a large percentage of the remaining 15%. Fifty-two% of the population in the Gamagara Municipality is male, and 48% is female. Twenty-eight (28) percent of the population is under 14 years of age, while 33% is over 35 (Social and Labour Plan, 2005).

Fifty-six (56) percent of the Gamagara Municipality population in the 5 to 24 year age group attend school. Sixteen (16) percent of the population has not had any schooling (Social and Labour Plan, 2005).

Unemployment levels in the Kgalagadi District are high, with 65% to 70% of the economically active population out of work. Poverty is especially problematic in rural areas. Given the extreme lack of service provision, economic and educational opportunities, the Kgalagadi District has been named a presidential poverty node.

Twenty percent of the labour force is unemployed. This represents a slight increase in unemployment since 1996, when 16% of the labour force was unemployed (Social and Labour Plan, 2005).

Of those persons employed, 28% are employed in elementary (unskilled) occupations. Twenty-five percent are employed in craft- and trade-related occupations, and 11% as clerks (Social and Labour Plan, 2005).

Eighty-three (83) percent of the population live in formal housing, and 16% in informal settlements. Twenty-nine (9) percent of households have more than four people, while 41% have fewer than four (4) rooms. The average household size is just over 3.6 persons/household (Social and Labour Plan, 2005).

3 PROJECT ALTERNATIVES

No project alternatives were considered for the proposed project as the location is determined to a large extent by existing opencast pits as specified in the approved EMP (January 2007).

4 PROJECT MOTIVATION

Sishen and Khumani's undertook a study to establish the extent of iron ore resources within the Bruce Barrier Pillar that separates the two (2) mines. The study indicated the benefits to be realised from mining the Barrier Pillar. At the present situation an area of approximately 400m (surface distance) will be lost to the mines due to the required high walls and terraces associated with opencast mining activities (refer to Figure 10).

The two (2) mines have opted to expand on their co-operation agreement to optimise the utilisation of existing iron ore resources within the Barrier Pillar by mining through the Barrier Pillar and thereby securing additional resources by unlocking deeper ores sterilised by the Barrier Pillar.

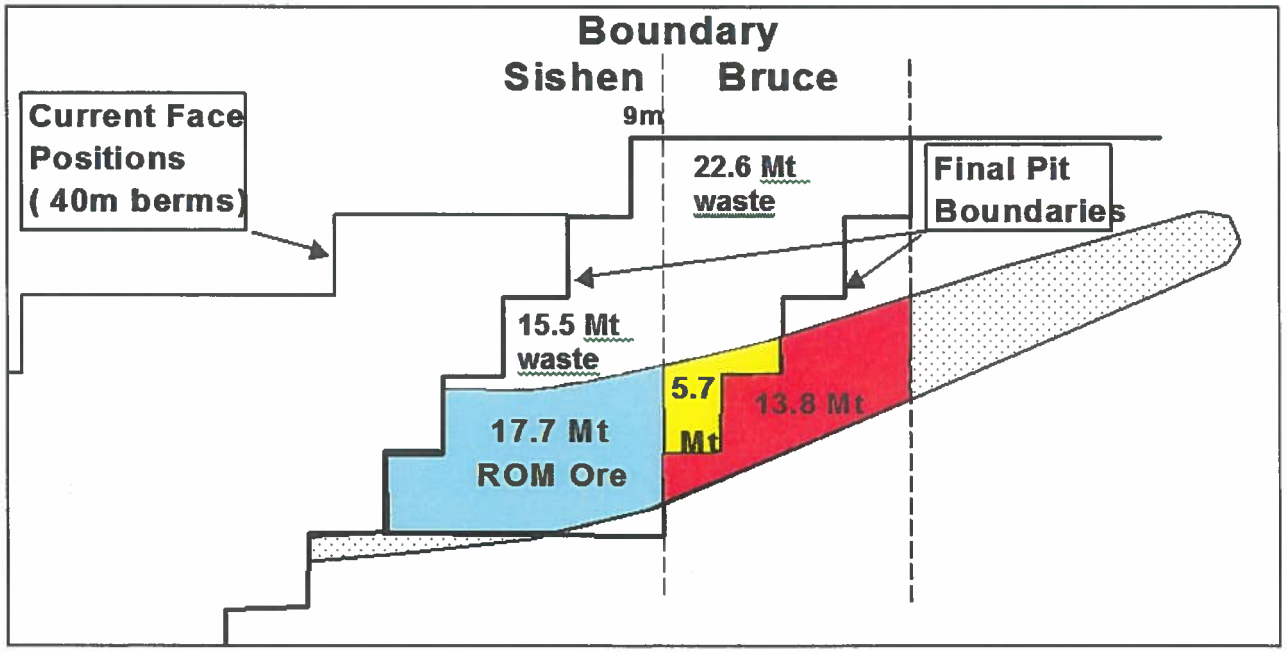

Figure 10: Cross section through the current mining activities vs. the mining of the Barrier Pillar

The project will not have an impact on the existing projected workforce and mining schedules will be planned in such a way as not to influence current and future planned mining operations.

With no agreement in place to mine the proposed Barrier Pillar, approximately 35Mt of high-grade iron ore and 32Mt of Low-grade iron ore will be sterilise within the Barrier Pillar, should this not be mined.

4.1 Benefits of the Project

Assmang and Sishen have investigated the feasibility of increasing the current available iron ore resources by exploiting the Barrier Pillar through existing and approved opencast pits.

The implementation of the project will ensure a sustainable life of mine up to approximately the year 2035 for the Khumani. The project, if approved, will include:

- Utilisation of existing infrastructure;
- Economic input into the area for the future by retaining the current employee base;
- Provision of Regional Socio-Economic Benefit; and
- National Economic Benefit (GDP).

4.2 Employment and Life of Mine

Although the project will not create additional employment opportunities the project will ensure a sustainable life of mine to at least the year 2035.

4.3 No Project Situation

By not undertaking this project, a large iron ore resource will be sterilised; and a large iron ore resource will be lost for the local, regional and South African economy. Therefore by not ensuring an optimal mining operation future economic benefit into the area will be lost.

5 DETAILED PROJECT DESCRIPTION

In order to ensure stability and safety between mining operations it is required that a Barrier Pillar of approximately 9m to each side of a mine boundary be left (in this case between the Khumani and the Sishen). This Barrier Pillar between the Khumani and Sishen's and has however resulted in the sterilisation of approximately 400m of feasible mining iron ore as a result of the construction of the different terraces of the opencast pits (refer to Figure 10).

Both Assmang and Sishen Iron Ore Mines wish to mine the Barrier Pillar between the Khumani and the Sishen, which is situated on the farms Bruce and Sishen. Neither of the two (2) mines has included the Barrier Pillar reserves into the approved EMPs and has obtained the consent from the DME to commission an EMP Amendment process to include the mining of this Barrier Pillar.

Six (6) areas of potential feasibility have been identified to be mined within this Barrier Pillar. Three (3) of these areas (Areas 2, 4 and 5) are planned to be mined by Sishen and the remaining three (3) by Assmang (Areas 1, 3 and 6). Sishen wishes to start mining Area 2 during the middle of 2007 and continue to mine the remaining two (2) areas over a period of five (5) years. After this five (5) year period Assmang will start mining Areas 1, 3 and 6. The area will be mined layer by layer as the areas involved are small (the area on Khumani mining rights area only comprises of approximately 4ha). Sishen's waste will be deposited on the existing Sishen dumps and Assmang's waste will be deposited on the approved Overburden and Low-grade ROM Stockpiles (which will also form part of reclaiming of Low-grade iron ore in the near future) (refer to Figure 2 and Figure 3).

Please note that all volumes and tonnages associated with the mining activities as presented within this document (i.e. iron ore and waste material) are estimations based on initial planning studies and cannot be utilised for mining purposes or detailed designs.

