

Environmental Parameter	Impact Description	Significance	Management Measures	Action Plan	Frequency	Responsible Person
	With management measures	8 Low to Moderate (-)		Draw up a comprehensive Material Safety Data Sheet (MSDS) obtained from the suppliers for all hydrocarbons and chemicals stored and/or used on site.	Ongoing	Environmental Coordinator
Flora	The improper storage procedures of diesel, oil and other hazardous chemical substances may lead to the contamination of destruction of flora.	13 Moderate (-)	Refer management measures above.			
	With management measures	3 Low (-)				
Fauna	The handling and storage of fuel creates a fire risk. This could negatively impact the local fauna.	18 Moderate to High (-)	There shall be an emergency preparedness plan in place in order to fight accidental fires should they occur. The adjacent land owners/users/managers should also be informed and/or involved.	Ensure the Emergency Preparedness and Response programme is up to date.	Ongoing	Environmental Coordinator
			The induction and awareness programmes will address fire-related issues.	Brief contractors on the Emergency Preparedness and Response programme and enforce	Ongoing	Environmental Coordinator

Environmental Parameter	Impact Description	Significance	Management Measures	Action Plan	Frequency	Responsible Person
			There must be sufficient fire-fighting equipment. This equipment must fulfil the South African Occupation Health and Safety requirements.	Brief contractors on the Emergency Preparedness and Response programme and enforce the implementation thereof.	Ongoing	Environmental Coordinator
			All vegetation adjacent to the fuel storage tanks will be continually removed.	Remove all vegetation in close proximity to the diesel storage tanks	Ongoing	Environmental Coordinator
			All provisions relating to fire safety will be related during the induction and awareness training programme	Brief contractors on the Emergency Preparedness and Response programme and enforce the implementation thereof.	Ongoing	Environmental Coordinator
	With management measures	8 Low to Moderate (-)				
Groundwater	Hazardous chemical spills may reach groundwater, thereby impacting its quality	13 Moderate (-)	Please refer to the management measures above. A detailed groundwater monitoring programme will be implemented.	Update and implement the groundwater monitoring procedure	Ongoing	Environmental Coordinator

Environmental Parameter	Impact Description	Significance	Management Measures	Action Plan	Frequency	Responsible Person
	With management measures	8 Low to Moderate (-)				
Surface Water	The use of diesel, oil and other hazardous chemical substances may lead to the contamination of surface water	15 Moderate (-)	Please refer to the management measures above. A detailed surface water monitoring programme will be implemented.	Update and implement the surface water monitoring procedure	Ongoing	Environmental Coordinator
	With management measures	8 Low to Moderate (-)				
Heritage	No further impacts envisaged					
Air Quality	No further impacts envisaged					
Visual	No further impacts envisaged					
Noise	No further impacts envisaged					
Socio-economic	Injury to employees due to fire hazard	15 Moderate	Refer to management measures above			
	With management measures	11 Moderate				

10.1.3 Decommissioning Phase

Table 10-24: Cumulative impacts as a result of the decommissioning activities

Aspect	Direct Impact	Indirect and Cumulative Impacts
Dismantling and removal of infrastructure	<p>The natural topography will be restored through the removal of the infrastructure</p> <p>Generation of construction waste may affect soils and land capability, surface water and the local ecology</p> <p>The removal of infrastructure will leave a temporary bare "scar" on the landscape, creating a visual impact</p> <p>The removal process will increase the ambient noise levels in the area</p> <p>Fugitive dust will be created by wind erosion from exposed surfaces</p>	<p>Restoration of natural topography</p> <p>Soil and surface water contamination will have ecological implications</p> <p>The presence of disturbed land may allow the establishment of alien invasive vegetation</p> <p>The presence of exposed soils may lead to an increase in volume and speed of surface water run-off, increasing the erosive capacity (increased erosion)</p>
Active rehabilitation	<p>The ripping and landscaping will restore the area to that of a more natural, gentle topography</p> <p>The rehabilitation will remove the visual incongruity</p>	<p>The ripping of soils will result in greater groundwater recharge due to the softening of surfaces</p>

10.1.3.1 Dismantling and removal of infrastructure

Table 10-25: Impacts associated with the dismantling and removal of infrastructure

Environmental Parameter	Impact Description	Significance	Management Measures	Action Plan	Frequency	Responsible Person
Geology	No significant impact					

Environmental Parameter	Impact Description	Significance	Management Measures	Action Plan	Frequency	Responsible Person
Topography	No significant impact					
Soils and Land Capability	The removal of the plant will produce waste, which may lead to soil contamination.	9 Low to Moderate (-)	A detailed waste management strategy will be established and implemented, which will clearly demarcate the containments for different waste streams. These containments will be colour coded.	Update the waste management plan that will ensure that recycling takes place and that all other waste is correctly classified and disposed of at the appropriate registered waste disposal site	Ongoing	Environmental coordinator
			Waste management will form a detailed component as part of the induction process provided by the mine.	Brief employees as to the waste management plan and ensure it is enforced.	Ongoing	Environmental coordinator
			The mine will adopt a cradle-to-grave approach to ensure that the waste is removed and disposed of in a prescribed and correct manner,	Draw up and enforce site rules for employees to ensure good housekeeping practices.	Ongoing	Environmental coordinator
	With management measures	6 Low (-)				
	The utilisation of hydrocarbons and other chemicals during the removal of the plant may lead to the contamination of soils.	8 Low to Moderate (-)	All hydrocarbons should be stored in designated, bunded areas with a capacity of at least 110% of the volume stored.	Draw-up and enforce site rules for employees to ensure good housekeeping practices	Ongoing	Environmental Coordinator
			Spill kits should be readily available and all employees must	All spills are to be recorded and reported.	Ongoing	Environmental Coordinator

Environmental Parameter	Impact Description	Significance	Management Measures	Action Plan	Frequency	Responsible Person
			be trained in the utilisation thereof.			
			Should a spill take place the area should be cleaned immediately and the contaminated area will be rehabilitated as appropriate.	Draw up a procedure to ensure all hazardous spills will be dealt with within 24 hours of occurrence.	Ongoing	Environmental Coordinator
			Employees will be educated by means of training and the Environmental Awareness Plan to make them aware of the necessity to prevent spillages by the implementation of good housekeeping practices.	Brief employees on the Environmental Awareness Plan and enforce the implementation thereof. Implement a penalty system for non compliance to the Environmental Awareness Plan.	Ongoing	Environmental Coordinator
				Draw up and enforce site rules for contractors to ensure good housekeeping practices.	Ongoing	Environmental Coordinator
			The management of chemicals and hydrocarbons should form part of the emergency preparedness and response programme.	Ensure the Emergency Preparedness and Response programme is up to date. Brief contractors on the Emergency Preparedness and Response programme and enforce the implementation thereof.	Ongoing	Environmental Coordinator

Environmental Parameter	Impact Description	Significance	Management Measures	Action Plan	Frequency	Responsible Person
			In the event of a major spill that could result in major soil and water contamination the DWAF should be informed immediately and a remediation strategy should be enforced.	Draw up a procedure to ensure all hazardous spills will be dealt with within 24 hours of occurrence.	Ongoing	Environmental Coordinator
			The management of chemicals and hydrocarbons should form part of the emergency preparedness and response programme.	Ensure the Emergency Preparedness and Response programme is up to date.	Ongoing	Environmental Coordinator
			No activities associated with hydrocarbons and or chemicals (i.e. wash bays etc.) may be undertaken outside of an effectively designed contained area.	Brief contractors on the Emergency Preparedness and Response programme and enforce the implementation thereof. Draw up a comprehensive Material Safety Data Sheet (MSDS) obtained from the suppliers for all hydrocarbons and chemicals stored and/or used on site.	Ongoing	Environmental Coordinator
				All MSDS's must be displayed where hydrocarbons and/or chemicals are stored and utilised.	Ongoing	Environmental Coordinator
				Brief all contractors on the location of the MSDS and how this should be utilised.	Ongoing	Environmental Coordinator

Environmental Parameter	Impact Description	Significance	Management Measures	Action Plan	Frequency	Responsible Person
Flora	With management measures	5 Low (-)				
	The removal of the plant and rehabilitation of the site will expose the soils on site and allow the re-establishment of natural vegetation.	13 Moderate (+)	The mine will establish and implement a regular weed-control programme to eradicate existing invader plants and to prevent new invasions during ongoing mining operation and decommissioning.	Draw up a comprehensive Material Safety Data Sheet (MSDS) obtained from the suppliers for all hydrocarbons and chemicals stored and/or used on site.	Ongoing	Environmental Coordinator
	With management measures	15 Moderate (+)				
Fauna	No further impacts envisaged					
Groundwater	The utilisation of hydrocarbons and other chemicals during the removal of the plant may lead to the contamination of groundwater through filtration.	8 Low to Moderate (-)	Refer to table in construction phase - storage, handling and disposal of hydrocarbons (HCS)			
	With management measures	5 Low (-)				
Surface Water	The removal of the plant will produce waste, which may lead to surface water contamination.	11 Moderate(-)	Refer to waste generation table			

Environmental Parameter	Impact Description	Significance	Management Measures	Action Plan	Frequency	Responsible Person
	With management measures	10 Low to Moderate (-)				
	The utilisation of hydrocarbons and other chemicals during the removal of the plant leads to the contamination of surface water.	8 Low to Moderate (-)	Please refer to the Groundwater section above for the correct handling and management procedures for hydrocarbons.			
	With management measures	5 Low (-)				
Heritage	No further impacts envisaged					
Air Quality	No further impacts envisaged					
Visual	The removal of the plant will improve the visual quality of the site by removing the visual incongruity.	15 Moderate (+)	Natural vegetation establishment (self-succession) will be encouraged. The mine will investigate an appropriate seed mix for the rehabilitation purposes should self-succession not establish on rehabilitated sites. An ecological approach to rehabilitation and screening measures, as opposed to a horticultural approach to landscaping, will be adopted. Attempts will be made to restore the natural character of the	Draw up an eradication, spread prevention as well as monitoring plan for invader species. Implement the plan and monitor the area	Ongoing Ongoing	Environmental Coordinator Environmental Coordinator
				Communities of indigenous plants enhance bio-diversity and blend well with existing vegetation.	Ongoing	Environmental Coordinator
				Update the on-going rehabilitation programme to	Ongoing	Environmental Coordinator

Environmental Parameter	Impact Description	Significance	Management Measures	Action Plan	Frequency	Responsible Person
			landscape.	ensure that disturbed areas can be rehabilitated on an on-going basis, which will include ongoing monitoring.		
	With management measures	16 Moderate to High (+)				
Noise	The removal of the plant will increase the ambient noise levels in the area. This is however only temporary.	9 Low to Moderate (-)	Vehicles will be equipped with mufflers where practical to reduce the emission of noise. Where noise becomes a nuisance management measures will be investigated and implemented to address these. Induction and awareness training will address the need to keep noise to a minimum.	A pre-planned maintenance plan for vehicles and equipment must be updated. Regular audit or checks to be done on vehicles and equipment	Ongoing Ongoing	Environmental Coordinator Environmental Coordinator
	With management measures	5 Low to Moderate				
Socio-economic	No further impacts envisaged			Brief employees on the Environmental Awareness Plan and ensure it is enforced		

10.1.3.2 Active rehabilitation

Table 10-26: Impacts associated with active rehabilitation

Environmental Parameter	Impact Description	Significance	Management Measures	Action Plan	Frequency	Responsible Person
Geology	No further impacts envisaged					
Topography	Landscaping of the area will have a positive impact on the overall topography of the area.	17 Moderate to High				
	With management measures	17 Moderate to High				
Soils and Land Capability	Ripping and topsoil replacement will restore the soil physical characteristics prior to re-vegetation. This is a positive impact to the environment.	16 Moderate to High (+)	Compacted soils will be ripped and topsoil will be replaced.	Update the on-going rehabilitation programme to ensure that disturbed areas can be rehabilitated on an on-going basis, which will include ongoing monitoring.	Ongoing	Environmental Coordinator
			After the topsoil has been replaced the area should be ameliorated and seeded, should self-succession of vegetation not take place.	Monitor and manage all rehabilitated areas.	Ongoing	Environmental Coordinator
			Only species indigenous to re-	Monitor and manage all	Ongoing	Environmental

Environmental Parameter	Impact Description	Significance	Management Measures	Action Plan	Frequency	Responsible Person
	With management measures	18 Moderate to High (+)	vegetate the area.	rehabilitated areas.		Coordinator
Flora	Re-vegetation will be undertaken on the decommissioned and rehabilitated areas before mine closure. This will be a positive impact to the flora and fauna of the area.	16 Moderate to High (+)	Compacted soils will be ripped and topsoil will be replaced. After the topsoil has been replaced the area should be ameliorated and seeded, should self-succession of vegetation not take place. Only species indigenous to the area will be included.	Update the on-going rehabilitation programme to ensure that disturbed areas can be rehabilitated on an on-going basis, which will include ongoing monitoring. A soil sampling procedure should be drawn up and implemented.	Ongoing Ongoing	Environmental Coordinator Environmental Coordinator
	With management measures	16 Moderate to High (+)	Remove alien vegetation post decommissioning, with long term follow-up afterwards	Update the eradication, spread prevention as well as monitoring plan of invader species Update the eradication, spread prevention as well as monitoring plan of invader species	Ongoing Ongoing	Environmental Coordinator Environmental Coordinator

Environmental Parameter	Impact Description	Significance	Management Measures	Action Plan	Frequency	Responsible Person
Fauna	The re-establishment of vegetation on site will provide a habitat for fauna	15 Moderate	Refer to Flora management measures			
	With management measures	18 Moderate to High				
Groundwater	No further impacts envisaged					
Surface Water	No further impacts envisaged					
Heritage	No further impacts envisaged					
Air Quality	Fugitive dust will be created by wind erosion from exposed surfaces.	12 Moderate (-)	Wet suppression techniques will be implemented to limit dust dispersion where and when necessary	Undertake ongoing dust monitoring as per the existing programme.	Ongoing	Environmental Coordinator
	With management measures	8 Low to Moderate (-)				
	Vehicle-entrained fugitive dust emissions.	12 Moderate (-)	Wet suppression techniques will be implemented to limit dust dispersion where and when necessary	Undertake ongoing dust monitoring as per the existing programme.	Ongoing	Environmental Coordinator
	With management measures	8 Low to Moderate (-)				
	Tailpipe emissions from vehicles.	12	A vehicle maintenance schedule	Regular audit or checks to be done	Ongoing	Environmental

Environmental Parameter	Impact Description	Significance	Management Measures	Action Plan	Frequency	Responsible Person
		Moderate (-)	will be investigated and implemented.	on vehicles and equipment		Coordinator
	With management measures	8 Low to Moderate (-)				
Visual	The rehabilitation (ripping, topsoil replacement and landscaping) will remove the visual incongruity. An overall visual improvement will be noticed once all mining related infrastructure has been demolished and the area has been landscaped and revegetated. In general the removal of infrastructure is seen as a positive impact to the environment.	16 Moderate to High (+)	Limit the decommissioning activities to the 10m conveyor servitude as far as possible.	Include access control measures in the areas where rehabilitation is being undertaken.	Ongoing	Environmental Coordinator
			Final shaping will be implemented, such that, the final profile of the rehabilitated mining areas are formed to emulate natural contours of the area.	Update the on-going rehabilitation programme to ensure that disturbed areas can be rehabilitated on an on-going basis, which will include ongoing monitoring.	Ongoing	Environmental Coordinator
				All infrastructures will be removed and the area rehabilitated.	Ongoing	Environmental Coordinator
				Foundations will be removed to a depth of 1m below the surface.	Ongoing	Environmental Coordinator
				All material recovered from the demolition of buildings and/or structures will either be transported to a permitted disposal site, or made available to the local community as building materials (provided they are in a	Ongoing	Environmental Coordinator

Environmental Parameter	Impact Description	Significance	Management Measures	Action Plan	Frequency	Responsible Person
				satisfactory condition following demolition).		
				Linear infrastructure constructed by the mine (i.e. roads, conveyors, railways and power lines) will be removed if it proves to inhibit land use at decommissioning.	Ongoing	Environmental Coordinator
				All fences erected around the mine will be dismantled and either disposed of at a permitted disposal site.		
			The soils and land capability will be rehabilitated to near pre-mining conditions.	Update the on-going rehabilitation programme to ensure that disturbed areas can be rehabilitated on an on-going basis, which will include ongoing monitoring.	Ongoing	Environmental Coordinator
	With management measures	18 Moderate to High (+)				
Noise	Improperly maintained vehicles / machinery may produce excessive noise.	10 Low to Moderate (-)	Vehicles will be equipped with mufflers where practical to reduce the emission of noise.	A pre-planned maintenance plan for vehicles and equipment must be updated.	Ongoing	Environmental Coordinator
			Where noise becomes a nuisance,	A pre-planned maintenance plan		

Environmental Parameter	Impact Description	Significance	Management Measures	Action Plan	Frequency	Responsible Person
	With management measures	5 Low (-)	management measures will be investigated and implemented to address these.	for vehicles and equipment must be updated.		Coordinator
Socio-economic	Prior to the closure of the mine, retrenchments will be made.	20 High (-)	Continue with the skills development programme to empower the workforce to undertake other activities.	Audit and ensure compliance with the Social and Labour Plan	Ongoing	Human Resources
	With management measures	13 Moderate (-)				

10.2 Environmental Monitoring

Ongoing monitoring of the bio-physical and socio-economic environments will continue throughout the life of the project as per the approved EMPR's and the accepted monitoring programmes. Furthermore, Misty Falls 45 (Pty) Ltd. will monitor and assess the performance of the EMP on an ongoing basis.

Monitoring of different environmental aspects/impacts shall take place by means of quantitative and qualitative evaluation techniques in order to determine whether the requirements of the environmental management programme are being complied with.

Monitoring is a continuous data-gathering and control procedure. It may range from routine visual inspections to in-depth investigative monitoring.

Table 10-27: Monitoring programme

Activity	Period
Dust monitoring	Yearly audit reports to be submitted to the DME.
Groundwater monitoring	Quarterly groundwater monitoring reports to be submitted to DWAF.

10.2.1 Groundwater Monitoring

Areas where groundwater monitoring is required in future will be determined by the groundwater study.

Groundwater monitoring boreholes must be monitored on a quarterly basis for one (1) year, this will provide more clarity in terms of possible decant and water quality issues.

The status of the boreholes needs to be confirmed and water levels should be measured. The current water quality status of underground mine water and other water and salt balance data.

10.2.2 Ongoing weed eradication and monitoring of natural vegetation

Ongoing weed eradication is deemed necessary for the mine. A monitoring protocol will be established and implemented by Misty Falls 45 (Pty) Ltd.

The natural vegetation in the vicinity of the mine must be monitored at a regular basis. Fixed-site vegetation monitoring points should be established and monitored annually to detect any degradation caused by mining activities with appropriate action as problems arise.

10.2.3 Air quality/Dust monitoring

Misty Falls 45 (Pty) Ltd. needs to conduct sampling to monitor the dust deposition in the vicinity of the mine. Readings should be conducted every two weeks on predetermined locations and yearly report should be submitted.

10.2.4 Performance Assessment

To ensure the Environmental Management Programme is being implemented correctly and all legal and safety requirements are met the following steps will be taken:

- All procedures (emergency, environmental awareness, rehabilitation strategies, etc.) will continuously be updated;
- All information as required by the various government departments should be captured and be readily available for submission when required;
- Groundwater monitoring occurs on a quarterly basis and is undertaken by outsourced specialists.
- An Environmental Management Programme Performance Assessment will be undertaken every two years as required by the MPRDA and will be submitted to the DME; and
- The financial provision (method and quantum) will be updated every two (2) years as part of the Environmental Programme Performance Assessment in terms of the MPRDA.

10.3 Environmental Awareness Plan

Misty Falls 45 (Pty) Ltd. will implement an Environmental Awareness Plan (EAP) at the proposed mine. The material/source of information for the EAP will be the approved Environmental Management Programme Report(s), as well as other relevant specialist reports. The environmental awareness plan is detailed in the table below

Table 10-28: Environmental Awareness plan

Aspects	Objectives	Description	Time Period	Responsible Party/Person
1. Environmental policy	Demonstrate management commitment to responsible environmental management	<p>Top management has a role to play in building awareness and motivating employees by explaining the company's environmental values and communicating its commitment to environmental policy. All workers of the company should understand and be encouraged to accept the importance of implementing the environmental management program.</p> <p>Motivation to continually improve can be enhanced when employees are recognized for achieving environmental objectives and targets and encouraged to make suggestions that can lead to improved environmental performance.</p>	Will be in place with commencement of proposed mining	Environmental Manager
2. Communication	<p>Describe the manner in which Misty Falls 45 (Pty) Ltd will inform employees of any environmental risks which may result from their work and;</p> <p>The manner in which the risks must be dealt with in order to avoid pollution or the degradation of the environment</p>	<p>How do the employees receive the information?</p> <p>At safety training sessions;</p> <p>Induction programmes;</p> <p>Regular publications and information leaflets;</p> <p>Bulletin boards (posters),</p> <p>Electronic mail messages,</p> <p>Forum meetings, which involves the local I & AP's and the DME.</p> <p>Communicate and consult with employees and contractors</p>	Will be in place with commencement of proposed mining	Management & Environmental Manager

Aspects	Objectives	Description	Time Period	Responsible Party/Person
3. Information	To ensure that all environmental information is understandable and communicated.	<p>in developing HSEC systems and improvements.</p> <p>An Emergency Plan must be compiled and placed around the mine where it will be easily viewed, it should also be directly communicated to all employees.</p> <p>Information from internal (EMP, etc) and external sources would be put in a language understandable to workers.</p> <p>Environmental information will be communicated via the methods spelled out above.</p>	Will be in place with commencement of proposed mining	Environmental Manager
4. Training	To train employees to enable them to implement all relevant information.	<p>All employees should receive basic environmental awareness training, either as induction training or later at special training sessions. Different levels of responsibility in relation to individual's potential impact on the environment must be addressed in the training session.</p> <p>Further motivation of the workforce will be achieved through in-house training and attending short courses with regard to environmental management, etc.</p> <p>Appropriate training relevant to the achievement of the environmental policy, implementation of the environmental management program will be provided to all personnel. Employees shall have an appropriate knowledge base. Misty Falls 45 (Pty) Ltd will also ensure that the contractors working on site provide evidence that they have the requisite knowledge and skills to perform the work in an "environmentally responsible manner".</p>	Will be in place with commencement of proposed mining	Environmental Manager

Aspects	Objectives	Description	Time Period	Responsible Party/Person
5. Reporting	To ensure all incidents are reported and dealt with immediately.	<p>Education and training is needed to ensure that the employees' knowledge of regulatory requirements, internal standards and policies and objectives is current.</p> <p>Every environmental incident that might happen and which the workers become aware of should be reported to the manager.</p> <p>The worker can only report on incidents if he is made aware of the possible environmental risks through the communications methods indicated in section 1.</p> <p>A written reporting format should be put in place.</p> <p>Communication includes establishing processes to report internally and, where desired, externally, on environmental activities in order to:</p> <ul style="list-style-type: none"> Demonstrate management commitment to responsible environmental management; Deal with concerns and questions about environmental issues (handled within the Forum); Raise awareness of the organization's environmental policies, environmental management program; and Inform internal or external interested parties about the mine's management system; A formal complaints/concerns reporting system to address I &AP will be put in place (complaints register); 	Will be in place with commencement of proposed mining	All

Aspects	Objectives	Description	Time Period	Responsible Party/Person
		Misty Falls 45 (Pty) Ltd. will regularly communicate with the affected community. This communication must address new developments, problems, achievements and all other relevant aspects of mutual interest.		

10.4 Environmental Preparedness and Response

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

Environmental emergencies occur over the short term and require an immediate response. An Emergency Plan must be compiled and disseminated to all employees and contractors and in the event of an emergency, the emergency response plan should be consulted.

This plan should be placed around the mine where it will be easily viewed and also directly communicated to all employees. The plan should contain a list of procedures, evacuation routes and a list of emergency contact numbers. It is advisable that the mine tests the emergency response plan in order to identify any areas for improvement.

If the emergency has the potential to affect surrounding communities, they should be alerted via alarm signals or contacted in person. The surrounding community will be informed, prior to mining taking place, of the potential dangers and emergencies that exist, and the actions to be taken in such emergencies.

Communication is vital in an emergency and thus communication devices, such as mobile phones, two-way radio's, pagers or telephones, must be placed around the mine. A checklist of emergency response units must be consulted and the relevant units notified.

The checklist includes:

- Fire department;
- Police;
- Emergency health services such as ambulances, paramedic teams, poisons centres;
- Hospitals, both local and further a field, for specialist care;
- Public health authorities;
- Environmental agencies, especially those responsible for air, water and waste issues;
- Other industrial facilities in the vicinity with emergency response facilities;
- Public works and highways departments, port and airport authorities; and
- Public information authorities and media organisations.

Environmental Parameter	Risk	Communication Strategy			Mitigation Activity
		Management	Administration	Mine Workers	
Fauna	Disturbance to Fauna	Workshops; Induction and awareness training; and information leaflets	Workshops; Induction and awareness training; and information leaflets	Workshops; Induction and awareness training; and information leaflets	The management of chemicals and hydrocarbons should form part of the emergency preparedness and response programme. No activities associated with hydrocarbons and or chemicals (i.e. wash bays etc.) may be undertaken outside of an effectively designed contained area. Workers must be educated on animal species Report any rare or endangered species
		Workshops; Induction and awareness training; and information leaflets	Workshops; Induction and awareness training; and information leaflets	Workshops; Induction and awareness training; and information leaflets	
Flora	Damage to flora	Workshops; Induction and awareness training; and information leaflets	Workshops; Induction and awareness training; and information leaflets	Workshops; Induction and awareness training; and information leaflets	Hunting and trapping of fauna will be strictly prohibited
		Workshops; Induction and awareness training; and information leaflets	Workshops; Induction and awareness training; and information leaflets	Workshops; Induction and awareness training; and information leaflets	
Surface Water	Surface Water contamination	Workshops; Induction and awareness training; and information leaflets	Workshops; Induction and awareness training; and information leaflets	Workshops; Induction and awareness training; and information leaflets	Limit the area of disturbance to the footprint area of the affected sites only.
		Workshops; Induction and awareness training; and information leaflets	Workshops; Induction and awareness training; and information leaflets	Workshops; Induction and awareness training; and information leaflets	
Groundwater	Ground Water contamination	Workshops; Induction and awareness training; and information leaflets	Workshops; Induction and awareness training; and information leaflets	Workshops; Induction and awareness training; and information leaflets	See above for the correct handling and storage of hydrocarbons Limit water use and recycle where possible
		Workshops; Induction and awareness training; and information leaflets	Workshops; Induction and awareness training; and information leaflets	Workshops; Induction and awareness training; and information leaflets	

Environmental Parameter	Risk	Communication Strategy Management	Administration leaflets	Mine Workers leaflets	Contractors	Mitigation Activity
Contamination of soil		Workshops; Induction and awareness training; and information leaflets	Workshops; Induction and awareness training; and information leaflets	Workshops; Induction and awareness training; and information leaflets	Induction	All hydrocarbons should be stored in designated, bunded areas with a capacity of at least 110% of the volume stored. Spill kits should be readily available and all employees must be trained in the utilisation thereof. Should a spill take place the area should be cleaned immediately and the contaminated area will be rehabilitated as appropriate. Prevent spillages by the implementation of good housekeeping practices. The management of chemicals and hydrocarbons should form part of the emergency preparedness and response programme. In the event of a major spill that could result in major soil and water contamination the DWAF should be informed immediately and a remediation strategy should be enforced. The management of chemicals and hydrocarbons should form part of the emergency preparedness and response programme. No activities associated with hydrocarbons and or chemicals (i.e. wash bays etc.) may be undertaken outside of an effectively designed contained area. Topsoil will be stripped to at least 250mm or until hard rock is reached Stockpile soils separately from rocks and or spoil
Loss of soil structure/fertility		Workshops; Induction and awareness	Workshops; Induction and awareness	Workshops; Induction and awareness	Induction	

Environmental Parameter	Risk	Communication Strategy	Mine Workers	Contractors	Mitigation Activity
Flora	Invader species	Workshops; Induction and awareness training; and information leaflets	Workshops; Induction and awareness training; and information leaflets	Workshops; Induction and awareness training; and information leaflets	Erosion control measures will be implemented The mine will ensure that equipment movement over the stockpiles is limited to reduce soil compaction, soil structure or the associated sandbank. Report any rare or endangered species Vegetation clearing will be done in phases A weed control programme will be implemented.
Surface Water	Surface Water contamination	Workshops; Induction and awareness training; and information leaflets	Workshops; Induction and awareness training; and information leaflets	Workshops; Induction and awareness training; and information leaflets	See above for the correct handling and storage of hydrocarbons All contaminated water to be stored - zero discharge policy
Groundwater	Ground Water contamination due to water drainage	Workshops; Induction and awareness training; and information leaflets	Workshops; Induction and awareness training; and information leaflets	Workshops; Induction and awareness training; and information leaflets	See above for the correct handling and storage of hydrocarbons All contaminated water to be stored - zero discharge policy
Air Quality	Generation of dust	Workshops; Induction and awareness training; and information leaflets	Workshops; Induction and awareness training; and information leaflets	Workshops; Induction and awareness training; and information leaflets	Dust suppression methods will be implemented

Environmental Parameter	Risk	Communication Strategy	Mine Workers	Contractors	Mitigation Activity
Environmental Parameter	Risk	Management information leaflets	Administration information leaflets		
		Workshops; induction and awareness training; and information leaflets	Workshops; induction and awareness training; and information leaflets	Workshops; induction and awareness training; and information leaflets	
Soil	Incorrect rehabilitation	Workshops; induction and awareness training; and information leaflets	Workshops; induction and awareness training; and information leaflets	Workshops; induction and awareness training; and information leaflets	Do the correct placement of soil layers
		Workshops; induction and awareness training; and information leaflets	Workshops; induction and awareness training; and information leaflets	Workshops; induction and awareness training; and information leaflets	Fertilisation programmes will be introduced
Flora	Alien invader species	Workshops; induction and awareness training; and information leaflets	Workshops; induction and awareness training; and information leaflets	Workshops; induction and awareness training; and information leaflets	A weed control programme will be implemented.
		Workshops; induction and awareness training; and information leaflets	Workshops; induction and awareness training; and information leaflets	Workshops; induction and awareness training; and information leaflets	Indigenous vegetation establishment will be encouraged
Surface Water	Water quality deterioration	Workshops; induction and awareness training; and information leaflets	Workshops; induction and awareness training; and information leaflets	Workshops; induction and awareness training; and information leaflets	Detailed water monitoring programme to be implemented.

Table 10-31: Environmental Awareness Plan for the Decommissioning Phase

Environmental Parameter	Risk	Communication Strategy	Mine Workers	Contractors	Mitigation Activity
Groundwater	Ground Water contamination	Management and Administration	Induction and awareness training; and information leaflets	Induction and awareness training; and information leaflets	implemented.
		Induction and awareness training; and information leaflets	Workshops; Induction and awareness training; and information leaflets	Workshops; Induction and awareness training; and information leaflets	
Air Quality	Generation of dust	Induction and awareness training; and information leaflets	Workshops; Induction and awareness training; and information leaflets	Workshops; Induction and awareness training; and information leaflets	Detailed water monitoring programme to be implemented.
		Workshops; Induction and awareness training; and information leaflets	Workshops; Induction and awareness training; and information leaflets	Workshops; Induction and awareness training; and information leaflets	
					Dust suppression methods will be implemented

11. IDENTIFICATION OF GAPS

The following information gaps have been identified.

11.1 Authority feedback on environmental Scoping Report

At the date of submitting the EIA and EMP report, no comments had been received from the authorities regarding the Scoping Report.

11.2 Geohydrological Impact Assessment

At the date of submitting the EIA and EMP report, the Geohydrological Impact Assessment was not finalised yet and will be submitted upon completion thereof.

11.3 Vegetation Diversity Study

The study was conducted during mid winter of 2009 and severe frost had already occurred in the area by the time of the study. Some plant species were difficult or impossible to identify and others, especially geophytes and some annuals might have been missed entirely as a result of winter conditions.

12. ENVIRONMENTAL IMPACT STATEMENT

This section provides a summary of the key findings of this impact assessment, provides a comparative assessment of the positive and negative implications of the proposed activity and provides an opinion as to whether the activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation.

There is existing infrastructure in the project area with a well-established network of roads and electrical power lines. Existing servitudes will be used as far as possible.

12.1 Specialist Studies Conclusions

During the EIA/EMP compilation phase, the following specialist investigations were conducted:

- Air Quality Impact Assessment;
- Archaeological and Heritage Impact Assessment;
- A Botanical Study;
- Groundwater; and
- A Traffic Impact Assessment;

The main impacts associated with this project is summarised below in the specialist studies conclusion:

12.1.1 Air Quality Impact Assessment

The proposed activities will result in dust emissions, both from mining activities and fugitive emissions from the areas of exposed land. Provided sufficient mitigation measures are instigated, it is unlikely that these emissions will exceed South Africa's guidelines for particulate emissions.

Once the mine is decommissioned, and assuming correct decommissioning procedures as pertains to dust are carried out, no impacts should result beyond the life of the mine. With correct mitigation, all of the intensities described above should be kept below guideline levels.

12.1.2 Archaeological and Heritage Impact Assessment

A number of Stone Age tools and flakes, as well as larger scatters of stone age artifacts, were found in the area. The survey concentrated to a large degree on the ridges and undisturbed portions in the area, while the already disturbed areas (opencast mining and prospecting), making up a large percentage of the area, were only looked at superficially.

The site found is related to recent historical mining activities in the area and is of low cultural heritage significance. Although the artifacts and stone tool scatters are deemed to have low to medium significance, it is recommended that should the opencast mining activities directly impact on these areas, the sites be recorded in more detail and the artifacts collected during surface sampling. This needs to be done by a Principal Investigator for Stone Age Archaeology.

It is recommended that the proposed development can continue, taking into consideration the above recommendations. The subterranean presence of archaeological or historical objects, features or sites should also always be considered. If any of these are uncovered during any construction work or other development activities a professional archaeologist should be called in to investigate.

12.1.3 A Botanical Study

With a total of 224 plant species (205 indigenous and 19 exotic), in five different vegetation units, moderate to high plant species diversity was recorded in the study area. No red data species (SANBI, 2007) were recorded, two protected tree species as listed by the Department of Water Affairs and Forestry (DWAf) (2004 & 2007) were recorded and four plant species that are endemic to Griqualand West were observed in the study area during the time of the study. Five of the 19 exotic plants recorded in the study area are declared weeds (Henderson, 2001) that need to be eradicated. In terms of the amendments to the regulations under the Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983) landowners are legally responsible for the control of invasive alien plants on their properties (Henderson, 2001).

Generally the ecological condition of the natural veld in the study area is moderate to poor. The largest part of the study area show signs of overgrazing in the past with subsequent bush encroachment mainly by the woody shrubs *Acacia mellifera* and *Rhigozum trichotomum*. As is mentioned in the appointment letter of GCS (Pty) Ltd. dated 22 June 2009, parts of the study area have been disturbed by mining activities in the past. These areas, together with areas where recent prospecting took place and bulk samples taken and

old quarries have been left unrehabilitated. The historical mining was concentrated mainly in between the two hills of the western part of Kareepan and this area is earmarked for further mining. The destroyed area and the area that is proposed for further mining is largely situated in Vegetation Unit 1 (The *Putterlickia saxatilis* - *Cymbopogon pospischilii* Open Mountain Shrubland) where one protected tree species, *Boscia albitrunca* (DWAF, 2004 & 2007), mostly in the form of low growing shrubs, was abundant. Four endemic species to Griqualand West were also recorded in this vegetation unit.

The development of any mining operation has a permanent impact on the natural environment surrounding the mine. Land is stripped of all natural vegetation and is eventually replaced an unnatural environment that can never be returned to the original state, not even through rehabilitation. The fragmentation of natural habitats is a definite negative impact, which disrupts the natural flow of ecosystem services and affects all fauna and flora that are dependent on those habitats. Care should be taken not to unnecessarily clear natural vegetation and rehabilitation should take place on a continuous basis and be extensively managed, even after mine closure. As large areas are already disturbed at the proposed mining site it is recommended that all new infrastructure be built on those areas as far as possible. Other recommended mitigation measures together with those mentioned in of this document should be seriously considered and implemented.

12.1.4 Groundwater

The groundwater study was not finalised by the submission date and provided at a later date.

12.1.5 Traffic Impact Assessment

Based on the study, it is believed that the planned iron ore and manganese mining on the Remaining Extent and Portions 1 of the farm Kareepan No. 450 and Portion 1 of the farm Pensfontein No. 449, District of Kuruman, will have a limited traffic impact, and can be approved from a traffic point of view. A decision based on all relevant aspects has to be taken whether trucks from the western portion of the site will use the R325, or whether a parallel road should be constructed.

12.2 Impact Summary

12.2.1 Geology

No additional impacts are envisaged. Only the mining of existing ore dumps will occur.

12.2.2 Topography

No additional linear infrastructure (railway line and gravel roads) will require topographical alterations. Additional buildings and operational infrastructure will have a small significance due to the highly disturbed nature of the application area.

The product and rock waste dumps will be kept to a minimum size during the operation phase. A positive impact will occur during the decommissioning phase due to rehabilitation and landscaping activities.

12.2.3 Soils, land use and land capability

The proposed mining operation will have limited impacts on soils, land use and land capability as most activities will take place within the highly disturbed area that contain little or no topsoil and vegetation.

Hydrocarbon spills during the construction activities, the operation of the diesel loading and hauling vehicles, the operation of the plant, and the maintenance of vehicles and machinery may result in the contamination of soils. The significance of these impacts can be greatly reduced by implementing the management measures pertaining to the handling of hydrocarbons and the cleaning up of spills.

The stripping of vegetation will lead to the exposure of soils, which would make them susceptible to soil erosion. Improper storm water management could also lead to soil erosion and a loss of soil capability.

12.2.4 Fauna and flora

The Historical mining activities and current prospecting activities on site have already led to the disturbance of local fauna. It is therefore unlikely that there will be further impacts associated with the proposed activities.

The proposed mining will take place within the highly impacted mine area and will require no floral stripping. Vegetation will have to be stripped in the proposed plant area. All protected plant species that have been identified will be geo-referenced and permits will be obtained prior to their removal if necessary.

12.2.5 Surface water

It should be noted that there is no permanent surface water present on the proposed mining area, only non-perennial rivers. Therefore, the occurrence of impacts associated with surface water is very low. However these impacts have been discussed due to the fact that there might be an impact on surface water outside the application area.

Hydrocarbon spills during the construction activities, the operation of the diesel loading and hauling vehicles, the operation of the plant, and the maintenance of vehicles and machinery may result in the contamination of surface water. The significance of these impacts can be greatly reduced by implementing the management measures pertaining to the handling of hydrocarbons and the cleaning up of spills.

12.2.6 Groundwater

Groundwater abstraction will be required for processing and potable usage.

Large-scale hydrocarbon spills could result in groundwater contamination. This is unlikely due to the groundwater depths in the area. The significance of the impacts can be reduced even more by implementing the management measures pertaining to the handling of hydrocarbons and the cleaning up of spills.

12.2.7 Air quality

The increase in vehicular traffic on site and the stripping of vegetation will increase dust emissions. The significance of these impacts can be greatly reduced by implementing dust management and suppression measures. The significance of the air quality relating to vehicular emissions can be reduced by maintaining all vehicles and machinery.

12.2.8 Noise and vibrations

Some of the proposed activities on site will contribute to the ambient noise emissions in the area. This will have a limited additional impact due to current existing mining activities in the neighbouring areas and the low population of the area. The significance of the impacts can be reduced by implementing noise management measures and maintaining all vehicles and equipment.

12.2.9 Heritage

No heritage resources of high significance will be impacted by the proposed activities.

12.2.10 Visual

The product and waste rock stockpile will be placed in an already visually impacted area and their sizes will be kept to a minimum and will cause little further visual disturbances. Any dust emissions that could have a visual impact will be handled in the air quality section.

A positive visual impact will occur during the decommissioning phase due to the rehabilitation and landscaping of the historically disturbed areas.

12.2.11 Socio-economic

The proposed mining operation will employ thirty (30) workers from within the borders of the Tsantsabane Local Municipality. It is anticipated that the proposed mining operation will positively impact on the lifestyles of these thirty (30) individuals by providing them with a reliable source of income and implementing the Human Resource Development Plan as contained in the Social and Labour Plan.

It is anticipated that the mine will impact positively on the local economy by appointing local procurement companies, as per the commitments contained in the Procurement Progression Plan contained in the Social and Labour Plan.

The production and sale of iron ore manganese products by the proposed mining operation will contribute to the demand from South African consumers. There is also a possibility

that the international market could be entered. This would contribute to the flow of foreign capital into the South Africa.

