SECTION 3

THE REGIONAL MANAGER
NORTHERN CAPE REGION

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3.0 MOTIVATION FOR THE PROJECT

3.1 Benefits of the Project

Beeshoek Mine currently produces approximately 6 million tons of iron ore / annum. Life of mine for Beeshoek Mine at the current production rate is in the order of approximately 6 years where after production will be reduced drastically to 1 million tons / annum for approximately a further 4 years.

In total, there is an average of 8.7% growth in World Crude Steel Production. The main driving force is the growth China has shown resulting in increased demand for raw materials for steel production. World Crude Steel Production was reported to total 965 million metric tons during calendar year 2003. It was estimated that World Crude Steel production would exceed 1,000 million metric tons during calendar year 2004. China's contribution to World Crude Steel production and consumption since calendar year 2001 is detailed in Table 3-1.

Table 3-1: China's contribution to World Crude Steel production and consumption

	Production (%)	Consumption (%)
CY 2001	17.6	22.2
CY2002	20.1	25.8
CY2003	22.8	27.2

There are therefore two main reasons for the development of a new iron ore mine. Firstly, in order for Assmang to replace Beeshoek Mine and utilize their available iron ore deposits, the BKM mine development is essential. Secondly, the development of a new iron ore mine will ensure that South Africa contributes to the growing demand in the World Crude Steel market. The BKM Mine will come into place to ramp up to approximately 16 tons / annum.

3.2 Product Market

The iron ore product will be produced for international markets. The production and sale of iron ore products will ensure a constant inflow of foreign capital into South Africa and into the project region.

The geographic market is a global one, with the major markets being China and Japan. The products are sold throughout the world and prices are set on a global level. It is sold under long-term contracts or on the metal market.

BKM Mine will export approximately 16 million tons / annum through the port of Saldanha via the Orex railway line.

3.3 Capital Expenditure

Assmang will invest R 4 264.9 million in the BKM Mine; this comprises of the feasibility drilling and evaluation, mining, plant, infrastructure and equipment, as well as rehabilitation / closure.

3.4 Total Annual Expenditure

In addition to the capital development cost stated above (Section 3.3), the following annual expenditure has been invested into the BKM Mine Project:

- Assmang invested R 4 697 529 into the prospecting activities during 2003 / 2004 of the BKM Mine and provided a further R 20 000 for rehabilitation of the prospecting site.
- R 12 277 000 was spent on exploration drilling, core logging, orthophotography and gravity surveys on the farms Bruce-King Mokaning and McCarthy between August 1994 and June 2004. Infill, geotechnical and infrastructure drilling was completed in January 2005 at an additional cost of R 2 600 000.
- A further amount of R 3 098 000 was spent on metallurgical test work on cores in Germany during 2003. A further R 2 000 000 is currently being spent on additional test work in Germany, USA and South Africa.
- In total, R 22 975 000 was spent on evaluating the northern iron ore resources by January 2005.

In total, R 24 692 529 was spent on evaluating the northern iron ore resources by January 2005.

3.5 Labour Force

3.5.1 Employment

At the end of Phase 1 (2012), the workforce of BKM Mine will consist of 594 employees. By 2016 (Phase 2), it will consist of 784 employees.

3.5.1.1 Employment Demographics and Composition

Assmang's recruitment policy gives preference to members of local communities. The ideal target is to achieve a local content of some 60%. The remainder typically represent workers with scarce strategic skills who may be recruited from all over South Africa.

This preferential local recruitment policy will be continued at the BKM mine. Consequently, it is expected that the geographic origins of the BKM workforce will reflect the following three categories:

- Employees transferred from Beeshoek, currently residing in the Postmasburg area. This category will constitute the largest proportion of the workforce;
- Employees recruited from the Kathu/Olifantshoek area; and
- Individuals with scarce skills recruited from elsewhere in South Africa.

The exact % of the workforce that will be drawn from other areas in South Africa will depend on the skills requirements of BKM Mine and on the local availability of these skills.

The preferential local recruitment policy of the Assmang Group reflects its commitment to local economic development.

As a result of its policy of local recruitment preference, Assmang Group employs few foreign migrants or even emigrants from other regions in South Africa. This is currently the case at Beeshoek, and is also anticipated to be the case at the BKM mine.

Refer to Table 3-2 (page 3-4) for the proposed BKM Mine staffing requirements.

Table 3-2: BKM staffing requirement summary

SUMMARY				1	2	3	4	5	6	7	8	9	10	11	12	13	14	1
Year		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	20
Senior Management																		
General Mine Manager	EU		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Manager Production	EL	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Manager Engineering	EL	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Manager Financial	EL		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Manager HR	EL		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
ager Sustainable Development	EL		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Manager Metallurgy	EL	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Total Senior Management		3	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
Business Unit/Department																		
Snr Management		3	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
Engineering			21	52	52	52	52	52	59	59	59	59	59	59	59	59	59	5
Admin		1	33	40	40	40	40	40	46	46	46	46	46	46	46	46	46	4
Human Resources		1	25	26	30	30	30	30	30	30	30	30	30	30	30	30	30	3
Mining			67	143	144	192	188	211	312	325	340	340	394	403	403	390	436	43
Sustainable Development		2	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	1
Metallurgy			35	138	148	148	148	169	205	205	205	205	205	205	205	205	205	20
Total Mine		7	198	416	431	479	475	519	669	682	697	697	751	760	760	747	793	79
Contract Labour			29	75	75	75	75	75	87	87	87	87	87	87	87	87	87	8
TOTAL		7	227	491	506	554	550	594	756	769	784	784	838	847	847	834	880	88
BKM SUMMARY BY GRADE																		
JOB CATEGORIES	Grade																	
General Manager	EU		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Managers	EL	3	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Co-ordinators	DU	3	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18
Superintendents	DL	1	25	32	32	32	32	32	36	36	36	36	36	36	36	36	36	36
Supervisors	CU		36	76	76	76	76	82	98	98	98	98	98	98	98	98	98	98

SUMMARY				1	23	24	25	26	27	28	29	30
Year		2006	2007	2008	2030	2031	2032	2033	2034	2035	2036	2037
Controller/Snr Operator/	CL		60	115	373	365	355	282	242	61	59	35
Operators	BU		36	100	174	174	162	148	136	97	90	39
Assistants	BL		13	65	113	113	113	109	107	75	69	31
Assistants	A		3	3	3	3						
Contractors			29	75	87	87	87	87	87	87	87	87
TOTAL		7	227	491	909	901	876	775	718	435	408	268

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Specific care will be taken to ensure that the composition of the BKM workforce (particularly with respect to the HDSA representation in senior positions and women in mining operations) will reflect the South African society.

The Assmang Group has already introduced and implemented the following strategies and actions to achieve equity targets as reflected in the Mining Charter as well as to transform the organization:

- Skills Profile Audit amongst all employees
- Career progression Plans per Department
- Appointment of mentors for all accelerated development candidates
- Implementation of a stakeholder-inclusive Equity/Training and Development Committee to watchdog and monitor affirmative action orientated accelerated development.

Assmang Group has already appointed women in the hard-core business production units such as heavy vehicle operators, samplers, instrumentation mechanics, etc. Assmang Group has also taken a policy decision to increase the focus on women bursary holders and learnership intakes. These practices will be continued at the new BKM Mine.

Assmang Group has adopted a policy focusing on achieving the 40 % HDSA participation in management. The Equity Manager at BKM Mine will be the appointed watchdog in the recruitment process to optimise HDSA appointments in vacancies, and to ensure the optimal utilization of the principles of suitably qualified, recognition of prior learning etc, in recruitment.

Even though the Assmang Group has implemented a focussed process to promote affirmative action, it must be noted that Assmang is still experiencing difficulties in attracting suitably qualified HDSAs to apply for vacancies. The result is that Assmang will have to rely heavily on its long-term internal accelerated development process and pool, as well as on its internal affirmative action orientated bursary and learnership systems to achieve Mining Charter targets.

Assmang's recruitment policy gives preference to members of local communities. The ideal target is to achieve a local content of some 60%. The remainder typically represent workers with scarce strategic skills who may be recruited from all over South Africa.

This preferential local recruitment policy will be continued at the BKM mine. Consequently, it is expected that the geographic origins of the BKM workforce will reflect the following three categories:

- Employees transferred from Beeshoek, currently residing in the Postmasburg area. This category will constitute the largest proportion of the workforce;
- Employees recruited from the Kathu/Olifantshoek area; and
- Individuals with scarce skills recruited from elsewhere in South Africa.

The exact % of the workforce that will be drawn from other areas in South Africa will depend on the skills requirements of BKM Mine and on the local availability of these skills.

The preferential local recruitment policy of the Assmang Group reflects its commitment to local economic development.

3.5.1.2 Skills Requirements

The biggest challenge regarding the future human resources strategy of BKM Mine will be to ensure the proactive and timely availability of appropriate operational skills and competencies for the new mine. For a specific period in the transition phase, additional jobs utilising contract labour may be created as a temporary measure while incumbents are either developed or recruited to assume permanent positions.

A Human Resources Development Programme (HRD) will therefore be founded on the formulation, development and implementation of plans to identify, train, assess and develop and appoint employees into positions that are commensurate with their skills, knowledge and competence profile as determined by the operational plan.

Some of BKM Mine's workforce will be drawn from Beeshoek's current employees. The number of 191 has been estimated as a consequence of having undertaken a process of scenario planning as well as on the basis that the education profile at BKM Mine will be of higher qualifications and technical skills (primarily for new recruits). This shift will be necessitated by the fact that the new mine will rely more heavily on automation, therefore requiring a more highly skilled workforce. It has not yet been confirmed which of the current Beeshoek employees will be amongst the 191. Before the screening processes can commence, the jobs/skills required at BKM will need to be:

- Scoped and profiled (job specification and performance proxies); and
- Graded in line with Assmang's Remuneration Framework (2005/6). Further, as BKM is scheduled to commence construction in 2006, at a time when Beeshoek is envisaged to have commenced downsizing its scale of operations to about a third of its current production, it is not possible to confirm BKM's skills requirements and Skills Development Plan in detail.

BKM Mine therefore undertakes, upon the transfer of incumbents from Beeshoek and or completion of the BKM recruitment/placement processes, to:

- Conduct a Skills Audit and complete Form Q for submission to the DME;
- To establish the baseline in terms of 'current skills' Vs 'future skills' needs;
- To develop the respective skills development plans with timeframes assigned, for submission to the DME and MQA i.e. WPSP, ABET; Learnerships etc. and
- To implement such plans having communicated them to all stakeholders.

BKM will endeavour to adhere to relevant legislation wherein all systems and processes employed will be customised where appropriate to be aligned to the strategic imperatives of the operation.

Information regarding the estimated number and educational levels of BKM employees will therefore be provided in Form Q format upon the completion of the transfer of employees from Beeshoek Mine and or BKM recruitment and placement processes.

At the end of Phase 1 (2012), the workforce of BKM Mine will consist of 594 employees. By 2016 (Phase 2), it will consist of 784 employees. All plans will be based on operational plans and business case scenarios relating to the period 2006 to 2010 (5-year).