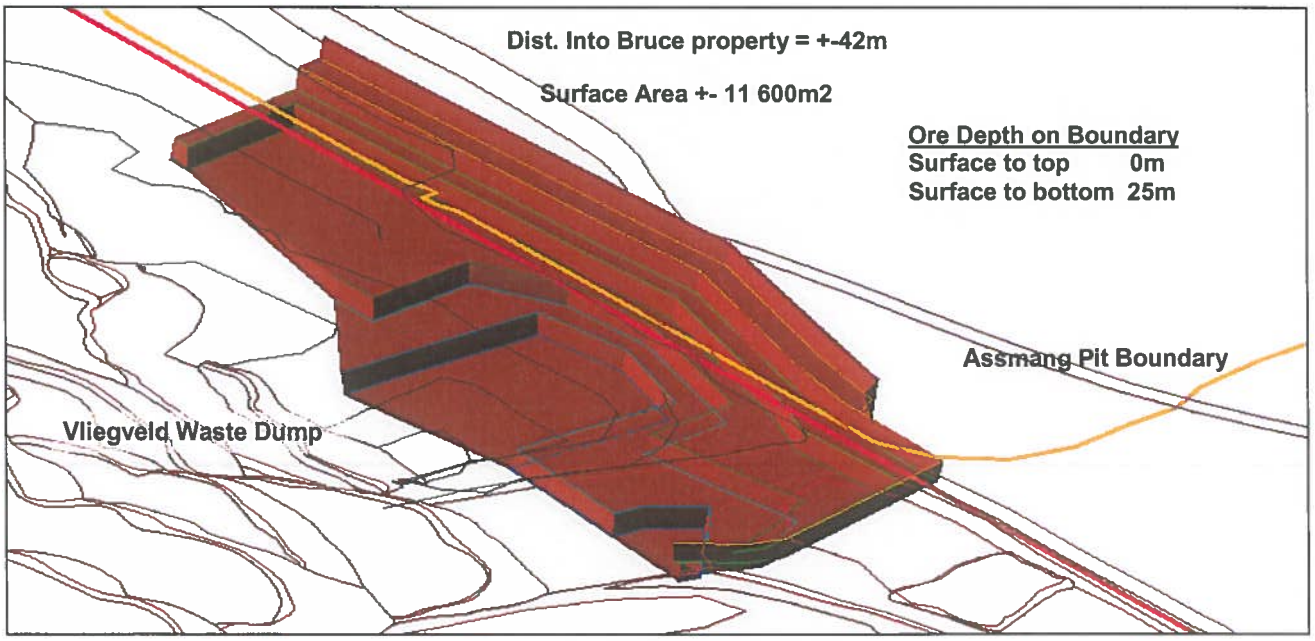

Figure 11: Area 1 to be mined by Assmang into the Sishen mining area

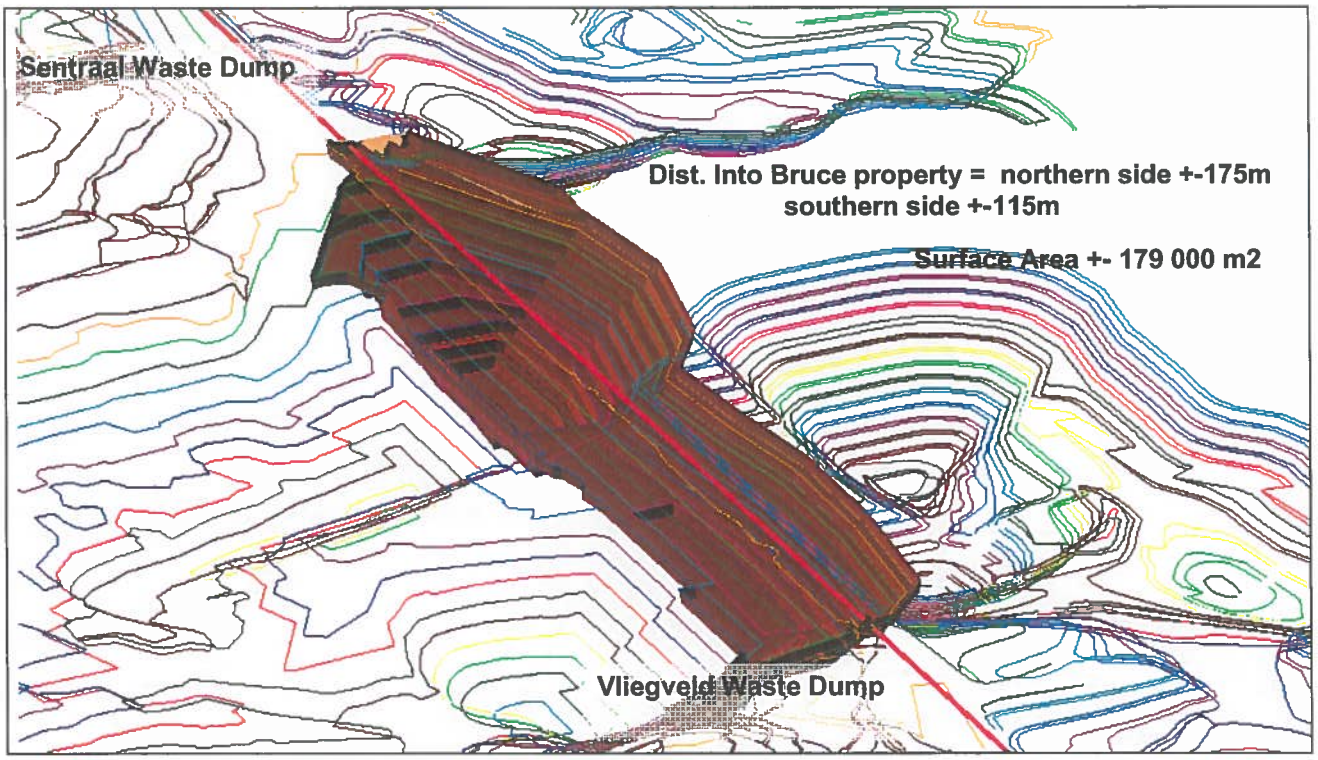

Figure 12: Area 2 to be mined by Sishen into the Khumani mining area

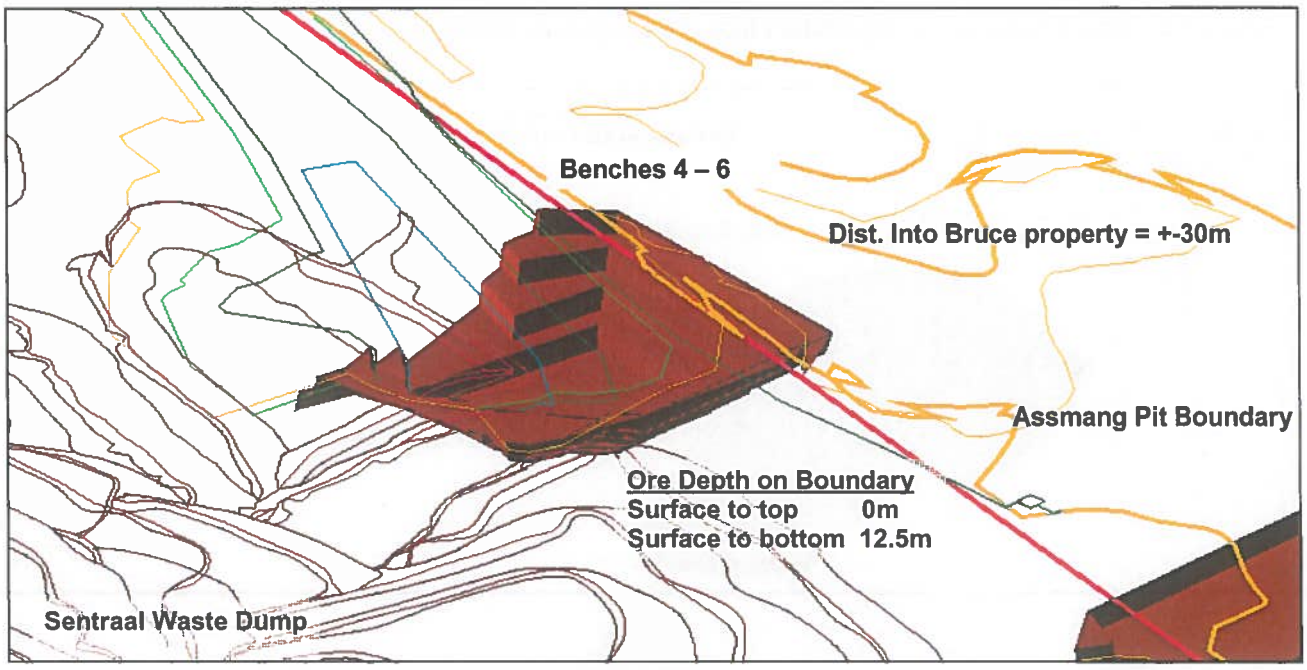

Figure 13: Area 3 to be mined by Assmang into the Sishen mining area

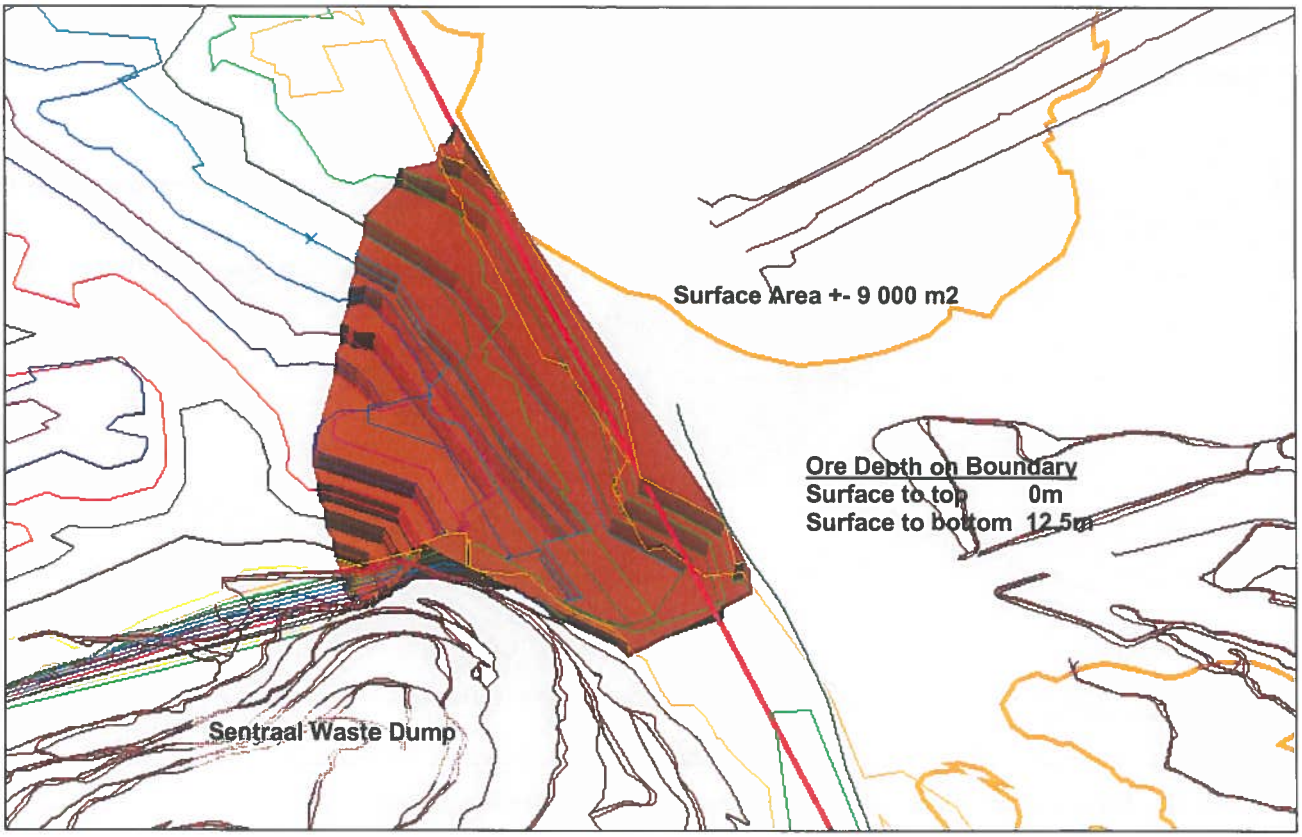

Figure 14: Area 4 to be mined by Sishen into the Khumani mining area

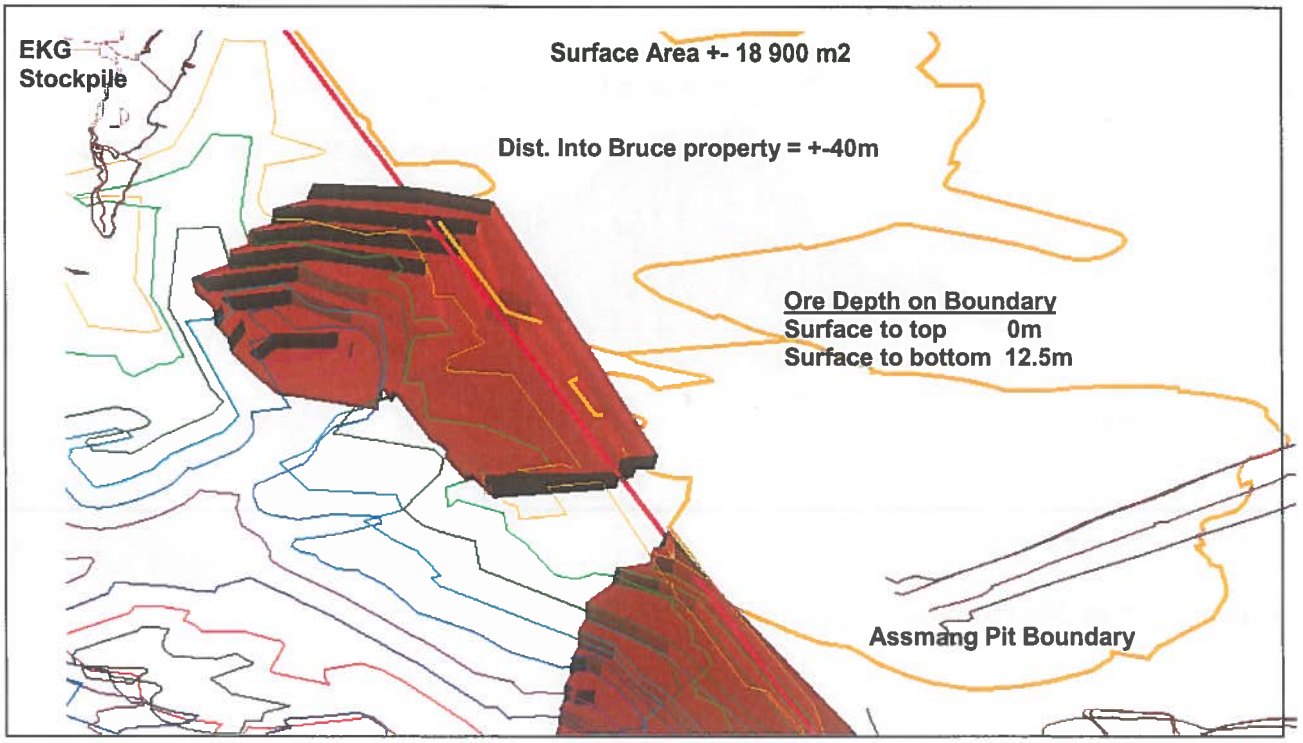

Figure 15: Area 5 to be mined by Sishen into the Khumani mining area

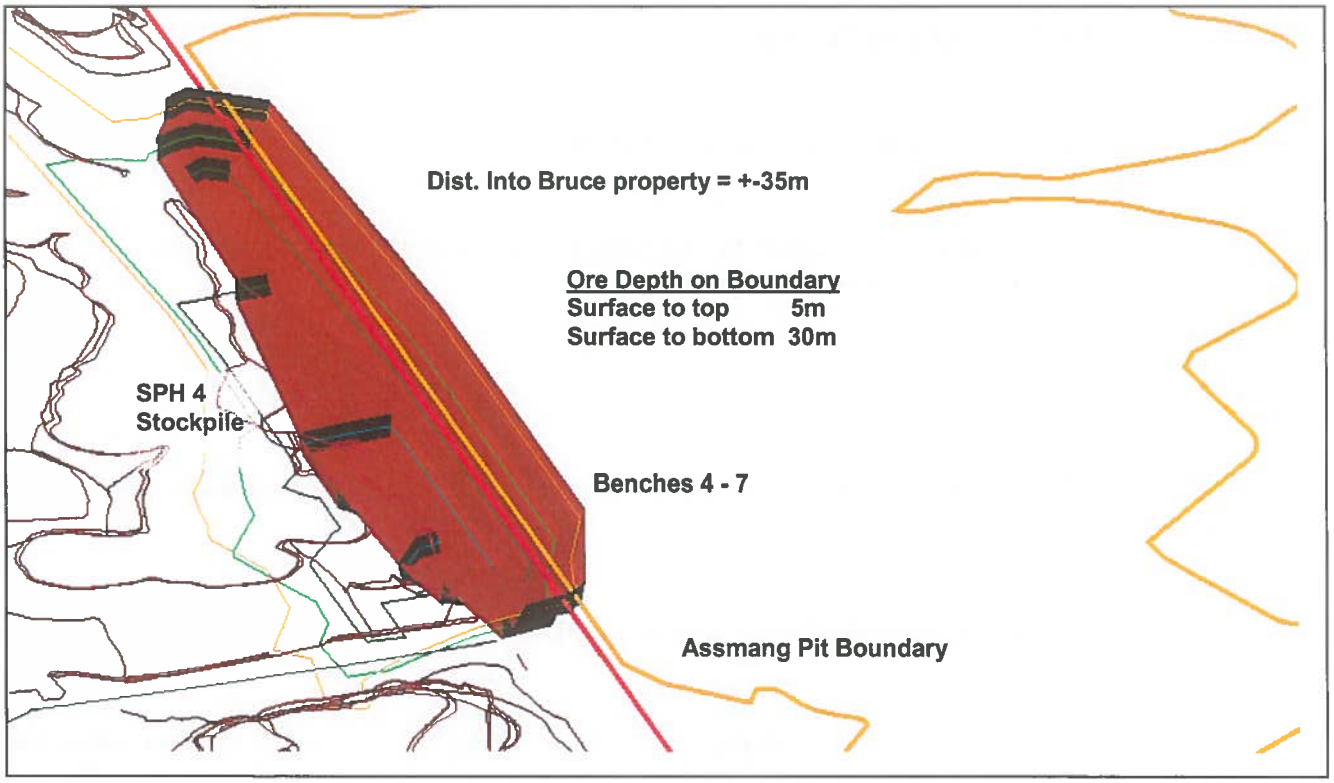

Figure 16: Area 6 to be mined by Assmang into the Sishen mining area

5.1 Infrastructure

5.1.1 Roads, Railway Lines and Power Lines

The mining of the Barrier Pillar will make use of existing access, haul and service roads, railway lines and power lines. No new infrastructure will be required.

Existing Conveyors will be utilised to transport the ore from the crushers to the plant area on Parson (refer to Section 4.1.1 of the approved Khumani EMP, January 2007).

5.1.2 Other Buildings (Workshops, Administration and Other)

No new buildings or other infrastructure will be required. All existing infrastructure will be utilised (refer to Section 4.1.6 of the approved Khumani EMP, January 2007).

5.1.3 Borrow Pits

No construction activities will take place as part of this project and therefore no borrow material will be required.

5.2 Waste Material and Topsoil

5.2.1 Solid Waste (Domestic, Industrial and Hazardous)

The existing waste management procedure for the Khumani will be implemented (refer to Section 4.1.2 of the approved Khumani Iron Ore EMP, January 2007).

5.2.2 Waste Rock

From the onset of this project the following resources have been determined within the Barrier Pillar for both the Khumani (refer to Table 7).

Table 7: Potential resources within the Barrier Pillar for the Khumani (excluding Sishen) as per initial studies

Grade	Khumani Iron Ore Mine
High Grade	23,5Mt
The following has reference to Overburden and Low-grade iron ore to be stockpiled on the Overburden and Low-grade ROM Stockpile (Bruce)	
Low Grade	26,2Mt
Waste	53,3Mt
Total to be stockpiled on Bruce Overburden and Low-grade ROM Stockpile (Low-grade and waste material)	79.5Mt

Table 7 indicates that 79.5Mt of overburden and Low-grade iron ore will be produced from the Khumani mining rights area. For the purposes of this project the two (2) mines (i.e. Khumani and Sishen) have come to an agreement that Sishen's waste will be deposited on the existing Sishen Waste Rock Dumps and vice versa and the same strategy will be followed for the iron ore resources.

In terms of the approved EMP, January 2007, material with an approximated 50% iron content and high Al_2O_3 and K_2O will be stockpiled on the Overburden and Low-grade ROM Stockpiles situated at the King/Mokaning and Bruce opencast workings. These stockpiles will be reclaimed should it be proven economically feasible to process and sell the product.

The following was planned in terms of the approved EMP, January 2007 (refer to Table 8):

- Approximately 1.3% (1.6Mt) of the Bruce Overburden and Low-grade ROM Stockpile will be reclaimed. The remainder of the stockpile will remain as a rehabilitated overburden dump upon decommissioning;
- Approximately 4.9% (19.4Mt) of the King/Mokaning Overburden and Low-grade ROM Stockpiles will be reworked (refer to Table 8); and
- The reclaiming of the Overburden and Low-grade ROM Stockpiles has been addressed within the approved Mining Right.

In terms of the current plans and market requirements the percentages to be reclaimed form the Overburden and Low-grade ROM Stockpiles are illustrated within (refer to Table 8 and Figure 17).

Table 8: Initial vs. current approximate capacity of the Overburden and Low-grade ROM Stockpiles

	Design				Initial Plans as per approved EMP		Refined Plans – Refer to Figure 17	
Location	Approximate Tonnages (Mt)	Footprint (m^2)	Height (m)	Capacity (m^3)	Planned Reclamation (Mt)	Tonnes Left (Mt)	Planned Reclamation (Mt)	Tonnes Left (Mt)
Bruce	122	2 677 080	30	73 300 000	1.6	120.4	15.2	106.8
King	396	3 431 994	70	189 000 000	19.4	376.6	16.2	379.8

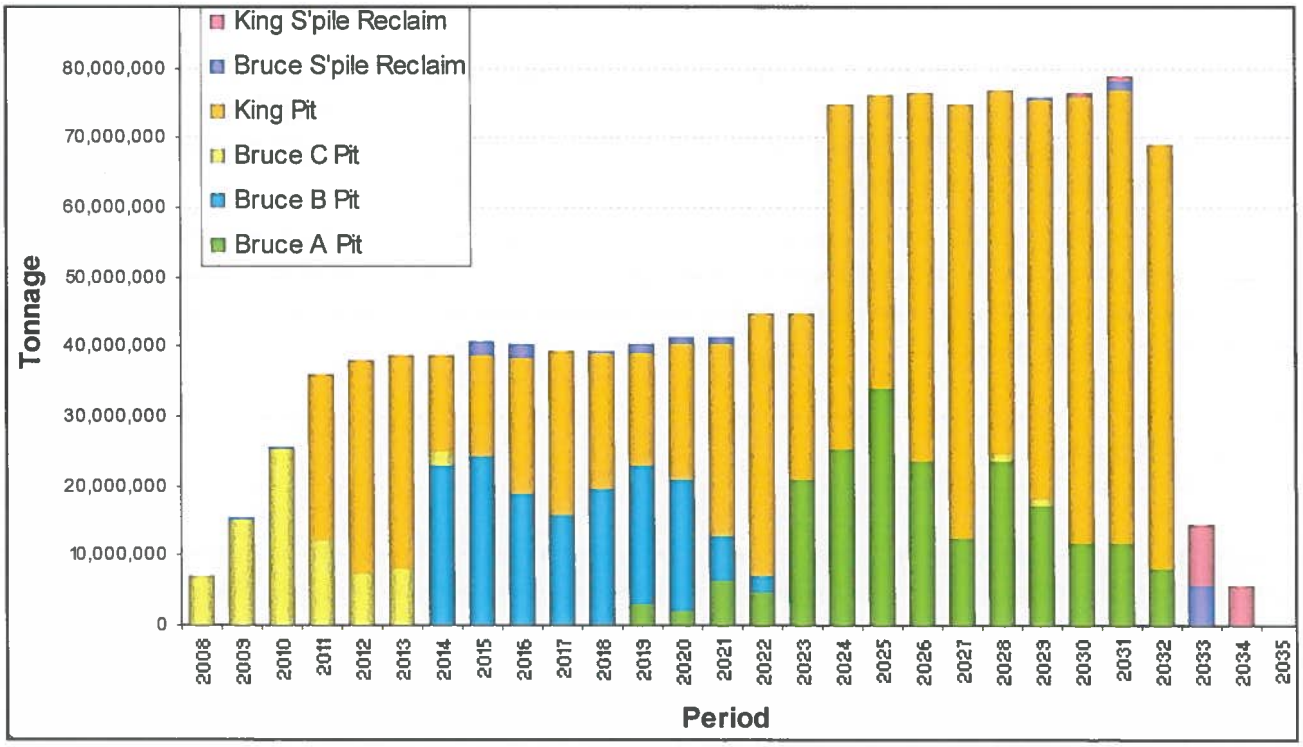

Figure 17: Potential material movement associated with the mining of the Barrier Pillar with reference to the Reclaiming of the Overburden and Low-grade Stockpiles (Khumani Iron re Mine)

Table 7 indicates that approximately 79.5Mt overburden and low-grade iron ore will be produced from the Khumani mining rights area. Within Table 8 it is shown that of the potential 79.5Mt of overburden and low-grade iron ore, approximately 31.4Mt of iron ore will be reclaimed (approximately 15.2Mt and 16.2Mt capacity available respectively), which will result in an available capacity of 31.4Mt for the stockpiling of overburden and low-grade iron ore on these stockpiles.

