case ID: 1892

mineral resources

Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

Private Bag X6093, Kimberley, 8300, Tel: (053) 807 1700, Fax: (053) 832 5631
First Floor. Liberty Corner, 29-31 Curry Street, Kimberley 8301

From: Directorate: Mineral Regulation: Northern Cape **Date:** 30 May 2011
Enquiries: Ms. Linah Tshikororo E-Mail:Tshisikhawe.Tshikororo@dmr.gov.za
Ref: NC 30/5/1/3/3/2/1/2043 EM

The Director
South African Heritage Resources Agency
PO Box 4637
CAPE TOWN
8000

Attention: Mrs Nonofho Ndobochani

CONSULTATION IN TERMS OF SECTION 40 OF THE MINERAL AND PETROLEUM RESOURCES DEVELOPMENT ACT 2002, (ACT 28 OF 2002) FOR THE APPROVAL OF AN ENVIRONMENTAL MANAGEMENT PLAN FOR MINING PERMIT ON A CERTAIN PORTION OF FARM MEY'S DAM NO. 68 SITUATED IN THE MAGISTERIAL DISTRICT OF CARNARVON, NORTHERN CAPE REGION.

APPLICANT: NATIONAL RESEARCH FOUNDATION (SKA SA) QUARRY & BORROW PIT.

Attached herewith, please find a copy of an EMP received from the above-mentioned applicant for your comments.

It would be appreciated if you could forward any comments or requirements your Department may have to this office and to the applicant before **23 July 2011** as required by the Act.

Consultation in this regard has also been initiated with other relevant State Departments. In an attempt to expedite the consultation process please contact **Linah Tshikororo** of this office to make arrangements for a site inspection or for any other enquiries with regard to this application.

Your co-operation will be appreciated.

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

2043

File number:.....

DEPARTMENT OF MINERALS AND ENERGY

ENVIRONMENTAL MANAGEMENT PLAN

Submitted in support of application for a prospecting right

Section 39 and Regulation 52 of the Minerals and Petroleum Resources Development Act, 2002 (Act 28 of 2002)

Gravel 4A

Application for a:		
	Prospecting Right	
	Mining Permit	X

Applicant: National Research Foundation (SKA SA) Quarry & Borrow pit

Farm: A Certain Portion of Farm Mey's Dam Nr 68

District: Carnarvon

Mineral: Granular materials (stone aggregate)

Date: May 2011

Contents

Section A:

Section B:

Section C:

Section D:

Section E:

Section F:

Section G:

Management Plan (Section F) of the document is legally binding once approved and, in the undertaking contained in Section H, the applicant effectively agrees to implement all the measures outlined in this Environmental Management Plan.

A.5 LEGISLATION/ REGULATIONS

The relevant sections of Mineral and Petroleum Resources Development Act and its supporting Regulations are *summarised below* for the information of applicants. The onus is on the applicant to familiarise him/herself with the provisions of the full version of the Mineral and Petroleum Resources Development Act and its Regulations.

SECTION OF ACT	LEGISLATED ACTIVITY/ INSTRUCTION/ RESPONSIBILITY OR FAILURE TO COMPLY	PENALTY IN TERMS OF SECTION 99
5(4)	No person may prospect, mine, or undertake reconnaissance operations or any other activity without an approved EMP, right, permit or permission or without notifying land owner	R 100 000 or two years imprisonment or both
19	Holder of a Prospecting right must: lodge right with Mining Titles Office within 30 days; commence with prospecting within 120 days, comply with terms and conditions of prospecting right, continuously and actively conduct prospecting operations; comply with requirements of approved EMP, pay prospecting fees and royalties	R 100 000 or two years imprisonment or both
20(2)	Holder of prospecting right must obtain Minister's permission to remove any mineral or bulk samples	R 100 000 or two years imprisonment or both
26(3)	A person who intends to beneficiate any mineral mined in SA outside the borders of SA may only do so after notifying the Minister in writing and after consultation with the Minister.	R 500 000 for each day of contravention
28	Holder of a mining right or permit must keep records of operations and financial records AND must submit to the DG: monthly returns, annual financial report and a report detailing compliance with social & labour plan and charter	R 100 000 or two years imprisonment or both
29	Minister may direct owner of land or holder/applicant of permit/right to submit data or information	R 10 000
38(1)(c)	Holder of permission/permit/right MUST manage environmental impacts according to EMP and as ongoing part of the operations	R 500 000 or ten years imprisonment or both.
42(1)	Residue stockpiles must be managed in prescribed manner on a site demarcated in the EMP	A fine or imprisonment of up to six months or both
42(2)	No person may temporarily or permanently deposit residue on any other site than that demarcated and indicated in the EMP	A fine or imprisonment of up to six months or both
44	When any permit/right/permission lapses, the holder may not remove or demolish buildings, which may not be demolished in terms of any other law, which has been identified by the Minister or which is to be retained by agreement with the landowner.	Penalty that may be imposed by Magistrate's Court for similar offence
92	Authorised persons may enter mining sites and require holder of permit to produce documents/ reports/ or any material deemed necessary for inspection	Penalty as may be imposed for perjury
94	No person may obstruct or hinder an authorised person in the performance of their duties or powers under the Act.	Penalty as may be imposed for perjury

SECTION OF ACT	LEGISLATED ACTIVITY/ INSTRUCTION/ RESPONSIBILITY OR FAILURE TO COMPLY	PENALTY IN TERMS OF SECTION 99
95	Holder of a permit/right may not subject employees to occupational detriment on account of employee disclosing evidence or information to authorised person (official)	Penalty as may be imposed for perjury
All sections	Inaccurate, incorrect or misleading information	A fine or imprisonment of up to six months or both
All sections	Failure to comply with any directive, notice, suspension, order, instruction, or condition issued	A fine or imprisonment of up to six months or both

A.6 OTHER RELEVANT LEGISLATION

Compliance with the provisions of the Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002) and its Regulations does not necessarily guarantee that the applicant is in compliance with other Regulations and legislation. Other legislation that may be immediately applicable includes, but are not limited to:

- National Monuments Act, 1969 (Act 28 of 1969).
- National Parks Act, 1976 (Act 57 of 1976)
- Environmental Conservation Act, 1989 (Act 73 of 1989)
- National Environmental Management Act, 1998 (Act No. 107 of 1998)
- Atmospheric Pollution Prevention Act, 1965 (Act 45 of 1965)
- The National Water Act, 1998 (Act 36 of 1998)
- Mine Safety and Health Act, 1996 (Act 29 of 1996)
- The Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983).

A.7 WORD DEFINITIONS

In this document, unless otherwise indicated, the following words will have the meanings as indicated here:

Act (The Act)	Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002)
Borehole	A hole drilled for the purposes of prospecting i.e. extracting a sample of soil or rock chips by pneumatic, reverse air circulation percussion drilling, or any other type of probe entering the surface of the soil.
CARA	The Conservation of Agricultural Resources Act
EIA	An Environmental Impact Assessment as contemplated in Section 38(1) (b)of the Act
EMP	an Environmental Management Plan as contemplated in Section 39 of the Act
Fauna	All living biological creatures, usually capable of motion, including insects and predominantly of protein-based consistency.
Flora	All living plants, grasses, shrubs, trees, etc., usually incapable of easy natural motion and capable of photosynthesis.
Fence	A physical barrier in the form of posts and barbed wire and/or "Silex" or any other concrete construction, ("palisade"- type fencing included), constructed with the purpose of keeping humans and animals within or out of defined boundaries.
House	any residential dwelling of any type, style or description that is used as a residence by any human being

NDA	National Department of Agriculture
NWA	National Water Act, Act 36 of 1998
Pit	Any open excavation
"Porrel"	The term used for the sludge created at alluvial diamond diggings where the alluvial gravels are washed and the diamonds separated in a water-and-sand medium.
Topsoil	The layer of soil covering the earth which- (a) provides a suitable environment for the germination of seed; (b) allows the penetration of water; (c) is a source of micro-organisms, plant nutrients and in some cases seed; and (d) is not of a depth of more than 0,5 metres or such depth as the Minister may prescribe for a specific prospecting or exploration area or mining area.
Trench	A type of excavation usually made by digging in a line towards a mechanical excavator and not pivoting the boom – a large, U-shaped hole in the ground, with vertical sides and about 6 – 8 metres in length. Also a prospecting trench.
Vegetation	Any and all forms of plants, see also Fauna
DWAF	The Department of Water Affairs and Forestry – both national office and their various regional offices, which are divided across the country on the basis of water catchment areas.
MPRDA	the Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002)
EMPlan	An Environmental Management Plan as contemplated in Regulation 52 of the Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002) – this document.

A.8 EXECUTIVE SUMMARY

The international bid to construct the Square Kilometre Array (hereafter SKA) radio telescope is between South Africa and Australia. SKA SA is a business unit of the National Research Foundation (hereafter NRF). The proposed core site in South Africa for the SKA is in the Karoo, approximately 78 km north from the town of Carnarvon in the Northern Cape.

As a pathfinder to the SKA, the MeerKAT (Karoo Array Telescope) telescope and associated infrastructure must be built. This is already underway. In February 2009, an Environmental Impact Assessment (hereafter EIA) was conducted and submitted to the Northern Cape Department of Tourism, Environment and Conservation. In July 2009 a positive Record of Decision (hereafter RoD) was granted for the MeerKAT construction.

To complete the MeerKAT antenna foundations and associated infrastructure, gravel material will be required for the construction of internal gravel roads to the MeerKAT site and dishes.

This Environmental Management Plan (hereafter EMP) forms part of the mining permit application to mine a gravel quarry to obtain material as described above. A closure plan will only be submitted after the operational phase has commenced.

A detailed environmental aspect and impact register has been developed to identify all the potential environmental impacts of the operations. The identified impacts were rated and the most significant aspects were identified. Based on the rating, mitigation measures were proposed to address the specific environmental aspects. Rehabilitation will be an ongoing process and will take place concurrent with mining.

PROJECT DESCRIPTION

Main Components of the Mine

Mining of a borrow pit for granular (alluvial) materials will be by means of dozing and /or excavating after the securing of the particular area /perimeter. The product will be transported with trucks to the site.

The contractor will erect a contractor's camp with suitable housing and washing facilities. Contractor's formal site camps will be located at Losberg and Mey's Dam.

Main Impacts

The main impacts identified are as follow:

- Removal of resources;
- Change in topography due to ground depression;
- Loss of topsoil;
- Soil, surface water and groundwater contamination due to various mining activities;
- Change in surface water quantity;
- Dust and noise from mining activities;
- Disturbance of archaeological features (only in certain area as to be discussed in the EMP);
- Damage to roads; and
- Establishment of alien vegetation.

Main Mitigation Measures

The following is a summary of the main mitigation measures:

- Topsoil stripping and replacement;
- Erosion control;
- Prevention of soil, surface water and groundwater contamination;
- Prevention of soils compaction;
- Management of stormwater flow;
- Conservation of biodiversity and control of invader species;
- Management of air quality including noise;
- Management of all waste;
- Management of hazardous substances; and
- Overall management of safety.

Summary of Environmental Background

- The gravel quarry is located on a flood plain and consists of a horizon of fine calcified quartzite gravels and calcrete, underlain by mudstone and shale gravel.
- The topography of the area is generally flat.
- Saline soils occur in relatively deep deposits on the site. Soils are moderately susceptible to wind erosion and have a moderate potential for water erosion.

- The site has a very low agricultural potential.
- The site has been used for some type of grazing in the past and has been significantly disturbed due to intensive sheep grazing activities.
- The site was previously used to obtain gravel material.
- Invader plants such as *Tribulus terrestris* are dominant.
- There are no drainage lines that cross the site and as a result no wetlands are present.
- The result of the phase one heritage survey indicated that no sites of archaeological or cultural interests are located on this site

Summary of Public Participation

A comprehensive public participation process (PPP) was undertaken as part of the project. The PPP was undertaken according to the MPRDA Regulations. Refer to Annexure 2 for a description of the PPP as well as proof and copies of the site notices, newspaper notices and public meetings. An inquiry has been made to the Department of Rural Development and Land Reform regarding any land claims on the site. According to the Department of Rural Development and Land Reform "no claims lodged on the mentioned property". A copy of the letter is included in Annexure 7.

Conclusion and Recommendations

The proposed site is not considered to be sensitive. The proposed activities will not impact significantly on the biodiversity pattern at neither the community or at an ecosystem level at the proposed site. No fatal flaws were identified at the proposed site. It is recommended that the application for a mining permit be approved.

Figure 1: Site Layout Plan – Refer to Addendum 1

B. BIOGRAPHIC DETAILS OF THE APPLICANT:

B 1.1 Full name (and surname) of person or company applying for permit or right	National Research Foundation (SKA SA)
B 1.2 ID number of person or company/ CC registration number	There is no registration number for the SKA SA. The SKA falls under the NRF and the NRF Act applies
B 1.3 Postal address	P.O. Box 522940 Saxonwold Johannesburg 2132
B 1.4 Physical/ residential address	17 Baker Street Rosebank Johannesburg
B 1.5 Applicant's telephone number	011 442 2434
B 1.6 Applicant's cellular phone number	Not applicable
B 1.7 Alternative contact's name	Dawie Fourie
B 1.8 Alternative contact's telephone/cell phone numbers	082 926 1875
B 2.1 Full name of the property on which mining/ prospecting operations will be conducted	The Farm Mey's Dam Nr 68
B 2.2 Name of the subdivision	Not applicable – No subdivision
B 2.3 Approximate centre of prospecting area: Latitude	30.69013555° S
Longitude	21.48434888° E
B 2.4 Magisterial district	Pixley Ka Seme District Municipality
B 2.5 Name of the registered owner of the property	National Research Foundation (SKA SA)
B 2.6 His/her Telephone number	011 442 2434

B 2.7 His/ her Postal address	P.O. Box 522940 Saxonwold Johannesburg 2132
B 2.8 Current uses of surrounding areas.	
Pre-mining land use is vacant or unspecified. The whole Gravel Quarry 4 has already been disturbed by quarry activity. There are also no existing structures on site.	
B 2.9 Are there any other existing land uses that impact on the environment in the proposed prospecting area?	
Stock and game farming in the area leads to overgrazing which impacts on the environment.	
B 2.10 What is the name of the nearest town?	
Van Wyksvlei	

B3(1) Description of prospecting operation

Mining of borrow pits for granular (alluvial) materials will be by means of dozing and /or excavating after the securing of the particular area /perimeter. Dozers will load the material into haul trucks. No blasting will take place.

The product will be transported with trucks to the site of use. The quarry is next to the main gravel road and as a result no additional roads will be needed.

B3(2) Description of topographical and environmental features likely to be impacted upon.
Refer to **Annexure 5** for a complete description of the environmental features likely to be impacted upon.

C. ENVIRONMENTAL IMPACT ASSESSMENT:

The information provided in this section will enable officials to determine how serious the impact of

DESCRIBE THE ENVIRONMENT THAT WILL BE AFFECTED BY THE PROPOSED PROSPECTING/MINING OPERATIONS UNDER THE FOLLOWING HEADINGS:

C 1.1 What does the landscape surrounding the proposed operation look like? (Open veldt/ valley/ flowing landscape/ steep slopes)
The quarry lies mainly in the general area that supports Bushmanland Basin Shrubland, according to the new vegetation map of South Africa (Mucina & Rutherford 2003).
C 1.2 Describe the type of soil found on the surface of the site
The soil type is classified as SC, strongly saline soils generally occurring in relatively deep deposits in low lying arid areas, especially at this quarry. The soil has a low to moderate water holding capacity with abrupt textural transitions transparent. The soils have loamy sands dominant and therefore are moderately susceptible to wind erosion. The soil of the site has a clay content of approximately 15% to 35% clays. This site has no swelling clays. These soils have no favourable structure for arable land. This quarry has soils with a low to moderate potential for water erosion. These soils do not have poor drainage constraints, and have no beneficial water retaining zones for plant roots. The organic carbon content is very low with pH as high as 8.4. Soils are not susceptible for acidification and have a calcareous leaching status.

	VALUE	TICK	OFFICE USE
C 1.3 How deep is the topsoil?	0 – 300mm	X	8
	300 – 600mm		4
	600mm +		2

C 1.4 What *plants, trees and grasses* grow naturally in the area around the site?
This gravel quarry has already been disturbed by quarry activity and very few indigenous vegetation species are present on site. Invader plants such as *Tribulus terrestris* are dominant.
C 1.5 What *animals* naturally occur in the area?

Amphibians and Reptiles:

Approximately 38 reptile and 8 amphibian species are likely to inhabit the area. The following reptiles were observed on site during the site survey:

- *Trachylepis capensis* (Cape Skink); and
- *Trachylepis varia* (Variable Skink).

The only Red Listed reptile species which may occur within the study area is the Fisk's House Snake (*Lamprophis fiskii*); the IUCN (2001) lists this species as Vulnerable. Very little is known of the habitat requirements of this species and as a result it cannot be confirmed that the species is likely to occur within the study area.

No amphibian species were observed during the surveys. No Red Listed amphibian species are known to occur in the area of the site.

Mammals:

Several mammal species are supported in the Nama Karoo. The big mammal species however were replaced with sheep. Introduced Springbok and Kudu are the largest mammal species occurring within the area. Some 46 mammal species are known to occur in the bigger area (Smithers 1983). The following mammal species were observed on site during the survey:

- *Hystrix africaeaustralis* (Porcupine spoor);
- *Raphicerus campestris* (Steenbok); and
- *Caracal caracal* (Caracal spoor).

Various small borrowing pits were observed within the study area indicating rodent populations.

Bird:

189 bird species are known to occur in the bigger area (Hockey *et al,* 2006). The following species were observed during the survey within the study area:

- *Alopochen aegyptiaca;*
- *Buteo rufofuscus;*
- *Corvus albus;*
- *Oena capensis;*
- *Philetairus socius;*
- *Ardea cinerea;*
- *Columba guinea;*
- *Elanus caeruleus;*
- *Falco tinnunculus;*
- *Pterocles namaqua;*
- *Upupa Africana;*
- *Mirafra albescens;*
- *Hirundo rustica;*

- *Corvus capensis;*
- *Cercomela schlegelii; and*
- *Teylophorus eylonus.*

Other animals:

Insect species observed during the survey includes:

- *Anax imperator* (Blue Emperor);
- *Ischnura senegalensis* (March Blue tail);
- *Locustana pardalina* (Brown Locust);
- *Empusa guttula* (Cone-headed Mantid);
- *Rhachitopis* sp;
- *Oedaleus* sp (Yellow Wings);
- *Quintilia* sp (Karoo cicadas);
- *Julodis cirrosa* (Brush Jewel Beetle);
- *Mylabris oculata* (CMR Bean Beetle);
- *Eurychora* sp (Mouldy Beetles);
- *Danaus chrysippus* (African Monarch);
- *Junonia hierta* (Yellow Pansy);
- *Messor capensis* (Harvester Ant);
- *Camponotus fulvopilosus* (Bal-byter); and
- *Arachnid* spp.

	VALUE	TICK	OFFICE USE
C 1.6 Are there any *protected areas* (game parks/nature reserves, monuments, etc) close to the proposed operation?	Yes		4
	No	X	0

C 1.7 What mineral are you going to prospect for?

Calcrete and Mudstone

C 1.8 Describe the type of equipment that will be used:

Mining of borrow pits for granular (alluvial) materials will be by means of dozing and /or excavating after the securing of the particular area /perimeter. Dozers will load the material into haul trucks. No blasting will take place.

C.2 HOW WILL THE PROPOSED OPERATION IMPACT ON THE *NATURAL* ENVIRONMENT? (REGULATION 52(2)(b)) .

A table identifying the impact and proposed mitigation has been compiled and is reflected in section 6.7 and 6.8 below.			
ENVIRONMENTAL ELEMENT/ IMPACTOR			
	VALUE	TICK	OFFICE USE
C 2.1 What will the ultimate depth of the proposed prospecting operations be?	0 – 5m	X	2
	6 – 10m		4
	10 – 25m		8
	25m +		10
C 2.2 How large will the *total* area of all excavations be?	1.304		ha
	VALUE	TICK	OFFICE USE
C 2.3 How large will each excavation be before it is filled up?	<10 X 10m		2
	<20 X 20m		4
	>20 X 20m	X	8
C 2.4 How many *prospecting* boreholes or trenches will there be?			
Not applicable			
	VALUE	TICK	OFFICE USE
C 2.5 Will employees prepare food on the site?	Yes		4
Food will be prepared at the contractor's camp	No	X	0
	VALUE	TICK	OFFICE USE
C 2.6 Will water be extracted from a river, stream, dam or pan for use by the proposed operation?	Yes		4
	No	X	2
C 2.7 If so, what is the name of this water body?			
NOT APPLICABLE			
C 2.8 If water will not be extracted from an open surface source, where will it be obtained?			
The mining activities will not use water. Water will be transported and stored at the quarry sites for drinking. This water will be received from the contractor's site camp at Losberg.			
	VALUE	TICK	OFFICE USE
C 2.9 How much water per day will the *mineral processing* operation require?	1 000 – 10 000 L		2
Not applicable, no mineral processing taking place.	20 000 – 40 000 L		3
	40 000 –		5

	60 000 L		
	60 000 – 100 000L		8
	More		10
	VALUE	TICK	OFFICE USE
C 2.10 How far is the proposed operation from open water (dam, river, pan, lake)?	0 – 15m		8
	16 – 30m		6
	31 – 60m		4
	More than 60 metres	X	2
C 2.11 What is the estimate depth of the water table/ borehole?	12 - 20		Metres
C 2.12 How much water per day will the proposed operation utilize for employees?	5 000		Litres
	VALUE	TICK	OFFICE USE
C 2.13 What toilet facilities will be made available to workers?	None		8
	Pit latrine (longdrop)		4
	Chemical toilet	X	2
	VALUE	TICK	OFFICE USE
C 2.14 Would it be necessary to construct roads to access the proposed operations?	Yes	X	4
	No		0
	VALUE	TICK	OFFICE USE
C 2.15 How long will these access road(s) be (from a public road to the proposed operations)	0 – 0,5 km	X	4
	0,6 – 1,5 km		2
	1,6 – 3 km		4
	VALUE	TICK	OFFICE USE
C 2.16 Will trees be uprooted to construct these access road(s)?	Yes		4
	No	X	0
	VALUE	TICK	OFFICE USE
C 2.17 Will any foreign material, like crushed stone, limestone, or any material other than the naturally occurring	Yes		4

topsoil be placed on the road surface?			
	No	X	0
C.3 TIME FACTOR			
	VALUE	**TICK**	**OFFICE USE**
C 3.1 For what time period will prospecting operations be conducted on this particular site?	0 – 6 months		2
This is application for a mining permit.	6 – 12 months		4
	12 – 18 months		6
	18 – 24 months		8
	>24 months		10
C.4 HOW WILL THE PROPOSED OPERATION IMPACT ON THE *SOCIO-ECONOMIC ENVIRONMENT*? (REGULATION 52(2)(b))			
ELEMENT/ IMPACTOR	**VALUE**	**TICK**	**OFFICE USE**
C 4.1 How many people will be employed?	5		
C 4.2 How many men?	4		
C 4.3 How many women?			
	1		
C 4.4 Where will employees be obtained? (Own or employed from local communities?)	Own	X	2
	Local	X	4
C 4.5 How many hours per day will employees work?	Sunrise→ Sunset	X	4
	Less		2
	More		8
	VALUE	**TICK**	**OFFICE USE**
C 4.6 Will operations be conducted within 1 kilometre from a residential area	Yes		6
A farmhouse is nearby; however, this belongs to SKA SA and will be used as offices and NOT for residential use.	No	X	1
	VALUE	**TICK**	**OFFICE USE**

C 4.7 How far will the proposed operation be from the nearest fence/windmill/house/dam/built structure?	0 – 50 metres		8
	51 – 100 metres	X	4
	150 or more metres		2
C.5 HOW WILL THE PROPOSED OPERATION IMPACT ON THE *CULTURAL HERITAGE* OF THE SURROUNDING ENVIRONMENT? REGULATION 52(2)(b)			
ELEMENT/ IMPACTOR	**VALUE**	**TICK**	**OFFICE USE**
C 5.1 Are there any graveyards or old houses or sites of historic significance within 1 kilometre of the area?	Yes		8
	No	X	0

C.6 SPECIFIC REGULATORY REQUIREMENTS

C.6.1 Air quality Management and Control (Regulation 64)
Describe how the operation will impact on the quality of the air, taking into account predominant wind direction and other affected parties in the downwind zone:

Dust may be generated during the removal of topsoil and dozing or excavation of gravel from the Gravel Quarries. Only one farmhouse is near these gravel quarries. This farmhouse has been bought by the SKA SA. The impact will be limited to the close proximity of the gravel quarries.

C.6.2 Fire Prevention (Regulation 65)
Applicants for permits, rights or permissions **involving coal or bituminous rock** must:

- **Indicate on a plan** where the coal or rock discard dump will be located
  (If applied for a permit to mine or prospect for coal or bituminous rock, indicate the exact location of the discard dump on the plan and write" EMPlan C6.2" next to it)

Not applicable

C.6.3 Noise control (Regulation 66)
Indicate how much noise the operation will generate, and how it will impact on the surrounding environment, who might be influenced by noise from your operation.

The mining activities will utilise diesel-powered earthmoving and mining equipment. Noise emissions from these sources would lead to an elevation in ambient noise levels in the area. Only one farmhouse is near these gravel quarries. This farmhouse has been bought by the SKA SA. Impact of noise is thus deemed to be insignificant.

C.6.4 Blasting, vibration and shock (Regulation 67)
Please indicate whether any blasting operations will be conducted.

Blasting: ~~Yes/ No~~	**How often?**
Not applicable	

C.6.5 Disposal of waste material (Regulation 69) Indicate on your plan where waste will be dumped in relation to the beneficiation works/ washing pans Also indicate below how domestic waste material will be managed.
No beneficiation works or washing will take place. Domestic waste and / or general waste will be generated and contained in skips or bins.
C.6.6 Soil pollution and erosion control (Regulation 70) 6.6.1 Indicate how topsoil will be handled on the area.
All topsoil will be removed where the gravel quarries are situated. Note that these soils are not favourable for agricultural activities.
6.6.2 Describe how spills of oil, grease, diesel, acid or hydraulic fluid will be dealt with.
The pollution of soil due to mining activities includes spillages / leakages of lubricants during operation of vehicles, dozers and other mining equipment. The volumes that could spill will not be more than 50 l which will be contained to a specific area.
6.6.3 Briefly describe the storage facilities available for the above fluids:
All chemical and hazardous substances will be stored in a sealed and lockable container.

Section 6.7 and 6.8:

The following tables provides for the identification of potential and actual environmental impacts related to the proposed mining activities as well as the proposed mitigation measures to prevent the potential impacts from occurring. Refer to Annexure 3 for the mitigation measures. These measures are referred to in the tables below.