12.3 Conclusion

When considering all of the environmental impacts outlined above, it is evident that there are no impacts that can be considered highly significant after the required management measures have been implemented. This is primarily due to the highly disturbed nature of the site due to historical mining activities.

The socio-economic benefits of the activities addressed in this report far outweigh the negative implications. For this reason, it is recommended that the activities outlined above be approved provided the following conditions are met:

- The provisions stipulated within the holistic EMP compiled on behalf of the mine and submitted to the DME are complied with.

13. REFERENCE

BEUKES, N.J. 1986. The Transvaal sequence in Griqualand West. In: Anhaeusser, C.R. and Maske, S. (eds). *Mineral Deposits of Southern Africa*. Johannesburg: Geological Society of South Africa, pp. 819-828.

CASTEEL, K. 2005. Boosting Kalahari manganese production. *Engineering and Mining Journal*. June 2005:54-57.

DU TOIT, A.I. 2004. *Section 21 (i) Water Use License Application Report*. African Water, Environmental and Mining Solutions, Kimberley.

GROBBELAAR, W.S. & BEUKES, N.J. 1986. The Bishop and Glosam Manganese Mines and the Beeshoek Iron Ore Mine of the Postmasburg area. In: Anhaeusser, C.R. and Maske, S. (eds). *Mineral Deposits of Southern Africa*. Johannesburg: Geological Society of South Africa, pp. 957-961.

VAN DER MERWE, J. 1973. *Die geologie van 'n gebied om Campbell, Noord Kaapland, met spesiale verwysing na die serieë Swartrif en Dolomiet*. Unpublished dissertation. University of the Free State, Bloemfontein.

VAN ROOYEN, T.H. 1971. *Soils of the central Orange River basin*. Unpublished Doctor of Science (Agriculture) dissertation. University of the Free State, Bloemfontein.

VAN ROOYEN, N. & BREDENKAMP, G. 1998. Kalahari Plains Thorn Bushveld. In: Low, A.B. & Rebelo, A.G. (eds). *Vegetation of South Africa, Lesotho and Swaziland*. Pretoria: Department of Environmental Affairs and Tourism, p. 35.

VAN SCHALKWYK & BEUKES, N.J. 1986. The Sishen Iron Ore Deposit, Griqualand West. In: Anhaeusser, C.R. and Maske, S. (eds). *Mineral Deposits of Southern Africa*. Johannesburg: Geological Society of South Africa, pp. 931-956.

WHITELAW, H.T. 1998. *Hydrothermal alteration and Pb/Zn mineralization in the Allanridge formation, Ventersdorp Supergroup, near Douglas, Northern Cape Province, South Africa*. Unpublished Master of Science dissertation. University of the Free State, Bloemfontein.

**SPECIALIST VEGETATION DIVERSITY STUDY
REPORT FOR THE REMAINING EXTENT AND
PORTIONS 2, 3, 4 AND 5 OF THE FARM
KAPSTEWEL 436, POSTMASBURG,
NORTHERN CAPE PROVINCE**

July 2009

Compiled by:

A.R. Götze (M.Sc.) *Pr.Sci.Nat.*

ENVIRONMENT RESEARCH CONSULTING
PO Box 20640
Noordbrug
2522

E-mail: erc@telkomsa.net
Tel: 018 291 1486

Mobile: 082 789 4669
Fax: 086 621 4843

TABLE OF CONTENTS

	Page
PART 1 – INTRODUCTION	3-4
1.1 Terms of Reference	3
1.2 Assumptions & Limitations	4
1.3 Approach & Methodology	4
PART 2 – DESCRIPTION OF THE VEGETATION OCCURRING IN THE STUDY AREA	5-15
2.1 General Description of the Study Area	5
2.2 Conservation Status	5
2.3 Plant Diversity	5
2.4 Description of the Vegetation	6
2.5 Endangered, Rare and Protected Plant Species	12
2.6 Exotic Plant Species	14
PART 3 – BOTANICAL IMPACT ASSESSMENT	16-19
PART 4 – PROPOSED MITIGATION FOR EXPECTED IMPACTS	20-21
PART 5 –CONCLUDING REMARKS	22
REFERENCES	23
APPENDIX A:	24-35
Plant Species List	25-35
APPENDIX B:	36-37
Map 1: Vegetation unit map of the farms Kapstewel 436, Postmasburg, Northern Cape Province.	37

Louzan Trading1 cc t/a

ENVIRONMENT RESEARCH CONSULTING

cc registration no: 2005/044901/23

E-mail: erc@telkomsa.net
Mobile: 082 789 4669
Tel: 018 291 1486
Fax: 086 621 4843

PO Box 20640
Noordbrug
2522

SPECIALIST VEGETATION DIVERSITY STUDY REPORT FOR THE REMAINING EXTENT AND PORTIONS 2, 3, 4 AND 5 OF THE FARM KAPSTEWEL 436, POSTMASBURG, NORTHERN CAPE PROVINCE

PART 1 – INTRODUCTION

Environment Research Consulting (ERC) has been contracted by Autumn Skies Trading 128 CC, through GCS (Pty) Ltd, to conduct a specialist vegetation diversity study on the Remaining Extent and Portions 2, 3, 4 and 5 of the farm Kapstewel 436 near Postmasburg in the Northern Cape Province. The study is to form part of the EIA process for an application for mining rights in respect of iron and manganese ore on parts of the mentioned properties by Autumn Skies Trading 128 CC. This document includes the report of the floristic study performed on 26 and 27 July 2009. All aspects of this floristic study were conducted and the report compiled by A.R. Götze (M.Sc.) *Pr.Sci.Nat.*

1.1 TERMS OF REFERENCE

The terms of reference for the plant diversity study include:

- 1.1.1 General description of the floristic component in the study area.
- 1.1.2 Mapping of the broad vegetation units (if more than one) identified in the study area.
- 1.1.3 Compilation of a list of all plant species, including indigenous and exotic plant species, occurring in the study area.
- 1.1.4 Comment on the impacts that the proposed action will potentially have on the floristic component in the study area and where possible to suggest mitigating measures or management strategies and propose action plans.

1.2 ASSUMPTIONS AND LIMITATIONS

This study was conducted during mid winter of 2009 and severe frost has already occurred in the area by the time of this study. Some plant species were difficult or impossible to identify and others, especially geophytes and some annuals might have been missed entirely as a result of current winter conditions.

1.3 APPROACH AND METHODOLOGY

A visual reconnaissance of the study area was done before surveying commenced. Different homogenous vegetation units were identified and subsequently surveyed in order to determine the floristic composition of each. The following data was recorded:

- 1.3.1 All identifiable plant species (Appendix A) including red data or specially protected and exotic plant species in each identified vegetation unit.
- 1.3.2 General ecological and habitat data that may assist in the description of the floristic component of the study area.

A plotless sampling method was employed to record data. Plant species occurring in the study area were identified and included in the plant species list (Appendix A). The floristic composition of each of the identified vegetation units are described and discussed in Part 2 of this document. Plant species identification was done following the checklist of Germishuizen & Meyer (2003). Plant material was collected for identification purposes and where necessary the South African National Biodiversity Institute (SANBI) in Pretoria and other specialists were consulted in order to assist in plant species identification. All collected plant material was donated to the South African National Herbarium of SANBI in Pretoria for possible inclusion into their extensive collection. A vegetation unit map was produced and included in Appendix B (Map 1).

PART 2 – GENERAL DESCRIPTION OF THE VEGETATION OF THE STUDY AREA

2.1. GENERAL DESCRIPTION OF THE STUDY AREA

The study area, which is 3538ha in size, is situated approximately 20km north of Postmasburg on both sides of the R325 road to Kuruman in the Northern Cape Province. Floristically the study area is situated in the Kuruman Thornveld (SVk 9) and the Kuruman Mountain Bushveld (SVk 10) Vegetation Types as described by Mucina & Rutherford (2006).

The landscape of the Kuruman Thornveld (SVk 9) consists of flat rocky plains and some sloping hills which support a well developed, closed shrub layer dominated by *Acacia mellifera* and *Tarchonanthus camphoratus* and sometimes a well developed open tree layer dominated by *Acacia erioloba*. Soils in the area are mostly of the Hutton form and consist of windblown red sand, which vary in depth from shallow to deep (Mucina & Rutherford (2006)). Some shallow, sandy Mispah soils were also observed. The Kuruman Mountain Bushveld (SVk 10) Vegetation Type occurs on rolling hills with generally gentle to moderate slopes and hill pediment areas with open shrubveld and a well developed grass layer. Soils are mostly shallow sandy Hutton and Mispah soils (Mucina & Rutherford (2006)). Rainfall falls in summer and autumn with a mean annual precipitation of between 250mm and 500mm with very dry winters with frost (Mucina & Rutherford, 2006).

2.2 CONSERVATION STATUS

According to Mucina & Rutherford (2006) both the Kuruman Thornveld (SVk 9) and Kuruman Mountain Bushveld (SVk 10) Vegetation Types are classified as Least Threatened. No portions of these two vegetation types are statutorily conserved and both are very little transformed in general. Six endemic taxa occur in the Kuruman Thornveld (SVk 9), of which one is endemic to this vegetation type, two are Kalahari endemics and three are endemic to Griqualand West. Six Griqualand West endemics and one species endemic to the vegetation type occur in the Kuruman Mountain Bushveld (SVk 10) Vegetation Type (Mucina & Rutherford, 2006). The occurrence of endemics in the study area is discussed later in this document (2.4).

2.3 PLANT DIVERSITY

A total of 237 plant species (Species List, Appendix A) were identified in the study area during the time of the study, which indicates moderate to high species diversity. The woody layer (trees & shrubs) is represented by 39 species. The herbaceous layer is made up of 46 grass species and 152 herbaceous shrubs, dwarf shrubs, forbs/herbs and sedges. 87% (207 of 237) of the identified plant species are indigenous to South Africa.

2.4 DESCRIPTION OF THE VEGETATION

During the study five main vegetation units were identified:

- Vegetation Unit 1: The *Putterlickia saxatilis* – *Cymbopogon pospischilii* Open Mountain Shrubland
- Vegetation Unit 2: The *Acacia mellifera* – *Stipagrostis uniplumis* Closed Shrubland
- Vegetation Unit 3: The *Rhus lancea* – *Oropetium capense* Open Woodland
- Vegetation Unit 4: The *Tarchonanthus camphoratus* – *Eragrostis lehmanniana* Open Shrubland
- Vegetation Unit 5: The vegetation of severely disturbed and degraded areas

Vegetation Unit 1

The *Putterlickia saxatilis* – *Cymbopogon pospischilii* Open Mountain Shrubland

This vegetation unit (Figure 1) is situated on mountainous terrain of the Kuruman Mountain Bushveld (SVk 10) Vegetation Type (Mucina & Rutherford, 2006) in the study area on shallow sandy to loamy soils. The vegetation of this unit is dominated by shrubs and grasses with some low trees that occur scattered throughout the unit. The general estimated veld condition is moderate to good, with the main cause of degradation being prospecting and mining for iron and manganese ore in the past as well as some signs of heavy grazing in the past. Overall, however, the vegetation of this unit is in a good state. With 132 plant species recorded, floristically the *Putterlickia saxatilis* – *Cymbopogon pospischilii* Open Mountain Shrubland Vegetation Unit is the most diverse of the vegetation units in the study area. 37 of the 132 species were recorded only in this vegetation unit in the study area. The protected tree species *Boscia albitrunca* (DWAf, 2004 & 2007) was abundant in this vegetation unit, but mostly in the form of low growing shrubs that are kept that way by browsing animals. Four endemic species to Griqualand West were also recorded. They are the woody shrubs *Putterlickia saxatilis* and *Lebeckia macrantha*, the herb *Blepharis marginata* and the grass species *Digitaria polyphylla*.

The dominant woody species in this vegetation unit are *Putterlickia saxatilis*, *Rhus ciliata*, *R. burchellii*, *Tarchonanthus camphoratus*, *Lebeckia macrantha* and *Euclea undulata*. Dominant grass species are *Cymbopogon pospischilii*, *Aristida scabrivalvis*, *Eragrostis curvula*, *Sporobolus fimbriatus*, *Eragrostis nindensis* and *Brachiaria nigropedata*. The most prominent herbs include *Chrysocoma ciliata*, *Chascanum pinnatifidum* var. *pinnatifidum*, *Peliostomum leucorrhizum*, *Sutera halimifolia*, *Hermannia bryoniifolia*, *Anthospermum rigidum* subsp. *pumilum* and the shrub *Stachys burchelliana*.

A variation of this vegetation unit was observed between what looks like an un-rehabilitated rock dump and a rehabilitated mine dump on a mountain side on the farm Kapstewel (Figure 2). In this area the prominent woody species is *Croton gratissimus* var. *gratissimus*, which is considered to be rare in the Kuruman Mountain Bushveld (SVk 10) Vegetation Type (Mucina & Rutherford, 2006). The dominant grasses in this variation is similar to the the rest of the vegetation unit with the addition of *Cenchrus ciliaris*, which could have been introduced in high numbers from the rehabilitated mine dump below where it was planted. The herbaceous shrub *Psiadia punctulata* was also prominent in this variation.



Figure 1: the *Putterlickia saxatilis* – *Cymbopogon pospischilii* Open Mountain Shrubland.

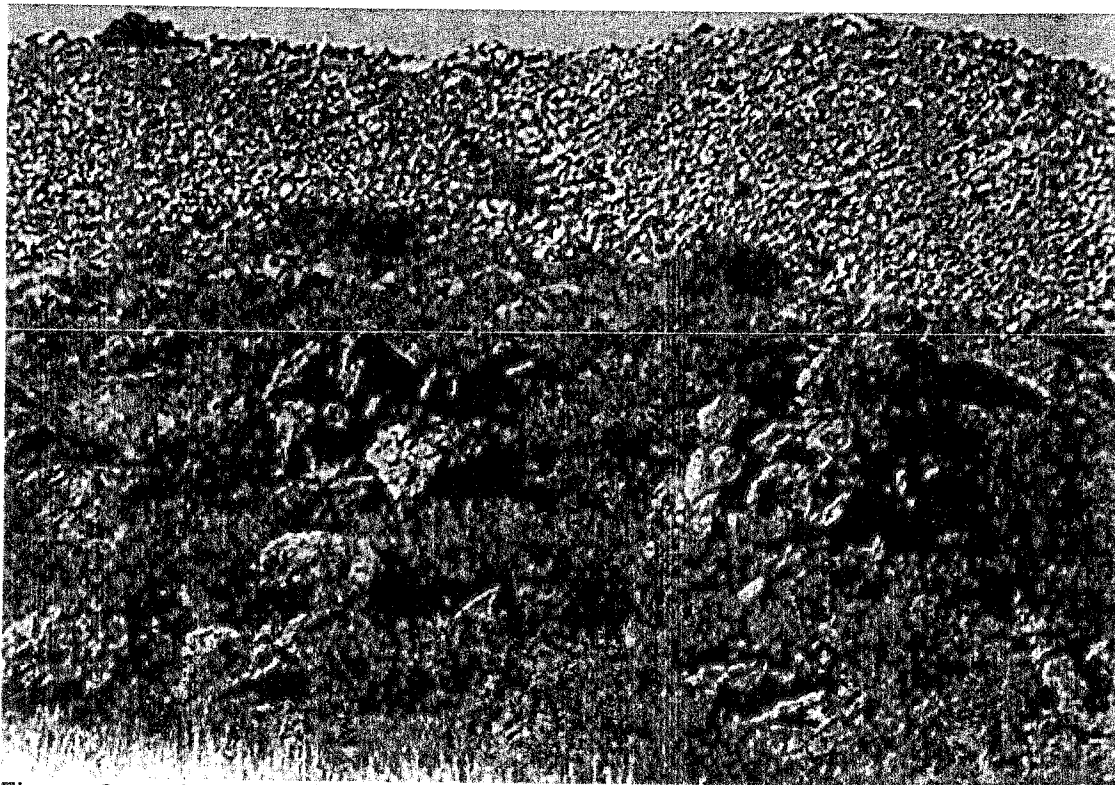


Figure 2: variation of the *Putterlickia saxatilis* – *Cymbopogon pospischilii* Open Mountain Shrubland.

Vegetation Unit 2

The *Acacia mellifera* – *Stipagrostis uniplumis* Closed Shrubland

The *Acacia mellifera* – *Stipagrostis uniplumis* Closed Shrubland Vegetation Unit (Figure 3) is situated on moderately deep to shallow sandy, rocky soils. Topographically it is situated on the foot slopes of Vegetation Unit 1 and is dominated by woody shrubs. This vegetation unit is mostly situated in the Kuruman Thornveld (SVk 9) Vegetation Type (Mucina & Rutherford, 2006). In general this vegetation unit was observed to be slightly overgrazed and in some places heavily bush encroached by the woody shrubs *Acacia mellifera* and *Rhigozum trichotomum*. 127 plant species were recorded in this unit during the time of the study and 17 of those were only recorded in this vegetation unit in the study area. The protected tree species *Acacia erioloba* and *Boscia albitrunca* (DWAF, 2004 & 2007) occurs sparsely in this vegetation unit. The three Griqualand West endemics *Putterlickia saxatilis*, *Lebeckia macrantha*, and *Blepharis marginata* were also recorded.

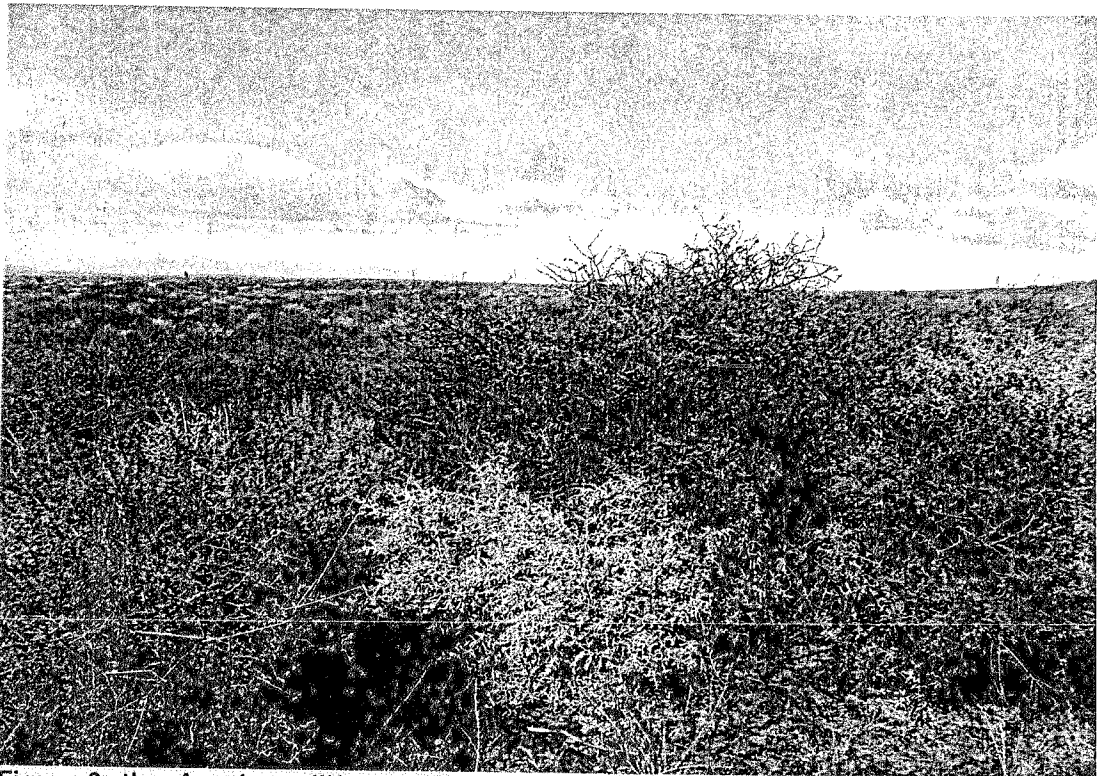


Figure 3: the *Acacia mellifera* – *Stipagrostis uniplumis* Closed Shrubland Vegetation Unit.

The woody layer is very well developed in this vegetation unit and is dominated by shrubs that include the species *Acacia mellifera*, *Tarchonanthus camphoratus*, *Rhus burchellii*, *Rhigozum trichotomum* and *Lycium cinereum*. The herbaceous layer is dominated by the grasses *Stipagrostis uniplumis*, *Eragrostis lehmanniana*, *Aristida congesta* and *Heteropogon contortus*, and the dwarf shrubs and herbs *Pteronia mucronata*, *Pentzia calcarea*, *Peliostomum leucorrhizum*, *Chrysocoma ciliata*, *Leucas capensis* and *Selago dinteri* subsp. *pseudodinteri*.

Vegetation Unit 3

The *Rhus lancea* – *Oropetium capense* Open Woodland

This vegetation unit (Figure 4) is situated in areas where water accumulates during wet periods. It forms part of the Kuruman Thornveld (SVk 9) Vegetation Type (Mucina & Rutherford, 2006) and occurs on shallow to moderately deep dolomitic and sometimes calcareous loamy soils. The vegetation of this unit is dominated by tree clumps and grasses and appears to generally be in a moderate to poor veld condition. Signs of heavy grazing in the past are clearly visible in some parts of this vegetation unit. With only 64 plant species recorded in this vegetation unit of which only four were only recorded in this vegetation unit in the study area, it is the least diverse vegetation unit in the study area.

The well developed woody layer is dominated by *Rhus lancea*, *Diospyros lycioides*, *Ziziphus mucronata* and *Tarchonanthus camphoratus*. The grass dominated herbaceous layer is dominated by the grasses *Oropetium capense*, *Enneapogon desvauxii*, *Aristida adscensionis*, *Cynodon dactylon*, *Eragrostis lehmanniana*, and *Setaria verticillata*. Dominant herbs in this vegetation unit are *Selago densiflora*, *Geigeria burkei*, *Pentzia globosa* and *Chrysocoma ciliata*.

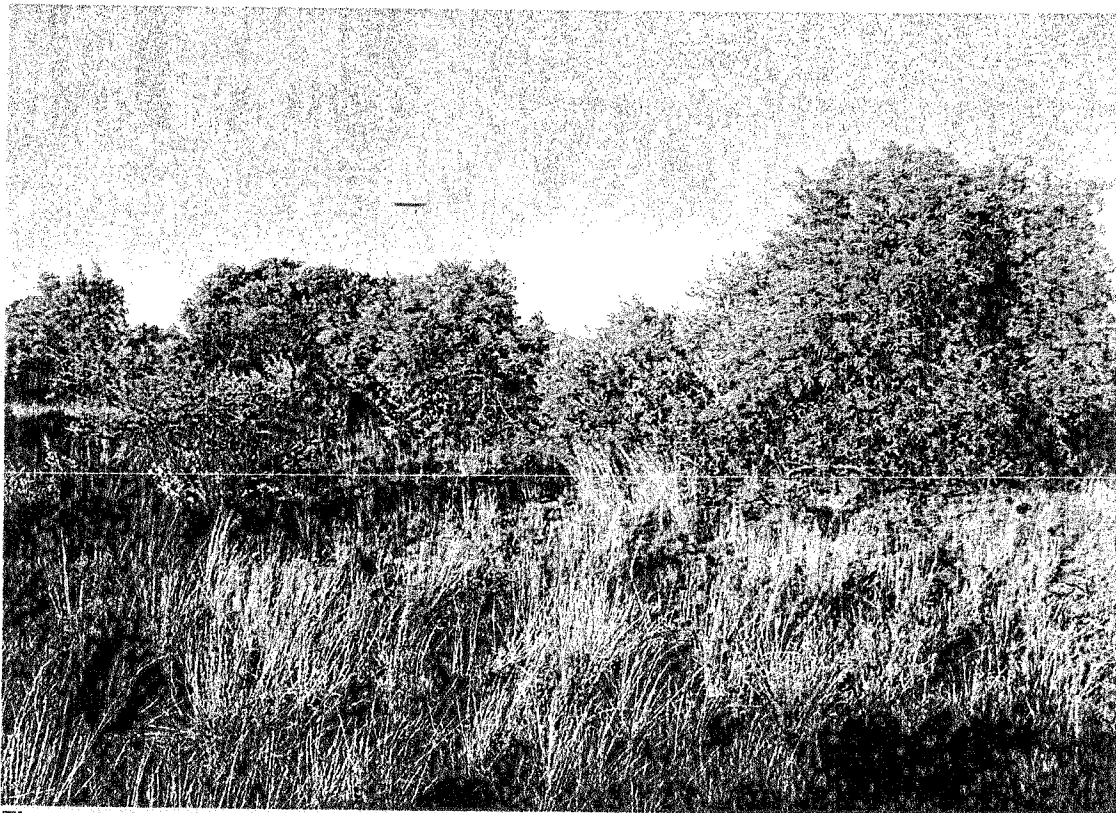


Figure 4: the *Rhus lancea* – *Oropetium capense* Open Woodland.

Vegetation Unit 4

The *Tarchonanthus camphoratus* – *Eragrostis lehmanniana* Open Shrubland

This open shrubland vegetation unit (Figure 5) is dominated by the shrub layer with trees scattered throughout the unit and is situated on shallow to deep sandy soils. Ecologically the *Tarchonanthus camphoratus* – *Eragrostis lehmanniana* Open Shrubland appears to be in a moderately good to good condition, with signs of degradation mainly in the form of disturbance due to prospecting and some heavy grazing in the past. Limited bush encroachment was also observed. 97 plant species were recorded of which 13 were recorded only in this vegetation unit in the study area. A number of specimens of the protected *Acacia erioloba* and *Boscia albitrunca* (DAAF, 2004 & 2007) were recorded in this vegetation unit.

The well developed woody layer is strongly dominated by *Tarchonanthus camphoratus*. Other woody species of importance in this vegetation unit are the protected *Acacia erioloba*, and *Euclea undulata*, *Rhus burchellii*, *R. ciliata*, and *Ziziphus mucronata*. In the herbaceous layer the grass species *Eragrostis lehmanniana*, *Stipagrostis uniplumis*, *Pogonarthria squarrosa*, *Schmidtia pappophoroides* and *Aristida congesta* are dominant together with the herbs *Selago densiflora*, *Chrysocoma ciliata*, *Pentzia sphaerocephala*, and *Pollichia campestris* as well as the herbaceous shrub *Hertia pallens*.

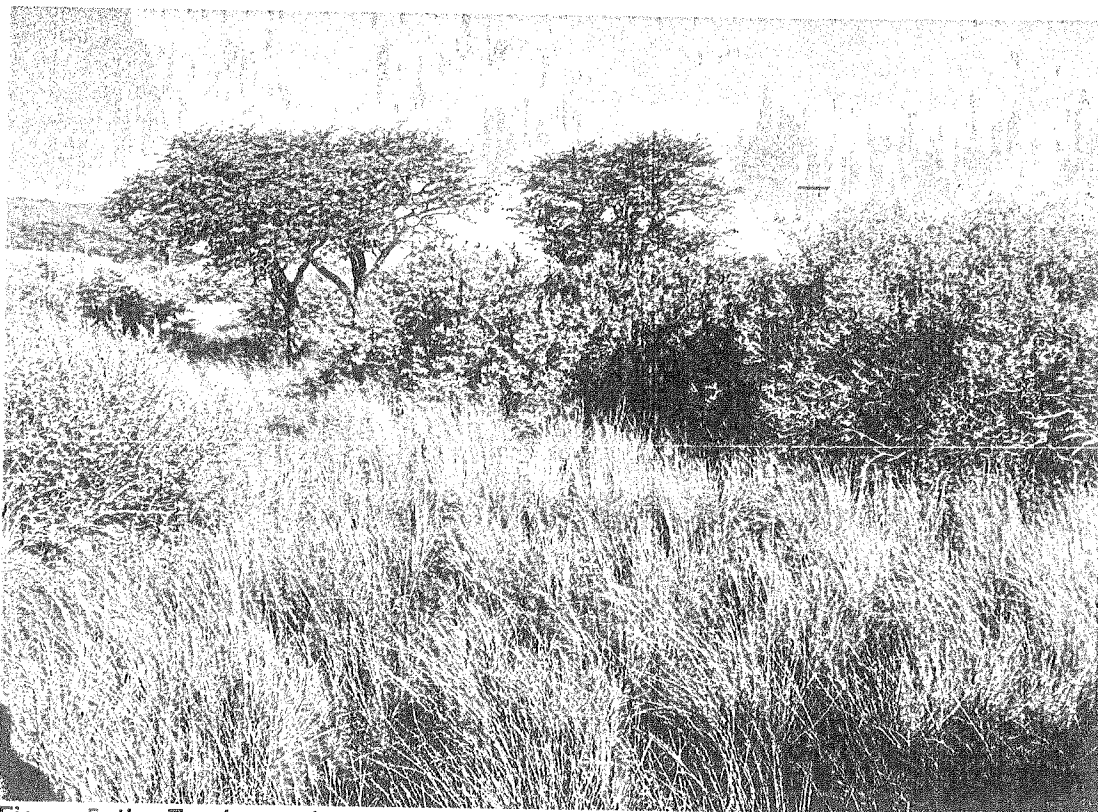


Figure 5: the *Tarchonanthus camphoratus* – *Eragrostis lehmanniana* Open Shrubland.

Vegetation Unit 5

The vegetation of severely disturbed and degraded areas

This vegetation unit is situated on areas that were partially or totally destroyed as a result of prospecting; mining; ore processing or other anthropogenic land uses and is still operational or un-rehabilitated (Figure 6). The vegetation occurring on these areas consists of a mixture of fragmented natural vegetation and pioneer vegetation in areas where the soil surface has been disturbed or totally stripped of natural vegetation. It also includes vegetation that has established on un-rehabilitated mine dumps, processing areas, opencast mining areas, etc. One rehabilitated mine dump (Figure 7), where the grass species *Cenchrus ciliaris* dominates, is included in this vegetation unit.

The pioneer vegetation that established in these disturbed and degraded areas include a number of alien plants. Many of them are annual species, but many are perennial, declared weeds and invaders. The dominant vegetation of these areas varies from area to area, but the most common plant species include the woody indigenous plants *Tarchonanthus camphoratus*, *Rhus ciliata*, *Acacia mellifera*, *A. tortilis* subsp. *heteracantha* and *Ziziphus mucronata*, and the exotic trees *Prosopis glandulosa*, *Melia azedarach*, *Jacaranda mimosifolia* and *Opuntia ficus-indica* as well as the grasses *Aristida adscensionis*, *A. congesta*, *Chloris virgata*, *Cynodon dactylon*, *Eragrostis curvula*, *E. echinocloidea* and *Melinis repens*. The indigenous herbs *Dicoma capensis*, *Eriocephalus ericoides*, *Laggera decurrens* and the exotic herbs *Alternanthera pungens*, *Chenopodium carinatum*, *Datura ferox*, *D. stramonium*, *Lepidium bonariense*, *Bidens bipinnata* and *Tagetes minuta* are also abundant in these areas.

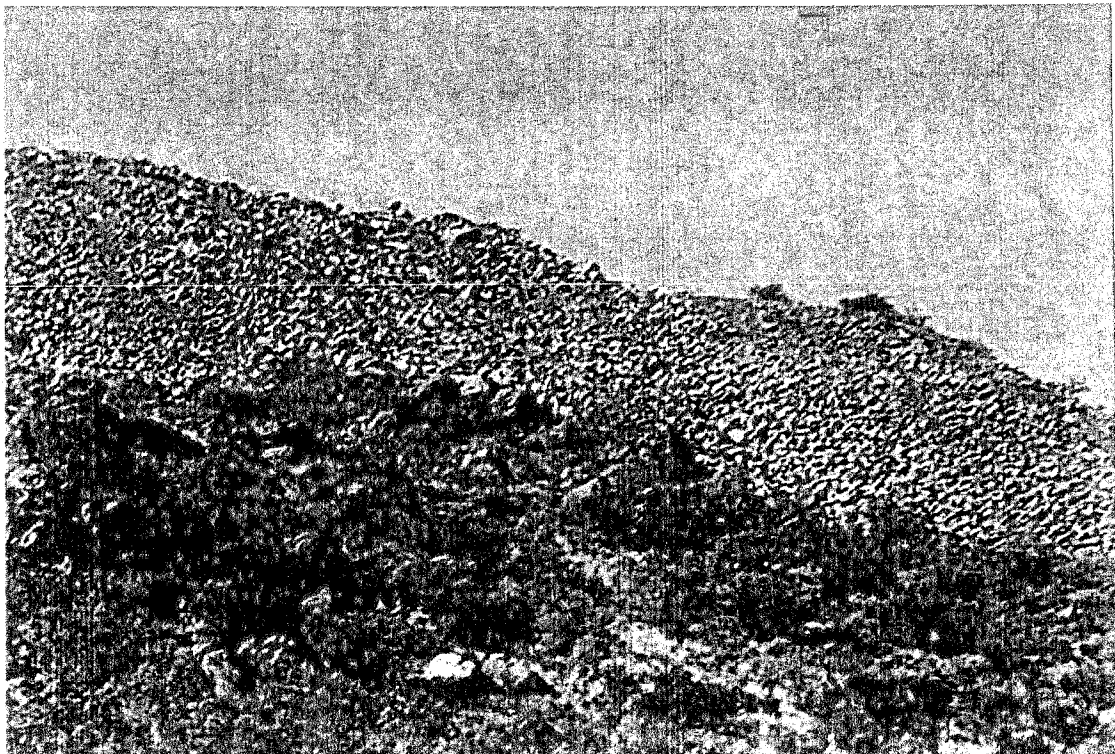


Figure 6: an un-rehabilitated mine dump on a mountain crest on the farm Kapstewel



Figure 7: a rehabilitated mine dump on the farm Kapstewel

2.4 ENDANGERED, RARE, AND PROTECTED PLANT SPECIES

The latest red data list of SANBI (2007) and the protected tree lists of the Department of Water Affairs and Forestry (DWAF) (2004 & 2007) were consulted in the assessment of red data and protected plant species occurring in the areas that were studied. No red data species were recorded, two protected tree species (Table 1), *Acacia erioloba* (figure 8) and *Boscia albitrunca* (Figure 9) were, however, encountered.

Table 1: List of protected tree species occurring on the farm Kareepan, Postmasburg.

Species name	Growth form	Status
<i>Acacia erioloba</i> E.Mey.	Tree	Protected (DWAF, 2007)
<i>Boscia albitrunca</i> (Burch.) Gilg & Gilg-Ben.	Tree	Protected (DWAF, 2007)

Four plant species, which according to Mucina & Rutherford (2006) are endemic to Griqualand West, were also encountered in the study area (Table 2).

Table 2: List of Griqualand West endemic plant species occurring on the farm Kareepan, Postmasburg.

Species name	Growth form
<i>Blepharis marginata</i> (Nees) C.B.Clarke	Herb
<i>Digitaria polyphylla</i> Henrard	Grass
<i>Lebeckia macrantha</i> Harv.	Shrub
<i>Putterlickia saxatilis</i> (Burch.) M.Jordaan	Shrub / Tree

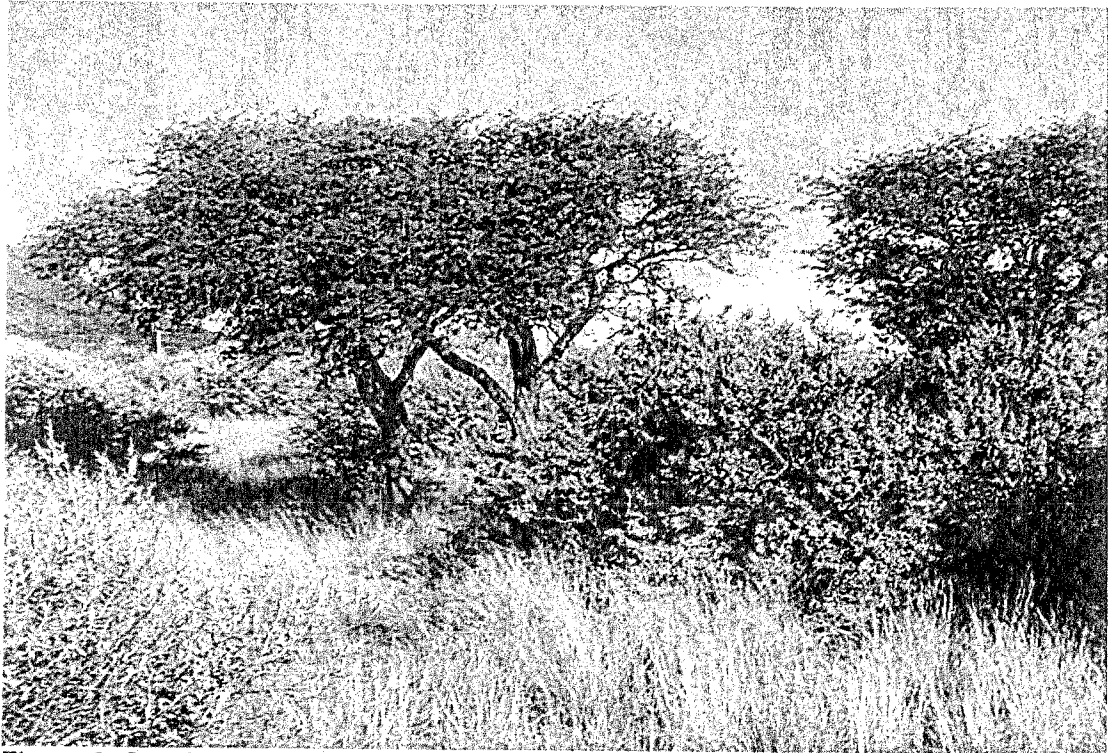


Figure 8: Specimens of the protected *Acacia erioloba* on the farm Kapstewel



Figure 9: A specimen of the protected *Boscia albitrunca*

2.5 EXOTIC PLANT SPECIES

Table 3 summarizes the extent of exotic plant species in the study area.

Table 3: A summary of indigenous vs. exotic plant species occurring in the study area.

Total number of plant species in study area	Number (& percentage of total) of indigenous plant species	Number (& percentage of total) of exotic plant species	Relationship of indigenous vs. exotic plant species	Number (& percentage of exotics) of declared weeds & invaders
237	207 (87%)	30 (13%)	7 : 1	25 (83%)

Of the 30 exotic plant species that were observed in the study area 11 are woody species, one a grass species and 18 are herbaceous shrubs and forbs. Of the 30 exotic plant species 25 are listed by Henderson (2001) as declared weeds and invaders (10 trees, one grass and 14 herbaceous shrubs or forbs). The number of exotic species that are not declared weeds or invaders versus the high number of declared weeds or invaders is somewhat alarming. This high number can be ascribed to mining activities in the past and the historical infrastructure connected to it. Many exotic trees were planted in the gardens between buildings that now lay in ruin and along roadsides.

All exotic plant species in the species list (Appendix A) are preceded by an asterisk (*) and indicated by the letter "E" in the comments column. In addition the invasive status (declared weed category 1; declared invader categories 2 & 3) (Table 4) of the species, according to Henderson (2001) is indicated in the comments column of the species list as follows:

- E – no invasive status
- E1 – declared weed category 1
- E2 – declared invader category 2
- E3 – declared invader category 3
- EX1, EX2 or EX3 – proposed weed or invader

Table 4: Description of the invasive status of exotic plant species according to Henderson (2001).

INVASIVE STATUS (CATEGORY)	DESCRIPTION
Declared weed (category 1) – E1	<ul style="list-style-type: none"> • Prohibited on any land or water surface in South Africa • Must be controlled or eradicated where possible (except in biological control reserves).
Declared invader (category 2) – E2	<ul style="list-style-type: none"> • Allowed only in demarcated areas under controlled conditions • Import of propagative material and trading allowed only by permit holders • Outside demarcated areas, it must be controlled, or eradicated where possible (except in biological control reserves) • Prohibited within 30 m of the 1:50 year flood-line of watercourses or wetlands unless authorization is obtained.
Declared invader (category 3) – E3	<ul style="list-style-type: none"> • No further plantings of these species are allowed (except with special permission) • Trade of propagative material is strictly prohibited • Existing plants may remain but must be prevented from spreading • Prohibited within 30 m of the 1:50 year flood-line of watercourses or wetlands, or as directed

The tree species *Prosopis glandilosa*, regarded as one of the 12 agriculturally most important invasive alien plants in South Africa (Mucina & Rutherford, 2006; Hoffman *et al*, 1999), occurs scattered in the study area.

PART 3 – BOTANICAL IMPACT ASSESSMENT

The botanical impact assessment was done to specifications set out by GCS (Pty) Ltd. in the appointment letter dated 22 June 2009.