Should the mine decide to only utilise the Bruce Overburden and Low-grade ROM Stockpile and not the King Overburden and Low-grade ROM Stockpile due to transportation cost, the capacity available (estimated at 15.2Mt) will be utilised for the deposition of overburden and low-grade material. In addition to the reclaiming of the Overburden and Low-grade ROM Stockpile, which will provide additional capacity on the stockpile, ongoing backfilling will be undertaken as per the commitment within the approved EMP. From the initial

studies it is possible that the opencast pits associated with the Barrier Pillar will have a capacity to backfill up to 100Mt of waste rock (this will however be confirmed during future studies).

In terms of the above information [capacity available (estimated at 15.2Mt on the Bruce Overburden and Low-grade ROM Stockpile) and the available capacity for ongoing backfilling (approximately 100Mt)] no increase in the approved Overburden and Low-grade ROM Stockpile capacity and footprint area would be required.

It should be noted that Khumani Iron Ore is in the process of assessing the reduction in the iron ore grade, but that this has not been included as part of this report. The following is being assessed:

- Reduction in the initial planned grade of the iron within approximately five (5) years, which could result in percentages of the existing Low-grade ROM Stockpiles to be reclaimed.

Should this be undertaken more capacity on the existing Overburden and Low-grade ROM Stockpiles will be available.

5.2.3 Process Waste and Plant Discard

Approximately 23.5Mt of high-grade iron ore will be processed by the existing, approved processing plant situated on Parson of which 7% (1.6Mt) will disposed of as residue on the Paste Disposal Facility. The deposition of the additional residue will not have a significant impact on the capacity of the approved Paste Disposal Facility and will not result in an increase in the footprint of the facility.

Of the 23.5Mt of high-grade iron ore processed by the processing plant, 7% (approximately 1.6Mt) will be disposed of as waste rock on the Discard Stockpile on Parson. The deposition of the additional discard will not have a significant impact on the capacity of the approved Discard Dump and will not result in an increase in the footprint of the dump.

5.2.4 Topsoil

Topsoil will be stockpiled on designated areas as per the approved EMP and will be utilised in the ongoing rehabilitation processes of the mining operations where and when required (refer to Section 4.1.2.2 of the approved Khumani Iron Ore EMP, January 2007).

Topsoil requirements for rehabilitation purposes will be assessed and investigated during the life of mine to ensure to utilise the available topsoil efficiently, which will replace the commitment within the approved EMP of the placement of 500mm topsoil over rehabilitated areas, as this will not be possible with the amount of topsoil available on site.

5.3 Water Pollution and Storm Water Management Facilities

5.3.1 Legalities

The project will utilise the existing storm water management systems in place and therefore, no additional storm water control measures will be required, except for upslope of the new opencast operations, where berms would be required if not already established or planned to separate clean and dirty water.

Storm water management infrastructure at the new mining operations will comply with the requirements of Government Notice Number 704, published in terms of the National Water Act, 1998 (Act 26 of 1998).

With specific reference to this project, DWAF Government Notice No. 704 requires the following, which forms the bases of the design principles of the Khumani water pollution and storm water management facilities:

- All clean water systems must be designed and operated in such a manner that they are at all times capable of handling the 1:50 year flood event on top of their mean operation level without spilling; and
- Any water arising from an area, which causes, has caused or is likely to cause pollution of a water resource, including polluted storm water, must be contained within a dirty water system. In order to reduce the volume of polluted water, contaminated areas should be minimised. While clean water should be diverted to natural watercourses, polluted water should be re-used wherever possible, thereby reducing the use of clean water.

5.3.2 Opencast Pit Water Management Facilities

Diversion systems will be constructed upslope of the opencast areas in order to divert clean water away from the contaminated areas as per the approved EMP, it is not foreseen that additional clean and dirty water systems would be required as this project will only involve an extension of the already approved opencast pits towards the direction of Sishen. However where extension to the existing and planned diversions are required, these will be implemented.

In terms of the approved EMP, clean runoff form upstream of the opencast areas will be diverted around the affected area by means of berms, sized so as to prevent spilling for up to a 1:50 year storm event. The diversion berms will be constructed with overburden material from the mining area.

Groundwater seepage and direct rainfall water onto the opencast areas will be pumped out by means of portable pumps. The water will be used for dust suppression on the mine haul roads and operation water in the process plant (refer to Section 4.1.9 of the approved Khumani Iron Ore EMP, January 2007).

5.3.3 Disturbance to Water Courses

There will be no disturbance to any water courses. All mining operations will remain outside of the 1:100yr flood line.

5.4 Water Supply

5.4.1 Potable Water Supply

No additional potable water will be required as the mining operations in terms of the Barrier Pillar will be scheduled as part of the approved mining plan and processes. The potable water requirements as presented in the approved EMP will have reference: Groundwater will be sourced from the farm Parson as per the Water Use License Application, which has been submitted to the DWAF during 2005. The boreholes as per the approved EMP will be used during the construction period of the mine and until the Vaal Gamagara Pipeline has been installed. It is likely that the groundwater could be utilised during the operational phase as a contingency measure (i.e. backup water supply system) (refer to Section 4.1.10 of the approved Khumani Iron Ore EMP, January 2007).

5.4.2 Operational and Process Water Supply

No additional operational and process water will be required for the purpose of this project. The process water requirements as presented in the approved EMP will have reference. Water from the Vaal Gamagara Pipeline will be supplied at the maximum rate of 800m^3/hour from an abstraction point on the existing Vaal Gamagara water pipeline at the farm Parson (Surveyor-General Cadastral Code: C-041-0000-00000564-00000). The volume could decrease with the implementation of more stringent water control measures as part of the philosophy of a closed water circuit. Dirty water from the opencast pits, will be pumped to concrete mine dirty water tanks (10 000 m^3). The water in the mine dirty water tanks will be re-used in the plant process (refer to Section 4.1.11 of the approved Khumani Iron Ore EMP, January 2007).

5.4.3 Water Balance

No change in the existing water balance will be required as these mining activities will be scheduled are part of the existing mine plan and no groundwater dewatering will be required (refer to Section 4.1.12 of the approved Khumani Iron Ore EMP, January 2007).

5.5 Process Description

5.5.1 Transportation of Resources

No additional transportation routes will be required for the purpose of this project. The transportation requirements as presented in the approved EMP will have reference. Haul trucks will transport the blasted product to the crushers in the vicinity of the opencast operations. Following the primary and secondary crushing operations, the crushed ore will be stockpiled using stackers. Re-claimers will be used to load the ore onto belt conveyors to transport the ore to the processing plants situated away from the mining areas, on the farm Parson. From the plant the final product will be transported via conveyor to the export stockpiles, from where it will be loaded onto the rapid load out facility. The final product will be transported from a Rapid Load Out Facility located on the farm Parson to the north and west of the Plant. The final product will be transported from the Rapid Loud Out Facility, via the OREX rail to Saldanha (for export) and the Port Elizabeth line to Gauteng (for local markets) (refer to Section 4.1.8 and Section 4.3.5 of the approved Khumani Iron Ore EMP, January 2007).

5.5.2 Processing of Resources

No change in the approved processing methods is required for the purpose of this project. The requirements as presented in the approved EMP will have reference. All resources will be transported from the crushers via approved conveyors to the existing plant area at Parson, where it will be stockpiled on ROM Stockpiles until processing commences. Once processed, the final product will be stockpiled on product stockpiles from where it will be loaded onto the approved Rapid Load Out Facility to be transported to Saldanha via the OREX railway line (refer to Section 4.1.11 and Section 4.3.3 of the approved Khumani Iron Ore EMP, January 2007).

5.6 Housing and Employment

The project will not result in the creation of new employment opportunities as it will form part of the current mining plan, which will be altered to accompany the mining operation of the Barrier Pillar. As a result no new housing requirements are foreseen for this project.

5.7 Project Planning Phases and Associated Activities

5.7.1 Construction phase

No construction activities will be undertaken as this project is regarded as the expansion of existing and future approved opencast pits.

5.7.2 Operational Phase

During the operational phase, the following activities could impact on the environment, cultural and social setting (existing infrastructure as referred to herein is considered as infrastructure that was approved in the original EMP) (refer to Section 4.3 of the approved Khumani EMP, January 2007):

- Removal of vegetation: all vegetation at the opencast site will be stripped as the opencast pits expand;
- Vegetation and animal rescue: Assmang has committed to establish an offset area as per the approved EMP;
- Stripping of topsoil: all areas to be disturbed during the mining operations will be stripped and soils stockpiled for later use during rehabilitation. The topsoil and subsoil will be stripped and stockpiled separately;
- Construction of storm water, clean water and dirty water separation systems: where required the existing and/or planned berms will be extended to cater for the expansion of the opencast pits; and
- Opencast mining method to remove iron ore and waste;
- Continuous backfilling of waste rock into the opencast pits;
- Transportation of ore by means of existing haul roads to the existing crusher (approved activity as per the EMP, January 2007);
- Dust suppression by means of water and chemical binding agents on existing infrastructure, i.e. roads (approved activity as per the EMP, January 2007);
- Clean and dirty water control on existing infrastructure, i.e. roads, conveyors (approved activity as per the EMP, January 2007);
- Transportation of the crushed ore via existing conveyors to the existing plant (approved activity as per the EMP, January 2007);
- Operation of the existing plant (approved activity as per the EMP, January 2007);
- Stockpiling of discard from the plant on the existing discard stockpile (approved activity as per the EMP, January 2007);
- Deposition of residue on the existing paste deposition facility (approved activity) as per the EMP, January 2007;

- Transport of product to the existing load out facility (approved activity as per the EMP, January 2007); and
- Loading and railage at the load out facility (approved activity as per the EMP, January 2007).

5.7.2.1 Access to workings

Access to the workings will be via planned and existing haul ramp into the opencast pits.

5.7.2.2 Surface affected by blasting vibrations

The zone that could be affected by blasting includes the mining area and all land within 500m of the perimeter of the opencast pits.

Khumani and Sishen's will schedule the current mining operations in such a way to ensure that no mining activities are undertaken within a 500m blasting perimeter of the Barrier Pillar mining activities.

No other privately owned land is situated within the 500m blasting perimeter.

5.7.2.3 Low-grade and ROM Stockpiles

Due to planned reclaiming of low-grade iron ore, as well as the philosophy of ongoing rehabilitation by means of backfilling no increase in the approved Low-grade ROM Stockpiles on site is envisaged.

5.7.2.4 Ongoing Backfilling

The Khumani will undertake continuous backfilling throughout the mining operation in order to eliminate double handling (as approved within the EMP, January 2007). However, due to the almost 1:1 swelling factor, as well as the extensive cost of double handling, in the case of backfilling, the opencast pits will be not be entirely backfilled and will remain as open voids upon closure. During operational activities the opencast pits will be fenced off or planted with thorny indigenous vegetation and warning signs will be established to ensure safety (as per approved EMP – Section 6.2.2.1).

5.7.2.5 Mineral Processing

No change in the approved mineral processing is planned.

5.7.2.6 Residue Disposal

No change in residue disposal as presented in the approved EMP is planned, as the potential lowering of the iron ore grade within the next few years could result in less volumes of residues being deposited on the Paste Disposal Facility.

5.7.2.7 Transport of Ore

No change in the transporting routes is planned.

5.7.2.8 Product Supply

The main market for the iron ore is the export market. However, the railway siding for domestic markets as mentioned in the approved EMP is still planned to the east of the existing Port-Elizabeth railway line on the farm King. It is, however planned that this siding will only be operational by the year 2024 and only if a requirement for local markets exists.

This will be addressed in a follow-up investigation, which will be included within an EMP Amendment.

5.7.2.9 Mining Plan

Khumani and Sishen plan to mine the Barrier Pillar in parallel with their existing and planned mining operations as per approved Mining Right Applications. Sishen has been in operation, since the 1950s, where the Khumani Iron Ore Mine plans to start with approved mining operations during the middle of 2007.

Sishen plans to start mining the Barrier Pillar within their mining right area during July 2007 (refer toTable 9). The mining operations in Areas 2, 4 and 5 will be initiated from their existing opencast operations. To streamline the mining operations Sishen will mine the Barrier Pillar into the Khumani mining rights area (planned opencast pit areas) (refer to Section 5). Similar to this Khumani will commence mining the Barrier Pillar during middle of 2014 (refer to Table 10). Khumani will mine from their planned, approved opencast pit areas into the Sishen mining rights area.

These activities will result in six (6) mutual opencast pits between Khumani and Sishen's, which will be managed coherently.

The schedules presented in Table 9 and Table 10 indicate the total ore (High-grade and Low-grade) and waste to be removed at each of the opencast pit areas associated with the Barrier Pillar (also refer to Figure 17.