Table 1: Risk Assessment and Mitigation for Operational Phase

SECTION	ACTIVITY	ASPECT	IMPACT DESCRIPTION	ASSESSMENT PRE-MITIGATION					MITIGATION	TIMEFRAMES	ASSESSMENT POST-MITIGATION				
				EXTENT	DURATION	PROBABILITY	SEVERITY	SIGNIFICANCE			EXTENT	DURATION	PROBABILITY	SEVERITY	SIGNIFICANCE
Mining Activities	Mining of resource	Geology	Removal of material	Site	Long term	Definitely	Very low	Moderate	No mitigation is necessary. The changes in geology will not have significant negative impacts on the health and welfare of people, the well-being of surrounding plant and animal communities and the condition of other natural resources.	During the LoM	Site	Long term	Definitely	Very low	Moderate
		Topography	Depression in topography	Local	Long term	Improbable	Low	Moderate	Refer to **Annexure 3** for Rehabilitation design through topography sloping.	During the LoM	Local	Long term	Improbable	Low	Moderate
		Soil and Surface Water	Contamination	Site	Long term	Probable	Moderate	Moderate	Refer to: **Annexure 3** for Soil Contamination management measures, **Annexure 3** for Surface Water Quality management measures, and **Annexure 3** for Handling and Clean-Up of Spills.	During the LoM	Site	Long term	Improbable	Low	Low
		Surface water	Sedimentation of surface water	Local	Long term	Probable	Moderate	Moderate	Refer to **Annexure 3** for Stormwater control measures.	During LoM until rehabilitation finished	Local	Long term	Improbable	Low	Low
			Change in quantity	Local	Long term	Improbable	Very low	Low	During mining no surface watercourses are disturbed. Overland flow will not be significant for the area to be disturbed.	During LoM	Local	Long term	Improbable	Very low	Low

SECTION	ACTIVITY	ASPECT	IMPACT DESCRIPTION	ASSESSMENT PRE-MITIGATION					MITIGATION	TIMEFRAMES	ASSESSMENT POST-MITIGATION				
				EXTENT	DURATION	PROBABILITY	SEVERITY	SIGNIFICANCE			EXTENT	DURATION	PROBABILITY	SEVERITY	SIGNIFICANCE
			Disturbance of water course	Local	Long term	Improbable	Very low	Low	During mining no surface watercourses are disturbed.	During LoM	Local	Long term	Improbable	Very low	Low
		Air Quality	Dust and emissions	Local	Long term	Probable	Low	Moderate	Refer to **Annexure 3** for air quality management measures.	During LoM	Local	Long term	Improbable	Very low	Low
		Noise	Disturbance of neighbouring residents	Local	Long term	Probable	Low	Moderate	Refer to **Annexure 3** for Noise management measures.	During LoM	Local	Long term	Improbable	Very low	Low
		Sites of Archaeological and Cultural Interests	Disturbance of sites	Local	Long term	Probable	Low	Moderate	No sites were observed.	During LoM	Local	Long term	Improbable	Very low	Low
		Regional Socio-Economic	Safety hazard to workers	Local	Long term	Probable	High	Moderate	The contractor must adhere to all Mine Health and Safety requirements.	During the LoM	Local	Long term	Improbable	Low	Low
	Removal of topsoil	Soil	Loss of topsoil	Site	Long term	Probable	Moderate	Moderate	Refer to **Annexure 3**for Topsoil stripping and replacement	During the LoM	Site	Long term	Improbable	Low	Low
			Soil erosion	Site	Long term	Probable	Moderate	Moderate	Refer to **Annexure 3** for erosion control measures.	During the LoM	Local	Long term	Probable	Very low	Moderate

SECTION	ACTIVITY	ASPECT	IMPACT DESCRIPTION	ASSESSMENT PRE-MITIGATION					MITIGATION	TIMEFRAMES	ASSESSMENT POST-MITIGATION				
				EXTENT	DURATION	PROBABILITY	SEVERITY	SIGNIFICANCE			EXTENT	DURATION	PROBABILITY	SEVERITY	SIGNIFICANCE
Mining Activities	Removal of topsoil	Soil	Soil sterilisation	Site	Long term	Probable	Moderate	Moderate	Refer to **Annexure 3**for Topsoil stripping and replacement	During the LoM	Site	Long term	Improbable	Low	Low
		Land capability	Loss of agricultural potential	Site	Permanent	Probable	Moderate	Moderate	Concurrent and final rehabilitation must take place. The end land use to keep in mind is to restore the area.	During LoM until rehabilitation finished	Site	Permanent	Improbable	Very low	Low
		Natural vegetation	Loss of biodiversity and ecological function	Site	Long term	Probable	Moderate	Moderate	Refer to **Annexure 3** for biodiversity and ecological management measures.	During the LoM	Local	Long term	Improbable	Low	Low
			Invasive or exotic plants	Site	Long term	Probable	Moderate	Moderate	Refer to **Annexure 3** for invader control measures.	During the LoM	Local	Long term	Improbable	Low	Low
		Animal life	Loss of biodiversity and ecological function	Site	Long term	Probable	Moderate	Moderate	Refer to **Annexure 3** for biodiversity and ecological management measures.	During the LoM	Local	Long term	Improbable	Low	Low
Transport and Conveyance	Constructed roads	Soils	Erosion due to removed vegetation cover	Site	Long term	Probable	Moderate	Moderate	Refer to **Annexure 3** for erosion control measures.	During the LoM	Local	Long term	Probable	Very low	Moderate
	Road transportation	Soils and Surface Water	Soil and surface water contamination by spills	Site	Long term	Probable	Moderate	Moderate	Refer to: **Annexure 3** for Soil Contamination management measures, **Annexure 3** for Surface Water Quality management measures, and **Annexure 3**for Handling and Clean-Up of Spills.	During the LoM	Site	Long term	Improbable	Low	Low

SECTION	ACTIVITY	ASPECT	IMPACT DESCRIPTION	ASSESSMENT PRE-MITIGATION					MITIGATION	TIMEFRAMES	ASSESSMENT POST-MITIGATION				
				EXTENT	DURATION	PROBABILITY	SEVERITY	SIGNIFICANCE			EXTENT	DURATION	PROBABILITY	SEVERITY	SIGNIFICANCE
		Soils	Soil compaction due to vehicles	Site	Long term	Probable	Low	Moderate	Refer to **Annexure 3** for Soil Compaction prevention measures.	During the LoM	Site	Long term	Improbable	Low	Low
		Land Use	Road disturbances and mine traffic	Local	Long term	Probable	Low	Moderate	Mine traffic will be regulated.	During the LoM	Site	Long term	Improbable	Low	Low
		Natural Vegetation	Damage due to off road driving	Site	Long term	Probable	Moderate	Moderate	Refer to **Annexure 3** for biodiversity and ecological management measures, and **Annexure 3** for soil compaction management measures.	During the LoM	Local	Long term	Improbable	Low	Low
Transport and Conveyance	Road transportation	Air Quality	Dust generation and emissions	Local	Long term	Probable	Low	Moderate	Refer to **Annexure 3** for air quality management measures.	During LoM	Local	Long term	Improbable	Very low	Low
		Noise	Disturbance of neighbouring residents	Local	Long term	Probable	Low	Moderate	Refer to **Annexure 3** for Noise management measures.	During LoM	Local	Long term	Improbable	Very low	Low

SECTION	ACTIVITY	ASPECT	IMPACT DESCRIPTION	ASSESSMENT PRE-MITIGATION					MITIGATION	TIMEFRAMES	ASSESSMENT POST-MITIGATION				
				EXTENT	DURATION	PROBABILITY	SEVERITY	SIGNIFICANCE			EXTENT	DURATION	PROBABILITY	SEVERITY	SIGNIFICANCE
		Regional socio-economic	Road damage	Local	Long term	Improbable	Very low	Low	Mine traffic will be regulated.	During the LoM	Site	Long term	Improbable	Low	Low
			Safety on roads	Local	Long term	Probable	Moderate	Moderate	Refer to **Annexure 3** for Operational Safety Measures.	During the LoM	Local	Long term	Improbable	Very low	Low
Waste Management Facilities – General and Hazardous Waste	Disposal of waste	Soils, Surface Water and Groundwater	Soil, surface water and groundwater contamination due to incorrect placement of waste	Site	Long term	Probable	Moderate	Moderate	Refer to: **Annexure 3** for Soil Contamination management measures, **Annexure 3** for Surface Water Quality management measures, and **Annexure 3** for Handling and Clean-Up of Spills.	During the LoM	Site	Long term	Improbable	Low	Low
		Visual Aspect	Visual intrusion if incorrect dispose	Site	Long term	Probable	Moderate	Moderate	Refer to **Annexure 3** for Waste Management Measures.	During the LoM	Site	Long term	Improbable	Low	Low
		Regional Socio-Economic	Fire hazard	Local	Lon term	Probable	High	Moderate	Refer to **Annexure 3** for Fire management measures.	During LoM	Local	Long term	Improbable	Low	Low
	General		Resource Consumption	Site	Long term	Probable	Moderate	Moderate	Refer to **Annexure 3** for Inventory and Separation of Waste.	During the LoM	Site	Long term	Improbable	Low	Low

SECTION	ACTIVITY	ASPECT	IMPACT DESCRIPTION	ASSESSMENT PRE-MITIGATION					MITIGATION	TIMEFRAMES	ASSESSMENT POST-MITIGATION				
				EXTENT	DURATION	PROBABILITY	SEVERITY	SIGNIFICANCE			EXTENT	DURATION	PROBABILITY	SEVERITY	SIGNIFICANCE
Water and Effluent Management	Sanitary facilities	Soils, Surface Water and Groundwater	Soil, surface water and groundwater contamination by spills	Site	Long term	Probable	Moderate	Moderate	Refer to: **Annexure 3** for Soil Contamination management measures, **Annexure 3** for Surface Water Quality management measures **Annexure 3** for Sewerage management measures, **Annexure 3** for Compliance with GN 704 Regulations; and **Annexure 3** for Handling and Clean-Up of Spills.	During the LoM	Site	Long term	Improbable	Low	Low
Chemical and Hazardous Substances Management	Operation of chemical and hazardous substances management facilities	Soils, Surface Water and Groundwater	Soil, surface water and groundwater contamination by spills	Site	Long term	Probable	Moderate	Moderate	Refer to: **Annexure 3** for Soil Contamination management measures, **Annexure 3** for Surface Water Quality management measures, **Annexure 3** for the Handling and Storage of Hazardous Substances, **Annexure 3** for Bund Wall Specifics management measures, **Annexure 3** for Maintenance of Machinery management measures, and **Annexure 3** for Handling and Clean-Up of Spills.	During the LoM	Site	Long term	Improbable	Low	Low
Chemical and Hazardous Substances Management	Operation of chemical and hazardous substances management facilities	Air Quality	Fire Hazard	Local	Lon term	Probable	Moderate	Moderate	Refer to **Annexure 3** for Fire management measures.	During LoM	Local	Long term	Improbable	Low	Low
		Regional Socio-Economic		Local	Lon term	Probable	High	Moderate		During LoM	Local	Long term	Improbable	Low	Low

SECTION	ACTIVITY	ASPECT	IMPACT DESCRIPTION	ASSESSMENT PRE-MITIGATION					MITIGATION	TIMEFRAMES	ASSESSMENT POST-MITIGATION				
				EXTENT	DURATION	PROBABILITY	SEVERITY	SIGNIFICANCE			EXTENT	DURATION	PROBABILITY	SEVERITY	SIGNIFICANCE
	Vehicular activity	Soils	Soil Compaction	Site	Long term	Probable	Low	Moderate	Refer to **Annexure 3** for Soil Compaction prevention measures.	During the LoM	Site	Long term	Improbable	Low	Low
		Vegetation	Damage to vegetation	Site	Long term	Probable	Moderate	Moderate	Refer to **Annexure 3** for biodiversity and ecological management measures, and **Annexure 3** for soil compaction management measures.	During the LoM	Local	Long term	Improbable	Low	Low
Maintenance Facilities	Operation of maintenance facilities	Soils and Surface Water	Soil and surface water contamination by spills	Site	Long term	Probable	Moderate	Moderate	Refer to: **Annexure 3** for Soil Contamination management measures, **Annexure 3** for Surface Water Quality management measures, **Annexure 3** for the Handling and Storage of Hazardous Substances, **Annexure 3** for Refuelling of Vehicles management measures, **Annexure 3** for Bund Wall Specifics management measures, **Annexure 3** for Maintenance of Machinery management measures, and **Annexure 3** for Handling and Clean-Up of Spills.	During the LoM	Site	Long term	Improbable	Low	Low
Run on Mine and Product Stockpile	Construction of run of mine and product stockpile	Soil	Loss of topsoil	Site	Long term	Probable	Moderate	Moderate	Refer to **Annexure 3**for Topsoil stripping and replacement	During the LoM	Site	Long term	Improbable	Low	Low
			Soil compaction	Site	Long term	Probable	Low	Moderate	Refer to **Annexure 3** for Soil Compaction prevention measures.	During the LoM	Site	Long term	Improbable	Low	Low

SECTION	ACTIVITY	ASPECT	IMPACT DESCRIPTION	ASSESSMENT PRE-MITIGATION					MITIGATION	TIMEFRAMES	ASSESSMENT POST-MITIGATION				
				EXTENT	DURATION	PROBABILITY	SEVERITY	SIGNIFICANCE			EXTENT	DURATION	PROBABILITY	SEVERITY	SIGNIFICANCE
		Natural Vegetation	Damage and loss of natural vegetation	Site	Long term	Probable	Moderate	Moderate	Refer to **Annexure 3** for biodiversity and ecological management measures.	During the LoM	Local	Long term	Improbable	Low	Low
Run on Mine and Product Stockpile	Construction of run of mine and product stockpile	Natural Vegetation	Invasive and exotic plants	Site	Long term	Probable	Moderate	Moderate	Refer to **Annexure 3** for invader control measures.	During the LoM	Local	Long term	Improbable	Low	Low
			Sedimentation of surface water	Local	Long term	Probable	Moderate	Moderate	Refer to **Annexure 3** for Stormwater control measures.	During LoM until rehabilitation finished	Local	Long term	Improbable	Low	Low
		Air Quality	Dust generation	Local	Long term	Probable	Low	Moderate	Refer to **Annexure 3** for air quality management measures.	During LoM	Local	Long term	Improbable	Very low	Low
Run on Mine and Product Stockpile	Construction of run of mine and product stockpile	Visual Aspects	Visual intrusion	Site	Long term	Probable	Low	Low	The run of mine and product stockpile will be removed at end of mine life.	During the LoM	Site	Long term	Probable	Low	Low

SECTION	ACTIVITY	ASPECT	IMPACT DESCRIPTION	ASSESSMENT PRE-MITIGATION					MITIGATION	TIMEFRAMES	ASSESSMENT POST-MITIGATION				
				EXTENT	DURATION	PROBABILITY	SEVERITY	SIGNIFICANCE			EXTENT	DURATION	PROBABILITY	SEVERITY	SIGNIFICANCE
Administration and other Buildings	Operation of contractor's camp	Soils, Surface Water and Groundwater	Soil, surface water and groundwater contamination by spills	Site	Long term	Probable	Moderate	Moderate	Refer to: **Annexure 3** for Soil Contamination management measures, **Annexure 3** for Surface Water Quality management measures, and **Annexure 3** for Handling and Clean-Up of Spills.	During the LoM	Site	Long term	Improbable	Low	Low
		Soil	Soil erosion	Site	Long term	Probable	Moderate	Moderate	Refer to **Annexure 3** for erosion control measures.	During the LoM	Local	Long term	Probable	Very low	Moderate
		Natural Vegetation	Damage and loss of natural vegetation	Site	Long term	Probable	Moderate	Moderate	Refer to **Annexure 3** for biodiversity and ecological management measures.	During the LoM	Local	Long term	Improbable	Low	Low
		Visual Aspects	Visual intrusion	Site	Long term	Probable	Low	Low	All buildings will be removed at end of mine life	During the LoM	Site	Long term	Probable	Low	Low
Contractor Facilities	Operation of contractor facilities	Soils and Surface water	Soils and surface water contamination by spills	Site	Long term	Probable	Moderate	Moderate	Refer to: **Annexure 3** for Soil Contamination management measures, **Annexure 3** for Surface Water Quality management measures, and **Annexure 3**for Handling and Clean-Up of Spills.	During the LoM	Site	Long term	Improbable	Low	Low
General	Alien Invasive Plants removal	Soils	Loss of soil	Site	Long term	Probable	Moderate	Moderate	Refer to **Annexure 3**for Topsoil stripping and replacement	During the LoM	Site	Long term	Improbable	Low	Low

SECTION	ACTIVITY	ASPECT	IMPACT DESCRIPTION	ASSESSMENT PRE-MITIGATION					MITIGATION	TIMEFRAMES	ASSESSMENT POST-MITIGATION				
				EXTENT	DURATION	PROBABILITY	SEVERITY	SIGNIFICANCE			EXTENT	DURATION	PROBABILITY	SEVERITY	SIGNIFICANCE
			Soil erosion	Site	Long term	Probable	Moderate	Moderate	Refer to **Annexure 3** for erosion control measures.	During the LoM	Local	Long term	Probable	Very low	Moderate
	Alien Invasive Plants removal	Soils and Surface water	Soils and surface water contamination by spills	Site	Long term	Probable	Moderate	Moderate	Refer to: **Annexure 3** for Soil Contamination management measures, **Annexure 3** for Surface Water Quality management measures, and **Annexure 3**for Invader control.	During the LoM	Site	Long term	Improbable	Low	Low

Table 2: Risk Assessment and Mitigation for Decommissioning Phase

SECTION	ACTIVITY	ASPECT	IMPACT DESCRIPTION	ASSESSMENT PRE-MITIGATION					MITIGATION	TIMEFRAMES	ASSESSMENT POST-MITIGATION				
				EXTENT	DURATION	PROBABILITY	SEVERITY	SIGNIFICANCE			EXTENT	DURATION	PROBABILITY	SEVERITY	SIGNIFICANCE
Sloping of Area and Ripping of Roads	Sloping of Area	Topography	Slope Angles and Drainage	Site	Permanent	Probable	Moderate	Moderate	Refer to **Annexure 3** for slope angles and drainage design measures	During and after decommissioning	Site	Permanent	Improbable	Low	Low
		Soils	Sloping using Topsoil	Local	Permanent	Probable	High	High	See **Annexure 3** for slope techniques.	During and after decommissioning	Local	Permanent	Improbable	High	Low
		Land Capability	Sloping without Considering Final Land Capability	Local	Permanent	Probable	High	High	See **Annexure 3** for slope angles and drainage design measure	During and after decommissioning	Local	Permanent	Improbable	Very low	Low
		Land Use	Sloping without Considering Final Land Use	Local	Permanent	Probable	High	High		During and after decommissioning	Local	Permanent	Improbable	Very low	Low
	Vehicles and machinery	Soils	Soil Contamination	Site	Long term	Probable	Moderate	Moderate	Refer to **Annexure 3** for soil measures as well as **Annexure 3** for hazardous substances measures.	During LoM until rehabilitation finished	Site	Long term	Improbable	Low	Low

SECTION	ACTIVITY	ASPECT	IMPACT DESCRIPTION	ASSESSMENT PRE-MITIGATION					MITIGATION	TIMEFRAMES	ASSESSMENT POST-MITIGATION				
				EXTENT	DURATION	PROBABILITY	SEVERITY	SIGNIFICANCE			EXTENT	DURATION	PROBABILITY	SEVERITY	SIGNIFICANCE
		Surface Water	Water Contamination	Site	Long term	Probable	Moderate	Moderate	Refer to **Annexure 3** for water measures	During LoM until rehabilitation finished	Site	Long term	Improbable	Low	Low
		Air Quality	Dust and Emissions	Local	Long term	Probable	Low	Moderate	Refer to **Annexure 3** for air and noise measures	During LoM	Local	Long term	Improbable	Very low	Low
		Noise	Disturbance to Neighbouring Residents	Local	Long term	Probable	Low	Moderate		During LoM	Local	Long term	Improbable	Very low	Low
Infrastructure Waste, Tyres and Old Fencing Removal	Infrastructure Removal	Topography	Removal of Infrastructure	Site	Permanent	Definitely	Positive high	Positive high	See **Annexure 3** for infrastructure removal measures.	During and after decommissioning	Site	Permanent	Definitely	Positive high	Positive high
		Surface Water	Sedimentation	Local	Permanent	Probable	Moderate	Moderate	Sloping of areas where infrastructure has been removed must take place as soon as possible.	During and after decommissioning	Local	Permanent	Improbable	Very low	Low

SECTION	ACTIVITY	ASPECT	IMPACT DESCRIPTION	ASSESSMENT PRE-MITIGATION					MITIGATION	TIMEFRAMES	ASSESSMENT POST-MITIGATION				
				EXTENT	DURATION	PROBABILITY	SEVERITY	SIGNIFICANCE			EXTENT	DURATION	PROBABILITY	SEVERITY	SIGNIFICANCE
Infrastructure Waste, Tyres and Old Fencing Removal	Waste Removal	Soils	Soil Contamination	Site	Temporary	Probable	Moderate	Low	Soil and surface water pollution can occur from incorrect waste disposal. See **Annexure 3** for waste management. See **Annexure 3** for the handling of spillages.	During decommissioning	Local	Temporary	Improbable	Very low	Very low
	Vehicles and machinery	Soils	Soil Contamination	Site	Long term	Probable	Moderate	Moderate	Refer to **Annexure 3** for soil measures as well as **Annexure 3**for hazardous substances measures.	During LoM until rehabilitation finished	Site	Long term	Improbable	Low	Low
		Surface Water	Water Contamination	Site	Long term	Probable	Moderate	Moderate	Refer to **Annexure 3** for water measures	During LoM until rehabilitation finished	Site	Long term	Improbable	Low	Low
		Air Quality	Dust and Emissions	Local	Long term	Probable	Low	Moderate	Refer to **Annexure 3** air and noise measures	During LoM	Local	Long term	Improbable	Very low	Low
		Noise	Disturbance to Neighbouring Residents	Local	Long term	Probable	Low	Moderate		During LoM	Local	Long term	Improbable	Very low	Low

SECTION	ACTIVITY	ASPECT	IMPACT DESCRIPTION	ASSESSMENT PRE-MITIGATION					MITIGATION	TIMEFRAMES	ASSESSMENT POST-MITIGATION				
				EXTENT	DURATION	PROBABILITY	SEVERITY	SIGNIFICANCE			EXTENT	DURATION	PROBABILITY	SEVERITY	SIGNIFICANCE
Soil Replacement	Replacement	Soils	Soil Compaction	Site	Permanent	Probable	High	Moderate	See **Annexure 3**for soil compaction measures.	During and after decommissioning	Site	Permanent	Improbable	Low	Very low
		Surface Water	Ponding of Water	Local	Medium term	Probable	Moderate	Low	See **Annexure 3** for slope angles and drainage design.	During decommissioning	Local	Medium term	Improbable	Low	Very low
	Vehicles and machinery	Air Quality	Dust and Emissions	Local	Long term	Probable	Low	Moderate	Refer to **Annexure 3** for air and noise measures	During LoM	Local	Long term	Improbable	Very low	Low
	Replaced Soil	Soils	Soil Erosion	Site	Long term	Probable	Moderate	Moderate	Refer to **Annexure 3** for soil erosion measures.	During LoM until rehabilitation finished	Site	Long term	Improbable	Low	Low
		Natural Vegetation	Invasive and Exotic Plants	Site	Permanent	Probable	Moderate	Moderate	See **Annexure 3** for control of invasive and exotic plants.	During and after decommissioning	Site	Permanent	Improbable	Low	Very low
		Surface Water	Sedimentation	Local	Permanent	Probable	Moderate	Moderate	Revegetation of replaced soil area must take place as soon as possible	During and after decommissioning	Local	Permanent	Improbable	Very low	Low

SECTION	ACTIVITY	ASPECT	IMPACT DESCRIPTION	ASSESSMENT PRE-MITIGATION					MITIGATION	TIMEFRAMES	ASSESSMENT POST-MITIGATION				
				EXTENT	DURATION	PROBABILITY	SEVERITY	SIGNIFICANCE			EXTENT	DURATION	PROBABILITY	SEVERITY	SIGNIFICANCE
Vegetation of Areas	Vegetated Areas	Natural Vegetation	Invasive and Exotic Plants	Site	Permanent	Probable	Moderate	Moderate	See **Annexure 3** for control of invasive and exotic plants.	During and after decommissioning	Site	Permanent	Improbable	Low	Very low

C.7 Financial provision: (Regulation 54)

The amount that is necessary for the rehabilitation of damage caused by the operation, both sudden closure during the normal operation of the project and at final, planned closure will be estimated by the regional office of the DME, based on the information supplied in this document. This amount will reflect how much it will cost the Department to rehabilitate the area disturbed in case of liquidation or abscondence. The following calculation has been done:

SKA SA is a semi government organisation. For this reason, it is not envisaged that financial provision would be made available for any rehabilitation purposes. Discussions are underway between the SKA SA and the Department of Minerals to enter into a Memorandum of Understanding regarding this issue. Funding for rehabilitation will form part of the contract with contractors. For a cost breakdown refer to Annexure 4.

Therefore the total for environmental financial provision is:

Refer to Annexure 4

What method will be used to furnish DME with this financial provision?

Cash deposit	
Bank guarantee	
Trust Fund	
Other: (specify) (Note: other methods must be approved by the Minister)	

The standard formats for each of these types of guarantees are available from your regional office of the DME.

C.8.1 Monitoring and performance assessment.

Regulation 55 of the Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002) clearly describes the process and procedure as well as requirements for monitoring and auditing of the performance of this plan to adequately address environmental impacts from the operation. The following information must be provided:

C.8.2 Please describe how the adequacy of this programme will be assessed and how any inadequacies will be addressed. (Regulations 55(1) and 52(2)(e))
Example: I will, on a bi-monthly basis, check every aspect of my operation against the prescriptions given in Section F of this document and, if I find that certain aspects are not addressed or impacts on the environment are not mitigated properly, I will rectify the identified inadequacies immediately.
Information supplied during the operational phase which is still applicable will be forwarded to the required department. Progress reports will be forwarded to the required government departments on a regular basis (preferable every six months). A system must be developed to ensure all projects (new and amendments) are submitted to the Northern Cape Department of Tourism, Environment and Conservation to pro-actively identify any environmental legal requirements.

The applicant will undertake performance assessments on the commitments of all EMP's as per Regulation 55 of GN R527 of 23 April 2004 – MPRDA Regulations, 2004. The applicant will ensure that the assessments focus on performance as well as the suitability and adequacy of the EMP's. All non-conformances will be addressed, but if this is not possible then a review of the EMP's will be undertaken. The applicant will submit a report on the performance assessment to DMR.

C.9 Closure and Environmental objectives: (Regulation 52(2)(f))

Clearly state the intended end use for the area prospected/mined after closing of operations.

1 Rehabilitate mining activities to such an extent that the mining area can be fully utilized as the land use determined, in this case grazing. Rehabilitation will be conducted according to the closure plan which will be compiled before closure is applied for.

2 The following activities form part of the rehabilitation of the area:

- Sloping the excavated areas. Surface topography should emulate the surrounding areas and be aligned to the general landscape character.
- Levelling of disturbed areas. Landscaping should facilitate surface runoff and result in free draining areas.
- Covering disturbed areas with stockpiled topsoil (or imported topsoil should there be need to do so).
- Preparation of the soil for rehabilitation (for example, by adding fertilizer/ compost and manure).
- Re-vegetation of the area.

C.9.1 Describe, in brief terms, what the environment will look like after a closure certificate has been obtained.

Rehabilitate mining activities to such an extent that the mining area can be fully utilized as the land use determined, in this case grazing.

Note: The proposed end-state of your area must be consulted with interested and affected parties in terms of Regulation 52(2)(g). Details of the acceptability of the end-state must appear in the section below.

C 10 Closure

Regulations 56 to 62 outline the entire process of mine closure, and these are copied in Section F of this document, both as a guide to applicants on the process to be followed for mine closure, and also to address the legal responsibility of the applicant with regard to the proper closure of his operation. In terms of Section 37 of the Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002), the holder

of a permit is liable for any and all environmental damage or degradation emanating from his/her operation, until a closure certificate is issued in terms of Section 43 of the Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002).

C.11 Public Participation: (Regulation 52(2)(g))

In terms of the above regulation consultation with interested and affected person or persons must take place prior to the approval of the environmental management plan. This regulation is quoted below for ease of reference.

"a record of the public participation undertaken and the results thereof"

C 11.1 Any comments lodged by an interested and affected person or persons in terms of section 10(1)(b) of the Act, must be in writing and addressed to the relevant Regional Manager.

C 11.2 Any objections lodged by an interested and affected person or persons against the application for a right or permit in terms of the Act, must set out clearly and concisely the facts upon which it is based and must be addressed to the relevant Regional Manager in writing.

C 11.3 The Regional Manager must make known by way of publication in a local newspaper or at the office of the Regional Manager, that an application for a right or permit in terms of the Act has been received.

In the table below, please list the names of people or organisations likely to be influenced by the proposed operations (these might include neighbours, other water users, etc.) Kindly indicate how these people were consulted (eg. By letter or by phone) *and provide proof* of that consultation. What were the main concerns/ objections raised by the interested and affected parties to the proposed operation?

Refer to Annexure 2 for a complete summary of the Public Participation as well as all relevant documentation.

C 11.4 Public Participation Process

D SCORING OF EIA– FOR OFFICIAL USE ONLY

Instructions for officials:
In this table, complete the totals of each section indicated below and do the calculation. ***Remember to first add all the values of sections C 1,2,4 and 5 and then to multiply it by the time factor in Section C 3***
Note that the value for the time factor element of the impact rating appears in Section C3. This is the total amount of time that the operation is expected to impact on the environment and all other factors are MULTIPLIED by this value. Compare the score (Impact rating) with the table below to help you make a decision on the total impact of the operation and also on the sufficiency of this programme to address all expected impacts from the operation on the environment.

D 1.1 CALCULATION TABLE

Section **C 1** Total	+	Section **C 2** Total	+	Section **C 4** Total	+	Section **C 5** Total	=	*Subtotal*	X	Time Factor Section **C 3**	=	Score (Impact rating)
	+		+		+		=		X		=	

D 1.2 IMPACT RATING SCALE

SCORE ATTAINED	IMPACT RATING	REMARKS
46 – 300	Low	No additional objectives needed – this programme is sufficient
301 - 800	Medium	Some specific additional objectives to address focal areas of concern may be set.
801 - 1160	High	Major revision of Environmental Management Plan for adequacy and full revision of objectives.

Additional Objectives:

Based on the information provided by the applicant and the regional office's assessment thereof, combined with the interpretation of the scoring and impact rating attained for the particular operation above, the Regional Manager of the regional office of the DME may now determine additional objectives /requirements for the mine owner/manager to comply with. *These measures will be specific and will address specific issues of concern that are not adequately covered in the standard version of this document.* These requirements are not listed here, but are specified under Section G of this document, so as to form part of the legally binding part of this Environmental Management Plan.

E UNDERTAKING:

I,_____, the applicant for a prospecting permit/ right hereby declare that the above information is true, complete and correct. I undertake to implement the measures as described in Sections F and G hereof. I understand that this undertaking is legally binding and that failure to give effect hereto will render me liable for prosecution in terms of Section 98 (b) and 99 (1)(g) of the Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002). I am also aware that the Regional Manager may, at any time but after consultation with me, make such changes to this plan as he/she may deem necessary.

Signed on this _____day of___May 2011 at_____(Place)

.....
Signature of applicant

F. ENVIRONMENTAL MANAGEMENT PLAN:

INTRODUCTION

This Environmental Management Plan contains guidelines, operating procedures and rehabilitation/pollution control requirements which will be binding on the holder of the mining permit/ prospecting permission/ reconnaissance permission after approval of the Environmental Management Plan. It is essential that this portion be carefully studied, understood, implemented and adhered to at all times.