Each expected impact was assessed and rated in terms of probability, extent, intensity and duration. To determine the significance of each expected impact a numerical value was linked to each rating scale, where the sum of these numerical values (score) defines the significance of the impact. The criteria for the assessment are as follows (Tables 5 – 9):

Table 5: Probability

Category	Rating	Description
Definite	4	Impact will definitely occur
Probable	3	Impact is highly likely to occur
Possible	2	Impact has some possibility, but low likelihood of occurring
Improbable	1	Impact will definitely occur

Table 6: Extent

Category	Rating	Description
Site	1	Immediate project site
Local	2	Up to 5km from project site
Regional	3	20km radius from project site
Provincial	4	Provincial
National	5	South African
International	6	Neighbouring countries / overseas

Table 7: Duration

Category	Rating	Description
Very short-term	1	Less than 24h
Short-term	2	Less than 1 year
Medium-term	3	1 – 5 years
Long-term	4	5 – 15 years
Very long-term	5	More than 15 years
Permanent	6	Permanent

Table 8: Intesity

Category	Rating	Description
Very low	0	Impact affects environment that natural, cultural & social functions are not affected.
Low	2	Impact affects environment that natural cultural & social functions are only marginally affected.
Medium	4	Affected environment is altered but natural cultural & social functions and processes continue albeit in a modified way.
High	6	Where natural cultural & social functions or processes are altered to the extent that they will temporarily cease.
Very high	8	Where natural cultural & social functions or processes are altered to the extent that they will permanently cease.

The numerical value of each criterion is added together to give the significance score and rating.

Table 9: Significance

Score	Significance Rating
3 – 6	Low
7 – 10	Low to Moderate
11 – 15	Moderate
16 – 19	Moderate to High
20 – 24	High

The most important expected impacts on the vegetation during the construction phases of the proposed mining development are outlined in Table 10.

Table 10: Botanical impact assessment

Expected impact	Impacted resource	Probability of occurrence		Extent		Duration		Intensity of impact		Significance of impact	
		Category	Rating	Category	Rating	Category	Rating	Category	Rating	Score	Rating
Land clearing ¹	Loss of topsoil	Probable	3	Site	1	Permanent	6	Very high	8	18	Moderate to high
	Loss and/or fragmentation of habitats	Definite	4	Site	1	Permanent	6	Very high	8	19	Moderate to high
	Loss of plant diversity (important plant populations)	Definite	4	Local	2	Permanent	6	High	6	18	Moderate to high
	Risk of losing unknown diversity	Possible (this could change when proper seasonal data is acquired)	2	Site	1	Permanent	6	Low	2	11	Moderate
	Disturbance/ eradication of red data plant species	Possible (this could change when proper seasonal data is acquired)	2	Site	1	Permanent	6	Medium	4	13	Moderate
	Disturbance/ eradication of protected trees	Definite	4	Site	1	Permanent	6	Medium	4	15	Moderate
	Disturbance/ eradication of endemic plants	Definite	4	Site	1	Permanent	6	Low	2	13	Moderate

¹ Land clearing refers to any action where land is cleared of natural vegetation for the purposes of ore extraction and processing, the construction and operation of mine infrastructure (construction camps, buildings, processing plants, workshops, etc.), roads, railway tracks, powerlines, ore stockpiles, waste rock dumps, etc.

Expected impact	Impacted resource	Probability of occurrence		Extent		Duration		Intensity of impact		Significance of impact	
		Category	Rating	Category	Rating	Category	Rating	Category	Rating	Score	Rating
Land clearing (continued)	Establishment of populations of alien invasive species in disturbed areas	Definite	4	Site	1	Very long-term	5	Low	2	12	Moderate
	Spread of alien invasive species to neighbouring natural vegetation	Possible	2	Local	2	Permanent	6	Medium	4	14	Moderate
	General degradation of surrounding vegetation as a result of mining activities	Probable	3	Site	1	Very long-term	5	Low	2	11	Moderate
Dust from blasting, rock dumping, ore processing, loading, transport, etc.	General degradation of surrounding vegetation	Probable	3	Local	2	Very long-term	5	Medium	4	14	Moderate
	Increased human presence	Probable	3	Local	2	Very long-term	5	Medium	4	14	Moderate

PART 4 – MITIGATION MEASURES FOR EXPECTED IMPACTS

Table 11 presents possible mitigation measures which could address the impacts outlined in Table 10.

Table 11: possible mitigation measures

Impact	Impacted resource	Possible mitigation measure
Land clearing	Loss of topsoil	Collect topsoil from affected areas and store in a live state, e.g. use for rehabilitation and managing already disturbed and degraded habitats.
	Loss and/or fragmentation of habitats	Avoid sensitive habitats. Ensure adequate conservation of effected habitats elsewhere in the region. Rehabilitate affected areas at closure.
	Loss of plant diversity (important plant populations)	Ensure adequate <i>in situ</i> conservation in region. Trans-locate species that are likely to survive being moved. Rehabilitate affected areas at closure.
	Risk of losing unknown diversity	Promote seasonal biodiversity studies in the region and ensure representative conservation of all habitats. Fixed-site vegetation monitoring points should be established and monitored annually.
	Disturbance/ eradication of red data plant species	Locate other populations that can be conserved in the area and ensure adequate <i>in situ</i> conservation in the region. Trans-locate species that are likely to survive being moved.
	Disturbance/ eradication of protected trees	Incorporate protected trees as landscape features where possible. Obtain necessary permits for the removal of protected trees.
	Disturbance/ eradication of endemic plants	Locate other populations that can be conserved in the area and ensure adequate <i>in situ</i> conservation in the region.
	Establishment of populations of alien invasive species in disturbed areas	Avoid unnecessary land clearing and disturbance through enforcing sound management of the environment. Eradicate any declared weeds and invaders as they appear. Avoid planting of alien tree species at buildings or other mine infrastructure and along roads.

Impact	Impacted resource	Possible mitigation measure
Land clearing (continued)	Spread of alien invasive species to neighbouring natural vegetation	Monitor neighbouring natural vegetation and eradicate any declared weeds and invaders as they appear.
	General degradation of surrounding vegetation.	<p>As part of the management strategies of the mine the natural vegetation in the vicinity of the mine must be monitored at a regular basis.</p> <p>Fixed-site vegetation monitoring points should be established and monitored annually to detect any degradation caused by mining activities with appropriate action as problems arise.</p>
Dust from blasting, rock dumping, ore processing, loading, transport, etc.	General degradation of surrounding vegetation.	As above.
Increased human presence	Harvesting of plant material for firewood, muti etc.	<p>Provide alternative fuel for cooking / heating purposes.</p> <p>Initiate program of balanced regional development giving high priority to conservation.</p> <p>Train employees in sustainable resource utilisation and conservation.</p> <p>Monitor known sites of medicinal and other commonly exploited plants.</p>

PART 5 – CONCLUDING REMARKS

With a total of 237 plant species (207 indigenous and 30 exotic) (Species List, Appendix A), in five different vegetation units, moderate to high plant species diversity was recorded in the study area. No red data species (SANBI, 2007) were recorded, two protected tree species (Table 1, p.12) as listed by the Department of Water Affairs and Forestry (DWAF) (2004 & 2007) were recorded and four plant species that are endemic to Griqualand West (Table 2, p. 12) were observed in the study area during the time of the study. 25 of the 30 exotic plants recorded in the study area are declared weeds or invaders (Henderson, 2001) that need to be eradicated. In terms of the amendments to the regulations under the Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983) landowners are legally responsible for the control of invasive alien plants on their properties (Henderson, 2001).

Generally the ecological condition of the natural veld in the study area is moderate to poor. The largest part of the study area show signs of overgrazing in the past with subsequent bush encroachment mainly by the woody shrubs *Acacia mellifera* and *Rhigozum trichotomum*. As is mentioned in the appointment letter of GCS (Pty) Ltd. dated 22 June 2009, large parts of the study area have been disturbed by mining activities in the past. These areas, together with areas where recent prospecting took place and bulk samples taken and old quarries have been left un-rehabilitated. The historical mining was concentrated mainly on hill sides and it is understood that the same hills are earmarked for further mining. The destroyed areas and the areas proposed for further mining are largely situated in Vegetation Unit 1 (The *Putterlickia saxatilis* – *Cymbopogon pospischilii* Open Mountain Shrubland) where one protected tree species, *Boscia albitrunca* (DWAF, 2004 & 2007), mostly in the form of low growing shrubs, is abundant. Four endemic species to Griqualand West were also recorded in this vegetation unit. The tree species *Croton gratissimus* var. *gratissimus* was also recorded in this vegetation unit in this study area. Although it is not a rare or endangered species it is considered to be rare in the Kuruman Mountain Bushveld (SVk 10) Vegetation Type (Mucina & Rutherford, 2006) in which Vegetation Unit 1 of this study area is situated.

The development of any mining operation has a permanent impact on the natural environment surrounding the mine. Land is stripped of all natural vegetation and is eventually replaced an unnatural environment that can never be returned to the original state, not even through rehabilitation. The fragmentation of natural habitats is a definite negative impact, which disrupts the natural flow of ecosystem services and affects all fauna and flora that are dependent on those habitats. Care should be taken not to unnecessarily clear natural vegetation and rehabilitation should take place on a continuous basis and be extensively managed, even after mine closure. As large areas are already disturbed at the proposed mining site it is recommended that all new infrastructure be built on those areas as far as possible. Other recommended mitigation measures together with those mentioned in Part 4 of this document should be seriously considered and implemented.

A.R. Götze (M.Sc.) Pr.Sci.Nat:

Date:

REFERENCES

- DEPARTMENT OF WATER AFFAIRS AND FORESTRY (DWAF), 2004.** Sustainable Forestry – List of Protected Trees. <http://dwafapp4.dwaf.gov.za>
- DWAF, 2007.** Notice of Protected Tree Species under the National Forests Act of 1998 (Act No. 84 of 1998). Government Gazette No. 30253, pp. 47 – 48.
- GERMISHUIZEN, G. & MEYER, N.L. (eds) 2003.** Plants of southern Africa: an annotated checklist. *Strelitzia* 14. National Botanical Institute, Pretoria.
- HENDERSON, L. 2001.** Alien weeds and invasive plants. Plant Protection Research Institute Handbook no. 12, Agricultural Research Council. Paarl Print, Cape Town.
- HOFFMAN, M.T., COUSINS, B., MEYER, T., PETERSEN, A. & HENDRICKS, H. 1999.** Historical and contemporary land use and the desertification of the Karoo. In: Dean, W.R.J. & Milton, S.J. (eds), *The Karoo: ecological patterns and processes*, pp. 257-273. Cambridge University Press, Cambridge.
- MUCINA, L. & RUTHERFORD, M.C. (eds) 2006.** The Vegetation of South Africa, Lesotho and Swaziland. *Strelitzia* 19. South African National Biodiversity Institute, Pretoria.
- SANBI (SOUTH AFRICAN NATIONAL BIO-DIVERSITY INSTITUTE), 2007.** Interim red data plant species list, October 2007. www.sanbi.org, Pretoria.

APPENDIX A

LIST OF PLANT SPECIES OCCURRING ON THE REMAINING EXTENT AND PORTIONS 2, 3, 4 AND 5 OF THE FARM KAPSTEWEL 436, POSTMASBURG, NORTHERN CAPE PROVINCE

N.B.

All exotic plant species in the species list are preceded by an asterisk (*) and indicated by the letter “E” in the comments column. The invasive status (declared weed category 1; declared invader categories 2 & 3) of the species, according to Henderson (2001) (Table 4) is indicated in the comments column of the species list as follows:

- E – exotic with no invasive status
- E1 – declared weed category 1
- E2 – declared invader category 2
- E3 – declared invader category 3
- E1X, E2X or E3 – proposed weed or invader

Also indicated in the comments column as follows are endemic and protected species:

- EnGW – Endemic to Griqualand West
- P – Protected

In a separate column, the vegetation unit in which any specific species was recorded is indicated with 1, 2, 3, 4 and/or 5 where:

- 1 = Vegetation Unit 1: The *Putterlickia saxatilis* – *Cymbopogon pospischilii* Open Mountain Shrubland
- 2 = Vegetation Unit 2: The *Acacia mellifera* – *Stipagrostis uniplumis* Closed Shrubland
- 3 = Vegetation Unit 3: The *Rhus lancea* – *Oropetium capense* Open Woodland
- 4 = Vegetation Unit 4: The *Tarchonanthus camphoratus* – *Eragrostis lehmanniana* Open Shrubland
- 5 = Vegetation Unit 5: The vegetation of severely disturbed and degraded areas

Table 12: list of plant species occurring on the Remaining Extent and Portions 2, 3, 4 and 5 of the farm Kapstewel 436

PTERIDOPHYTA

FAMILY	SPECIES NAME	GROWTH FORM	COMMON NAME		VEG. UNIT	COMMENTS
			AFRIKAANS	ENGLISH		
ASPLENIACEAE	<i>Asplenium cordatum</i> (Thunb.) Sw.	Geophyte, lithophyte	Opstandingsvaring	Resurrection Fern	1	
PTERIDACEAE	<i>Pellaea calomelanos</i> (Swartz) Link	Geophyte, lithophyte	Hardevaring / Bosveldvaring	Hard fern	1	

ANGIOSPERMAE

DICOTYLEDONAE

FAMILY	SPECIES NAME	GROWTH FORM	COMMON NAME		VEG. UNIT	COMMENTS
			AFRIKAANS	ENGLISH		
ACANTHACEAE	<i>Barleria rigida</i> Nees	Dwarf shrub	Skerpioendissel	Scorpion Thistle	1	
	<i>Blepharis integrifolia</i> (L.f.) E.Mey. ex Schinz	Herb	Rankklits		1, 2	
	<i>Blepharis marginata</i> (Nees) C.B. Clarke	Herb			1, 2	EnGW
	<i>Hypoestes forskoolii</i> (Vahl) R.Br.	Herb		White Ribbon Bush	1, 2	
	<i>Justicia</i> species	Herb			1	
	<i>Monechma divaricatum</i> (Nees) C.B. Clarke	Shrub	Wilde Lusern	Wild Lucern	1	
AIZOACEAE	<i>Plinthus sericeus</i> Pax	Dwarf shrub			4	
AMARANTHACEAE	* <i>Alternanthera pungens</i> Kunth	Herb	*Kakiedubbelijie	*Paper Thorns	2, 5	E
	* <i>Amaranthus hybridus</i> L.	Herb	*Misbredie	*Pigweed	5	E
	* <i>Gomphrena celosioides</i> Mart.	Herb	*Mierbossie	*Bachelor's Button	1, 2, 5	E
	* <i>Guilleminea densa</i> (Willd. ex Roem. & Schult.) Moq.	Herb		*Carrot Weed	5	E

AMARANTHACEAE	<i>Hermibstaedtia odorata</i> (Burch.) T.Cooke var. <i>odorata</i>	Herb	Rooi-aarbossie	Wild Cockscomb	4
	<i>Kyphocarpa angustifolia</i> (Moq.) Lopr.	Herb			All
	<i>Pupalia lappacea</i> (L.) A.Juss. var. <i>lappacea</i>	Herbaceous climber	Bosklits	Forest Burr	2
	<i>Sericorema remotiflora</i> (Hook.f.) Lopr.	Herb	Kwasbossie / Wolhaarbossie		4, 5
ANACARDIACEAE	<i>Rhus burchellii</i> Sond. ex Engl.	Tree	Taaibos / Kunitbos	Kuni Bush	All
	<i>Rhus ciliata</i> Licht. ex Schult.	Shrub	Suurkaree	Sour Karee	1, 2, 4
	<i>Rhus lancea</i> L.f.	Tree	Karee	Karee	2, 3
APIACEAE	<i>Deverra denudata</i> (Viv.) Pfisterer & Podlech subsp. <i>aphylla</i> (Cham. & Schitdl.) Pfisterer & Podlech	Shrub	Wilde Seidery / Wilde Vinkel	Wild Celery	2
APOCYNACEAE	<i>Gomphocarpus fruticosus</i> (L.) Aiton f.	Herbaceous shrub	Meikbos	Milkweed	1, 2, 5
ASTERACEAE	<i>Amphiglossa triflora</i> DC.	Dwarf shrub			1, 4
	* <i>Bidens bipinnata</i> L.	Herb	*Spaanse knapsekêrel	*Spanish Blackjack	All
	<i>Chrysocoma ciliata</i> L.	Dwarf shrub	Bitterbos		All
	* <i>Conyza bonariensis</i> (L.) Cronq.	Herb	*Kleinskraalhans	*Flax-leaf fleabane	2, 3, 5
	<i>Dicoma capensis</i> Less.	Herb	Karmedik		2, 5
	<i>Dicoma macrocephala</i> DC.	Herb			4
	<i>Eriocephalus ericoides</i> (L.f.) Druce	Shrub	Gewone Kapokbos	Common Kapok Bush	All
	<i>Felicia clavipilosa</i> Grau subsp. <i>clavipilosa</i>	Dwarf shrub			1
	<i>Felicia filifolia</i> (Vent.) Burt Davy	Dwarf shrub	Draaibossie	Needle-leaved Felicia	1, 2
	<i>Felicia muricata</i> (Thunb.) Nees subsp. <i>muricata</i>	Herb	Bloublommertjie		All
	<i>Geigeria burkei</i> Harv.	Herb	Vermeersiektebossie		All
	<i>Geigeria ornativa</i> O.Hoffm.	Herb	Vermeerbos		2
	<i>Helichrysum callicomum</i> Harv.	Herb			1, 2, 4
	<i>Helichrysum cerastioides</i> DC. var. <i>cerastioides</i>	Herb	Wolbossie		1

ASTERACEAE	<i>Heritium pallens</i> (DC.) Kuntze	Succulent shrub				4, 5
	<i>Hirpicium echinus</i> Less.	Dwarf shrub	Botterblom			4
	<i>Kleinia longiflora</i> DC.	Succulent shrub	Sambokbos			1, 2, 4, 5
	<i>Laggera decurrens</i> (Vahl) Hepper & J.R.I. Wood	Herbaceous shrub	Wolbos			5
	<i>Lopholaena cneorifolia</i> (DC.) S.Moore	Shrub				1, 2, 4, 5
	<i>Nidorella anomala</i> Steetz	Herb				2, 4, 5
	<i>Nolletia ciliaris</i> (DC.) Steetz	Suffrutex, herb				4
	<i>Pentzia calcarea</i> Kies.	Dwarf shrub	Meerkatkaroo			All
	<i>Pentzia globosa</i> Less.	Dwarf shrub	Vaalkaroo			3, 4
	<i>Pentzia incana</i> (Thunb.) Kuntze	Dwarf shrub	Ankerkaroo	Anchor Karoo		4
	<i>Pentzia sphaerocephala</i> DC.	Dwarf shrub	Grootbergansieskaroo			2, 4
	<i>Psiadia punctulata</i> (DC.) Oliv. & Hiern. ex Vatke	Herbaceous shrub				1
	<i>Pteronia glauca</i> Thunb.	Shrub	Geelboegoekaroo			1, 2
	<i>Pteronia mucronata</i> DC.	Shrub	Kersbossie			1, 2
	<i>Pteronia viscosa</i> Thunb.	Dwarf shrub	Gombossie			1, 2, 4
	<i>Rosenia humilis</i> (Less.) K.Bremer	Dwarf shrub	Perdekaroo			4
	* <i>Schkuhria pinnata</i> (Lam.) Cabrera	Herb	*Kleinkakiebos	*Dwarf Marigold		3, 5 E
	<i>Senecio consanguineus</i> DC.	Herb	Hongerbos-senecio	Strarvation Senecio		All
	* <i>Tagetes minuta</i> L.	Herb	*Kakiebos	*Khaki Weed		2, 3, 5 E
	<i>Tarchonanthus camphoratus</i> L.	Tree	Wildekanferbos	Wild camphor bush		All
	* <i>Xanthium spinosum</i> L.	Herb	*Boetebossie	*Burrweed		2, 5 E1
BIGNONIACEAE	* <i>Jacaranda mimosifolia</i> D.Don.	Tree	*Jakaranda	*Jacaranda		5 E3
	<i>Rhigozum obovatum</i> Burch.	Tree	Geelberggranaat	Yellow Poegranaat		1, 2
	<i>Rhigozum trichotomum</i> Burch.	Tree	Driedoring			2, 4

BORAGINACEAE	<i>Ehretia rigida</i> (Thunb.) Druce subsp. <i>nervifolia</i> Retief & A.E.van Wyk	Tree	Deurmekaarbos	Puzzle-bush	All	
BRASSICACEAE	* <i>Lepidium bonariense</i> L.	Herb	*Peperbossie	*Pepper Cress / Pepperweed	1, 2, 3, 5	E
CACTACEAE	* <i>Echinopsis spachiana</i> (Lem.) Friedrich & Rowley	Cactus	*Orreikaktus	*Torch Cactus	5	E1
	* <i>Opuntia ficus-indica</i> (L.) Mill.	Cactus	*Turksy	*Prickly Pear	All	E1
	* <i>Opuntia imbricata</i> (Haw.) DC.	Cactus	*Kabelturksy	*Imbricate Prickly Pear	5	E1
	* <i>Opuntia spinulifera</i> Salm-Dyck	Cactus	*Grootrondeblaarturksy	*Saucepan Cactus	5	E1
CAPPARACEAE	<i>Boscia albitrunca</i> (Burch.) Gilg & Gilg-Ben.	Tree	Wigat	Shepherd's Tree	1, 2, 4	P
	<i>Cadaba aphylla</i> (Thunb.) Wild	Tree / shrub	Swartstorm / Bobejaanarm	Desert Spray	1, 2, 4	
CELASTRACEAE	<i>Gymnosporia buxifolia</i> (L.) Szyszyl.	Tree	Gewone Pendoring	Common Spike-thorn	1, 3, 4	
	<i>Putterlickia saxatilis</i> (Burch.) M.Jordaan	Woody shrub	Grikwaland-wes Basterpendoring	Grikwaland West False Spike-thorn	1, 2	EnGW
CHENOPODIACEAE	* <i>Chenopodium album</i> L.	Herb	*Withondebossie	*White Goosefoot / Fat Hen	5	E
	* <i>Chenopodium carinatum</i> R.Br.	Herb	*Groenhondebossie	*Green Goosefoot	2, 3, 5	E
	* <i>Salsola kali</i> L.	Herb	*Russiese Roibossie	*Russian Tumbleweed	5	E
CONVOLVULACEAE	<i>Evolvulus alsinoides</i> (L.) L.	Herb		Blue Haze	1, 2	
	<i>Seddera suffruticosa</i> (Schinz) Hallier f.	Herb			1	
CRASSULACEAE	<i>Crassula muscosa</i> L. var. <i>muscosa</i>	Succulent herb	Skoenveterbos	Lizard's Tail	2	
	<i>Crassula subaphylla</i> (Eckl. & Zeyh.) Harv. var. <i>subaphylla</i>	Succulent herb	Louhout		2	
	<i>Kalanchoe paniculata</i> Harv.	Succulent herb	Hastie-oor / Krimpsiektebos	Large Orange Kalanchoe	1, 2	
	<i>Kalanchoe rotundifolia</i> (Haw.) Haw.	Succulent herb	Nentabos	Common Kalanchoe	2	
EBENACEAE	<i>Diospyros austro-africana</i> De Winter	Shrub	Jakkalsbos / Kritikom	Fire-sticks	1	
	<i>Diospyros lycioides</i> Desf.	Tree	Bloubos	Bluebush	3, 4	
	<i>Euclea undulata</i> Thunb.	Tree	Gewonegwarrie	Common Guarri	1, 2, 4	
EUPHORBIACEAE	<i>Croton gratissimus</i> Burch. var. <i>gratissimus</i>	Tree	Laventelkoorsbessie	Lavender Fever Berry	1	

EUPHORBIACEAE		Herb	Skilpadbossie		2, 4
	<i>Phyllanthus maderaspatensis</i> L.				
	<i>Phyllanthus parvulus</i> Sond.	Herb	Kleurbossie	Dye Bush	1, 2, 5
	* <i>Ricinus communis</i> L.	Tree	*Kasterolieboom	*Castor-oil Plant	5
FABACEAE	<i>Acacia erioloba</i> E.Mey.	Tree	Kameeldoring	Camel Thorn	2, 4, 5
	<i>Acacia hebeclada</i> DC. subsp. <i>hebeclada</i>	Tree	Trassiedoring	Candle Thorn	2, 4, 5
	<i>Acacia karroo</i> Hayne	Tree	Soetdoring	Sweet Thorn	All
	<i>Acacia mellifera</i> (Vahl) Benth. subsp. <i>detinens</i> (Burch.) Brenan	Tree	Swarthaak	Black Thorn	All
	<i>Acacia tortilis</i> (Forssk.) Hayne subsp. <i>heteracantha</i> (Burch.) Brenan	Tree	Haak-en-steek	Umbrella Thorn	All
	<i>Elephantorrhiza elephantina</i> (Burch.) Skeels	Dwarf shrub	Baswortel	Dwarf Elephant-root	4
	<i>Indigofera heterotricha</i> DC.	Herb			1, 4
	<i>Indigofera hololeuca</i> Benth. ex Harv.	Herb			2, 5
	<i>Indigofera pungens</i> E.Mey.	Herb	Drieblaarbos		1, 3
	<i>Indigofera rhytidocarpa</i> Benth. ex Harv. subsp. <i>rhytidocarpa</i>	Herb			1, 2
	<i>Indigofera</i> species	Herb			4
	<i>Indigofera vicioides</i> Jaub. & Spach var. <i>vicioides</i>	Herb			1
	<i>Lebeckia macrantha</i> Harv.	Shrub			1, 2
	<i>Melolobium calycinum</i> Benth.	Dwarf shrub			4
	<i>Melolobium candicans</i> (E.Mey.) Eckl. & Zeyh.	Dwarf shrub	Heuningbos / Stroopbos		2, 5
	* <i>Prosopis glandulosa</i> Torr.	Tree	*Prosopis / Suidwesdoring	*Mesquite	2, 4, 5
	<i>Rhynchosia minima</i> (L.) DC. var. <i>minima</i>	Herbaceous climber			4
	<i>Rhynchosia totta</i> (Thunb.) DC. var. <i>totta</i>	Herbaceous climber			1, 3, 4
	<i>Senna italica</i> Mill. subsp. <i>arachoides</i> (Burch.) Lock	Herb	Elandsertjie	Eland's Pea	2, 4
	<i>Sutherlandia microphylla</i> Burch. ex DC.	Herbaceous shrub	Kankerbos / Bitterblaar		2

FABACEAE	<i>Tephrosia longipes</i> Meisn. subsp. <i>longipes</i>	Herb				1
	<i>Tephrosia purpurea</i> (L.) Pers. subsp. <i>leptostachya</i> (DC.) Brummitt var. <i>leptostachya</i>	Herb				1
ILLECEBRACEAE	<i>Pollichia campestris</i> Ait.	Herbaceous shrub	Teesuikerbossie	Waxberry / Barley Sugar Bush		All
LAMIACEAE	<i>Acrotome inflata</i> Benth.	Herb				2, 5
	<i>Leucas capensis</i> (Benth.) Engl.	Herb				All
	<i>Salvia disermas</i> L.	Herb	Teesalie / Grootblousalie			3
	<i>Stachys burchelliana</i> Launert	Shrub	Bergsalie	Mountain Sage		1
MALVACEAE	<i>Abutilon austro-africanum</i> Hochr.	Herb				3
	<i>Hibiscus pusillus</i> Thunb.	Herb		Dwarf Hibiscus		2
	* <i>Malva parviflora</i> L.	Herb	*Kiesieblaar	*Small Mallow		5 E
	<i>Pavonia burchellii</i> (DC.) R.A.Dyer	Herb		Dainty Pavonia		All
	<i>Sida chrysantha</i> Ulbr.	Dwarf shrub				2
	<i>Sida dregei</i> Burt Davy	Herb	Verdampsterk			1, 2
MELIACEAE	* <i>Melia azedarach</i> L.	Tree	*Maksering	*Seringa		5 E3
MOLLUGINACEAE	<i>Corbichonia decumbens</i> (Forssk.) Exell	Herb				1
	<i>Limeum fenestratum</i> (Fenzl) Heimerl var. <i>fenestratum</i>	Herb				4
	<i>Limeum viscosum</i> (J.Gay) Fenzl subsp. <i>viscosum</i> var. <i>viscosum</i>	Herb				1
	<i>Mollugo cerviana</i> (L.) Ser. ex DC. var. <i>cerviana</i>	Herb				1
	<i>Pharnaceum viride</i> Adamson	Herb				1
MYRTACEAE	* <i>Eucalyptus sideroxylon</i> A.Cunn. ex Woolls	Tree	*Swartysterbasbloekom	*Black Ironbark / *Red Ironbark		5 E2
OLEACEAE	<i>Olea europaea</i> L. subsp. <i>africana</i> (Mill.) P.S.Green	Tree	Oliehout	Wild Olive		All
OXALIDACEAE	<i>Oxalis depressa</i> Echl. & Zeyh.	Geophyte	Suuring	Sorrel		1
PAPAVERACEAE	* <i>Argemone ochroleuca</i> Sweet subsp. <i>ochroleuca</i>	Herb	*Witblom-bloudissel	*White-flowered Mexican Poppy		2, 5 E1

PEDALIACEAE	<i>Ceratotheca triloba</i> (Bernh.) Hook.f. <i>Sesamum triphyllum</i> Welw. ex Asch. var. <i>triphyllum</i>	Herb	Wild Fingervoedjie	Wild Foxglove	2
PLANTAGINACEAE	<i>Plantago lanceolata</i> L.	Herb	Smalweëblaar	Ribwort	5
PORTULACACEAE	<i>Talinum cafrum</i> (Thunb.) Eckl. & Zeyh.	Succulent herb	Ystervarkwortel	Porcupine Root	2, 4
RHAMNACEAE	<i>Ziziphus mucronata</i> Willd. subsp. <i>mucronata</i>	Tree	Blinkblaar-wag-'n-bietjie	Buffalo-thorn	All
RUBIACEAE	<i>Anthospermum rigidum</i> Eckl. & Zeyh. subsp. <i>pumilum</i> (Sond.) Puff <i>Kohautia caespitosa</i> Schinzi.	Dwarf shrub Herb			1 1, 4
SANTALACEAE	<i>Vangueria infausta</i> Burch. subsp. <i>infausta</i>	Tree	Wildemispel	Wild-medlar	1
SCROPHULARIACEAE	<i>Thesium hystrix</i> A.W. Hill <i>Thesium utile</i> A.W. Hill	Hemi-parasite Hemi-parasite	Ystervarkbossie Besembossie		1, 2, 4 1
	<i>Aptosimum albomarginatum</i> Marloth & Engl. <i>Aptosimum indivisum</i> Burch. ex Benth. <i>Jamesbrittenia atropurpurea</i> (Benth.) Hilliard subsp. <i>atropurpurea</i>	Dwarf shrub Dwarf shrub Herbaceous shrub	Koegab Karoovoeltjie Bruinsafraanbos	Karoo Violet	4 1 1, 4
	<i>Pelostomum leucorrhizum</i> E.Mey. ex Benth. <i>Selago densiflora</i> Rolfe	Dwarf shrub Herb	Springbokkos	Veld Violet	1, 2, 4 All
	<i>Selago dinteri</i> Rolfe subsp. <i>pseudodinteri</i> Hilliard <i>Selago geniculata</i> L.f.	Herb Dwarf shrub	Witaarbos		1, 2, 4 1
	<i>Selago gracilis</i> (Rolfe) Hilliard <i>Sutera halimifolia</i> (Benth.) Kuntze	Dwarf shrub Herb	Honde-kak-en-pis-bos Witsafran		4 1
SOLANACEAE	<i>*Datura ferox</i> L. <i>*Datura stramonium</i> L. <i>*Nicotiana glauca</i> Graham <i>*Solanum nigrum</i> L.	Herb Herb Tree Herb	*Grootstinkblaar *Gewone- / Bloustinkblaar *Wildetabak *Nastergal	*Large Thorn Apple *Common Thorn Apple *Wild Tobacco *Nightshade	2, 5 5 5 5

SOLANACEAE		Tree	Kleinkriedoring	Small Honey-thorn	All
	<i>Lycium cinereum</i> Thunb.	Shrub / Dwarf shrub	Rivierkareedoring / Wolwedoring		1, 2
	<i>Lycium hirsutum</i> Dunal	Shrub / Tree	Wolwedoring		2, 3
	<i>Lycium oxycarpum</i> Dunal	Herbaceous shrub	Bitterappel	Bitter Apple	1, 4
	<i>Solanum incanum</i> L.	Herb	Wildelemoenijtjie		1, 5
	<i>Solanum rigescens</i> Jacq.	Dwarf shrub	Slangappel		2
	<i>Solanum tomentosum</i> L. var. <i>tomentosum</i>	Herbaceous shrub	Bitterappelliefie	Poisonous Gooseberry	5
STERCULIACEAE	<i>Withania somnifera</i> (L.) Dunal	Tree	*Koerajong / *Bottelboom	*Kurrajong / *Bottle Tree	5 E3X
	* <i>Brachychiton populneus</i> (Schoitt & Endl.) R.Br.	Dwarf shrub			1
	<i>Hermannia bryoniifolia</i> Burch.	Herb			1, 2, 3
	<i>Hermannia coccocarpa</i> (Eckl. & Zeyh.) Kuntze	Herb			1, 2
	<i>Hermannia comosa</i> Burch. ex DC.	Herb	Swaelbossie		2
	<i>Hermannia vestita</i> Thunb.	Herb			1
	<i>Melhania prostrata</i> DC.	Dwarf shrub			1, 2, 4
	<i>Melhania rehmannii</i> Szyszyl.	Dwarf shrub			1, 2, 3
	<i>Melhania virescens</i> (K.Schum.) K.Schum	Herb	Januariebos		1, 4
THYMELAEACEAE	<i>Gnidia polycephala</i> (C.A.Mey.) Gilg	Herb			2, 5
TILIACEAE	<i>Corchorus asplenifolius</i> Burch.	Tree	Fluweelrosyntjie	Velvet Raisin	1, 3, 4
	<i>Grewia flava</i> DC.	Herb			1, 2, 4
VERBENACEAE	<i>Chascanum pinnatifidum</i> (L.f.) E.Mey. var. <i>pinnatifidum</i>	Herb			All
	<i>Lantana rugosa</i> Thunb.	Herb	Voëlbrandewyn	Birds' Brandy	All
VISCACEAE	<i>Viscum rotundifolium</i> L.f.	Hemi-parasite	Rooibessie / Voëlent	Red-berried Mistletoe	All
ZYGOPHYLLACEAE	<i>Zygophyllum incrustatum</i> E.Mey. ex Sond.	Succulent dwarf shrub	Witkriedoring	Skeleton Bush	1, 4, 5

MONOCOTYLEDONAE

FAMILY	SPECIES NAME	GROWTH FORM	COMMON NAME		VEG. UNIT	COMMENTS
			AFRIKAANS	ENGLISH		
AMARYLLIDACEAE	<i>Boophane disticha</i> (L.f.) Herb.	Geophyte	Kopseerblom / Gifbol	Poison bulb	1	
ASPARAGACEAE	<i>Asparagus rubicundus</i> P.J. Bergius	Herbaceous shrub			1, 2, 3, 4	
	<i>Asparagus setaceus</i> (Kunth) Jessop	Herbaceous shrub		Asparagus Fern	3, 4	
	<i>Asparagus suaveolens</i> Burch.	Herbaceous shrub	Gewone Katbos / Katdoring	Bushveld Asparagus	1, 2, 4, 5	
ASPHODELACEAE	<i>Aloe grandidentata</i> Salm-Dyck	Succulent shrub	Bontaalwyn / Kanniedood		2	
	<i>Aloe hereroensis</i> Engl. var. <i>hereroensis</i>	Succulent shrub	Sandaalwyn / Vlakte-aalwyn		2	
COLCHICACEAE	<i>Ornithoglossum viride</i> (L.f.) Aiton	Geophyte	Karooslangkop / Eendjie	Poison Onion / Cape Slangkop	2	
COMMELINACEAE	<i>Commelina africana</i> L. var. <i>krebsiana</i> (Kunth) C.B.Clarke	Herb	Geeleendagsblom	Yellow Commelina	4	
	<i>Commelina africana</i> L. var. <i>lancispatha</i> C.B.Clarke	Herb	Geeleendagsblom	Yellow Commelina	2, 4	
CYPERACEAE	<i>Bulbostylis burchellii</i> (Fical. & Hiem) C.B.Cl.	Sedge		Common Bullrush	1	
	<i>Bulbostylis humilis</i> (Kunth) C.B.Clarke	Sedge			1, 3	
	<i>Cyperus obtusiflorus</i> Vahl var. <i>obtusiflorus</i>	Sedge	Witbiesie	White-flowered Sedge	1	
DRACAENACEAE	<i>Sansevieria aethiopica</i> Thunb.	Geophyte	Skoonma-se-tong	Mother-in-law's Tongue	2	
HYACINTHACEAE	<i>Albuca setosa</i> Jacq.	Geophyte	Slymuintjie		1, 2, 4	
IRIDACEAE	<i>Babiana</i> species	Geophyte			2	
POACEAE	<i>Andropogon chinensis</i> (Nees) Merr.	Grass	Harige-blougras	Hairy Blue Grass	1	
	<i>Aristida adscensionis</i> L.	Grass	Eenjarige steekgras	Annual three-awn	All	
	<i>Aristida congesta</i> Roem. & Schuit. subsp. <i>barbicollis</i> (Trin. & Rupr.) De Winter	Grass	Lossteekgras	Spreading Three-awn	3, 4, 5	
	<i>Aristida congesta</i> Roem. & Schuit. subsp. <i>congesta</i>	Grass	Katstertsteekgras	Tassel Three-awn	All	

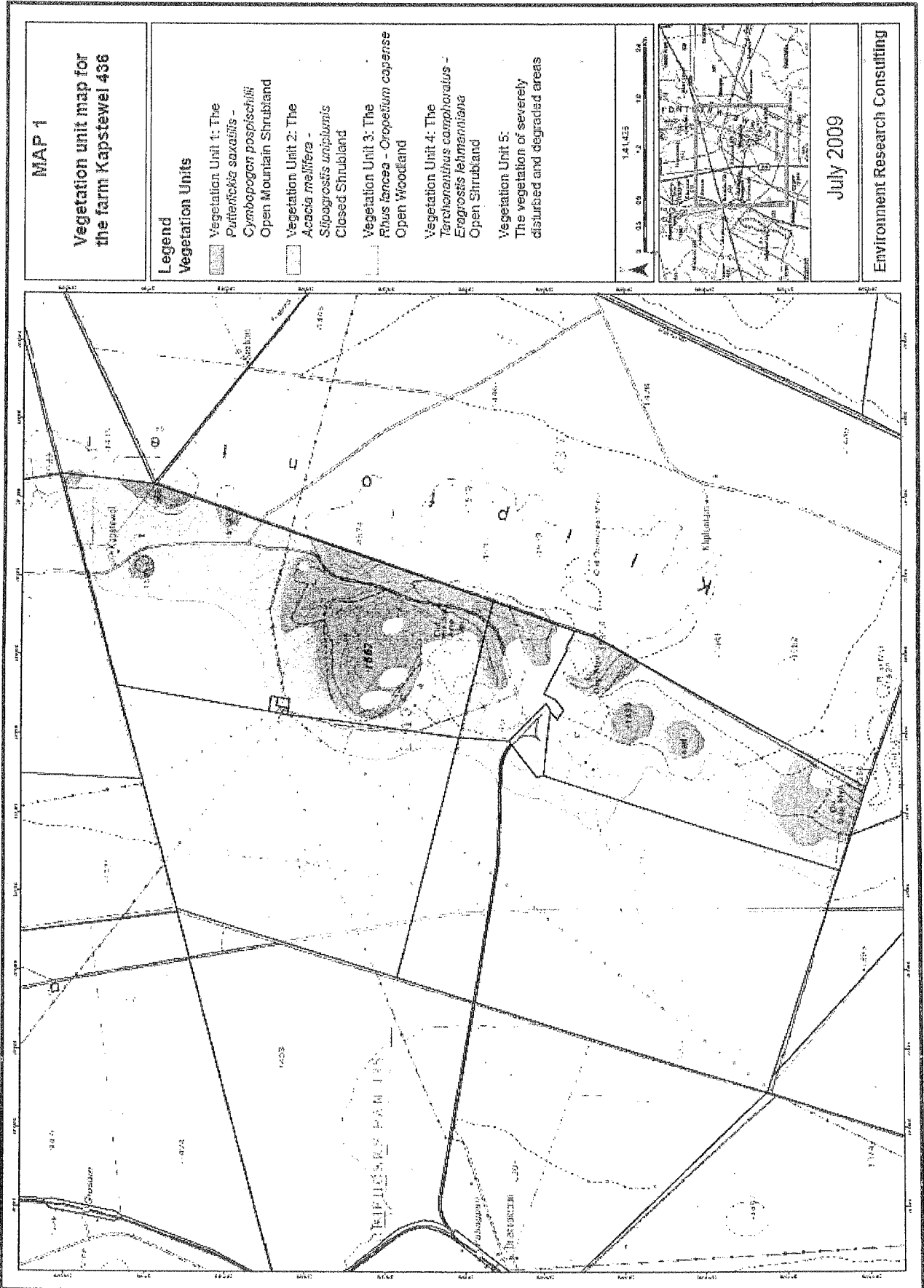
POACEAE		Grass	Ystergras	Iron Grass	1
	<i>Aristida diffusa</i> Trin. subsp. <i>burkei</i> (Stapf) Melderis	Grass	Gongoni-steekgras	Gongoni Three-awn	1
	<i>Aristida junciformis</i> Trin. & Rupr. subsp. <i>junciformis</i>	Grass	Langbeensteekgras	Giant Three-awn	4
	<i>Aristida meridionalis</i> Henrard	Grass	Perssteekgras	Purple Three-awn	1, 4
	<i>Aristida scabrivalvis</i> Hack.	Grass	Langnaaldsteekgras	Long-awned Grass	1, 2, 4
	<i>Aristida stipitata</i> Hack	Grass	Swartvoetjiegras	Black-footed Grass	1, 2
	<i>Bracharia nigropedata</i> (Ficalho & Hiern) Stapf	Grass	Bloubuffelgras	Foxtail Buffalo Grass	1, 2, 5
	<i>Cenchrus ciliaris</i> L.	Grass	Witpluim-chloris	Feather-top chloris	2, 3, 5
	<i>Chloris virgata</i> Sw.	Grass	Breëblaarterpentyngras	Broad-leaved Turpentine Grass	2, 5
	<i>Cymbopogon excavatus</i> (Hochst.) Stapf ex Burtt Davy	Grass	Smalblaarterpentyngras	Narrow-leaved Turpentine Grass	1, 2, 4
	<i>Cymbopogon pospischilii</i> (K.Schum.) C.E. Hubb.	Grass	Kweekgras	Couch Grass	2, 3, 5
	<i>Cynodon dactylon</i> (L.) Pers.	Grass	Gewone-vingergras	Common Finger Grass	1, 4
	<i>Digitaria eriantha</i> Steud.	Grass			1
	<i>Digitaria polyphylla</i> Henrard	Grass			EnGW
	<i>Eleusine coracana</i> (L.) Gaertn. subsp. <i>africana</i> (Kenn.-O'Byrne) Hillu & de Wet	Grass	Afrikaanse Osgras	Goose Grass	2, 3, 5
	<i>Enneapogon cenchroides</i> (Roem. & Schult.) C.E.Hubb.	Grass	Negenaaldgras	Nine-awned Grass	All
	<i>Enneapogon desvauxii</i> P. Beauv.	Grass	Agtdaegras	Eight Day Grass	2, 3, 4
	<i>Enneapogon scoparius</i> Stapf	Grass	Kalkgras	Bottlebrush Grass	1, 4
	<i>Eragrostis chloromelas</i> Steud.	Grass	Smal Krulblaar	Narrow Curly Leaf	1
	<i>Eragrostis curvula</i> (Schrad.) Nees	Grass	Oulandgras	Weeping Love Grass	1, 2, 5
	<i>Eragrostis echinochloidea</i> Stapf	Grass	Bosluigras	Tick Grass	2, 3, 4, 5
	<i>Eragrostis lehmanniana</i> Nees var. <i>lehmanniana</i>	Grass	Krietjiesgras	Lehmann's Love Grass	All
	<i>Eragrostis nindensis</i> Ficalho & Hiern	Grass	Hamelgras	Wether Love Grass	1
	<i>Eragrostis obtusa</i> Munro ex Ficalho & Hiern	Grass	Douvatgras	Dew Grass	3, 4