Table 9: Project Timeframes associated with areas mined by Sishen

Areas to be mined	Mining Party	From	To	Sishen Reserves (Mt)			Assmang Resources (Mt)		
				High-Grade	Low-grade	Waste	High-Grade	Low-grade	Waste
2	Sishen	01 July 2007	30 June 2014	7.8	3.0	7.5	2.3	3.7	13.2
4	Sishen	01 July 2007	30 June 2013	1.0	0.5	2.1	0.1	0.1	0.3
5	Sishen	01 July 2007	30 June 2013	0.7	0.3	2.5	0.5	0.3	0.8
			Subtotal	**9.5**	**3.8**	**12.1**	**2.9**	**4.1**	**14.3**
Gamagara	Sishen	01 July 2007	End of Life of Mine (LOM)	To be Determined later					

Table 10: Project timeframes associated with areas mined by Khumani

Areas to be mined	Mining Party	From	To	Assmang Resources (Mt)			Sishen Reserves (Mt)		
				High-Grade	Low-grade	Waste	High-Grade	Low-grade	Waste
1 & 2	Assmang	01 July 2014	2020	11.6	10.5	13.9	0.3	0.2	13.2
3	Assmang	01 July 2014	2020	1.2	0.1	5.0	0.4	0.2	0.3
4	Assmang	01 July 2014	30 June 2028	1.4	1.3	8.6	0.0	0.0	
5 & 6	Assmang	01 July 2014	30 June 2028	6.4	10.2	11.5	1.6	1.4	
			Subtotal	**20.6**	**22.1**	**39.0**	**2.3**	**1.8**	0.8
Lylyveld*	Assmang	01 Jan 2008	31 Dec 2013	272 272Mt					
Portion 5	Assmang	01 July 2014	30 June 2028	to be determined later					

**In order to mine the portion of Lylyveld as presented in the table above, it is required that Sishen first obtain approval for mining activities on this farm, as Khumani has approval to mine on the Bruce portion neighbouring Lylyveld.*

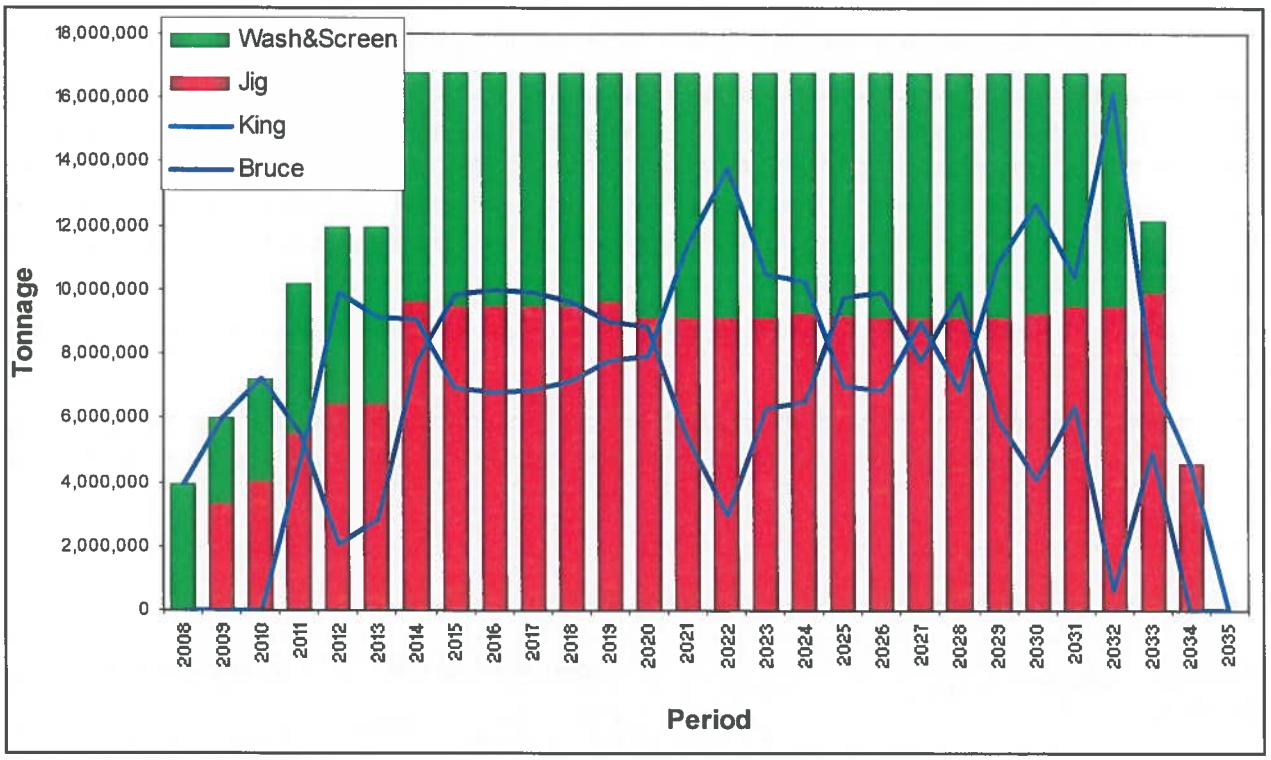

Figure 18: Plan tonnages associated with the mining of the Barrier Pillar within the Khumani mining rights area

5.7.3 Decommissioning and Closure Phase

The closure (rehabilitation) phase of the facilities will form part of the overall closure objectives and activities of the approved Khumani EMP, January 2007.

The current closure plans and estimates will be updated by the mine to include the additional costs of closing the new facilities as per the EMP. The financial provision will make provision for the overall rehabilitation of a maximum of 4ha in addition to the existing 595ha as approved in the Khumani EMP, January 2007.

5.8 Soil Utilisation Guide

The existing soil utilisation guide as per the approved EMP will be followed. The following presents a summary of the guide as applicable to this project.

Table 11: Soil utilisation guide associated with the opencast operations

Steps	Factors to Consider	Detail
Construction and Operational Phase		
Delineation of areas to be stripped		Stripping will only occur where soils are to be disturbed and an end-use for the stripped soils has been identified (Affected areas).
Open Cast Mining – Stripping	Topsoil / subsoil	The full thickness of topsoil and subsoil to a depth of 0,25m will be stripped and put aside, together with any vegetation cover present (only large bushes and trees to be removed prior to stripping). Where possible more topsoil will be stripped for the purpose of rehabilitation. Where soil depth is less than 0,25m, stripping will stop when hard material is encountered.
Rehabilitation		
Rehabilitation of disturbed land; restoration of land capability	Placement of topsoil	The approved EMP stated the following: "To re-establish grazing land capability, at least 500mm of topsoil will be replaced at time of rehabilitation". The mine would like to amend this statement and commits to assess and investigate the topsoil requirements for rehabilitation purposes and to ensure to utilise the available topsoil efficiently.
	Fertilisation	Samples of the stripped soils will be analysed immediately prior to their replacement to determine the nutrient status of the soils. Based on the analysis, fertilisers will be applied if necessary.
	Erosion control	Erosion control measures will be implemented to ensure that the topsoil is not washed away and erosion gullies do not develop on the affected areas.

6 PUBLIC PARTICIPATION PROCESS

For the purpose of this project no public participation was undertaken as per agreement with the DME and DTEC, Northern Cape Province, as no Interested and Affected Parties (I&APs) are residing on the proposed property or within a 100m radius from the proposed project.

In-depth consultation with Authorities was however undertaken to ensure that the environmental process is undertaken in accordance with the relevant legislation, as well as Authorities requirements.

6.1.1 Introductory or "Pre-Application" Authorities Meeting

Two (2) introductory meetings were held on 11 January 2007 with the lead authorities (i.e. the DME and the DTEC) regarding the mining of the Barrier Pillar. The objectives of the meetings were to:

- Inform the Authorities of the proposed Barrier Pillar project,
- Inform and discuss the projected timeframes of the project,
- Determine the technical issues associated with the project and the requirements of the MPRDA in relation thereto,
- Determine the technical issues associated with the project and the requirements of the NEMA and associated Regulations in relation thereto;
- Understand the concerns of the Authority's,
- Highlight the importance of the Authorities input in the EIA / EMP process.

The minutes of the meetings are attached as Appendix 2.

6.1.2 Identification of Authorities

Authorities to be consulted with were identified by Ivuzi and DME, during the initial Authorities Introductory Meeting. The following Authorities were identified and invited to become involved in the environmental process (refer to Table 12):

- Department of Minerals and Energy (DME);
- Department of Water Affairs and Forestry (DWAF);
- National Department of Agriculture (NDA);
- Department of Tourism, Environment and Conservation (DTEC); and
- South African Heritage Resources Agency.

The relevant stakeholders from the various departments are listed in the table overleaf.

Table 12: Contact details of the regulatory Authorities

Name	Department	Tel	Fax	Email
Bason Mkhombo	DTEC	053 807 4800	053 831 3530	bmkhombo@half.ncape.gov.za
Richard Moseki	DTEC	054 332 2885	054 331 1155	rmoseki@half.ncape.gov.za
Sibonelo Mbanjwa	DTEC	053 807 4800	053 831 3530	smbanjwa@half.ncape.gov.za
Rudzani Mudau	DME	053 830 0800	03 832 5631	succaina.jarodien@dme.gov.za
Sam Dywili	DWAF	053 830 8800 082 807 4340	053 831 5682	dywilif@dwaf.gov.za
Marguerite Geldenhuys	DWAF	054 332 2781		megois@intekom.co.za macroplan@mweb.coz.a
T Mtshaulana	DWAF	053 830 8816 082 889 3412		MtshaulanaT@dwaf.gov.za
Mary Leslie	SAHARA	021 462 4502		
Andrew Timothy	SAHARA	053 831 2537 083 329 5791	053 833 1435	sahranc2@iafrica.com
Harm Voster	NDA	053 831 1793	053 832 3101	jhen@iafrica.com

6.1.3 Scoping Meetings

Representatives from the departments listed under Section 6.1.2 were invited to attend the Scoping Meeting and site visit on 28 February 2007 at Sishen Mine. The objectives of the meeting were to:

- Provide detailed information regarding the proposed project;
- Finalise the technical issues associated with the project, and the MPRDA;
- Ensure that all the concerns of the Authorities are understood;
- Define the scope of work for the compilation of the EMP Amendment; and
- Finalise the timeframe for the proposed EMP Amendment process.

Copies of the Authority Meeting presentation, attendance register and minutes were forwarded to all the government departments. Refer to Appendix 2 for minutes of the meeting.

Authorities who could not attend the meeting were also supplied with copies of the minutes of the meeting and were personally contacted to discuss the environmental process discussed during the Scoping Meeting.

The EIA/EMP Report will be submitted to the Authorities on 13 April 2007, which will be followed by a feedback meeting in which the documents will be discusses.

6.1.4 Document Review

The draft EMP Amendment will be distributed to the following authorities for review:

- DME;
- DTEC;
- NDA;

- DWAF; and
- SAHRA.

A review period of 21 days will be provided in which the authorities must present their comments. Once the comments have been received, these will be included within a final EIA/EMP Report and will be submitted to the DME for a review period of 30 days.

7 IMPACT ASSESSMENT AND MANAGEMENT PROGRAMME

7.1 Impact Assessment Description

To ensure uniformity, the assessment of potential impacts is addressed in a standard manner so that a wide range of impacts is comparable. For this reason a clearly defined rating scale is provided to assess the impacts associated with the environmental investigation. The Environmental Impact Rating was done according to the procedure generally used by Ivuzi (Pty) Ltd to determine the significance of the potential impact as a result of the proposed project is depicted within Table 13.

The impacts associated with this project were assessed in context with the approved activities for the Khumani. The project will result in an impacted area of approximately 4ha.

Each impact identified is assessed in terms of probability (likelihood of occurring), extent (spatial scale), intensity (severity) and duration (temporal scale). To enable a scientific approach to the determination of the impact significance (importance), a numerical value is linked to each rating scale. The sum of the numerical values defines the significance (refer to Table 14).

7.2 Environmental Management Programme

The EIA ensures that the needs of the environment (biophysical and socio-economic) are identified. The EMP in turn provides a tool for meeting the objective to reduce or avoid negative environmental impacts associated with a project within a certain environment by providing detailed mitigation measures and management commitments and the associated action plans as a legal commitment by the applicant (in terms of this project Assmang, Khumani).

Limited additional management measures are required for the expansions to the approved opencast pits as this project will be management in terms of the approved EMP (Khumani EMP, January 2007). However as the project will result in six (6) large opencast pits crossing over two mining right areas (i.e. Khumani Iron Ore and Sishen's) it is essential that mutual management measures be implemented especially in terms of surface water, and dust monitoring (refer to Table 14).

The EMP for the project comprises of the following Sections:

- Section 7;
- Section 8;
- Section 9;
- Section 10;
- Section 11; and
- Section 12.

All of these sections will become legally binding on the approval of this report.

Table 13: Impact rating table

Category	Category	Rating	Description
Probability	Improbable	0	Less than 40 % sure of a particular fact or of the likelihood of that impact occurring
	Possible	1	40 to 70 % sure of a particular fact or of the likelihood of that impact occurring
	Probable	2	70 to 90 % sure of a particular fact or of the likelihood of that impact occurring
	Definite	3	More than 90 % sure of a particular fact or of the likelihood of that impact occurring
Extent	Site	1	Immediate project site
	Local	2	Up to 5 km from the project site
	Regional	3	20 km radius from the project site
	Provincial	4	Provincial
	National	5	South African
	International	6	Neighbouring countries/overseas
Duration	Very short-term	1	Less than 1 year
	Short-term	2	1 to 5 years
	Medium-term	3	5 to 10 years
	Long-term	4	10 to 15 years
	Very long-term	5	Greater than 15 years
	Permanent	6	Permanent
Intensity	Very low	0	Where the impact affects the environment in such a way that natural, cultural and social functions are not affected
	Low	1	Where the impact affects the environment in such a way that natural, cultural and social functions are only marginally affected
	Medium	2	Where the affected environment is altered but natural, cultural and social function and processes continue albeit in a modified way
	High	3	Where natural, cultural or social functions or processes are altered to the extent that it will temporarily cease
	Very high	4	Where natural, cultural or social functions or processes are altered to the extent that it will permanently cease
Significance		2 – 4	Low
		5 – 7	Low to Moderate
		8 – 10	Moderate
		11 - 13	Moderate to High
		14 – 16	High
		17 – 19	Very High

7.3 Construction Phase

No additional construction activities will be undertaken during the expansion of the approved opencast pits.

7.4 Operational Phase

During the operational phase, the following activities could impact on the environment, cultural and social setting (existing infrastructure as referred to herein is considered as infrastructure that was approved in the original EMP) (refer to Section 4.3 of the approved Khumani EMP, January 2007):

- Removal of vegetation: all vegetation at the opencast site will be stripped as the opencast pits expand;
- Vegetation and animal rescue: Assmang has committed to establish an offset area as per the approved EMP;
- Stripping of topsoil: all areas to be disturbed during the mining operations will be stripped and soils stockpiled for later use during rehabilitation. The topsoil and subsoil will be stripped and stockpiled separately;
- Construction of storm water, clean water and dirty water separation systems: where required the existing and/or planned berms will be extended to cater for the expansion of the opencast pits; and
- Opencast mining method to remove iron ore and waste;
- Continuous backfilling of waste rock into the opencast pits;
- Transportation of ore by means of existing haul roads to the existing crusher (approved activity as per the EMP, January 2007);
- Dust suppression by means of water and chemical binding agents on existing infrastructure, i.e. roads (approved activity as per the EMP, January 2007);
- Clean and dirty water control on existing infrastructure, i.e. roads, conveyors (approved activity as per the EMP, January 2007);
- Transportation of the crushed ore via existing conveyors to the existing plant (approved activity as per the EMP, January 2007);
- Operation of the existing plant (approved activity as per the EMP, January 2007);
- Stockpiling of discard from the plant on the existing discard stockpile (approved activity as per the EMP, January 2007);
- Deposition of residue on the existing paste deposition facility (approved activity) as per the EMP, January 2007;
- Transport of product to the existing load out facility (approved activity as per the EMP, January 2007); and
- Loading and railage at the load out facility (approved activity as per the EMP, January 2007).