F 1 GENERAL REQUIREMENTS

F 1.1 MAPPING AND SETTING OUT

F 1.1.1 LAYOUT PLAN

- A copy of the layout plan as provided for in Regulation 2.2 must be available at the prospecting/mining site for scrutiny when required.
- The plan must be updated on a regular basis with regard to the actual progress of the establishment of surface infrastructure, mining operations and rehabilitation (a copy of the updated plan shall be forwarded to the Regional Manager on a regular basis).
- A final layout plan must be submitted at closure of the mine or when operations have ceased.

NOTE: Regulation 2.2 of the regulations promulgated in terms of the Act requires:

"An application contemplated in sub-regulation (1) must be accompanied by a plan that must contain –

(a) the co-ordinates of the land or area applied for;
(b) the north point;
(c) the scale to which the plan has been drawn;
(d) the name, number and location of the land or area covered by the application; and
(e) in relation to farm boundaries and surveyed points-
  (i) the size and shape of the proposed area;
  (ii) the boundaries of the land or area comprising the subject of the application concerned;
  (iii) the layout of the proposed reconnaissance, prospecting, exploration, mining or production operations;
  (iv) surface structures and servitudes;
  (v) the topography of the land or area; "

F 1.1.2 DEMARCATING THE MINING/ PROSPECTING AREA

- The mining/ prospecting area must be clearly demarcated by means of beacons at its corners, and along its boundaries if there is no visibility between the corner beacons.
- Permanent beacons as indicated on the layout plan or as prescribed by the Regional Manager must be firmly erected and maintained in their correct position throughout the life of the operation.

- Mining/ prospecting and resultant operations shall only take place within this demarcated area.

F 1.1.3 DEMARCATING THE RIVER CHANNEL AND RIVERINE ENVIRONMENT

The following is applicable if operations are conducted within the riverine environment (See F 3.2):

- Beacons as indicated on the layout plan or as prescribed by the Regional Manager must be erected and maintained in their correct position throughout the life of the operation.
- These beacons must be of a permanent nature during the operations and must not be easily removable, especially those in a river channel. The beacons must, however, be removed at the end of the operations.
- The mining of and prospecting for any mineral shall only take place within this demarcated mining area.
- If riverine vegetation is present in the form of reeds or wetland vegetation, the presence of these areas must be entered in Part C 1.45 of the EMPlan and indicated on the layout plan.
- The holder of the mining permit/ prospecting right will also be required to permanently demarcate the areas as specified in F 1.1.2.

F 1.2 RESTRICTIONS ON MINING/ PROSPECTING

- On assessment of the application, the Regional Manager may prohibit the conducting of mining or prospecting operations in vegetated areas or over portions of these areas
- In the case of areas that are excluded from mining or prospecting, no operations shall be conducted within 5 m of these areas.

F 1.3 RESPONSIBILITY

- The environment affected by the mining/ prospecting operations shall be rehabilitated by the holder, as far as is practicable, to its natural state or to a predetermined and agreed to standard or land use which conforms with the concept of sustainable development. The affected environment shall be maintained in a stable condition that will not be detrimental to the safety and health of humans and animals and that will not pollute the environment or lead to the degradation thereof.
- It is the responsibility of the holder of the mining permit/ prospecting right to ensure that the manager on the site and the employees are capable of complying with all the statutory requirements which must be met in order to mine, which includes the implementation of this EMP.
- If operations are to be conducted in an area that has already been disturbed, the holder must reach specific agreement with the Regional Manager concerning the responsibilities imposed upon himself/herself pertaining to the rehabilitation of the area and the pollution control measures to be implemented.

F 2 INFRASTRUCTURAL REQUIREMENTS

F 2.1 TOPSOIL

- Topsoil shall be removed from all areas where physical disturbance of the surface will occur.
- All available topsoil shall be removed after consultation with the Regional Manager prior to the commencement of any operations.
- The topsoil removed, shall be stored in a bund wall on the high ground side of the mining/prospecting area outside the 1:50 flood level within the boundaries of the mining area/ prospecting.
- Topsoil shall be kept separate from overburden and shall not be used for building or maintenance of access roads.
- The topsoil stored in the bund wall shall be adequately protected from being blown away or being eroded.

F 2.2 ACCESS TO THE SITE

F 2.2.1 Establishing access roads on the site

- The access road to the mining/prospecting area and the camp-site/site office must be established in consultation with the landowner/tenant and existing roads shall be used as far as practicable.
- Should a portion of the access road be newly constructed the following must be adhered to:

  - The route shall be selected that a minimum number of bushes or trees are felled and existing fence lines shall be followed as far as possible.
  - Water courses and steep gradients shall be avoided as far as is practicable.
  - Adequate drainage and erosion protection in the form of cut-off berms or trenches shall be provided where necessary.

- If imported material is used in the construction or upgrading of the access road this must be listed in C 2.17
- The erection of gates in fence lines and the open or closed status of gates in new and existing positions shall be clarified in consultation with the landowner/tenant and maintained throughout the operational period.
- No other routes will be used by vehicles or personnel for the purpose of gaining access to the site.

NOTE: The design, construction and location of access to provincial roads must be in accordance with the requirements laid down by the Provincial or controlling authority.

F 2.2.2 Maintenance of access roads

- In the case of dual or multiple use of access roads by other users, arrangements for multiple responsibility must be made with the other users. If not, the maintenance of access roads will be the responsibility of the holder of the mining permit/ prospecting right.
- Newly constructed access roads shall be adequately maintained so as to minimise dust, erosion or undue surface damage.

F 2.2.3 Dust control on the access and haul roads

- The liberation of dust into the surrounding environment shall be effectively controlled by the use of, inter alia, water spraying and/or other dust-allaying agents. The speed of haul trucks and other vehicles must be strictly controlled to avoid dangerous conditions, excessive dust or excessive deterioration of the road being used.

F 2.2.4 Rehabilitation of access roads

- Whenever a mining permit/ prospecting right is suspended, cancelled or abandoned or if it lapses and the holder does not wish to renew the permit or right, any access road or portions thereof, constructed by the holder and which will no longer be required by the landowner/tenant, shall be removed and/or rehabilitated to the satisfaction of the Regional Manager.
- Any gate or fence erected by the holder which is not required by the landowner/tenant, shall be removed and the situation restored to the pre mining/ prospecting situation.
- Roads shall be ripped or ploughed, and if necessary, appropriately fertilised (based on a soil analysis) to ensure the regrowth of vegetation. Imported road construction materials which may hamper regrowth of vegetation must be removed and disposed of in an approved manner prior to rehabilitation.
- If a reasonable assessment indicates that the re-establishment of vegetation is unacceptably slow, the Regional Manager may require that the soil be analysed and any deleterious effects on the soil arising from the mining/prospecting operation, be corrected and the area be seeded with a seed mix to the Regional Manager's specification.

F 2.3 OFFICE/CAMP SITES

F 2.3.1 Establishing office / camp sites

- Office and camp sites shall be established, as far as is practicable, outside the flood plain, above the 1 in 50 flood level mark within the boundaries of the mining/ prospecting area.
- The area chosen for these purposes shall be the minimum reasonably required and which will involve the least disturbance to vegetation. Topsoil shall be handled as described in F 2.1 above

- No camp or office site shall be located closer than 100 metres from a stream, river, spring, dam or pan.
- No trees or shrubs will be felled or damaged for the purpose of obtaining firewood, unless agreed to by the landowner/tenant.
- Fires will only be allowed in facilities or equipment specially constructed for this purpose. If required by applicable legislation, a fire-break shall be cleared around the perimeter of the camp and office sites.
- Lighting and noise disturbance or any other form of disturbance that may have an effect on the landowner/tenant/persons lawfully living in the vicinity shall be kept to a minimum.

F 2.3.2 Toilet facilities, waste water and refuse disposal

- As a minimum requirement, the holder of a mining permit/ prospecting right shall, at least, provide pit latrines for employees and proper hygiene measures shall be established.
- Chemical toilet facilities or other approved toilet facilities such as a septic drain shall preferably be used and sited on the camp site in such a way that they do not cause water or other pollution.
- The use of existing facilities must take place in consultation with the landowner/tenant.
- In cases where facilities are linked to existing sewerage structures, all necessary regulatory requirements concerning construction and maintenance should be adhered to.
- All effluent water from the camp washing facility shall be disposed of in a properly constructed French drain, situated as far as possible, but not less than 200 metres, from any stream, river, pan, dam or borehole.
- Only domestic type wash water shall be allowed to enter this drain and any effluents containing oil, grease or other industrial substances must be collected in a suitable receptacle and removed from the site, either for resale or for appropriate disposal at a recognised facility.
- Spills should be cleaned up immediately to the satisfaction of the Regional Manager by removing the spillage together with the polluted soil and by disposing of them at a recognised facility.
- Non-biodegradable refuse such as glass bottles, plastic bags, metal scrap, etc., shall be stored in a container at a collecting point and collected on a regular basis and disposed of at a recognised disposal facility. Specific precautions shall be taken to prevent refuse from being dumped on or in the vicinity of the camp site.
- Biodegradable refuse generated from the office/camp site, processing areas vehicle yard, storage area or any other area shall either be handled as indicated above or be buried in a pit excavated for that purpose and covered with layers of soil, incorporating a final 0,5 metre thick layer of topsoil (where practicable). Provision should be made for future subsidence of the covering.

F 2.3.3 Rehabilitation of the office/camp site

- On completion of operations, all buildings, structures or objects on the camp/office site shall be dealt with in accordance with section 44 of the Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002), which states:

  (1) When a prospecting right, mining right, retention permit or mining permit lapses, is cancelled or is abandoned or when any prospecting or mining operation comes to an end, the holder of any such right or permit may not demolish or remove any building, structure, object -

  (a) which may not be demolished in terms of any other law;
  (b) which has been identified in writing by the Minister for purposes of this section; or
  (c) which is to be retained in terms of an agreement between the holder and the owner or occupier of the land, which agreement has been approved by the Minister in writing.

  (2) The provision of subsection (1) does not apply to bona fide mining equipment which may be removed

- Where office/camp sites have been rendered devoid of vegetation/grass or where soils have been compacted owing to traffic, the surface shall be scarified or ripped.
- Areas containing French drains shall be compacted and covered with a final layer of topsoil to a height of 10cm above the surrounding ground surface.
- The site shall be seeded with a vegetation seed mix adapted to reflect the local indigenous flora.
- If a reasonable assessment indicates that the re-establishment of vegetation is unacceptably slow, the Regional Manager may require that the soil be analysed and any deleterious effects on the soil arising from the mining/prospecting operation be corrected and the area be seeded with a vegetation seed mix to his or her specification.
- Photographs of the camp and office sites, before and during the mining/ prospecting operation and after rehabilitation, shall be taken at selected fixed points and kept on record for the information of the Regional Manager.

F 2.4 VEHICLE MAINTENANCE YARD AND SECURED STORAGE AREAS

F 2.4.1 Establishing the vehicle maintenance yard and secured storage areas

- The vehicle maintenance yard and secured storage area will be established as far as is practicable, outside the flood plain, above the 1 in 50 flood level mark within the boundaries of the mining/prospecting area.
- The area chosen for these purposes shall be the minimum reasonably required and involve the least disturbance to tree and plant life. Topsoil shall be handled as described in F 2.1 above.

- The storage area shall be securely fenced and all hazardous substances and stocks such as diesel, oils, detergents, etc., shall be stored therein. Drip pans, a thin concrete slab or a facility with PVC lining, shall be installed in such storage areas with a view to prevent soil and water pollution.
- The location of both the vehicle maintenance yard and the storage areas are to be indicated on the layout plan.
- No vehicle may be extensively repaired in any place other than in the maintenance yard.

F 2.4.2 Maintenance of vehicles and equipment

- The maintenance of vehicles and equipment used for any purpose during the mining/prospecting operation will take place only in the maintenance yard area.
- Equipment used in the mining/prospecting process must be adequately maintained so that during operations it does not spill oil, diesel, fuel, or hydraulic fluid.
- Machinery or equipment used on the mining/prospecting area must not constitute a pollution hazard in respect of the above substances. The Regional Manager shall order such equipment to be repaired or withdrawn from use if he or she considers the equipment or machinery to be polluting and irreparable.

F 2.4.3 Waste disposal

- Suitable covered receptacles shall be available at all times and conveniently placed for the disposal of waste.
- All used oils, grease or hydraulic fluids shall be placed therein and these receptacles will be removed from the site on a regular basis for disposal at a registered or licensed disposal facility.
- All spills should be cleaned up immediately to the satisfaction of the Regional Manager by removing the spillage together with the polluted soil and by disposing of them at a recognised facility.

F 2.4.4Rehabilitation of vehicle maintenance yard and secured storages areas

- On completion of mining/prospecting operations, the above areas shall be cleared of any contaminated soil, which must be dumped as referred to in section F 2.4.3 above.
- All buildings, structures or objects on the vehicle maintenance yard and secured storage areas shall be dealt with in accordance with section 44 of the Mineral and Petroleum Resources Development Act, 2002.
- The surface shall then be ripped or ploughed to a depth of at least 300mm and the topsoil previously stored adjacent the site, shall be spread evenly to its original depth over the whole area. The area shall then be fertilised if necessary (based on a soil analysis).
- The site shall be seeded with a vegetation seed mix adapted to reflect the local indigenous flora.

- If a reasonable assessment indicates that the re-establishment of vegetation is unacceptably slow, the Regional Manager may require that the soil be analysed and any deleterious effects on the soil arising from the mining/prospecting operation be corrected and the area be seeded with a seed mix to his or her specification.

F 3 OPERATING PROCEDURES IN THE MINING AREA

F 3.1 Limitations on mining/prospecting

- The mining of or prospecting for precious stones shall take place only within the approved demarcated mining or prospecting area.
- Mining/ prospecting may be limited to the areas indicated by the Regional Manager on assessment of the application.
- The holder of the mining permit/ prospecting right shall ensure that operations take place only in the demarcated areas as described in section F 1.1.2 above.
- Operations will not be conducted closer than one and a half times the height of the bank from the edge of the river channel and in such manner that the stability of the bank of the river is effected.
- Precautions shall also be taken to ensure that the bank of the river is adequately protected from scouring or erosion. Damage to the bank of the river caused by the operations, shall be rehabilitated to a condition acceptable to the Regional Manager at the expense of the holder.
- Restrictions on the disturbance of riverine vegetation in the form of reeds or wetland vegetation must be adhered to. The presence of these areas must be entered in Part of the programme and indicated on the layout plan.

F 3.2 Mining/ prospecting operations within the riverine environment

NOTE: The Department of Water Affairs and Forestry may impose additional conditions which must be attached to this EMP. In this regard, please see the Best Practice Guideline for small scale mining developed by DWAF (BPG 2.1)
(available from http://www.dwaf.gov.za)

- The mining of or prospecting for precious stones in the river or the banks of the river will be undertaken only after the Regional Manager has consulted with the Department of Water Affairs and Forestry.
- The canalisation of a river will not be undertaken unless the necessary permission has been obtained from the Department of Water Affairs and Forestry. Over and above the conditions imposed by the said Department, which conditions shall form part of this EMPlan, the following will also apply:

  - The canalisation of the flow of the river over different parts of the river bed shall be constructed in such a manner that the following are adhered to at all times:

- The flow of the river may not be impeded in any way and damming upstream may not occur.
- The canalisation of the flow may not result in scouring or erosion of the river-bank.
- Well points or extraction pumps in use by other riparian users may not be interfered with and canalisation may not impede the extraction of water at these points.

- Access to the riverbed for the purpose of conducting excavations in the river-bed, shall be through the use of only one access at a time. The location of the access to the river channel across the river-bank shall be at a point of the river-bank where the least excavation and damage to vegetation will occur and shall not be wider than is reasonably required. The position of the river access together with all planned future access points, must be indicated on the layout plan.

F 3.2.1 Rehabilitation of access to river-bed

- When rehabilitating the access point, the original profile of the river-bank will be re-established by backfilling the access point with the original material excavated or other suitable material.
- The topsoil shall then be returned over the whole area to its original depth and if necessary fertilised and the vegetation allowed to grow.
- If a reasonable assessment indicates that the re-establishment of vegetation is unacceptably slow, the Regional Manager may require that the soil be analysed and any deleterious effects on the soil arising from the mining/prospecting operation be corrected and the area be seeded with a seed mix to his or her specification.
- In the event of damage from an occurrence where high flood waters scour and erode access points in the process of rehabilitation over the river-bank or an access point currently in use, repair of such damage shall be the sole responsibility of the holder of the mining permit or prospecting right.
- Repair to the river-bank to reinstate its original profile to the satisfaction of the Regional Manager must take place immediately after such event has occurred and the river has subsided to a point where repairs can be undertaken.
- Final acceptance of rehabilitated river access points will be awarded only after the vegetation has re-established to a point where the Regional Manager is satisfied that the river-bank is stable and that the measures installed are of durable nature and able to withstand high river-flow conditions.

F 3.2.2 Rehabilitation of mining/prospecting area in the bed of the river

- The goal of rehabilitation with respect to the area where mining/prospecting has taken place in the river-bed is to leave the area level and even, and in a natural state containing no foreign debris or other materials and to ensure the hydrological integrity of the river by not attenuating or diverting any of the natural flow.
- All scrap and other foreign materials will be removed from the bed of the river and disposed of as in the case of other refuse (see section F 2.3.2 above), whether

these accrue directly from the mining/prospecting operation or are washed on to the site from upstream.

- Removal of these materials shall be done on a continuous basis and not only at the start of rehabilitation.
- Where reeds or other riverine vegetation have been removed from areas, these shall be re-established systematically in the approximate areas where they occurred before mining/prospecting.
- An effective control programme for the eradication of invader species and other exotic plants, shall be instituted on a regular basis over the entire mining/prospecting area under the control of the holder of the mining permit/ prospecting right, both during mining/prospecting and at the stage of final rehabilitation.

2. THE WATER USE LICENCE

The National Water Act, (Act 36 of 1998), is based on the principles of sustainability, efficiency and equity, meaning that the protection of water resources must be balanced with their development and use.

In addition to being issued with a prospecting right or mining permit a small-scale miner may also need to get a **water use licence** for the proposed water uses that will take place, except in certain cases.

NOTE: The Department of Water Affairs and Forestry (DWAF) developed specific Best Practice Guideline for small scale mining that relates to stormwater management, erosion and sediment control and waste management. Copies of these guidelines can be obtained from the regional office of DME or DWAF.

Applications for a water use licence must be made in good time, such that approval can be granted before a water use activity can begin. The appropriate licence forms for each kind of expected water use should be completed together with supporting documentation. The main supporting document required is a technical report. To make the technical report easier, you can refer to sections in this EMPlan, as most of what the technical report requires has already been done in the EMPlan. If you refer to the EMPlan it must be attached to the technical report.

F 3.3 EXCAVATIONS

F 3.3.1 Establishing the excavation areas

- Whenever any excavation is undertaken for the purpose of locating and/or extracting ore bodies of all types of minerals, including precious stone-bearing gravels, the following operating procedures shall be adhered to:

  - ❖ Topsoil shall, in all cases (except when excavations are made in the river-bed), be handled as described in F 2.1 above.
  - ❖ Excavations shall take place only within the approved demarcated mining/prospecting area.
  - ❖ Overburden rocks and coarse material shall be placed concurrently in the excavations or stored adjacent to the

excavation, if practicable, to be used as backfill material once the ore or gravel has been excavated.

- ❖ Trenches shall be backfilled immediately if no ore or precious stone-bearing gravel can be located.

F 3.3.2 Rehabilitation of excavation areas

The following operating procedures shall be adhered to:

- The excavated area must serve as a final depositing area for the placement of tailings during processing.
- Rocks and coarse material removed from the excavation must be dumped into the excavation simultaneously with the tailings.
- Waste, as described in paragraph F 2.3.2 above, will not be permitted to be deposited in the excavations.
- Once excavations have been refilled with overburden, rocks and coarse natural materials and profiled with acceptable contours and erosion control measures, the topsoil previously stored, shall be returned to its original depth over the area.
- The area shall be fertilised if necessary to allow vegetation to establish rapidly. The site shall be seeded with a local or adapted indigenous seed mix in order to propagate the locally or regionally occurring flora.
- If a reasonable assessment indicates that the re-establishment of vegetation is unacceptably slow, the Regional Manager may require that the soil be analysed and any deleterious effects on the soil arising from the mining/ prospecting operation, be corrected and the area be seeded with a vegetation seed mix to his or her specification.

F 3.4 PROCESSING AREAS AND WASTE PILES (DUMPS)

F 3.4.1 Establishing processing areas and waste piles

- Processing areas and waste piles shall not be established within 100 metres of the edge of any river channel or other water bodies.
- Processing areas should be established, as far as practicable, near the edge of excavations to allow the waste, gravel and coarse material to be processed therein.
- The areas chosen for this purpose shall be the minimum reasonably required and involve the least disturbance to vegetation.
- Prior to development of these areas, the topsoil shall be removed and stored as described in paragraph F 2.1 above.
- The location and dimensions of the areas are to be indicated on the layout plan and once established, the processing of ore containing precious stones shall be confined to these areas and no stockpiling or processing will be permitted on areas not correctly prepared.
- Tailings from the extraction process must be so treated and/or deposited that it will in no way prevent or delay the rehabilitation process.

F 3.4.2 Rehabilitation of processing areas

- Coarse natural material used for the construction of ramps must be removed and dumped into the excavations.
- On completion of mining/prospecting operations, the surface of the processing areas especially if compacted due to hauling and dumping operations, shall be scarified to a depth of at least 300mm and graded to an even surface condition and the previously stored topsoil will be returned to its original depth over the area.
- Prior to replacing the topsoil the material that was removed from the processing area will be replaced in the same order as it originally occurred.
- The area shall then be fertilised if necessary to allow vegetation to establish rapidly. The site shall be seeded with a local, adapted indigenous seed mix.
- If a reasonable assessment indicates that the re-establishment of vegetation is unacceptably slow, the Regional Manager may require that the soil be analysed and any deleterious effects on the soil arising from the mining/prospecting operation be corrected and the area be seeded with a seed mix to his or her specification.

F 3.5 TAILINGS DAM(S) (SLIMES DAM)

The permission of the Regional Manager must be obtained should a tailings dam be constructed for the purpose of handling the tailings of the mining/prospecting operations. The construction, care and maintenance of tailings dams have been regulated and the relevant regulation is copied herwith , both for your information and as a guideline to the commisioning, management, operation, closing and aftercare of a tailings deposition facility.

Regulation 73 promulgated under the Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002) requires the following:

Management of residue stockpiles and deposits

56. *(1)* *The assessment of impacts relating to the management of residue stockpiles and deposits, where appropriate, must form part of the environmental impact assessment report and environmental management programme or the environmental management plan.*

(2) *Residue characterisation*

(a) *Mine residue must be characterised to identify any potentially significant health and safety hazard and environmental impact that may be associated with the residue when stockpiled or deposited at the site(s) under consideration.*

(b) *Residue stockpiles and deposits must be characterised in terms of its –*

(i) *physical characteristics, which may include -*

(aa) *the size distribution of the principal constituents;*

(bb) *the permeability of the compacted material;*

(cc) *void ratios of the compacted material;*

(dd) *the consolidation or settling characteristics of the material under its own weight and that of any overburden;*

(ee) *the strength of compacted material;*

(ff) *the specific gravity of the solid constituents; and*

(gg) *the water content of the material at the time of deposition, after compaction, and at other phases in the life of the deposit.*

(ii) *chemical characteristics, which may include -*
- (aa) *the toxicity;*
- (bb) *the propensity to oxidize and /or decompose;*
- (cc) *the propensity to undergo spontaneous combustion;*
- (dd) *the pH and chemical composition of the water separated from the solids;*
- (ee) *stability and reactivity and the rate thereof; and*
- (ff) *neutralising potential.*

(iii) *mineral content, which include the specific gravity of the residue particles and its impact on particle segregation and consolidation;*

(3) *Classification of residue stockpiles and deposits*

(a) *All residue stockpiles and deposits must be classified into one or a combination of the following categories –*
- (i) *the safety classification to differentiate between residue stockpiles and deposits of high, medium and low hazard on the basis of their potential to cause harm to life or property; and*
- (ii) *the environmental classification to differentiate between residue stockpiles and deposits with -*
  - (aa) *a potentially significant impact on the environment due to its spatial extent, duration and intensity of potential impacts; or*
  - (bb) *no potentially significant impact on the environment.*

(b) *All mine residue stockpiles and deposits must be classified by a suitably qualified person(s).*

(c) *The classification of residue stockpiles and deposits shall determine the –*
- (i) *level of investigation and assessment required;*
- (ii) *requirements for design, construction, operation, decommissioning, closure and post closure maintenance; and*
- (iii) *qualifications and expertise required of persons undertaking the investigations, assessments, design, construction thereof.*

(d) *The safety classification of residue stockpiles and deposits shall be based on the following criteria –*

Number of residents in zone of influence	*Number of workers in zone of influence*	*Value of third party propert in zone of influence*	*Depth to underground mine workings*	*Classiication*
0	*< 10*	*0 – R2 m*	*> 200m*	*Low hazard*
1 – 10	*11 – 100*	*R 2 m – R20 m*	*50 m – 200 m*	*Medium hazard*
> 10	*> 100*	*> R20 m*	*< 50 m*	*High hazard*

(e) *A risk analysis must be carried out and documented on all high hazard residue stockpiles and deposits.*

(f) *The environmental classification of residue stockpiles and deposits must be undertaken on the basis of –*
- (i) *the characteritics of the residue;*
- (ii) *the location and dimensions of the deposit (height, surface area);*
- (iii) *the importance and vulnerability of the environmental components that are at risk; and*
- (iv) *the spatial extent, duration and intensity of potential impacts.*

(g) *An assessment of the environmental impacts shall be done on all environmental components which are significantly affected.*

(h) *The assessment of impacts and analyses of risks shall form part of the environmental assessment and management programme.*

(4) *Site selection and investigation:*

(a) *The process of investigation and selection of a site must entail -*
- (i) *the identification of a sufficient number of possible candidate sites to ensure adequate consideration of alternative sites;*
- (ii) *qualitative evaluation and ranking of all alternative sites;*
- (iii) *qualitative investigation of the top ranking sites to review the ranking done in (ii);*
- (iv) *a feasibility study to be carried out on the highest ranking site(s), involving -*
  - (aa) *a prelimenary safety classification;*
  - (bb) *an environmental classification;*
  - (cc) *geotechnical investigations; and*
  - (dd) *groundwater investigations.*

(b) *The geotechnical investigations may include-*
- (i) *the characterization of the soil profile over the entire area to be covered by the residue facility and associated infrastructure to define the spatial extent and depth of the different soil horizons;*
- (ii) *the characterization of the relevant engineering properties of foundations soils and the assessment of strength and drainage characteristics.*

(c) *The groundwater investigations may include-*
- (i) *the potential rate of seepage from the residue facility;*
- (ii) *the quality of such seepage;*
- (iii) *the geohydrological properties of the strata within the zone that could potentially be affected by the quality of seepage;*
- (iv) *the vulnerability and existing potential use of the groundwater resource within the zone that could potentially be affected by the residue facility.*

(d) *From these investigations, a preferred site must be identified.*

(e) *Further investigation on the preferred site, shall include –*
- (i) *land use;*
- (ii) *topography and surface drainage;*
- (iii) *infrastructure and man-made features;*
- (iv) *climate;*
- (v) *flora and fauna;*
- (vi) *soils;*
- (vii) *ground water morphology, flow, quality and usage; and*
- (viii) *surface water.*

(f) *The investigations, laboratory test work, interpretation of data and recommendations for the identification and selection of the most appropriate and suitable site for the disposal of all residue that have the potential to generate leachate that could have a significant impact on the environment and groundwater must be carried out by a suitably qualified person.*

(5) Design of residue stockpile and deposit

(a) The design of the residue stockpile and deposit shall be undertaken by a suitably qualified person.

(b) An assessment of the typical soil profile on the site is required for residue stockpiles and deposits which -
- *(i) have a low hazard potential; and*
- *(ii) have no significant impact on the environment.*

(c) The design of the residue stockpile and deposit must take into account all phases of the life cycle of the stockpile and deposit, from construction through to closure and must include –
- *(i) the characteristics of the mine residue;*
- *(ii) the characteristics of the site and the receiving environment;*
- *(iii) the general layout of the stockpile or deposit, whether it is a natural valley, ring dyke, impoundment or a combination thereof and its 3-dimensional geometry at appropriate intervals throughout the planned incremental growth of the stockpile or deposit;*
- *(iv) the type of deposition method used; and*
- *(v) the rate of rise of the stockpile or deposit.*

(d) Other design considerations, as appropriate to the particular type of stockpile and deposit must be incrporated –
- *(i) the control of storm water on and around the residue stockpile or deposit by making provision for the maximum precipitation to be expected over a period of 24 hours with a frequency of once in a 100 years, in accordance with the regulations made under section 8 of the National Water Act, 1998;*
- *(ii) the provision, throughout the system, of a freeboard of at least 0.5 m above the expected maximum water level, in accordance with regulations made under the National Water Act, 1998, to prevent overtopping;*
- *(iii) keeping the pool away from the walls; where there are valid technical reasons for deviating from this, adequate motivation must be provided and the design must be reviewed by a qualified person as required in terms of sections 9(6) or 9(7) of the Mine Health and Safety Act, 1996;*
- *(iv) the control of decanting of excess water under normal and storm conditions;*
  - *(aa) the retension of polluted water in terms of polluted water in terms of GN R991(9), where measures may be required to prevent water from the residue deposit from leaving the residue management system unless it meets prescribed requirements;*
  - *(bb) the design of the penstock, outfall pipe, under-drainage system and return water dams;*
  - *(cc) the height of the phreatic surface, slope angles and method of construction of the outer walls and their effects on shear stability;*
  - *(dd) the erosion of slopes by wind and water, and its control by (ee) vegetation, berms or carchment paddocks; and*
  - *(ee) the potential for pollution.*

(e) A design report and operating manual shall be drawn up for all residue stockpiles and deposits which –
- *(i) have a medium to high hazard; and*
- *(ii) have a potentially significant impact on the environment.*

(f) Relevant information must be included in the draft environmental management programme or environmental management plan.