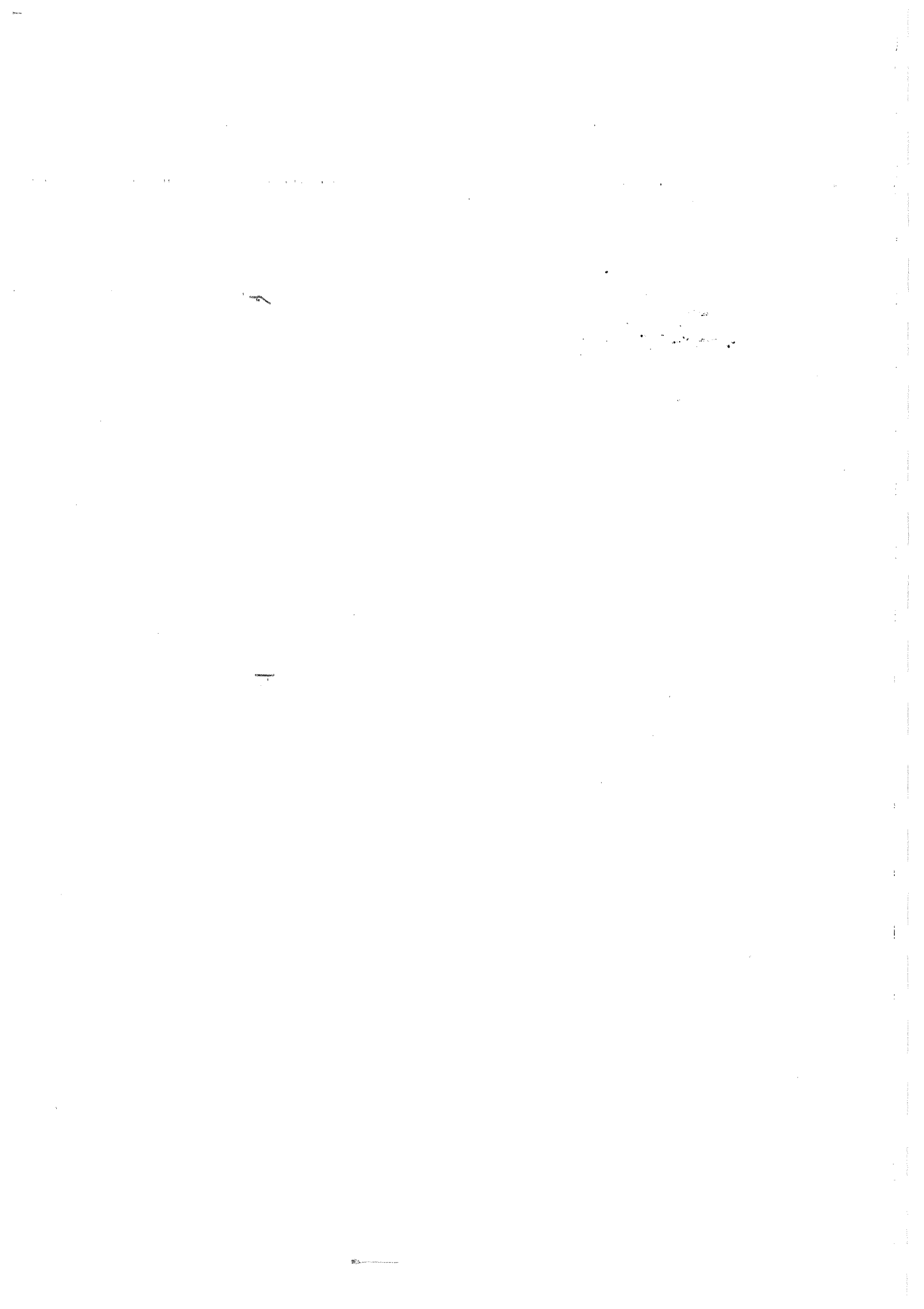
Vegetation Diversity Study -- Kapstewiel, Postmasburg - July 2009

POACEAE		Grass	Harige Pluimgras	Hairy Love Grass	2, 3, 5
<i>Eragrostis trichophora</i> Coss. & Durieu		Grass	Bruinhoederspoor	Brown Rhodes Grass	1
<i>Eustachys paspaloides</i> (Vahl) Lanza & Mattei		Grass	Vingerhoedgras	Thimble grass	1, 3
<i>Fingerhuthia africana</i> Lehm.		Grass	Assegaaigras	Spear Grass	All
<i>Heteropogon contortus</i> (L.) Roem. & Schult.		Grass	Gewone-dekgras	Common Thatching Grass	5
<i>Hyparrhenia hirta</i> (L.) Stapf		Grass	Fluweelgras / Natal Rooipluim	Natal Red Top	All
<i>Melinis repens</i> (Willd.) Zizka subsp. <i>repens</i>		Grass	Haasgras	Dwarf Grass	All
<i>Oropetium capense</i> Stapf		Grass	Buffelsgras	Guinea Grass	1
<i>Panicum maximum</i> Jacq.		Grass	*Kikoejoe-gras	*Kikuju Grass	5 E2X
* <i>Pennisetum clandestinum</i> Hochst. & Chiov.		Grass	Sekelgras	Herringbone Grass	2, 4
<i>Pogonarthria squarrosa</i> (Roem. & Schult.) Pilg.		Grass	Sandkweek	Sand Quick	2, 4
<i>Schmidtia pappophoroides</i> Steud.		Grass	Klitsgras	Bur Bristle Grass	2, 3, 5
<i>Setaria verticillata</i> (L.) P. Beauv.		Grass			1
<i>Sporobolus discosporus</i> Nees		Grass	Fynsaadgras	Dropseed Grass	1, 2
<i>Sporobolus fimbriatus</i> (Trin.) Nees		Grass	Kortbeen Boesmangras	Small Bushman Grass	4
<i>Stipagrostis obtusa</i> (Delile) Nees		Grass	Blinkblaar-boesmangras	Silky Bushman Grass	All
<i>Stipagrostis uniplumis</i> (Licht.) De Winter var. <i>uniplumis</i>		Grass	Rooigras	Red Grass	2, 4
<i>Themeda triandra</i> Forsk.		Grass	Kousklits	Carrot-seed Grass	5
<i>Tragus berteronianus</i> Schult.		Grass	Klein Rolgras	Small Rolling Grass	1, 2, 4, 5
<i>Trichoneura grandiglumis</i> (Nees) Ekman		Grass			

APPENDIX B

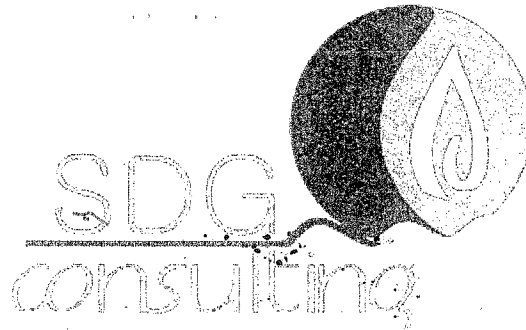
MAP 1: VEGETATION UNIT MAP FOR THE FARM KAPSTEWEL 436





APPENDIX A : VEGETATION REPORT

APPENDIX B : AIR QUALITY REPORT



AIR QUALITY

Kapstewel – Proposed Iron ore/Manganese mine

Air Quality report

Issue/revision	Final
Job number	09/016
Date	July 2009
Prepared by	Simon Gear

SDG Consulting cc

26 Fairbridge St
Roosevelt Park Ext 1
Johannesburg
2195
South Africa

Tel ++27 (0) 11 782 5269
Fax ++27 (0) 86 567 9243
Cell ++27 (0) 82 821 4975
simon@sdgconsulting.co.za

1. INTRODUCTION

SDG Consulting was approached by Groundwater Consulting Services (Pty) Ltd (GCS) to provide specialist air quality input into the study of the potential impact that the reworking of old ore dumps and possible open cast mining at the proposed Kapstewel mine would have on the surrounding environment.

A site visit was conducted by GCS on SDG Consulting's behalf and the following scope of work was identified:

- Site baseline analysis
- Modelling of dust dispersion patterns for the proposed alterations to the site
- An assessment of likely changes in dust impact
- Recommendations for dust mitigation strategies

2. PROCESS DESCRIPTION

The following is adapted from terms of reference as provided by GCS.

The proposed mining activities of the applicant will consist of the processing of ore from different dumps located within the borders of the study area, as well as the possible open cast mining of manganese ore and iron ore with machinery, should a potential in-situ resource be classified as viable.

The selected mining method was designed based on the nature of the ore body. The method proposes that ore from the different dumps located in the study area be processed at a central plant and accumulated into two product stockpiles. Waste will be loaded, hauled and dumped into historical quarries and trenches. The mining sequence was developed so that space will be created for drilling the in-situ resource according to a pre-defined grid.

A front-end loader capable of loading 40 ton trucks in three passes will be used; where-after ore will be hauled from the dumps to a crushing and conveyer system. Ore loaded onto trucks will be hauled to a crusher where it will be crushed, where-after the resultant product will be moved via a conveyer belt to a wet screening plant producing lumpy ore or bigger fraction ore (-63mm to +20mm), containing 35 to 38 percent manganese and a smaller fraction ore (-20mm in size) with a manganese content of 35 to 37 percent manganese.

The following equipment will be used as part of the mining operation:

- Haulers – 5 x CAT 777;
- Loaders – 2 x CAT 992 FEL; and
- Water Trucks – 1 x Bell B40.

Loading and hauling of both waste and ore will be carried out by 15 ton front-end loaders matched with 40 ton rear dump CAT trucks. Working shifts will be arranged so that 750 tons of product, which will constitute 60 percent of material put through the crusher, is daily produced daily. One Cat D8R Ripper dozer and one CAT 824 Wheel dozer will be acquired in future to exploit an in-situ resource, if it is found to be viable.

Prospecting operations conducted in the area have focused mainly on the sampling and treating of ore from the dumps. The same procedure will be followed when exploiting the dumps, although on a bigger scale. The current infrastructure and technical resources can handle a production rate of 600 tonnes of saleable material per day. The production rate will increase once a viable in-situ resource has been established and a dense media separation plant commissioned.

3. AREA DESCRIPTION

3.1 Legislative framework

The farm Kapstewel No. 436 is located approximately 20 km to the north of Postmasburg, just off the R325 connecting Postmasburg and Kathu. The study area falls under the Hay Registration District, which is located in the Northern Cape Province of South Africa and is located within the borders of the Tsantsabane Local Municipality, which forms part of the Siyanda District Municipality.

The area does not fall within a priority area as defined by the Air quality Act of 2004 and none of the proposed activities require emission permitting as defined under that act.

3.2 Climate description and qualitative baseline assessment

No long term weather dataset was available for the site in question so Postmasburg, Northern Cape was selected as an acceptable proxy in consultation with the South African Weather services (SAWS).

Dust emissions are a function of the makeup of the exposed material (particularly silt and small particle content), wind and moisture. Conditions of fine, dry, exposed material in windy weather will result in the greatest emissions. Thus, in analysing potential dust from a source such as the Kapstewel mine, it is these factors on which the focus lies.

3.2.1 Precipitation

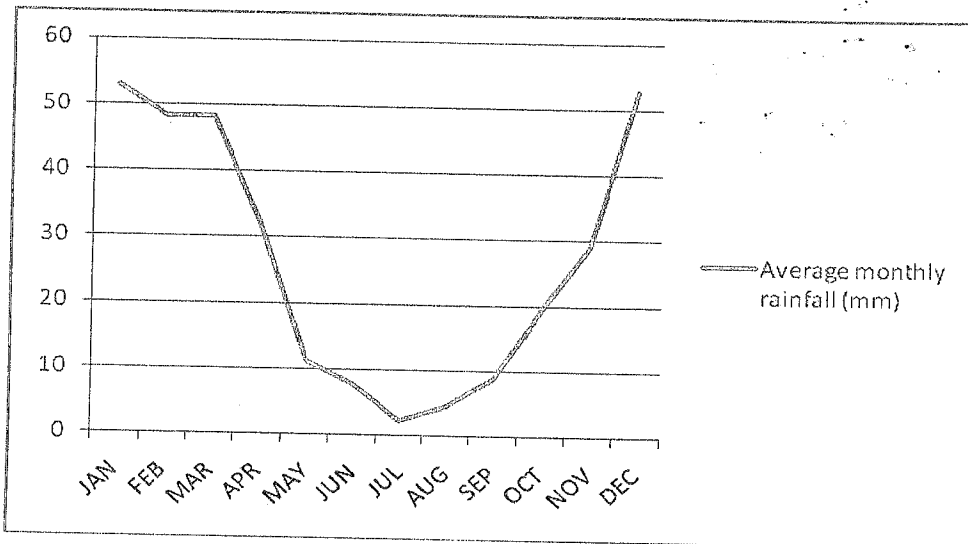


Figure 1: Average monthly rainfall - Postmasburg, Northern Cape (SAWS, 1993 - 2009)

The mine is set on the arid flats of the Northern Cape. It is in South Africa's summer rainfall region with an annual average rainfall of under 400mm per year. Rain peaks mid-season, in December and January, while the winter months are characterized by a long, very dry period. Rain is generally delivered in short duration convective thunderstorms.

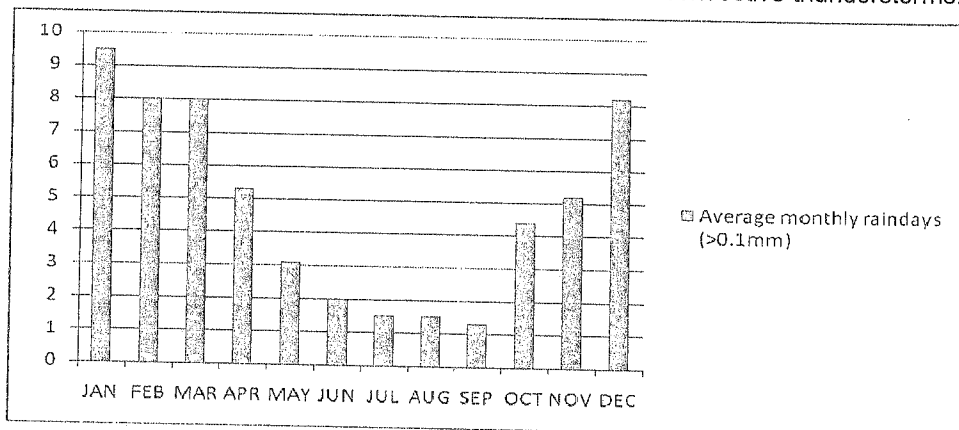


Figure 2: Average monthly rain days > 0.1mm – Postmasburg, Northern Cape (SAWS, 1993-2009)

Even the addition of a small amount of moisture can have a dramatic effect on the reduction of potential dust emissions. Similarly, a long spell without rain will necessitate intervention in the form of dust control measures in order to manage impacts on the surrounding environment. These will be particularly necessary during the months from April to October but the very hot dry climate will likely necessitate almost permanent dust mitigation.

3.2.2 Temperature

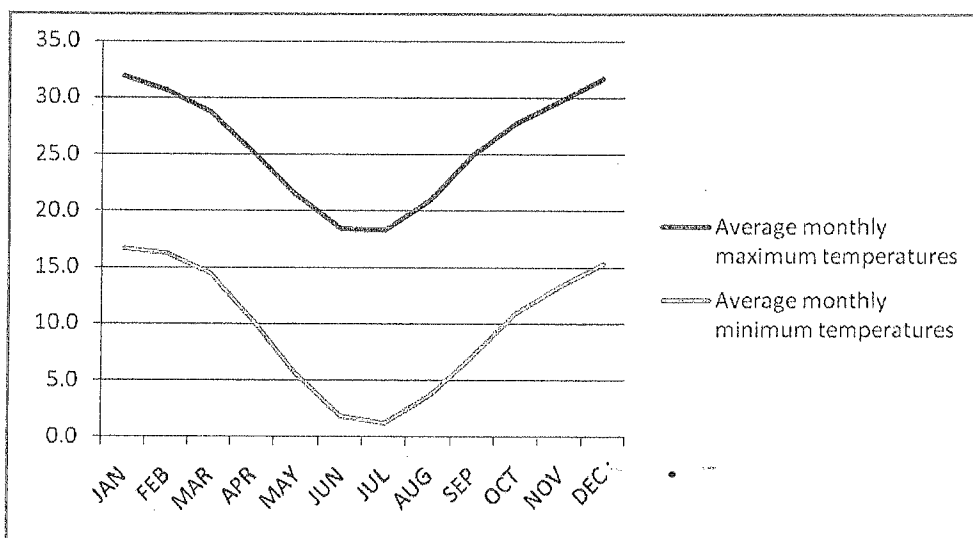


Figure 3: Average monthly temperatures - Postmasburg, Northern Cape (SAWS, 1993-2009)

The warmest period is December / January, when maximum temperatures averaging above 30 degrees centigrade while July is the coldest with daytime temperatures averaging 18.3 degrees and overnight temperatures frequently dropping below freezing. The winter period is also very dry with little or no rainfall and relative humidity dropping below the 40% mark.

3.2.3 Wind

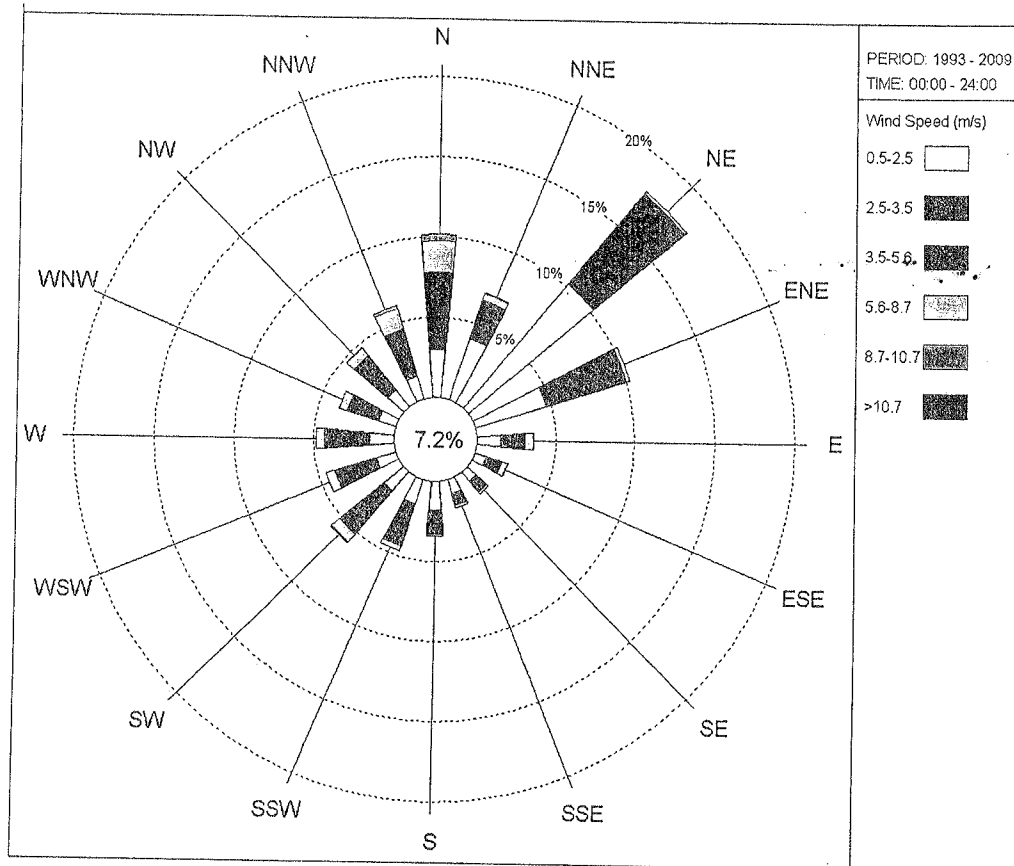


Figure 4: Annual average wind speed and direction - Postmasburg, Northern Cape (SAWS, 1993 - 2009)

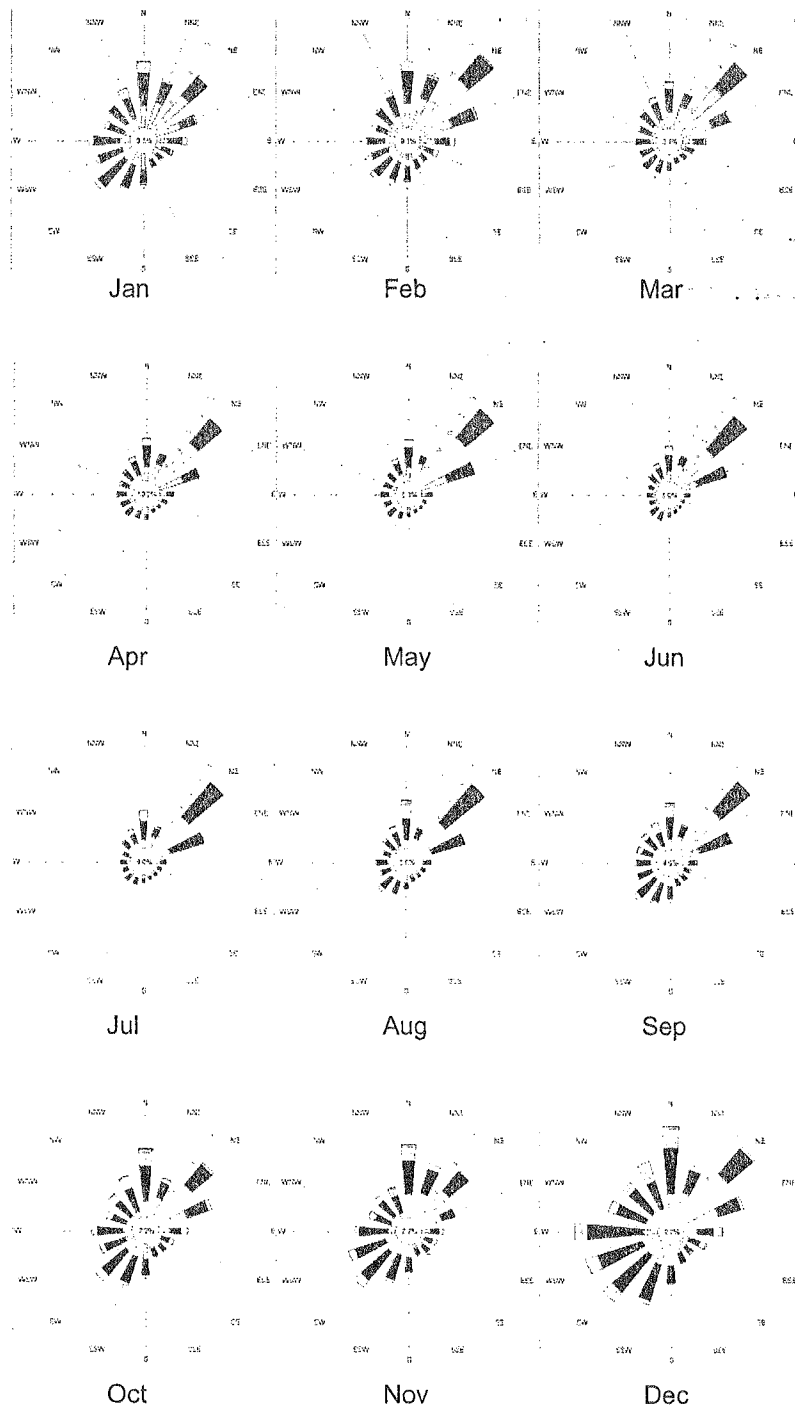


Figure 5: Monthly average wind speed and direction - Postmasburg, Northern Cape (SAWS, 1993 - 2009)

Winds are predominantly northeasterly with a strengthening westerly component in summer. Strongest wind speeds are recorded in winter, and are associated with frontal southwesterlies. More than a third of the data shows periods of calm (wind $<0.5 \text{ m.s}^{-1}$).

3.2.4 Summary

The mine is situated in an extremely dry region characterized by occasional summer rains and where the winters are cool and dry, resulting in conditions ideal for the desiccation of the environment and the wind entrainment of any loose material. Areas most affected by dust from the mine will generally lie to the south and southwest of the mine when synoptic level flow dominates.

4. METHODOLOGY

Emissions to air during the extension and operation of a facility of this nature are generally limited to fugitive dust from exposed land and dumps, smoke emissions from heavy machinery and vehicles, fugitive volatile organic compound emissions from diesel storage (VOC) and a wide range of trace gases given off during the drying of solvents and similar processes resulting from activities associated with routine construction and maintenance.

Of these, dust is by far the greatest potential polluter. The degree to which dust becomes a polluter is in direct relation to four factors:

- The nature of the area to be exposed by surface clearing (including total area, shape relative to prevailing winds and height of dumps etc).
- The moisture content of the soil and by association, the average rainfall for the area
- The silt content and grading of the material exposed to the surface
- Activities taking place on that surface (transport, loading, blasting and entrainment by the passage of vehicles)

4.1 Dispersion Modelling

Potential emission modelling is undertaken using Cambridge Environmental Research Consultants (CERC)'s latest generation model, the Atmospheric Dispersion Modelling System (ADMS 4). Input data is a combination of field data and estimates generated using the Australian National Pollution Inventory (NPI) *Emission Estimation Technique Manual for Mining, Version 2.3*. Meteorological data is sourced from the South African Weather Services (SAWS).

4.1.1 Meteorological data

Following discussions with SAWS, the nearest available hourly sequential dataset was identified as being that of Postmasburg for the year 2008. This is considered to be a reasonable proxy for the region's climate.

4.1.2 Pollutants

Pollutants to air from an open cast mine under normal operations, such as is proposed are likely to fall into two main categories:

- Dust
- Vehicle emissions
- Fugitive VOC emissions

Vehicle emissions are seldom a significant contributor to ambient, fence line pollution levels and were not considered during this study.

4.1.2.1 Dust

Dust is considered in two broad categories, namely total suspended particulates (TSP) and particulate matter with a diameter less than 10µm (PM₁₀).

TSP is also referred to as 'nuisance dust' and accounts for the visible dust that may settle and cause the clogging of machinery as well as having an adverse affect on local flora through the clogging of stomata. Due to the wide range of particles that make up TSP, modelling of this material is considered impractical. Rather, PM₁₀ dispersion is modelled and the flow fields derived from that run are used as indicators of potential problem areas for TSP deposition.

The second category of dust is made up of those particles smaller than 10µm (PM₁₀). PM₁₀ particles are small enough to be inhaled and are thus a significant contributing factor to respirable illness associated with air pollution.

4.1.3 Emission factors

Fugitive dust emissions from a mine of this nature are generally a function of the rate of activity on the mine and the silt and moisture content of the material being handled. These are then exacerbated by wind and dry weather conditions.

When modelling emissions from a site where real data is not available, it is possible to estimate the emissions that will be generated by using a series of equations to determine the likely emission of each process. These are called emission factors. An emission factor is a representative value that attempts to relate the quantity of a pollutant released to the atmosphere with an activity associated with the release of that pollutant.

The emission factors used for this study were taken from the Australian National Pollution Inventory (NPI)'s *Emission Estimation Technique Manual for Mining, Version 2.3* (2001). The emission factors contained therein are mostly based on those developed by the United States Environmental Protection Agency (USEPA, 1985 and 1998) and are in turn published in *Emission Factor Documentation for AP-42* itself considered an industry standard. South Africa has yet to develop its own set of emission factors.

A broad overview of potential dust emissions likely to be emitted *during operation* can be obtained through the use of the NPI's general equation:

$$E_{kpy,i} = [A * OpHrs] * EF_i * [1 - (CE_i/100)]$$

where:

$E_{kpy,i}$ = emission rate of pollutant i, kg/yr

A = activity rate, t/h

OpHrs = operating hours, h/yr

EF_i = uncontrolled emission factor of pollutant i, kg/t

CE_i = overall control efficiency for pollutant i, %

Thus, the following emissions of TSP and PM₁₀ can be anticipated:

Table 1: Estimated emissions per activity, as per *Emission Estimation Technique Manual for Mining, Version 2.3 (2001)*

Operation / Activity	TSP (g/s)		PM ₁₀ (g/s)	
	Estimate	Default	Estimate	Default
Excavators/shovels/front end loaders (on overburden)	3.01	2.833	0.5	0.903
Trucks (dumping ore / overburden)	-	0.039	-	0.016
Wheel generated dust from unpaved roads	1.332	0.898	0.387	0.222
Scraping	0.028	0.001	0.01	0.012
Grading	0.141		0.031	-
Loading stockpiles	-	0.016	-	0.007
Unloading from stockpiles	-	0.117	-	0.051
Wind erosion	-	0.056	-	0.028

The equations used are provided to estimate dust. When any doubt existed as to the input data required, inputs were assumed conservatively, so as to maximise indicated emissions. Background levels were assumed to be 20 µg/m³.

5. RESULTS

The following model outputs were achieved:

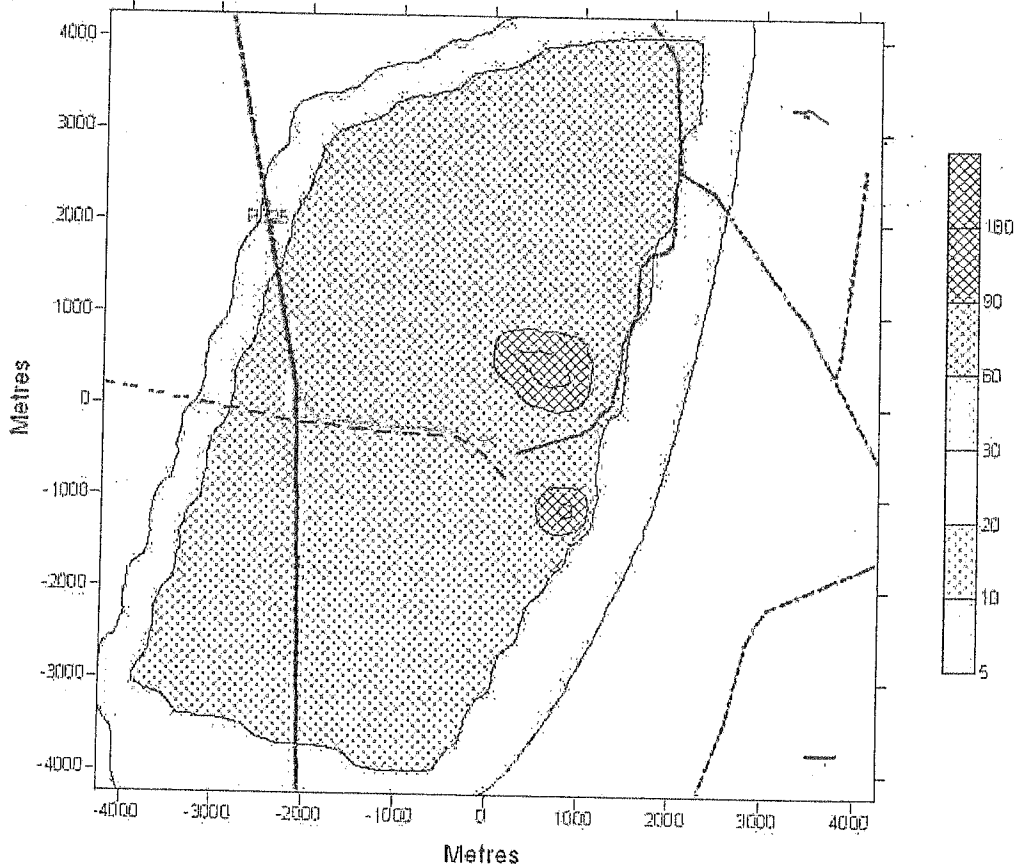


Figure 6: Modelled representation of PM₁₀ dispersion from the proposed Kapstewel mine. Long term averages, 24 hour averaging period, levels indicated in µg/m³

The representation above indicates that dispersion from the proposed additions is likely to be limited to the areas immediately adjacent to the actively mined areas. The modelled levels are generally below South Africa's 24 hour average ambient guidelines (180µg/m³) although areas around the mining activity may exceed this level if sufficient mitigation is not in place. It should be noted that peak dust levels in proximity to haul roads and active heavy machinery may sporadically exceed these levels on a shorter time scale. Dust should not significantly impact areas beyond the mine boundary.

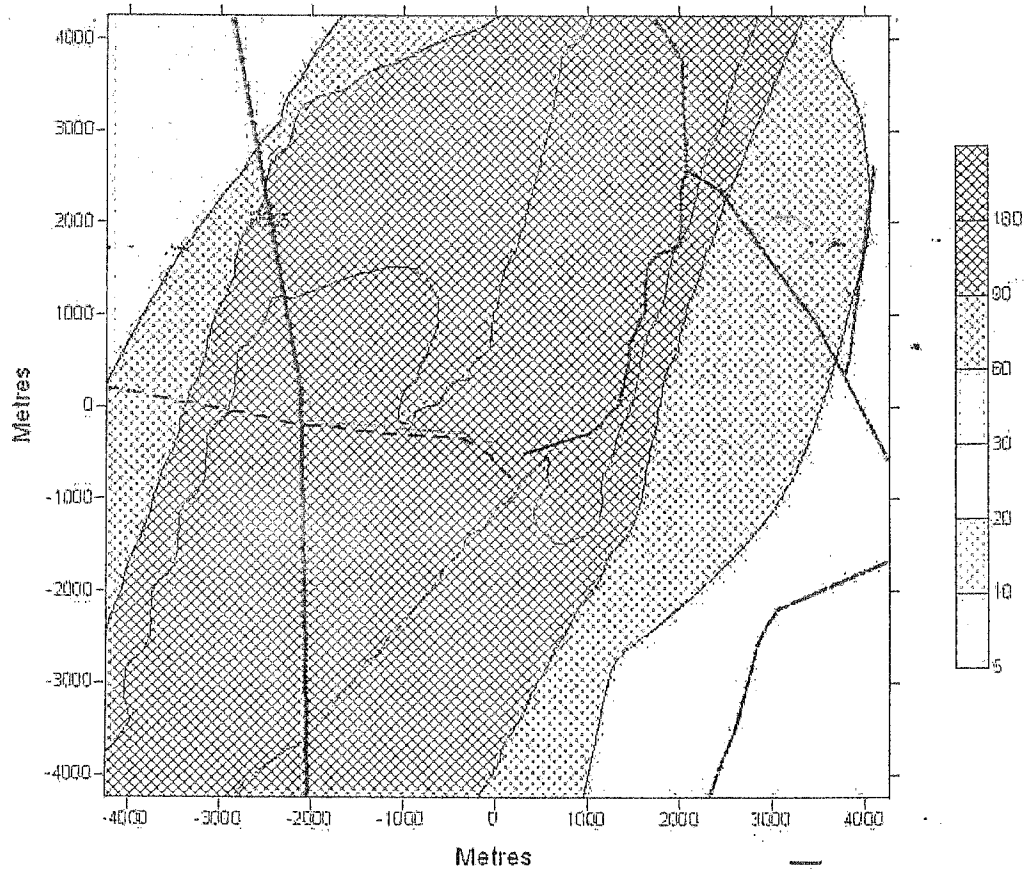


Figure 7: Modelled representation of 'worst hour' PM₁₀ dispersion from the proposed Kapstewel mine. Long term averages, 24 hour averaging period, levels indicated in µg/m³

Figure 7 shows a plot of the worst hour for each grid point of the 8640 hours that make up the year long model run. From this it can be recognised that occasional exceedence of the 180 µg/m³ level is likely to the southwest and northeast of the mine. These are likely to be highly localised and associated with specific activities.

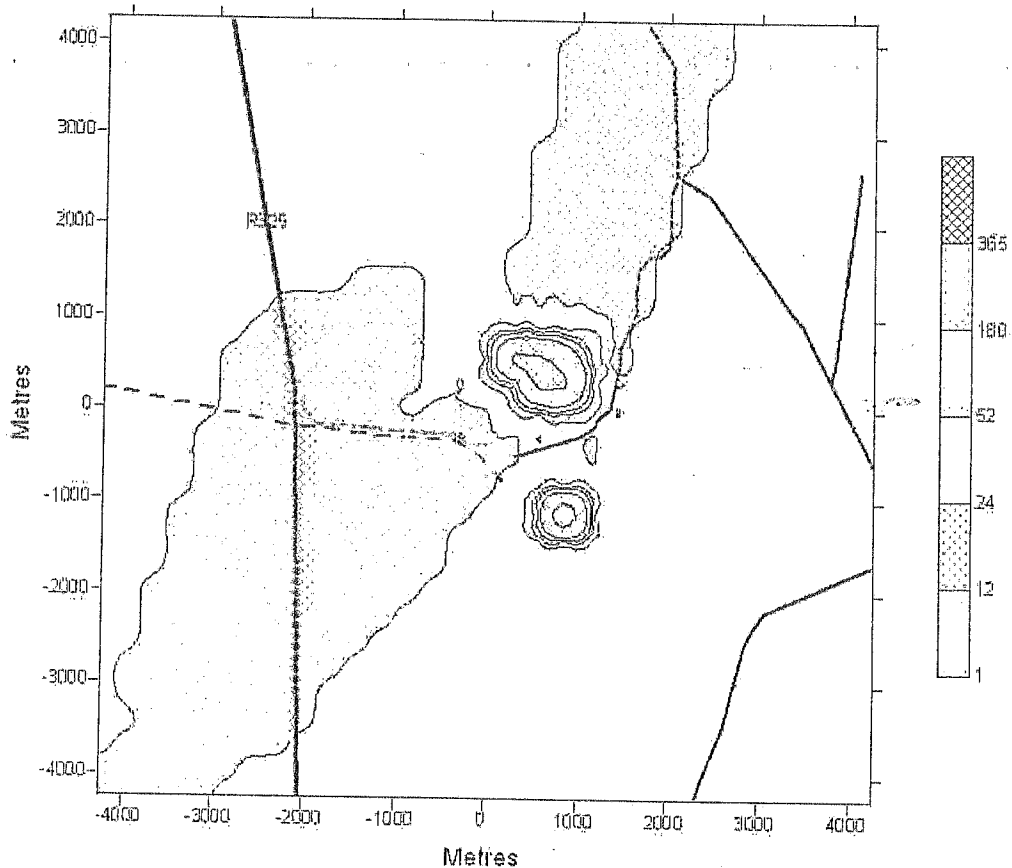


Figure 8: Modelled representation of incidences of ambient PM₁₀ levels from the proposed Kapstewel mine exceeding the 180 µg/m³ level.