3.5.1.3 Procurement

Assmang, in close collaboration with Kumba Resources, through the Northern Cape Mine Managers Association, initiated a groundbreaking initiative in this regard amongst Northern Cape Mines, thereby taking the lead in South Africa to transform and activate BEE Procurement transformation. This initiative with a dedicated consultant appointed to drive the initiative, resulted in the aforementioned BEE transformation policy.

Assmang will also require all its long-term contractors to conform to this BEE Procurement Policy. One of the main pillars of the Assmang Group BEE transformation Policy is to encourage existing suppliers and contractors to transform internally, or to form partnerships with HDSAs who are not yet available or capable of providing an appropriate service.

The Assmang Group, through its Equity Manager, Equity and Skills Development Committee and Skills Development Facilitator, will constantly monitor the BEE, skills development and general transformation progress among its long-term contractors. Formal annual audits will be conducted on all long-term contractors regarding compliance

and progress with regard to the Basic Conditions of Employment Act, Equity legislation, Skills Development legislation, Mining Charter Scorecard requirements and BEE transformation.

3.5.1.4 40% HDSA participation in management and 10% participation of women in mining

The HDSA participation in management will have exceeded the 40% target set in terms of compliance requirements of the Mining Charter/Scorecard. Further, the participation of women in mining, in particular women HDSA origin, will have been around 25%. From the Labour Forecast and EE Baseline data, BKM's EE Plan has been determined. The table below details the numerical targets and resultant %s. From Patterson E to D- Band, a total of 24 HDSA incumbents (designated groups, excluding 'White Women' will have been recruited or have been internally developed from 2006 to 2010. This relates to 24 out of a Complement of 56 incumbents, which equals 34% being HDSA Males and 11% being HDSA Females. This totals 45% HDSA in Management by 2010. Further, the internal feedstock pool comprises 68% HDSA Males and 32% HDSA Females in support of achieving the said numerical targets.

Table 3-3: BKM Mine's employment equity plan (2006 to 2010)

Patterson Grade	2006		2007		2008		2009		2010		Target		
	M	F	M	F	M	F	M	F	M	F	Comp/ Actual	M	F
EL	1		2								6	2	
DU	1		3	1							14	3	1
DL			9	4			3	1			26	12	5
CU			15	6	25	12					76	40	18
CL			21	8	43	15			54	33	156	118	56
Future Feedstock			36	14	68	27			54	33	232	158	74
%HDSA of Pool	**Internal Feedstock to support EE Plan (CL & CU)**										232	68%	32%
D Band & above	**Target of 40% HDSA in Management**										56	34%	11%

Even though the Assmang Group has implemented a focussed process to progress its HDSA representation in Management, it must be noted that it still experiences difficulties

in attracting suitably qualified HDSA's to apply for vacancies due to a host of factors i.e. rural positioning of the operations etc. The result is that Assmang will have to rely heavily on its long-term internal accelerated development process and pool from the lower Patterson Bands (CL and CU), as well as on bursary and learnership systems to achieve these targets.

3.6 Human Resources Policy

Housing – Permanent staff

Assmang's policy is to not become directly involved in the provision of housing or housing benefits for employees. Housing is included as an element within the remuneration package and the employees then provide their own housing.

Housing – Construction phase

Discussions are underway with the Gamagara Municipality regarding the possible establishment of a construction camp in the Kathu area (i.e. Sesheng), should this be required.

Medical facilities – Permanent staff

A medical clinic in Kathu will be utilized if required. Medical facilities will further be established at the Plant with sub-stations at the Bruce and King opencast operations.

Medical facilities – Construction phase

A medical clinic in Kathu will be utilized if required. Medical facilities will further be established at the Plant with sub-stations at the Bruce and King opencast operations.

Change houses – Permanent staff

Employees are to be provided with change houses and washing facilities for their working clothes.

Change houses – Construction phase

Contractors are required to ensure provision of temporary facilities.

Transport – Permanent

BKM Mine will provide a public transport facility (i.e. busses etc.) that would transport employees from the surrounding towns (i.e. Postmasburg, Olifantshoek, Kathu) to the mine. The utilization thereof (i.e. bus fairs) will however remain the responsibility of the employees.

Transport – Construction phase

Contractors are required to make provision for their own transportation.

Recruitment policy – Permanent

Assmang's final labour composition, and skills available in the area, will determine the number of people the mine shall be able to recruit locally.

The emphasis will be on the employment from immediate surrounding areas. Skills required will be the driving force in terms of Assmang's recruitment.

A minimum education level of Grade 12 is envisaged at this time to ensure better training and development and adaptability in future developments on the mine.

Recruitment policy – Contractors

Where possible, Assmang will endeavour to employ local labour during the construction phase.

Safety

Employees will undergo stringent safety training on procedures.

Much attention will be given to supervision and direction in reducing workplace accidents, fatalities and occupational health and hygiene related incidents through the application of regular measurement against legislated or regulatory requirement, reviews of accidents and current industry and international best practices.

Training and Development

The philosophy is to undertake training in-house as well as outsource where required. A training clause will be incorporated in all purchase agreements regarding machinery and equipment, whereby the manufacturer must provide training to the users and / or maintainers of such equipment and machinery, before, at time of purchase and / or afterwards as an ongoing arrangement.

Provision is to be made for training facilities for basic training such as induction and safety training.

Beeshoek Mine has provided the following facilities to all people in the area:

- Employment programmes
- Competency learning
- Life skills training
- Computers in order to increase their skills.

These facilities will be continued at the BKM Mine.

Outsourcing of labour / non-core activities

The outsourcing of non-core labour is envisaged in the following areas:

- Security services,
- All cleaning occupations,
- Garden services and general maintenance, etc

Certain highly skilled labour not needed on a full time basis may also be outsourced to meet short-term requirements.

Assmang Investments in the Community

The main aim of the Group's community investment activities is to empower people by providing them with the skills and business know-how that will allow them to build their own future and participate in the renaissance of Africa.

Assmang annually commits one percent of its pre-tax profit to community investment programmes.

The challenge in Africa is to channel resources where they are urgently needed in education, work creation, income generation and welfare, while at the same time make a useful contribution to the many needs created by the scourge of HIV/AIDS.

To meet this challenge, the Group supports initiatives that address as many of these needs as possible.

Assmang's community investment initiatives continue with successful joint venture projects in close collaboration with Regional and Local Government, local community leadership and other mining companies operating in the area. Community investment initiatives are also specifically focussed on the remote rural areas in which the Company operates, where much needed networking, community empowerment and upliftment continues to be addressed. The community investment philosophy and approach has also been revised in order to align community investment to a series of human resources development legislations and to optimally align community investment with the core business strategy of Assmang.

In keeping with the ARM Group policy of being a good corporate citizen within the communities within which it operates, provision is made to contribute to social investment funding once the initial investment is recovered.

Assmang will endeavour to employ from within the local communities and will make provision for training where practical. The salaries earned through local employment and

those paid to skilled people brought into the area will have multiplier effects within these communities.

Assmang envisages that its social investment funds may either be used to establish services within the areas surrounding its properties, or may contribute to social investment through other structures.

Medical provision

Medical costs will be incorporated in the remuneration structure and all employees, as a condition of employment will belong to a company medical scheme. The preferred scheme is still to be identified.

HIV / Aids

Assmang has a policy and strategy regarding HIV / Aids. This policy and strategy has been adopted for BKM Mine.

Each operation has devised a comprehensive strategy to control the impact of the disease on its operations and on its global competitiveness, and to provide humanitarian support to its employees and their families.

Participation in initiatives to address HIV /AIDS is ongoing. Current policies include, inter alia, the education of the work force in terms of HIV / AIDS by way of an extensive education programme. This programme has also been taken to schools and other institutions within the rural areas of the operating divisions. Regular surveys are conducted to measure changing perspectives towards, HIV /AIDS and voluntary peer education takes place.

In addition, the Group continues to work closely with organisations collaborating with the Centre for International Health at Boston University. Risk and prevalence surveys at various Group operations have been conducted and have provided the Group with a statistically viable measurement of the HIV / AIDS prevalence stratified into age, job skill, division and area categories. They have also provided a baseline for assessing any future growth of the epidemic and the effectiveness of future HIV / AIDS prevention efforts.

Remuneration and Conditions of Employment (COE)

The remuneration structure is based on a flex package with benefits such as:

- Medical
- Housing
- Travelling

- Leave
- Pension
- Car allowance
- Death and Ill health insurance, etc.
- Retirement / provident funds.

Industrial Relations

Organized labour is extremely active in the Postmasburg and Kathu area and union activity on the mine is envisaged.

Sustainable Development

Assmang's sustainable development mission is to convert mineral wealth into income and other forms of sustainable capital to the mutual benefit of shareholders, employees, local communities and other interested and affected parties / stakeholders where applicable.

The five primary pillars of sustainable development are safety, health (occupational), the environment, social and community investment, and HIV / AIDS. The key premise of sustainable development is the Group's ability to convert the raw ore that is mined (natural resource capital) into sustained shareholder income as well as new forms of capital such as economic, social and human capital, all of which are essential requirements for sustainable development to succeed.

3.7 Environmental Awareness

3.7.1 Introduction

In order for Assmang to improve the interfacing of a collection of well-established disciplines, among others Safety, Health, Environment, Other Business Risks and Quality (SHERQ) with business activities, Assmang has adopted an integrated business process approach which is based on the ISO9001:2000 standard. The objective of this approach is the integration of the Safety, Health, Environment, Other Business Risks and Quality Management Systems into a single integrated, coordinated SHERQ Management System that is interfaced with the business processes. A further reason for the integration of the various disciplines was that the International Standards ISO 9001:2000 (Quality Management System) and ISO14001:1996 (Environmental Management System) share

common management principles. The OHSAS 18001:2000 has further been developed to be compatible with ISO 9001:2000 and ISO 14001:1996.

The SHERQ processes encompass a full spectrum of associated legal requirements and deliver on these requirements through the services of the SHERQ department that includes a clinic.

By adopting the integrated SHERG Management System, Assmang is therefore committed to:

- Manage solid, liquid and gaseous waste responsibly;
- Rehabilitate all degraded areas in line with the approved EMPR;
- Manage the entire area under its control in terms of sound ecological practices;
- Reduce wasteful use of natural resources;
- Prevent inappropriate / ineffective application of human resources;
- Provide a work environment, facilities, equipment, products and services that improve safety and health performance;
- Manage hazardous substances and dangerous goods effectively / efficiently within the parameters of the law;
- Effective management practice that maintains the integrity of systems, infrastructure and related information, ensures competence and awareness of personnel and availability of resources that support this policy;
- Measure the effectiveness of the SHERQ management system, health and safety performance and exposure as well as internal and external customer satisfaction;
- Consistently deliver products and services that satisfy internal and external customer requirements in a cost effective manner;
- Optimise the supply chain and outsource partners through development and control;
- Continuously grow profit margins and improve the efficiency and productivity of the operation;
- Continuously monitor its business and operational risks and to adjust where possible or to inform the Assmang board of such risks which cannot be controlled by the operation;
- Communicate this policy statement to internal stakeholders and to make sure that they understand the policy statement; and

- Make it available to external stakeholders on request: (communication procedure).

Success of the SHERQms is a key performance area for the mine.