(6) Construction and operation of residue deposits:

(a) The holder of any right or permit in terms of the Act, must ensure that-

(i) the residue deposits, including any surrounding catchment paddocks, is constructed and operated in accordance with the approved environmental management programme or environmental management plan;

(ii) the design of the residue deposit is followed implicitly throughout the construction thereof, and that any deviations from the design be approved by the Regional Manager and the environmental manage programme and environmental management plan be amended accordingly;

(iii) as part of the monitoring system, measurements of all residues transported to the site and of all surplus water removed from the site are recorded;

(iv) the provision for appropriate security measures be implemented to limit unauthorised access to the site and inrusion into the residue deposit;

(v) specific action be taken in respect of any sign of pollution;

(vi) adequate measures be implemented to control dust pollution and erosion of the slopes; and

(vii) details of rehabilitation of the residue deposit be provided in the draft environmental management programme or environmental management plan.

(b) A system of routine maintenance and repair in respect of the residue deposit must be imlemented to ensure the ongoing control of pollution, the integrity of rehabilitation and health and safety maters at the site.

(7) Monitoring of residue stockpiles and deposits:

(a) A monitoring system for residue stockpiles and deposits with respect to potentially significant impacts as identified in the environmental assessment must be included in the environmental management programme or environmental management plan.

(b) In the design of a monitoring system for a residue stockpile or deposit, consideration must be given to –

(i) baseline and background conditions with regard to air, surface and groundwater quality ;

(ii) the air, surface and groundwater quality objectives;

(iii) residue characteristics;

(iv) the degree and nature of residue containment;

(v) the receiving environment and secifically the climatic, local geological, hydrogeological and geochemical conditions;

(vi) potential migration pathways;

(vii) potential impacts of leachate;

(viii) the location of monitoring points and the prescribed monitoring protocols; and

(ix) the reporting frequency and procedures.

(8) Decommissioning, closure and after care:

(a) The decommissioning, closure and post closure management of residue deposits must be addressed in the closure plan, which must contain the following -

(i) the environmental classification, including assumptions on which the classification were based;

(ii) the closure objectives, final land use or capability;

(iii) conceptual descrption and details for closure and post closure management;

(iv) cost estimates and financial provision for closure and post-closure management; and

(v) residual impacts, monitoring and requirements to obtain mine closure in terms of the Act.

F 3.6 FINAL REHABILITATION

- All infrastructure, equipment, plant, temporary housing and other items used during the mining period will be removed from the site (section 44 of the MPRDA)
- Waste material of any description, including receptacles, scrap, rubble and tyres, will be removed entirely from the mining area and disposed of at a recognised landfill facility. It will not be permitted to be buried or burned on the site.
- Final rehabilitation shall be completed within a period specified by the Regional Manager.

F 4 MONITORING AND REPORTING

F 4.1 Inspections and monitoring

- Regular monitoring of all the environmental management measures and components shall be carried out by the holder of the prospecting right, mining permit or reconnaissance permission in order to ensure that the provisions of this programme are adhered to.
- Ongoing and regular reporting of the progress of implementation of this programme will be done.
- Various points of compliance will be identified with regard to the various impacts that the operations will have on the environment.
- Inspections and monitoring shall be carried out on both the implementation of the programme and the impact on plant and animal life.
- Visual inspections on erosion and physical pollution shall be carried out on a regular basis.

Regulation 55 promulgated in terms of the MPRDA requires the following:

Monitoring and performance assessments of environmental management programme or plan

(1) As part of the general terms and conditions for a prospecting right, mining right or mining permit and in order to ensure compliance with the approved environmental management programme or plan and to assess the continued appropriateness and adequacy of the environmental management programme or plan, the holder of such right must-

(a) conduct monitoring on a continuous basis;

(b) conduct performance assessments of the environmental management programme or plan as required; and

(c) compile and submit a performance assessment report to the Minister to demonstrate adherence to sub-regulation (b).

(2) The frequency of performance assessment reporting shall be-

(a) in accordance with the period specified in the approved environmental management programme or plan , or, if not so specified;

(b) as agreed to in writing by the Minister; or

(c) biennially (every two years).

(3) The performance assessment report, shall be in the format provided in guidelines that will from time to time be published by the Department and shall as a minimum contain-

(a) information regarding the period that applies to the performance assessment;

(b) the scope of the assessment;

(c) the procedure used for the assessment;
(d) the interpreted information gained from monitoring the approved environmental management programme or plan;
(e) the evaluation criteria used during the assessment;
(f) the results of the assessment; and
(g) recommendations on how and when deficiencies that are identified and/or aspects of non-compliance will be rectified.

(4) The holder of a prospecting right, mining right or mining permit may appoint an independent qualified person(s) to conduct the performance assessment and compile the performance assessment report provided that no such appointment shall relieve the holder of the responsibilities in terms of these regulations.

(5) Subject to section 30(2) of the Act, the performance assessment report submitted by the holder shall be made available by the Minister to any person on request.

(6) If upon consideration by the Minister, the performance assessment executed by the holder is not satisfactory or the report submitted by the holder is found to be unacceptable, the holder must-
(a) repeat the whole or relevant parts of the performance assessment and revise and resubmit the report; and/or
(b) submit relevant supporting information; and/or
(c) appoint an independent competent person(s) to conduct the whole or part of the performance assessment and to compile the report.

(7) If a reasonable assessment indicates that the performance assessment cannot be executed satisfactorily by the holder or a competent person(s) appointed by the holder, the Minister may appoint an independent performance assessment person(s) to conduct such performance accessment. Such appointment and execution shall be for the cost of the holder.

(8) When the holder of a prospecting right, mining right or mining permit intends closing such operation, a final performance assessment shall be conducted and a report submitted to the Minister to ensure that -
(a) the requirements of the relevant legislation have been complied with;
(b) the closure objectives as described in the environmental management programme or plan have been met; and
(c) all residual environmental impacts resulting from the holder's operations have been identified and the risks of latent impacts which may occur have been identified, quantified and arrangements for the management thereof have been assessed.

(9) The final performance assessment report shall either precede or accompany the application for a closure certificate in terms of the Act.

F 4.2 Compliance reporting / submission of information

- Layout plans will be updated on a regular basis and updated copies will be submitted on a biennial basis to the Regional Manager
- Reports confirming compliance with various points identified in the environmental management programme will be submitted to the Regional Manager on a regular basis and as decided by the said manager .
- Any emergency or unforeseen impact will be reported as soon as possible.
- An assessment of environmental impacts that were not properly addressed or were unknown when the programme was compiled shall be carried out and added as a corrective action.

F 5 CLOSURE

When the holder of a prospecting right, mining permit or reconnaissance permission intends closing down his/her operations, an environmental risk report shall accompany the application for closure. The requirements of such a risk report is contained in Regulation 60 of the Regulations promulgated in terms of the Act and is quoted below :

F 5.1 ENVIRONMENTAL RISK REPORT

"An application for a closure certificate must be accompanied by an environmental risk report which must include-

(a) the undertaking of a screening level environmental risk assessment where-
- *(i) all possible environmental risks are identified, including those which appear to be insignificant;*
- *(ii) the process is based on the input from existing data;*
- *(iii) the issues that are considered are qualitatively ranked as –*
  - *(aa) a potential significant risk; and/or*
  - *(bb) a uncertain risk; and/or*
  - *(cc) an insignificant risk.*

(b) the undertaking of a second level risk assessment on issues classified as potential significant risks where-
- *(i) appropriate sampling, data collection and monitoring be carried out;*
- *(ii) more realistic assumptions and actual measurements be made; and*
- *(iii) a more quantitative risk assessment is undertaken, again classifying issues as posing a potential significant risk or insignificant risk.*

(c) assessing whether issues classified as posing potential significant risks are acceptable without further mitigation;

(d) issues classified as uncertain risks be re-evaluated and re-classified as either posing potential significant risks or insignificant risks;

(e) documenting the status of insignificant risks and agree with interested and affected persons;

(f) identifying alternative risk prevention or management strategies for potential significant risks which have been identified, quantified and qualified in the second level risk assessment;

(g) agreeing on management measures to be implemented for the potential significant risks which must include-
- *(i) a description of the management measures to be applied;*
- *(ii) a predicted long-term result of the applied management measures;*
- *(iii)the residual and latent impact after successful implementation of the management measures;*
- *(iv) time frames and schedule for the implementation of the management measures;*
- *(v) responsibilities for implementation and long-term maintenance of the management measures;*
- *(vi) financial provision for long-term maintenance; and*
- *(vii) monitoring programmes to be implemented."*

F 5.2 CLOSURE OBJECTIVES

Closure objectives form part of this EMPlan and must-

(a) identify the key objectives for mine closure to guide the project design, development and management of environmental objectives;
(b) provide broad future land use objective(s) for the site; and
(c) provide proposed closure cost

F 5.3 CONTENTS OF CLOSURE PLAN

A closure plan forms part of the EMP and must include the following:

(a) a description of the closure objectives and how these relate to the prospecting or mine operation and its environmental and social setting;
(b) a plan contemplated in Regulation 2(2), coordinated according to generally accepted standards, showing the land or area under closure;
(c) a summary of the regulatory requirements and conditions for closure negotiated and documented in the environmental management programme or plan;
(d) a summary of the results of the environmental risk report and details of identified residual and latent impacts;
(e) a summary of the results of progressive rehabilitation undertaken;
(f) a description of the methods to decommission each prospecting or mining component and the mitigation or management strategy proposed to avoid, minimize and manage residual or latent impacts;
(g) details of any long-term management and maintenance expected;
(h) details of financial provision for monitoring, maintenance and post closure management, if required;
(i) a plan or sketch at an appropriate scale describing the final land use proposal and arrangements for the site;
(j) a record of interested and affected persons consulted; and
(k) technical appendices, if any.

F 5.4 TRANSFER OF ENVIRONMENTAL LIABILITIES TO A COMPETENT PERSON

Should the holder of a prospecting right, mining permit or reconnaissance permission wish to transfer any environmental liabilities and responsibilities to another person or persons, the following will pertain:

(1) An application to transfer environmental liabilities to a competent person in terms of section 48) of the Act, must be completed on Form O as set out in Annexure 1 to the Regulations and be lodged to the Minister for consideration.
(2) The holder of a prospecting right, mining right or mining permit may transfer liabilities and responsibilities as identified in the environmental management plan and the required closure plan to a competent person as contemplated in Regulation 58.
(3) When considering the transfer of environmental liabilities and responsibilities in terms of section 48) of the Act, the Minister must consult with any State department which administers any law relating to matters affecting the environment.
(4) No transfer of environmental liabilities and responsibilities to a competent person may be made unless the Chief Inspector of Mines and the Department of Water Affairs and Forestry have confirmed in writing that the person to whom the liabilities and responsibilities is transferred to, have the necessary qualifications pertaining to health and safety and management of potential pollution of water resources.

F 5.5 NOTES ON LEGAL PROVISIONS

NOTE: The holder of a prospecting right, mining permit or reconnaissance permission must also take cognisance of the provisions of other legislation dealing with matters relating to conservation, and which include, *inter alia,* the following:

* National Monuments Act, 1969 (Act 28 of 1969).
* National Parks Act, 1976 (Act 57 of 1976)
* Environmental Conservation Act, 1989 (Act 73 of 1989)
* National Environmental Management Act, 1998 (Act No. 107 of 1998)
* Atmospheric Pollution Prevention Act, 1965 (Act 45 of 1965)
* The National Water Act, 1998 (Act 36 of 1998)
* Mine Safety and Health Act, 1996 (Act 29 of 1996)
* The Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983).

G. SPECIFIC ADDITIONAL REQUIREMENTS DETERMINED BY THE REGIONAL MANAGER.

Officials in regional offices may use the following matrix to determine the necessity for additional objectives to be included in this Section of the document:

POTENTIAL ENVIRONMENTAL IMPACTS OF MINING

Activity	Disturbance					Pollution				Visual
	Landform	Soil	Flora	Fauna	Heritage	Land	Water	Air	Noise	
Mining										
Access										
Topsoil removal										
Overburden removal										
Mineral Extraction										
Tailings disposal										
Water Abstraction										
Pipeline route										
Transport										
Accommodation										
Waste Disposal										
Electricity										
Hydrocarbon storage										
Workforce										

Please indicate VL, L, M, H, and VH for Very Low, Low, Medium, high and Very High in each column to determine the main area and severity of impact.

G. This section outlines the specific additional requirements that may be set for the operation by the Regional Manager. Additional requirements will only have been set if the Regional Manager is of the opinion that there are specific impacts on the environment which will not be adequately mitigated by the provisions set within the standard version of the Environmental Management Plan. These requirements form part of the Environmental Management Plan and all elements and instructions contained herein must be complied with by the applicant.

H. UNDERTAKING

I, _____, the undersigned and duly authorized thereto by National Research Foundation (SKA SA) Quarry & Borrow pit have studied and understand the contents of this document in it's entirety and hereby duly undertake to adhere to the conditions as set out therein including the amendment(s) agreed to by the Regional Manager in Section G and approved on_____ _____.

Signed at _____ this_____day _____2010

....

Signature of applicant **Designation**

Agency declaration: This document was completed by_____on behalf of _____.

J. APPROVAL

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

Signed at.....this.....day of.....2010

.....

REGIONAL MANAGER

REGION:.....

This document has been compiled by the Directorate: Mine Environmental Management of the Department of Minerals and Energy at their Head Office in Pretoria. Any comments, suggestions or inputs will be sincerely appreciated. If you have any comments or suggestions regarding this document or its application, please forward your contribution to:

The Director: Mine Environmental Management
Private Bag X 59
PRETORIA
0001

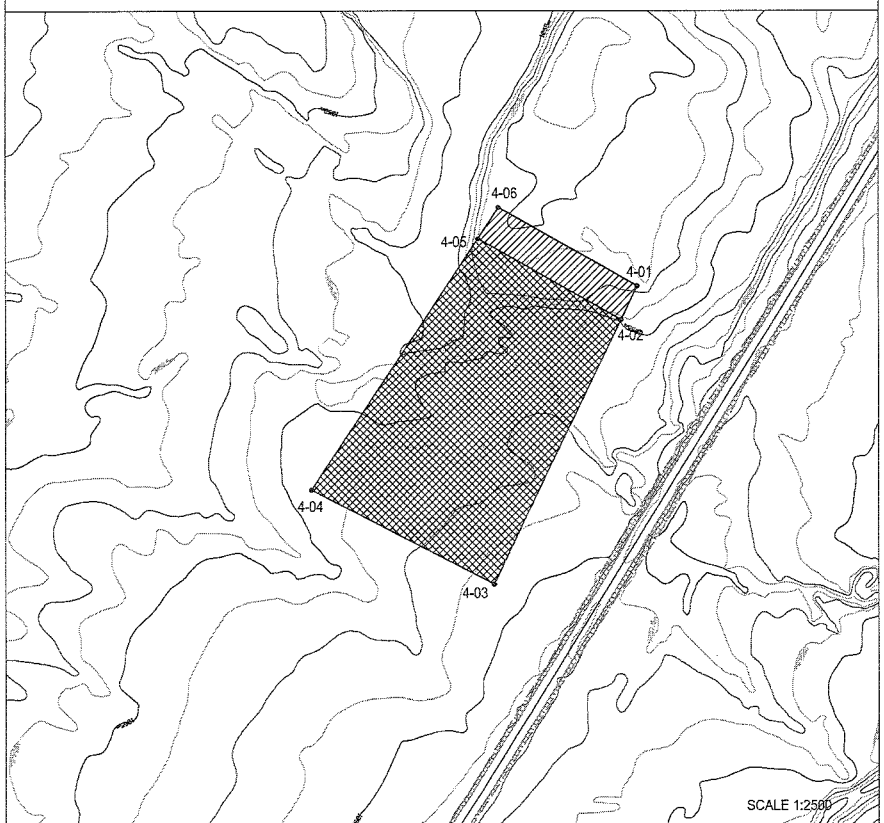
Tel : 012 317 9288
Fax: 012 320 6786
E-mail: dorothy@mepta.pwv.gov.za

ADDENDUM 1
LAYOUT OF THE PERMIT AREA

SHANGONI
Management Services (Pty) Ltd

SHEET 2 OF 2		EXPROPRIATION DIAGRAM NO. BP-04A

BORROWPIT 4 A CO-ORDINATES		
NO	POSITION Y	POSITION X
4-01	46561.9731	-3396706.9438
4-02	46553.0775	-3396722.7288
4-03	46492.2131	-3396852.4215
4-04	46403.2068	-3396806.8805
4-05	46484.3559	-3396684.0012
4-06	46494.3595	-3396668.8532
MATERIAL		50000 m³
TOTAL AREA		1.446 ha



PREPARED BY:		CHECKED BY:	DATE:
AURECON		P GRAHAM	MARCH 2011

SHEET 1 OF 2	DATE: MARCH 2011	REVISION: A

EXPROPRIATION DIAGRAM NO.
BP-04A

SKA WORK PACKAGE 1
PROVISION OF DESIGN & ENGINEERING SERVICE FOR MEERKAT
SKA SA SSLE 001/2009

THE HATCHED FIGURE: AREA TO BE EXPROPRIATED

PROPERTY DESCRIPTION

MAY'S DAM No 68

DISTRICT
CARNARVON DISTRICT

DIAGRAM NO.

OWNER(S)

SKA SA
MEY'S DAM No 68
KAREEBERG MUNICIPALITY
CARNARVON DISTRICT
NORTHERN CAPE

CONTACT PERSON: TRACY CHEETHAM
TEL No: 011 442 2434
FAX No: 011 442 2434

TITLE DEED NO.

T047450/08

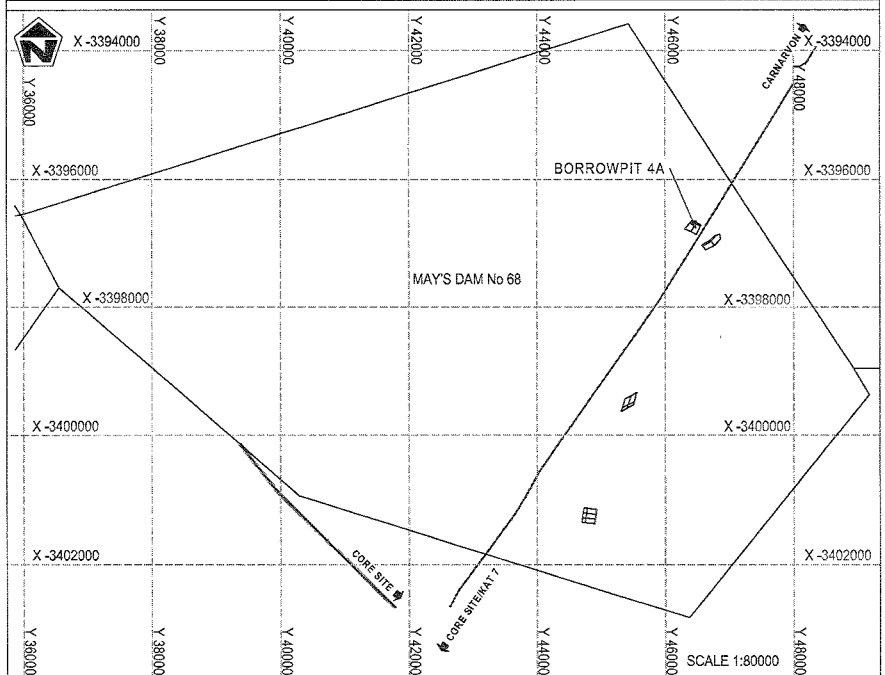
APPROVED

REGIONAL MANAGER

DATE

APPROXIMATE AREA TO BE ACQUIRED: TOTAL

0.143 Ha | 1.304 Ha



EXTENT OF PROPERTY: 7046.0463 Ha

SCALE: AS SHOWN

LEGEND

EXISTING ROAD RESERVE	FUTURE ROAD RESERVE	ACCESS ROAD	STOCKPILING OF OVERBURDEN	BORROW PIT QUARRY

ADDENDUM 2
PUBLIC PARTICIPATION

SHANGONI
Management Services (Pty) Ltd

Public Participation

A Public Participation Process (hereafter PPP) was conducted as part of the Environmental Impact Assessment (hereafter EIA) process; as set out in the Minerals and Petroleum Resources Development Act, Act 28 of 2002 (hereafter MPRDA) section 10 (b) "*to call upon Interested and Affected Parties (hereafter I&AP's) to submit their comments regarding the application within 30 days of the notice*". The purpose entails the gathering of information from the community and stakeholders that could ultimately affect the decision-making process concerning the planning, construction and operational phases of the proposed mine. The communities and public have been identified as I&AP's and they have been given the opportunity to participate in this process.

The PPP aims to enlighten the public on the positive and negative aspects that the proposed mine will have on their immediate surroundings. Negative comments and objections received from I&AP's prompt the applicant to enact change in their proposed course of action. The applicant is compelled to mitigate to an acceptable status the significant impacts, as well as consider suitable alternatives as identified during the process.

1 Objectives of the PPP

The PPP has the following objectives:

- To inform I&AP's as well as all Stakeholders of the proposed mining activities;
- To provide an opportunity for I&AP's and Stakeholders to raise environmental issues / concerns and make suggestions;
- To promote transparency and an understanding of the project and its consequences;
- To serve as a structure for liaison and communication with I&AP's and Stakeholders;
- To serve as a data gathering mechanism (of local knowledge) for the Impact Assessment.

To summarise, the objective of the on-going PPP is to promote openness and transparency concerning the proposed gravel quarries. Any conclusions agreed upon must be socially, financially and technically acceptable and feasible in order to meet the requirements of the MPRDA, Act No. 28 of 2002.

2 The Guidelines Followed for the PPP

The PPP for this project was conducted by Shangoni Management Services, and undertaken strictly according to the MPRDA, Act No. 28 of 2002. The Regulations state the following in terms of "Consultation with I&AP's":

1 The Regional Manager or designated agency, as the case may be, must make known by way of a notice, that an application contemplated in Regulation 2, has been accepted in respect of the land or offshore area, as the case may be.

2 The notice referred to in Sub Regulation (1) must be placed on a notice board at the office of the Regional Manager or designated agency, as the case may be, that is accessible to the public.

3 In addition to the notice referred to in Sub Regulation (1) the Regional Manager or designated agency, as the case may be, must also make know the application by at least one of the following methods:
   a) Publication in the applicable Provincial Gazette;
   b) Notice in the Magistrate's court in the magisterial district applicable to the land in question; or
   c) Advertisement in a local or national newspaper circulating in the area where the land or offshore area to which the application relates, is situated.

4 A publication, notice or advertisement referred to in Sub Regulation (3) must include –
   a) An invitation to members of the public to submit comments in writing on or before a date specified in the publication, notice or advertisement, which date may not be earlier than 30 days from date of publication, notice or advertisement.
   b) The name and official title of the person to whom any comments must be sent or delivered; and
   c) The following additional information:
      i. Work, postal and street address and if available electronic mail address;
      ii. Work telephone number
      iii. Facsimile number if any of the person contemplated in paragraph (b).

3 Advertisement and Site Notices

An advertisement was placed in the local newspaper, namely the Noordwester, on Thursday 10th February 2011. This advertisement was the size of half a newspaper page. The

advertisement was placed to inform the public of the mining activities. This advertisement was published in English and Afrikaans. The advertisement provided information on:

- Legislation used for the PPP;
- Applicant details;
- Details of the proposed activity;
- Location of the proposed activity;
- Contact details of the environmental consultant; and
- Details on how to participate in the PPP.

Ten (10) Site Notices of A4 size were erected in the town of Carnarvon. Eight (8) Site Notices of A3 size, one at each quarry site, were erected. Two (2) A3 Site Notices were erected on the roads closest to the quarries. This was done during the 8th and 9th February 2011. These notices contained the same information as the advertisements.

Background Information Documents (BID) were also distributed in the town of Carnarvon. This was done during the 8th and 9th February 2011. These BID's contained the same information as the advertisements with an additional locality map included. Refer to **Addendum 1 and 2** for proof and copies of these site notices and advertisement.

4 Public Meeting

An SMS containing an invitation to the public meeting was send to all members of the SKA Stakeholders Forum. The names of the forum are contained in **Table 1**. During the time in the town of Carnarvon the public meeting was also mentioned to all people met in the town.

The public meeting was held on 10th February 2011 in the Kareeberg Library. Refer to **Addendum 3** for the Minutes of the Meeting, **Addendum 4** for the Presentation, and **Addendum 5** for the Attendance Register for the Meeting.

Table 1: List of Interested and Affected Parties

NAME	ORGANIZATION
Ria van Schalkwyk	ACVV
Q Liebenberg	AME Kerk
Koos Saal	AME Kerk
Keith Hoorn: Deputy Chairperson	ANCYL
GregoruisSlaverse: Deputy Secretary	ANCYL
Jerrian Kock	ANCYL

NAME	ORGANIZATION
Ellen Riley	Belastingbetalers
Hester du Toit	Belastingbetalersforum
Charl Vermeulen	Carnarvon Agri
Mary Adams	Carnarvon Raadslid
Pieter Snyman	Coordinator SKA SA
Wilfred Horn: Chairperson	COSATO
Marie. Hanekom	DA
Godfrey. Jansen	DeptWelsyn
Ricardo Beest	Disabled Forum
Esau Hoorn	Gemeenskap
Christo Prins	H/S Carnarvon
Willie van Schalkwyk	Huis Danie Beheerraad
Dirk Sacco	JappanVennootskap
Elda Jann	Kareeberg Municipality
Anna Snyers	KleinbeginSaamstaan
Catharina Vivier	KleinbeginSaamstaan
Lavona van Schalkwyk: Secretary	Laerskool Carnarvon
Andries van Wyk	Laerskool Carnarvon
Raymond Kammies	New Life
Jan Moolman	Opkomende Klein Boere
NicolaasBeest	Parrabellum
JoanettClaasens	PCO
Dionne Connan	Rooikruis
Johannes J. Olivie	SASSA Carnarvon
Adriaan Newat.	ShereTuckshop
N Sosibo	SKA
Alfred Vass	Tourism information Centre
Peter Sawall	Tourism/ VG Kerk
Gurshwin de Bruyn	Ward committee
JandreNyl	Y.D.F

The presentation of the meeting contained the following information for the public:

- Goal of the meeting;
- Background information on the project;
- Location of the quarries;
- Environmental background of the quarries;
- Description of the authorisation process to be followed; and
- Contact details of the environmental consultant.

The following comments were raised during the meeting:

Table 2: Comments Raised during Meeting

COMMENT	REPLY
Will the stone be transported through Carnarvon if the Saaifontein Stone Quarry is used?	At the current stage of the project a decision has not been made on which quarry will be utilized and therefore the decision around the transportation routes has not yet been made
Construction of the road to SKA? Will it be necessary to construct the road again?	The access road to the SKA SA site is and will continue to be maintained on a frequent basis by the Northern Cape Department of Roads. There is no need to construction the road again. The project is currently working very closely with the Northern Cape Department of Roads who are responsible for the maintenance of the provincial road to the SKA SA site.
Mrs Hanekom requested a geological map to view the granite of the area. She wanted to know if there is no stone nearer to the SKA activities.	The entire area has been surveyed by geotechnical specialists for material to be used. These two stone quarries are the nearest quarries with the most suitable material and quantity of material.
Was there flood irrigation in the areas? Are the areas inhabited?	Dams were used for flood irrigation. No other inhabited areas are lower down the area. Nobody will be impacted upon.
Is there a social impact study done and was it done with the people of the area?	The SKA SA is busy with the development of a "Social and Labour Road Map". The SKA SA has conducted a socio-economic baseline study of the local area in 2007 which was followed by a socio-economic impact study in 2009. The findings of both reports were made available to the Northern Cape Province, the local municipalities and the Stakeholder Forums.
What will be the influence of the use of the road past Konka Farm and the Corbelled dwellings when considering routes to be used for trucks?	Mitigation measures will be put into place for this. Refer to Annexure 3 for Air Quality management measures.
Will there be rehabilitation plans for the quarries?	This will be in place. Refer to Annexure 3 for Rehabilitation management measures.
Rehabilitation funding	SKA is a semi government organisation. For this reason, a financial provision will not be in place. Discussions are underway between the SKA SA and the Department of Minerals to enter into a Memorandum of Understanding regarding this issue. Funding for rehabilitation will form part of the contract with contractors.
Will there be follow-up action to discuss the comments to be raised throughout the project?	Yes, a follow-up meeting will take place.
Will there be adequate water for the stone crushing activities?	Yes, this has been investigated by Aurecon.
Dust and noise from Saaifontein.	Mitigation measures will be put into place for this. Refer to Annexure 3 for Air Quality management measures.
Water problems on Saaifontein.	Mitigation measures will be put into place for this.

COMMENT	REPLY
	Refer to Annexure 3 for Water Quality management measures.