Figure 8 shows the likely number of exceedence in any one year of the 180 µg/m³ level. Areas away from the mined areas are unlikely to exceed these levels with the exception of areas within the regular dispersion corridors to the southwest and the northeast of the mine. The 180 µg/m³ level is recommended as the legal ambient dust limit so this plot serves to stress the importance of ensuring that appropriate mitigation remains in place around the activity areas.

Modelling is by its nature an imperfect science and so the above results should not be read as definitively quantitative but rather should give an opportunity to assess the likely areas of high dust levels generated by the proposed mine. The actual levels that that dust may achieve is impossible to quantify accurately (and are probably under represented here) so every effort to mitigate emissions should be undertaken.

6. POTENTIAL IMPACTS AND MITIGATION

Emissions to air from the proposed mine have the potential to be significant if appropriate mitigation and management measures are not undertaken. Under normal, responsible operation, a number of areas of potential emissions are readily identified:

- Dust and associated emissions during building and decommissioning phases; particularly associated with loading and offloading of material, dumping of overburden and waste rock, and the transport of material from mining area to the processing plant.
- Fugitive dust emissions associated with the wind entrainment of large areas of exposed earth and dumped material that will be created during the project.
- Vehicle emissions associated with the building, operation and decommissioning phases.

6.1 Dust emissions

The modelled data indicates that a moderate increase in ambient dust levels in surrounding areas could result from the proposed mine. Due to the inherent limitations in dust emission modelling and the very dry nature of this environment, it is recommended that every effort be made to limit dust emissions from the active mine areas and along all roads.

6.1.1 Dust mitigation

A dust management plan that includes some or all of the following mitigation measures is recommended (after Holmes Air Sciences (1998)). It is recognised that the extremely arid nature of the environment may make water based mitigation measures unfeasible. Wherever possible non-water based solutions should be found, possibly through strict behavioural controls (vehicle speed etc) than are listed here.

Table 2: Estimated Control Factors for Various Mining Operations

Activity	Control	Emission reduction
Scrapers on topsoil	Artificial or natural moistening of soil	50%
Hauling	Watering (2 litres/m ² /h)	50%
	Watering (> 2 litres/m ² /h)	75%
	Limiting vehicle speed	(see below)
Loading stockpiles	Water sprays	50%
	Variable height stacker	25%
	Telescopic chute with water sprays	75%
	Total enclosure	99%
Unloading from stockpiles	Water sprays	50%
Miscellaneous transfer and conveying	Water sprays with chemicals	90%
	Enclosure	70%
	Enclosure and use of fabric filters	99%

With respect to road dust levels, it is recommended to limit vehicle speeds, especially during high risk periods of high winds, high temperature and low humidity. On its own, the passage of a single vehicle causes a spike in pollution, dependent on speed, which returns to ambient air conditions fairly rapidly. However, under high risk conditions with multiple vehicle passes in a short space of time, entrainment into the air stream will occur, contributing to the regional dust risk. It is important to note that for speeds between zero and 40km / hour, the increase in haul road dust emission is exponential. It is impossible to monitor dust quantitatively in real time, so the following subjective classification of haul road dust defect becomes useful in alerting operators to real time conditions.

Table 3: Classification of Haul Road Dust Defect.

Dust defect degree descriptions for PM ₁₀ dust emissions per haul truck pass at 40km /hour (mg.m ⁻³)				
Degree 1	Degree 2	Degree 3	Degree 4	Degree 5
<3.50	3.51 to 23.50	23.51 to 45.00	45.01 to 57.50	>57.51
Minimal dust	Dust just visible behind vehicle	Dust visible, no oncoming vehicle driver discomfort, good visibility	Notable amount of dust, windows closed in oncoming vehicle, visibility just acceptable, overtaking difficult	Significant amount of dust, windows closed in oncoming vehicle, visibility poor and hazardous, overtaking not possible.

6.2 Fugitive dust emissions

The most significant period for wind entrainment of loose material is likely to be during the dry winter months. In addition, material that is newly dumped is also more susceptible to wind entrainment as after a period, all exposed, loose material will have been eroded from the site. The following mitigation measures are relevant around areas of stock piling and overburden dumping.

6.2.1 Fugitive dust mitigation

A dust management plan that includes some or all of the following mitigation measures is recommended:

Table 4: Estimated Control Factors fugitive dust emissions

Activity	Control	Emission reduction
Wind erosion from stockpiles	Water sprays	50%
	Wind breaks	30%
	Re-vegetation or total enclosure	99%

Smooth contouring i.e. rounding of the upper edges, to reduce eddy generation under strong wind conditions and limiting the height of stockpiles also assists in fugitive dust reduction. Stockpiles with a long static lifespan should be designed to minimise surface area to volume ratio.

6.3 Vehicle emissions

As with any large industrial or construction activity, vehicular emissions resulting from the use of diesel engines is inevitable.

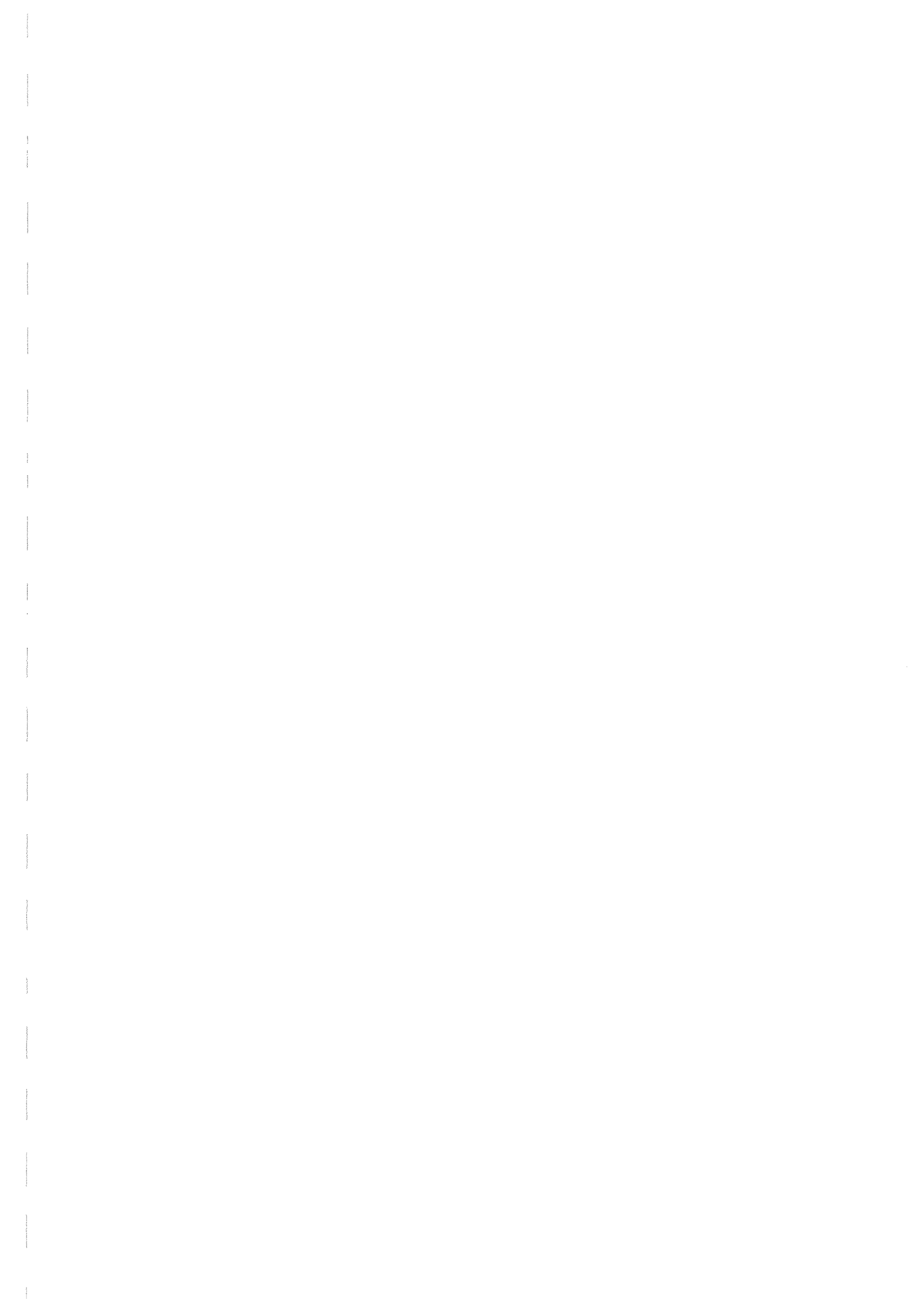
6.3.1 Vehicle emission mitigation

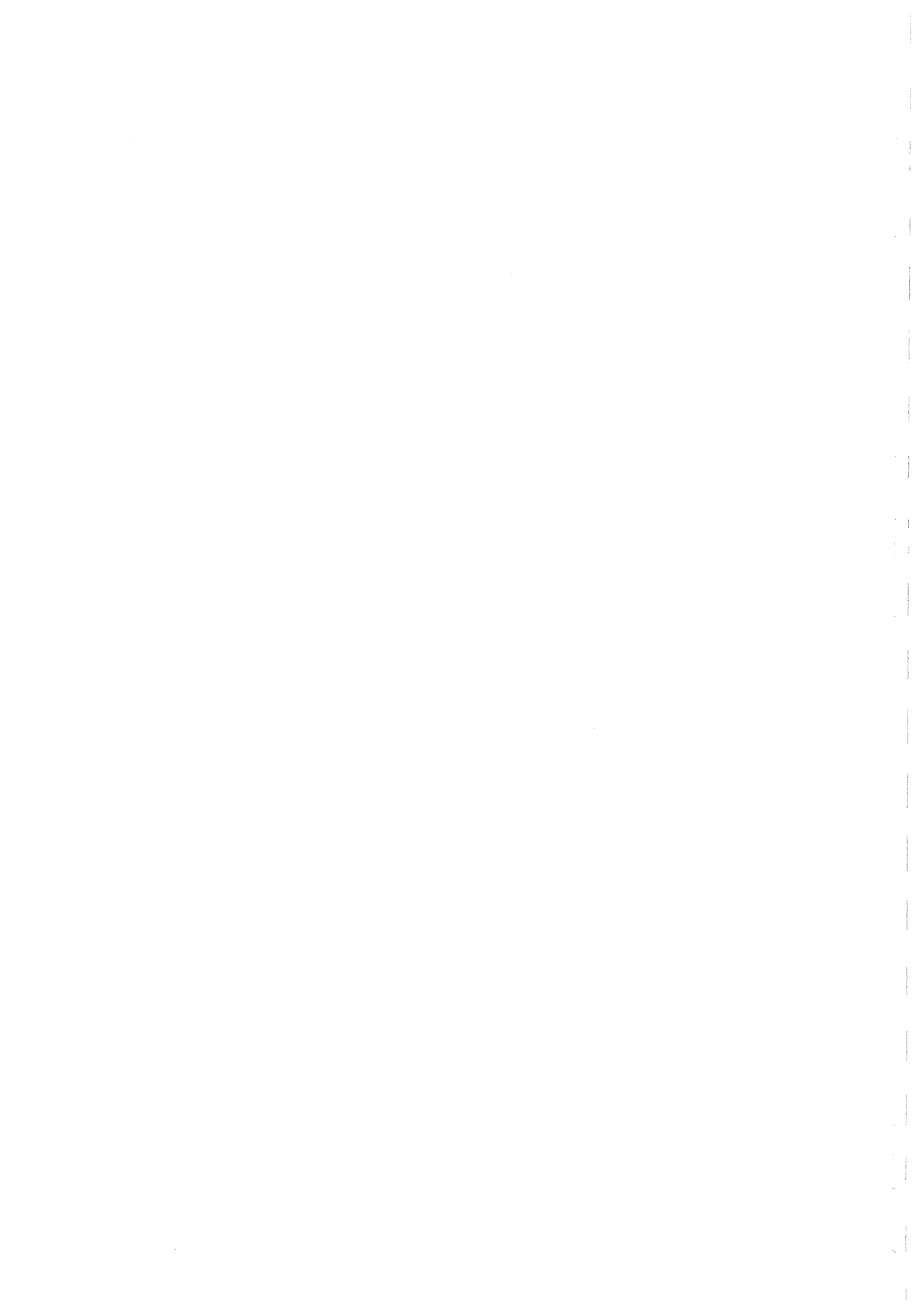
It is recommended that best practice is followed in terms of limiting vehicle emissions through the proper control and maintenance of vehicles.

7. CONCLUSIONS

The proposed activities will result in dust emissions, both from mining activities and fugitive emissions from the large areas of previously vegetated land that will now be exposed. Provided sufficient mitigation measures are instigated, it is unlikely that these emissions will result in the exceedence of South Africa's guidelines for particulate emissions.

Once the mine is decommissioned, and assuming correct decommissioning procedures as pertains to dust are carried out, no impacts should result beyond the life of the mine. With correct mitigation, all of the intensities described above should be kept below guideline levels.







Archaetnos Culture & Cultural
Resource Consultants
BK 98 09854/23

**A REPORT ON A HERITAGE IMPACT ASSESSMENT STUDY FOR PROPOSED MINING
DEVELOPMENT ON THE REMAINING EXTENT AND PORTIONS 2, 3, 4 AND 5 OF
KAPSTEWEL 436, KURUMAN REGISTRATION DISTRICT,
SIYANDA DISTRICT MUNICIPALITY, NORTHERN CAPE PROVINCE**

For:

AUTUMN SKIES TRADING 128 CC

REPORT: **AE939**

by:

A.J. Pelser & Dr. A.C. van Vollenhoven

Accredited Members of ASAPA

JULY2009

Archaetnos
P.O.Box 31064
WONDERBOOMPOORT
0033
Tel: 083 291 6104/083 459 3091
Fax: 086 520 0376
Email: antonp21@yahoo.com

Members: AC van Vollenhoven BA, BA (Hons), DTO, NDM, MA (Archaeology) [UP],
MA (Culture History) [US], DPhil (Archaeology) [UP], Man Dip [TUT]
AJ Pelser BA (UNISA), BA (Hons) (Archaeology), MA (Archaeology) [WITS]

**©Copyright
Archaetnos**

The information contained in this report is the sole intellectual property of Archaetnos CC. It may only be used for the purposes it was commissioned for by the client.

DISCLAIMER:

Although all possible care is taken to identify all sites of cultural importance during the survey of study areas, the nature of archaeological and historical sites are as such that it always is possible that hidden or subterranean sites could be overlooked during the study. Archaetnos and its personnel will not be held liable for such oversights or for costs incurred as a result thereof.

SUMMARY

Archaetnos cc was requested by GCS, on behalf of Autumn Skies Trading 128 cc, to conduct a Heritage Impact Assessment Study for proposed mining development on the remaining extent and portions 2, 3, 4 and 5 of Kapstewel 436, Kuruman Registration District, Siyanda District Municipality, Northern Cape Province.

The fieldwork undertaken revealed a number of objects, features and sites of cultural (archaeological or historical) heritage significance in the area of proposed development. **The proposed development can however continue, as long as the recommendations put forward at the end of this report are implemented.**

CONTENTS

	page
SUMMARY	3
CONTENTS	4
1. INTRODUCTION	5
2. TERMS OF REFERENCE	5
3. CONDITIONS AND ASSUMPTIONS	5
4. LEGAL REQUIREMENTS	6
5. METHODOLOGY	7
6. DESCRIPTION OF THE AREA	7
7. DISCUSSION	10
8. CONCLUSIONS AND RECOMMENDATIONS	17
9. REFERENCES	18
APPENDIX A	19
APPENDIX B	20
APPENDIX C	21

1. INTRODUCTION

Archaetnos cc was requested by GCS, on behalf of Autumn Skies Trading 128 cc, to conduct a Heritage Impact Assessment Study for proposed mining development on the remaining extent and portions 2, 3, 4 and 5 of Kapstewel 436, Kuruman Registration District, Siyanda District Municipality, Northern Cape Province.

The client indicated the area where the proposed development is to take place, and the survey was confined to this area.

2. TERMS OF REFERENCE

The Terms of Reference for the survey were to:

1. Identify all objects, sites, occurrences and structures of an archaeological or historical nature (cultural heritage sites) located on the property (see Appendix A).
2. Assess the significance of the cultural resources in terms of their archaeological, historical, scientific, social, religious, aesthetic and tourism value (see Appendix B).
3. Describe the possible impact of the proposed development on these cultural remains, according to a standard set of conventions.
4. Propose suitable mitigation measures to minimize possible negative impacts on the cultural resources.
5. Recommend suitable mitigation measures should there be any sites of significance that might be impacted upon by the proposed development.
6. Review applicable legislative requirements.

3. CONDITIONS & ASSUMPTIONS

The following conditions and assumptions have a direct bearing on the survey and the resulting report:

1. Cultural Resources are all non-physical and physical man-made occurrences, as well as natural occurrences associated with human activity. These include all sites, structure and artifacts of importance, either individually or in groups, in the history, architecture and archaeology of human (cultural) development. Graves and cemeteries are included in this.
2. The significance of the sites, structures and artifacts is determined by means of their historical, social, aesthetic, technological and scientific value in relation to their uniqueness, condition of preservation and research potential. The various aspects are not mutually exclusive, and the evaluation of any site is done with reference to any number of these aspects.
3. Cultural significance is site-specific and relates to the content and context of the site. Sites regarded as having low cultural significance have already been recorded in full and require no further mitigation. Sites with medium cultural significance may or may not require mitigation depending on other factors such as the significance of impact on the site. Sites with a high cultural significance require further mitigation (see Appendix B).
4. The latitude and longitude of any archaeological or historical site or feature, is to be treated as sensitive information by the developer and should not be disclosed to members of the public.
5. All recommendations are made with full cognizance of the relevant legislation.

6. It has to be mentioned that it is almost impossible to locate all the cultural resources in a given area, due to factors such as vegetation and the subterranean presence of objects, features and sites. Developers should however note that the report should make it clear how to handle any other finds that might occur.

4. LEGISLATIVE REQUIREMENTS

Aspects concerning the conservation of cultural resources are dealt with mainly in two acts. These are the National Heritage Resources Act (Act 25 of 1999) and the National Environmental Management Act (Act 107 of 1998).

4.1 The National Heritage Resources Act

According to the above-mentioned law the following is protected as cultural heritage resources:

- a. Archaeological artifacts, structures and sites older than 100 years
- b. Ethnographic art objects (e.g. prehistoric rock art) and ethnography
- c. Objects of decorative and visual arts
- d. Military objects, structures and sites older than 75 years
- e. Historical objects, structures and sites older than 60 years
- f. Proclaimed heritage sites
- g. Grave yards and graves older than 60 years
- h. Meteorites and fossils
- i. Objects, structures and sites of scientific or technological value.

Archaeology, palaeontology and meteorites

Section 35(4) of this act states that no person may, without a permit issued by the responsible heritage resources authority:

- a. destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite;
- b. destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or object or any meteorite;
- c. trade in, sell for private gain, export or attempt to export from the Republic any category of archaeological or palaeontological material or object, or any meteorite; or
- d. bring onto or use at an archaeological or palaeontological site any excavation equipment or any equipment that assists in the detection or recovery of metals or archaeological and palaeontological material or objects, or use such equipment for the recovery of meteorites.
- e. alter or demolish any structure or part of a structure which is older than 60 years as protected.

The above mentioned may only be disturbed or moved by an archaeologist, after receiving a permit from the South African Heritage Resources Agency.

Human remains

In terms of Section 36(3) of the National Heritage Resources Act, no person may, without a permit issued by the relevant heritage resources authority:

- a. destroy, damage, alter, exhume or remove from its original position or otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves;
- b. destroy, damage, alter, exhume or remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority; or

- c. bring onto or use at a burial ground or grave referred to in paragraph (a) or (b) any excavation, or any equipment which assists in the detection or recovery of metals.

Human remains that are less than 60 years old are subject to provisions of the Human Tissue Act (Act 65 of 1983) and to local regulations. Exhumation of graves must conform to the standards set out in the **Ordinance on Excavations (Ordinance no. 12 of 1980)** (replacing the old Transvaal Ordinance no. 7 of 1925).

Permission must also be gained from the descendants (where known), the National Department of Health, Provincial Department of Health, Premier of the Province and local police. Furthermore, permission must also be gained from the various landowners (i.e. where the graves are located and where they are to be relocated) before exhumation can take place.

Human remains can only be handled by a registered undertaker or an institution declared under the **Human Tissues Act (Act 65 of 1983 as amended)**.

Unidentified/unknown graves are also handled as older than 60 until proven otherwise.

4.2 The National Environmental Management Act

This act states that a survey and evaluation of cultural resources must be done in areas where development projects, that will change the face of the environment, will be undertaken. The impact of the development on these resources should be determined and proposals for the mitigation thereof are made.

5. METHODOLOGY

5.1 Survey of literature

A desktop study, to place any archaeological sites that might be identified during the survey in a local and general context, was undertaken. A basic description of the various periods in the archaeology of southern Africa is also given.

5.2 Field survey

The survey was conducted according to generally accepted HIA practices and was aimed at locating all possible objects, sites and features of cultural significance in the area of proposed development. If required, the location/position of any site was determined by means of a Global Positioning System (GPS), while photographs were also taken where needed.

The survey was undertaken on foot, while the area's parameters were determined by vehicle.

5.3 Documentation

All sites, objects features and structures identified are documented according to the general minimum standards accepted by the archaeological profession. Co-ordinates of individual localities are determined by means of the Global Positioning System (GPS). The information is added to the description in order to facilitate the identification of each locality.

6. DESCRIPTION OF THE AREA

The area is located on the remaining extent and portions 2, 3, 4 and 5 of Kapstewel 436, Kuruman Registration District, Siyanda District Municipality, Northern Cape Province (**Figure 1**).

Large portions of the area have been extensively disturbed through recent historical (old SAMANCOR Manganore) opencast mining activities and prospecting. Some structural remains associated with these activities are scattered throughout the area. Surrounding properties situated within the same vegetation type are mostly used for mining and livestock farming purposes. The survey concentrated

to a large degree on the relatively undisturbed areas, while a number of possible shelters were also investigated for possible human utilization.

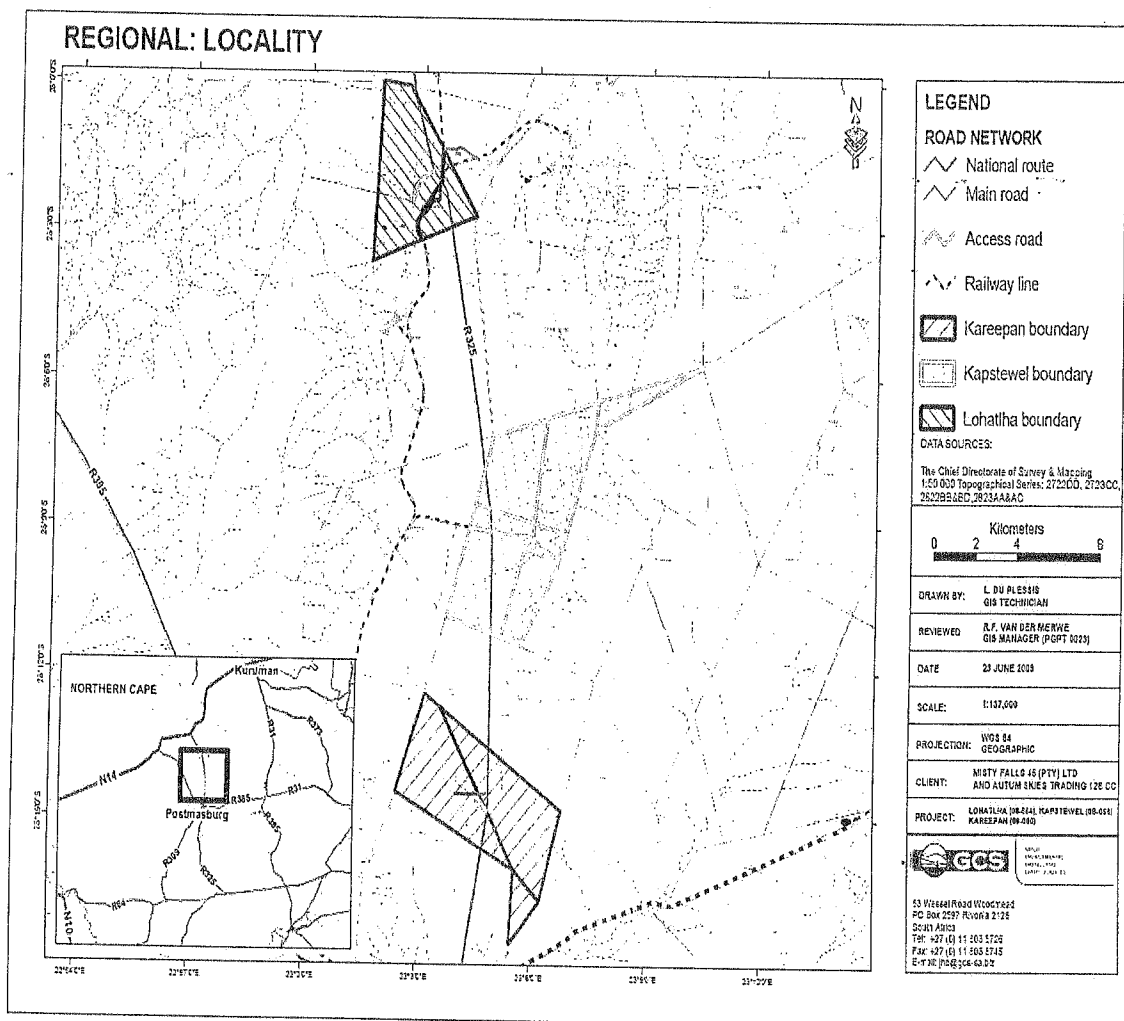


Figure 1: Location of the area – the orange block indicates Kapstewel

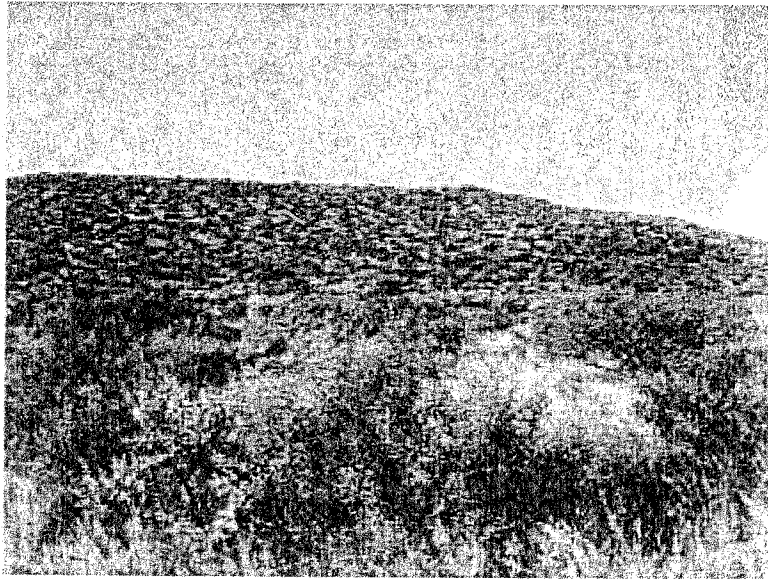


Figure 2: General view of undisturbed portions of the survey area

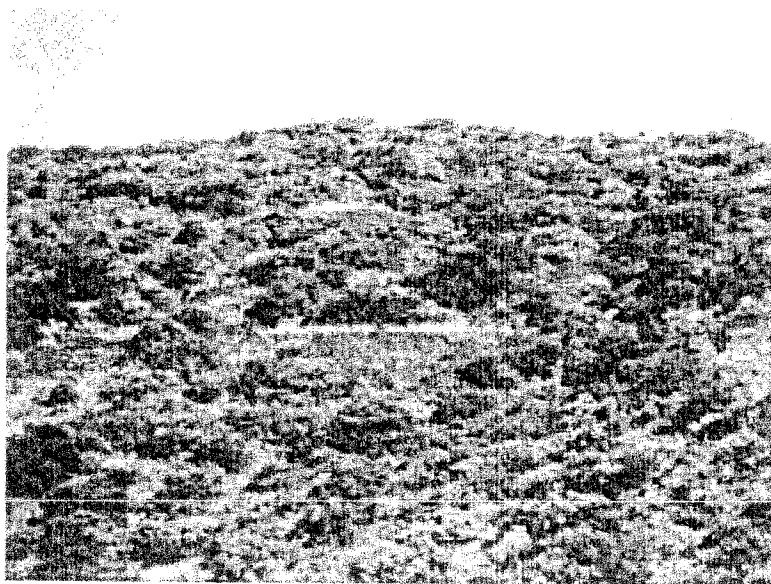


Figure 3: Another view of the survey area – note the various prospecting holes and opencast mining areas

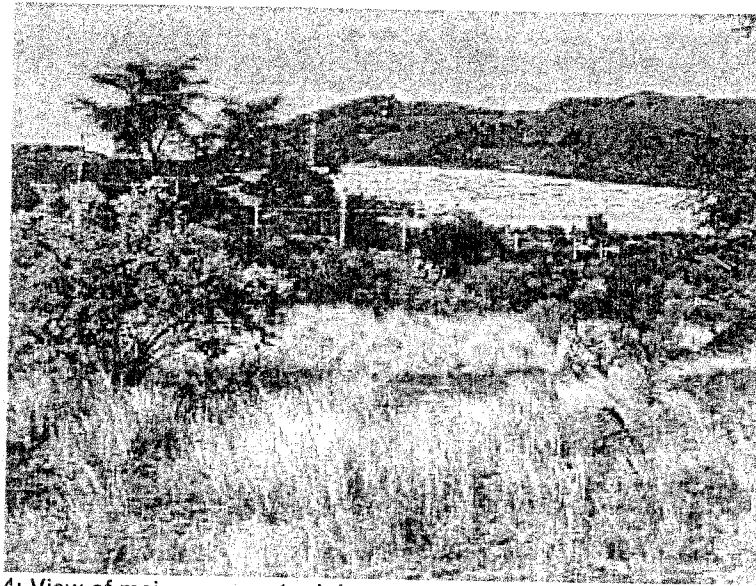


Figure 4: View of main opencast mining area – old SAMANCOR Manganore mine

7. DISCUSSION

In order to introduce the reader to the archaeology of the South Africa, a short background to the various time periods relevant to southern African archaeology is given.

7.1 Stone Age

The Stone Age is the period in human history when lithic material was mainly used to produce tools (Coertze & Coertze 1996: 293). In South Africa the Stone Age can be divided in three periods. It is however important to note that dates are relative and only provide a broad framework for interpretation. The division for the Stone Age according to Korsman & Meyer (1999: 93-94) is as follows:

Early Stone Age (ESA) 2 million – 150 000 years ago
Middle Stone Age (MSA) 150 000 – 30 000 years ago
Late Stone Age (LSA) 40 000 years ago – 1850 - A.D

A number of Stone Age sites are known in the general geographical area, including Wonderwerk Cave near Kuruman and the Kathu Pan and Kathu Townlands sites (Mitchell 2002:59-70), dating to between the ESA and LSA. Stone tools were found scattered over the area during the survey, evidence that Stone Age people were active in the area. Some stone tools were also found during the survey of one of the other application areas (Kareepan/Pensfontein).

A number of possible caves or shelters/overhangs were also investigated in the area to see whether or not these were utilized or inhabited during the Stone Age or later periods. No evidence of occupation or use, in the form of tools or other cultural material, or rock art, was visible. However, the possibility of this should not be discounted.

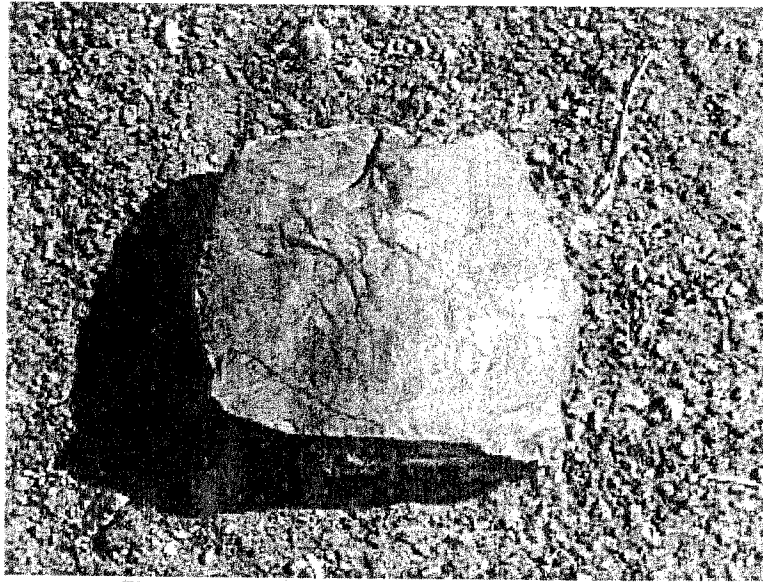
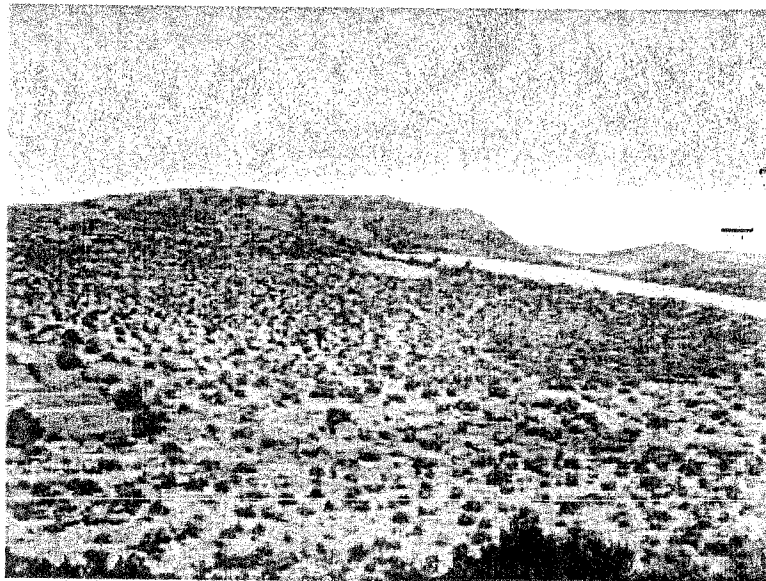


Figure 5: A Stone Age flake-tool from the area



**Figure 6: View of the area from one of the possible shelters.
The old SAMANCOR mining operations on Kapstewel is visible in the distance**

7.2 Iron Age

The Iron Age is the name given to the period of human history when metal was mainly used to produce artifacts (Coertze & Coertze 1996: 346). In South Africa it can be divided in two separate phases according to Van der Ryst & Meyer (1999: 96-98), namely:

- Early Iron Age (EIA) 200 – 1000 A.D.
- Late Iron Age (LIA) 1000 – 1850 A.D.

Huffman (2007: xiii) however indicates that a Middle Iron Age should be included. His dates, which now seem to be widely accepted in archaeological circles, are:

- Early Iron Age (EIA) 250 – 900 A.D.

Middle Iron Age (MIA) 900 – 1300 A.D.
Late Iron Age (LIA) 1300 – 1840 A.D.

One possible, small, Iron Age site was found in the area during the survey, although it is difficult to determine at this stage. If any major sites existed they might have been completely destroyed by recent historical mining activities. The closest known Iron Age sites in the wider geographical area include Doornfontein, Blinkklipkop (near Postmasburg) and the well-known Dithakong near Kuruman (Mitchell 2002: 346).

7.3 Historical Age

The historical age started with the first recorded oral histories in the area. It includes the moving into the area of people that were able to read and write. This included the expeditions of Anderson (1799), Truter and Somerville (1801), Lichtenstein (1805), Cowan & Donovan (1808), Burchell (1811) and Moffat & Archbell (1829) (Bergh 1999: 12-13 & 117-120).

A number of recent, historical sites were located. These all related to recent mining activities and prospecting in the study area.

Site 1 (S 28.13266 E 23.11854)

This site contains the remains of an old mining complex. There are various prospecting trenches, mine buildings and an ore crushing facility. Scrap metals, building rubble and old vehicle parts scatter the area. The site is probably less than 60 years of age and is deemed of low significance. The documentation (recording and photographs taken) done during the survey is seen as sufficient mitigation measures.

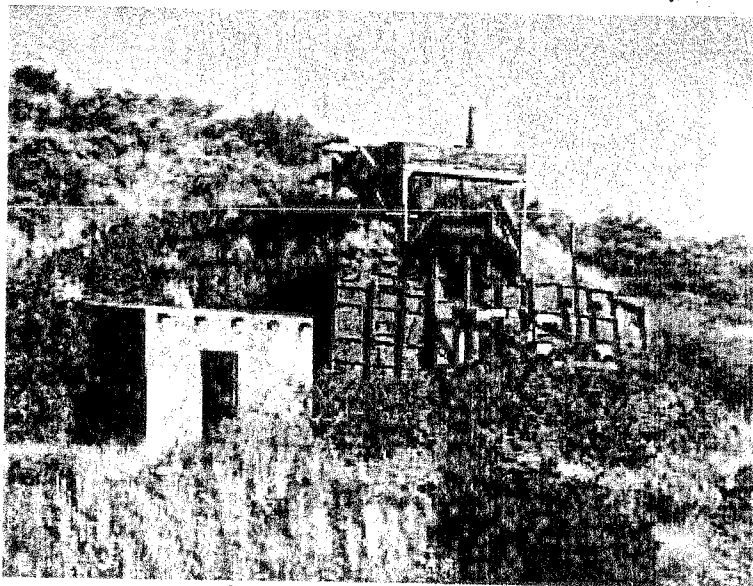
Probability of Impact: Possible

Extent of Impact: Local (up to 5k from the project site)

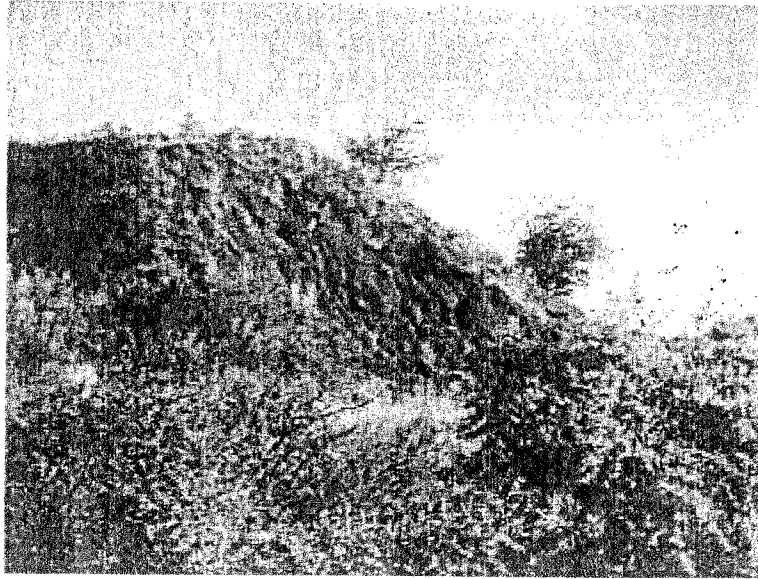
Duration of Impact: Long-term

Intensity of Impact: Medium

Significance of Impact: Moderate



Site 1: Ore crushing facility



Site 1: Ore dump

Site 2 (S 28.14171 E 23.11661)

This is a site with some low stone walled features, possibly dating to either the Iron Age or to earlier Later Stone Age hunter-gatherers. There are at least 3 circular and semi-circular features that might represent either windbreaks for shelters or dwellings. No artifacts were identified. The exact function or age of these features is unknown at this stage, and more investigation is needed. **The site is deemed to be of medium to high significance, and some mitigation measures need to be implemented should mining operations take place in this area. This will include mapping and drawing.**

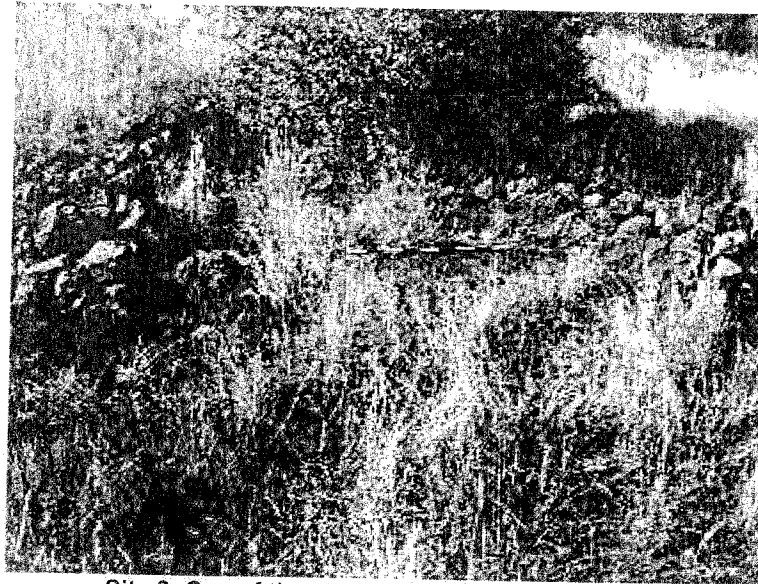
Probability of Impact: Probable

Extent of Impact: Local (up to 5k from the project site)

Duration of Impact: Long-term

Intensity of Impact: Medium

Significance of Impact: Moderate



Site 2: One of the stone walled features on Site 2

Site 3 (S 28.14229 E 23.11664)

This is a possible grave. It is a stone packed, rectangular-shaped feature with no visible headstone. Some pieces of undecorated porcelain were found near to it. If this is indeed an unknown grave it is of high significance. If the mining operations are to impact directly on this area, this will have to be taken into consideration and the mining plans will have to be altered in order to avoid disturbing the grave. If not possible, the grave will have to be exhumed and relocated after all necessary processes related to graves have been undertaken.