3.7.2 Awareness Plan

Assmang has an integrated awareness plan (encompassing safety, health, environment, risk and quality issues) in place, as part of its Safety, Health, Environment, Risk and Quality Management System.

The objectives of the SHERQ awareness plan are to:

- Explain to the Assmang employees how the SHERQ policy and objectives are compiled,
- Communicate the SHERQ policy and objectives to all employees with the intent that employees are made aware of their individual SHERQ obligations and that they understand the SHERQ policy and objectives,
- Explain to the employees what the roles and responsibilities of management, appointed SHERQ Management Representatives and all employees are towards the SHERQ Management System,

The plan consists of the following:

- Procedure for SHERQ Risk Assessment and Management,
- Procedure for SHERQ Accident, Non-conformance risk investigations and corrective- and preventive action implementation,
- Procedure for emergency preparedness and response,
- Procedure for communication and consultation,
- Procedure for waste management,
- Procedure for monitoring and measuring,
- Procedure for control of document,
- Procedure for record control.
- The following sections briefly describe the procedures for integrated awareness on Assmang's Mine.

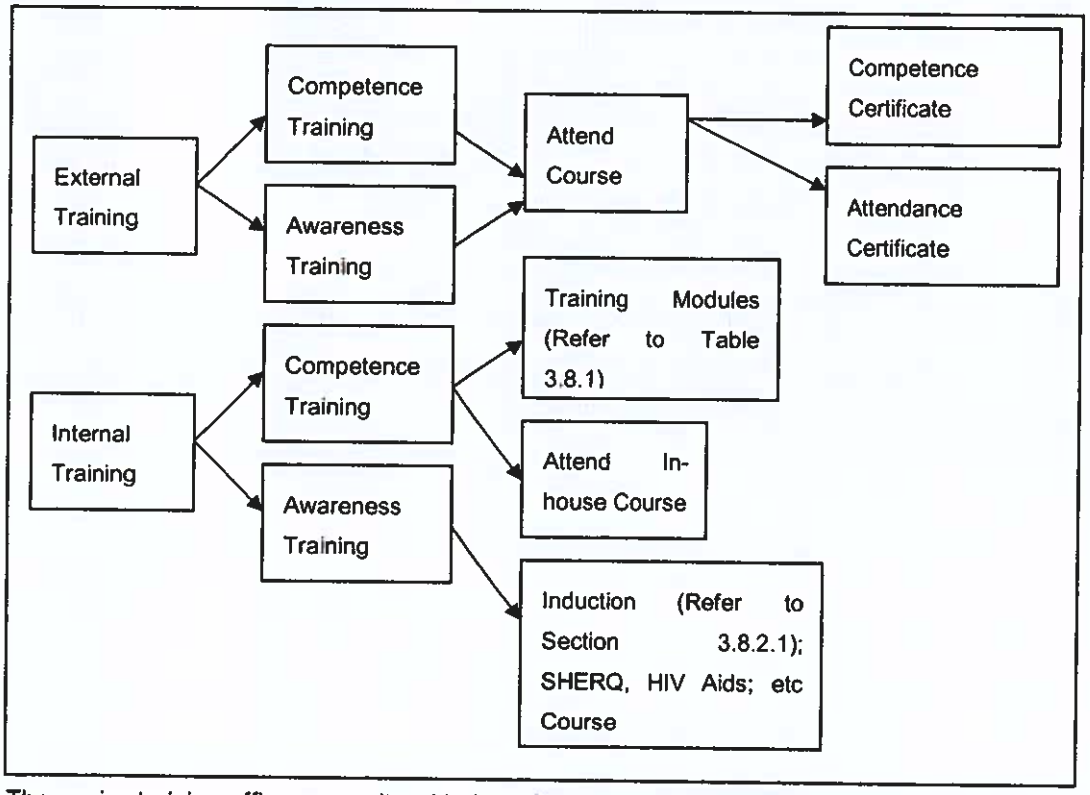
3.7.2.1 Induction

Environmental issues related to the operation are addressed in induction sessions. All environmental impacts and their remedial measures are discussed, explained and communicated to employees. The induction sessions are modified according to the level of employee attending the induction session, so that all employees gain a suitable understanding of environmental issues and pollution.

3.7.2.2 SHERQ Training

Assmang has developed a procedure for training, which involves attending internal and external training sessions. The procedure is indicated in Table 3-4.

Table 3-4: SHERG training procedure



The senior training officer consults with the relevant department managers; at which time the training needs for individual tasks are determined. Tasks are divided into various modules (Refer to Table 3-5 – page 3-18), with each module accompanied by a training schedule. An employee is provided with a training manual for the specific module in which he / she is employed.

Table 3-5: General training modules implemented by Assmang

Apt's (Area Process Training)		Process Technology Module
Primary Crusher	Primary Crusher	PT 1 Units and Mass
Tertiary Crusher	Shunting	PT 2 Quality Principals
Washing & Screening	Sample Tower	PT 3 Temperature
Mid South Plant	Fines Loading	PT 4 Heat
Lumpy & Scaw / DRI's Loading	Mining	PT 5 Mechanical Pressure
Scalping of Scaw / DRI's and		PT 6 Sampling Principals
Slurry Section		PT 7 Quality Assurance
Component Modules		PT 8 Inspection
Primary Crusher	Lumpy & Scaw / DRI's	PT 9 Pressure Temperature & Heat
Secondary Crusher	Fines Loading	PT 10 Work, energy and power
Tertiary Crusher	Sample Tower	PT 11 Pressure in Liquids
Washing & Screening		PT 12 Fluid flow Theory
Primary Crusher Mid South		PT 13 Valves, traps and strainers
Secondary Crusher Mid South	Conveyor belt systems	PT 14 Pumps, fans and blowers
Stockpile Stacker Mid South		PT 15 Hydraulic and Pneumatic Principals
Vibrating Scalping Screen Mid		PT 16 Electrical Fundamentals
Scalping Scaw / DRI's and Fines		PT 17 Electrical Protections
Slurry Section		PT 18 Process control
		PT 19 Instrument fundamentals
Standard Works Procedures		PT 20 Interlocks
Primary Crusher	Vibrating Scalping	PT 21 Chemistry Fundamentals
Secondary Crusher	Lumpy & Scaw / DRI's Loading	PT 22 Acids, Bases & pH
Tertiary Crusher	Fines Loading	PT 23 Chemical & Bonding
Washing & Screening	Sample Tower	PT 24 Solution & Mixtures
Primary Crusher Mid South		PT 25 Process Diagrams
Secondary Crusher Mid South		PT 26 Statistical Process Control

Apt's (Area Process Training)		Process Technology Module
Stockpile Stacker Mid South	Conveyor belt systems	PT 27 Titration
AT Operator Modules	ADHOC	PT 28 Dewatering
AT 1 Primary Crusher	Lubrication	PT 29 Leaching
AT 2 Wash & Screening	Getting To Know The	PT 30 Size Analysis
AT 3 Loading Section	Control System	PT 31 Compressors
	Maintaining a Crusher	PT 32 Transport Systems
Metallurgical Modules		Instrumentation Modules
MET 01 Strategic Management	PLC & Network	PLC & Network Modules
MET 02 The Ore Mining Process	Scada Module	Scada Module
MET 03 The Beneficiation	Introduction to basic	Introduction to basic PLC
MET 04 On - Site Stockpiling		

3.7.2.3 General Training and Skills Development

Human Resources Development Programmes include appropriate training and skills development programmes as required by the workforce in support of operation specific business plans (both mining and non-mining related). Training is offered in portable skills, being competencies that will enable employees to find jobs elsewhere within the mining industry, or to become self-employed.

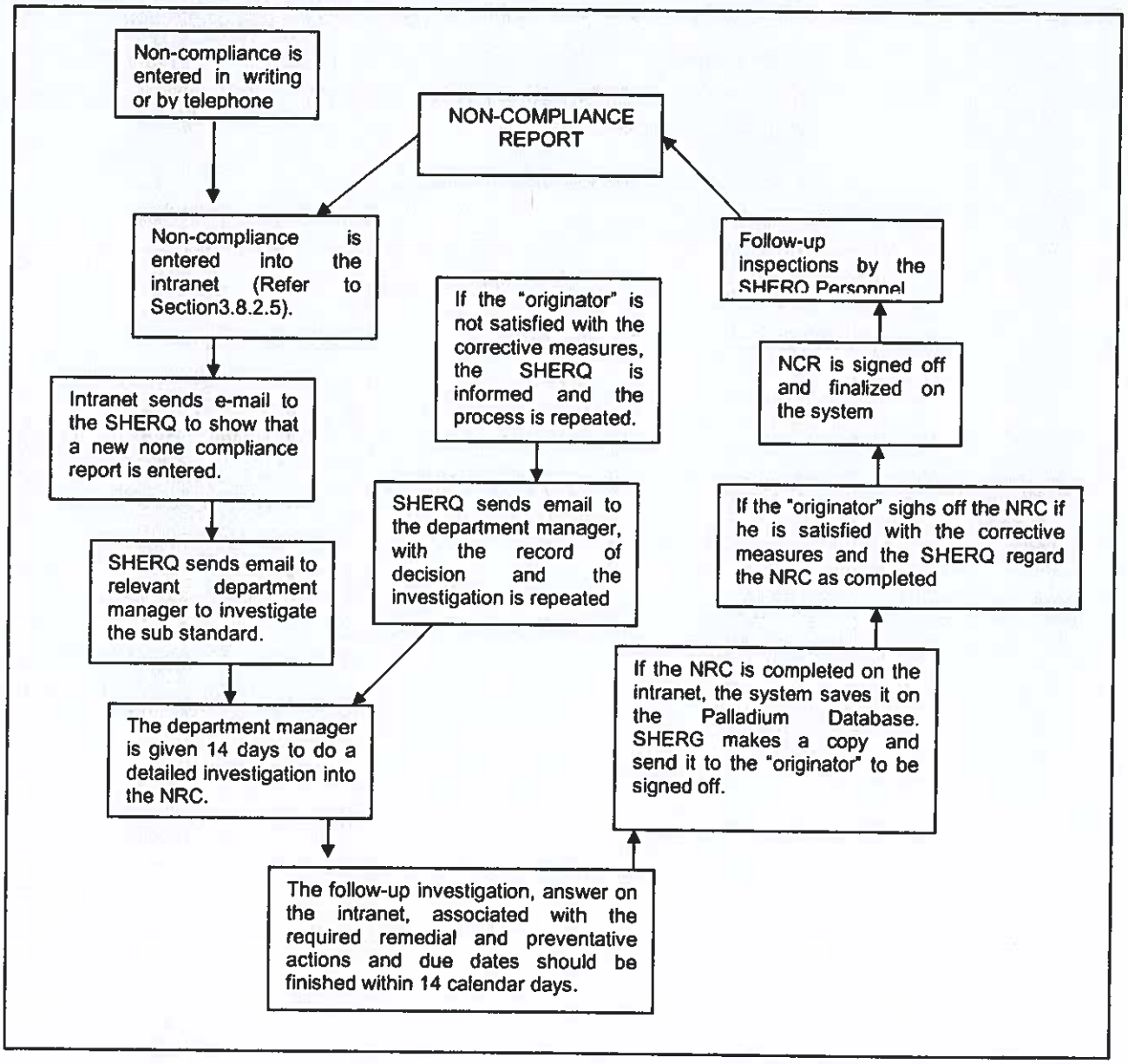
Assmang has developed a monthly internal training schedule, which is called Indaba. The Indaba serves to inform the employees of relevant topics associated to their working environment. The supervisor or department management organizes the Indaba topic discussion. Basic environmental and pollution control skill are included in this training.