Table 14: Impact assessment and management measures during operational phase for the Barrier Pillar

Activity and associated Impact	Probability	Extent	Duration	Intensity	Significance	Management Measure *(All the management measures presented in italics have been approved as part of the Khumani EMP, January 2007*
Geology						
The removal of the underlying geology for the purpose of mining iron ore optimally.	Definite (3)	Site (1)	Permanent (6)	Very Low (0)	Moderate (10) (-)	*Mining of the iron ore will remain within the limits of the proposed project application (as per approved EMP – Section 6.1.2).*
With Management Measures	Definite (3)	Site (1)	Permanent (6)	Very Low (0)	Moderate (10) (-)	The mine will ensure that, first and foremost, they optimally mine all iron ore within their existing mining rights area to limit the impact on green field areas.
Climate						
No Impact	Not applicable					Not applicable
Topography						
Altering of the topography (area of approximately 4ha) due to the expansion of the approved opencast mining operation.	Definite (3)	Site (1)	Permanent (6)	Low (1)	Moderate to High (11) (-)	*The mine will undertake continuous backfilling as part of the mining operations (as per approved EMP – Section 6.2.2.1).*
With Management Measures	Probable (2)	Site (1)	Very Long (5)	Very Low (0)	Moderate (8) (-)	*During operational activities the opencast pits will be fenced off or planted with thorny indigenous vegetation and warning signs will be established to ensure safety (as per approved EMP – Section 6.2.2.1).*
Development of sinkholes due to underlying dolomites is not considered to take place as no dewatering for the proposed mining operations is required.	Not applicable					Not applicable
Soils						
Loss of soil resources due to the removal of topsoil to expand the opencast pits.	Probable (2)	Site (1)	Permanent (5)	High (3)	Moderate to High (11) (-)	*0,25m of topsoil will be removed from the area of expansion (as per approved EMP – Section 6.1.3.1).*

Activity and associated Impact	Probability	Extent	Duration	Intensity	Significance	Management Measure (All the management measures presented in italics have been approved as part of the Khumani EMP, January 2007
With Mitigation	Possible (1)	Site (1)	Very Long (5)	Very Low (0)	Low to Moderate (7) (-)	*Topsoil will be stockpiled on designated areas upslope of the mining operations and designed as per the approved EMP (as per approved EMP – Section 6.1.2.1 and Section 6.2.2.1).* *All commitment in terms of Section 6.1.3 and Section 6.2.3 of the approved EMP will remain.*
Increased erosion potential due to removal of vegetation within the area where the opencast operations will be expanded.	Probable (2)	Site (1)	Permanent (6)	High (3)	Moderate to High (12) (-)	*All commitment in terms of Section 6.1.3.2 and Section 6.2.3.2 of the approved EMP will remain.*
With Mitigation	Improbable (0)	Site (1)	Very Short (1)	Very Low (0)	Low (2) (-)	
Degradation of soil resource (compaction, change in soil texture and structure) due to stripping and stockpiling thereof.	Probable (2)	Site (1)	Very Long (5)	High (3)	Moderate to High (11) (-)	*All commitment in terms of Section 6.1.3.3 and Section 6.2.3.3 of the approved EMP will remain.*
With Mitigation	Improbable (0)	Site (1)	Very Short (1)	Very Low (0)	Low (2) (-)	
Land Use						
Loss of grazing potential due to expansion of opencast pit.	Possible (1)	Site (1)	Very Long (5)	Medium (2)	Moderate (9) (-)	*All commitment in terms of Section 6.1.4 and Section 6.2.4 of the approved EMP will remain.*
With Mitigation	Improbable (0)	Site (1)	Very Long Term (5)	Low (1)	Low to Moderate (7) (-)	
The mining of the Barrier Pillar could impact on the existing mining operations in the area, both for the existing Sishen mining operation as well as for the planned Khumani mining operations.	Definitely (3)	Local (2)	Long (5)	High (3)	Moderate to High (13) (-)	The mine plan will be structure in such a way to ensure that no mining activities associated with the Barrier Pillar takes place within a 500m radius of planned or existing opencast operation activities. Where necessary the mining plan will be amended to accommodate the mining of the Barrier Pillar.
With Mitigation	Improbable (0)	Site (1)	Very Short (1)	Medium (3)	Low to Moderate (5) (-)	

Activity and associated impact	Probability	Extent	Duration	Intensity	Significance	Management Measure *(All the management measures presented in italics have been approved as part of the Khumani EMP, January 2007*
The opencast operations could present safety hazards to the employees and also animals in the area.	Definitely (3)	Site (1)	Permanent (6)	High (3)	Moderate to High (13) (-)	*During operational activities the opencast pits will be fenced off or planted with thorny indigenous vegetation and warning signs will be established to ensure safety (as per approved EMP – Section 6.2.2.1).*
With Mitigation	Possible (1)	Site (1)	Very Long (5)	Low (2)	Moderate (9) (-)	The mine plan will be structure in such a way to ensure that no mining activities associated with the Barrier Pillar takes place within a 500m radius of planned or existing opencast operation activities. Where necessary the mining plan will be amended to accommodate the mining of the Barrier Pillar.
Land Capability						
Loss of grazing potential due to expansion of opencast pit.	Possible (1)	Site (1)	Very Long (5)	Medium (2)	Moderate 9 (-)	*All commitment in terms of Section 6.1.4 and Section 6.2.4 of the approved EMP will remain.*
With Mitigation	Improbable (0)	Site (1)	Very Long Term (5)	Low (1)	Low to Moderate (7) (-)	
Natural Vegetation						
Loss of vegetation due to site clearing of the approximately 4ha associated with the expansion of the opencast pits.	Possible (1)	Site (1)	Permanent (6)	Medium (2)	Moderate (10) (-)	*The commitments in terms of Section 6.1.6.1 and Section 6.2.6.1 of the approved EMP will remain.*
With Mitigation	Possible (1)	Site (1)	Short (2)	Medium (2)	Low to Moderate (6) (-)	The mine is also in the process of establishing an offset area as per the requirement of the DTEC Authorisation of the approved EMP. However, the commitment as per Table 6-4 of the approved EMP is replaced with the commitment that the mine will investigate an appropriate seed mix for the rehabilitation purposes should self-succession not establish on rehabilitated sites.
Activities at the opencast area can encourage the spread of alien invasive species	Probable (2)	Local (2)	Permanent (6)	Medium (2)	Moderate to High (12) (-)	*The commitments in terms of Section 6.1.6.3 and Section 6.2.6.3 of the approved EMP will remain.*
With Mitigation	Probable (2)	Site (1)	Very Short (1)	Medium (2)	Low to Moderate (6) (-)	

Activity and associated Impact	Probability	Extent	Duration	Intensity	Significance	Management Measure *(All the management measures presented in italics have been approved as part of the Khumani EMP, January 2007*
Fauna						
Impact on Fauna due to expansion of the opencast operations.	Probable (1)	Site (1)	Very Long (5)	Medium (2)	Moderate to High (11) (-)	*The commitments in terms of Section 6.1.7.1 and Section 6.1.7.2 of the approved EMP will remain.*
With Mitigation	Possible (2)	Site (1)	Very Short (1)	Low (1)	Low to Moderate (5) (-)	
Surface Water						
Increase in volume and speed of surface water run-off due to stripping of soil and vegetation may lead to increased erosive capacity of the water and subsequent sedimentation of the receiving watercourse.	Probable (2)	Local (2)	Very Long (5)	Medium (2)	Moderate to High (11) (-)	*The commitments in terms of Section 6.1.8.1 and Section 6.2.8.2 of the approved EMP will remain.*
With Mitigation	Possible (1)	Site (1)	Very Short (1)	Low (1)	Low (4) (-)	
Contamination of clean water when coming in contact with dirty water	Definite (3)	Site (1)	Very Long (5)	High (3)	Moderate to High (12) (-)	*Berms, to serve as diversion systems, will be constructed upstream of the opencast pits to ensure that clean water is kept separate from dirty water, this will also serve as a safety measure to reduce water inflow into the opencast pit areas (as per approved EMP – Section 6.1.8.1, Section 6.2.8.1 and Section 6.2.8.2).* *The berms will be maintained by vegetating all berms to ensure that they are stable. The berms will also be inspected to ensure that there are no cracks, which could cause leakage as per Section 6.2.22.3 of the approved EMP.* *Water monitoring as per the approved EMP will be continued at the mine (Section 6.2.21.1)* Khumani and Sishen's will work together to establish mutual storm water management systems (i.e. berms) upstream of the mutual opencast pits.
With Mitigation	Possible (1)	Site (1)	Very Short (1)	Medium (2)	Low to Moderate (5) (-)	

Activity and associated Impact	Probability	Extent	Duration	Intensity	Significance	Management Measure *(All the management measures presented in italics have been approved as part of the Khumani EMP, January 2007*
Containment of storm water (due to precipitation) within the opencast pits and the associated impact on operational activities.	Definite (3)	Site (1)	Very Long (5)	High (3)	Moderate to High (12) (-)	*As per the approved EMP – Section 6.2.8.4, the mine will operate in a closed water system. Should excess water be present within the pit this water will be pumped to the return water dams and additional storage tanks on site. The water may also be utilised for dust suppression around the opencast operations in terms of Section 4..1.9 of the approved EMP.*
With Mitigation	Possible (1)	Site (1)	Very Short (1)	Medium (3)	Low to Moderate (6) (-)	
Groundwater						
No impact is envisaged due to the depth of groundwater. The expansion of the opencast operations will not result in dewatering activities.	Not applicable					Not applicable, *however ongoing monitoring as per Section 6.2.21.2 will be continued at the mine.*
Air Quality						
No impact is envisaged due to the expansion of the opencast operations. There will be no increase in vehicles on site and no additional roads will be required.	Not applicable					Not applicable, *however as dust is a sensitive issue in this area the mine will commit to continue with the monitoring system as per Section 6.2.21.3.* In addition, the mine will commit to the sharing of dust monitoring data with Sishen and will together with Sishen appoint an external specialist to assess the existing dust monitoring system and amend this where necessary. The specialist will also be appointed to prepare an overall dust monitoring report which will be submitted to the DTEC and DME annually.
Noise						
No impact is envisaged due to the expansion of the opencast operations. There will be no increase in vehicles on site and no additional roads will be required.	Not applicable					Not applicable, *all commitments in terms of the approved EMP – Section 6.2.11 will be implemented.*
Archaeology and Sites of Cultural Importance						
No impact is envisaged as there are no sites present in the area where the expansion activities will be undertaken.	Not applicable					Not applicable
Sensitive Landscapes						

Activity and associated Impact	Probability	Extent	Duration	Intensity	Significance	Management Measure *(All the management measures presented in italics have been approved as part of the Khumani EMP, January 2007*
No impact is envisaged as there are no sites present in the area where the expansion activities will be undertaken.	Not applicable					Not applicable
Visual						
No impact is envisaged as the project will form part of existing and approved mining operations.	Not applicable					Not applicable
Socio-Economic						
The removal of the underlying geology for the purpose of mining iron ore optimally will present a further economic addition into surrounding region.	Definite (3)	Site (1)	Permanent (6)	Low (1)	Moderate to High (11) (+)	The mine will ensure to mine all iron ore within their existing mining rights application optimally to limit the impact on green field areas.-
With Management Measures	Not applicable					
Safety issues in terms of the two (2) mining companies ongoing mining operations whilst mining the Barrier Pillar.	Definite (3)	Site (1)	Permanent (6)	Low (1)	Moderate to High (11) (-)	The mine plan will be structure in such a way to ensure that no mining activities associated with the Barrier Pillar takes place within a 500m radius of planned or existing opencast operation activities. Where necessary the mining plan will be amended to accommodate the mining of the Barrier Pillar.
With Mitigation	Possible (1)	Site (1)	Very Long (5)	Low (2)	Moderate (9) (-)	

7.5 Decommissioning Phase

The Decommissioning phase will comprise of the following activities that could lead to potential impacts;

- Safe-making of the opencast pits;
- Decontamination of areas as part of the rehabilitation process; and
- Overall rehabilitation of the affected area.

Table 15: Impact assessment and management measures during decommissioning phase for the Barrier Pillar

Activity and associated Impact	Probability	Extent	Duration	Intensity	Significance	Management Measure Ref.
Geology						
No further impact	Not applicable					Not applicable
Climate						
No Impact	Not applicable					Not applicable
Topography						
There will not be sufficient soils available to backfill all the opencast pits completely and therefore the presence of voids will remain, which will result in safety issues and the impact on free drainage of the area.	Definite (3)	Site (1)	Permanent (6)	Low (1)	Moderate to High (11) (-)	*Due to economic implications associated with double handling the mine would have undertaken ongoing rehabilitation during the operation phase and some voids will remain. The voids will be made safe either by fencing or the establishment of berms, planting of indigenous thorny vegetation, as well as safety and warning signs (as per approved EMP – Section 6.3.1.4).* Mutual agreements will be put in place to establish safety features around the entire opencast pit mined by Sishen and Khumani's.
With Management Measures	Possible (1)	Site (1)	Very Short (1)	Very Low (0)	Low (3) (-)	
Soils						

Activity and associated Impact	Probability	Extent	Duration	Intensity	Significance	Management Measure Ref.
Topsoil will be placed on all areas where rehabilitation is undertaken. Increased erosion on soils utilised for rehabilitation could occur without the necessary management measures in place.	Definite (3)	Site (1)	Permanent (6)	High (3)	Moderate to High (13) (-)	*Management measures in terms of Section 6.3.1.3 of the approved EMP will be adhered to.* However, the mine will investigate an appropriate seed mix for the rehabilitation purposes should self-succession not establish on rehabilitated sites, which will replace the commitment of utilising the provided seed mix within the approved EMP. In addition the mine commits to assess and investigate the topsoil requirements for rehabilitation purposes and to ensure to utilise the available topsoil efficiently, which will replace the commitment within the approved EMP of the placement of 500mm topsoil over rehabilitated areas, as this will not be possible with the amount of topsoil available on site (refer to Appendix 3).
With Mitigation	Improbable (0)	Site (1)	Very Short (1)	Very Low (0)	Low (2) (-)	
Land Use						
During the decommissioning phase the rehabilitation of the opencast area will be undertaken. Should the mine not consult with the relevant authorities and stakeholders and come to a mutually agreed decision on the end result of the land use it could result a site no suitable for economical or environmental sustainability.	Possible (1)	Site (1)	Very Long (5)	Medium (2)	Moderate (9) (-)	*Management measures in terms of Section 6.3.1.4 of the approved EMP will be adhered to.*
With Mitigation	Improbable (0)	Site (1)	Short (2)	Low (1)	Low (4) (-)	
Land Capability						
During the decommissioning phase the rehabilitation of the opencast area will be undertaken. Should the mine not consult with the relevant authorities and stakeholders and come to a mutually agreed decision on the end result of the land use it could result a site no suitable for economical or environmental sustainability.	Possible (1)	Site (1)	Very Long (5)	Medium (2)	Moderate (9) (-)	*Management measures in terms of Section 6.3.1.4 of the approved EMP will be adhered to.*
With Mitigation	Improbable (0)	Site (1)	Short (2)	Low (1)	Low (4) (-)	

Activity and associated Impact	Probability	Extent	Duration	Intensity	Significance	Management Measure Ref.
Natural Vegetation						
The rehabilitation activities if not monitored could result in the self succession by vegetation not taking place and therefore the loss thereof.	Possible (1)	Site (1)	Very Long (5)	Medium (2)	Moderate (9) (-)	*Management measures in terms of Section 6.3.1.6 of the approved EMP will be adhered to.* However, the commitment as per Table 6-4 of the approved EMP is replaced with the commitment that the mine will investigate an appropriate seed mix for the rehabilitation purposes should self-succession not establish on rehabilitated sites. Where required erosion control measures will be implemented up until the rehabilitation of the area proves to be successful.
With Mitigation	Possible (1)	Site (1)	Very Short (1)	Low (1)	Low (4) (-)	
Activities at the opencast area can encourage the spread of alien invasive species	Probable (2)	Local (2)	Permanent (6)	Medium (2)	Moderate to High (12) (-)	*Management measures in terms of Section 6.3.1.6 of the approved EMP will be adhered to.*
With Mitigation	Possible (1)	Site (1)	Very Short (1)	Low (1)	Low (4) (-)	
Fauna						
No further impact. During the rehabilitation phase fauna will return to the area.	Not applicable					Not applicable, the animals will return to the area once rehabilitation has been completed.
Surface Water						
Ongoing erosive capacity of the water and subsequent sedimentation of the receiving watercourse.	Definite (3)	Local (2)	Very Long (5)	Medium (2)	Moderate to High (12) (-)	*All commitments in terms of the approved EMP – Section 6.3.1.8 and Section 6.3.5.1 will be adhered to.*
With Mitigation	Possible (1)	Site (1)	Very Short (1)	Low (1)	Low (4) (-)	
Containment of storm water (due to precipitation) within the opencast pits and associated contamination thereof.	Improbable (0)	Site (1)	Very Short (1)	Very Low (0)	Low (2) (-)	Storm water due to precipitation will remain in the opencast pits and will evaporate.
With Mitigation	Improbable (0)	Site (1)	Very Short (1)	Very Low (0)	Low (2) (-)	

Activity and associated Impact	Probability	Extent	Duration	Intensity	Significance	Management Measure Ref.
Groundwater						
No further impacts are envisaged. Water contained in the pits will evaporate and the water that seeps through to underlying groundwater levels will not be contaminated due to the nature of the operations.	Not applicable					Not applicable, *all commitments as per the approved EMP – Section 6.3.1.9 and Section 6.3.5.2 will remain.*
Air Quality						
No further impacts are envisaged. The expansion to the opencast pit areas will be rehabilitated as part of the approved EMP.	Not applicable					Not applicable, *dust monitoring will be undertaken in terms of the approved EMP – Section 6.3.5.3.* In addition the mine will commit to continue with the air quality monitoring programme as finalised after the appointment of the external specialist to assess the current system up until the time it is no longer required by the regulatory authorities.
Noise						
No further impact	Not applicable					Not applicable
Archaeology and Sites of Cultural Importance						
No further impact	Not applicable					Not applicable
Sensitive Landscapes						
No further impact	Not applicable					Not applicable
Visual						
No further impact	Not applicable					Not applicable, *all commitments in terms of Section 6.3.1.1.14 of the approved EMP will be adhered to.*
Socio-Economic						
No further impact	Not applicable					Not applicable

7.6 Closure Phase

7.6.1 Closure Objectives

There is no intention to apply for a closure certificate in respect of a portion, part or section of the mine as this is not allowed as part of the MPRDA. All structures erected on the mine will be used for the duration of mining activities, however ongoing rehabilitation will be undertaken (i.e. backfilling of opencast pits).