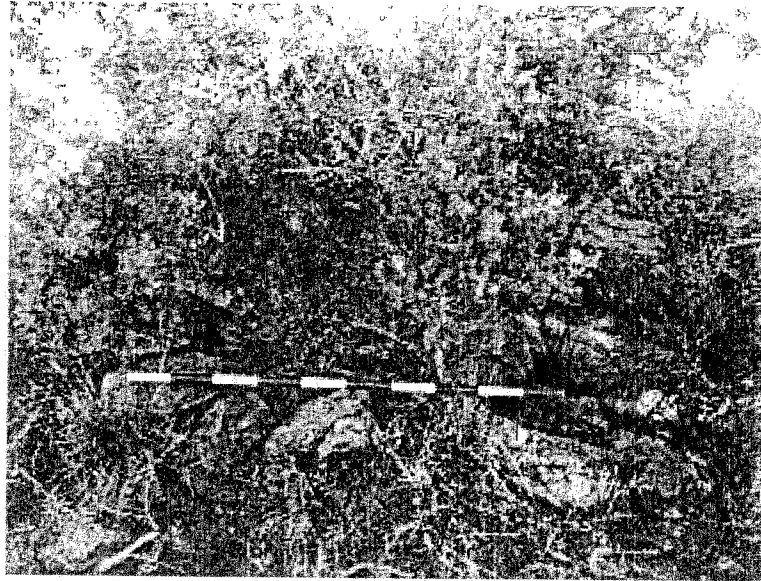
Probability of Impact: Possible

Extent of Impact: Local (up to 5k from the project site)

Duration of Impact: Long-term

Intensity of Impact: Medium

Significance of Impact: Moderate



Site 3: Possible grave

Site 4 (S 28.14735 E 23.11530)

The site contains at least 9 circular (stone-lined) depressions, stretched in a row along an old mine prospecting road. The function or exact age of these features is unknown, but it is possible that it is related to the recent historic mining activities in the area and that it represents a mine camp where tents were pitched. The linear layout of the site does not conform to the Iron Age and its location next to the road does seem to favor the mine camp conclusion. Bottles and other cultural material found in the vicinity also seems to date the site to the 1960's/70's. The site has low significance, as it most probably is less than 60 years of age. The documentation done during the survey is deemed sufficient enough mitigation.

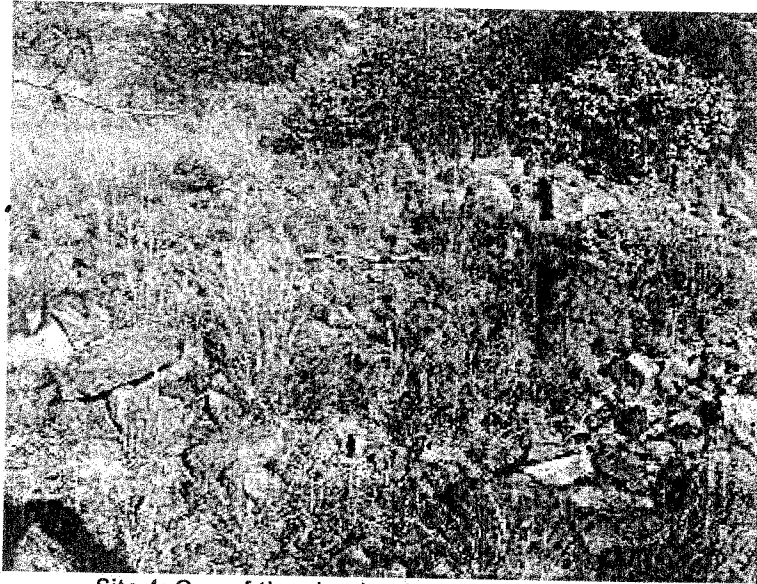
Probability of Impact: Possible

Extent of Impact: Local (up to 5k from the project site)

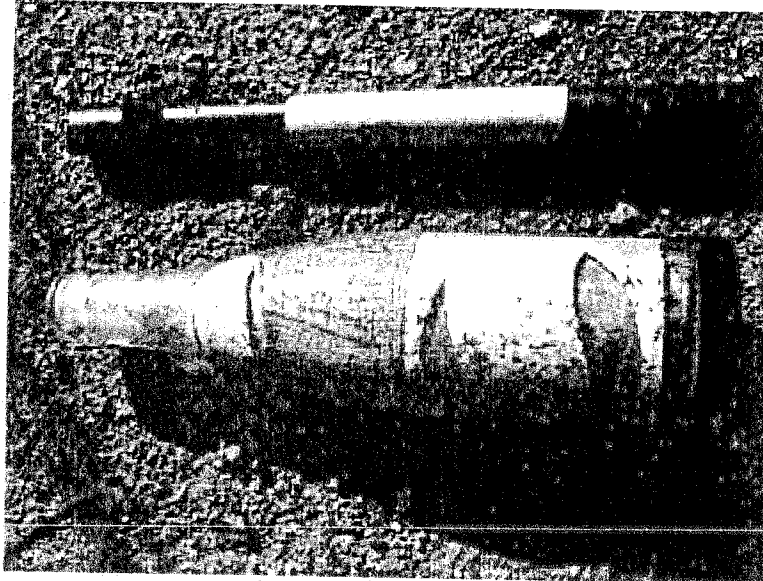
Duration of Impact: Long-term

Intensity of Impact: Medium

Significance of Impact: Moderate



Site 4: One of the circular depressions on the site



Site 4: Old Pepsi bottle

Site 5 (NO GPS location)

This is an old farm stead, with a number of buildings and features on it. It is less than 60 years of age and not very significant. It will be revamped and used as part of the new mining infrastructure. Impacted on by the mining activities. The documentation (recording and photographs taken) done during the survey deemed sufficient.

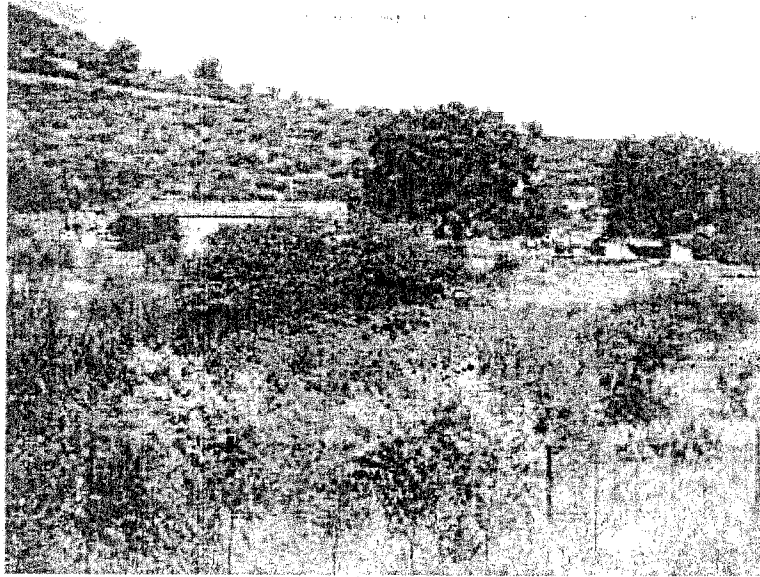
Probability of Impact: Definite

Extent of Impact: Site

Duration of Impact: Long-term

Intensity of Impact: Medium

Significance of Impact: Moderate



Site 5

Site 6 (S 28.15434 E 23.10222; S 28.15394 E 23.10295; S 28.15448 E 23.10101; S 28.15612 E 23.10101)

This site represents the old mine offices and complex of the old SAMANCOR Manganore mining operations. It contains various buildings and features. This could be re-used for the new mining operations. It is less than 60 years of age (dating to around the 1970's to 1990's). It has low cultural heritage significance and the documentation done during the survey is sufficient enough to be regarded as mitigation.

Probability of Impact: Definite

Extent of Impact: Site

Duration of Impact: Long-term

Intensity of Impact: Medium

Significance of Impact: Moderate

Site 7 (S 28.15708 E 23.09991)

This site is related to Site 6 and contains the remains of the SAMACOR mining operations, including conveyor belts and the old railway line. The railway line will be revamped and used during the new mining operations. The documentation (recording and photographs taken) done during the survey is deemed sufficient.

Probability of Impact: Definite

Extent of Impact: Site

Duration of Impact: Long-term

Intensity of Impact: Medium

Significance of Impact: Moderate

8. CONCLUSIONS AND RECOMMENDATIONS

In conclusion it is possible to say that the assessment of the area was conducted successfully. The area has been extensively disturbed through recent historical opencast mining operations and prospecting and many of the sites recorded are related to this. These sites are of low heritage significance and no mitigation measures are needed. Two sites, Site 2 and Site 3 have medium to high significance and mitigation measures are needed should the mining operations extend into the area where they are located.

Site 2 is a possible Iron Age or earlier Stone Age site, and mitigation would include detailed mapping and drawing and further research. Site 3, a possible grave and has high significance if indeed it is a grave. If possible it should be avoided, but if not then it should be exhumed and relocated after all necessary legal processes has been followed. Both these sites and the mitigation involved should be handled by archaeologists specializing in these aspects.

It is however recommended that the proposed development can continue, taking into consideration the above recommendations. The subterranean presence of archaeological or historical objects, features or sites should also always be considered. If any of these are uncovered during any construction work or other development activities a professional archaeologist should be called in to investigate.

REFERENCES

- 1:50 000 Topographical Map location of development:: Map provided by client (GCS)
- Aerial view of location of development area (Appendix C): produced on Google Earth – Provided by client (GCS)
- Site distribution (Appendix C): Produced on Google Earth
- Coertze, P.J. & Coertze, R.D. 1996. *Verklarende vakwoordeboek vir Antropologie en Argeologie*. Pretoria: R.D. Coertze.
- Bergh, J.S. (ed.), 1999. *Geskiedenisatlas van Suid-Afrika. Die vier noordelike provinsies*. (J.L. van Schaik, Pretoria).
- Huffman, T.N. 2007. *Handbook to the Iron Age: The Archaeology of Pre-Colonial Farming Societies in Southern Africa*. Scottsville: University of KwaZulu-Natal Press.
- Knudson, S.J. 1978. *Culture in retrospect*. Chicago: Rand McNally College Publishing Company.
- Korsman, S.A. & Meyer, A. 1999. Die Steentydperk en rotskuns. Bergh, J.S. (red.). *Geskiedenisatlas van Suid-Afrika. Die vier noordelike provinsies*. Pretoria: J.L. van Schaik.
- Mitchell, P. 2002. *The Archaeology of Southern Africa*. Cambridge World Archaeology: Cambridge University Press.
- Republic of South Africa. 1999. *National Heritage Resources Act (No 25 of 1999)*. Pretoria: the Government Printer.
- Republic of South Africa. 1998. *National Environmental Management Act (no 107 of 1998)*. Pretoria: The Government Printer.
- Van der Ryst, M.M. & Meyer, A. 1999. Die Ystertydperk. Bergh, J.S. (red.). *Geskiedenisatlas van Suid-Afrika. Die vier noordelike provinsies*. Pretoria: J.L. van Schaik.

Appendix A

Definition of terms:

Site: A large place with extensive structures and related cultural objects. It can also be a large assemblage of cultural artifacts, found on a single location.

Structure: A permanent building found in isolation or which forms a site in conjunction with other structures.

Feature: A coincidental find of movable cultural objects.

Object: Artifact (cultural object).

(Also see Knudson 1978: 20).

Appendix B

Cultural significance:

- Low A cultural object being found out of context, not being part of a site or without any related feature/structure in its surroundings.
- Medium Any site, structure or feature being regarded less important due to a number of factors, such as date and frequency. Also any important object found out of context.
- High Any site, structure or feature regarded as important because of its age or uniqueness. Graves are always categorized as of a high importance. Also any important object found within a specific context.

APPENDIX C : HERITAGE IMPACT ASSESSMENT

APPENDIX D : TRAFFIC IMPACT REPORT

**Remaining Extent of the farm Lohatlha No.
673, Tsantsabane Local Municipality**

MINING APPLICATION

TRAFFIC IMPACT ASSESSMENT

JULY 2009




**KMA
Consulting
Engineers**

Project: 6481.02

PO Box 25054, Langenhoven Park, 9330, 44 First Avenue,
Westdene, Bloemfontein
Tel & Fax: 051 430 6047, Cell: 083 381 5884, E-mail:
kma@telkomsa.net

REPORT SHEET

Property Description:	<i>Remaining Extent and Portions 2, 3, 4 and 5 of the farm Kapstewel No. 436.</i>
Area:	<i>Tsantsabane Local Municipality, Siyanda District Municipality</i>
Application:	<i>Mining Application</i>
Type of Report:	<i>Traffic Impact Assessment</i>
Project Number:	<i>6481.02</i>
Compiled By:	<i>Koot Marais Pr Eng</i>
Signed:	
Date:	<i>July 2009</i>

PREPARED BY:



P.O. Box 25054,
 Langenhovenpark, 9330
 44 First Ave, WESTDENE,
 Bloemfontein, 9301
 t (051) 430 6047
 f (051) 430 6047
 g 083 381 5884
 kma@telkomsa.net

TABLE OF CONTENTS

1.	INTRODUCTION	5
1.1	Aim of the Study.....	5
1.2	Background	5
1.3	Study Area	6
1.4	Proposed Development	6
1.5	Available Information	9
1.5.1	Site Inspection	9
1.5.2	Operational Information	9
2.	BACKGROUND INFORMATION	10
2.1	Existing External Road Network.....	10
2.2	Existing Land Use	10
2.3	Road Planning	10
2.4	Internal Infrastructure.....	11
3.	TRIP GENERATION.....	12
3.1	On-Site Activities	12
3.2	External Activities.....	13
3.2.1	Administrative and Personnel Trips	13
3.2.1	Transport of Saleable Material	13
4.	TRAFFIC IMPACT.....	14
4.1	Impact of On-Site Activities	14
4.2	External Impact	14
4.2.1	Capacity Considerations	18
a)	Access on R325	18
4.2.2	Road Traffic Safety	18
a)	Access to the Site.....	19
b)	Pedestrian Movement	21
c)	Road Signs and – Markings.....	21
d)	Dust Emission.....	21
e)	Impact on Roads and Road Pavements.....	21
f)	Train Operations	21
5.	RATING OF IMPACT	22

6.	POTENTIAL MANAGEMENT MEASURES & ACTION PLANS	23
7.	CONCLUSIONS AND RECOMMENDATIONS	24
8.	REFERENCES	25
9.	APPENDIX A – RATING SCALE	26
10.	APPENDIX B – CURRICULUM VITAE OF COMPILER	28

1. INTRODUCTION

1.1 Aim of the Study

The aim of this study is to determine the traffic impact of intended iron ore and manganese mining on the **Remaining Extent and Portions 2, 3, 4 and 5 of the farm Kapstewel No. 436**, Tsantsabane Local Municipality, Siyanda District Municipality, Northern Cape Province.

1.2 Background

An application was made for a Mining Right on the Remaining Extent and Portions 2, 3, 4 and 5 of the farm Kapstewel No. 436 to mine iron ore and manganese ore.

A Mining Right Application was submitted to, and accepted by, the Department of Minerals and Energy (DME). Following the acceptance by DME a Scoping Report was submitted to the relevant authorities. The following phase in the MPRDA process requires the compilation and submission of Environmental Management Programmes in terms of Section 39(1) and Regulation 51 of the MPRDA.

The Scoping Report determined that the following specialist studies are required to form part of the EIA/EMP:

- Heritage Impact Assessment;
- Air Quality Impact Assessment;
- Botanical study;
- Groundwater Study; and
- Traffic Impact Assessment.

The aim of this document is therefore to report on the expected traffic impact of the planned mining activities.

The Applicant is **Autumn Skies Trading 128 CC**

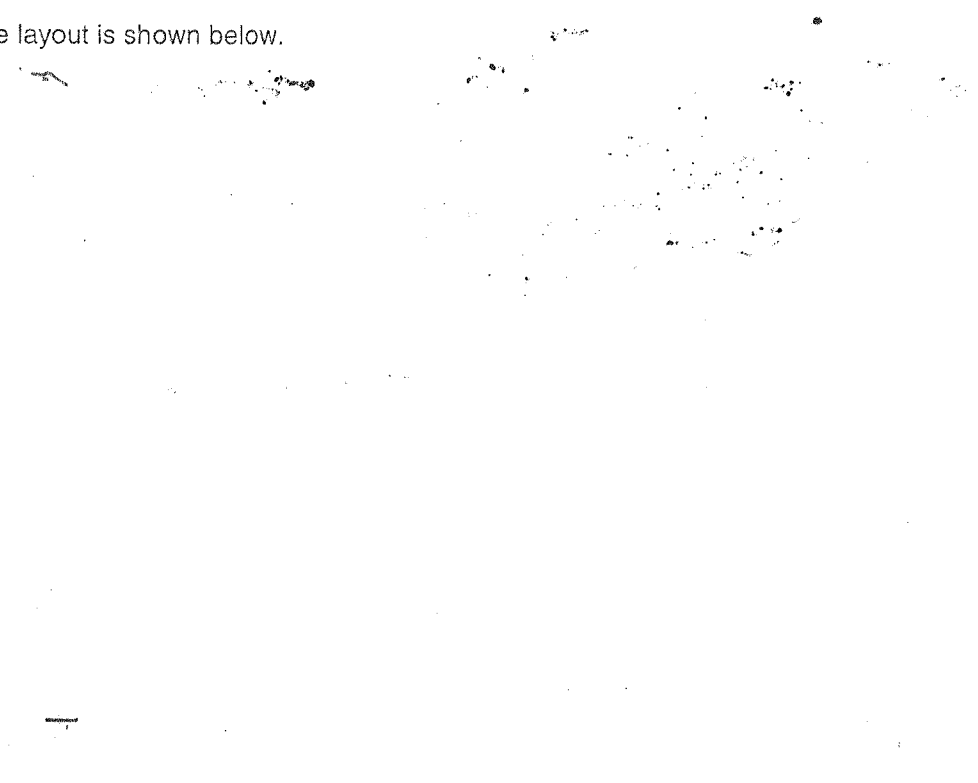
Application is also made for mining rights on:

- Remaining Extent of the farm Lohatlha No. 673, and
- The Remaining Extent and Portions 1 of the farm Kareepan No. 450 and Portion 1 of the farm Pensfontein No. 449

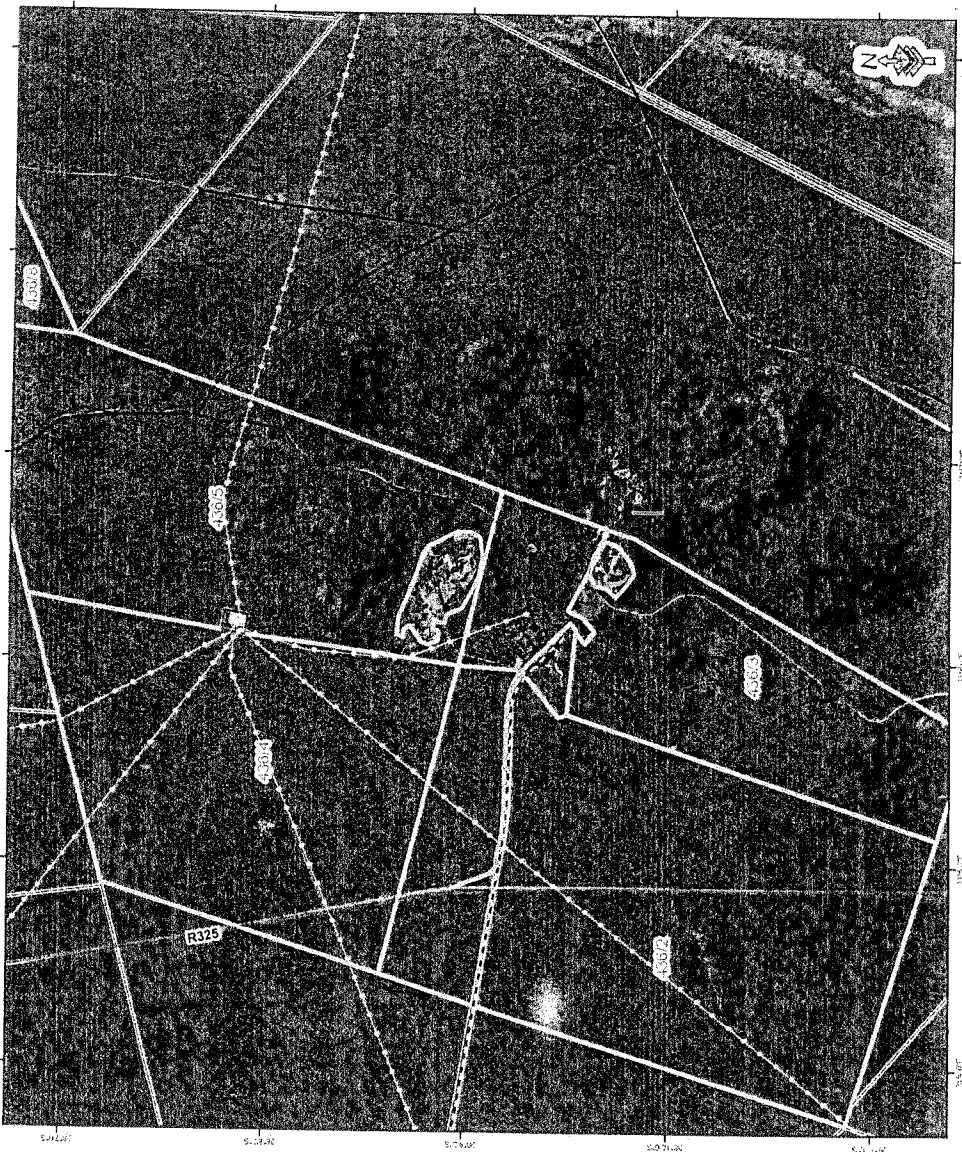
Although separate mining applications were submitted, and separate traffic impact assessments have been undertaken, some coordination between mining activities on the different areas will take place and reference is thus in some instances made of the other two applications in this document.

Ore from the different dumps located in the study area will be processed and accumulated into two product stockpiles. Waste will be loaded, hauled and dumped into historical quarries and trenches. The mining sequence was developed so that space will be created for drilling the in-situ resource according to a pre-defined grid.

The site layout is shown below.



KAPSTEWEL: SITE LAYOUT



LEGEND	
ROAD NETWORK	
	Main road
	Secondary roads
	Access road
SERVICE LINES	
	Powerline
	Railway line
	Infrastructure
	Kapstewel site boundary
	Historical opencast & dumps
	Parcel boundaries
DATA SOURCES: Google Earth™ mapping service: 2009	
Kilometers 0 0.5 1 2	
DRAWN BY: L. DU PLESSIS GIS TECHNICIAN	
REVIEWED: R.F. VAN DER MERWE GIS MANAGER (PGPT 0023)	
DATE: 30 JUNE 2009	
SCALE: 1:35,000	
PROJECTION: WGS 84 GEOGRAPHIC	
CLIENT: AUTUM SKIES TRADING	
PROJECT: KAPSTEWEL (09-058)	
63 Westel Road Woodmead PO Box 2557 Rivonia 2128 South Africa 1683 8728 Tel: +27 (0) 11 803 5745 Fax: +27 (0) 11 803 5745 E-mail: jhb@gcs.co.za	

Figure 1.2 Site Layout (GCS)

1.5 Available Information

1.5.1 Site Inspection

A site inspection was undertaken on 2 July 2009.

1.5.2 Operational Information

Additional information on planned operations was obtained from Mr Chris Victor, who is a director of the company applying for the mining rights.

2. BACKGROUND INFORMATION

2.1 Existing External Road Network

The only relevant road in this instance is:

a) R325 Provincial Road

The R325 is a provincial two-lane paved road linking Postmasburg with the N14 national road towards the north.

The road is shown in the photo below:

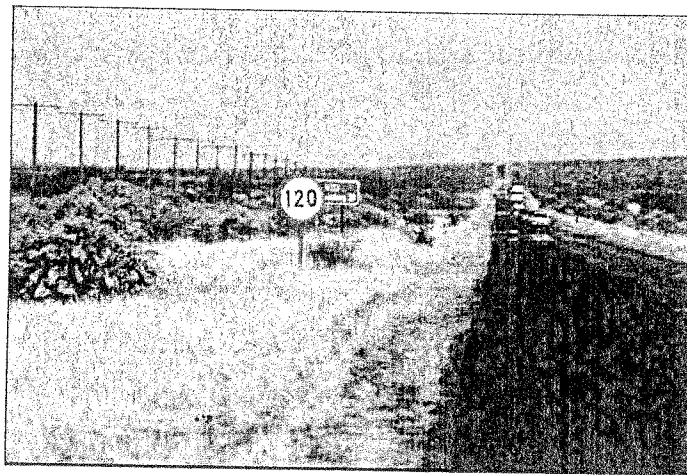


Photo 1: S325 Road

2.2 Existing Land Use

The area under consideration has previously been mined and some of dumps are currently being re-processed. During the prospecting phase bulk sampling also took place which disturbed large areas with no subsequent rehabilitation.

The site is mainly surrounded by mining activities.

2.3 Road Planning

There is no road planning in the area that will affect the application.

2.4 Internal Infrastructure

Existing infrastructure located on the applicable area includes:

- Access roads;
- A railway line;
- Power lines; and
- Buildings that will be renovated for use.

The above infrastructure will be extended and upgraded to enable effective mining of the area and in particular, a processing plant will be established.

3. TRIP GENERATION

The expected trip generation of the mining activities cannot be based on standard trip generation rates as trip generation depends on the type of mining, extent of activities and specifics of the particular site. As a result, potential trip generation was determined based on the specific expected mining activities.

3.1 On-Site Activities

The processing of ore from dumps is expected to be undertaken by the following vehicles:

- Haulers – 5 x CAT 777;
- Loaders – 2 x CAT 992 FEL; and
- Water Trucks – 1 x Bell B40.

A front-end loader capable of loading 40-ton trucks in three passes will be used; where-after ore will be hauled from the dumps to a crushing and conveyer system. Ore loaded onto trucks will be hauled to a crusher where it will be crushed, where-after the resultant product will be moved via a conveyer belt to a wet screening plant producing lumpy ore or bigger fraction ore (-63mm to +20mm), containing 35 to 38 percent manganese and a smaller fraction ore (-20mm in size) with a manganese content of 35 to 37 percent manganese.

Loading and hauling of both waste and ore will be carried out by 15-ton front-end loaders matched with 40-ton rear dump CAT trucks. Working shifts will be arranged so that 750 tons of product, which will constitute 60 percent of material put through the crusher, is produced daily.

Operations will take place five days a week

Prospecting operations conducted in the area have focused mainly on the sampling and treating of ore from the dumps. The same procedure will be followed when exploiting the dumps, although on a bigger scale. The infrastructure and technical resources could probably handle a production rate of 600 tonnes of saleable material per day.

If open cast mining is embarked on, it is expected that additional vehicles will be employed and in particular Cat D8R Ripper dozers and CAT 824 Wheel dozers will be added to the vehicle fleet.

Operations will be similar to that of the processing of dumps, except that ore will be transported from the open cast mine area to the crushing and conveyer system.

Production could be expected to increase to approximately 50 000 to 80 000 tons of iron ore and 20 000 tons manganese per month, or 2 200 to 3 600 tons of processed iron ore and 900 tons of manganese per day.

3.2 External Activities

From a traffic impact perspective, external trips are more important than internal activities. The following external trips could be expected:

3.2.1 Administrative and Personnel Trips

The expected number of people that will be employed on the site is 20 administrative personnel and 30 operational personnel. The personnel will mainly be resident in Postmasburg and according to planning, will be transported to the three sites under consideration by two buses and approximately six light vehicles.

3.2.1 Transport of Saleable Material

Transportation of saleable material has the biggest impact potential.

In this instance, material will be transported from the site by means of the existing railway line shown in the photo below and no trip generation of material will take place on the main provincial road network due to the mining activities. The railway line will have to be repaired as it is currently not used as shown below.

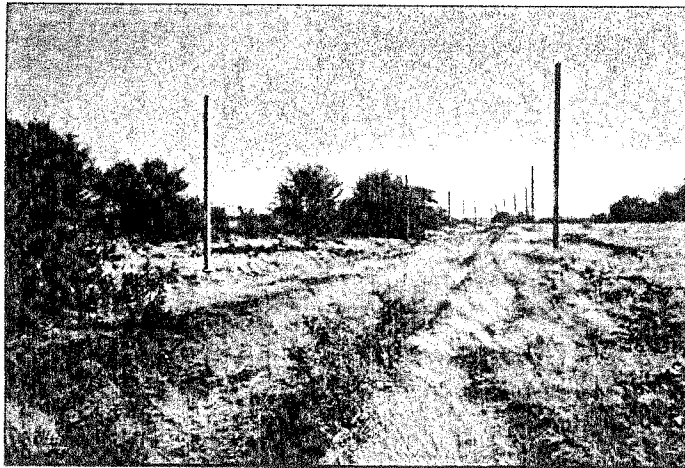


Photo 2: Railway line to be used

4. TRAFFIC IMPACT

4.1 Impact of On-Site Activities

Given the location of the site and the expected operations, on-site activities are not relevant from a traffic impact point of view and should be undertaken according to standard procedures as governed by the relevant mining and health- & safety legislation.

4.2 External Impact

The expected activities and especially activities that could have an impact on the external road network are shown in Figure 4.1.

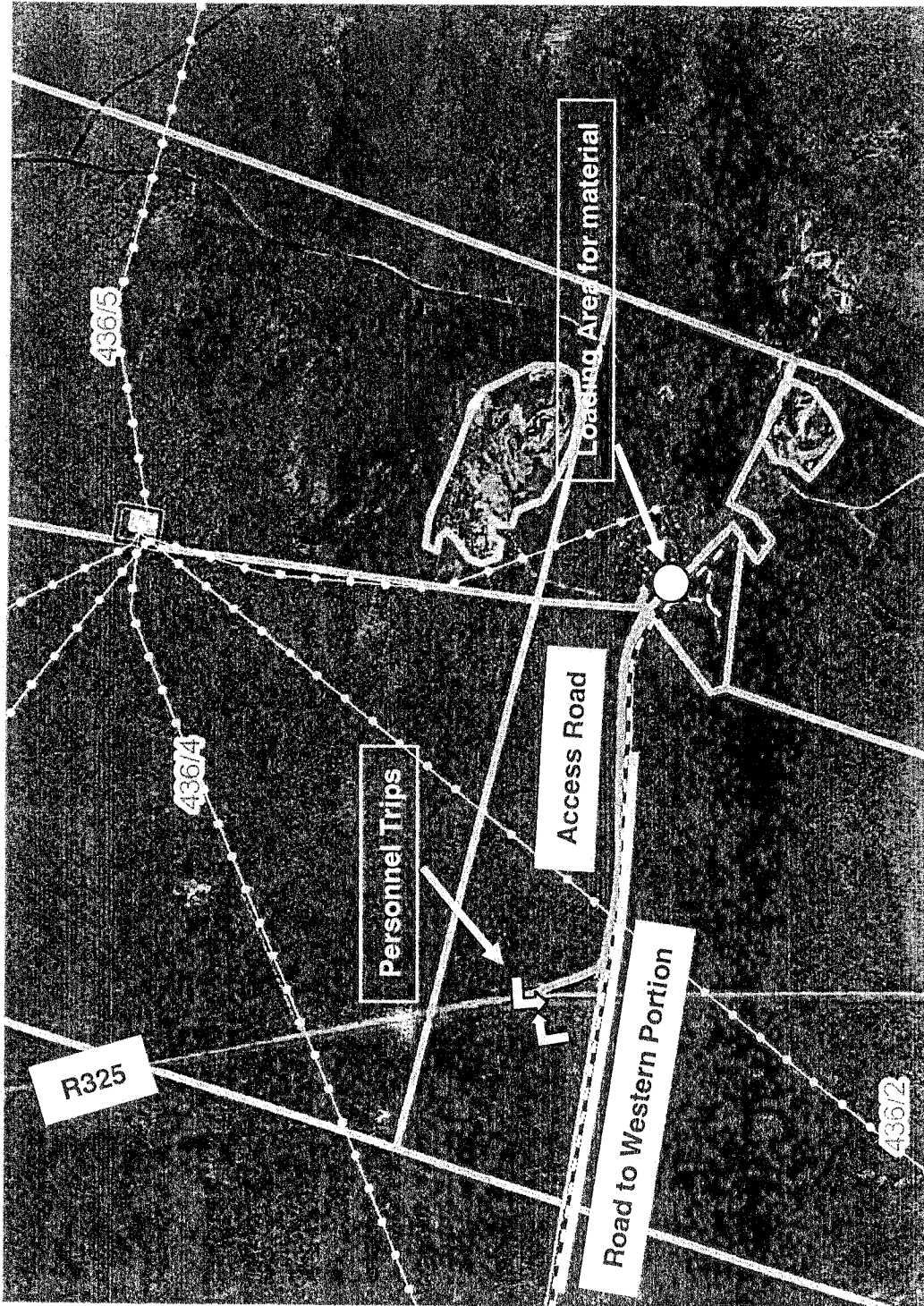


Figure 4.1 Expected Activities

The figure above indicates that material could be transported from both sides of the R325 towards the railway line located on the property. One loading area will be established near the processing plant in the position shown in the photo below.

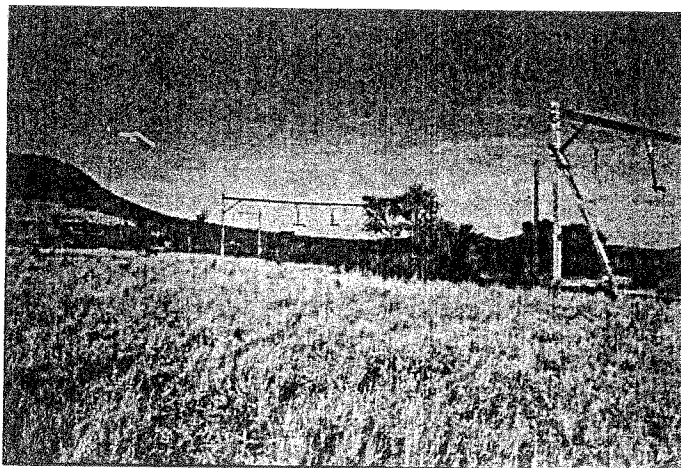


Photo 3: Position of processing plant and loading area

The northern historical open-cast and dumps are shown in Photo 4 below. (See Figure 1.2)

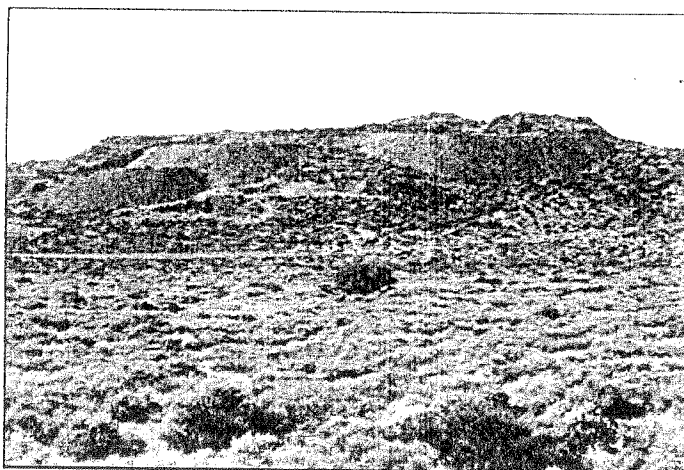


Photo 4: Northern historical open-cast and dumps

The southern historical open-cast and dumps are shown in Photo 5 below. (See Figure 1.2)

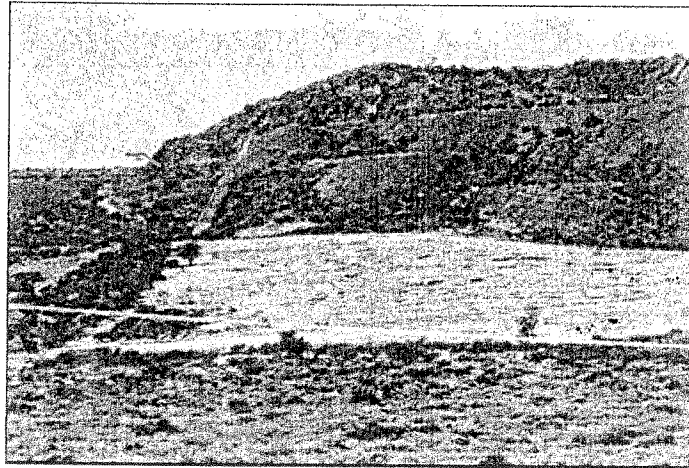


Photo 5: Northern historical open-cast and dumps

The road that will be used as a link between the eastern and western portions of the site runs parallel to the railway line, passing underneath the R325. Also shown in the photo is the western portion of the site.

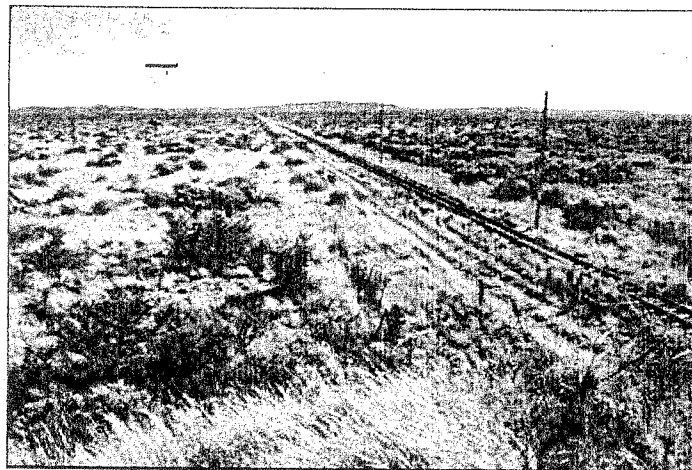


Photo 6: Link road between eastern and western portions

Personnel and any other trips to and from the site will access onto the main road network at the current access on the R325 shown below.

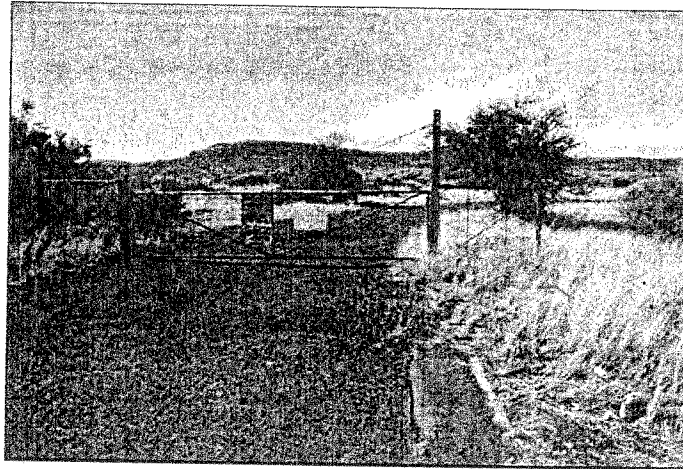


Photo 7: Main access to site

The following possible traffic impact related aspects could be considered as a result of the above-mentioned activities, namely:

- 1. Capacity Considerations**
- 2. Road Traffic Safety**
 - a) Access
 - b) Pedestrians
 - c) Road Signs & Markings
 - d) Dust Emission
 - e) Impact on roads and road pavements
 - f) Train operations

Of the above aspects, dust emission and the impact on roads and pavements do not primarily form part of a traffic impact assessment and are only dealt with as far as it affects road safety, and should not be seen as a comprehensive assessment of the potential impact of the relevant aspects.