3.7.2.4 Incident Reporting Structure

Environmental incident reporting is a vital part of communication for the Environmental Department at the current Beeshoek Mine, and will form a further vital role at the new BKM Mine. Employees are required to report any and all environmentally related problems, incidents and pollution, so that the appropriate remedial action can be implemented timeously.

In the event of an Environmental Incident the reporting procedure as indicated in the Table 3-6 should be followed.

Table 3-6: Incident reporting structure



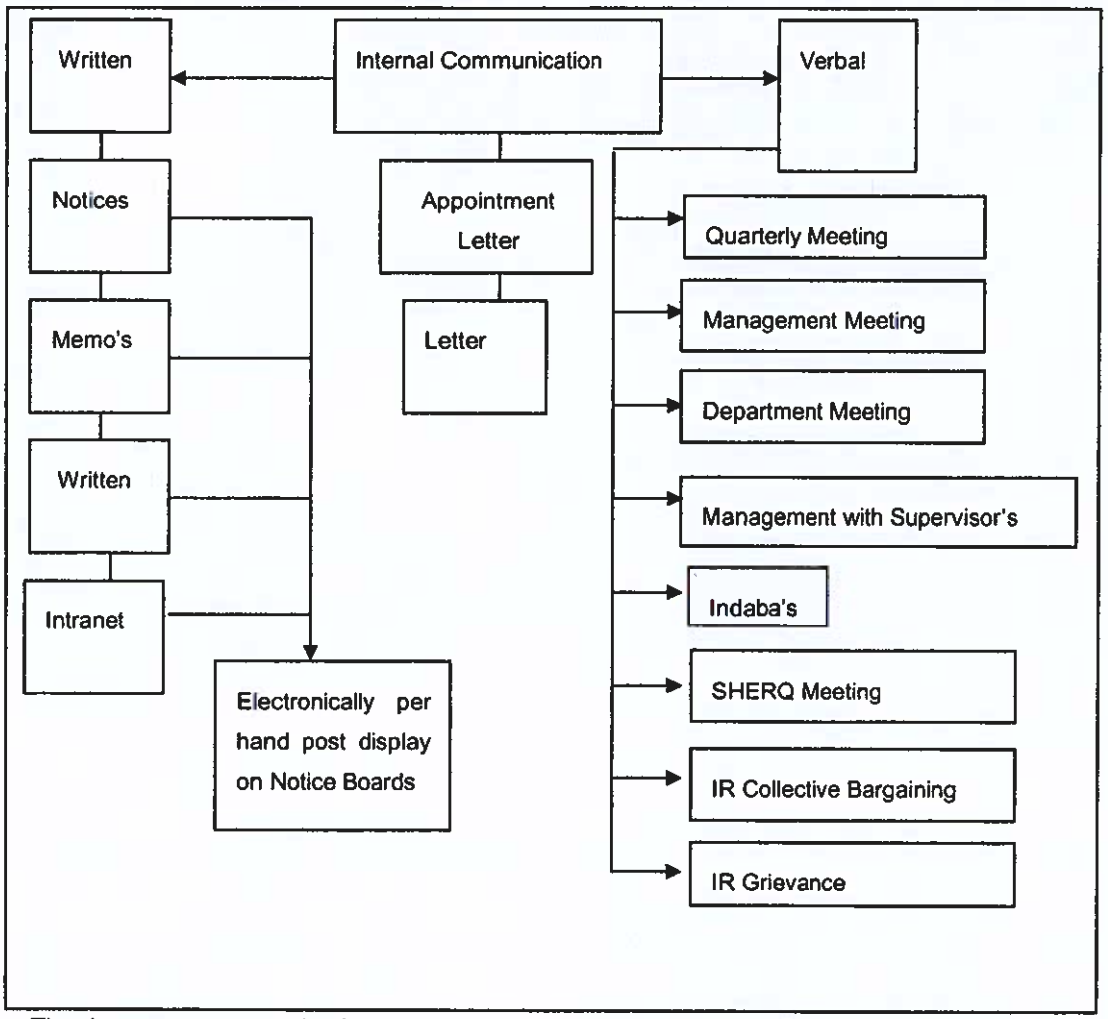
3.7.2.5 Internal communication strategy

Communication is a management responsibility. All line supervisors are responsible for effective communication within their own sections. Environmental communication can be divided into four main categories, which include: internal communication, external

communication, communication and consultation on SHERQ related issues and communication of SHERQ related issues by means of reports to stakeholders.

Assmang Management has established and is maintaining procedures for the internal communication between the various levels and functions of the organisation, and receiving, documenting and responding to relevant communication from external interested & affected parties. Employees may communicate issues and concerns either by writing or verbally. The communication procedure involves the following media and channels (Refer to Table 3-7).

Table 3-7: Internal communication strategy



The Assmang communication strategy is based on a behavioural approach. Due to the environmental awareness generated by induction, on the job training etc, employees are able to identify environmental problems, issues, concerns and pollution timeously.

Internal communication is further enhanced on the mine by the distribution of the Sibilo newspaper, which is distributed quarterly to inform employees of the current SHERQ status and any new developments regarding Assmang.

Weekly notices of any new developments and relevant information is also distributed to employees.

The following records are kept to ensure that all communication is effectively stored:

- E-mail:

E-mail communication received must be stored, with replies, in an appropriate folder on a server. E-mail messages, relevant to environmental management system, should be kept for a minimum of two years before deletion.

- Mail:

Correspondence received by mail must be filed, along with the response (where relevant), within the Environmental Departments filing system for a minimum period of 2 years. Paper correspondence will be archived in this department.

- Telephone:

A register of telephonic environmental queries should be kept by the Environmental Department detailing caller, date, query, action taken and response. Furthermore, the person answering the call will be responsible for logging their particulars against the call, as well as ensuring that all communication that leads to an aspect or an impact, is entered on the EMS database.

- Storage of Correspondence:

All original correspondence must be retained by the BKM Mine Environmental Manager for a minimum period of two years.

- Environmental Reports:

Copies of relevant specialist study reports and Environmental Impact Assessments will be available on request from the Environmental Manager.

- Queries from Interested and Affected Parties:

Response to queries about environmental impacts and aspects will be addressed by the Environmental Department, and approved by the Environmental Manager.

- Queries and requests from the media:

Requests for articles from the media on environmental issues at BKM will be co-ordinated by the HR Manager, with input from the Environmental Department, as approved by the General Manager, in line with Assmang Communication Strategy.

3.7.2.6 External communication strategy

- Environmental Steering Committees

Environmental Steering committees work to increase awareness in the community regarding environmental constraints and opportunities. At corporate level, this includes providing support for NGOs involved with specific environmental awareness programmes. Assmang has initiated an environmental focus meeting, which includes representatives from Sishen Mine.

- Forums

Beeshoek Mine has established the Tsantsabane Forum, which is attended by various people within the Tsantsabane Municipality. A complete procedure for liaison is made available to all employees. Communication from external interested and affected parties may be received by e-mail, fax, telephonically or by mail. During these forum meetings the public / stakeholders are presented with the opportunity to raise concerns, which are addressed, documented and filed.

In order to reach the bigger population of the Gamagara Municipality, in which the BKM Mine falls, a Future Forum was established. The future forum has various unions involved; people from the Tsantsabane and Gamagara Municipalities are invited to attend these meetings, at which time they are presented with the opportunity to raise their issues and concerns. This forum will continue to operate during the operation of BKM Mine.

3.7.3 Multiplier Effect

The average household size of the area is approximately 4 persons per household. Multiplied by the number of direct and indirect employment opportunities created at BKM and lost at Beeshoek, this figure translates into direct or indirect financial benefits for about 2 332 people.

The analysis below is premised on the assumption that expenditure and labour, consumables, capital goods and services at BKM Mine will be similar to the current expenditure at Beeshoek.

The current total wage bill of Beeshoek Mine is in the order of R80 million per annum. Its total annual expenditure on consumables, capital goods and services is summarised in Table 3-8 .

As these figures show, the mine provides an annual financial injection of R82 million into the local economy, of which just over R2 million is directed at BEE companies. This is in addition to the annual wage bill of R80 million. Furthermore, the mine provides an annual financial injection of R172 million into the regional economy, of which just over half a million is directed at BEE companies.

If it is assumed that similar expenditure trends will be continued at the new BKM mine, the figures indicate that the annual local and regional expenditure of BKM mine will be equivalent to roughly 1.5% of the Gross Geographic Product (GGP) of the Northern Cape Province, if not slightly more.

Table 3-8: Annual expenditure on consumables, capital goods and services at Beeshoek Mine

		Expenditure:				
		Local	**Regional**	**Provincial**	**National**	**Inter-national**
Consumables	Annual expenditure	R 5,079,649	R 69,815,767	R 947,237	R 64,491,822	R 0
	% directed to BEE companies	16,23%	82,70%	13,08%	12,45%	-
Capital	Annual expenditure	R 0	R 2,065,971	R 539,613	R 6,747,236	R 0
	% directed to BEE companies	0%	50,36%	0%	0%	-
Services	Annual expenditure	R 77,173,223	R 100,669,955	R 132,483,142	R 30,966,898	R 0
	% directed to BEE companies	2,38%	2,15%	1,36%	82,89%	-
	Total	R 82,252,872	R 172,551,693	R 133,969,992	R 102,205,956	
Directed to BEE companies		R 2,661,150	R 609,425	R 19,257	R 336,977	

3.8 Consideration of Project Alternatives

3.8.1 Mining Method

Detailed optimisation studies were undertaken after the ore reserves were determined using 3-dimensional algorithmic calculations. These calculations provided the mining cost, process cost, and timeframes etc., which in turn give rise to the best mining layout.

The northern iron ore deposits on the farms Bruce, King and Mokaning are relatively shallow lending them to economical opencast mining. No other mining methods (i.e. underground mining) were considered due to the shallowness of the ore body. Should underground mining methods be considered these will result in an extensive loss in reserves as indicated during the optimisation phase (shallow ore reserves not being mined optimally), which will in turn result in a much higher operational cost and lower profit margin. Underground operations will also hold a much higher health and safety risk due to the shallow ore reserves present than that of opencast mining.

A proportion of the overburden (Refer to Section 4) will be backfilled into the opencast pits, where mining has been completed. Additional overburden will be stockpiled in close proximity to the opencast pits for final rehabilitation.

Blasting cannot be replaced by any other methodology because of the hardness of the overlying material.

The Bruce and King / Mokaning opencast areas will be equipped with processing units consisting of a primary gyratory crusher, scalping screen and the secondary cone crusher. Run-of-mine feed will be reduced from a top size of one metre squared to a crushed product less than 80 mm.

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, which will transport the ore to the processing plants situated away from the mining areas, on the farm Parson.

3.8.2 Mineral Processing Method

Alternative mineral processing methods are not evaluated from the environmental perspective. There will be no smelting or refining on site.