All the closure objectives as stated within the approved Khumani EMP, January 2007 will be relevant for the purposes of this project (refer to Section 6.3.1 for the approved Khumani Iron Ore EMP, January 2007).

7.6.2 Infrastructure Areas

No additional infrastructure will be established. The closure objectives for infrastructure as presented within the approved EMP will remain (refer to Section 6.3.2 for the approved Khumani Iron Ore EMP, January 2007).

In addition the mine commits to assess and investigate the topsoil requirements for rehabilitation purposes and to ensure to utilise the available topsoil efficiently, which will replace the commitment within the approved EMP of the placement of 500mm topsoil over rehabilitated areas, as this will not be possible with the amount of topsoil available on site (refer to Appendix 3).

7.6.3 Mine Residue deposits

No increase in capacity will be required at the Overburden and Low-grade ROM Stockpiles and the slight increase in capacity 7% for the Paste Disposal Facility and Discard Dump will have no significant impact on the rehabilitation thereof. The potential to reduce the iron ore grade within the near future will ensure that the capacity of these residue deposits are not utilised as planned initially and more capacity will be available.

The closure objectives for residue deposits as presented within the approved EMP will remain (refer to Section 6.3.3 for the approved Khumani Iron Ore EMP, January 2007).

7.6.4 Water Pollution Control Structures

Clean and dirty water diversions upslope of opencast pits will be engineered and constructed in such a way to be stable and to remain after closure (refer to Section 6.3.1.8 for the approved Khumani Iron Ore EMP, January 2007).

7.6.5 Maintenance

The aim of the maintenance measures are to ensure that the area affected by the mining operations is rehabilitated according to the closure plan and to apply for closure. The objective is for the area to be rehabilitated sustainability (ensuring self-succession of plants and the associated return of natural wildlife, as well as the improvement of the natural watercourses and groundwater systems).

All rehabilitated areas will be monitored and all post-closure impacts will be managed. The monitoring will be undertaken for erosion of rehabilitation areas, surface water drainage, air quality, surface and groundwater quality, groundwater levels, vegetation growth, weed encroachment and colonisation by animals.

Monitoring and management will only cease when the area is self-sustaining or until such time when agreed to with the regulatory authorities and once the mine may apply for closure.

The closure plan will be reviewed every five years during the life of mine (refer to Section 4.3.6 for the approved Khumani Iron Ore EMP, January 2007).

7.7 Post Closure Phase

The mine will have undertaken a Closure Certificate according to Section 43 of the MPRDA. Section 43 (1) of the MPRDA states clearly that "The holder of a ... mining right ... remains responsible for any environmental liability, pollution or ecological degradation, and the management thereof, until the Minister has issued a closure certificate to the holder concerned."

It is therefore assumed that all environmental impacts will be successfully addressed and management at the Post Closure Phase.

7.7.1 Decommissioning and Aftercare Programme

The Khumani aims to complete as much of the rehabilitation programme/aftercare programme while the mine is in operation.

The Decommissioning ad Aftercare Programme as per the approved Khumani Iron Ore EMP, January 2007 will be adhered to (refer to Section 6.4.7 for the approved Khumani Iron Ore EMP, January 2007).

8 ENVIRONMENTAL AWARENESS PLAN

The MPRDA requires in the Regulations Section 51(b) vi that the mine implements an Environmental Awareness Plan. The existing Environmental Awareness Plan of the Khumani will be applied to this project.

9 EMERGENCY PREPAREDNESS AND RESPONSE PROGRAMME

An effective, comprehensive, well-considered and tested environmental emergency preparedness and response plan has the potential to save lives, prevent unnecessary damage to company and other property and to manage environmental risk in the event of a large chemical spill, oil spill, fuel spill or explosives spill.

The MPRDA requires in the Regulations Section 51(b) iii that the mine implements procedures to environmental related emergencies and remediation. The existing Emergency Preparedness and Response Procedure will be applied to this project.

10 MONITORING AND MANAGEMENT OF ENVIRONMENTAL IMPACTS

The approved surface and groundwater monitoring programme as well as the dust monitoring programme will form part of this project.

All monitoring will be undertaken in terms of the approved EMP.

It is however recommended that the dust monitoring process be amended to:

- Monitor the dust emissions between the different mines (i.e. Khumani and Sishen) in terms of the mining of the Barrier Pillar and for this reason the management programme (refer to Section7.4 and section 7.5) states that an independent air quality specialist should be appointed to amend the existing dust monitoring programme should this be necessary; and
- This specialist should also compile an overall air quality report comprising both Sishen Iron Ore and Khumani's air quality results, which will be submitted to the relevant authorities annually.

11 SUBMISSION OF INFORMATION

All information (i.e. surface water monitoring, groundwater monitoring and air quality monitoring) will be submitted to the relevant authorities as stipulated within Section 6.3.5 of the approved EMP, January 2007.

12 FINANCIAL PROVISION FOR CLOSURE

12.1 Method for Financial Provision

The financial provision for the environmental rehabilitation and closure of any mine and its associated mining operations forms an integral part of the MPRDA. Sections 41(1), 41(2), 41(3) and 45 of the MPRDA deal with the financial provision for mine rehabilitation and closure.

In order to gain an *overall* perspective of the closure cost of the Khumani a detailed closure cost for rehabilitation has been submitted to the DME and was approved in the Khumani EMP, January 2007.

For the purpose of this project only an increase in the existing opencast pit sizes will take place (from 595ha to 599ha – an increase of 4ha). No additional infrastructure will be required.

Two costs are provided for the purposed of this project:

- Firstly, the cost should the mine undertake rehabilitation themselves.
- The second option is based on the assumption that a third party will be employed to undertake the necessary rehabilitation and remedial work, should the mining operation close prematurely.

The financial provisions required by the holder of a 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; and
- Any other manner determined by the Minister.

Assmang has an approved rehabilitation trust fund in place. The Khumani has been included into the approved Assmang Rehabilitation Fund during 2006.

12.2 Quantum

The financial provision to undertake closure as per the DME Guidelines are summarised within Table 16. The financial provision has included the necessary finances to rehabilitate the additional 4ha of opencast pits, in terms of the Khumani Barrier Pillar.

In order to ensure that the mine can commit to closure and undertake the necessary rehabilitation an additional amount of *R120 156.67* should be provided for within the existing Trust Fund for Khumani. Should the mine fail to comply with the EMP and premature closure by a third party should be undertaken and additional amount of *R150 797.67* should be provided for within the existing Trust Fund for Khumani.

The financial provision for the Khumani will be assessed during January 2008 as part of the first EMP performance assessment and will be presented to the DME, Northern Cape Province.

Table 16: Financial Rehabilitation associated with the mining of the Barrier Pillar

No	Description	Unit	A	B	C	D	E=A*B*C*D
			Quantity	Master rate	Multiplication factor	Weighting factor 1	Amount (rands)
			Step 8	Step 6	Step 6	Step 7	
1	Dismantling overland conveyors	m^3	N/A	N/A	N/A	N/A	N/A
2(A)	Demolition of steel buildings and structures (including floor slabs)	m^2	N/A	N/A	N/A	N/A	N/A
2(B)	Demolition of reinforced concrete buildings and structures including Processing Plant and related structures	m^2	N/A	N/A	N/A	N/A	N/A
3	Rehabilitation of access roads	m^2	N/A	N/A	N/A	N/A	N/A
3	Rehabilitation of haul roads	m^2	N/A	N/A	N/A	N/A	N/A
4(A)	Demolition of electrified railway lines	m	N/A	N/A	N/A	N/A	N/A
4(B)	Demolition and rehabilitation of non-electrified railway lines	m	N/A	N/A	N/A	N/A	N/A
5	Demolition of housing and facilities (including floor slabs)	m	N/A	N/A	N/A	N/A	N/A
6	Opencast rehabilitation (including final voids and ramps)	ha	4	57767.60	0.52	1.00	120156.608
7	Sealing of shafts, adits and inclines (including concrete cap)	m^3	N/A	N/A	N/A	N/A	N/A
8(A)	Rehabilitation of overburden and spoils	ha	N/A	N/A	N/A	N/A	N/A
8(B)	Rehabilitation of processing waste deposits and evaporation ponds (basic, salt-producing waste)	ha	N/A	N/A	N/A	N/A	N/A
8(C)	Rehabilitation of processing waste deposits and evaporation ponds (acidic, metal-rich waste)	ha	N/A	N/A	N/A	N/A	N/A
9	Rehabilitation of subsided areas	ha	N/A	N/A	N/A	N/A	N/A
10	General surface rehabilitation, including grassing of all denuded areas	ha	N/A	N/A	N/A	N/A	N/A
11	River diversions	ha	N/A	N/A	N/A	N/A	N/A
12	Fencing and powerlines	m	N/A	N/A	N/A	N/A	N/A
13	Water management	ha	N/A	N/A	N/A	N/A	N/A
14	2 to 3 years of maintenance and	ha	N/A	N/A	N/A	N/A	N/A

	aftercare						
15 (A)	Specialist study	Sum	N/A	N/A	N/A	N/A	N/A
15 (B)	Specialist study	Sum	N/A	N/A	N/A	N/A	N/A
					Sub Total 1 (Sum of items 1 to 15)		**R 120,156.67**
1	Preliminary and General	12.5% of Subtotal 1			Weighting factor 2 (Step 7)	1	15,020
2	Administration and Supervision Costs	6.0% of Subtotal 1				7,209	
3	Engineering drawings and specifications	2.0% of Subtotal 1				2,403	
4	Engineering and procurement of specialist work	2.5% of Subtotal 1				3,004	
5	Development of a closure plan	2.5% of Subtotal 1					
6	Final groundwater modelling					3,004	
	Grand Total (Sub total 1 plus sum of management and administrative items 1 to 6)						**R 150,797.67**

12.2.1 Assumptions

All information and quantities provided in Table 16 are based on the additional expansion associated with the Barrier Pillar (i.e. 4ha). The remainder of infrastructure and activities associated with the Khumani have been addressed in approved EMP and therefore approved financial provisions and quantum's are available. The master rate for the rehabilitation of the opencast pits in terms of the approved EMP (based on 2005 rates) has been multiplied by the CPI index of 5.4% per year (for 2006 and 2007).

The financial provision for the Khumani will be assessed during January 2008 as part of the first EMP performance assessment and will be presented to the DME, Northern Cape Province.

No quantities have been provided for the following:

- Dismantling overland conveyors
- Demolition of steel buildings and structures (including floor slabs)
- Demolition of reinforced concrete buildings and structures including Processing Plant and related structures - including all admin and mine buildings and sewage facilities
- Access Roads and Haul Roads; as existing roads will be utilised;
- Electrified railway lines; as these are not applicable to the project;
- Non-electrified railway lines; only for the additional railway spur to be established at the No. 2 Shaft;
- Rehabilitation of overburden and spoils; as the project will have no impact on the approved capacity of the Waste Rock Dumps and the Paste Disposal Facility;
- Rehabilitation of Processing wastes and evaporation ponds; as the project will have no impact on the approved capacity of the Paste Disposal Facility;
- General surface rehabilitation for the concentrator area; as the area has been covered in the approved EMP;

- Water management; as the project will utilise existing infrastructure where water management is concerned; and
- 2 to 3 years of maintenance and aftercare; only allowed for the area of new infrastructure.

13 IDENTIFICATION OF GAPS

The following gaps have been identified as part of this EMP Amendment:

- Khumani wishes to mine the Barrier Pillar to the east of the Bruce Property (Bruce/Lylyveld), however this can only take place once Sishen has undergone an EMP process to include the iron ore resources within Lylyveld into their mining rights, not timeframes are available for this;
- No storm water management plan (in terms of berm requirements) has been included as part of the EMP Amendment and must be undertaken as part of the management commitments by Sishen and Khumani. This should include the management of water within the opencast pit as well as around the mutual opencast pit areas;
- No amended dust monitoring programme is included as part of this EMP as it is required that the two (2) mining companies appoint an external qualified person to amend the existing dust monitoring procedures if required; and
- The exact impact on sizes (even though insignificant) of the Overburden and Low-grade ROM Stockpiles, Paste Disposal Facility, and Discard dump cannot be presented at this stage as the reclaiming and backfilling operations must first be quantified.

14 CONCLUSION

Assmang is the holder of new order mining rights in respect of high-grade hematite iron ore deposits on the farms Bruce, King and Mokaning, which forms part of the Khumani, neighbouring the Sishen Mine.

In order to ensure stability and safety between mining operations it is required by the Department of Minerals and Energy and associated legislation that a Barrier Pillar of approximately 9m to each side of a mine boundary be left between operations (in this case between the Khumani and the Sishen Mine). This Barrier Pillar between the Khumani and Sishen has however resulted in the sterilisation of approximately 400m of feasible mining iron ore as a result of the construction of the different terraces of the opencast pits.

As a result Assmang and Kumba (Sishen Mine) wishes to mine the Barrier Pillar between the Khumani and the Sishen Mine, which is situated on the farms Bruce and Sishen. Neither of the two mines has included the Barrier Pillar reserves into the approved Environmental Impact Assessment and Management Programmes and has obtained the consent from the Department of Minerals and Energy (DME) to commission an Environmental Management Programme Amendment process to include the mining of this pillar.

This report addressed six (6) areas to be mined in the Bruce Barrier Pillar. Areas 2, 4 and 5 are planned to be mined by Sishen from within the Sishen mining rights area into the Khumani mining area and the remaining three by Assmang from within the Khumani Mining area into the Sishen mining area.

Sishen wishes to start mining operations during the middle of 2007 and continue to mine for a period of five years. After this five year period Assmang will commence mining Areas 1, 3 and 6. For the purposed of managing environmental liabilities the two companies will dispose waste from within the Sishen mining rights area onto their waste rock dumps and vice versa. The same principle will be applied by Khumani.

This report was compiled to include the additional mining activities within the Khumani mining rights area within the approved mining rights in terms of the MPRDA.

The project does not involve the establishment of any new mining infrastructure. The only addition to the approved mining right of Khumani is the expansion of the existing opencast operations on the Bruce property and will result in an increase of approximately 4ha. Although the opencast operations will increase by approximately 4ha, no increase in the capacity of the approved Overburden and Low-grade ROM Stockpiles will be required due to planned reclaiming activities of these stockpiles as per the approved EMP, as well as the mine philosophy of ongoing backfilling. A slight increase of approximately 7% is expected on the Paste Disposal Facility, as well as the Discard Stockpile. This slight increase will however not result in an increase in the footprint area and will be accommodated within the existing planned structures and therefore no impacts were assessed in this regard.

The impact assessment for this project was undertaken with the view of a slight expansion of an existing brown fields operation. To ensure uniformity, the assessment of potential impacts was addressed in a standard manner so that all impacts are comparable. Each impact identified was assessed in terms of probability (likelihood of occurring), extent (spatial scale), intensity (severity) and duration (temporal scale). To enable a scientific approach to the determination of the impact significance (importance), a numerical value was linked to each rating scale of which the sum of the numerical values defined the significance. The main impacts associated with this project are:

- Continuation of existing mining operations without disruptions due to the mining of the Barrier Pillar;
- The management of storm water in terms of the mutual opencast pits; and
- The management of air quality in terms of the mutual opencast pits.