5 Additional Comments

An e-mail was received. This e-mail was from Mr Smit. The following concerns were highlighted in his e-mail:

Table 3: Comments after Meeting

COMMENT	REPLY
The roads from Saaifontein to Carnarvon will be damaged due to the heavy vehicles.	At this stage, the SKA SA project has not made a decision on which stone quarry will be utilized. The SKA SA will engage the Northern Cape Department of Roads to provide assistance with blading of roads
Roads in Carnarvon will also not be able to handle this load.	Only designated roads will be used.
A question was raised regarding acid water generation in the quarry.	No acid water will be generated. The mining activities will not take place within the ground water.
What will happen to the borehole water when blasting?	No blasting will take place.
The stone quarries are far from the SKA site. This is a waste of money.	The entire area has been surveyed by geotechnical specialists for material to be used. These two stone quarries are the nearest quarries with the correct material and amount of material. (contractors tarring the Vosburg road are sourcing material from De Aar crushers)
Dust generation will be a problem.	Mitigation measures will be put into place for this. Refer to Annexure 3 for Air Quality management measures.

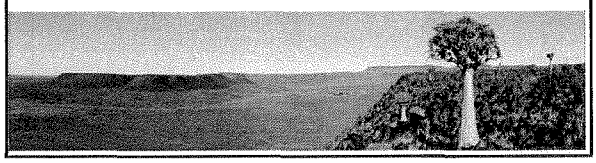
ADDENDUM 2A
Public Meeting Presentation

SHANGONI
Management Services (Pty) Ltd

MeerKAT: Publieke Vergadering vir Bespreking van Gruisgroef- en Klipgroef Aktiwiteite

Donderdag, 10 Februarie 2011

Aanbieder : Salome Venter (Shangoni)



Opening en Verwelkoming

- Almal (alle Geïntresseerde en Geaffekteerde Partye) word hartelik welkom geheet by die publieke vergadering rakende die mynboureg aansoek van gruisgroewe en klipgroewe vir die MeerKAT projek.
- Dankie vir die gasvryheid in die dorp en die belangstelling getoon in die projek.
- Die publieke deelname proses is deel van wetlike vereiste, waarvan hierdie vergadering addisioneel is tot die proses is.
- Let wel, hierdie projek is slegs vir die aansoek van die mynboulisensie vir die groewe en nie vir die implementering van die uitgrawing van die groewe nie.

Vergadering Protokol

- Registreer as 'n Geïntresseerde en Geaffekteerde Party deur jou kontakbesonderhede in die register in te skryf.
- Indien jy enige vrae het kan jy dit enige tyd tydens die aanbieding vra.
- Sê asb wat jou naam is en wie jy verteenwoordig asook wat jou vraag is sodat dit vir rekord doeleindes aangeteken kan word.
- Die notule sal beskikbaar gestel word aan al die mense wat geregistreer het as Geïnteresseerde en Geaffekteerde Partye.
- Shangoni sal vandag se vergadering fasiliteer.
- Indien ons nie 'n duidelike antwoord het nie sal ons terugkom na jou toe.

Agenda van die Vergadering

1. Doel van die vergadering
2. Inleiding
3. Projek beskrywing
4. Proses gevolg
5. Bespreking
6. Vergadering verdaag

Doel van die Vergadering

- Om all partye in te lig oor die plasing van die voorgestelde groewe.
- Om insette van die publiek an ander partye te kry rakende die verwagte impakte
- Om all partye in te lig oor die verwagte aktiwiteite rondom die groewe
- Om die publiek in te lig oor die spesialis studies en die proses wat gevolg word vir die goedkeuring van die groewe

Inleiding

- Behoefte vir konstrusie materiaal vir MeerKAT projek (algemene fondasies en paaie).
- Behoefte van ± 430 000m^3 gruis.
- Behoefte van ± 16 500m^3 klip.
- Vir ekonomiese doeleindes moet groewe so naby as moontlik aan die gebruik areas wees.
- 4 areas geidentifiseer vir gruisgroewe.
- 2 areas geidentifseer vir klipgroewe.

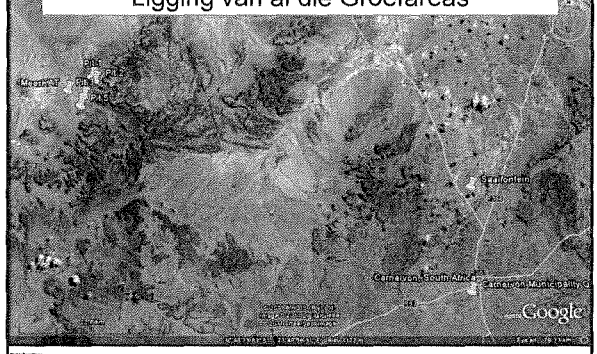
Projek Beskrywing

- Gruisgroewe
  - Plaas Meys Dam (4 groef areas)
  - Materiaal studies is afgehandel
- Klipgroewe
  - Carnarvon Munisipale groef (voorkeur)
  - Plaas Saaifontein 257(Saaipoort Plaas)
  - Geotegniese studies is afgehandel vir beide
- 4 areas geïdentifiseer vir gruisgroewe (>4ha)
- 2 areas geïdentifseer vir klipgroewe
- Slegs 1 area gaan gebruik word vir klipgroef

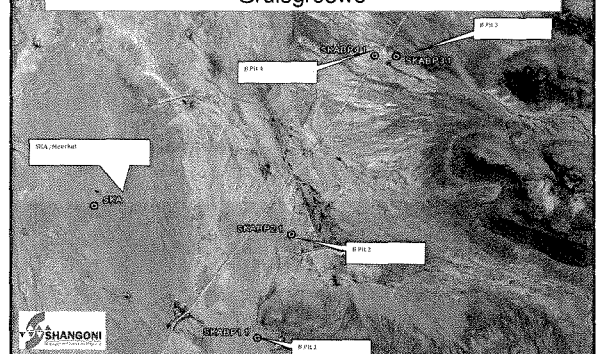
Projek Beskrywing Vervolg

- Gruisgroewe aktiwiteite
  - Gewone trok en voorlaaier aktiwiteit
- Klipgroef aktiwiteite
  - Boor en breek
  - Trok en voorlaaier
  - Breker en sifting van klip groottes
  - Vervoer van Carnarvon na SKA area per pad (R63 en SKA pad)
- Aurecon sal op publiek tender uitgaan vir die werk volgens wetlike vereistes.
- Plaaslike arbeid sal gebruik word en deel vorm van die kontrak.
- 'n "Social and Labour Roadmap" is in die proses om geskryf te word wat sal insluit alle ekonomiese en sosiale kwessies aangeende die projek.

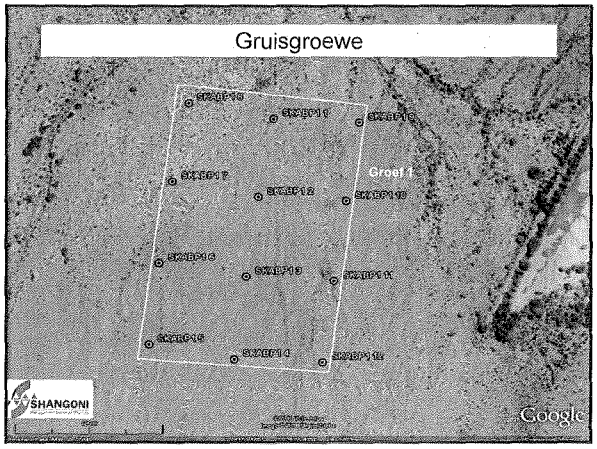
Ligging van al die Groefareas



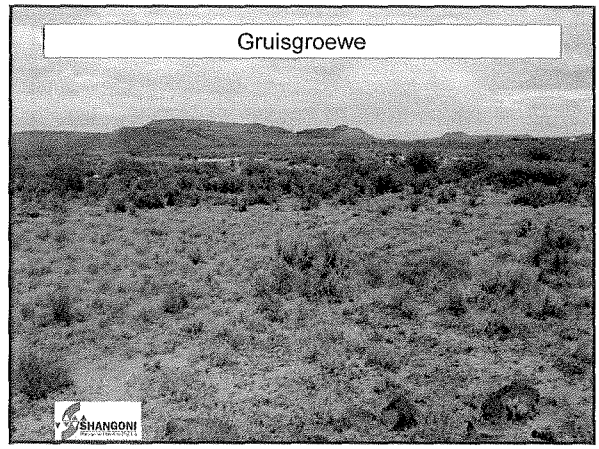
Gruisgroewe

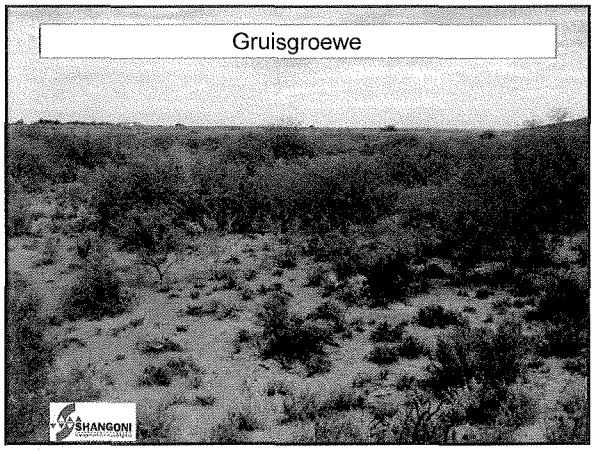


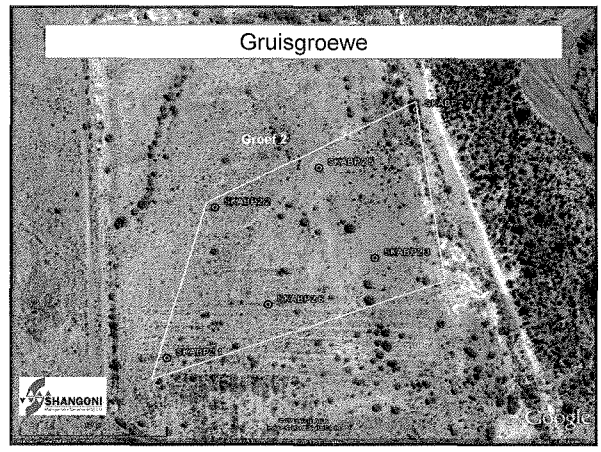
Gruisgroewe

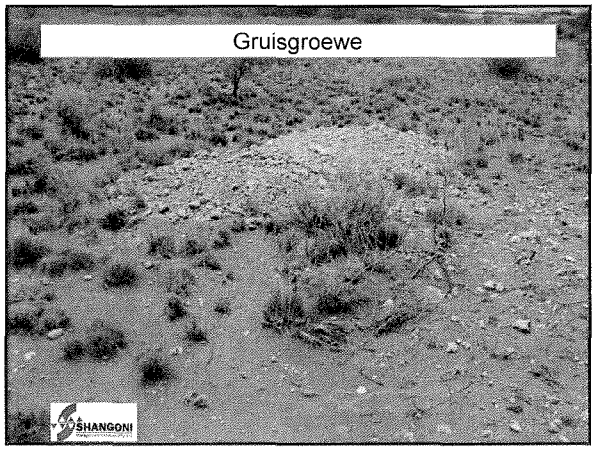


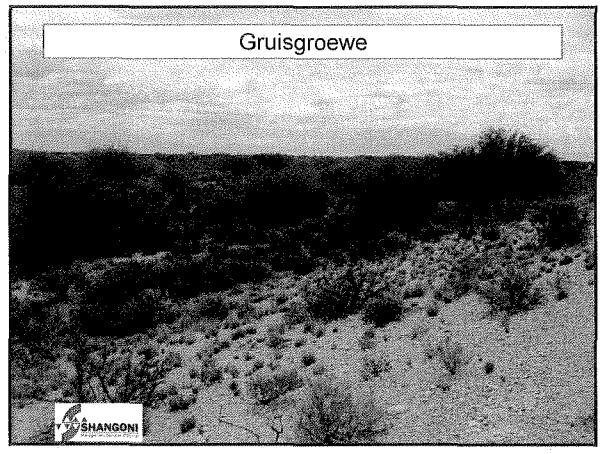
Gruisgroewe

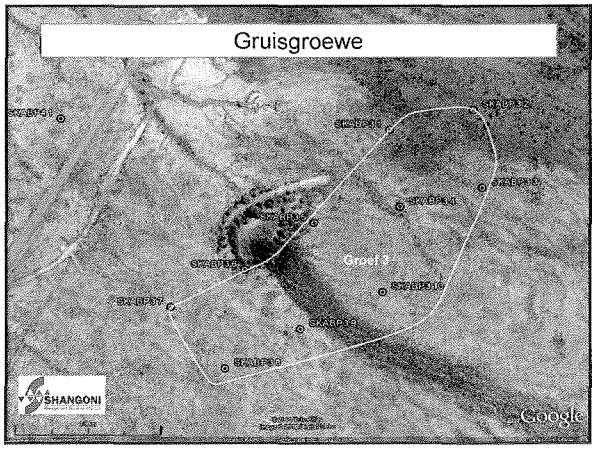


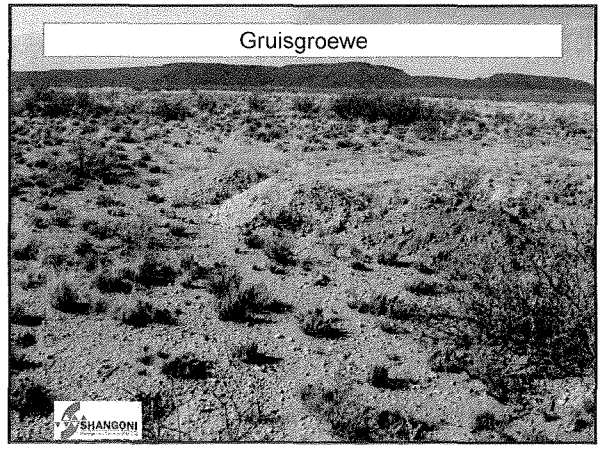

Gruisgroewe

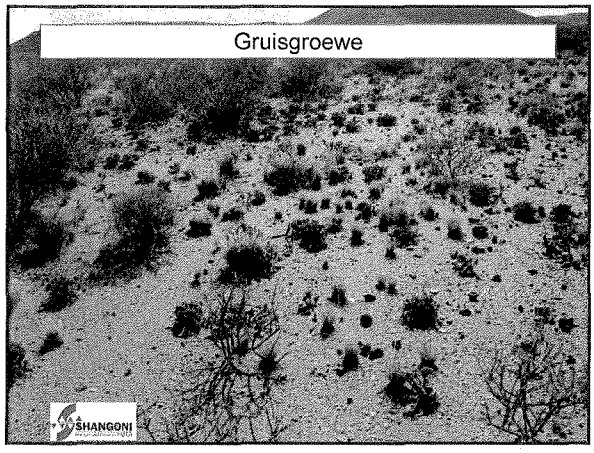

Gruisgroewe
Groef 2
Google

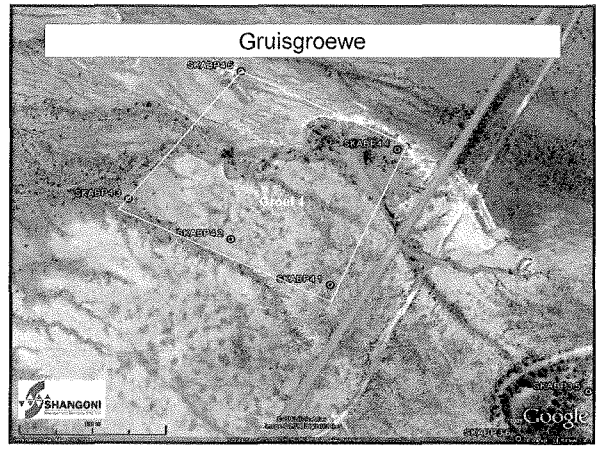

Gruisgroewe

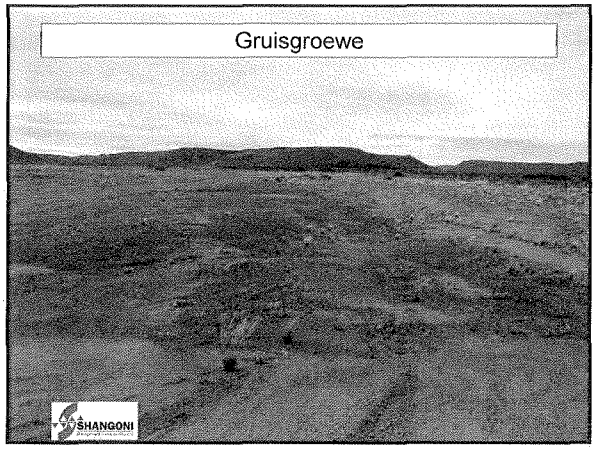

Gruisgroewe

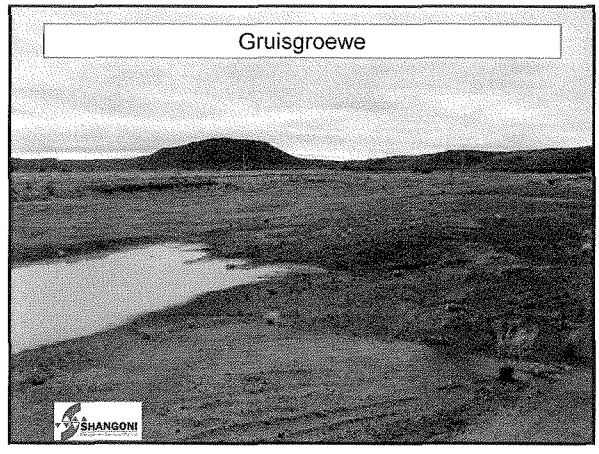

Gruisgroewe
Groef 3
Google

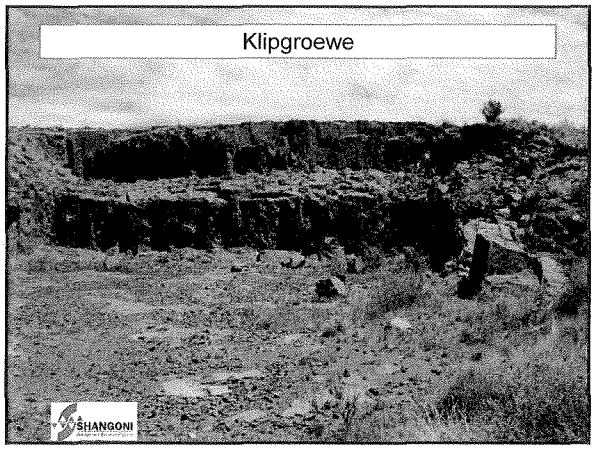

Gruisgroewe

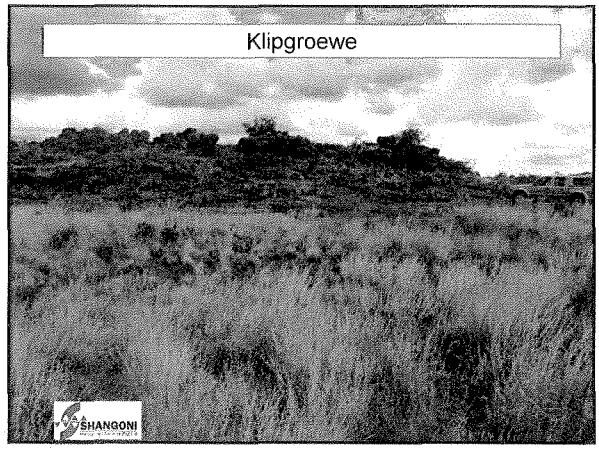

Gruisgroewe


Gruisgroewe


Gruisgroewe


Gruisgroewe


Klipgroewe


Klipgroewe

Proses Beskrywing Vervolg

- SKA aansoeker van mineraal reg by Staat naamlik Noord Kaapse Departement van Minerale Hulpbronne (DMR).
- Advertensie gepubliseer in Noorwester 10 Februarie 2011.
- Publieke deelname proses begin 07 Februarie 2011.
- Kommentaar moet teen 28 Februarie 2011 ingedien word.
- Spesialis studies gedoen op fauna en flora, moontlike argeologiese areas asook geotegniese studies
- Omgewingsbestuurplan opgestel en ingedien einde Maart.
- Enige verdere kommentaar na hierdie indiening moet ingedien word by Shangoni asook DMR.
- Beoogde goedkeuring teen einde Julie 2011.

Kontakbesonderhede

- Omgewingskonsultant:
  - Shangoni Management Services (Pty) Ltd
- Kontakbesonderhede:
  - Posbus 74726
  - Lynnwood Ridge
  - 0040
  - Tel: (+27) 807 7036
  - Faks: (+27) 12 807-1014 or (+27) 12 361 6191
  - Selfoon: (+27) 71 609 1078
  - E-pos: salome@shangoni.co.za

Bespreking

Vergadering Verdaag

Baie dankie vir u bywoning en veilig ry huis toe.

ADDENDUM 2B
Public Meeting Attendance Register

SHANGONI
Management Services (Pty) Ltd

(1)

ATTENDANCE REGISTER – PUBLIC MEETING: 10 February 2011, 18h00

Name	Designation	Company	Telephone Number	Email address
Jan Nel	Konsultant	Shangoni	0823795935	jan@shangoni.co.za
A v Schalkwyk	HOB	Karetberg Mun	0533823012	
U. Olivier	PA - Manager	KM	053 3823 012	
E. Phele	COW	Dept. Housing	078 3883 081	elliotphele@yahoo.com
M. KIEWIETS		Com. Member	0731450453	
M. Hanekom	D.A.	D.A.	0721361410	
Hdu Toit	Belasting	Belastingbet	0829288411	
Ria v. Schalkwyk		Individual	0724366663	
W T. van Schalkwyk		Individueel	0533823367	
Kalinka Hugo	KONICA	KONICA	0834440662	kalinka@34south.co.za
Nick [illegible]	[illegible]	Boer	0533822-1903	—
N J BEEST	3 de Kamp Rivier	SKIETKLUB	0533823504	[signature]
michelle Boom	.	Gemeenskaplike	0153888308	[signature]
J J OLIVIER		SASSA	0726368000	[signature]
M. OCKHUIS	HOSTEL	N.Y.D.A	0533823012	[signature]
J. Kock	D/Aartkamp	ANC Y/L	0768857650	[signature]
A. VIVIERS	ERWE	ANC YL	0533384858	[signature]
D. SACCO	B/H 243	JAGPAN Vennootskap	0782651641	[signature]

Naam	Van	Verteenwoordig	Telefoonnommer	e-pos adres.
Tibato	MOLEFE	Dep of Environment	0796949624	tmolefe@de.ncape.gov.za
Elaine W	WITBOOI	Gemeenskap	0729950677	
ADRIAAN NEWAT	NEWAT	SEDA (TUCKSHOP)	0729874139	—
DIONNE	DIONNE	ROOIKRUIS	053-3823295(H)	dionne@telkomsa.net
Ellen	Riley	DA.	0825784504	carnarvontileys@vodamail.co.za
JANDRE NY	NY	Y.D.F	0825433716	
BARBIE	Moos	Gemeenskap	0533824770	—
Patie	MONYOBE	NC DOE	0796264604	pmonyobe@ncpg.gov.za
K.D. Hoeni		COSATU	0762747913	
P. SAWALL.	SAWALL.	TOURISM	0713538807	
B. van Niekerk	Van Niekerk	PRIVAAT	0827799220	bredavn@iafrica.com
R. Adams	Adams	YAC	0533823012	roderick_adams@yahoo.com
Quinton	Liebenberg	ANC	0727715719	qwliebenberg@gmail.com

Shangoni Management Services (Pty) Ltd
2002/000002/07
PO Box 74726 Lynnwood Ridge 0040
Tel: (+27) 807 7036
Fax: (+27) 12 807-1014 or (+27) 12 361 6191
E-mail: info@shangoni.co.za
www.shangoni.co.za

Minutes of the public meeting for MeerKAT project – Discussion of Gravel quarries and Stone quarries activities

Kareeberg Library
10 February 2011
18:00

Mr. Pieter Snyman of the SKA welcomed everyone and handed the meeting over to Salome Venter of Shangoni Management Services to facilitate. He discusses the purpose of the meeting as being mainly for statutory requirements as well as obtaining inputs from all affected parties to ensure all aspects of the project is covered.

Salome Venter starts with the presentation on the details regarding the project and the processes to be put into place for the removal of material for construction of the MeerKAT project.

Persons attending the meeting:

NAAM	BESIGHEID	AFKORTING
Jan Nel	Shangoni	JN
Salome Venter	Shangoni	SV
A van Schalkwyk	Kareeberg Munisipaliteit	AS
U Olivier	Kareeberg Munisipaliteit	UO
E Phula	Departement Behuising	EP
M Kiewiets	Kom member	MK
Marie Hanekom	DA	MA

NAAM	BESIGHEID	AFKORTING
H du Toit	Belasting betaler	HT
Ria van Schalkwyk		RS
WT van Schalkwyk		WTS
Karina Hugo	Konka	KH
Nick Rooyens	Saaipoort	NR
J Beest	3de Laan Rivier en Skietklub	JB
Michelle Bosman	Gemeenskap	MB
JJ Olivier	SASSA	JJO
M Olkhuis	NYDA	MO
J Kock	ANC Y/L	JK
A Viviers	ANC Y/L	AV
D Sacco	Jagpan Vennootskap	DS
Thato Molefe	Department of Environment	TM
Elaine Witbooi	Gemeenskap	EW
Adriaan Newat	Snoepie winkel	AN
Dionne	Rooikruis	D
Ellen Riley	DA	ER
Jandre Nyl	YDF	JNyl
Barbie Moos	Gemeenskap	BM
Palci Monyob	NC DOE	PM
WD Holme	Cosatu	WDH
P Sawail	Tourism	PS
B van Niekerk	Privaat	BN
R Adams	YAC	RA
Quinton Liebenberg	AMY	QL

Questions asked during the meeting:

NAAM	OPMERKING	TERUGVOER
MA	Sal die gruis deur Carnavon vervoer word as dit op Saaifontein ontgun word?	Nog nie seker oor die pad wat gevolg sal word nie
TM	Construction of the road to SKA? Will it be necessary to construct the road again?	At this stage no indication that the road will be upgraded.
MA	Mev Hanekom versoek dat geologiese kaarte beskikbaar gemaak word wat wys waar al die granite in die distrik is. Is dit moontlik dat die kilpgroef nader aan die SKA aktiwitietie kan wees.	So 'n kaart sal beskikbaar wees. Sal Aurecon versoek om dit deur te gee aan die DA.
MA	Was daar vloedbesproeiing in die areas gewees? Is die area bewoonde eiendom?	Damme is gebruik vir vloedbesproeiing. Geen ander bewoonde gebiede laer af nie. Niemand word beïnvloed nie.
QL	Is daar 'n sosiale impakstudie gedoen en is dit saam met die mense in die omgewing gedoen?	Aurecon is getaak om "Social and Labour Roadmap" te doen.

NAAM	OPMERKING	TERUGVOER
BN	Mnr. Van Niekerk vra of die invloed van die gebruik van die pad verby Konkaplaas en die Korbeelhuise in ag geneem word vir die bepaling van die roete van die trokke.	Sal kyk na maatreels om byvoordbeeld die spoed te beperk.
	Mnr. Van Niekerk vra of daar enige rehabilitasieplanne in plek om die groewe te rehabiliteer.	Rehabilitasie maak deel uit van die omgewingsbestuur plan.
QL	Rehabilitasie versekering.	SKA is semi staatorganisasie dus is daar die
QL	Vra of daar opvolg aksies sal wees om die kommentaar te bespreek.	Opvolg vergadering sal plaasvind.
MH	Is daargenoeg water vir die klipbreek proses?	Sal by Aurecon uitvind wat die behoefte is vir water vir brekers en indien dit nodig is waar sal die water vandaan kom.
NK	350m wes van Saaifonteingroef. Stof en geraas ens.	
MA	Water probleme op Saaifontein	

Before this meeting a separate meeting was held with Mr. Sakkie Jacobs (SJ), owner of the Saaifontein farm regarding (one of the Stone Quarry sites options) the aspects of the proposed mining activities of the stone quarry. Before the meeting Mr Breda van Niekerk (BN) also spoke to the consultants regarding the project. MrJacobs and van Niekerk had the following questions:

NAAM	OPMERKING	TERUGVOER
SJ	Hoeveel mense gaan op die plaas werksaam wees?	Jan Nel noem dat hy nog nie enige definitiewe detail het rondom die hoeveelheid mense wat werksaam sal wees op die groef nie.
SJ	Hoe lank gaan dit moontlik aanhou?	Jan Nel noem dat dit sal bepaal word nadat die kontrakteur aangestel is. Hy is nog nie seker oor die tydperk nie.
SJ	Wanneer wil hulle begin?	Jan Nel noem dat dit heel waarskynlik teen die middle van die jaar sal begin.
BN	Watter roete sal die kliptrokke neem?	Jan Nel noem dat hulle heel waarskynlik die R63 en dan die SKA pad sal neem.
BN	Gaan dit 'n impak he op sy gastehuis (Nasionale gedenkwaardigheid) wat op die Brandvlei pad gelee is?	Jan Nel noem dat dit moontlik kan en dat daar aandag gegee sal word aan die potensiele impak bv. Spoedbeperkings.

Subsequent to the meeting an e-mail was received from the Department of Arts and Culture with regards to the proposed route for transport of stone from the quarries to the site.

The following mail was received from the heritage resource department of the Western Cape.