The use of an approved plant for ore beneficiation is the only viable alternative (Refer to Section 4.1.5).

3.8.3 Transport, Water and Power Supply

3.8.3.1 Transport

Trucks were not considered as the main transportation method due to extensive distances from the plant to the various pits and the associated financial and environmental implications. Transportation of ore from the opencast pit to the crushers will however be undertaken by truck transportation. Trucks will dump the excavated iron ore directly into the crushers from where it will be transported via conveyors to the Run-of-Mine Stockpiles situated at the Beneficiation Plant.

The final product will be transported via conveyors to the Export Stockpiles at the Rapid Load Out Facility. Due to the proximity of the Orex Line, which is already transporting Sishen Mine iron ore to the Sishen Port, the final BKM Mine product will be loaded onto train at the Rapid load Out Facility, from where the product will be railed via the Orex Railway Line to the Saldanha Port.

Due to the large scale of the BKM Mining operations and the associated economic implications the utilization of various transportation modes have therefore been considered.

3.8.3.2 Water Supply

Water in the mining area is scarce. Various alternatives have been investigated to establish exactly what water resources are available.

Due to the fact that the BKM Mine area is a water stressed area, with the only river in the surrounding area being the non-perennial Gamagara River, the use of surface water has not been considered as an alternative.

The BKM mining area (i.e. Bruce, King and Mokaning farms) has been dewatered by the adjacent Sishen mining operations; it is therefore unlikely (especially in the early stages

of the mining operation) that groundwater could be supplied from the Bruce area and eastern portion of King. However, it is likely that the western portions of King and the farm Parson have not been dewatered and could be a potential water supplier. Water will therefore be taken from boreholes on the farm Parson for construction and will be utilized as a contingency measure during the operational phase.

Negotiations could be entered into with Sishen and the regional Department of Water Affairs to purchase water form the Sishen's dewatering operation at a lower cost than that charged for the Vaal-Gamagara water. This alternative is however not feasible as Sishen does not have the volumes of water available as required by the BKM Mine and the water available is allocated to other institutions (i.e. Gamagara Municipality and the SEP).

The Vaal Gamagara Pipeline proved to be the most suitable choice of alternative. The line runs reasonably close to the proposed position of the new plant. Beeshoek Mine will pump surplus water into the Pipeline, where it will again be extracted at the BKM Mine. The Vaal Gamagara Pipeline therefore has the capacity to provide a water supply service to the BKM Mine, without impacting on the downstream users.

3.8.3.3 Power Supply

The BKM Mine will require an initial load of 32 MVA to produce 8 million tonnes of product per annum; building up to 16 million tonnes per annum at which time a load of 50 MVA will be required.

Eskom will supply the power to the BKM Mine via two 132 kV power lines. Three power lines (132 kV) will be taken from an existing Eskom Substation near Sishen Mine. The take off point is next to the proposed Bruce MV substation. The pole number identified on site is LD26. Eskom will establish their Auto re-closer and metering point from this pole and extend it towards the Bruce MV substation. The lines will be taken to a proposed Eskom yard, situated at the plant area on the farm Parson. From the Eskom yard, two 22 kV lines will be taken to the Bruce opencast operations and two 22 kV lines will be taken to the King / Mokaning opencast operations. Eskom agreed with the proposed Eskom 22kV and 132kV line crossings by the 22kV line between Bruce and Parson MV substations.

The structure-series Eskom is going to use will be the "Steel mono pole Raptor Friendly" series. The intermediate suspension structure can be self-supporting or guyed structures depending on the landowner and/or environmental preferences.

- Self-supporting intermediate structure

The self-supporting intermediate structure footprint will vary from approximately 1.2 m^2 to a maximum of approximately 12.5 m^2 depending on the soil formation. The visible footprint above ground for all conditions will be 1.2m^2.

- The guyed intermediate structure

The guyed intermediate structure footprint varies from 0.81 m^2, minimum to a maximum of approximately 10.9 m^2 depending on the soil formation. The visible footprint above ground for all conditions will be 0.81 m^2. The structure will be guyed with four diagonally positioned stays, maximum 15,5 m from the structure.

Refer to Figure 3-1 and Figure 3-2 (page 3-29).

The angle strain structures will be mono steel pole guyed structure with maximum seven stays per structure.

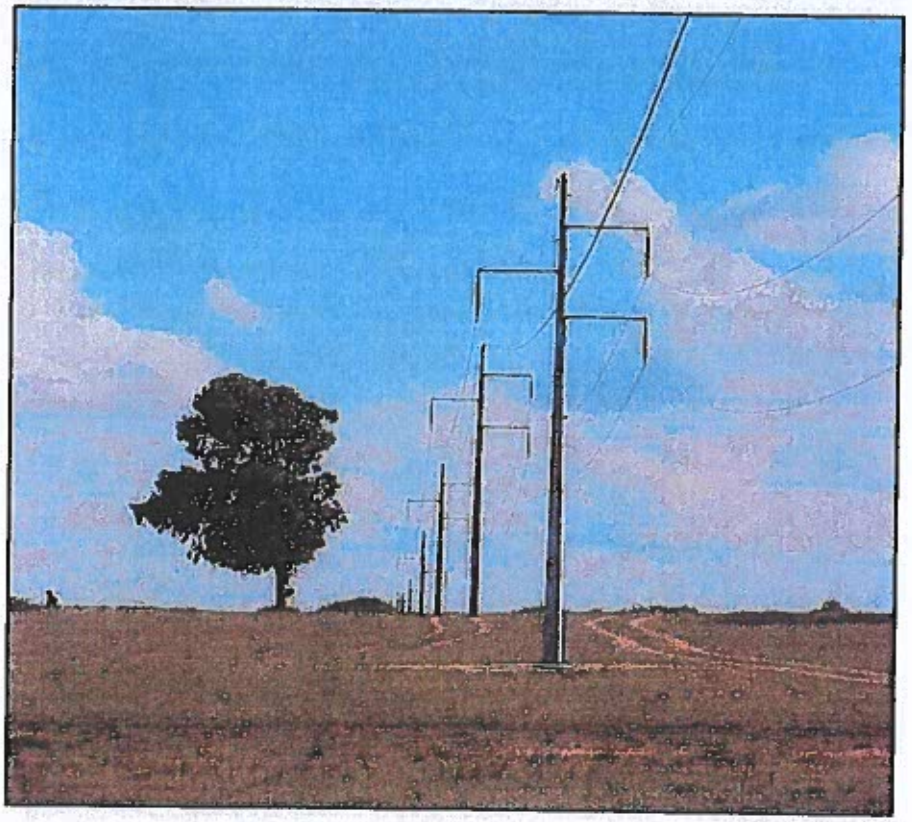


Figure 3-1: Typical single steel structure

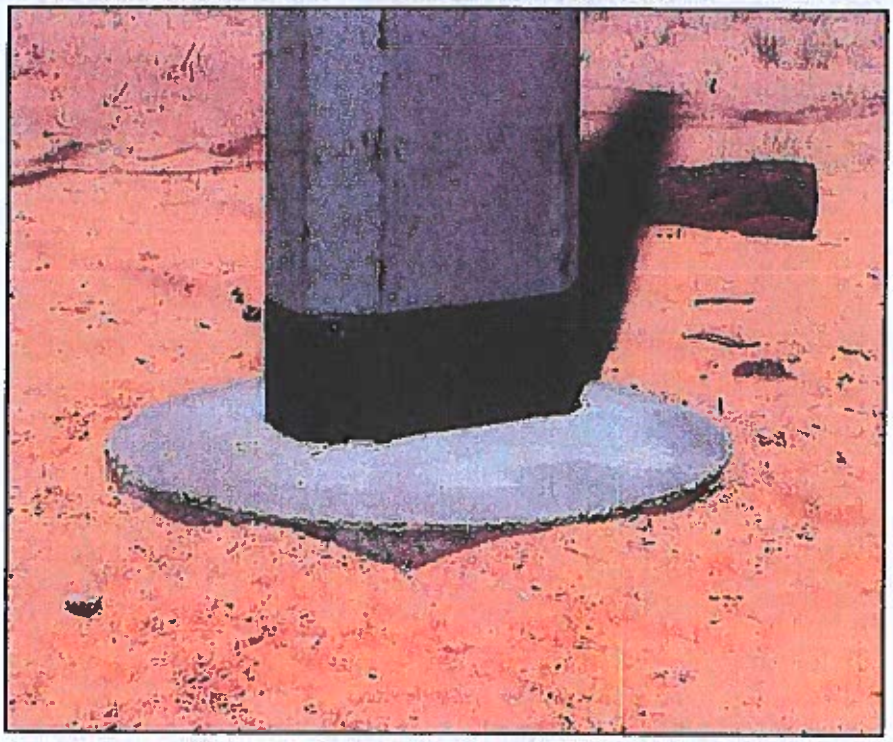


Figure 3-2: Potential impact area associated with the single steel structure

The mining activities around the opencast areas will be generator driven.

All power lines will be established on servitudes along which the proposed conveyors will run. A substation on the farm Mokaning could also be utilized. However, the envisaged diversion of the existing railway line on the farm Mokaning and King, in approximately 2024, will result in a future diversion of the power line. This latter option has therefore not been regarded as a viable alternative.

3.8.4 Sources of Water

Beeshoek Mine will pump approximately 850 m^3 of water per hour into the Vaal Gamagara Pipeline, for use at the BKM Mine. Water will be provided from a take-off point from the Vaal Gamagara Pipeline.

The BKM Mine plans to utilize 2.5 million m^3 of water per year during the start of the mining operations, which will increase to 4.5 million m^3 per year once the mine ramps up to higher production rates. The mine design requires 800 m^3 of water per hour for 6 000 hours per year (4.8 million m^3 per year). According to the groundwater model run for the BKM Mine, the calculated dewatering rates at the King/Mokaning pits would be in the order of 500 m^3/hr, which indicates that an additional 300 m^3/h water will be required to

supply the 800 m^3/hr demand of the processing plant, which will be obtained form the southern section of the pipeline.

A 10 000 m^3 potable water dam will be established at the plant in which the water from the Vaal Gamagara Pipeline will be stored. From the potable water dam, the water will be pumped to potable water tanks (150 m^3), which will be established at the plant and northern and southern opencast areas to provide water for domestic, workshop and wash bay purposes. Dirty water from the pits, sewage facilities, workshops and wash bays will be pumped to mine dirty water tanks. The water in the mine dirty water tanks will be re-used in the plant process. Water in the plant system will be recycled where possible to minimise the potable water demand.

Assmang's objective is to reduce the volume of water abstracted by improving the re-use of water. Shortfall could be made up from the Vaal River via the Vaal Gamagara Pipeline, at an additional cost, should this be required.

Should water be collected from pit dewatering, the water will be used for dust control.

Due to the limited water available to the BKM mining operations, it is not foreseen that there will be excess water to be discharged, and therefore such alternatives have not been investigated.

3.8.5 Dust Suppression

BKM has certain specific requirements with regard to dust palliative products and the effects of their use on the Operation and operational maintenance costs. These include the following:

- A reduction in water requirements for dust suppression, preferably to zero water required,
- Retention of traction of heavy haulage equipment during rainy weather (both longitudinally and laterally to the direction of travel),
- Solid underfoot conditions for heavy haulage equipment,
- Low road maintenance costs, and
- Effective dust suppression.