The EIA ensured that the needs of the environment (biophysical and socio-economic) were identified. The EMP in turn provided a tool for meeting the objective to reduce or avoid negative environmental impacts

associated with a project within a certain environment by providing detailed mitigation and management commitments and the associated action plans as a legal commitment by the applicant (in terms of this project Assmang, Khumani). Limited additional management measures were required for the expansions to the approved opencast pits as this project will be management in terms of the approved EMP (Khumani EMP, January 2007). However, as the project will result in six (6) opencast pits crossing over two mining right areas (i.e. Khumani and Sishen) it is essential that mutual management measures be implemented especially in terms of surface water, and dust monitoring. Some of the additional management measures recommended for this project included:

- The mine plans of the two (2) mining companies will be structured in such a way to ensure that no mining activities associated with the Barrier Pillar takes place within a 500m radius of planned or existing opencast operations;
- The two (2) mining companies will establish a mutual storm water management system upstream of the mutual opencast pits;
- Sharing of information in terms of air quality between the two (2) mining companies will be undertaken;
- An external air quality specialist will be appointed to assess the existing air quality management procedures and amend it where possible;
- A holistic air quality report will be compiled annually by an external qualified person and will be submitted to the relevant authorities;
- Mutual agreements will be put in place to establish safety features around the entire mutual opencast pits; and
- The financial provision for closure will be amended to accommodate the expansion of the 4ha opencast pits area.

It is the opinion of the independent environmental consultant that this project, if properly managed between the two (2) mining companies, will not have a significant impact on the environment and where potential impacts could occur sufficient management measures have been identified to mitigate these.

15 REFERENCES

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APPENDICES

APPENDIX 1: LEGISLATION

LEGISLATION

Documented in this chapter is a list of the current South African environmental legislation, which is considered to be pertinent to the operation of an iron ore mine. This list is not intended as an exhaustive analysis of the pertinent environmental legislation but provides a guideline to the relevant aspects of each of the acts

Mineral and Petroleum Resources Development Act (Act 28 of 2002)

The MPRDA make provision for equitable access to and sustainable development of the nation's mineral and petroleum resources; and to provide for matters connected therewith by:

- Recognizing that minerals and petroleum are non-renewable natural resources;
- Acknowledging that South Africa's mineral and petroleum resources belong to the nation and that the State is the custodian thereof;
- Affirming the State's obligation to protect the environment for the benefit of present and future generations, to ensure ecologically sustainable development of mineral and petroleum resources and to promote economic and social development;
- Recognizing the need to promote local and rural development and the social upliftment of communities affected by mining;
- Reaffirming the State's commitment to reform to bring about equitable access to South Africa's mineral and petroleum resources;
- Being committed to eradicating all forms of discriminatory practices in the mineral and petroleum industries;
- Considering the State's obligation under the Constitution to take legislative and other measures to redress the results of past racial discrimination;
- Reaffirming the State's commitment to guaranteeing security of tenure in respect of prospecting and mining operations; and
- Emphasizing the need to create an internationally competitive and efficient administrative and regulatory regime.

Rehabilitation and financial provision

The MPRDA has a two-stage procedure in granting a mining title. This is affected by means of granting a prospecting permit and a mining right. In terms of applications for mining, no mining right will be issued unless the Director: Mineral Development is satisfied that the manner in which the applicant intends to rehabilitate is satisfactory and that the applicant has the ability and has made provisions to mine optimally and rehabilitate the disturbed area. All mining applications must be accompanied by information pertaining to the above issues.

In addition to the rehabilitation requirements contained in the sections pertaining to mining rights, the Minerals and Petroleum Resources Development Act also contains a specific chapter dedicated to the "mineral and environmental regulation". In essence, this chapter (in specific regards to environmental principles) requires that any prospecting or mining operation must be conducted in accordance with

generally accepted principles of sustainable development by integrating social, economic and environmental factors into the planning and implementation of prospecting and mining projects in order to ensure that exploitation of mineral resources serves present and future generations.

This chapter further makes provision that the relevant party must manage all environmental impacts in accordance with an environmental management plan or approved environmental management programme and should as far as it is reasonably practicable, rehabilitate the environment affected by the prospecting or mining operations to its natural or predetermined state or to a land use which conforms to the generally accepted principle of sustainable development. Any environmental damage, pollution or ecological degradation because of reconnaissance prospecting or mining operations will be held the responsibility of the holder of the various rights or permits.

Section 41 of this Chapter makes provision for an Environmental Management Plan of Programme to make the prescribed financial provision for the rehabilitation or management of negative environmental impacts. Section 42 of this Chapter further makes provision that residue stockpiles and residue deposits be managed in the prescribed manner on any site demarcated for that purpose in the Environmental Management Plan or Programme.

This Chapter states in Section 43 that the holder of a prospecting right, mining right, retention permit or mining permit remains responsible for any environmental liability, pollution or ecological degradation, and the management thereof, until the Minister has issued an closure certificate to the holder concerned. This chapter also contains provisions relating to the removal of buildings, structures and objects after termination of the prospecting permit or mining authorisation.

Environmental Impact Assessment, Management Plan and Social and Labour Plan

Section 39 of the MPRDA makes provision for the preparation of an environmental impact assessment and submits an environmental management programme in respect of any application for prospecting or mining operations. No mining operation will be granted a mining license without the preparation of a satisfactory EIA and EMP, as well as a Social and Labour Plan.

An applicant who prepares an environmental management programme or an environmental management plan must:

- Establish baseline information concerning the affected environment to determine protection, remedial measures and environmental management objectives;
- Investigate, assess and evaluate the impact of his or her proposed prospecting or mining operations on
  - The environment
  - The socio-economic conditions of any person who might be directly affected by the prospecting or mining operation
  - Any national estate referred to in section 3(2) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999), with the exception of the national estate contemplated in section 3(2)*(i)*(vi) and (vii) of that Act
- Develop an environmental awareness plan describing the manner in which the applicant intends to inform his or her employees of any environmental risks which may result from their work and the manner in which the risks must be dealt with in order to avoid pollution or the degradation of the environment; and
- Describe the manner in which he or she intends to:

- Modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation
- Contain or remedy the cause of pollution or degradation and migration of pollutants
- Comply with any prescribed waste standard or management standards or practices

Regulations in terms of the Minerals and Petroleum Resources Development Act have recently been passed for Environmental Management Programme (EMP) assessment and monitoring. The purpose of the assessment and monitoring is to ensure compliance with the approved EMP and to assess the continued appropriateness and adequacy of the EMP. The mineral authorization holder is required to appoint an independent competent person to conduct ongoing monitoring of the EMP and report on the EMP performance assessment. The frequency of the reporting is generally accepted to be annually.

Part 2 of the regulations makes provision for the Social and Labour Plan. The objectives of the Social and Labour Plan are to:

- Promote employment and advance the social and economic welfare of all South Africans;
- Contribute to the transformation of the mining industry and
- Ensure that holders of mining rights contribute towards the socio-economic development of the area in which they are operating.

Other Relevant Legislation

The MPRDA is not the only guiding and mandatory legislation that is required for the proposed extension of iron mining operations and therefore, the following legislation will be considered as part of the EMP Amendment process to ensure legal compliance and best practice. The key environmental Acts in South Africa, which must be considered in the context of the project, are listed below.

- South African Constitution (Act No. 108 of 1996);
- National Environmental Management Act (Act No. 107 of 1998), and all subsequent revisions;
- National Water Act (Act No. 36 of 1998);
- The National Heritage Resources Act (Act No. 25 of 1999);
- Conservation of Agricultural Resources Act (Act No. 43 of 1983);
- NEMA: Air Quality Management Act (Act No. 39 of 2004);
- The white paper on integrated Pollution and waste management for South Africa;
- Hazardous Substances Act (Act No. 15 of 1973); and
- Sustainable Development.

Constitution of the Republic of South Africa Act (Act No. 108 of 1996)

The Constitution of South Africa, 1996 (Act 108 of 1996) provides for an environmental right (contained in the Bill of Rights, Chapter 2). In terms of Section 7, the state is obliged to respect, promote and fulfill the rights in the Bill of Rights. In other words, a positive obligation is placed on the State to give effect to the environmental right. The environmental right states that:

'Everyone has the right -

a) To an environment that is not harmful to their health or well-being; and

b) To have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that -

- Prevent pollution and ecological degradation;
- Promote conservation; and
- Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.'

National Environmental Management Act (107 of 1998)

The National Environmental Management Act (107 of 1998) (NEMA) is South Africa's overarching environmental legislation and has, as its primary objective, to provide for co-operative governance by establishing principles for decision making on matters affecting the environment, institutions that will promote co-operative governance and procedures for co-ordinating environmental functions exercised by organs of state and to provide for matters connected therewith.

The principles of the Act include:

- Environmental management must place people and their needs at the forefront of its concern;
- Development must be socially, environmentally and economically sustainable;
- Environmental management must by integrated, acknowledging that all elements of the environment are linked and interrelated;
- Environmental justice must by pursued;
- Equitable access to environmental resources to meet basic human needs and ensure human well-being must be pursued;
- Responsibility for the environmental health and safety consequences of a project or activity exists throughout its life cycle;
- The participation of all interested and affected parties in environmental governance must be promoted;
- Decisions must take into account the interests, needs and values of all interested and affected parties;
- The social, economic and environmental impacts of activities, must be considered assessed and evaluated, and decisions must be appropriate in the light of such consideration and assessment;
- Decisions must be taken in an open and transparent manner, and access to information must be provided in accordance with the law;
- The environment is held in a 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;
- The cost of remedying pollution, environmental degradation and consequent adverse health effects must be paid for by those responsible for harming the environment; and
- Sensitive, vulnerable, highly dynamic or stressed ecosystems, such as coastal shores, estuaries, wetlands, and similar systems required specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure.

National Water Act (Act No. 36 of 1998)

The National Water Act (NWA) provides for fundamental reformation of legislation relating to water resources and use. The preamble to the Act recognizes that the ultimate aim of water resource management is to achieve sustainable use of water for the benefit of all users and that the protection of the quality of water resources is necessary to ensure sustainability of the nation's water resources in the interests of all water users. The purpose of the Act is stated, in Section 2 as, *inter alia:*

- Promoting the efficient, sustainable and beneficial use of water in the public interest;
- Facilitating social and economic development;
- Protecting aquatic and associated ecosystems and their biological diversity;
- Reducing and preventing pollution and degradation of water resources; and
- Meeting international obligations.

The Act presents strategies to facilitate sound management of water resources provides for the protection of water resources, and regulates use of water catchment management agencies water user associations advisory committees and international water management.

Section 19 of the Act makes provision for the prevention of pollution. A landowner or occupier is responsible for the prevention, control and clean up of water pollution occurring because of activities on his land. If the responsible person fails to undertake remediation (prevention, containment, clean-up), the catchment management agency may take the measures it considers necessary, and recover the costs from the responsible person.

Part 5 of the NWA deals with pollution of water resources following an emergency incident, such as an accident involving the spill of a harmful substance that finds or may find its way into a water resource. In terms of Section 30 of NEMA and Section 20 of the NWA, the responsibility for remedying the situation rests with the person responsible for the incident or the substance involved. If there is a failure to act, the relevant Catchment Management Agency may take the necessary steps and recover the costs from every responsible person.

The National Heritage Resources Act (Act No. 25 of 1999)

The National Heritage Resources Act established the South African Heritage Resources Agency (SAHRA) in 1999. SAHRA is tasked with protecting heritage resources of national significance. Under Section 38 of this Act, all new developments with a site exceeding 5 000 m², are subject to assessment by SAHRA. A heritage impact assessment must be carried out by a heritage specialist approved by SAHRA to enable them to make and informed decision.

Conservation of Agricultural Resources Act (Act No. 43 of 1983)

The Conservation of Agricultural Resources Act aims to provide for control over the utilisation of natural agricultural resources in order to promote the conservation of the soil, water resources and vegetation and to combat weeds and invader plants. Section 6 of the Act makes provision for control measures to be applied in order to achieve the objectives of the Act, these measures relate to *inter alia*:

- Cultivation of virgin soil;
- Utilization/protection of wetlands, marshes, water sponges, water course/sources;

- The regulating of the flow pattern of run-off water;
- The utilization and protection of the vegetation;
- The grazing capacity of veld and the number and type of animals;
- The control of weeds and invader plants; and
- The restoration or reclamation of eroded land or land which is disturbed or denuded.

All these provisions have implications for any development and these aspects are implemented via Regulations to the Act.

National Environmental Management: Air Quality Act (Act No. 39 of 2004)

The NEMA Air Quality Management Act states the following as it primary objective: "To reform the law regulating air quality in order to protect the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development while promoting justifiable economic and social development; to provide for national norms and standards regulating air quality monitoring, management and control by all spheres of government, for specific air quality measures, and for matters incidental thereto.

Whereas the quality of ambient air in many areas of the Republic is not conducive to a healthy environment for the people living in those areas let alone promoting their social and economic advancement and whereas the burden of health impacts associated with polluted ambient air falls most heavily on the poor, And whereas air pollution carries a high social, economic and environmental cost that is seldom borne by the polluter, And whereas atmospheric emissions of ozone-depleting substances, greenhouse gases and other substances have deleterious effects on the environment both locally and globally, and whereas everyone has the constitutional right to an environment that is not harmful to their health or well-being, and whereas everyone has the constitutional right to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that:

- Prevent pollution and ecological degradation;
- Promote conservation; and
- Secure ecologically sustainable development and use of natural resources.

And whereas minimisation of pollution through vigorous control, cleaner technologies and cleaner production practices is key to ensuring that air quality is improved, and whereas additional legislation is necessary to strengthen the Government's strategies for the protection of the environment and, more specifically, the enhancement of the quality of ambient air, in order to secure an environment that is not harmful to the health or well-being of people."

The White Paper on Integrated Pollution and Waste Management for South Africa

The White Paper on Integrated Pollution and Waste Management outlines government's new thinking in relation to pollution and waste management.

This chapter defines the concept of integrated pollution and waste management that government will use in its national policy on pollution prevention, waste minimization, impact control and remediation. It also describes the scope and purpose of this integrated pollution and waste management policy, together with the consultative process used in developing this policy. The government's national policy on Integrated Pollution and Waste Management (IP&WM) sets out the vision, principles, strategic goals and objectives that government will use for integrated pollution and waste management in South Africa.

This White Paper on Integrated Pollution and Waste Management for South Africa serves the following two purposes:

- To inform the public of the government's objectives, and how the government intends to achieve them; and
- To inform government agencies and State organs of these objectives, and their roles in achieving them.

The Integrated Pollution and Waste Management Policy is a subsidiary policy of the overarching environmental management policy, as set out in the White Paper on Environmental Management Policy for South Africa, and further supported by the NEMA. This Integrated Pollution and Waste Management policy accordingly subscribes to the vision; principles, goals and regulatory approach set out in the environmental management policy and Act and detail the government's specific policy for pollution and waste management.

This Integrated Pollution and Waste Management Policy applies to all government institutions, society at large, and to all activities that impact on pollution and waste management. One of the fundamental approaches of this policy is to prevent pollution, minimize waste, and to control and remediate impacts. The management of waste will be implemented in a holistic and integrated manner, and will extend over the entire waste cycle, from "cradle to grave", including the generation, storage, collection, transportation, treatment, and final disposal of waste.

The government aims to:

- Encourage the prevention and minimization of waste generation, and thus pollution at source;
- Encourage the management and minimization of the impact of unavoidable waste from its generation to its final disposal;
- Ensure the integrity and sustained "fitness for use" of all environmental media, i.e. air, water and land;
- Ensure that any pollution of the environment is remediated by holding the responsible parties accountable;
- Ensure environmental justice by integrating environmental considerations with the social, political and development needs and rights of all sectors, communities and individuals; and
- Prosecute non-compliance with authorizations and legislation.

The White Paper proposes a number of tools to implement the objectives of the policy it sets out. The most significant of these is a legislative programme that will culminate in new pollution and waste legislation. This proposed legislation, amongst other things, will address current legislative gaps, and clarify and allocate responsibilities within government for pollution and waste management. The importance of drafting such legislation in a manner that continues to build on the participation of all stakeholders who were involved in the development of this White Paper is emphasized.