"Hi Sidney

Thanks for the provisional report. Yes, the road through the corbelled structures is indeed sad. We are however in conversation with the consultants. We expect some response next week. Perhaps the system did fail, but this time there'll have to be consequence for non-compliance. Heritage Northern Cape is serious about this issue and will not take it lying down..... We are prepared to go to court on this matter and hopefully it will send out a strong message that we are indeed serious of protecting our collective heritage.

I will be in contact soon.

Regards
Shane Christians"

A second e-mail was received from Mr. Mike Smit and is as follows:

"As naby gelee grondeienaar wil ons beswaar maak teen die opening van n klipgroef te Saaifontein om die volgende redes nl;-

1 *Die grondpad vanaf Saaifontein tot by die dorp Carnarvon sal onmoontlik nie hierdie swaar verkeer (vragmotors) kan hanteer nie. Gevolglik sal hierdie stuk pad sodanig beskadig word dat ons gewone voertuie nie op hierdie stuk pad sal kan ry sonder om ernstige skade op te doen nie.*

2 *Die strate in die dorp sa look nie hierdie vragmotors kan hanteer nie.*

3 *Wat gaan julle met die suurwater ,wat deur die klipgroef veroorsaak word, maak ?*

4 *Wat gaan die impak op ons boorgat-water wees na al die skietwerk by hierdie klipgroef ?*

5 *Ons is van mening dat dit n vermorsing van geld is om n klipgroef so ver vanaf die SKA perseel te bedryf aangesien daar beslis net so baie ysterkilp nader na die terrain beskikbaar moet wees ,asook genoeg water. Julle moet dit net soek en ontwikkel. Dit sal beslis goedkoper wees as om die klip so ver te moet vervoer.*

6 *My vrou het long-probleme en die stofsal n baie nadelige uitwerking op haar gesondheid he.*

Ons vertrou dat u die gebruik van hierdie klipgroef te Saaifontein in heroorweging sal neem.

Dankie vir u aandag.

Geelvlak Boerderye dms bpk.
Luckhoff, Carnarvon

M.M. SMIT.
Direkteur"

ADDENDUM 2D
Proof and Copy of Advertisement

SHANGONI
Management Services (Pty) Ltd

NOTICE OF PLANNED GRAVEL AND STONE QUARRY MINING ACTIVTIES PUBLIC NOTICE

IN TERMS OF SECTION 10 OF THE MINERALS AND PETROLEUM RESOURCES DEVELOPMENT ACT, ACT 28 OF 2002 AND REGULATION 3 OF THE MINERALS AND PETROLEUM RESOURCES DEVELOPMENT REGULATIONS, GN 527 OF 2004, NOTICE IS HEREBY GIVEN OF THE PLANNED GRAVEL AND STONE QUARRY MINING ACTIVITIES IN THE KAREEBERG AND KAROO HOOGLAND MUNICIPAL DISTRICT, NORTHERN CAPE

Applicant: Square Kilometre Array South Africa (SKA SA)

Proposed activity: The mining of four Gravel Quarries and one Stone Quarry. There are two stone quarries that have been identified of which only one will be utilized to source material. The material obtained from these quarries will be used to build the MeerKAT road network, antenna foundations and new buildings at the MeerKAT site.

Locations: Four gravel quarries have been identified on the Farms Meys Dam and Losberg which are owned by the SKA SA and two stone quarries (quarry 1 on the Farm Saaifontein and quarry 2 is the Carnarvon Municipal Stone Quarry), in the Kareeberg and Karoo Hoogland Municipal District, Northern Cape.

Environmental Consultants: Shangoni Management Services (Pty) Ltd

Contact Details:
PO Box 74726
Lynnwood Ridge
0040
Tel: (+27) 807 7036
Fax: (+27) 12 807-1014 or (+27) 12 361 6191
Mobile: (+27) 71 609 1078
E-mail: salome@shangoni.co.za

INVITATION TO PARTCIPATE

Should you wish to raise any comment or concerns regarding the proposed project, register as I&AP and/or inform us of any other I&AP's and/or stakeholders who should be notified, please contact **Salome Venter** before the expiry date on **28th February 2011**. A Background Information Document is also available from the Consultant.

SKA AFRICA
SQUARE KILOMETRE ARRAY

KENNISGEWING VIR VOORGENOME GRUIS- EN KLIPGROEF MYNBOU AKTIWITEITE PUBLIEKE KENNISGEWING

KENNIS WORD INGEVOLGE ARTIKEL 10 VAN DIE MINERAAL EN PETROLEUM HULPBRONNE ONTWIKKELINGSWET, WET 28 VAN 2002 AND REGULASIE 3 VAN DIE MINERAAL EN PETROLEUM HULPBRONNE ONTWIKKELINGSREGULASIES GN 527 VAN 2004, GEGEE VAN DIE BEOOGDE GRUIS- EN KLIPGOEF MYNBOU AKTIWITEITE IN THE KAREEBERG EN KAROO HOOGLAND MUNISIPALE DISTRIK, NOORD KAAP.

Applikant: Square Kilometre Array South Africa (SKA SA)

Projek: Die myn van vier gruisgroewe en een klipgroef. Daar is twee klipgroewe wat geïdentifiseerd is, waarvan slegs een gebruik sal word vir die verkryging van materiaal. Die material wat van hierdie groewe verkry word, sal vir die bou van die MeerKAT padnetwerk, antenna grondslag (skottelplasing) asook nuwe geboue van die MeerKAT in die Karoo gebruik word.

Ligging: Vier gruisgroewe is geïdentifiseer op die Plase Meys Dam en Losberg wat in die besit van SKA SA is,en twee klipgroewe (groef 1 op die Plaas Saaifontein en groef 2 is die Carnarvon Munisipale Klipgroef), in die Kareeberg en Karoo Hoogland Munisipale Distrik, Noord Kaap.

Omgewingskonsultant: Shangoni Management Services (Pty) Ltd

Kontakbesonderhede:
Posbus 74726
Lynnwood Ridge
0040
Tel: (+27) 807 7036
Faks: (+27) 12 807-1014 or (+27) 12 361 6191
Selfoon: (+27) 71 609 1078
E-pos: salome@shangoni.co.za

PUBLIEKE DEELNAME UITNODIGING

Indien u enige kommentaar en/of navrae wil rig, of indien u as geïnteresseerde en/of geaffekteerde party wil registreer kan u gerus vir **Salome Venter** by bg. kontak besonderhede, vóór die kommentaar periode van **28 Februarie 2011** verstrek, skakel. Vir meer inligting kan u ook 'n Agtergrondinligtingsdokument van die Konsultant aanvra.

SKA AFRICA
SQUARE KILOMETRE ARRAY

DONKERGRYS BERGWAGTER

Hy kan voëltaal goed namaak

VICTORIA-WES — Deurdat Victoria-Wes in 'n kloof tussen twee rante lê, is ons gelukkig om heelwat bergwagtertjies, *Oenanthe monticola* of mountain chat, in ons tuine onder in die dorp te sien.

Die voëltjies is donker grys tot swart van kleur met 'n wit buik en ook wit skouertjies in die geval van die mannetjie. Dis moeilik om die voëltjie se sang te beskryf omdat hy so graag ander voëls namaak. Somtyds as ons byevreters, lysters, kwikstertjies, tiptolle of mossies in die tuin hoor, is dit niemand anders as die wagtertjie wat ons so om die bos lei nie.

Hy word algemeen dwarsdeur al die droë dele van suidelike Afrika gevind en hou van rotsagtige klowe en rante, veral waar bossies en gras skuiling verleen. Geen wonder dan dat hy homself so graag in ons tuine tuismaak nie. Ons sien hulle dikwels alleen, maar ook in groepe van tot vier voëltjies bymekaar. Hulle vlieg laag in vinnige sarsies rond of hop vinnig oor rotse van die een skuilplek na die ander. Hulle raak maklik aan mense gewoond as ons hulle ongesteurd in ons tuine toelaat.

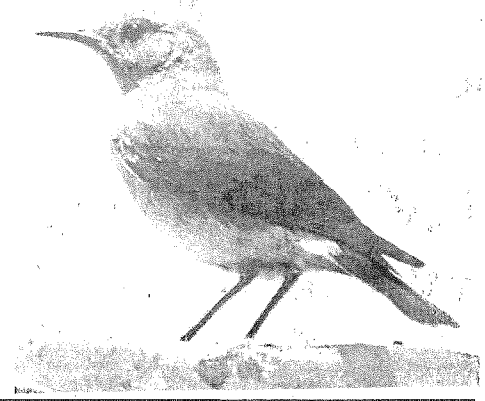
Die wagtertjies eet hoofsaaklik insekte en larwes, maar sal ook somtyds saadjies oppik. Hulle is opportunistiese voëltjies en broei graag na goeie reën wanneer kos meer geredelik beskikbaar is. Slordige nessies word van takkies, gras, wol en selfs spinnerakke onder rotse op die grond of in gate in mure deur slegs die wyfie gebou, waarin twee tot vier ligte blougroen eiertjies gelê word. Dit is ook net die wyfietjie wat op die eiers sit wat na twee weke uitbroei. Beide ouers help met die voer van die kuikens wat die nes na ongeveer sestien dae verlaat.

Daar kom vier spesies van hierdie oulike voëltjie in suidelike Afrika voor waarna algemeen verwys word as wagtertjies of skaapwagters.

fanieavenant@absamail.co.za

WAGTERS

SUID-AFRIKA het vier spesies van die voëltjies wat as bergwagters of skaapwagters bekend staan. Hulle woon graag in rotsagtige gebiede en klowe. In Victoria-Wes kom hul in tuine voor. Dis moeilik om hul sang te beskryf omdat hulle graag ander voëls namaak. Wagters broei graag na goeie reën omdat hul weet dat kos dan volop sal wees. Foto: Fanie Avenant.



BKB WOLPRYSE

PORT ELIZABETH — Laer volumes wol wat aangebied is en die swakker Rand het die Suid-Afrikaanse wolmark positief beïnvloed. BKB berig dat pryse op die oomblik 39% duurder is as die openingsveiling in Augustus 2010.

Goeie pryse is op die veiling van 2 Februarie behaal deur:

* Elias Nel, Calvinia vir CMY van 17,5 mikron teen R90,25/kg.
* A.J. de Klerk, Calvinia vir CMY van 18,0 mikron teen R89,40/kg.
* Elias Nel, Calvinia vir BMY van 18,5 mikron teen R84,55/kg.
* JC Nel, Loeriesfontein vir CL van 17,5 mikron teen R83,10/kg.

75 Jaar gelede

DIE NOORDWESTER:15 Oktober 1935. Daar Calvinia se KPVLV tak op 26 Oktober 1931 gestig is, het sy nou haar vierde verjaardag gevier. Mev. Stofberg het die verjaardagkoek versier en die gasvroue was mejj. Louw en De Klerk en mev. Japie de Klerk, sekretaresse van die Hantamtak.

NOTICE OF PLANNED GRAVEL AND STONE QUARRY MINNING ACTIVITIES
PUBLIC NOTICE

IN TERMS OF SECTION 10 OF THE MINERALS AND PETROLEUM RESOURCES DEVELOPMENT ACT, ACT 28 OF 2002 AND REGULATION 3 OF THE MINERALS AND PETROLEUM RESOURCES DEVELOPMENT REGULATIONS, GN 527 OF 2004, NOTICE IS HEREBY GIVEN OF THE PLANNED GRAVEL AND STONE QUARRY MINING ACTIVITIES IN THE KAREEBERG AND KAROO HOOGLAND MUNICIPAL DISTRICT, NORTHERN CAPE.

Applicant:
Square Kilometre Array South Africa (SKA SA)

Proposed activity:
The mining of four Gravel Quarries and one Stone Quarry. There are two stone that have been identified of which only one will be utillized to source materiaal. The obtained form these quarries will be used to build the MeerKat road network, antenna foundations and new buildings at the MeerKat site.

Locations:
Four gravel quarries have been identified on the Farms Meys Dam and Losberg which are owned by the SKA SA and two stone quarries (quarry 1 on the Farm Saalfontein and quarry 2 is the Carnarvon Municipal Stone Quarry), in the Kareeberg and Karoo Hoogland Municipal District, Northern Cape.

Environmental Consultants:
Shangoni Management Services (Pty) Ltd

Contact Details: PO Box 74726
Lynnwood Ridge
0040
Tel: 012 807 7036
Fax: 012 807 1014 or 021 361 6191
Mobile: 071 609 1078
E-mail: salome@shangoni.co.za

INVITATION TO PARTCIPATE
Should you wish to raise any comment or concerns regarding the proposed project, register as I&AP and/or inform us of any other I&AP's and/or stakeholders who should be notified, please contact **Salome Venter** before expiry daty on **28th February 2011.** A Background Information Document is also available from the Consultant.

KENNISGEWING VIR VOORGENOME GRUIS- EN KLIPGROEF MYNBOU AKTIWITEITE
PUBLIEKE KENNISGEWING

KENNIS WORD INGEVOLGE ARTIKEL 10 VAN DIE MINERAAL EN PETROLEUM HULPBRONNE ONTWIKKELINGSWET, WET 28 VAN 2002 EN REGULASIE 3 VAN DIE MINERAAL EN PETROLEUM HULPBRONNE ONTWIKKELINGSREGULASIES, GN 527 VAN 2004, GEGEE VAN DIE BEOOGDE GRUIS- EN KLIPGROEF MYNBOU AKTIWITEITE IN DIE KAREEBERG EN KAROO HOOGLAND MUNISIPALE DISTRIK, NOORD-KAAP.

Applikant:
Square Kilometre Array South Africa (SKA SA)

Projek:
Die myn van vier gruisgroewe en een klipgroef. Daar is twee klipgroewe wat geïdentifiseerd is, waarvan slegs een gebruik sal word vir die verkryging van materiaal. Die materiaal wat van hierdie groewe verkry word, sal vir die bou van die MeerKat padnetwerk, antenna grondslag (skottelplasing) asook nuwe geboue van die MeerKat in die Karoo gebruik word.

Ligging
Vier gruisgroewe is geïdentifiseer op die Plase Meys Dam en Losberg wat in die besit van SKA SA is, en twee klipgroewe (groef 1 op die Plaas Saalfontein en groef 2 is die Carnarvon Munisipale Klipgroef), in die Kareeberg en Karoo Hoogland Munispale Distrik, Noord-Kaap.

Omgewingskonsultant:
Shangoni Management Services (Pty) Ltd

Kontakbesonderhede: Posbus 74726
Lynnwood Ridge
0040
Tel: 012 807 7036
Faks: 012 807 1014 of 012 361 6191
Selfoon: 071 609 1078
E-pos: salome@shangoni.co.za

PUBLIEKE DEELNAME UITNODIGING
Indien u enige kommentaar en/of navrae wil rig, of indien u as geïnteresseerde en/of geaffekteerde party wil registreer kan u gerus vir **Salome Venter** by bogenoemde kontak besonderhede, voor die kommentaar periode van **28 Februarie 2011** verstrek, skakel. Vir meer inligting kan u ook Agtergrondinligtingsdokument van die Konsultant aanvra.

ADDENDUM 2E
Copy and Proof of Site Notices

SHANGONI
Management Services (Pty) Ltd

NOTICE OF PLANNED GRAVEL AND STONE QUARRY MINING ACTIVTIES PUBLIC NOTICE

IN TERMS OF SECTION 10 OF THE MINERALS AND PETROLEUM RESOURCES DEVELOPMENT ACT, ACT 28 OF 2002 AND REGULATION 3 OF THE MINERALS AND PETROLEUM RESOURCES DEVELOPMENT REGULATIONS, GN 527 OF 2004, NOTICE IS HEREBY GIVEN OF THE PLANNED GRAVEL AND STONE QUARRY MINING ACTIVITIES IN THE KAREEBERG AND KAROO HOOGLAND MUNICIPAL DISTRICT, NORTHERN CAPE

Applicant: Square Kilometre Array South Africa (SKA SA)

Proposed activity: The mining of four Gravel Quarries and one Stone Quarry. There are two stone quarries that have been identified of which only one will be utilized to source material. The material obtained from these quarries will be used to build the MeerKAT road network, antenna foundations and new buildings at the MeerKAT site.

Locations: Four gravel quarries have been identified on the Farms Meys Dam and Losberg which are owned by the SKA SA and two stone quarries (quarry 1 on the Farm Saaifontein and quarry 2 is the Carnarvon Municipal Stone Quarry), in the Kareeberg and Karoo Hoogland Municipal District, Northern Cape.

Environmental Consultants: Shangoni Management Services (Pty) Ltd

Contact Details:
PO Box 74726
Lynnwood Ridge
0040
Tel: (+27) 807 7036
Fax: (+27) 12 807-1014 or (+27) 12 361 6191
Mobile: (+27) 71 609 1078
E-mail: salome@shangoni.co.za

INVITATION TO PARTCIPATE

Should you wish to raise any comment or concerns regarding the proposed project, register as I&AP and/or inform us of any other I&AP's and/or stakeholders who should be notified, please contact **Salome Venter** before the expiry date on **28th February 2011**. A Background Information Document is also available from the Consultant.

SKA AFRICA
SQUARE KILOMETRE ARRAY

KENNISGEWING VIR VOORGENOME GRUIS- EN KLIPGROEF MYNBOU AKTIWITEITE PUBLIEKE KENNISGEWING

KENNIS WORD INGEVOLGE ARTIKEL 10 VAN DIE MINERAAL EN PETROLEUM HULPBRONNE ONTWIKKELINGSWET, WET 28 VAN 2002 AND REGULASIE 3 VAN DIE MINERAAL EN PETROLEUM HULPBRONNE ONTWIKKELINGSREGULASIES GN 527 VAN 2004, GEGEE VAN DIE BEOOGDE GRUIS- EN KLIPGOEF MYNBOU AKTIWITEITE IN THE KAREEBERG EN KAROO HOOGLAND MUNISIPALE DISTRIK, NOORD KAAP.

Applikant: Square Kilometre Array South Africa (SKA SA)

Projek: Die myn van vier gruisgroewe en een klipgroef. Daar is twee klipgroewe wat geïdentifiseerd is, waarvan slegs een gebruik sal word vir die verkryging van materiaal. Die material wat van hierdie groewe verkry word, sal vir die bou van die MeerKAT padnetwerk, antenna grondslag (skottelplasing) asook nuwe geboue van die MeerKAT in die Karoo gebruik word.

Ligging: Vier gruisgroewe is geïdentifiseer op die Plase Meys Dam en Losberg wat in die besit van SKA SA is,en twee klipgroewe (groef 1 op die Plaas Saaifontein en groef 2 is die Carnarvon Munisipale Klipgroef), in die Kareeberg en Karoo Hoogland Munisipale Distrik, Noord Kaap.

Omgewingskonsultant: Shangoni Management Services (Pty) Ltd

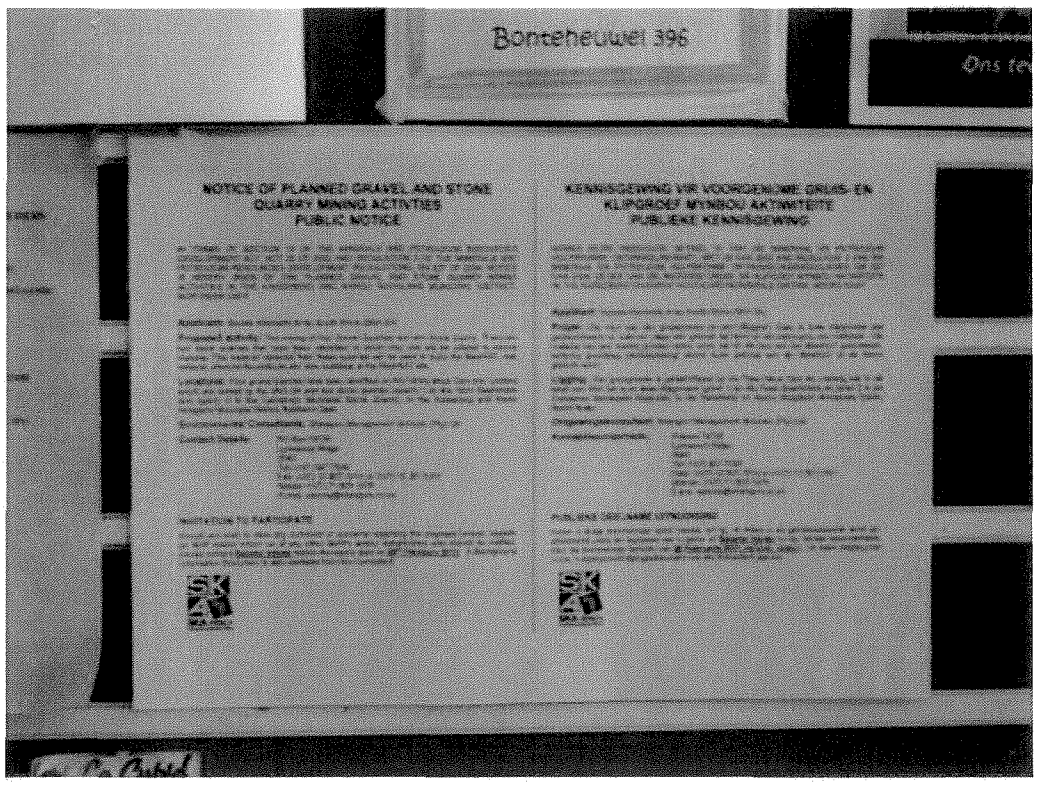
Kontakbesonderhede:
Posbus 74726
Lynnwood Ridge
0040
Tel: (+27) 807 7036
Faks: (+27) 12 807-1014 or (+27) 12 361 6191
Selfoon: (+27) 71 609 1078
E-pos: salome@shangoni.co.za

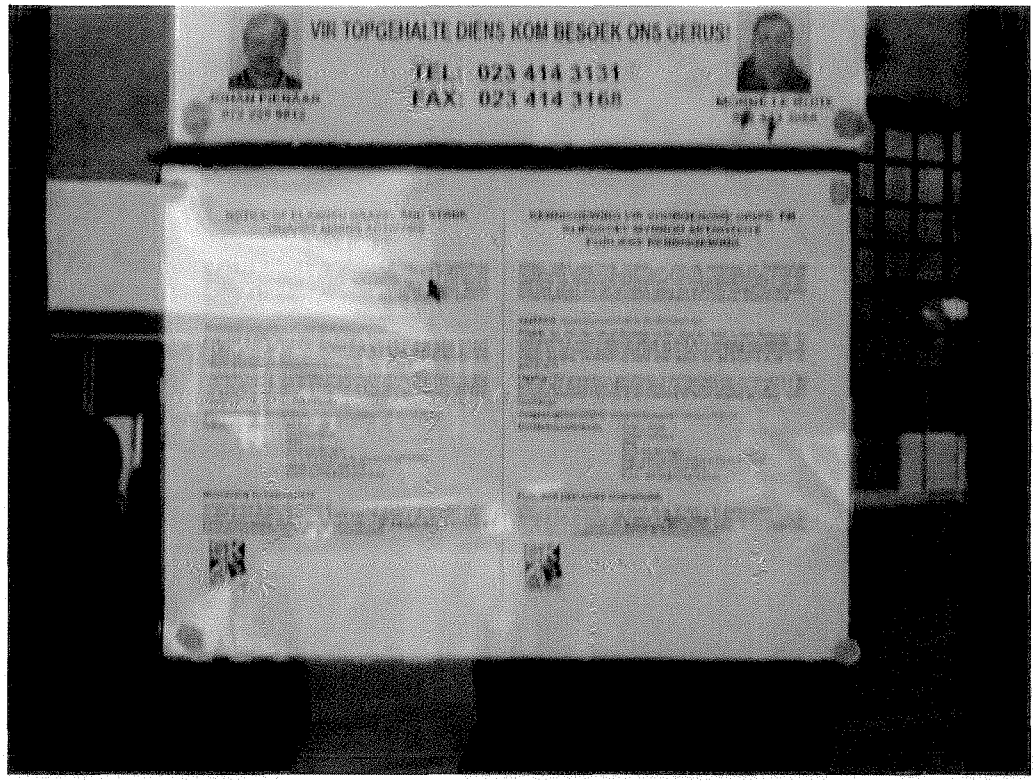
PUBLIEKE DEELNAME UITNODIGING

Indien u enige kommentaar en/of navrae wil rig, of indien u as geïnteresseerde en/of ge-affekteerde party wil registreer kan u gerus vir **Salome Venter** by bg. kontak besonderhede, vóór die kommentaar periode van **28 Februarie 2011** verstrek, skakel. Vir meer inligting kan u ook 'n Agtergrondinligtingsdokument van die Konsultant aanvra.

SKA AFRICA
SQUARE KILOMETRE ARRAY


MUNITYBOARD
SPAR
SERVICE
FOR SALE
ONS HET 'N BODE POS
BY CARNARVON KREDIET DIENSTE
BRING ASB'S CV MET AFSKRIFTE VAN
I.D EN ANDER RELEVANTE
DOKUMENTE


Bonteheuwel 396
NOTICE OF PLANNED GRAVEL AND STONE
QUARRY MINING ACTIVITIES
PUBLIC NOTICE
KENNISGEWING VIR VOORGENome GRUIS- EN
KLIPGROEF MYNBOU AKTIWITEITE
PUBLIEKE KENNISGEWING


VIR TOPGEHALTE DIENS KOM BESOEK ONS GERUS!
TEL 023 414 3131
FAX 023 414 3168


HANDEL


CONSTITUENCY OFFICE
KIESAFDELING KANTOOR
ANC

ADDENDUM 2F
Background Information Document

SHANGONI
Management Services (Pty) Ltd

KENNISGEWING VIR VOORGENOME GRUIS- EN KLIPGROEF MYNBOU AKTIWITEITE PUBLIEKE KENNISGEWING

KENNIS WORD INGEVOLGE ARTIKEL 10 VAN DIE MINERAAL EN PETROLEUM HULPBRONNE ONTWIKKELINGSWET, WET 28 VAN 2002 AND REGULASIE 3 VAN DIE MINERAAL EN PETROLEUM HULPBRONNE ONTWIKKELINGSREGULASIES GN 527 VAN 2004, GEGEE VAN DIE BEOOGDE GRUIS- EN KLIPGOEF MYNBOU AKTIWITEITE IN THE KAREEBERG EN KAROO HOOGLAND MUNISIPALE DISTRIK, NOORD KAAP.

Applikant: Square Kilometre Array South Africa (SKA SA)

Projek: Die myn van vier gruisgroewe en een klipgroef. Daar is twee klipgroewe wat geïdentifiseerd is, waarvan slegs een gebruik sal word vir die verkryging van materiaal. Die material wat van hierdie groewe verkry word, sal vir die bou van die MeerKAT padnetwerk, antenna grondslag (skottelplasing) asook nuwe geboue van die MeerKAT in die Karoo gebruik word.

Ligging: Vier gruisgroewe is geïdentifiseer op die Plase Meys Dam en Losberg wat in die besit van SKA SA is,en twee klipgroewe (groef 1 op die Plaas Saaifontein en groef 2 is die Carnarvon Munisipale Klipgroef), in die Kareeberg en Karoo Hoogland Munisipale Distrik, Noord Kaap.

Omgewingskonsultant: Shangoni Management Services (Pty) Ltd

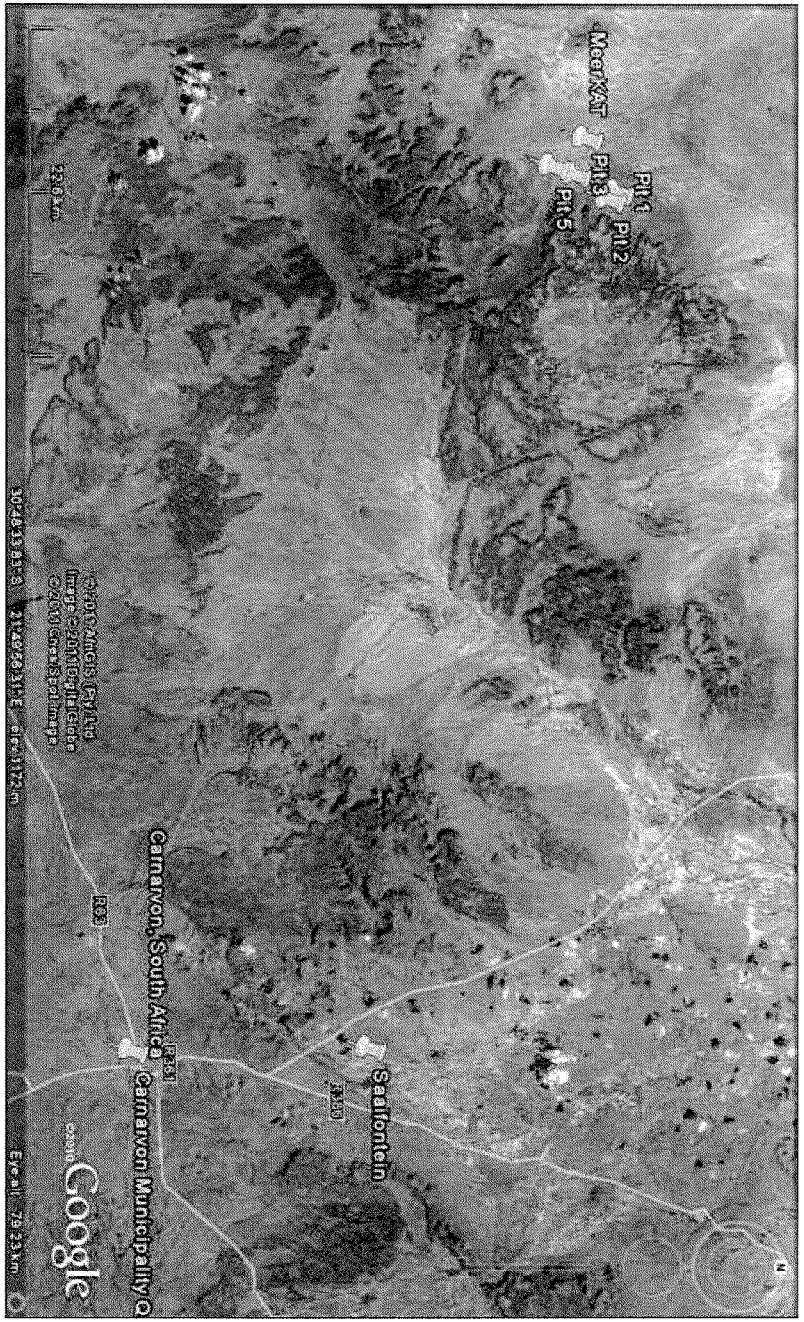
Kontakbesonderhede:

Posbus 74726
Lynnwood Ridge
0040
Tel: (+27) 807 7036
Faks: (+27) 12 807-1014 or (+27) 12 361 6191
Selfoon: (+27) 71 609 1078
E-pos: salome@shangoni.co.za

PUBLIEKE DEELNAME UITNODIGING

Indien u enige kommentaar en/of navrae wil rig, of indien u as geïnteresseerde en/of geaffekteerde party wil registreer kan u gerus vir **Salome Venter** by bg. kontak besonderhede, vóór die kommentaar periode van **28 Februarie 2011** verstrek, skakel. Vir meer inligting kan u ook 'n Agtergrondinligtingsdokument van die Konsultant aanvra.