Water requirements as part of dust palliatives, or the actual use of water as a dust palliative, may in some cases be highly impractical, particularly when mines are located in arid areas, where the availability and actual cost of water may even place a limit on the projected life of the Mine. This result in an undesirable investment for the owners of the

mine, reduced employment prospects for locals, and reduced profits. BKM is located in what may be considered an arid part of South Africa.

Three dust suppression systems were investigated:

- PennzSuppress D

PennzSuppress D is an American product, most famously used in the Pike's Peak hill climbing race, where the product is used with great success. Availability in South Africa is uncertain, and this product requires water during maintenance. The Mine performs its own maintenance, and therefore has to retain a fleet of water bowsers and graders as well as a team of labourers that attend to road maintenance alone. This leads to expenditure on the part of the Mine on an item that is not one of its core businesses activities. There are no indications that this product is used anywhere in South Africa, and thus it is not possible to produce an estimate of capital outlay costs, nor projected maintenance costs. Also impossible to make are estimates regarding savings on operating costs such as fuel or tyres, as an example.

- PPE Bitumen

PPE Bitumen is manufactured in Brakpan. This product is environmentally safe, and requires some water during the construction phase. The construction process is simple: at the time of construction the only water requirement is while the pavement layers are constructed. The PPE product is mixed in at a two to three percent ratio, and after final compaction a quantity of 1 litre per square meter is applied. Maintenance is carried out periodically by repeating the application of one litre per square meter. It would seem that PPE Bitumen suits the requirements of BKM with regard to water requirements and solid underfoot conditions for haul equipment. The same criticisms as presented for PennzSuppress D apply here.

- Dust-A-Side (DAS).

Dust-A-Side (DAS) is a complete haul road maintenance solution. The implementation of a DAS dust suppression system is not limited to the purchase of a product, but is a whole maintenance system in itself. DAS will place a grader operator, mechanical broom operator and a DAS product applicator on site, as well as a permanent site supervisor, who will report to the DAS area manager. Initially, after the haul road has settled and there is no more differential settlement or structural failure of the layer works, DAS places an initial saturation application after approximately 70mm of the top layer has been scarified. This material is bladed to shape the roadway, and afterwards a final seal is placed. DAS then takes over the responsibility of maintaining the haul roads, attending to the reparation of potholes and the removal of rocks and other material that could cause

damage to either roadway or vehicles. The dust suppression product is re-applied on a periodic basis.

DAS has a proven track record of successful dust suppression in the mining industry, and can demonstrate huge savings on a fuel bill, owing to increased traction, increased tyre life on haulage equipment, and a reduction in standing time arising from routine maintenance, along with other benefits. It is possible to recoup the initial capital outlay for the establishment of a DAS dust suppression system within the first year of operation.

DAS is currently the preferred dust suppression system for Kumba Resources, after having won the prestigious Kumba Silver Award for the breakthrough dust suppression project at the Thabazimbi Iron Ore Mine in the Limpopo Province. This means that DAS is also currently on site at Sishen, one of the immediate neighbours to BKM. They are currently handling dust suppression at a total of 58 mines throughout South Africa, Botswana and Namibia, with plans afoot to establish a factory in the province of Northern Cape. This will ensure better transport rates, which will lower the initial capital outlay required for the establishment of a DAS system.

When measured against BKM's requirements as presented earlier, the DAS system could prove to satisfy all aspects. It is therefore proposed that DAS dust suppression system be incorporated in the haul road study for the following reasons:

- The most effective, proven, dust suppression system,
- Retention of traction of heavy haulage equipment in bad weather,
- Low water requirement,
- Proven reduction in road maintenance costs,
- Proven reduction in plant vehicle fleet maintenance costs,
- Reduction of the maintenance fleet of the mine,
- Proven reduction in the total fuel bill of the mine,
- Proven increase of the life of tyres of the plant vehicle fleet,
- Reduction of the chance of mine employees having respiratory problems from airborne dust.

3.8.6 Mine Infrastructure Sites

All mining and processing operations will be undertaken within the Mining Area, in order for a final product to be transported to the Saldanha Port for export. The location of the infrastructure was dependant on the location of the plant, crushers, washing and screening facilities as well as a Paste Disposal Facility.

The infrastructure requirements for the BKM Mine will involve:

- Administration Offices,
- Plant Offices,
- Laboratory,
- Change house,
- Clinic / Training Centre,
- Security Building,
- Plant Control Centre,
- Main Workshop (including a diesel bay),
- Stores,
- Mess Facilities,
- Weighbridge, and
- Explosives Magazine.

3.8.7 Mine Residue Disposal Sites

All waste / overburden and low-grade ore, topsoil and subsoil will be stockpiled on designated sites on the Southern and Northern opencast pit areas.

It is planned that all waste (i.e. waste rock and low-grade ROM) and discard stockpiles resulting from BKM Mine primary opencast operations, be re-treated, should this be proven to be economically viable in the latter years with developing technologies.

As an integral part of the mining operations, backfilling will be employed to minimise both the final voids left open at the end of mining and the size of the waste dumps. The final quantities of waste backfilled and dumped will be determined by production scheduling and the need to maintain safe working conditions at the pit bottoms. Some 150 million tonnes of waste will be put back into the mined out voids over the life of the operations,

which could increase to 175 to 225 million tonnes once the mine is operational and the scheduling has been optimised.

The following sections provide information on the various residual disposal sites that will be established on the BKM Mine property. The locations of these sites have been determined based on the proximity of the opencast workings.

3.8.7.1 Overburden and Low-grade ROM stockpiles

The overburden and low grade ore will be stockpiled on the Overburden and Low-grade ROM Stockpile situated close to the opencast operations. Material with approximately 50 percent iron content and high Al_2O_3 and K_2O levels will be stockpiled on the Overburden / low-grade ROM stockpile. This stockpile will be reworked once the mine reaches the end of its life and it is economically feasible to process the product. The remainder of the stockpile will remain as an overburden dump.

3.8.7.2 Overburden Dump

Two overburden dumps will be established east and south east of the Paste Disposal Facility. This dump will not be reworked and will remain for the life of mine.

3.8.7.3 Topsoil Stockpiles

Designated areas for the storing of topsoil have been allocated. Topsoil Stockpiles will be established in close proximity to the various mining operations and activities. The material on this stockpile will be used for rehabilitation. Due to the limited volumes of topsoil available in the area, subsoil will also be stockpiled for rehabilitation purposes. The topsoil stockpiles will range between 1.5 and 5 m in height. Erosion control measures (i.e. terraces) will be implemented for topsoil stockpiles greater than 1.5 m in height.

3.8.7.4 Discard Stockpile

Discard produced by the beneficiation plant will be stockpiled on a designated Discard Stockpile. The stockpile will be reworked, where after the remainder will result in a discard dump.

3.8.7.5 Paste Disposal Facility

All residue produced at the Beneficiation Plant will be pipe-fed to the paste disposal facility on site.

The design life for the proposed tailings dam is approximately 10 years. The intention is to commence with backfilling of the open pits after the initial 10-year period for the remaining life of mine.

The following sections detail the site selection process.

3.8.7.5.1 Paste disposal facility objectives

The tailings disposal objectives can be summarized as follows:

- Create a safe and stable paste disposal facility.
- Optimise air space utilisation.
- Comply with legal requirements.
- Minimize environmental impacts.
- Zero discharge of surface process water to the environment.
- Separation of clean and process water.
- Maximize water return to the plant.
- Minimize seepage to the groundwater.
- Minimum storage of supernatant on the tailings disposal facilities.
- Cost effective construction, operation and closure. In addition, the paste disposal facility construction should be phased in order to, as far as possible, delay capital expenditure.
- The paste disposal facility must not be situated such that it sterilises any ore.
- The paste disposal facility should be located on BKM mine property, which includes the farms Bruce 544, King 561, Mokaning 560 and Parson 564.

3.8.7.5.2 Paste disposal facility philosophy

In order to comply with the tailings disposal objectives, it was decided to opt for a paste disposal solution.

The benefits that can be achieved include:

- More efficient volumetric storage as a result of steeper bench angles and higher in-situ dry densities may be achieved through thin layer deposition.
- Improved water management – returning the thickener overflow to the plant reduces the evaporation and seepage losses that occur on the paste disposal facility.
- Improved stability and reduced safety risk – reduction of water contained within the residue and maintained in the pond increases stability and reduces risk of failure and consequent environmental risk.
- Well-mixed non-segregating residue, with the fine fractions filling and reducing void space.
- More rapid drying and self-weight consolidation of the residue – there is less water to be removed from the deposited tailings under the same drying and consolidation conditions and therefore higher rates of rise can be accommodated.
- A dramatically smaller decant pond to drive the phreatic surface and hence maintain saturation.
- Liquefaction potential is further reduced when thin layer deposition is used. This achieves rapid drying to maximum density and shear strength. However, multiple discharge points are required to achieve this.
- Lower operational cost and risk – system can be designed for minimum labour input.
- Accelerated rehabilitation – more rapid consolidation and drying allows earlier access to the top surface of the paste disposal facility for rehabilitation and closure after disposal ceases.

Disadvantages of implementing a paste disposal system include:

- The additional costs associated with the purchase of thickening equipment including pumps and pipelines.
- Paste disposal systems may be more prone to line blockages, and contingency measures may be required to ensure operational continuity.

3.8.7.5.3 Site selection

Sufficient candidate sites were identified to ensure the due consideration of potential alternatives.

In identifying candidate sites, numerous economic, environmental and public acceptance criteria must be considered. These criteria interrelate, as there are always economic implications when candidate sites are sub-optimal in terms of environmental and/or public acceptance characteristics. Also, the public will usually not accept an environmentally unsuitable residue disposal site. Refer to Figure 3-3 (page 3-39).

Ivuzi has used the following criteria in order to assess the individual sites:

Economic and engineering criteria

Economic criteria relate to the cost of obtaining, developing and operating a site. They include the following considerations:

- The economies of scale. Larger sites are economically more attractive. In general, if it is to be economical, the facility must cater for the disposal of the residue stream over at least the medium term to justify the capital expenditure.
- Topography, which has a large effect on initial earthworks volumes.
- The distance of the disposal facility from the residue generation areas. This is directly proportional to pipeline and transport costs due to the paste deposition method. Important aspects include the deposition method and freeboard and pool control.
- Access to the disposal site. This has cost, convenience and environmental implications, especially if roads have to be constructed.
- The availability of on-site soil to provide low cost earthworks material. Importation of material increases capital and operating costs.
- The local availability of stone and sand suitable for use in drains.
- The quality of the on-site soil. Low permeability clayey soils on site will reduce the cost of containment liners and leachate control systems.
- Land availability and/or acquisition costs. These are often dependent on present or future competitive land-uses, such as agriculture, residential or mining.
- Capacity requirement (i.e. maximum starter wall height, maximum height and airspace availability).
- Conflict with the mining activity.
- Structural stability.
- Stability at closure.
- Cost.