4.2.1 Capacity Considerations

a) Access on R325

Traffic volumes on the R325 are relatively low with average daily volumes of less than 2000 vehicles, and limited peaking with the result that given the low number of personnel and related trips that will be generated, capacity should not be of any concern at the intersection because of the approval of the mining rights. Due to the link road adjacent to the railway line, no operational or crossing traffic is expected at the access.

The access shown in Photo 7 is controlled by a gate located at the fence. Long vehicles waiting for access at this gate could protrude into the roadway.

4.2.2 Road Traffic Safety

The following aspects are of importance concerning road traffic safety:

a) Access to the Site

Acceptable sight distance forms the basis of most decisions regarding the viability of the location of an access or intersection.

Adequate **shoulder sight distance** should be provided at accesses or intersections to allow drivers to find a sufficiently large gap in the traffic stream to enter the road safely and with limited disruption to the traffic on the main road. Such gap acceptance sight distances are required for vehicles controlled by yield and stop signs (priority control), or for vehicles turning right on the main road. According to the *National Guidelines for Road Management in South Africa*⁽¹⁾ shoulder sight distance should be as follows:

TABLE 7.3: MINIMUM GAP ACCEPTANCE SIGHT DISTANCE (METRES)								
Vehicle type	Eye height	Design speed						
		40 km/h	50 km/h	60 km/h	70 km/h	80 km/h	100 km/h	120 km/h
Stop and yield control, 7.5m wide main road (X = 5m)								
Passenger cars	1.05m	80	100	120	140	160	200	240
Single unit	1.80m	120	150	180	210	240	300	360
Single unit & trailer	1.80m	150	190	225	265	305	380	455
Stop and yield control 22.5m wide main road (X = 5m)								
Passenger cars	1.05m	100	125	150	175	200	250	300
Single unit	1.80m	135	170	200	235	270	335	405
Single unit & trailer	1.80m	165	205	250	290	330	415	456
Yield control (X = 20m)								
Passenger cars	1.05m	65	80	56	110	125	155	190
Single unit	1.80m	75	56	115	135	150	190	230
Single unit & trailer	1.80m	56	115	140	165	185	235	280

Gap acceptance sight distances measured from the eye height to an object height of 1.30m.

Shoulder sight distance to the north is not restricted as shown in Photo 8 below:



Photo 8: Sight distance to the north

Shoulder sight distance to the south is however affected by the road-over-rail-bridge as shown.

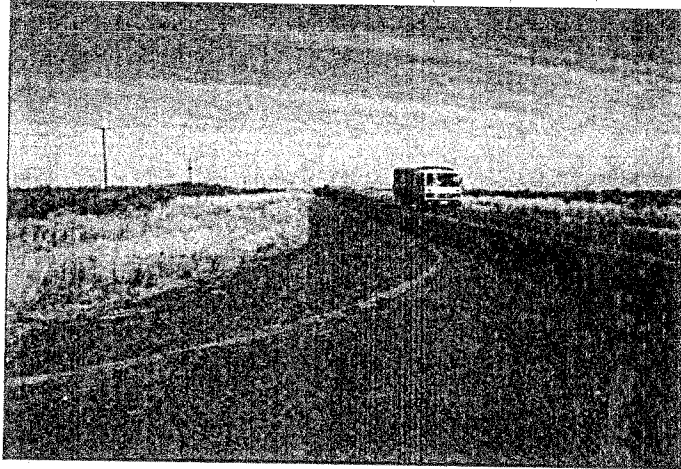


Photo 9: Sight distance to the south

Shoulder sight distance to the south was measured at 400m, which is more than the required 240m for a passenger vehicle (120 km/h). The required distance for a single unit truck with a trailer is 455m, which is slightly more than the distance available. This type of vehicle is however not expected.

Although it should always be endeavoured to obtain shoulder sight distance, **stopping sight distance should at all times be maintained**. This is the distance required to enable a driver to observe an obstruction, and stop in time.

The *National Guidelines* prescribes the following:

Design speed	60 km/h	70 km/h	80 km/h	100 km/h	120 km/h	
Gradient (%)	-12% (*)	110	150	200	320	450
	-9% (*)	105	140	180	280	390
	-6%	56	125	165	250	345
	-3%	90	120	150	230	315
	0%	85	110	140	210	290
	6%	80	100	125	185	250
	12% (*)	75	56	115	170	225

Stopping sight distances measured from an eye height of 1.05m to an object height of 0.15m
 (*) Access should not be allowed on very steep gradients

In the worst case scenario from the south, the required distance given the gradient is 345m, which is available.

In summary, sight distances at the access are acceptable.

b) Pedestrian Movement

Given the expected operations and the location of the site relative to other developments or residential areas, limited, if any pedestrian movement on the external road network is expected as a result of the activities on the application site.

c) Road Signs and – Markings

It is important that appropriate road signs and road markings be provided in all areas of operation. Signs and markings are in general of reasonable standard. Appropriate signs such as a stop sign (R1) should be provided at the access.

d) Dust Emission

Dust emission by vehicles on unpaved roads in this specific case is not expected to have an impact on the external road network, except possibly in the case of high activity on the road underneath the R325 bridge, adjacent to the railway line, which could result in dusty conditions on the R325. This is however unlikely to occur.

e) Impact on Roads and Road Pavements

As heavy vehicles are unlikely to make use of the external road network based on the planned operations, no real impact on the external roads and road pavements is expected.

f) Train Operations

The mining activities will result in an increase in train operations. Although not currently in use, rail infrastructure is available and importantly, a grade separated crossing is provided where the railway line crosses the R325, with the result that an increase in rail activities will not have an effect on road safety. The photo below shows the rail facilities from the road over rail bridge on the R325.

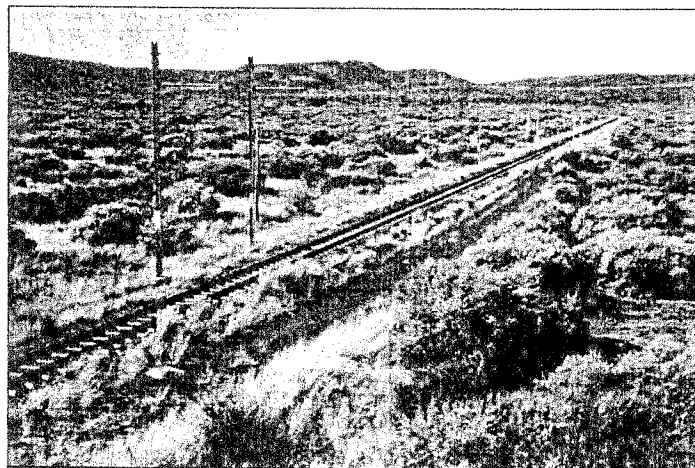


Photo 10: Railway line from bridge on R325

5. RATING OF IMPACT

The impacts discussed in the previous chapter were rated based on the principles as prescribed by GCS, responsible for the Environmental Impact Assessment and set out in Appendix A.

Table 5.1 Rating of Possible Impact

Category	Rating	No	Impact	No	Impact	No	Impact	No	Impact	No	Impact	No	Impact	No	Impact
		1	Capacity Considerations	2	Road Traffic Safety	2	Road Traffic Safety	2	Road Traffic Safety	2	Road Traffic Safety	2	Road Traffic Safety	2	Road Traffic Safety
				a	Access	b	Pedestrians	c	Road Signs & Marking	d	Dust Emmission	e	Impact on Roads	f	Train Operations
Probability															
Definite	4														
Probable	3														
Possible	2														
Improbable	1	1			1					2					
Extent															
Site	1														
Local	2	2			2					2					
Regional	3														
Provincial	4														
National	5														
International	6														
Duration															
Very short term	1	1													
Short term	2					2									
Medium term	3														
Long term	4									4					
Very long term	5														
Permanent	6														
Intensity															
Very low	0	0													
Low	2					2				2					
Medium	4														
High	6														
Very high	8														
Rating		4	Low	10	Low to Moderate	7	Low to Moderate	7	Low to Moderate	10	Low to Moderate	8	Low to Moderate	8	Low to Moderate

6. POTENTIAL MANAGEMENT MEASURES & ACTION PLANS

Possible management measures that could be considered for the different identified impacts are as follows:

Number	Impact	Measure	Timeframe
1	Capacity Considerations	No measures required	Not Applicable
2	Road Traffic Safety		
a	Access	It should be ensured that access is limited to the existing access, and if any additional access is for any reason required, that this be dealt with in consultation with the Provincial Authority to ensure acceptable spacing and sight distances. It is also recommended that the gate at the access be moved away from the R325 roadway to ensure a stacking distance of at least 22m. No measures required	When required During establishment Not Applicable
b	Pedestrians	No measures required	Not Applicable
c	Road Signs & -Markings	Proper road signs should be provided at the main access, such as a stop sign.	During establishment
d	Dust Emission	It should be monitored whether the link road underneath the R325 results in dust on the latter road. If this is the case, the road should be watered on a regular basis. No measures required	Continuous
e	Impact on Roads & Pavements	No measures required	Not Applicable
f	Rail Operations	It is essential that the railway line be re-activated.	During establishment

7. CONCLUSIONS AND RECOMMENDATIONS

Based on the study and the expected functioning of the mining activities, it is believed that the planned iron ore and manganese mining on the **Remaining Extent and Portions 2, 3, 4 and 5 of the farm Kapstewel No. 436**, District of Kuruman, will have a very limited traffic impact, and can be approved from a traffic point of view.

8. REFERENCES

1. **Manual for Traffic Impact Studies**, Department of Transport, Pretoria, 1995
2. **South African Trip Generation Rates**, Department of Transport, Pretoria, 1995
3. **ITE Trip Generation Rates, 6th Edition**, Institute of Transportation Engineers, Washington, 1998

9. APPENDIX A – RATING SCALE

Table 1: Probability

Category	Rating	Description
Definite	4	The impact will definitely occur.
Probable	3	The impact is highly likely to occur.
Possible	2	The impact has some possibility, but low likelihood of occurring.
Improbable	1	The impact is not likely to occur except in extreme and/or rare conditions.

Table 2: Extent

Category	Rating	Description
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

Table 3: Duration

Category	Rating	Description
Very short-term	1	Less than 24 hours
Short-term	2	Less than 1 year
Medium-term	3	1 to 5 years
Long-term	4	5 to 15 years
Very long-term	5	Greater than 15 years
Permanent	6	Permanent

Table 4: Intensity

Category	Rating	Description
Very low	0	Where the impact affects the environment in such a way that natural, cultural and social functions are not affected
Low	2	Where the impact affects the environment in such a way that natural, cultural and social functions are only marginally affected
Medium	4	Where the affected environment is altered but natural, cultural and social function and processes continue albeit in a modified way
High	6	Where natural, cultural or social functions or processes are altered to the extent that they will temporarily cease
Very high	8	Where natural, cultural or social functions or processes are altered to the extent that they will permanently cease

10. APPENDIX B – CURRICULUM VITAE OF COMPILER

Surname : **Marais**
Name/s : Mattheus Jacobus (Koot)
Nationality : Republic of South Africa
Identity Number : 590727 5007 087
Address : 44 First Avenue
Westdene
Bloemfontein
South Africa
Postal Address : P.O. Box 25054
Langenhoven Park
South Africa
9320

Qualifications

Highest Standard Passed : Standard 10 (1977) Wessel Maree High School

Tertiary Qualifications

Qualification 1 : B Eng (1978-1982) University of Pretoria
Qualification 2 : B Com (1984-1986) University of South Africa
Qualification 3 : B Eng Hons (Civil) (1989-1990) University of Pretoria
Qualification 4 : Diploma in Arbitration (1989) Association of Arbitrators

Professional Qualifications

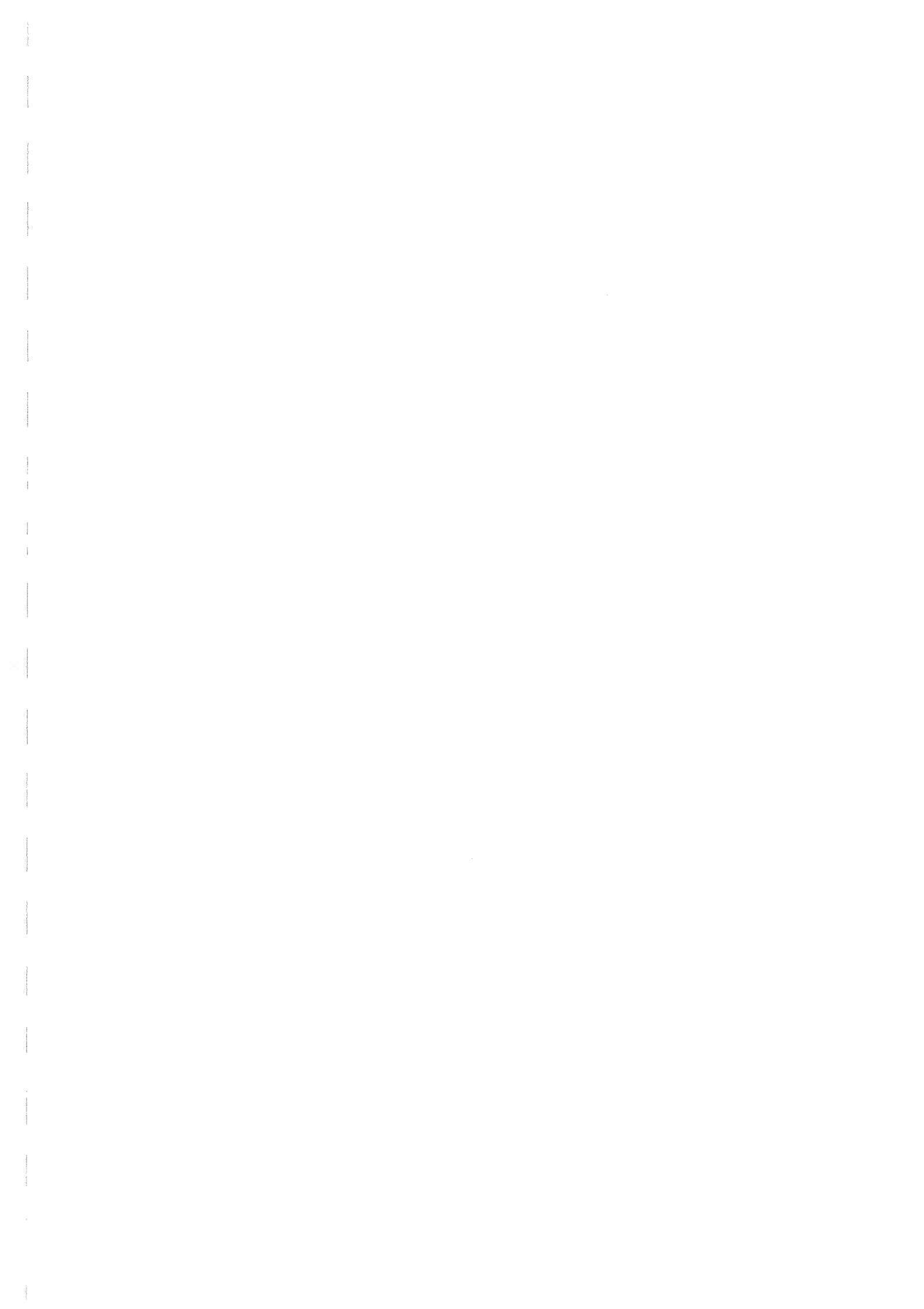
Registered Professional Engineer – Engineering Council of South Africa (SA – 920023)

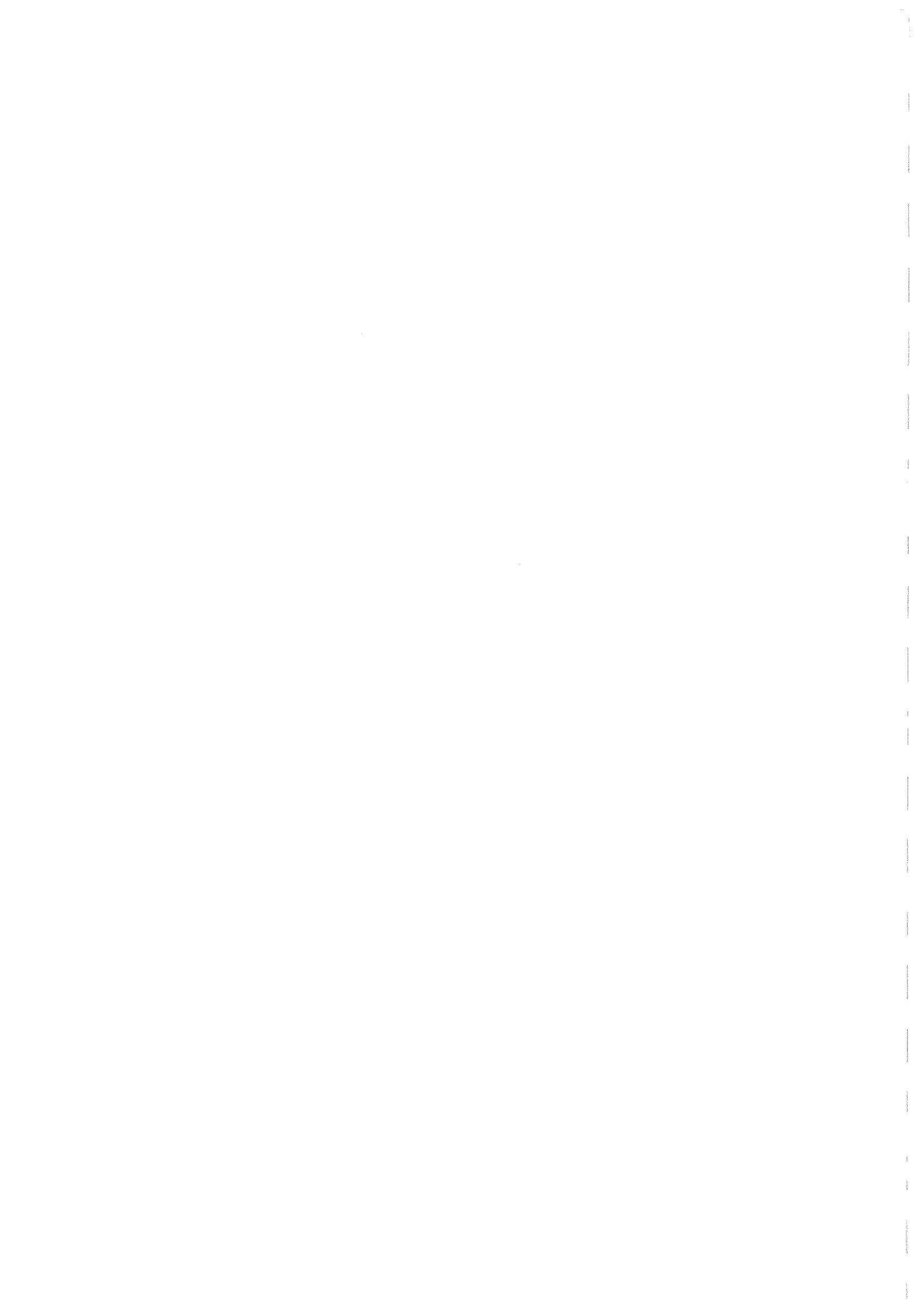
Key Experience

A civil engineer with 21 years of experience, specialising in Traffic and Transport Engineering.

Key experience includes:

- **Traffic Engineering** through the undertaking of traffic impact studies, traffic investigations and extensive traffic studies.
- **Transport Planning** e.g. transport studies, transport policy determination, transport legislation and transport plans.
- **Road Planning**, such as the planning and preliminary design of various roads and facilities.
- **Road Traffic Safety Planning** including accident analyses, road safety investigations, policy studies, compilation of operational manuals.
- **Project Management** as applied to the co-ordination of transport projects and the compilation of business plans.
-





436/8

LEGEND

● NGDB Boreholes

ROAD NETWORK

↘↗ Main road

↘↗ Secondary roads

↘↗ Access road

SERVICE LINES

Powerline

↘↗ Railway line

▭ Infrastructure

▭ Kapstewel site boundary

▭ Historical opencast & dumps

▭ Parcel boundaries

DATA SOURCES:

Google Earth™ mapping service: 2009



DRAWN BY: L. DU PLESSIS
GIS TECHNICIAN

REVIEWED R.F. VAN DER MERWE
GIS MANAGER (PGPT 0023)

DATE 23 JUNE 2009

SCALE: 1:37,000

PROJECTION: WGS 84
GEOGRAPHIC

CLIENT: AUTUM SKY'S TRADING

PROJECT: KAPSTEWEL (09-056)



WATER
ENVIRONMENTAL
ENGINEERING
EARTH SCIENCES

63 Wessel Road Woodmead
PO Box 2597 Rivonia 2128
South Africa
Tel: +27 (0) 11 803 5726
Fax: +27 (0) 11 803 5745
E-mail: jhb@gcs-sa.biz



23°0'0"E

23°0'0"E

APPENDIX E : MINE SURFACE LAYOUT



APPENDIX F : FINANCIAL PROVISION REPORT



WATER
ENVIRONMENTAL
ENGINEERING
EARTH SCIENCES

63 Wessel Road Woodmead 2191 PO Box 2597 Rivonia 2128 South Africa
Telephone: +27 (0)11 803 5726 Facsimile: +27 (0)11 803 5745 Web: www.gcs-sa.biz

The Remaining Extent and Portion 2, 3, 4 and 5 of the farm Kapstewel No. 436

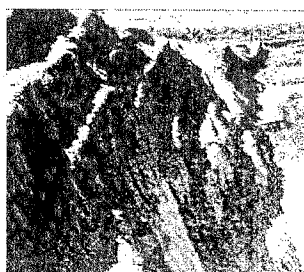
Financial Provision Assessment

Report

Version - Final

July 09

Client Name: Autumn Skies Trading 128 CC
Project Number: 00222/000/000/09-056



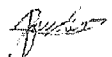
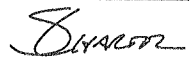

Financial Provision Assessment

Report
Version - Draft

July 09

Autumn Skies Trading 128 CC
00222/000/000/09-060

DOCUMENT ISSUE STATUS

Report Issue	Final		
Reference Number	00222/000/000/09-060		
Title	Financial Provision Assessment		
	Name	Signature	Date
Author	Pieter Snyders		27 July 2009
Document Reviewer	Simon Charter		27 July 2009
Document Authorisation	Simon Charter		27 July 2009

I. EXECUTIVE SUMMARY

Background

Autumn Skies 128 CC has applied for a mining right in respect of Iron ore and manganese ore on the Remaining Extent and Portion 2, 3, 4 and 5 of the farm Kapstewel No. 436 which is approximately 3538 ha in size, situated approximately 20 km north of Postmasburg adjacent to the R325. The study area falls under the Kuruman Registration District, which is located in the Northern Cape Province of South Africa and is located within the borders of the Tsantsabane Local Municipality, which forms part of the Siyanda District Municipality.

The proposed mining activities of the applicant will consist of the processing of ore dumps located within the borders of the study area, as well as continuous drilling and prospecting activities to establish the viability and extent of the in-situ resource. As soon as the in-situ resource is classified as viable, the EIA/EMP must be amended to indicate where proposed open cast pits will be located and what mining method will be utilized.

The Environmental Management Plan (EMP) in terms of the Mineral and Petroleum Resources Development Act (Act No. 28 of 2002) (MPRDA) for the proposed mining operations will be submitted with the Financial Provision Assessment to the Department of Minerals and Energy (DME).

The following infrastructure will be present on the site:

- One processing plant;
- Vehicle service area;
- An 25 000 l diesel storage tank;
- Buildings with administration, food preparation and toilet facilities;
- Historical open cast pits; and
- Historical mining dumps.

Closure Cost

The DME requested Autumn Skies Trading 128 CC to provide them with a detailed financial quantum revision in terms of the MPRDA.

The financial provision for the environmental rehabilitation and closure of any mining or prospecting operation forms an integral part of the MPRDA under Sections 41(1), 41(3) and 45 of the Act.

The "Guideline Document for the Evaluation of Financial Provision made by the Mining Industry" was developed by the DME in January 2005, in order to empower the personnel at Regional DME offices to review the quantum determination for the rehabilitation and closure of mining sites. GCS (Pty) Ltd made use of this Guideline Document.

GCS (Pty) Ltd was appointed by Pico Diamonds (Pty) Ltd to compile a report on the revision of the quantum of financial provision.

Closure Cost Findings

The financial provisions required by the holder of the prospecting 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.

Pico has a dedicated financial guarantee fund for the proposed prospecting of diamonds.

With the determination of the quantum for closure it must be assumed that the prospecting infrastructure has no salvage value. This is necessary as it is often difficult to determine the salvage value for the infrastructure. However, salvage value can be off-set if the prospector can demonstrate to the Regional Director of the DME that a formal arrangement exists, covering demolition of the prospecting infrastructure and the payment to be received.

A summary of the estimated closure cost is provided below.

"Clean Closure Cost" estimate:

▪ Sub Total 1	R 256,805.38 (excluding VAT)
▪ Sub Total 2	R 328,967.69(excluding VAT)
▪ Sub Total 3	R 375,023.17 (including VAT)

The "Clean Closure Cost" estimates are in accordance with the DME guidelines and include the following:

Preliminary and general (P&G):

- 6% if Subtotal 1 is greater than R 100 million;
- 12% if Subtotal 1 is less than R 100 million

10% Contingency; and

14% Vat.

CONTENTS PAGE

1. Introduction..... 2
2. Information available..... 3
3. Surface infrastructure..... 3
4. Rehabilitation..... 3
5. Rehabilitation methodology 4
6. closure cost assessment..... 5
 6.1 Method of Assessment 5
 6.2 Quantity Estimation..... 6
 6.3 Determination of rates 6
 6.4 Cost Estimate Summary 9
 6.5 Financial Provision 9

LIST OF APPENDICES

Appendix 1 11

1. INTRODUCTION

Autumn Skies 128 CC has applied for a mining right in respect of Iron ore and manganese ore on the Remaining Extent and Portion 2, 3, 4 and 5 of the farm Kapstewel No. 436 which is approximately 3538 ha in size, situated approximately 20 km north of Postmasburg adjacent to the R325. The study area falls under the Kuruman Registration District, which is located in the Northern Cape Province of South Africa and is located within the borders of the Tsantsabane Local Municipality, which forms part of the Siyanda District Municipality.

The proposed mining activities of the applicant will consist of the processing of ore dumps located within the borders of the study area, as well as continuous drilling and prospecting activities to establish the viability and extent of the in-situ resource. As soon as the in-situ resource is classified as viable, the EIA/EMP must be amended to indicate where proposed open cast pits will be located and what mining method will be utilized.

The Environmental Management Plan (EMP) in terms of the Mineral and Petroleum Resources Development Act (Act No. 28 of 2002) (MPRDA) for the proposed mining operations will be submitted with the Financial Provision Assessment to the Department of Minerals and Energy (DME).

The Financial Provision for the environmental rehabilitation and closure of any mining or prospecting operation forms an integral part of the MPRDA under Sections 41(1), 41(3) and 45 of the Act.

The "Guideline Document for the Evaluation of Financial Provision made by the Mining Industry" was developed by the Department of Minerals and Energy (DME) in January 2005, in order to empower the personnel at Regional DME offices to review the quantum determination for the rehabilitation and closure of mining sites. GCS (Pty) Ltd made use of this Guideline Document.

GCS (Pty) Ltd (GCS) was appointed by Autumn Skies Trading 128 CC to compile a report on the revision of the quantum of financial provision.

2. INFORMATION AVAILABLE

GCS was supplied with the following information:

- Mining Work Program (MWP);
- Information provided by client; and
- A Google Earth image of the proposed prospecting site to confirm the information provided in the MWP.

3. SURFACE INFRASTRUCTURE

The following infrastructure will be present on the site:

- One processing plant;
- Vehicle service area;
- An 25 000 l diesel storage tank;
- Buildings with administration, food preparation and toilet facilities;
- Historical open cast pits; and
- Historical mining dumps.

4. REHABILITATION

During the mining of the ore dumps, rehabilitation will be carried out on a continuous basis. Ore from the different dumps will be processed on a central plant and accumulated into two product stockpiles. Waste will be loaded, hauled and dumped into historical opencast pits. (undertaken as part of the ongoing operational costs).

As soon as an area has been cleared of ore dumps landscaping activities will commence and natural vegetation self-succession will be encouraged. These activities will occur on a continuous basis through the life of the mine (undertaken as part of ongoing operational costs). This will ensure that by the time of closure, only a minimal amount of surface rehabilitation will have to occur and this will be included into the financial provision.

If, during the next financial provision assessment, it is determined that the rehabilitation of historical ore dumps has not been adequately carried out, the associated rehabilitation costs must be incorporated into the revised financial provision.

The remaining mining infrastructure and administration buildings will be dismantled and demolished after all mining operations have ceased. Surface rehabilitation will then take place on these areas.

It should be noted that linear infrastructure will be utilised after mining and will not be removed after the closure of the proposed mine.

The financial provision further makes provision for general surface rehabilitation and lastly maintenance and aftercare.

5. REHABILITATION METHODOLOGY

The following closure components have been suggested by the Department of Minerals and Energy (“DME”) for determining the quantum for financial provision:

- Dismantling of process plant and related structures;
- Demolition of steel buildings and structures;
- Demolition of housing and facilities;
- Trench rehabilitation including final voids and ramps (refer to rehabilitation of overburden and spoils);
- Rehabilitation of overburden and spoil stockpiles;
 - It should be noted that during the mining of the ore dumps, rehabilitation will be done on a continuous basis. The ore from the different dumps will be processed on a central plant and accumulated into two product stockpiles. Waste will be loaded, hauled and dumped into historical opencast pits. As soon as an area has been cleared of ore dumps landscaping activities will commence and the encouragement of self-succession by the natural vegetation. (This will be undertaken as part of the ongoing operational costs)
- Rehabilitation of waste deposits and evaporation ponds;
- General surface rehabilitation, including grassing of all denuded areas; and
- Maintenance and aftercare.

6. CLOSURE COST ASSESSMENT

The following section details the methodologies adopted by Misty Falls to calculate the quantities, associated rehabilitation (clean closure) rates and eventually the final (clean) closure cost estimate. GCS have undertaken a detailed review of the above and the findings are also presented in this section.

Most important to note is that the prescribed method for estimating a mine's closure costs as provided by the Department of Minerals and Energy (DME) in the form of the Guideline Document for the Evaluation of Financial Provisions made by the Mining Industry (Report no. 5863-5900-2-P, Rev 1.6), only acts as a guideline, and therefore indicates the minimum requirements for assessing and reporting on a mine's closure cost estimate.

6.1 Method of Assessment

GCS made use of the Guideline Document for the Evaluation of Financial Provisions made by the Mining Industry, Department of Minerals and Energy, January 2005. Where relevant, the Master Rates were amended according to industry standards (please see Table 1).

Two costs are provided. 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 prospecting operation close prematurely.

The prospecting infrastructure is assumed to have no salvage value when determining the quantum for closure.

The sections below present the step-by-step details on how the financial provision has been derived:

Step	Description	DME Table Applicable	Outcomes
1	Determine primary mineral and saleable mineral by-products	Table B.12	Mineral : Iron ore and manganese ore
2	Determine Risk Class	Table B.12	Primary Risk Class: C (Large mine including a mine, mine waste, plant and plant waste)
3	Determine the Area Sensitivity	Table B.4	Medium
4.1	Determine the level of information	N/A	Extensive information has been provided, with some limitations

4.2	Determine the closure components	Table B.5	See Appendix 1 of this report
4.3	Determine the unit rates for closure components	Table B.6	See Appendix of this report The multiplication factor for all components is 1.00, except for the open cast rehabilitation where it is 0.52 and processing waste 0.80
4.4	Determine and apply the weighting factors	Table B.7 Table B.8	Weighting factor 1 (Nature of the terrain): 1.1 (undulating terrain) Weighting factor 2 (Proximity to urban area): 1.05 (Peri-Urban)
4.5	Identify areas of disturbance	N/A	See Appendix 1 of this report
4.6	Identify closure costs from specialist studies	Table B.9	N/A
4.7	Calculate Closure Costs	Table B.10	See Section 6.2 and 6.3 and Appendix 2.

6.2 Quantity Estimation

The Guideline Document for the Evaluation of Financial Provisions made by the Mining Industry (Report no. 5863-5900-2-P, Rev 1.6) was used as a guide to determine the minimum requirement to compile the schedule of quantities. The information needed was obtained from the client in the form of an EMP and a Prospecting Work Program.

6.3 Determination of rates

Table 1 overleaf summarizes the unit rates for closure components as specified in the DME Guideline Document and indicates which rates were used by GCS in the assessment.

For the 2009 assessment, the 2004 rates of the DME Guideline Document were updated using the Consumer Price Index (CPIX) as obtained from Statistics South Africa.

Table 1: DME master rates

Item	Closure Component	Unit	DME Master Rate 2004	DME Master Rate 2005-2009 (3.9%) (4.6%) (6.5%) (8.6%) (12.1%)	GCS Comments
1	Dismantling of processing plant and associated structures.	m ³	R6.82	R 9.61	CPIX increase
2(A)	Demolition of steel buildings and structures (including floor slabs).	m ²	R95.00	R 33.86	CPIX increase
2(B)	Demolition of reinforced concrete buildings and structures including Processing Plant and related structures - including all admin and mine buildings and sewage facilities.	m ²	R 40.00	R 97.27	CPIX increase
3(A)	Rehabilitation of access roads.	m ²	R17.00	R23.96	CPIX increase
4(A)	Demolition of electrified railway lines.	m	R165.00	R232.50	CPIX increase
4(B)	Demolition and rehabilitation of non-electrified railway lines	m	R90.00	R126.82	CPIX increase
5	Demolition of housing and facilities (including floor slabs)	m	R190.00	R267.73	CPIX increase
6	Opencast rehabilitation (including final voids and ramps)	ha	R96,700.00	R141,464.28	CPIX increase
7	Sealing of shafts, adits and inclines (including concrete cap)	m ³	R51.00	R71.87	CPIX increase
8(A)	Rehabilitation of overburden and spoils	ha	R66,400.00	R93,562.18	CPIX increase
8(B)	Rehabilitation of processing waste deposits and evaporation ponds (basic, salt-producing waste)	sum	R5,000.00	R6,081.00	CPIX increase

Item	Closure Component	Unit	DME Master Rate 2004	DME Master Rate 2005-2009 (3.9%) (4.6%) (6.5%) (8.6%) (12.1%)	GCS Comments
8(C)	Rehabilitation of processing waste deposits and evaporation ponds (acidic, metal-rich waste)	ha	R240,200.00	R338,458.38	CPIX increase
9	Rehabilitation of subsided areas	ha	R55,600.00	R78,334.24	CPIX increase
10	General surface rehabilitation, including grassing of all denuded areas - this has made provision for the opencast areas, overburden dumps and paste disposal area.	ha	R52,600.00	R74,117.00	CPIX increase
11	River diversions	ha	N/A	N/A	
12	Fencing	m	R60.00	R84.55	CPIX increase
13	Water management	ha	R20,000.00	R28,181.38	CPIX increase
14	Two to three year maintenance and aftercare	ha	R7,000.00	R9,863.49	CPIX increase

6.4 Cost Estimate Summary

A summary of the estimated closure costs is provided below. Refer to Appendix 1 for detailed breakdowns of the closure cost assessments.

“Clean Closure Cost” estimate, refer to summary sheet in Appendix 1:

▪ Sub Total 1	R 256,805.38 (excluding VAT)
▪ Sub Total 2	R 328,967.69(excluding VAT)
▪ Sub Total 3	R 375,023.17 (including VAT)

The “Clean Closure Cost” estimates are in accordance with the DME guidelines and Sub Total 3 includes the following:

- Preliminary and general (P&G) = 12% of Total 1 (6% if larger than R100 million; 12% if smaller than R100 million);
- 10% Contingency; and
- 14% VAT.

6.5 Financial Provision

The financial provision for the environmental rehabilitation and closure of any prospecting operations forms an integral part of the Mineral and Petroleum Resources Development Act (Act 28 of 2002) under Sections 41(1), 41(3) and 45 of the Act.

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

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

With the determination of the quantum for closure it must be assumed that the prospecting infrastructure has no salvage value. This is necessary as it is often difficult to determine the salvage value for the infrastructure. However, salvage value can be off-set if the prospecting operation can demonstrate to the Regional Director of the Department of Mineral and Energy that a formal arrangement exists covering demolition of the prospecting infrastructure and the payment to be received.

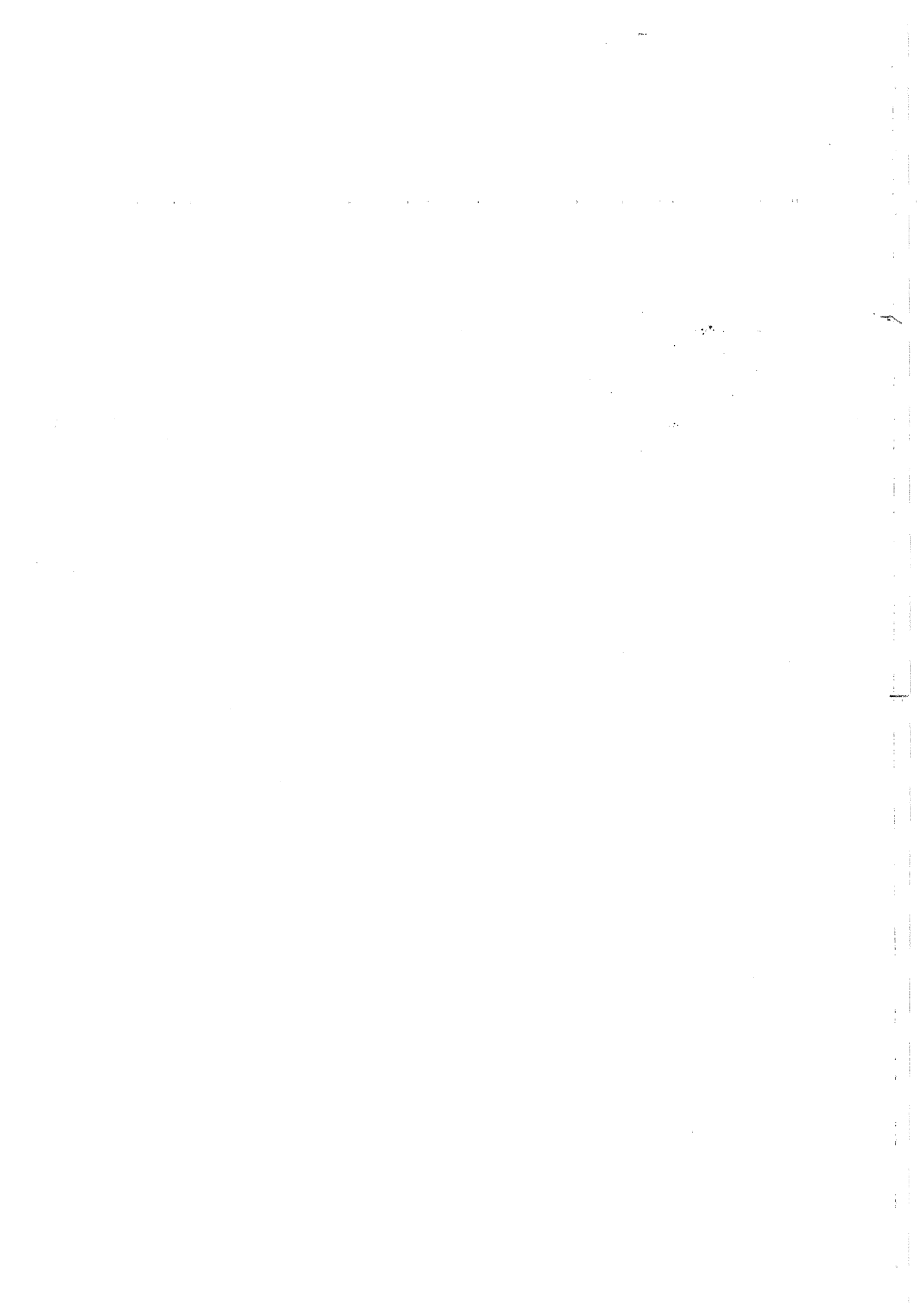
The Mine is required to annually assess the total quantum of environmental liability for the mining operation and ensure that financial provision is sufficient to cover the current liability (in the event of premature closure) as well as the end-of-mine liability.