SKA AFRICA
SQUARE KILOMETRE ARRAY



Proof of Background Information Documents

ADDENDUM 3
MITIGATION MEASURES

SHANGONI
Management Services (Pty) Ltd

1 Principles and Management Measures (Mitigation)

1.1 Rehabilitation Procedure and Standards

Overall Objectives:

1 Use available land, especially agricultural land, for the purposes to which it is best suited;

2 To minimise alteration of land capability therefore;

(a) To rehabilitate the area as close as possible to its former state;

(b) When the area is re-vegetated, to use only indigenous species;

(c) To slope the landscape to a gradient in line with the current slope; and

3 Reduce the impact on the land capability, to ensure that it can be rehabilitated once mining has been completed;

4 To minimise the area of land permanently affected by mining in the mining area;

5 Reduce the impact on the future land use, to ensure that it can be rehabilitated and potentially utilised once mining has been completed;

6 Minimisation of sterilisation and disturbance of the surface, by restricting land utilisation to the minimum reasonable required for the mining purpose; and

7 To preserve and maintain any sites of archaeological and / or cultural interest.

The major goal for surface mine rehabilitation is to ensure the adequate rehabilitation of all areas disturbed by mining operations. The rehabilitation of the mining area takes place in line with the actions described in this section.

Rehabilitation will continuously be monitored to determine whether the practices are effective. If erosion and limited re-vegetation takes place a detailed assessment of the seed mixture and possible fertilizer to be used will have to be done. It is recommended that three year monitoring take place to ensure that the practices were effective once the mining activities have ceased.

All heritage sites must be included in the rehabilitation plan. Please refer to **Section 1.1.4**.

1.1.1 Soil

Objectives:

1. To conserve soil resources disturbed by the development of the mine;
2. To prevent spillage or leakage of hazardous chemicals onto soils or into surrounding soils (contamination of soil);
3. To stockpile topsoil for future use;
4. To prevent erosion;
5. To prevent contamination of soils; and
6. The acidification, salination and mineralisation of soils through seepage of polluted water and irrigation must take place within legislative requirements.

Management:

1.1.1.1 Topsoil Stripping and Replacement

1. The stripping of topsoil will occur at a suitable distance ahead of the mining at all times to avoid the loss of soil and contamination of soil that will impact on the rehabilitation and re-vegetation practices.
2. It is essential to minimize the quantity of soil stockpiles, the time the topsoil is stockpiled and the number of times it is re-handled. The stockpiles should not be moved after initial stripping unless being replaced in their final location during rehabilitation practices.
3. Prior to the commencement of any top and subsoil stripping, all vegetation must be removed,
4. Invasive plants will be removed before topsoil is stripped.
5. Topsoil will be stockpiled separately from any subsoils and rock.
6. Suitable stockpiling areas will be identified, preferably in close proximity to the source of the topsoil. The areas will be calculated on the basis of the expected soil volume.
7. Stockpiles will be established within the bounds of storm water management infrastructure.
8. Soil stockpiles will be clearly identified as such.
9. To avoid compaction and consequent damage to the soils, equipment movement on the stockpiles will be limited.
10. The stockpiled top and subsoil's are not to exceed one and a half (1.5) meters in height, and are not to be compacted.
11. Topsoil will not be stored for more than 3 months.
12. Rapid growth of vegetation on the stockpiles will be promoted.

13. No waste will be disposed of at the stockpiled areas.
14. Erosion control measures will be implemented to ensure that the topsoil is not washed away and erosion gullies do not develop in the arable land.
15. The chemical and physical properties of topsoil to be used for rehabilitation must not be changed by introducing foreign material, gravel, rock, rubble or mine residue.
16. Topsoil and overburden are stockpiled and backfilled immediately after the removal of the saleable material. These areas are then sloped and sufficiently compacted where necessary. Unused roads are ripped and then re-vegetated.
17. The topsoil that has been replaced will still contain the original seeds and other material removed as part of the topsoil stripping exercise. Due to the fact that the topsoil is not stored for long it is foreseen that the topsoil fertility will still be appropriate to assist in the re-vegetation of the disturbed areas.
18. Map all roads, used and unused. The ripping and revegetation of unused roads must be included in the rehabilitation plan.
19. Sloping of the area must be done in accordance to the rehabilitation plan to be conducted.
20. Once the final landform has been created, soil replacement can begin. Refer to **Section 1.1.4**.Once an area has been sloped by the TLB the tipper trucks will replace the topsoil removed from the next area that is mined.

21. Compaction is the most significant problem with replacement of soil. Compaction must be minimised by using the right equipment. Too heavy machinery must not be used to replace the soil. Rather use a dozer than a grader.
22. Soils should also only be moved when it is dry to minimise soil compaction. Please note this may then lead to wind erosion or dust generation. Care must be taken to prevent wind blowing the placed topsoil away.
23. Where any soils have been compacted, soil will be ripped. Ripping is usually done by using a dozer with one or two ripper tines.
24. Ripping must penetrate through soil into the underlying overburden materials in order to ensure free drainage and to ensure root penetration.
25. Deep tillage must also take place to rip the subsoils as well as the topsoils. Successful subsoiling depends on shattering the compacted material. Wet soils will deform plastically without shattering. Moisture content at the time of subsoiling should therefore be low, preferably nearer to the permanent wilting percentage than the field moisture capacity. Therefore subsoiling must take place in the dry season, which is summer.

26. Despite soils having been ripped, the soils resettle and remain excessively compact. Monitoring of soil strength and bulk density should be used to confirm the existence of this happening.
27. Most replaced soils are a mixture of topsoil and sub-surface soils which have a lower organic content. Soils treated with organic amendments, sawdust, etc, have a greater resilience to compaction.

1.1.1.2 Erosion Control

1. Vegetation establishment in disturbed areas will be undertaken as soon as is practical, considering the regional rainfall and growing season (water availability being a constraint).
2. Where disturbed areas cannot be re-vegetated during the LoM appropriate measures will be taken to control erosion. These may include: contours, berms, runoff diversion canals, energy dissipaters, and application of straw mulches or soil binders to exposed soils.
3. The mine intends to observe the requirements of the Department of Agriculture (hereafter DA) in the design of effective erosion control measures on bare soils. These requirements are as follows:

    - Erosion control measures, such as contours, are required in all areas where slope gradients exceed 2% (1:50);
    - Engineered erosion control measures, such as berms and lifts, are required where slope gradients exceed 7% (1:15).

1.1.1.3 Soil Contamination

1. The spillage or leakage of hazardous chemicals onto soils or into surrounding soils must be prevented.
2. Storage areas and vehicle maintenance areas will be surfaced and will have appropriate runoff containment measures, such as bunds and canals, in place, if applicable.
3. All chemical, fuel and lubricant storage areas will be underlain by impermeable substrates and will have appropriate runoff containment measures, such as bunds and canals, in place.
4. Drums containing chemicals will be stored upright in a secure, bunded area with an impermeable surface.

5. Vehicles will be regularly serviced according to a pre-planned maintenance programme.
6. In the case of an incident, apply **Section 1.2.3**.
7. Refer to **Section 1.2.2** for the implementation of good waste management practices.

1.1.1.4 Soil Compaction

1 Vehicles may only drive on designated roads.

2 In the event of compaction, ripping must take place prior to re-vegetation.

1.1.2 Water

Objectives:

1. To ensure compliance with the GN 704 Regulations and conditions of approval of water use license;
2. To minimise the alteration of drainage patterns in the project area;
3. Remedy the effects of any disturbance to the bed and banks of a watercourse;
4. To prevent discharges of contaminated water to the environment, therefore:
   (a) To ensure that the ground water quality of surrounding ground water users is not adversely affected, by eliminating any source of the pollution; remedy the effects of pollution; and to monitor the water quality so as to identify any sources of pollution.
5. To prevent contaminated soil adversely affecting water courses.

Management:

1.1.2.1 Compliance with GN704 Regulations

1 The contractor may not:

(a) Locate or place any residue deposit, or associated structure within the 1:100 year flood-line or within a horizontal distance of 100 metres from any watercourse or estuary, borehole or well, excluding boreholes or wells drilled specifically to monitor the pollution of groundwater, or on water-logged ground, or on ground likely to become water-logged, undermined, unstable or cracked;

(b) Carry on any mining, or any other operation or activity under or within the 1:50 year flood-line or within a horizontal distance of 100 metres from any watercourse or estuary, whichever is the greatest;

(c) Place or dispose of any residue or substance which causes or is likely to cause pollution of a water resource, in the workings of the opencast excavation, or any other excavation; or

(d) Use any area or locate any sanitary convenience, for any substance which causes or is likely to cause pollution of a water resource within the 1:50 year flood-line of any watercourse or estuary.

2 The contractor must:

(a) Confine any unpolluted water to a clean water system, away from any dirty area;

3 The contractor must take reasonable measures to:

(i) Prevent water containing waste or any substance which causes or is likely to cause pollution of a water resource from entering any water resource, either by natural flow or by seepage, and must retain or collect such substance or water containing waste for use, re-use, evaporation or for purification and disposal as in **Section 1.2.2**;

(ii) Cause effective measures to be taken to minimise the flow of any surface water or floodwater into opencast workings, through cracked or fissured formations, subsided ground, sinkholes, outcrop excavations, entrances or any other openings;

(iii) At all times keep any water system free from any matter or obstruction which may affect the efficiency thereof.

1.1.2.2 Pollution of Surface Water

1. The mine will implement the control measures in accordance with the requirements of GN 704 Regulations and the corresponding Department of Water Affairs (hereafter DWA) M6.1 Operational Guideline. All storm water controls will be designed for the 1:50 year storm event.
2. Storm water management infrastructure will be installed before any construction and open pit mining activities commence.
3. Refer to **Section 1.1.1.3** for spillages and vehicle maintenance.
4. Refer to **Section 1.2.2** for the implementation of good waste management practices.
5. In the case of an incident, apply **Section 1.2.3.5**.
6. Major spillage incidents will be reported to the DMR, DWA, Environmental Department and the DA. Appropriate remedial measures will be implemented in consultation with these regulatory authorities.

1.1.2.3 Sewerage

1. Al sanitary facilities in the form of chemical latrines must be kept in good working order.

1.1.2.4 Stormwater

1. The strategy for managing stormwater is based on Regulation GN 704 and entails the following:
    - Clean and dirty stormwater is to be kept separate.
    - Channels and stormwater facilities are sized to retain the 1:50 year storm event.
    - Stormwater trenches / berms are not lined.
    - Channels are situated upstream and downstream of the various facilities.

1.1.3 Biodiversity

Objectives:

1. To minimise the area of disturbance and avoid disturbance of sensitive habitats.
2. To rehabilitate disturbed land to a stable physical state.
3. To control and eradicate all listed invasive plant species by means of methods that are appropriate for the species concerned and the environment in which it occurs.
4. To prevent disturbance of sensitive animal habitats.
5. To protect watercourses and wetlands and prevent alteration of these habitats directly and indirectly through sedimentation and pollution.
6. To maintain the diversity of species.
7. Prevent hunting and poaching.

Management:

Vegetation found on and around the site is not classified as rare or endangered. Very little vegetation is occurring on the site. Damage to vegetation will be insignificant.

1.1.3.1 Loss of Biodiversity and Ecological Function

1 Surface disturbance will be kept to a minimum. Activities will be concentrated in disturbed areas as far as is possible. Human and vehicular activity will be restricted to operational sites.

2 Disturbances at undisturbed sites will be prevented through the following measures:

(a) Mine staff will not be allowed to drive off-road into these habitats.
(b) Natural surface water flow to these areas will not be impeded.

(c) Dirty water from mine surface infrastructure areas will be retained within The Mine's storm water control system and prevented from flowing into these habitats.

(d) Erosion will be prevented or controlled where vegetation has been disturbed.

(e) Mine staff will not be allowed to hunt, collect plants or cut firewood in these habitats. Killing of animals that are perceived as dangerous, such as snakes will be discouraged.

(f) Indiscriminate disposal of waste in these habitats will be prevented.

(g) The spread of invasive plants into these habitats will be monitored and corrective action taken if required. Refer to **Section 1.1.3.2** for Invader Control.

1.1.3.2 Invader Control

1 Any action taken to control and eradicate a listed invasive species must be executed with caution and in a manner that may cause the least possible harm to biodiversity and damage to the environment.

2 The methods employed to control and eradicate a listed invasive species must also be directed at the offspring, propagating material and re-growth of such invasive species in order to prevent such species from producing offspring, forming seed, regenerating or re-establishing itself in any manner.

3 The following methods of control will be applied, this will be done in accordance with the species concerned and the ecosystem in which it occurs:

(a) Uprooting, felling, cutting or burning;

(b) Treatment with a Herbicide that is registered for use in connection with such plants in accordance with the directions for the use of such a Herbicide;

(c) Biological control carried out in accordance with the stipulations of the Agricultural Pests Act(Act No. 36 of 1983), the Environment Conservation Act(Act No. 73 of 1989), hereafter ECA, and any other applicable legislation;

(d) A combination of one or more of the methods prescribed in (a), (b), and (c) save that biological control reserves and areas where biological control agents are effective shall not be disturbed by other control methods to the extent that the agents are destroyed or become ineffective;

(e) The methods contemplated in (a) must also be applied with regard to the propagating material and the re-growth of Category 1, 2 and 3 plants in order to prevent such plants from forming seed or re-establishing in any manner;

(f) The performance of an act of control is not in itself proof that the objects of the control methods have been achieved and follow-up operations are mandatory to achieve the appropriate level of combating; and

(g) Where uncertainty exists about the presence or efficacy of any biological control agent, a biological control expert shall be consulted.

4 Selection of Pesticides to be Used

(a) Determine the type of pest or weeds that needs to be controlled, and the specific pesticide to be used for control;

(b) The pesticide must be registered under Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act(Act No.36 of 1947); and

(c) Obtain a Material Safety Data Sheet (MSDS) for the pesticide.

5 Operator Safety

All measures must be taken to ensure operators safety and label recommendations regarding safety are strictly observed. The following gives the toxicity rating according to the label colour band:

- Green : Acute hazard unlikely in normal
- Blue : Slightly hazard – caution
- Yellow : Moderately hazardous – harmful
- Red : Toxic to very toxic

(a) Operators should receive training on the:

- Basic pesticide awareness;
- Safe handling of concentrates and spray mixtures, toxicity of the pesticides, protective clothing and safe disposal;
- Application techniques to prevent waste; and
- Care of equipment – cleaning and disposal of washings.

(b) Personal Protective Equipment (PPE)

Always read the product label to determine what specific PPE is required for handling and application of a product. The minimum requirement when handling pesticides are:

- Adequate eye protection, goggles or a full-face shield;
- Rubber gloves and boots;
- Aprons to protect working clothes;
- Head protection; and
- Respirator or face-mask.

6 Environmental Safety

(a) Only pesticides with least environmental impact should be used;

(b) Precaution should be taken to ensure that these products are safely stored, handled, applied and disposed;

(c) During the application, damage to indigenous or other desirable vegetation product should be observed;

(d) Care must be taken to prevent contamination of water bodies.

7 Handling

Strict precautions should be applied when handling pesticides and the personnel handling the product must be fully aware of the precautions observed.

(a) Spillages:

- Absorbent materials must be available during the process to handle accidental spillages;
- In case of spillage, the spill must be contained immediately with absorbent;
- The contaminated material should then be disposed of as hazardous waste; and
- Concentrates and mixtures should never be decanted into or be mixed in drinking bottles or other food containers.

(b) All containers into which pesticides are decanted must be clearly marked and a copy of the original label secured to the container.

8 Disposal

(a) Empty pesticides containers should be treated as hazardous waste and correctly and safely disposed.

(b) All contaminated material must be paled in a sealable container marked with the following words e.g. "Pesticide/Toxic";

(c) Contaminated soil must be dug up and placed into a suitable container and sealed; and

(d) The container must be stored in a designated area, along with all other hazardous waste.

1.1.4 Topography and Sloping - Rehabilitation Design

The general guideline is to regrade spoiled areas to approximate contours and to ensure that the rehabilitated topography links seamlessly to the surrounding topography. Paddocks will be implemented on these contours in the form of whale-back tops.

The area will be contoured to prevent erosion, which could be caused by rainwater and surface flow and make the area free draining. With concurrent rehabilitation the estimated size of the final excavation to be backfilled, sloped and re-vegetated.

A bulldozer tends to create convex slopes when sloping an area. A concave slope is a more stable slope form; therefore it is advised to rather create concave slopes.

If needed, a network of drainage lines will be incorporated into the sloped areas. These drainage lines will ensure clean water run-off on the rehabilitated areas. Avoid impoundments on subsidence hollows which will cause water logging of the topsoil.

Once the final landform has been created, soil replacement can begin. Refer to **Section 4.6.1.1.1** for Soil Replacement.

1.2 Operational Procedures and Standards

1.2.1 Air Quality

Air quality includes noise management and control.

Objectives:

1 To ensure that the mine remains compliant with air quality legislation.
2 To limit public exposure to unacceptable health risks.
3 To prevent public exposure to disturbing noise.

Management:

The following general air quality management measures will be implemented during the LoM:

1.2.1.1 Fire

1 Fire equipment must be present and marked on site;
2 Fire equipment must be maintained;
3 All equipment that may potentially lead to a fire must be inspected regularly; and

4 Communicate the prohibition above to all contractors operating on site.

1.2.1.2 Dust

1 Removal of vegetation cover will be kept to a minimum. Refer to **Section 4.6.1.3.1**

2 Dust suppression through water bowsers will be utilised on all mine roads when required.

3 Strict speed limits of 30 km/h will be implemented.

4 Trucks transporting light/ wind- dispersible materials must be covered.

5 Establish temporary vegetation on the stockpiles, where possible, to prevent wind-blown erosion.

1.2.1.3 Air Emissions

1. List all diesel driven vehicles operating on public roads.
2. Reflect service / maintenance data / annual roadworthy inspections of all vehicles.
3. Undertake visual inspections on vehicles – black smoke.
4. Prioritize vehicles from oldest vehicles to newest and submit vehicles for vehicle emission testing as per GN R 1651 of 20 September 1974.

1.2.1.4 Health and Safety

1 The contractor must:

(a) Maintain a healthy and safe mine environment without risks to the employees.

(b) Identify the relevant hazards and assess the related risks to which persons who are not employees may be exposed.

(c) Ensure that persons who are not employees, but who may be directly affected by the activities at the mine, are not exposed to any hazards to their health and safety.

(d) Supply all necessary health and safety facilities and equipment to each employee.

(e) Maintain those facilities and equipment in a serviceable and hygienic condition.

(f) Ensure that sufficient quantities of all necessary PPE are available so that every employee who is required to use the equipment is able to do so.

1.2.1.5 Noise Measures

1. The following general noise management measures will be implemented during the LoM of the Mine:

(a) All diesel powered earthmoving and mining equipment must be of high quality and regularly maintained. Monitoring must be done, and included on a monitoring schedule.

(b) Any obvious increase in the noisiness of any equipment must result in that equipment being scheduled for a maintenance check. Reports as well as monitoring data must be kept.

(c) A good maintenance management scheme will be implemented to ensure that vehicles, plant and equipment are properly maintained thus reducing the occurrence of excessive emissions - for example, from faulty exhausts and vibrating surfaces.

2. If complaints of any noise pollution are made, noise levels at the applicable sites will be measured to assess the intensity of the alleged impact.

3. If significant increases in noise levels are identified technological alternatives such as silencers will be considered.

1.2.2 Waste Management

Objectives:

1. Avoid as far as possible the generation and production of waste.
2. Where the generation and production of waste cannot altogether be avoided, it must be minimized, re-used or recycled.
3. Where possible, dispose waste and mine residue in a responsible and sustainable manner.
4. Disposal of any waste, liquid or solid, must be done at an approved demarcated site.
5. Manage the waste in such a manner that it does not endanger health or the environment or cause a nuisance through noise, odour or visual impacts.
6. Cease, modify or control any act or process causing the pollution, environmental degradation or harm to health.
7. Eliminate any source of pollution or environmental degradation;
8. Remedy the effects of the pollution or environmental degradation;
9. Prevent the waste from being used for an unauthorised purpose;
10. Comply with any norm or standard or prescribed management practice; and
11. Prevent any employee or any person under his or her supervision from contravening these management measures or any Act in this regard.

Management:

4.6.2.2.1 Inventory and Separation

Develop a waste inventory, reflecting all waste streams, general and hazardous, area of generation, temporary storage requirements, classification (if hazardous), contractor for removal, and disposal methodology.

1.2.2.2 Temporary Storage of Waste

1. All ***general (non hazardous) waste*** generated from the Mine's activities, products or services will be placed by the mine in a container, such as skips or bins.

2. Ensure that:
   (a) The containers in which any waste is stored, are intact and not corroded or in any other way rendered unfit for the safe storage of waste;
   (b) The waste cannot be blown away;
   (c) Nuisances such as odour, visual impacts and breeding of vectors do not arise; and
   (d) Pollution of the environment and harm to health are prevented.

1.2.2.3 Transportation of Waste

1 Careful handling, collection, packaging, temporary storage and transportation of Hazardous Waste are essential for the maintenance of public health and for environmental protection. The requirements for transportation of hazardous waste are as follows:

2 The container must be manufactured from materials that can resist effects of the material contained and that can withstand the physical methods used for the handling and the transportation of the containers.;

3 Labelling of containers with the correct "Name" and "Description" of the contents is essential. Labelling of hazardous substances must be done according to the SABS Code 0233. When Hazardous Waste is transported, further labelling of bulk containers and placarding of the vehicle is also required.

4 Vehicles must be licensed as hazardous transporting vehicles.

5 Driver must be trained on the hazardous waste transporting, have the correct driver's license and be aware of he / she responsibilities.

6 The load must be secured when loading.

1.2.2.7 Duty of Care

1 The generator retains the ultimate responsibility for ensuring that the waste is handled, stored, transported and disposed of according to the legislation and in an environmentally sound and responsible manner.

2 Prevent illegal dumping of waste at different areas.

1.2.3 Hazardous Substances Procedures

Objectives:

1. Cease, modify or control any act or process causing pollution;
2. Comply with any prescribed waste standard or management practice;
3. Contain or prevent the movement of pollutants;
4. Eliminate any source of the pollution;
5. Remedy the effects of pollution; and
6. Remedy the effects of any disturbance to the bed and banks of a watercourse.

Management:

1.2.3.1 Handling and Storage of Hazardous Substances

1. Substances which are "hazardous" will have the physical details together with precautions and remedial actions recorded on the 16 point MSDS.
2. It is the responsibility of the contractor to ensure that all personnel within his/her area of responsibility are fully instructed and conversant in the use, handling and storage of hazardous substances.
3. The contractor will ensure that all designated personnel administering first aid and fire fighting adhere to the procedures and instructions laid down in the hazardous substances record sheets.
4. Spillage on any surface should be cleaned immediately as prescribed in the Hazardous substances sheets.
5. Wearing of PPE is compulsory when exposed to any hazardous substance.

1.2.3.2 Disposal

1. The Mine is to ensure that all chemicals when no longer required in his/her respective area of responsibility are disposed of via the approved methods.
2. It is the responsibility of the Mine to ensure that a copy of the MSDS is attached to every container (which has been wrapped in plastic, suitably sealed and stored) ready for disposal.

1.2.3.3 Bund Wall Specifications

All Bund walls will have the following specifications:

- The bund walls must be able to contain at least the volume of the largest container and an additional 10% of the largest container in the bunded area.
- The total capacity of the bund wall must be displayed on the bund wall or on the fence if the bunded area is fenced.
- No pipes or cables should run through the bund walls, except drainage pipes. As far as possible, all flanges, pipe fittings, valves and pumps etc. of the tank and the dispensing system should be situated well within the bund wall.
- Only galvanized steel pipes may be used for drainage. No rubber, plastic or PVC pipes will be allowed.

1. Demarcation of Bund Walls

A responsible person must:

- Calculate the volume of the bund wall.
- Prepare a conspicuous display mechanism i.e. a metal/ plastic plate, laminated sheet or painted on the bund wall.
- Attach the display mechanism in such a manner that the integrity of the bund wall will not be jeopardised.
- Ensure that only the volume of liquid that the bund wall is designed for is kept in the bund wall.

2. Cleaning of bunded areas

A responsible person must:

- Pump or drain contaminated water from bunded areas into a container.
- Clean the contaminated area with the appropriated absorbent in the case of spillage.
- Salvage and recycle any oil / fuel spilled inside the bund wall as far as possible.
- Dispose any absorbent material or polluted soil as hazardous waste.
- Empty drip trays regularly and stores them inside the bunded area.
- Ensure that no chemical, oil or fuel is present in the water before releases rain water from the bund wall.

- Ensure that the valves on the bund walls are locked at all times.

3. Inspection of bund walls

A responsible person must:

- Check on permeability, cracks and pollution of adjacent areas during regular inspection of bund walls.

1.2.3.4 Maintenance of Machinery

(a) Spillages will be minimized by conducting regular maintenance on equipment, machinery and vehicles according to a pre-planned maintenance programme.

(b) Storage areas and vehicle maintenance areas will be surfaced and will have appropriate runoff containment measures, such as bunds and canals, in place.

(c) During maintenance, drip trays must be provided under drums, and then disposed of in hazardous waste site.

1.2.3.5 Handling and Clean-up of Spills

Spillages will be minimized by conducting regular maintenance on equipment.

1. All spillages must be reported and attended to.
2. Should a spill occur, the person responsible/ discovering the spill should take the necessary steps to contain the spill in order to minimise the area that will be affected.
3. Once contained, the spill should be cleaned up in a manner appropriate to the spill, if uncertain refer to the MSDS for the fluid spilt.
4. Spills on an impermeable surface can be mopped up with a suitable absorbent material. If a reusable absorbent material is used this should be stored in a drum kept for this purpose until its life is exhausted. Once the absorbent material has reached the end of its life it should be disposed of in the hazardous waste bins and not discarded with general rubbish.
5. Should an oil, fuel or lubricant spill occur on a permeable surface (i.e. ground/soil) the area is to be remediate on site by the person responsible for the spill. If is not practical to remediate the site, as much of the contaminated soil as possible must be lifted and removed to the hazardous waste transit site for disposal.
6. The re-filling of spill kits is the responsibility of the employee who uses the kit.

1.2.4 Operational Safety Measures

1 Signage must be put in site to regulate traffic on the mine;

2 Traffic measures will be put into place. This will include speed limits, etc;

3 Implement security measures to prevent crime, loitering, etc.

1.3 Emergency Procedures

1.3.1 Fire Fighting Procedure

1 During a Fire

(a) Attempt to get water onto the fire from the fresh air-side of the fire, except if electrical equipment is burning.

(b) Use "stored pressure" fire extinguishers on the electrical fires.

(c) Remove where possible, explosives, acetylene bottles etc. from the fire area.

(d) Arrange to withdraw all persons from the affected area.

2 Management Systems

2.1 Environmental Awareness Training

Environmental training will take place on various levels within the organization. All employees are compelled to go through a process of general environmental awareness training.

The general environmental awareness training program is called the "SHE match" training program. The training program focuses on the following aspects:

(a) Explaining clearly what the environment is and what the environment consist of namely: air, water, soil, fauna, flora and people.

(b) Once participants have grasped the description of what the environment entails the training focuses on the potential impacts the mining activity may have on each one of these environmental components. This is done by making use of the aspect register where each one of the environmental aspects and associated impacts has been identified.

(c) To ensure that the training is effective visual aids are used. Photos are taken of actual and potential impacts occurring on site and in some cases role-play is used to generate a photo of a potential impact.

(d) The participants are then exposed to a poster that reflects the various environmental components. The various photos taken are posted on the poster on a rotational basis and the participants indicate (based on the visual component) what environmental component was or could have been affected by the activities portrayed on the photo.

(e) By doing this the participants visualize the action as well as the potential consequence (environmental impact) of their action.