Environmental criteria

Environmental criteria relate to the potential threat to the biotic and abiotic environment, particularly to water resources. They include the following considerations:

- The distance to ground or surface water. The greater this distance, the more suitable the site is in terms of a lower potential for water pollution.
- The importance of ground or surface water as water resources. The greater the resource value of the water, the more undesirable the establishment of a disposal facility as a potential source of pollution.
- The quality of on-site soil. Low permeability soils reduce pollutant migration and are therefore favoured.
- The sensitivity of the receiving environment. The development of a site in a disturbed environment, such as derelict mining land, would be preferable to a development in a pristine environment.
- The existence and sensitivity of the related fauna and flora within the area.
- The aesthetics (i.e. visual impact) of the site.
- The presence of sites of archaeological and cultural significance.
- The location of existing servitudes.

Public acceptance criteria

Public acceptance criteria relate to such issues as the possible adverse impact on public health, quality of life, and local land and property values. They also relate to potential public resistance to the development of a disposal site. Failure to meet the public acceptance criteria may constitute a fatal flaw.

The following are important considerations:

- Land claims and the displacement of local inhabitants. This will usually arouse public resistance.
- Exposed sites with high visibility. These are less desirable than secluded or naturally screened sites.
- Prevailing wind directions. New disposal facilities must be sited downwind of residential areas.

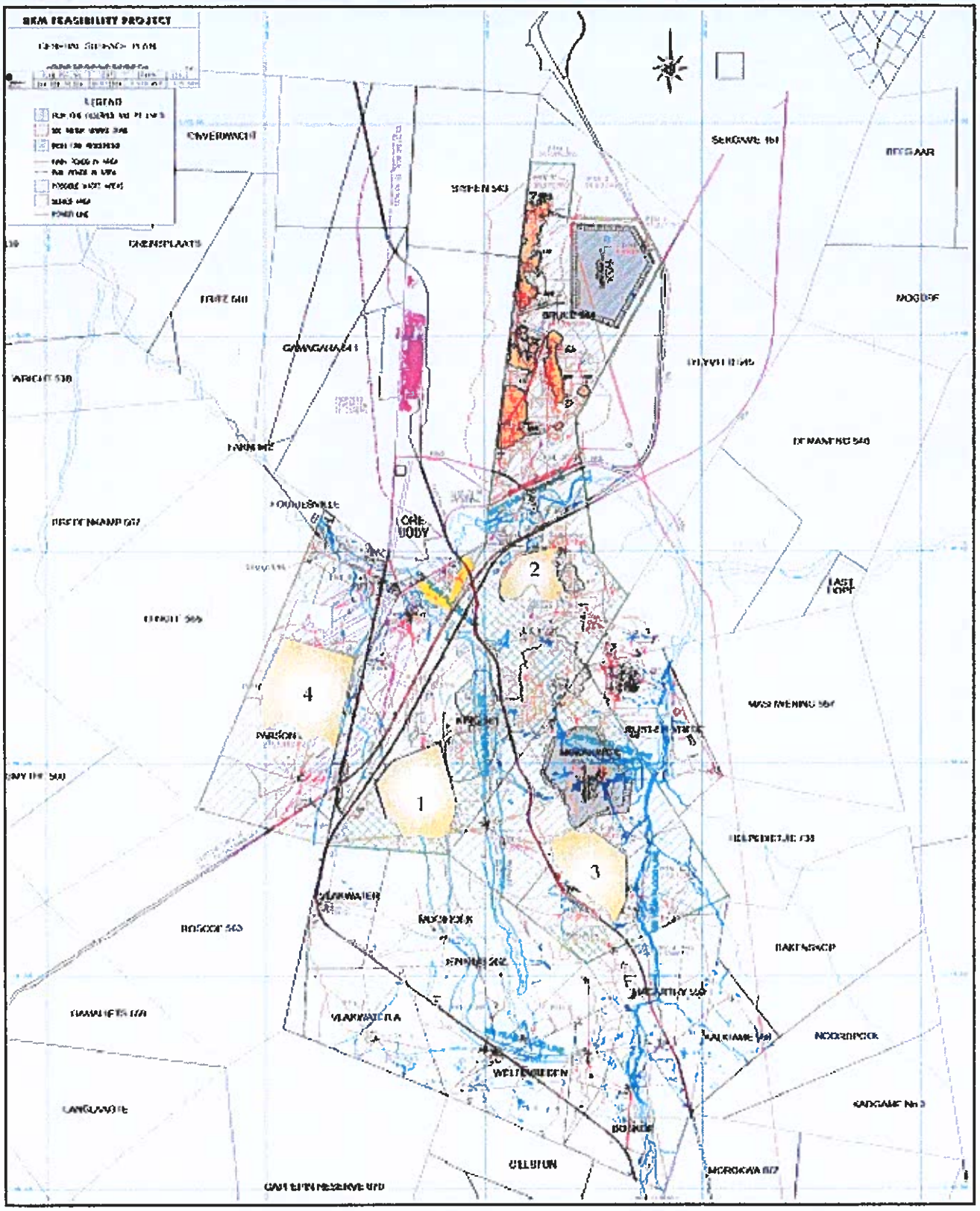


Figure 3-3: Paste disposal site selection

- The distance to the nearest residential area, or any other land-use which is incompatible with residue disposal. The greater the distance from incompatible land-uses, the lower the risk of nuisance problems and hence resistance to the facility.
- To protect the public from any adverse effects of residue disposal operation, adequate buffer zones must be provided around disposal sites.
- The mineral and surface rights holder of the individual sites.
- Refer to Appendix 12 (a) for the detailed site selection report.

3.8.8 Domestic and Industrial Waste Disposal Sites

Industrial waste will be limited to oil, diesel and grease. The waste will be sold in bulk, back to the manufacturers or suppliers. Unwanted waste (if any), will be collected by Waste Tech (a registered waste disposal company), who will dispose of the waste at an approved industrial waste site.

Domestic waste will be contained in designated central areas as required by the Gamagara Municipality. The Municipality will collect the waste three times a week from the designated areas where after the waste will be disposed of at the licensed municipal waste disposal site in the Kathu area.

An alternative would be to permanently dispose of all waste on site. This however would have negative environmental implications and further investigations and licensing would be required.

3.8.9 Rapid Load Out Facility

3.8.9.1 Export Siding

3.8.9.1.1 Main Line

Alternatives are under investigation for the deviation of the Spoornet Main Line foul of the King open pit mine. The line needs to be deviated clear of the 500m blasting limit. The deviated line adds approximately 1.74km to the route between Hotazel and Postmasburg. The main line was designed to a ruling grade of 1:100 or 1%, with a loop next to the deviated line at 0.125% grade for the loading of domestic trains. This will, however only come in effect in 2024, and will be addressed in a follow-up addendum.

3.8.9.1.2 Rapid Load Out Siding

Various alternative sites were investigated for location of the export siding on the farm Parsons. Measures of effectiveness (M.O.E.) were used to evaluate these options and at the end, one option was selected and further investigated during the study. In association with the site selections, various train moving options were investigated for hauling a train through the load out station whilst loading, and finally, and after discussions with Spoornet, it was decided that main line locomotives will stay attached and perform the loading under creep control conditions.

For a project of this nature, the evaluating of alternative layouts is rather complicated, as many factors beside the construction cost would need to be considered in the process. In the absence of an engineering design, the Consultants have opted to use a "qualitative" multi-criteria analysis using measure of effectiveness (M.O.E.) in an attempt to obtain an objective assessment of the alternative options. Each M.O.E. is given a "qualitative" value such as high, medium or low and the option having the larger number of "high" values or the least number of "low" values would be recommended. As long as the most successful of the alternative options is clear and obvious, no weights would be given to the M.O.E.'s.

The following measures of effectiveness are considered for each option, with the lower value scoring higher.

- Construction cost
- Total length of siding
- Bridges involved
- Amount of cut
- Amount of fill
- Height of Load out Station above ground level
- Proximity of Load out Station to plant and general layout in terms of plant layout and location

Six options (Refer to Figure 3-4, page 3-44) were investigated for the export rail facility and associated plant on the farm Parson. These options include:

- Option 1

The aim of this option was to remain as close as possible to the Parson road.

This option begins at the OREX line, south-west of the Parson road-over-rail bridge. The proposed line runs parallel to the OREX line where after it swerves to the north and runs parallel to the east of the Parsons road (R325). The railway line terminates in a balloon layout to form a loop for the rapid load out facility.

- Option 2

The purpose of this option was to remain as close as possible to the OREX line.

This option begins approximately at the same point as Option 1, where after it crosses the Parson road under the existing road-over-rail bridge. The proposed line runs parallel to the OREX line and terminates in a balloon layout with the loop situated to the east of the Parson road, with the OREX line to the east of the rapid load out facility.

- Option 3

Option 3 mirrors Option 1 with the only difference being that this option is situated to the west of the Parson road.

- Option 4

Option 4 starts in the same vicinity as Options 1 to 3. The line runs parallel to the OREX line, and crosses underneath the existing road-over-rail bridge. The line follows the OREX line for a distance, where after it turns to the west, crosses the Parson road and terminates in a balloon layout.

- Option 5

Option 5 begins to the south of Options 1 to 4, and runs north-west, parallel to the Parson road for approximately 2km. The line then turns to the east towards the OREX line, crosses the Parson road and terminates in a balloon layout in close proximity to the OREX line.

- Option 6

Option 6 begins at the OREX line to the north of the existing road-over-rail bridge. The line immediately swerves in a north-westerly direction, where it crosses the Parson road in a south-westerly direction and terminates in a balloon layout.

The various options were evaluated using a fixed unit cost per volume unit for major items such as bulk fill and cut, and a fixed unit cost per length for plate laying. The actual height of the rail level above ground level at the load out facility position was benchmarked against the ideal height of 3m.

Due to the abovementioned evaluations, Option 6 is the preferred option as it is:

- The least expensive; and
- Fits in well with the preferred location of the plant.

Take off from the OREX line is situated on a down grade for loaded trains (this facilitates easier departure for loaded trains as opposed to the take-off point in Option 2 which is situated on the ruling grade).

3.8.9.1.3 Train Moving Options

Dedicated Locomotives, Train Movers and Train Locomotives have been investigated.

Using train locomotives to load trains offers the major advantage in that the train moving solution is fully scalable. It would accommodate whatever future train tonnage increases might occur, as train locomotive tractive effort automatically follows train tonnage. In the context of Spoornet finding it necessary to enhance its competitiveness, this would be a significant advantage over both fixed train movers and other railbound solutions.

The use of train locomotives for loading achieves reliability through redundancy. The relative steepness of main line gradients will always ensure that there are redundant locomotives for the flatter gradients at a loading station. This averts the issue of trains having to depart partly loaded when site-bound train moving equipment has failed.

The use of train locomotives for loading allows a rail layout that does not necessitate pushing movements. This minimizes undue risk of derailment, giving a robust solution.