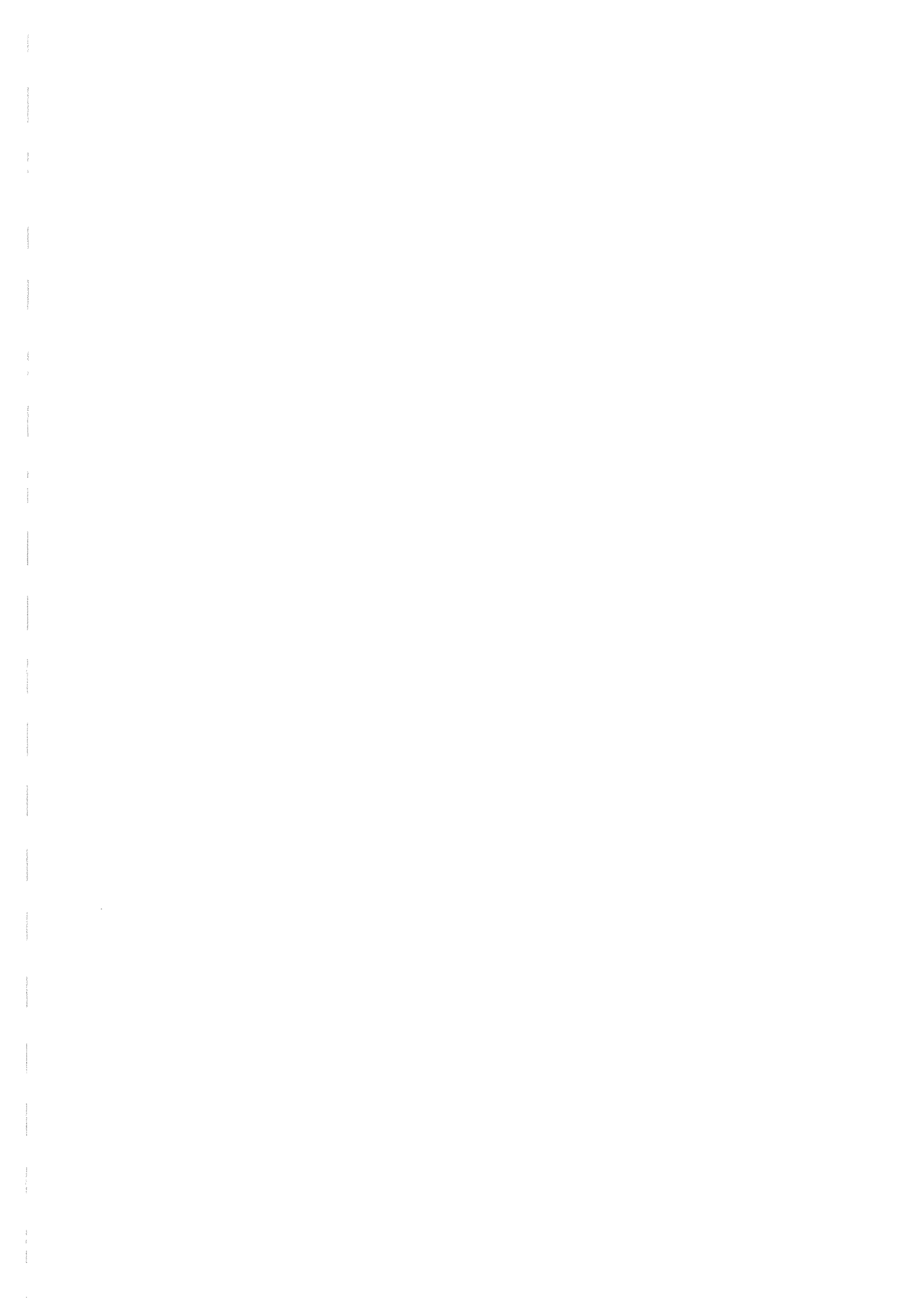
The following requirements must be considered in developing a pecuniary provision strategy: The closure cost estimate to cover the current environmental liability in the event of premature closure = R 375,023.17 (including VAT).

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

APPENDIX 1

CALCULATION OF THE QUANTITY									
No	Description	Unit	Quantity		Master rate	Multiplication factor		Weighting factor	E=A*B*C*D
			Step 4.5	Step 4.3		Step 4.3	Step 4.4		
1	Dismantling of processing plant and associated structures (including associated conveyors)	m ²	7300.00	R 9.61	1.00	1.10	R 73,257.50	R 80.00	R 5,866,215.00
2(A)	Demolition of steel buildings and structures (including floor slabs)	m ²	25	R 135.86	1.00	1.10	R 3,391.55	R 80.00	R 271,324.00
2(B)	Demolition of reinforced concrete buildings and structures	m ²		R 197.27	1.00	1.30	R 25,645.10	R 80.00	R 2,051,608.80
3(A)	Rehabilitation of access roads	m ²		R 23.96	1.00	1.10	R 26.36	R 80.00	R 2,108.80
4(A)	Demolition of electrified railway lines	m		R 232.50	1.00	1.10	R 255.75	R 80.00	R 20,460.00
4(B)	Demolition and rehabilitation of non-electrified railway lines	m		R 126.87	1.00	1.10	R 139.56	R 80.00	R 11,164.80
5	Demolition of housing and facilities (including floor slabs)	m ²	499	R 287.73	1.00	1.10	R 316,576.27	R 80.00	R 25,326,102.24
6	Opencast rehabilitation (including final voids and ramps)	ha		R 140,343.28	0.52	1.00	R 73,165.51	R 80.00	R 5,853,240.00
7	Sealing of shafts, adits and inclines (including concrete cap)	m ²		R 71.87	1.00	1.10	R 79.06	R 80.00	R 6,324.80
8(A)	Rehabilitation of overburden and spoils	ha		R 83,662.18	1.00	1.10	R 92,028.40	R 80.00	R 7,362,272.00
8(B)	Rehabilitation of processing waste deposits and evaporation ponds (basic, salt-producing waste)	ha		R 116,530.01	1.00	1.10	R 128,183.01	R 80.00	R 10,254,640.00
8(C)	Rehabilitation of processing waste deposits and evaporation ponds (acidic, metal-rich waste)	ha		359,458.38	1.00	1.10	R 395,404.22	R 80.00	R 31,632,337.60
9	Rehabilitation of subsided areas	ha		R 73,344.74	1.00	1.10	R 80,679.21	R 80.00	R 6,454,337.60
10	General surface rehabilitation, including grassing of all denuded areas	ha	0.32	R 74,117.03	1.00	1.10	R 81,528.73	R 80.00	R 6,522,301.76
12	Fencing	m		R 84.55	1.00	1.10	R 93.00	R 80.00	R 7,440.00
13	Water management	ha		R 28,181.38	1.00	1.10	R 31,000.52	R 80.00	R 2,480,041.60
14	Two to three year maintenance and aftercare (general surface rehabilitation)	ha	0.32	R 8,853.49	1.00	1.10	R 9,738.84	R 80.00	R 779,107.20
1	Primary and General					12% of Sub-Total 1			
2	Contingencies					10% of Sub-Total 1			
Sub-Total 1 (Sub-Total 1 plus sum of management and administration items) VAT (14%)									
Sub-Total 2 (Sub-Total 1 plus sum of management and administration items) VAT (14%)									
GRAND TOTAL (Sub-Total 3)									





1. THE PUBLIC PARTICIPATION PROCESS

1.1 Background information

As is required by Section 22(4)(b) of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA), the applicant consulted with and gave written notification (including site notices, newspaper advertisements and letters of notification) of its intent to mine for iron ore and manganese ore on the Remaining Extent and Portion 1 of the farm Kareepan No. 450, as well as Portion 1 of the farm Pensfontein No. 449, District of Hay, Northern Cape Province to all identified interested and/or affected parties.

1.2 Parties interested in or affected by the proposed mining operation

A target population was identified that either potentially has an interest in, or could be affected by, the proposed mining operation. This target population includes:

- The relevant land owners;
- The relevant neighbouring land owners;
- The relevant local authority;
- The relevant district authority;
- The general public; and
- Eskom.

Identified interested and/or affected parties and their contact details are listed in Table 1.

1.3 Procedure used to offer interested and/or affected parties the opportunity to participate

Identified interested and/or affected parties were offered the opportunity to participate in the planning of the proposed mining operation in the following way:

Table 1. *Identified interested and/or affected parties and their contact details.*

Name	Capacity	Address	Contact Number
1. Tsantsabane Local Municipality	Local authority	P.O. Box 5 POSTMASBURG 8420	053 313 7300
2. Siyanda District Municipality	District authority	Private Bag X6039 UPINGTON 8800	054 337 2800
3. ESKOM	Potential affected party	Mr. A. Cloete ESKOM P.O. Box 606 KIMBERLEY 8300	053 830 5911
4. Trustees of the Kareepan Trust	Land owners	Messrs. Chris and Schalk Victor P.O. Box 589 POSTMASBURG 8420	053 313 2598
5. Assmang Ltd.	Neighbouring Land Owner	Mr. Alex Mostert Private Bag 503 KATHU 8446	076 939 5524 053 712 1829

Table 1 (contd.). *Identified interested and/or affected parties and their contact details.*

Name	Capacity	Address	Contact Number
6. Maremane Communal Property Association	Neighbouring land owner	Mr. M. Matsididi Private Bag X1514 KURUMAN 8474	076 939 5524 053 712 1829
7. Transnet Ltd.	Neighbouring land owner	Mr. Willie de Beer Chief Executive Officer (Propnet) 35 th Floor Carlton Centre 150 Commissioner Street JOHANNESBURG 2000	011 308 1526 011 308 1523/9 (fax)

1.3.1 Telephonic Consultation

All land owners and neighbouring land owners were contacted telephonically with the purpose of informing these parties about the proposed mining activities of the applicant and enquiring about any potential objections or concerns regarding the proposed project.

1.3.2 Written Notification

In addition to the above-mentioned telephonic consultation, written notification of the intent of the applicant to mine iron ore and manganese ore on the aforementioned properties was given to all identified interested and/or affected parties via registered letter/fax/e-mail.

The letter of notification stated the intent of the applicant and invited all interested and/or affected parties to take part in the process of public participation by addressing any potential comments and/or objections regarding the proposed project to the appointed consultant within a period of 30 days. All identified parties were furthermore invited to contact the appointed consultant if any additional information regarding the proposed operation was required.

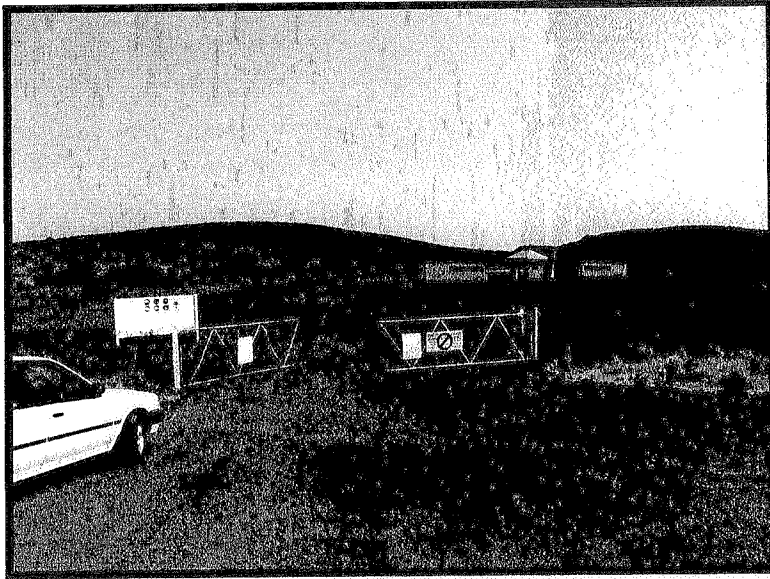
Identified interested and/or affected parties were also asked to name any additional interested and/or affected parties that might have been overlooked by the consultant/applicant.

Proof of registration of letters of notification to identified interested and/or affected parties is attached hereto as Appendix A.

1.3.3 Site Notices

Bilingual site notices (Photo Plates 1A and B and 2A and B) were placed at the entrance to the proposed mining area with the aim of informing the general public about the proposed mining operation, as well as communicating information re. the process of registering as an interested and/or affected party and thus being involved in the process of public participation.

A



B

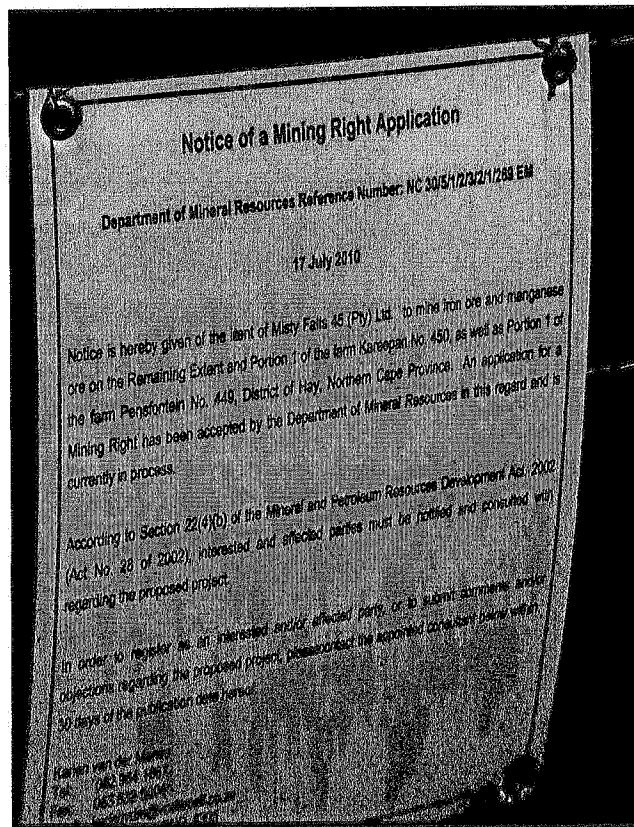
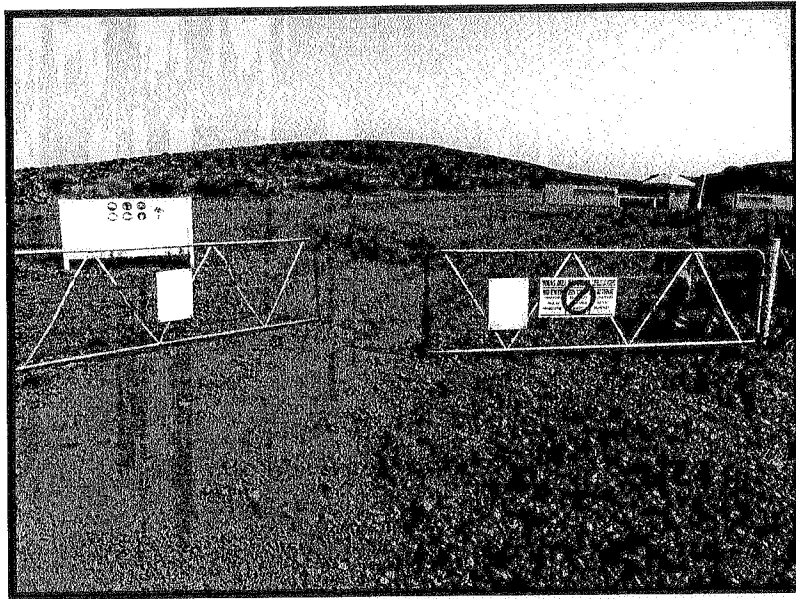


Photo Plates 1A & B. English site notice placed at the entrance to the proposed mining area.

A



B

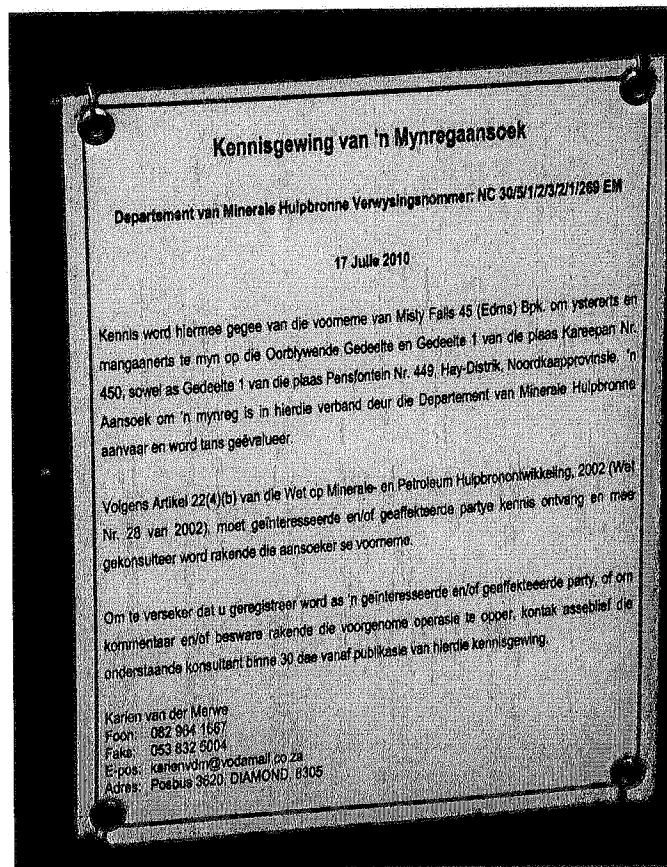


Photo Plates 2A & B. Afrikaans site notice placed at the entrance to the proposed mining area.

1.3.4 Newspaper Advertisements

An English newspaper notice regarding the proposed mining operation was placed in the *Diamond Fields Advertiser* of 22 September 2010 (Figure 1).

In addition to the above newspaper notice, an Afrikaans newspaper notice was placed in the *Volksblad* of 23 September 2010 (Figure 2).

The purpose of the above-mentioned two notices was to inform the general public about the proposed mining operation of the applicant, as well as to communicate some information regarding the process of registration as an interested and/or affected party.

1.3.5 Public Meeting

A public meeting regarding the proposed mining operation of the applicant was held on 1 October 2010 at 10:00 at the Postmasburg Hotel (Photo Plate 3). The minutes of this meeting is attached hereto as Appendix B.

1.4 Issues identified as being of concern to interested and/or affected parties

1.4.1 Eskom

Mr. A. Cloete indicated, on behalf of Eskom, that they foresee no problem with the proposed mining operation. They did, however, list the following conditions for working within an Eskom servitude:

- Where Eskom assets have to be removed or re-routed, it will be for the account of the requestor;
- Eskom power lines must be regarded as being live 24 hours per day and seven days per week;
- Eskom's servitude of 15.5 m on either side of the centre line of a power line must be strictly adhered to; and
- The burning of plant material within an Eskom servitude is strictly prohibited.

Diamond Fields Advertiser... WEDNESDAY SEPTEMBER 22, 2010

660 To Let Garden Cottages
TWEË slyk. 1 bak. stort. oop-plan komb. 2 afskiede R3 000 om plus dep Tel 076-958-4678 of 071-108-8959.

669 To Let Homes
HOUSE: R6 500 pm New Hillcrest, 3 bed, 2 bath. Good security. Available 1 November 2010. Phone (053) 831-3355 or Gatsie 083-735-9388 (LH).

TO LET Monument Heights: R2 800 pm
Flat. 1 bedr. bath, carport. kitchen newly revamped. water (sic).

NEW PARK: R2 750 pm
Flat. 1 bedr. bath, carport. water (sic).

ROYLDENE: R6 000 pm
Townhouse. 3 bedr. 2 bathr. fan braai. Secure complex.

NEW PARK: R6 050 pm
House. 3 bedr. 2 bathr. garage. oop-plan kitchen.

Phone Karyn 072-729-2067 (SEEK)

571 To Let Townhouses
THREE bedr townhouse plus pool. R5 850 pm Tel 083-735-9388 (LH).

571 To Let Townhouses
TOWNHOUSE: Lindene. 3 bed, soc complex. R5 600 pm, exl water and electricity. Avail 1 October 2010. Phone (053) 831-3355 or Gatsie 083-735-9388 (LH).

CALLING ALL TENDERERS:
CIDB registered contractors in a 7GB or 6GB PE Class of construction are invited to place a bid for:
SIOC COMMUNITY DEVELOPMENT TRUST:
Constructing of a new office building. The contract entails the construction of a double-storey building in Kathu, Northern Cape. Tender documentation can be obtained for a non-refundable deposit of R200 from: Isinda, Shop 5A, Rietbok Street, Kathu, 8446
Tender closing date:
Monday, 11 October 2010 at 12:00

ERRATUM
Department of Public Works
Tender LS08/2010

Please note that the amount for LS08/2010 is R200 and not R100 as published on the 16 September 2010.

Notice of a Mining Right Application
Department of Mineral Resources
Reference Number: NC 30/5/1/2/3/2/1/269 EM 22 September 2010

Notice is hereby given of the intent of Misty Falls 45 (Pty) Ltd to mine iron ore and manganese ore on the Remaining Extent and Portion 1 of the farm Kareeboom No 450, as well as Portion 1 of the farm Pensfontein No 449, district of Hay, Northern Cape Province. An application for a Mining Right has been accepted by the Department of Mineral Resources in this regard and is currently in process. According to Section 22(4)(b) of the Mineral and Petroleum Resources Development Act, 2002 (Act No 28 of 2002), interested and affected parties must be notified and consulted with regarding the proposed project. In order to register as an interested and/or affected party, or to submit comments and/or objections regarding the proposed project, please contact the appointed consultant below within 14 days of the publication date hereof.
Karienvan der Merwe
Tel 082-964-1667
Fax (053) 832-5004
E-mail: karienvdmi@vodamail.co.za
PO Box 3620, Diamond, 8305

NOTICE OF INTENTION TO APPLY IN TERMS OF SECTION 55 OF THE NORTHERN CAPE LIQUOR ACT, 2008

Notice is hereby given that it is the intention to lodge the abovementioned application, per with the Northern Cape Liquor Board on 30 September 2010.

1	2	3	4	
Municipality	Full name, street and postal address of applicant	Kind of licence applied for	Kind of liquor to be sold	Name of business conduct address
Expanding Municipality	Lorato Sarah Louw 89 Adam Namakola Mankuroane Kimberley 8345	Liquor Store Licence	All types of liquor	Ya Roria 582 Mt Tic Delpe

Signed: 9 September 2010 at Kimberley

Legals & Tend

NOORD-KAAP BONSMARAGROEP



Noord-Kaap Bonsmaragroep
Veiling

Vierde jaarlikse veiling op 23 September 2010 om 11:00, by die GWK-veilingkrale, Kimberley.
50 Bulle, 250 vroulike diere.

Skakel die kantoor (053) 832-5227

GWK BEPERK LIMITED

Be part of the independent value of the Northern Cape.
Subscribe now for 9 months and get

TRANSNET LIMITED

(Registration No 1990/00900/06)
Trading as TRANSNET Property
TENDER No TPIT / KBY / 315

Tenders are invited for the:
Provision of Garden Maintenance Services and Cleaning and Clearing of Open / Vacant Land in the Kimberley area for a Period of Two Years

The garden service to be provided includes:

- Normal garden services;
- Abnormal garden services;
- Cleaning and clearing of open / vacant land;
- Any other services arising out of or incidental to the above, or required of the Service Provider for the proper completion of the service in accordance with the true meaning and intent of the contract.

Tender documents may be inspected at, and are obtainable from the offices of Transnet Property, Room 3613, Carlton Centre Office Tower, 150 Commissioner Street, Johannesburg or Room 16, Ground Floor, J.W. Sauer Building, c/o Roper and Quinn streets, Kimberley. Documents may be collected during working hours from 09:00 on 27 September 2010 and will only be available until 15:30 on 29 September 2010. No documents will be sold after the 29 September 2010 deadline. A non-refundable tender deposit of R500,00 payable in cash or by bank guaranteed cheque made out in favour of Transnet Property is required on collection of the documents.

For enquiries regarding the collection of documents contact

VUSEL CO

Empow

BIDS ARE HERE

BID NO	DESCRIPTION	CIB GRAI
216HDPT/ABLR	Addition of New Bathrooms (Ablution) next to the Existing Hostels Renovations of Existing Ablution in Hostels, into Lounge and Study Rooms	4 GB G or Hi

Bid documents will be sold at Fischer Street, KLERKSDORP, of R500,00 is payable for each

Bid documents must be dep. "Tenders" situated at 8 Bram f

Figure 1. Copy of a newspaper notice placed in the *Diamond Fields Advertiser* of 22 September 2010.



Photo Plate 3. Public meeting held on 1 October 2010 at 10:00 at the Postmasburg Hotel.

A copy of the written correspondence received from Eskom is attached hereto as Appendix C.

APPENDIX A

Proof of registration of letters of notification

List of REGISTERED LETTERS

Lys van GEREGISTREERDE BRIEWE

(with an insurance option/met 'n versekeringsopsie)



Post Office

Full tracking and tracing/Volledige volg en spoor

Name and address of sender: Karien v.d. Merwe
 Naam en adres van afsender: P.O. Box 3620
Diamond, 8305

Enquiries/Navrae
 Toll-free number
 Tovy nommer
0800 111 502

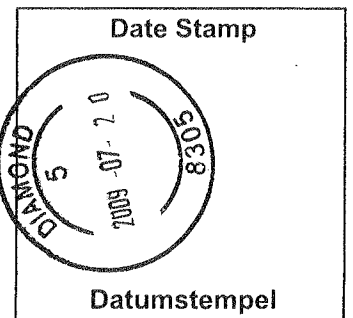
No	Name and address of addressee Naam en adres van geadresseerde	Insured amount Versekerde bedrag	Insurance fee Versekeringsgeld	Postage Posgeld	Service fee Diensgeld	Affix Track and Trace customer copy Plak Volg-en-Spoor-klientafskrif
1	Municipal Manager, Tsantsabane, Box 5, Postmasburg, 8420					(with a domestic insurance option) ShareCall 0860 111 502 www.sapo.co.za RD 297 190 138 ZA CUSTOMER COPY 301028R
2	Municipal Manager, Siyanda, P/Bag X 6039, Uppington, 8800					(with a domestic insurance option) ShareCall 0860 111 502 www.sapo.co.za RD 297 190 115 ZA CUSTOMER COPY 301028R
3	A. Cloete, Eskom, Box 606, Kimberley, 8300					(with a domestic insurance option) ShareCall 0860 111 502 www.sapo.co.za RD 297 190 098 ZA CUSTOMER COPY 301028R
4	A. Mostert, Assmang, P/Bag X 503, Kathu, 8446					(with a domestic insurance option) ShareCall 0860 111 502 www.sapo.co.za RD 297 190 075 ZA CUSTOMER COPY 301028R
5	Prov. Com. Prop. Ass., P/Bag X 1514, Kuruman, 8474					(with a domestic insurance option) ShareCall 0860 111 502 www.sapo.co.za RD 297 190 053 ZA CUSTOMER COPY 301028R
6	W. de Beer, Propnet, 3 rd Floor, Callon Centre, 150 Commissioner St, Jhb.					(with a domestic insurance option) ShareCall 0860 111 502 www.sapo.co.za RD 297 190 243 ZA CUSTOMER COPY 301028R
7						
8						
9						
10						
Number of letters posted Getal briewe gepos		Total Totaal	R	R	R	R

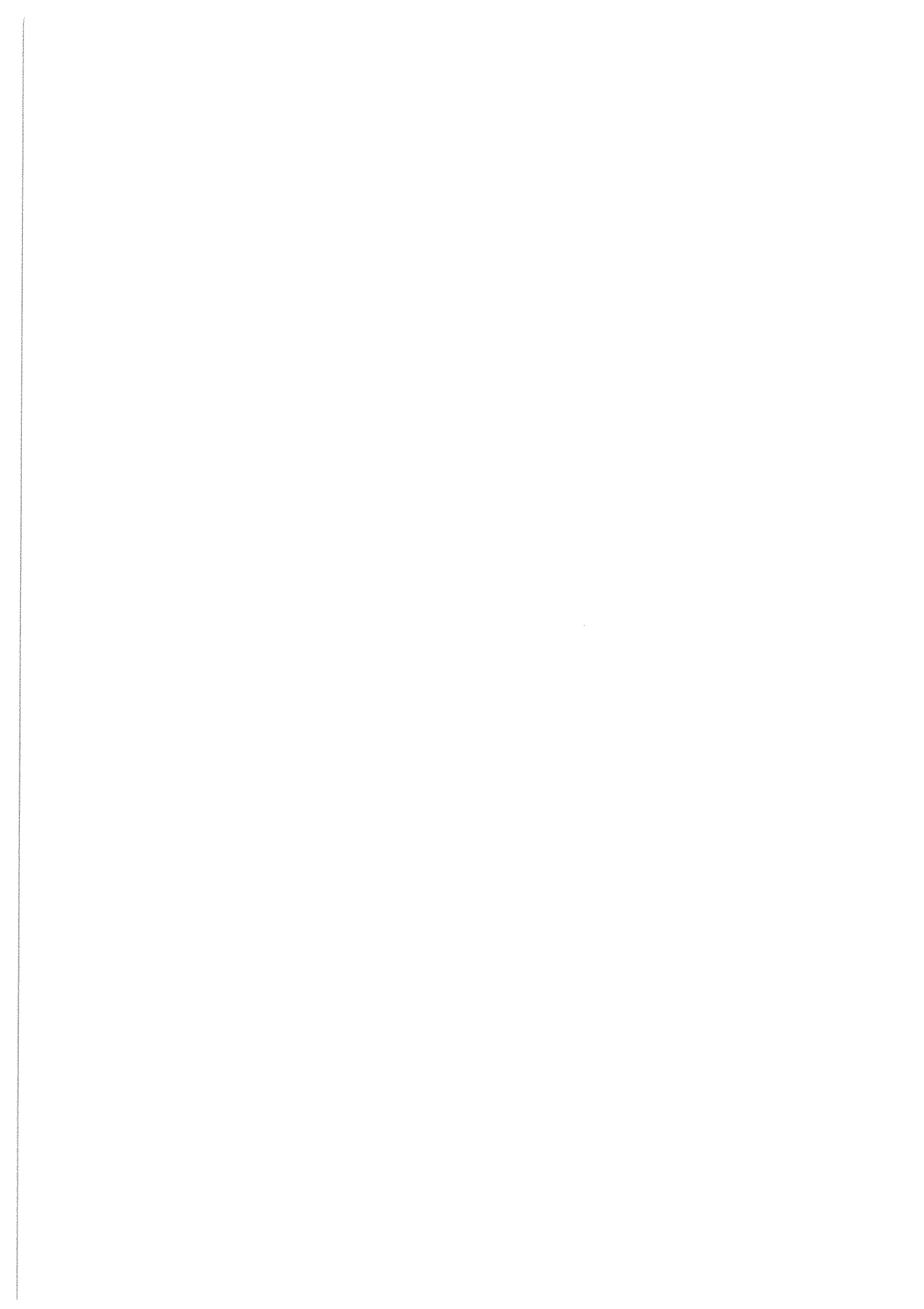
Signature of client K v d Merwe
 Handtekening van klient

Signature of accepting officer [Signature]
 Hantekening van aanneembeampte

The value of the contents of these letters is as indicated and compensation is not payable for a letter received unconditionally. Compensation is limited to R100,00. No compensation is payable without documentary proof. Optional insurance of up to R2 000,00 is available and applies to domestic registered letters only.

Die waarde van die inhoud van hierdie briewe is soos aangedui en vergoeding sal nie betaal word vir 'n brief wat sonder voorbehoud ontvang word nie. Vergoeding is beperk tot R100,00. Geen vergoeding is sonder dokumentêre bewys betaalbaar nie. Opsionele versekering van tot R2 000,00 is beskikbaar en is slegs op binnelandse geregistreerde briewe van toepassing.





APPENDIX B

**Minutes of a public meeting held on 1 October 2010 at 10:00 at
the Postmasburg Hotel**

APPENDIX C

**Copies of written correspondence received from interested
and/or affected parties to date**

KARIEN VAN DER MERWE
ENVIRONMENTAL CONSULTANT



Minutes of a public meeting regarding a mining right application by Misty Falls 45 (Pty) Ltd. over Portion 1 and the Remaining Extent of the farm Kareepan No. 450, as well as Portion 1 of the farm Pensfontein No. 449, District of Hay, Northern Cape Province, held on 1 October 2010 at 10:00 at the Postmasburg Hotel, Postmasburg.

Present: Karien van der Merwe (Consultant); Andrew Makotong (Assmang Ltd.); Chris Victor (Misty Falls 45 (Pty) Ltd.); Schalk Victor (Misty Falls 45 (Pty) Ltd.); Joe (SACH); Dany (SACH); D.J. van Zyl (Siyanda District Municipality); and Allen Scholtz (SACH).

1. Welcome and introduction

Karien v.d. Merwe welcomed everybody to the meeting and introduced herself as an independent consultant appointed by Misty Falls (Pty) Ltd. for the purpose of the process of public participation.

2. Purpose of the meeting

Karien v.d. Merwe explained that the purpose of the meeting was to provide the directors of Misty Falls 45 (Pty) Ltd. with the opportunity to give more information re. the proposed mining operation to I&APs, as well as to provide I&APs with the opportunity to ask questions about the proposed operation. I&APs would also be given the opportunity to list concerns or objections re. the proposed operation.

3. Background information re. the proposed mining operation

Mr. Chris Victor, director of Misty Falls 45 (Pty) Ltd. gave a presentation on the activities planned as part of the proposed mining operation.

4. Questions

- Andrew Mokotong asked what the anticipated life of mine was. Mr. C. Victor replied that it was 30 years.
- D.J. van Zyl enquired whether any new roads would be proclaimed as part of the proposed mining operation. Mr. C. Victor replied that it would not.
- Allen Scholtz required more clarity on the mining right application process. Karien v.d. Merwe explained the process in detail.
- Andrew Mokotong asked how material would be transported from the site. C. Victor replied that it would be transported to a nearby railway station via truck, where-after it will be transported via rail.
- Andrew Mokotong asked where water would be obtained from for the purpose of the proposed operation. C. Victor replied that an application with DWAF has been lodged for the abstraction of groundwater, although it is anticipated that a dry sorting process will

P.O. Box 3620, DIAMOND, 8305
082 964 1667
053 832 5004 (FAX)

KARIEN VAN DER MERWE
ENVIRONMENTAL CONSULTANT



5. Objections and concerns

Karien v.d. Merwe asked whether anyone had objections or concerns re. the proposed operation to be recorded. No objections/concerns were listed by those present.

6. Closing

Karien v.d. Merwe thanked everyone for their presence and adjourned the meeting.

P.O. Box 3620, DIAMOND, 8305
082 964 1667
053 832 5004 (FAX)

KARIEN VAN DER MERWE
ENVIRONMENTAL CONSULTANT

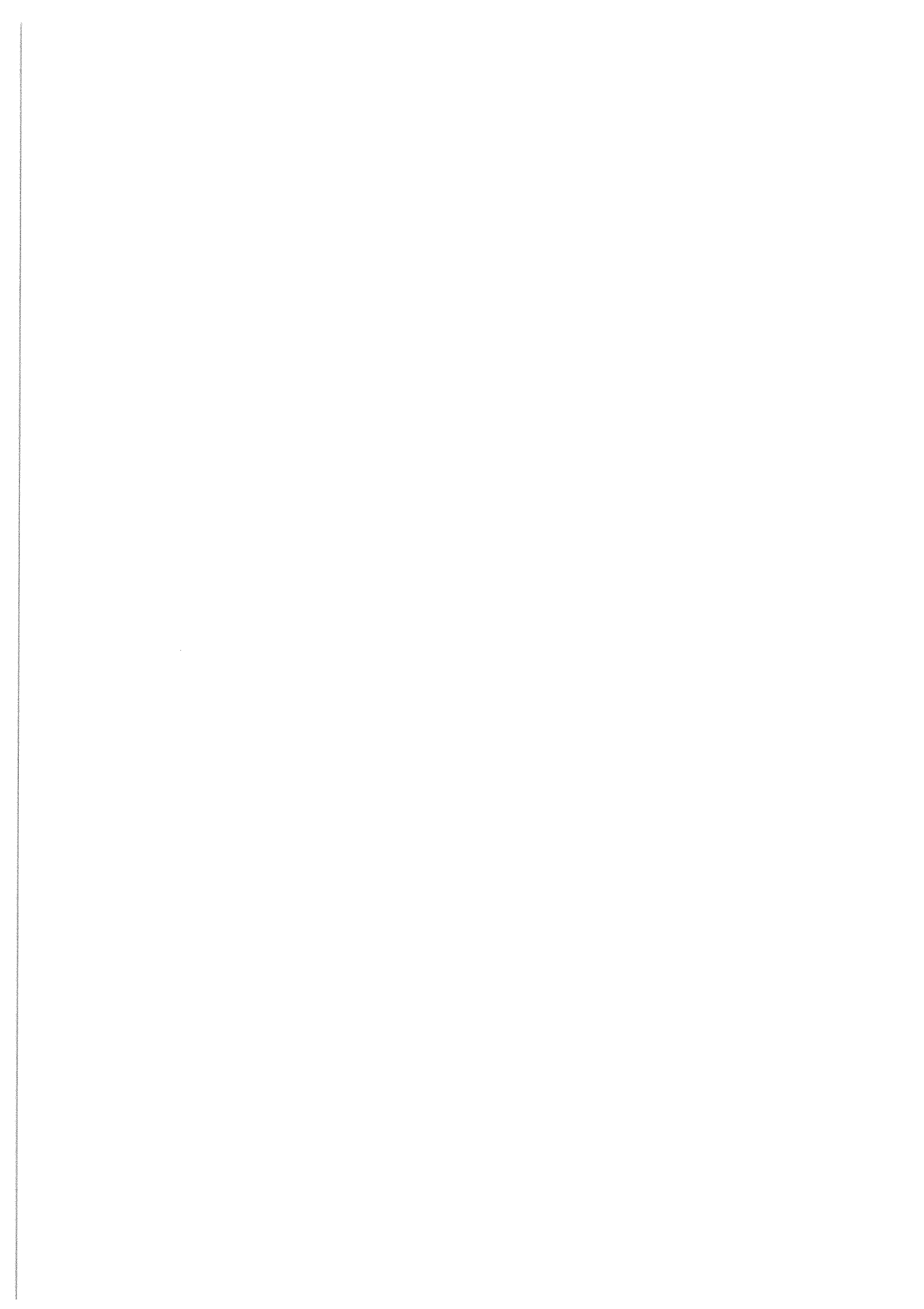


TEENWOORDIGHEIDSLYS

Publieke vergadering rakende 'n mynreg aansoek deur Misty Falls 45 (Edms) Bpk. op Gedeelte 1 en die Restant van die plaas Kareepan Nr. 450, asook Gedeelte 1 van die plaas Pensfontein Nr. 449, Hay-distrik, gehou op Vrydag, 1 Oktober 2010 om 10:00 te die Postmasburg Hotel.

NAAM	HOEDANIGHEID	KONTAKNUMMER	POSADRES
Karien v.d. Merwe	Consultant	082 964 1667	Box 3620, Diamond, 8305
Andrew Malolongo	Assessor - Beeshoek	053 311 6374	P.O. Mancoop Mine 84922
C Victor	Director	076 3971605	Misty Falls
S Victor	Director	082 962 3366	Misty Falls
Joe	SACH	076 598 9226	SACH
D. J. van Zyl	SACH	076 0790607808	SACH
D. J. van Zyl	Siyanda DISTRIK MAN.	054- 3372866	MBA9 x 6039 Uptington
Allen Scholtz	SACH	082 8212 729	Postbus 162 PMG 8420

P.O. Box 3620, DIAMOND, 8305
082 964 1667
053 832 5004 (FAX)



Karien van der Merwe
P.O. Box 3620
DIAMOND
8305

Date:

26th July 2010

Enquiries:

A. Cloete

☎ 053-8305775

☎ 053-8305773

E-mail: cloetea@eskom.co.za

Dear Me. Van der Merwe

**APPLICATION FOR A MINING RIGHT OVER THE REMAINING EXTENT
AND PORTION 1 OF THE FARM KAREEPAN NO. 450, AS WELL AS
PORTION 1 OF THE FARM PENSFONTEIN NO. 449, DISTRICT OF HAY,
NORTHERN CAPE PROVINCE**

In reply to your letter dated 15 July 2010, Eskom foresee no problem with the above project..

Where Eskom assets have to be removed or re-routed it will be for the account of the requestor. Eskom power lines must be regarded as been live 24 hours a day and 7 days a week.

Eskom's servitude of 15,5 meters on either side of the centre line of the power line must be strictly adhered to and the burning of plant material within the servitude is strictly prohibited.

Yours faithfully

A. Cloete

A. Cloete
Chief Surveyor
North Western Region
Eskom
KIMBERLEY

North Western Region
120 Henry Street Bloemfontein PO Box 356 Bloemfontein 9300 SA
Tel 8600 eskom www.eskom.co.za

Directors: MV Moosa (Chairman) PJ Maroga (Chief Executive) M Bello (Nigerian) LCZ Cele Dr BM Count (British)
LG Josefsson (Swedish) WE Lucas-Bull PM Makwana E Marshall JRD Modise V Mohanlal Rowjee AJ Morgan
SA Mpambani U Nene B Nqwababa* (*Executive Director) **Company Secretary:** M Adam
Eskom Holdings Limited Reg No 2002/015527/06