Hazardous Substances Act (Act No. 15 of 1973)

The object of the Act is *inter alia* to 'provide for the control of substances which may cause injury or ill health to or death of human beings by reason of their toxic, corrosive, irritant, strongly sensitising or flammable nature or the generation of pressure thereby in certain circumstances; for the control of electronic products; for the division of such substances or products into groups in relation to the degree of danger; for the prohibition and control of such substances.'

In terms of the Act, substances are divided into schedules, based on their relative degree of toxicity, and the Act provides for the control of importation, manufacture, sale, use, operation, application, modification, disposal and dumping of substances in each schedule.

Pollution control in South Africa is affected through numerous national statutes, provincial ordinances and local authority by-laws. Only the more significant legislation pertaining to the regulation of water, air, noise and waste pollution is dealt with in this section.

Sustainable Development

The principle of Sustainable Development has been established in the Constitution of the Republic of South Africa (Act No. 108 of 1996) and given effect by NEMA. Section 1(29) of NEMA states that sustainable development means the integration of social, economic and environmental factors into the planning, implementation and decision-making process so as to ensure that development serves present and future generations.

Thus Sustainable Development requires that:

- The disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimised and remedied;
- That pollution and degradation of the environment are avoided, or, where they cannot be altogether avoided, are minimised and remedied;
- The disturbance of landscapes and sites that constitute the nation's cultural heritage is avoided, or where it cannot be altogether avoided, is minimised and remedied;
- Waste is avoided, or where it cannot be altogether avoided, minimised and re-used or recycled where possible and otherwise disposed of in a responsible manner;
- A risk-averse and cautious approach is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions; and
- Negative impacts on the environment and on people's environmental rights be anticipated; and, prevented and where they cannot altogether be prevented, are minimised and remedied.

APPENDIX 2: AUTHORITIES MEETING

Ivuzi (Pty) Ltd
GROUNDWATER, EARTH SCIENCE & ENVIRONMENTAL CONSULTANTS

Our Ref: IV.ARM.07.005
Your Ref:

MINUTES OF MEETING

PROJECT: Khumani Iron Ore Mine (BKM Project)/Sishen Iron Ore Mine Barrier Pillar

SUBJECT: Introduction of the barrier pillar EMP amendment to the relevant authorities and discussion of further requirements and way forward

VENUE: Sishen Iron Ore Mine (Kumba Resources), Kathu, Northern Cape

DATE: 28 February 2007

PRESENT:

Name	Company	Position	Tel	Fax	Email
Rudzani Mudau (RM)	DME	Dep. Director: Environment - Co-ordinating signing of EMP	053 830 0800	053 832 5631	rudzani.mudau@dme.gov.za
R.F. Sekepane (RS)	DME	PEO: Environment	053 830 0800		raisibe.sekepane@dme.gov.za
N.B. Matodzi (NM)	DME	Environment Officer	053 830 0800		bethuel.matodzi@dme.gov.za
Sibonelo Mbanjwa (SM)	DTEC	Deputy Director	053 807 4800		smbanjwa@half.ncape.gov.za
R. Molusi (RMo)	DTEC	Environment Officer	053 807 4800		rmolusi@half.ncape.gov.za
R.J. Rutiri (RR)	ASSMANG	Manager: Mining	053 311 6421		johnr@assmang.co.za
W. Voigt (WV)	Sishen Iron Ore (Kumba Resources)	Environmental Manager: Project Leader	053 739 2821		werner.voigt@kioltd.com
A Mostert (AM)	ASSMANG	Technical Services Manager	082 376 6211		alexm@assmang.co.za
M.D. Carney (MC)	Sishen (MRM)		083 269 6762		mike.carney@kioltd.com

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Directors: AC Johnstone, EP Gabanakgosi, S Kisten

Reg No. 2002/028494/07

Frans Olivier (FO)	ASSMANG	Mining	082 882 5030		fransolivier@assore.com
Mari Els (ME)	Synergistics	Environmental Consultant	082 415 0289		mari@synergistics.co.za
Tanja Bekker (TB)	Ivuzi	Environmental Consultant	011 803 5726	011 803 5745	tanja2@ivuzi.co.za
Simon Botha (SB)	Ivuzi	Environmental Consultant	011 803 5726	011 803 5745	simonb@gcs-sa.biz

cc:

- Freddie Human (ARM) (FH)
- Graham Butler (ARM) (GB)
- Willem Grobelaar (Assmang) (WG)
- Gert Bosch (Sishen) (GB)

Distribution by:

- Email

		ACTION
1.	**Apologies** The following authorities and organisation could not attend the meeting: • DWAF; • NDA; and • SAHRA.	
2.	**Purpose of the Meeting** • TB: o Introduced the project and discussed the purpose of the meeting. The purpose is to introduce the project to the relevant authorities and obtain their input in terms of their requirements and way forward.	
3.	**Mining Schedule** • FO: o Discussed the mining schedule by way of the maps for the Barrier Pillar mining areas. The discussion addressed amongst others tonnages to be mined, liabilities, safety issues and the agreement between Sishen and ASSMANG.	FO
4.	**Site Visit** • MC: o Discussed the infrastructure set-up and in particular the location of the barrier pillar in relation to both the Sishen Iron Ore, as well as Khumani Mine. o Indicated that the barrier pillar area stretch over a distance of approximately 7km. o Barrier Pillar consists of 6 (six) areas which cut across the mining right areas of the two companies. o Sishen and ASSMANG will each mine 3 (three) of the areas. The mining of the barrier pillar areas have been divided between the two companies based on safety and operational issues, as well as the location of existing and planned opencast pits. o The plan in terms of the management of waste and product iron ore generated as a result of mining activities within the mineral right area of either Sishen or Khumani will be addressed as follows: ▪ Waste generated by Sishen within Khumani's mineral rights area will be stockpiled on Khumani's low-grade Stockpiles and vice versa. ▪ Product (iron ore) mined within the mineral rights area of Khumani will be stockpiled within Khumani's property and vice versa. ▪ To facilitate the above, Sishen will appoint Khumani as a contractor to mine within their mineral rights area. When Sishen has to mine within the Khumani mineral rights area, Khumani will appoint Sishen as a	MC

	contractor who on their part will appoint a contractor to conduct the mining activities on their behalf. ▪ The arrangements will be that of mine owner and contractors as per normal situations. • RM: o Inquired about the extent of the area that each of the companies will mine into the mineral rights area of the other. • TB: o Indicated that it will be addressed in the presentation.	RM TB
5.	Presentation By Frans Olivier • *Please refer to the attached presentation by Frans Olivier for the whole document and issues discussed.* • FO: o Discussed the agreement between Sishen and Khumani. o Discussed the motivation for the project: ▪ It is a legal requirement that a 9m safety barrier remain on each side of the boundary between Sishen Iron Ore and Khumani. ▪ This would have resulted in the sterilisation of the ore (up to 400m in some locations) located within the safety barrier. o Discussed the areas to be mined: ▪ Sishen will mine areas 2, 4 and 5. ▪ Khumani will mine areas 1, 3 and 6. o Indicated that the high walls of the mining pit will extent into the respective properties of Khumani and Sishen Iron Ore. o The mining will be done such that the bottom of the pit will be mined until the boundary of the respective properties is reached hence the extension of the high wall into the respective properties. o Discussed the mine schedule. o Discussed the Mutual Agreement between Sishen and Khumani. ▪ Discussed the objectives of the agreement. ▪ Agreement will be valid for the 20 year life of mine period. ▪ A mining plan is available for mining activities adjacent to the pillar. ▪ Agreement addresses rolling 5-year programme as well as requirements for dispute resolution. o Assmang will keep their activities away from the pillar area, 500m radius around the barrier pillar mining operations, until the mining activities cease. o Sishen would like to commence with the mining of area 2 in July 2007. o Assmang will submit the final EMP Amendment by May 2007 to the Department of Minerals and Energy.	FO

	• MC: o Area 2 has the largest intrusion into the Khumani property as well as the largest potential for backfilling.	MC
6.	Presentation of Environmental Process for ASSMANG • *Please see attached presentation for all the issues addressed in the presentation.* • TB: o Indicated that the parties (ASSMANG and Sishen) are willing to work together in terms of the technical and environmental requirements for the project. o No NEMA – EIA Amendment is required, as no change in the scheduled activities authorised in the DTEC – ROD issued for Khumani will take place. o Explained that this project is considered as a mini-EMP Amendment as no scoping phase is required and only a short report will suffice the purpose of the DME. o The project should be regarded as a brown-fields project as Sishen has already been mining the area and opencast pits are already approved for the Khumani Iron Ore Mine operations. o No impacts on groundwater are envisaged as the areas that could potentially be affected by the mining of the barrier pillar have already been dewatered. o Both parties must invest in the same mitigation measures, which will include the implementation of clean and dirty water systems, dust management etc. o From the onset of the project it is not foreseen that there will be any increase in dust. This is as no additional vehicles or personnel will be required. The mining of the barrier pillar will be scheduled in the existing mining works programme. o The waste dump on the farm Bruce may be utilised for waste stockpiling, however from the initial discussions it is possible that all additional waste will be accommodated on the existing low-grade Stockpiles. o No sites of archaeological or cultural importance are in the area of discussion. o Explained that where relevant the environmental closure liabilities will be addressed for each mine individually. o Safety and security issues have been discussed by the two companies involved and will be included within the mutual agreements. o Envisaged that the EMP Amendment Report will be submitted towards the middle of April 2007. o Required whether the authorities (SAHRA, DWAF, NDA and DTEC) could	

	accommodate the timeframes of this project and provide comments on the mini-EMP Amendment within 21 days of submission whereafter it will be submitted to the DME for review within 30 days. • RM: o Should the departments who should be consulted agree with the 21 day period, DME will have no problem to commit to the 30 day review and Record of Decision timeframe. • SM: o Will not have a problem with the 21-day review period provided the reports to be submitted are not too technical or require review by other directorates such the Conservation directorate of DTEC. Should only input from the waste management section be required, the 21-day review period should not be problematic. • TB: o Do not foresee any input required from the Conservation directorate of DTEC. o To ease the review process for the authorities a feedback meeting will be scheduled to present the findings of the EMP Amendment. • All in agreement.	
7.	Presentation on Implications for Sishen Iron Ore Mine • *Please see attached presentation for all the issues discussed.* • ME: o Discussed issues relating to air quality (dust), water, mining waste management, environmental liabilities and the environmental process to be followed by Sishen. • SM: o Inquired whether the mutual agreement between Sishen and Khumani sufficiently addresses the environmental liabilities that could stem from the activities associated by the mining of the barrier pillar areas. • TB/FO/ME: o Agreed that the agreement will address environmental liabilities. • RM: o Indicated that the respective companies will be held liable in terms of the requirements of the MPRDA.	
	Close Out • TB: o Thanked all attendees for their availability and input.	

Minutes taken by Simon Botha/Tanja Bekker, Ivuzi.

1 REHABILITATION OF DUMPS

Assmang (Beeshoek) has commenced with the rehabilitation process after 75 years of mining. As a result of the lack of an Environmental Management Programme Report (EMPR) or any environmental management plans for the management of topsoil; topsoil was not stripped and stockpiled for future use. Unfortunately the geology in the area is of such a nature that topsoil is not present at all the areas that have been mined.

The lack of topsoil in the area presented the problem of not being able to place topsoil over areas to be or which have been rehabilitated. The decision was made by Assmang (Beeshoek) to mix topsoil with gravel (refer to Figure 1) and spread it over the sloped dumps.

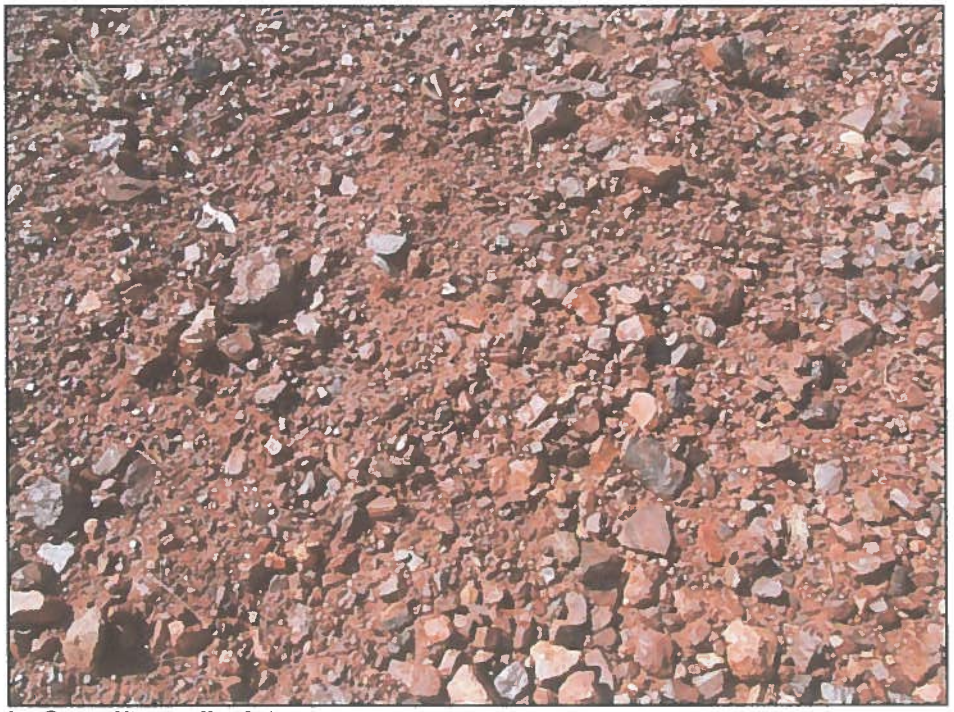

Figure 1: Gravel/topsoil mixture

1.1 Rehabilitation process

All identified dumps at the Beeshoek Iron Ore Mine were sloped to an angle of 18° (refer to Figure 2) with benches where required. The dumps were covered with approximately 100 to 150mm of topsoil (topsoil mixture as indicated in Figure 1) and the surface was ripped.

Figure 2: Beeshoek Iron Ore Mine Dumps sloped to 18°

2 CONCLUSION

Dozing of the test dump (covered with the topsoil mixture) commenced in August 2006 and the topsoil was spread during October 2006. With reference to Figure 3 and Figure 4 it can be seen that vegetation growth already started. It must be kept in mind that the topsoil was not fertilised or seeded. Also evident from the test site is that little erosion (refer to Figure 4) took place while other areas (refer to Figure 5) covered with only red soil show some significant erosion.

The test site has indicated the use of a mixture of topsoil and gravel is even more effective than only topsoil (red soil as present in the areas of Beeshoek and Khumani Iron Ore Mines).

However one must keep in mind that the test site is only five months old and that the sustainability can not be guaranteed and therefore ongoing monitoring is required to determine whether this process of rehabilitation is sustainable or whether other alternatives should be investigated.

The process of investigating the most effective means of rehabilitating dumps and other areas ensures that the mine identify the most suitable rehabilitation process relevant to that specific area for self-succession and sustainability.

Figure 3: Vegetation growth on test area

Figure 4: Area covered with the topsoil mixture where no erosion is present

Figure 5: Areas covered in topsoil where erosion is taking place and vegetation establishment is slow

UNDERTAKING

I, Simon Botha
....., the
undersigned and duly authorised thereto by Assmang
.....
Company/Close Corporation/Municipality (Delete that which is not applicable) have studied and understand the contents of this document in it's entirety and hereby duly undertake to adhere to the conditions as set out therein including the amendment(s) agreed to by the Regional Manager in Section G and approved on 26 August 2007.

Signed at Kimberley this 6th August day of 6th 2007.

.....
Signature of applicant

Env. Consultant (Ivuzi)
Designation

APPROVAL

Approved in terms of Section 39(4) of the Mineral and Petroleum Resources Development Act, 2002 (Act 29 of 2002)

Signed at...**Kimberly**...this....**26th**..day of...**July**...2007

.....
REGIONAL MANAGER

REGION: NORTHERN CAPE

THE REGIONAL MANAGER
NORTHERN CAPE REGION

APPENDIX 3: DOCUMENTARY PROOF FOR THE CHANGE IN THE UTLISATION OF TOPSOIL DURING REHABILITATION