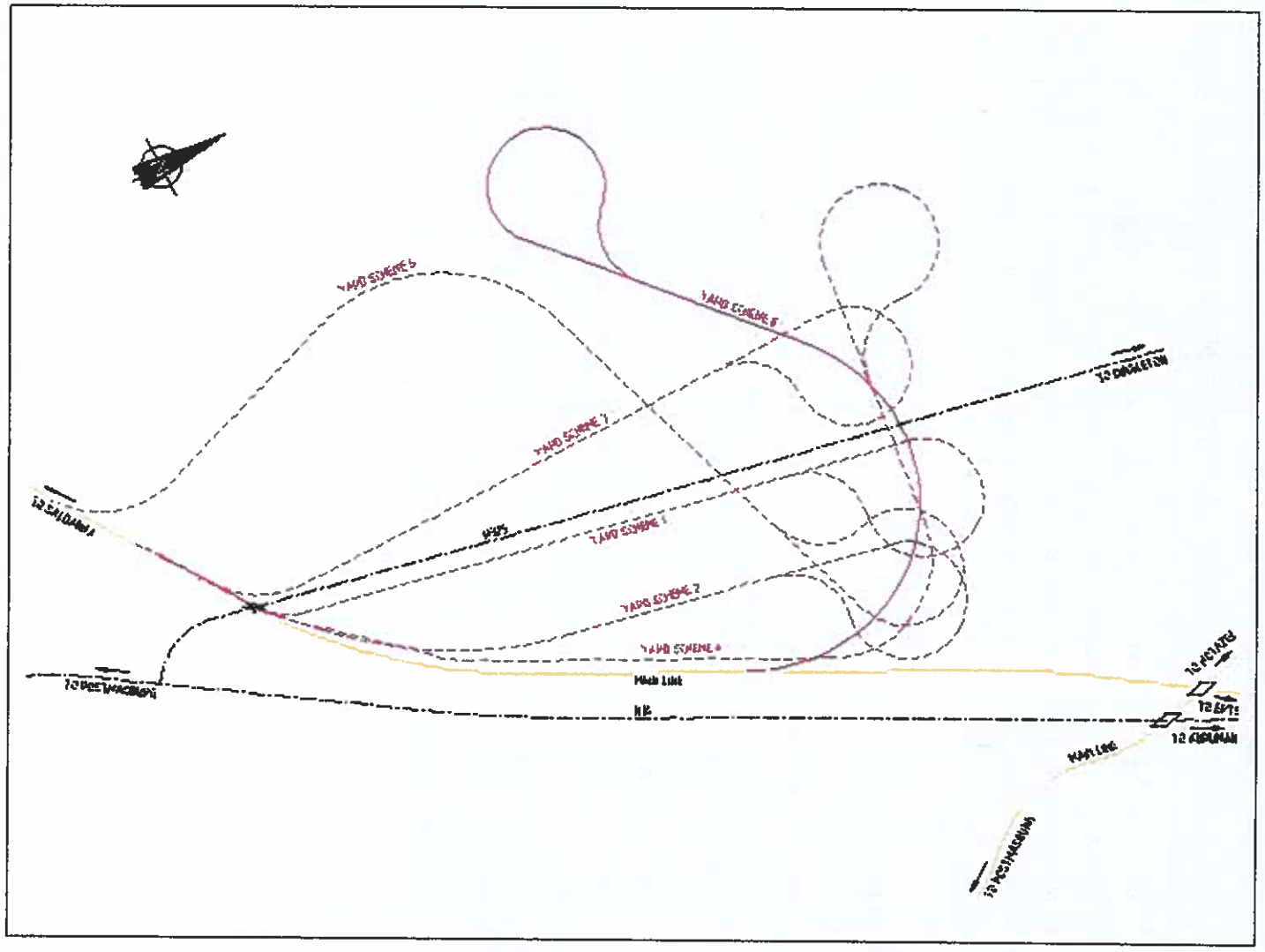


Figure 3-4: Rapid Load Out Facility site selection

3.8.9.2 Local Siding

The railway line traversing the farms King and Mokaning will require relocation, once mining commences on the King / Mokaning ore body. Discussions are underway between Assmang and Spoornet regarding the relocation of the railway line. It is, however envisaged that the relocation of the railway line will fall within the mining area. This is, however only envisaged to take place by the year 2024. Due to the scheduling of the relocation, it will not be addressed in the current environmental investigations, but will be investigated at a later stage and will be addressed within an addendum.

Refer to Appendix 12 (b).

3.8.10 Plant

Two alternative sites have been investigated for the establishment of the beneficiation plant facility and the associated rapid load out facility. These include:

- King farm

The farm King was the preferred option for the establishment of the required infrastructure (i.e. beneficiation plan, washing and screening facility, rapid load out facility and tailings dam) in relation to the location of the farms Bruce and Mokaning, the reason being that King is centrally situated to the mining operations and existing railway infrastructure.

However, geological surveys indicate that the available iron ore body on King is larger than was initially expected. This finding indicates that a larger ore body could be mined on the King property. As the ore body will be mined by means of opencast methods this will result in a smaller surface area being available for the construction of the required infrastructure.

- Parson farm

The farm Parson was identified as an alternative to the farm King to locate the mine surface infrastructure, due to the central location to the mining operations and the close proximity to the existing railway infrastructure. The Parson farm was not included in the initial project plan. With the increase in the ore body however, Assmang has now placed an option to purchase portions of the property to establish the essential mining infrastructure. The farm Parson is situated in close proximity to where the initial mining infrastructure would have been established on the King farm.

A cut-off of 60 percent iron content was given for the final product of the BKM Mine for export purposes. In order to comply with this cut-off, a beneficiation technology able to provide the final product was developed.

Refer to Section 4.3.3 for further detail.

Refer to Appendix 12 (c).

3.8.11 Housing Sites

Although no final decision has yet been taken as to the method to facilitate the housing process at BKM, this process will most likely involve facilitating the development of serviced plots at Kathu. Such a process will provide employees with an incentive to purchase. The Assmang Group will thereafter facilitate a process with housing developers and banks to build private houses for interested employees at Kathu. The employee and the developer will, however, finalise building, purchasing or rental agreements and contract independently from Assmang amongst themselves. Assmang may consider providing some form of financial guarantees to banks or even agree to rent blocks of housing from the developers and guarantee the rental income on these.

The Assmang Group undertakes to invest in bulk infrastructure as a part incentive to local government to initiate a housing development process and to address the potential impact of the influx of BKM employees on the Kathu services requirement. In this way, it will contribute towards the growth of Gamagara Local Municipality. Assmang is already part of an Inter-technical Committee between Gamagara Local Municipality and Kumba Mine, the purpose of which is to manage social and housing impacts arising from the new BKM mine in a proactive manner.

Housing will be included as an element within the remuneration package to allow the employees to provide their own housing. By undertaking this view, Assmang envisaged for their employees to be self-sustaining.

No permanent housing will be erected for employees on the site.

3.8.12 Land Use Options After Rehabilitation

Current land use is not extensive in the areas to be disturbed. The land capability is considered to be moderate to low, with the parts adjacent to the Gamagara River being classified as arable. Current land use in the proposed opencast area can be considered as wilderness.

As the BKM Mine reaches the end of its life, a closure plan will be developed and the most suitable land use will be determined in association with the authorities and local community.

At present it is envisaged to return the mining area to near pre-mining land use. Due to the fact that various dumps will remain on decommissioning, the area will be rehabilitated in such a way to be free-draining.

3.8.13 Alternatives to Stream Diversions

Diversion 1

The upper reaches of the catchment of Watercourse no. 1 encroach on the South Orebody. The King overburden and low-grade stockpile straddles the central portion of the catchment.

Of the total catchment area of 5.6km^2 for Watercourse No. 1 the top 0.1 km^2 will be taken by the opencast mining operation. An area of 0.4 km^2 immediately downstream of this will be isolated from its normal drainage path (i.e. dammed up) by the stockpile. Some form of drainage under or around the rock dump will be required.

In view of the comparatively low flow and small volume of water that will be isolated by the stockpile, it is recommended that the water be allowed to dam up against the stockpile after significant rainfall events. The high permeability of the dumped rock will allow trapped water to seep away under the stockpile over a period of time.

By not diverting the drainage channels on the southern BKM Mine property, a significant resource on the King / Mokaning opencast pit will be lost. The diversion of the eastern stream will also contribute to the separation of clean and dirty water, as a waste rock dump will be constructed in the natural path of the river.

By not diverting the streams it will not be possible to provide a safe mining environment in the King / Mokaning opencast pit area.

Diversion 2

The KM_WST and KM_CENT opencast pit areas will be developed within the watercourse and 1:100 year flood line of the Watercourse No. 2. Four alternatives were investigated. The impact on the watercourse and the safety issues associated with the diversions had a significant impact on the preferred option.

- Option 1

The upper reaches of Watercourse No. 2 could be diverted into the adjacent catchment (Watercourse No. 6) and the runoff from the area directly upstream of the opencast operations would be collected in catchment dams to prevent flooding of the opencast workings. A 450 m wide embankment approximately 8 m to 10 m high would be formed immediately upstream of the opencast workings, with waste material from the opencast operation and would act as a buffer between the catchment dams and the opencast operations.

- Option 2

Construct a dam on Watercourse No. 2 immediately upstream (south) of the proposed King / Mokaning opencast mining area to contain runoff and prevent flooding of the opencast operations. At its highest point the dam wall would require to be 4 m high with an overall length of 600 m. Concept design calculations indicate that the dam would store the full runoff from a 1:100 year storm event of 24 hour duration, which would account for a volume of 680 000 m^3. A spillway channel on the west flank of the dam would divert any water in excess of this into Watercourse No. 6. The length of the channel would be approximately 700 m with maximum excavation depth of approximately 10 m. The risk associated with a dam directly upstream of the opencast operations is high and the estimated cost for this option is extremely high.

- Option 3

Construct a dam as described above and construct a spillway channel around the west of the opencasts operations back into Watercourse No. 2 to the north of the King / Mokaning opencast area. The length of the channel would be approximately 2 700 m with a maximum excavation depth of approximately 10 m. The risk associated with a dam upstream of the opencast operations is high and the estimated cost of the option is extremely high.

- Option 4

An upstream storm water catchment dam could be constructed. Storm water could then be pumped via an overland pipeline and discharged into Watercourse No. 2 and Watercourse No. 6. The risk associate with this option is high, due to the fact that no water could be pumped in case of a pump or power failure.

Due to safety and cost associated with Option 1, this is the preferred option.

Refer to Appendix 12 (d).

3.8.14 The "No Project" Option

The greatest positive aspect of the BKM Project lies in meeting socio-economic requirements.

The Kalahari region, in which the BKM Project is situated, is the principal mining area of the Northern Cape. However, there has been a strong decline in mining activity in the region since the 1980, due to the closure of the asbestos mines. In addition, there has been no other emerging productive sector to replace the declining mining sector.

Beeshoek Mine will reduce its production capacity and iron exportation ore as the mine is reaching the end of its production capacity. If the BKM Project is refused, the majority of persons currently employed at Beeshoek will be retrenched in the near future and with the decline in iron ore production the economy of the Northern Cape will be seriously affected.

The ramp up of iron ore production to 16 million tons per annum could also provide employment opportunities for the local communities in the near future.

If the application is approved, the Northern Cape will gain a new mine with a life in excess of 30 years maintaining employment in the area, adding to the economy through taxation and supporting the economic and social developments of the area.

The BKM Project will also be committed to engage in a structured social process with the local community, as done by the current Beeshoek Mine. The purpose hereof will be to establish open communication channels between Interested and Affected Parties and the mine, as well as to invest in the social structure of the communities.