(f) This general awareness training is done every two years and the poster is posted in the communal area where the impacts are visualized and the photos rotated on a monthly basis.

ADDENDUM 4
COST BREAKDOWN

CALCULATION OF THE QUANTUM - DME GUIDELINE									
Mine: SKA Gravel Quarries (Quarry 1-4)									Notes
		Date: February 2011							
No	Description	Unit	A Quantity	B Master rate	C Multiplication factor	D Weighting factor 1	E=A*B*C*DAmount (rands)		
		Step 4.5	Step 4.3	Step 4.3	Step 4.4				
1	Dismantling of processing plant and related structures (Including overland conveyors and power lines)	m3					0		No plant on site
2(A)	Demolition of steel buildings and structures	m2					0		No steel structures
2(B)	Demolition of reinforced concrete buildings and structures	m2					0		No reinforced concrete buildings
3	Rehabilitation of access roads	m2	0	17	1	1.05	0.00		Access road is 1km long
	Quarry 1		6000	17	1	1.05	107 100.00		Access road is 1km long
	Quarry 2		6000	17	1	1.05	107 100.00		Access road is 1km long
	Quarry 3		12000	17	1	1.05	214 200.00		Access road is 1km long
	Quarry 4		600	17	1	1.05	10 710.00		Accessroad is 100m long
4(A)	Demolition and rehabilitation of electrified railway lines	m					0		No railway lines
4(B)	Demolition and rehabilitation of non-electrified railway lines	m					0		No non-electrical line
5	Demolition of housing and/or administration facilities	m2					0		No adminitstration facilities
6	Opencast rehabilitation including final voids and ramps	ha	0	99600	0	0	0.00		No opencast rehab required
7	Sealing of shafts, adits and inclines	m3					0		No shafts, adits or inclines
8(A)	Rehabilitation of overburden and spoils	ha					0		No spoils or overburden
8(B)	Rehabilitation of processing waste deposits and evaporation ponds (basic, salt-producing waste)	ha					0		No process waste deposits
8(C)	Rehabilitation of processing waste deposits and evaporation ponds (acidic, metal-rich waste)	ha					0		No process waste deposits
9	Rehabilitation of subsided areas	ha					0		No subsided areas
10	General surface rehabilitation	ha	0	52600	1	1.05	0.00		Current distrubed area
	Quarry 1		3.9	52600	1	1.05	215 397.00		Current distrubed area
	Quarry 2		3.3	52600	1	1.05	182 259.00		Current distrubed area
	Quarry 3		3.9	52600	1	1.05	215 397.00		Current distrubed area
	Quarry 4		4	52600	1	1.05	220 920.00		Current distrubed area

11	River diversions	ha	0				0		**No river diversions**
12	Fencing	ha	0	60	1	1.05	0.00		**No additional fencing. Mine is currently fenced**
13	Water management	ha	0	20000	0.25	1.05	0.00		**Existing water manageemnt structures**
	Quarry 1		3.9	20000	0.25	1.05	20 475.00		**Storm water structures**
	Quarry 2		3.3	20000	0.25	1.05	17 325.00		**Storm water structures**
	Quarry 3		3.9	20000	0.25	1.05	20 475.00		**Storm water structures**
	Quarry 4		4	20000	0.25	1.05	21 000.00		**Storm water structures**
14	2 to 3 years of maintenance and aftercare	ha	0	7000	1	1.05	0.00		**Maintenance on the current area**
	Quarry 1		3.9	7000	1	1.05	28 665.00		**Vegetation and erosion**
	Quarry 2		3.3	7000	1	1.05	24 255.00		**Vegetation and erosion**
	Quarry 3		3.9	7000	1	1.05	28 665.00		**Vegetation and erosion**
	Quarry 4		4	7000	1	1.05	29 400.00		**Vegetation and erosion**
15 (A)	Specialist study	Sum							
15 (B)	Specialist study	Sum							
Sub Total 1 (Sum of items 1 to 15 above)							**1 463 343.00**		
1	Preliminary and General	12.5% of Subtotal 1	Weighting factor 2 (Step 4.4)				182 917.88		
2	Administration and supervision costs	6.0% of Subtotal 1					87 800.58		
3	Engineering drawings and specifications	2.0% of Subtotal 1					29 266.86		
4	Engineering and procurement of specialist work	2.5% of Subtotal 1					36 583.58		
5	Development of a closure plan	2.5% of Subtotal 1					36 583.58		
6	Final groundwater modelling								
Sub Total 2 (Subtotal 1 plus sum of management and administrative items, 1 to 6 above)							**373 152.47**		
7	Contingency	10.0% of Subtotal 1					146 334.30		
Sub Total 3 (Subtotal 2 plus contingency)							**1 982 829.77**		
VAT (14%)							277 596.17		
GRAND TOTAL (Subtotal 3 plus VAT)							**2 260 425.93**		

ADDENDUM 5
ENVIRONMENTAL FEATURES

SHANGONI
Management Services (Pty) Ltd

DESCRIPTION OF THE ENVIRONMENT MINING ACTIVITIES

Addendum 1	**Biodiversity and Ecological Baseline Specialist Study**
Addendum 2	**Cultural Heritage Resources Impact Assessment**

1 Geology

1.1 Regional Geology

The geological map of the area indicates that the site is underlain by shale, sandstone and mudstone of the Ecca Group.

The lower lying terrain consists of the Tierberg Formation (grey mudstone and secondary siltstone), while the steep slopes and cliffs are made up of the Waterford Formation (alternating sandstone, siltstone, grey shale and mudstone). Dolerites that intrude the sedimentary rocks as sills, dykes and blows are also encountered. The dolerite can be described as dark grey, medium to fine crystalline rock.

Tertiary deposits might include the gravels contained in braided river channels and alluvial fans that radiate from the mountainous areas. Alluvial soils occur along streams, channels and pan areas. Aeolian sand is present in the form of dunes and patches. Soil conditions are not uniform and are laterally variable.

1.2 Local Geology

The borrow pit is located on a flood plain and consist of a horizon of fine calcified Quartzite gravels and Calcrete, underlain by Mudstone and Shale gravel.

Pedogenic Deposits: Pedogenic deposits consisting of fine and medium coarse Calcrete gravels and calcretions were encountered across the site. Vertically the lense of Calcrete is between 600mm and 1400mm thick. The overall consistency is loose. The results of the soil testing indicate the materials to be plastic, the Grading Modulus varying between 1.5 and 1.8.

Mudstone and Shale Gravel: Medium and coarse gravel was encountered as a second horizon and may extend to 1500mm deep. The material is described as medium and coarse gravels of Mudstone and Shale, with little or no fines and binding material.

2 Climate

2.1 Regional Climate

The study area falls in a semi-arid region with very little summer rainfall. The area experiences typical desert like conditions with extreme temperatures experienced between day/ night as well as summer/ winter. Summers are typically hot and dry, whereas winters are icy and dry with dew and frost typical during the night.

2.2 Precipitation

2.1.1 Mean Monthly and Annual Rainfall

Carnarvon normally receives approximately 102mm of rain per year, with most rainfall occurring mainly during autumn. It receives the lowest rainfall (0mm) in September and the highest (30mm) in March. Within approximately 20 years from 1961 to 1990, the area experienced between 2 to 7 days of rainfall greater or equal to 1mm per month, with the winter months experiencing the most number of days.

2.3 Temperature

The monthly distribution of average daily maximum temperatures shows that the average midday temperatures for Carnarvon range from 15.3°C in June to 30.8°C in January. The highest recorded temperature is at 41°C during February and -7°C during June (Data recorded from 1961 to 1990 taken from Environmental Impact Assessment Report for Proposed Karoo Array Telescope (MeerKAT) Project on Farms Losberg (73) and Mey's Dam (68) Near Carnarvon in the Northern Cape). Detailed analysis of the weather records gathered from 1961 to 1990 at the nearby weather station at Calvinia, reveal the following:

2.4 Evaporation

The annual evaporation rate is approximately 2300mm per annum.

2.5 Extreme Weather

Frost occurs from April to October.

3 Topography

3.1 Overview of Region

The site is situated on a morphological unit described as slightly irregular plains and pans. The site is situated on an area with a slope index of less than 2% and are therefore generally flat. This can also be seen when looking at the orthophotos of these sites.

4 Soil

The site is situated on a soil type classified as SC. Strongly saline soils generally occur in relatively deep deposits in low lying arid areas. These site has a low to moderate water holding capacity with abrupt textural transitions transparent. The soils have loamy sands dominant and therefore are moderately susceptible to wind erosion. These areas are covered by 15% to 35% clays. These sites have no swelling clays. These soils have no favourable structure for arable land.

The area has soils with a low to moderate potential for water erosion. These soils do not have poor drainage constraints, and have no beneficial water retaining zones for plant roots. The organic carbon content is very low with pH as high as 8.4. Soils are not susceptible for acidification and have a calcareous leaching status.

5 Pre-Mining Land Capability and Land Use

5.1 Pre-Mining Land Capability

5.1.1 General

The Northern Cape Province forms part of the former Cape Province and includes a number of communal areas. While it is the largest province in South Africa, it is also the most sparsely populated. The Northern Cape is characterised by very hot summers and very cold winters. Its arid nature has resulted in activities such as stock and game farming being more widespread than crop farming. Mining is also an important activity and the Province is the diamond centre of South Africa, with Kimberley as its capital.

The Northern Cape is predominantly arid and thus, only 2% of the land is used for crop farming. The majority of the Province is used for stock farming (including cattle, sheep or goat farming) and mining, whilst only 3.98% is reserved for conservation (Pixley Ka Seme District Municipality Integrated Development Plan Volume 1). Overgrazing is therefore one of the main causes of land degradation in the Northern Cape. Mining has had serious negative environmental consequences in cases where it has been conducted without due recognition of the need to mitigate negative impacts.

In South Africa the main desertification problems lie across large parts of the Northern Cape. This is due to the dry and arid characteristics of the Northern Cape. It should also be acknowledged that desertification is strongly linked to poverty and food security as a result of the social and economic importance of natural resources and agriculture to people living in poverty. This is especially true of the Northern Cape since the majority of the people live below the poverty line and have no choice but to overexploit the land. Mining is slowly decreasing in the Province and retrenched workers often purchase livestock to earn a living, thus ultimately contributing to increased land degradation.

5.1.2 Site Specific

5.1.2.1 Land Cover

According to the DEAT Environmental Potential Atlas, the site is situated on a shrubland land cover.

5.1.2.2 Agricultural Potential

Due to many aspects such as soil, climate and water scarcity, these areas have a very low agricultural potential. According to Agricultural Geo Information System these areas are non-arable and have a low potential for grazing. Grazing for these areas will most likely only be sheep with a low grazing capacity of 41-60hectare / animal unit. The Gross Domestic Product for Agriculture is very low at less than R150 per hectare. Lastly, according to the Agricultural Act No. 70, these areas are classified as non-agricultural land.

5.1.2.3 Pre-Mining Land Use

Pre-mining land use is vacant or unspecified. The site has been used to remove gravel.

5.1.2.4 Historical Agricultural Production

The site has been used for some type of grazing in the past.

5.1.2.4 Evidence of Misuse

The whole of the site has already been disturbed by quarry activity.

5.1.2.5 Existing Structures

There are no existing structures on the site.

6 Natural Vegetation

6.1 General Description

The site lies mainly in the general area that supports Bushmanland Basin Shrubland, according to the new vegetation map of South Africa (Mucina& Rutherford, 2003).

6.2 Site Specific

The site has as already been disturbed by quarry activity and very few indigenous vegetation species are present on site. Invader plants such as *Tribulus terrestris* are dominant.

Some of the vegetation species identified on the Gravel Quarry Sites during the surveys include:

- *Salsola tuberculata*
- *Stipagrostis obtusa*
- *Tribulus terrestris* (invader plant)
- *Pentzia incana*
- *Helichrysum sp*
- *Eriocephalus ericoides*
- *Galenia africana*
- *Ledebouria marginata*
- *Asteraceae sp*
- *Lebeckia spinescens*
- *Monechma incanum*
- *Phaeoptilum spinosum*
- *Atriplex lindleyi subsp. inflata*
- *Acacia karroo*
- *Stipagrostis sp*
- *Psilocaulon absimile*
- *Mesembryanthemacea sp*
- *Lycium sp*
- *Rhigozum trichotomum*
- *Prosopis glandulosa* (invader plant)
- *Phaeoptilum spinosum*
- *Salsola tuberculata*
- *Osteospermum spinescens*
- *Pteronia tricephala*
- *Limeum aethiopicum*

- *Walafrida saxatilis*
- *Pennisetum sp*
- *Zygophyllum gilfillanii*

6.3 Rare or Endangered Species

No red data flora species were identified during the surveys.

This vegetation type (Bushmanland Basin Shrubland) is listed as Not Threatened in the South African National Spatial Biodiversity Assessment (Rouget *et al,* 2004). The Upper Karoo Hardeveld is also listed as Not Threatened. All of the study sites are surrounded by extensive homogenous vegetation areas.

6.4 Invasive Alien Vegetation

During field surveys *Tribulus terrestris* on Gravel Quarry has been found on the site.

6.5 Conclusion

The proposed quarry activities will not impact significantly on the biodiversity pattern at neither the community or at an ecosystem level.

7 Animal Life

7.1 Site Specific

7.1.1 Amphibians and Reptiles (Herpetofauna)

Approximately 38 reptile and 8 amphibian species are likely to inhabit the area. The following reptiles were observed on site during the survey:

- *Trachylepis capensis* (Cape Skink);
- *Trachylepis varia* (Variable Skink).

The only Red Listed reptile species which may occur within the study area is the Fisk's House Snake (*Lamprophis fiskii*); the IUCN (2001) lists this species as Vulnerable. Very little is known of the habitat requirements of this species therefore it cannot be confirmed that the species is likely to occur within the study area.

No amphibian species were observed on any of the sites during the surveys. No Red Listed amphibian species are known to occur in the area of the development site.

The proposed development will not have significant impacts on reptiles or amphibians. The reptiles and amphibians may move to surrounding areas when quarry activities start.

7.1.2 Mammals

Several mammal species are supported in the Nama Karoo. The big mammal species however were replaced with sheep. Introduced Springbok and Kudu are the largest mammal species occurring within the area. Some 46 mammal species are known to occur in the bigger area (Smithers 1983). The following mammal species were observed on site during the survey:

- *Hystrix africaeaustralis* (Porcupine spoor);
- *Raphicerus campestris* (Steenbok);
- *Caracal caracal* (Caracal spoor).

Various small borrowing pits were observed within the study area indicating rodent populations.

7.1.3 Birds (Avifauna)

189 bird species are known to occur in the bigger area (Hockey *et al,* 2006). The following species were observed during the survey within the study area:

- *Alopochen aegyptiaca*
- *Buteo rufofuscus*
- *Corvus albus*
- *Oena capensis*
- *Philetairus socius*
- *Ardea cinerea*
- *Columba guinea*
- *Elanus caeruleus*
- *Falco tinnunculus*
- *Pterocles namaqua*
- *Upupa Africana*
- *Mirafra albescens*
- *Hirundo rustica*
- *Corvus capensis*
- *Cercomela schlegelii*
- *Teylophorus zeylonus*

The proposed development will not impact significantly on any listed bird species. Bird species known to occur in the study site that will be impacted upon by the proposed development, would simply fly away and move to the surrounding areas when mining activities start. No sensitive breeding or roosting sites were observed on the proposed sites.

7.1.4 Other Animals

Insect species observed during the survey includes:

- *Anax imperator* (Blue Emperor);
- *Ischnura senegalensis* (March Blue tail);
- *Locustana pardalina* (Brown Locust);
- *Empusa guttula* (Cone-headed Mantid);
- *Rhachitopis* sp;
- *Oedaleus* sp (Yellow Wings);
- *Quintilia* sp (Karoo cicadas);
- *Julodis cirrosa* (Brush Jewel Beetle);
- *Mylabris oculata* (CMR Bean Beetle);

- *Eurychora* sp (Mouldy Beetles);
- *Danaus chrysippus* (African Monarch);
- *Junonia hierta* (Yellow Pansy);
- *Messor capensis* (Harvester Ant);
- *Camponotus fulvopilosus* (Bal-byter);
- *Arachnid* spp.

The proposed activities will not have significant impacts on invertebrate species. No known rare or special species were observed or are known to occur or breed on any of the sites.

7.2 Rare or Endangered Species

Refer to **Addendum 1** for a list of the Red Data listed mammal species which are predicted, or confirmed to occur in the general area.

8 Surface Water

8.1 Surface Water Quantity

8.1.1 Catchments and Sub-Catchments and Affected Water Courses

The site is situated in the D54C Quaternary Catchment area which falls within the Lower Orange Water Management Area, which forms part of the Orange Primary Catchment and the Orange / Vaal Drainage Region.

There are many drainage lines surrounding the area, but no drainage line crosses through the site.

8.1.2 Mean Annual Run-off from Sub-Catchments

90 % of the runoff generated in the two Orange River Water Management Areas is generated in the Upper Orange Water Management Area. The bulk of the runoff generated in the Lower Orange comes from the Fish River in Namibia (approximately 60% of the Lower Orange runoff) but this only enters the Orange River close to the river mouth.

Run-off from the Orange Primary Catchment is 1 008 to 7 194X10^6 m^3. Run-off from the Quaternary Catchment is 42 to 84X10^6 m^3.

8.1.3 Dry Weather Flow

There is no normal dry weather flow, the rivers are non-perennial and only flow during wet weather conditions.

8.2 Water Quality

No information exists on the water quality of the area since no surface water bodies are present on any of the sites.

8.3 Surface Water Use

The abstraction of water resources in the Orange sub-WMA is used primarily for irrigation and livestock feeding.

8.4 Water authority

The water authority is the Lower Orange Water Management Area.

8.5 Wetlands

There are no wetlands in the area.

9 Groundwater

Please note no mining activities will take place within the groundwater.

9.1 Presence of Boreholes and Springs

There are a number of boreholes in the area.

9.2 Depth of Water Table

No wetlands occur on the site. The depth of the water table around the site is generally around 12-20m, although there are a number of boreholes in the area where the water table is less than 5m below the surface.

9.3 Groundwater Use

Groundwater utilisation is of major importance across wide areas and often constitutes the only source of water. It is mainly used for rural domestic supplies, stock watering and water supplies to towns. As a result of the low rainfall, recharge of groundwater is limited and only small quantities can be abstracted on a sustainable basis. Artificial recharge of groundwater is practised in some areas where water from small dams is transferred through pipelines into boreholes located in the area of recharge of the main production boreholes. Aquifer characteristics (borehole yields and storage of groundwater) are also typically unfavourable because of the hard geological formation underlying most of the area. Groundwater also constitutes an important source of water for rural water supplies in the Orange River, although only a small proportion of the total available water. Much of the groundwater abstracted near the rivers, is actually recharged from the river and could also be accounted for as surface water.

9.4 Groundwater Zone

The area is situated within the North Western Cape groundwater region.

10 Air Quality

There is currently no coordinated air pollution monitoring network in the Northern Cape. Existing monitoring is fragmented as it is mainly done by industries and results are therefore not readily available. Air quality for the Carnarvon area will not be impacted upon by the mining as this area is mostly focused on agricultural activities such as grazing.

11 Noise

At present, noise is not an issue in the area as there are no large industries or mining. No adjacent houses within a radius of 5 km are situated from the quarries.

12 Sites of Archaeological and Cultural Interest

12.1 General

Carnarvon was originally established in 1860 as the village of Harmsfontein, it was located within the territory of Schietfontein, the only water source in the area. Early documented data mention that Schietfontein originated from the travellers P.B. Borcherds, Henri Lichtenstein and W. J. Burchell in the early nineteenth century. In their travels through the hot and barren region of the Karee Mountains, Schietfontein presented them with fresh water and therefore an ideal resting-place. The word "karee" is indeed a Khoi word meaning dry or barren. Burchell himself ascribes the name "Schietfontein" to an earlier skirmish between white colonial settlers and the San people.

The first community to permanently settle in the Schietfontein area was a Xhosa faction, under leadership of Jan. Apparently, the Cape government had cordial relationships with Jan and his people and wished to use them as a buffer between the colonists and the San.

In 1839 the Cape Governor, Sir George Napier, officially granted 98 000 morgen of land to the Xhosa people of Jan K. This included the farms of Schietfontein, Harmsfontein and Rhenosterpoort. Before the end of that year 110 Xhosa families had settled in this area.

The Rhenish Mission (1847-1943) is also located in Carnarvon. In the year 1847, the Reverend C.W. Alheit started his ministry in Schietfontein area. He originally pitched his tent near the site on which the first parsonage was to be erected in the 1850's. This parsonage was restored by the Department of Tourism of the Northern Cape and was officially opened as an Information Centre of the Kareeberg Municipal area (serving the communities of Carnarvon, Van Wyksvlei and Vosburg) in April 2005.

The centre of Carnarvon town today also bears witness to the originating years of the Rhenish Mission, during the time of its pioneers, Rev. Alheit (1847-1865), Rev. P. Sterrenberg (1865-1891) and Rev. H. Stremme (1893-1902).

The most prominent architectural heritage from the pioneering years of the Rhenish mission in the town centre is:

- The restored Alheit parsonage utilized as Information Centre (1850's);
- The church building erected in 1858 and the addition of its clock tower in 1899;
- The old school building (1871); and
- The present parsonage (1912).

12.2 Site Specific

As far as could be determined no sites of archaeological or cultural interests are located on this site

13 Sensitive Landscapes

13.1 Overview

In terms of the Department of Environmental Affairs and Tourism (hereafter DEAT) guidelines for integrated environmental management (DEA, 1992) sensitive landscapes is a broad term applying to:

- Nature conservation or ecologically sensitive areas – indigenous plant communities (particularly rare communities and forests), wetlands, rivers, river banks, lakes, islands, lagoons, estuaries, reefs, intertidal zones, beaches and habitats of rare animal species;
- Sensitive physical environments – such as unstable soils and geotechnically unstable areas;
- Important natural resources – river systems, ground water systems, high potential agricultural land;
- Sites of special scientific interests;
- Sites of social interests – including sites of archaeological, historic, cultural, spiritual or religious importance and burial sites;
- Sites of outstanding natural beauty, panoramic views and scenic drives; and
- Green belts or public open space in municipal areas.

The sites are not near any conservation area, and total sensitive features mapped for the area is low to zero. These areas fall outside of the Succulent Karoo Ecosystem Programme. The NSBA Terrestrial Ecosystem status is "Least Threatened".

14 Visual Aspects

The aesthetic problems in the region are mainly concerned with the question of waste and litter. In the rural areas (farms), the absence of a waste collection system has resulted in indiscriminate dumping, particularly along the main roads and in river dongas, which give many of these areas an air of decay and neglect. In the urban areas, the lack of priority given to the prevention of littering and the absence of any attempt to encourage greater civic responsibility in this regard has resulted in degraded conditions with litter strewn throughout the CBD (Central Business District).

Some scenic mountains are situated in the area. The site has some present visual impacts as a quarry already exists.

The four gravel quarries are situated on a dirt road away from normal traffic. This road is only used by a very small amount of farmers and the SKA SA.

15 Regional Socio-Economic Structure

15.1 Local Economy

15.1.1 Population and Household Size and Income

The average Pixley Ka Seme District Municipality household size is 4.52 persons per household. There are approximately 0.72 children aged 6 years and younger per household in Pixley Ka Seme and 0.35 persons aged 60 years and older in households.

The age structure of the population is similar to that of the Northern Cape. An average of 16% of the population is between 0-6 years old while 8% are 60 years old or older. A further 31% are in the school-going age group of 7 to 19 years. The economically active age group of 20 to 59 years old accounts for almost half the population (46%). The implications of this population structure are a higher demand on the provision of social and physical facilities, like schools, primary health care centres, etc. in the district

The following issues were identified in the IDPs of local municipalities regarding the youth:

- Rise in teenage pregnancies;
- Lack of sport and recreational centres;
- Substance and alcohol abuse;
- High unemployment under the youth;
- Homelessness;
- Street children;
- Increasing rate of HIV infections amongst the youth;
- High drop-out rate at school;
- Lack relevant skills that are required for employment;
- High levels of domestic violence and rape;
- Vulnerability; and
- Lack of children's homes.

The Pixley Ka Seme region and the Northern Cape do not have skewed populations with regards to sex ratios. 51% of the population is female. Kareeberg has the highest female ratio at 53%. Farm households have low females ratios with only 45% of the population being female. While the population size in 1996 was 176 293, the population in 2002 is estimated at 186 375. A negative growth rate is forecast for the rural population and by 2015 the towns are also expected to show a negative growth rate of 1.29%.

Notwithstanding the low population growth, the prevalence rate of HIV is a major factor in shaping future population estimates. The HIV/AIDS prevalence rate of Pixley Ka Seme in 2001 was only marginally lower than the Northern Cape average (14.4% compared to 15.85% respectively), and well below the South African prevalence rate of 24.5%. Although it is not high by comparison to South Africa, it is undoubtedly a factor which will impact on the growth and welfare of the Pixley Ka Seme population.

Migration is also a determinant of population growth. Both urban to urban migration and rural to urban migration are relevant in Pixley Ka Seme DM. Rural to urban migration is perceived as the dominant migration type at present. A rapid decline in net migration into the province

is predicted. With declining economies, the district is unlikely to attract immigrants. However, while the Pixley Ka Seme population may appear to be stagnant, the towns are growing as rural households move to towns to access better facilities and services. This trend is expected to continue with the access to health and education facilities as major pull factors.

Because water and sanitation supply is provided at a household level, the growth in households is more relevant than population growth. In many instances the population may be static (i.e. no population growth) BUT the settlement is increasing with the formation of new households. Household size has decreased over time.

The farms have experienced negative population growth and this is predicted to continue. Most of the towns have also experienced low growth rates. Exceptions where higher growth rates have occurred seem to be at: Hopetown, Victoria West, De Aar and Douglas.

15.1.2 Rate of Economic Growth

The Economic growth of the district was 1.3% between 1995-2003, which is below the national average of 2.5% and represents a significant barrier to meeting the material needs of many communities in the region.

15.1.3 Employment and Industry

Agriculture

Wheat maize and lucerne are very important crops but the possibility exists that there can be a shift to alternative high value crops. Small stock farming is one of the attributes of the region and therefore the region has a strong history of wool farming and this can benefit farm diversification into the more lucrative ventures, like cashmere production.

Stock farming

Stock farming takes place throughout the whole region and is mainly focussed on small stock, consisting of sheep and goats. The sheep farming produces mutton and wool. There are several abattoirs in the region with the largest located in the Emthanjeni Municipal Area with a capacity of 2000 sheep slaughtered per day. At present up to 1000 sheep are slaughtered daily in Umsobomvu Municipal Area.

The huge potential for the region lies in adding value to the products within the area. At present products are leaving the areas in unprocessed form.

The area also produces large quantities of wool that are processed in the Eastern Cape. The area is surely the largest wool-producing region in South Africa and again offers the potential of benefaction within the region.

Irrigation

The Orange River and the Vaal River run through the region and irrigation farming is confined to outline the areas where irrigation farming is practised along these rivers. These products also leave the area in the raw form and there is potential for benefaction within the Pixley Region. Products produced under the climatic conditions in the region are considered as some of the healthiest available.

Game Farming

The region has a long history of game farming. Game farming industry provides possibilities of a reasonable income. The Orange and Vaal rivers are major tourist attraction and the district also have two game reserves.

Industry

Industries in the area are mostly confined to light industries. The rivers provide a constant supply of water in certain parts of the region, which at least offer the potential of using the products produced in the area as a basis for benefaction. The N1 and N12 routes link the two main economic centres, i.e., the Rand and the Western Cape and both these routes carry thousands of tons of valuable goods and material every day to all parts of the country.

The N9 and N10 routes link Namibia and Gauteng with the coastline of Port Elizabeth, which is also the nearest export harbour for the Pixley region.

The railway network around De Aar and Noupoort is one of the largest in South Africa and no fewer than 30 trains pass through the station daily at De Aar in both directions; to and from the main economic centres in South Africa. On average 9 freight trains between Gauteng and the Western Cape pass through the station at De Aar every day, 4 to Port Elizabeth, 2 to Namibia and 10 from De Aar to Kimberley. The station at De Aar has direct or indirect links to virtually every corner of South Africa. An average of 1 000 000 tons are conveyed through this station every month and the capacity exists to increase this tonnage with ease.

Eskom has a major presence in the District. A regional Office of Eskom is situated in Colesberg and Eskom is represented in nearly every town in the Pixley.

One of Eskom's largest sub-stations – Hydra – is located near De Aar.

15.2 Infrastructure

15.2.1 Transport

The people in the towns use micro-busses, private cars as well as walking to go to their places of employment. As far as public taxis are concerned they operate mostly during morning hours when the workers are going to work and in the afternoon when they are going back from work to their respective homes. On Saturdays the taxis operate from morning to 13h00 when businesses are open. There are no taxis on Sundays.

The use of bicycles is also very popular but users express that there is no planning for cyclists as there are no fully developed tracks in the whole region. As a result of this scenario cyclists are always in conflict with either vehicular traffic or pedestrians.

As mentioned earlier, the vicinity of the townships to the places of employment which is concentrated in the Central Business District (CBD) of all the towns, also encourage people to walk to their respective work places. In the event of the existing situation, a full development of pedestrian walkways and crossing points will be helpful in the elimination of pedestrian and vehicular conflicts in towns, especially in areas where lack of such facilities can be a source of danger to pedestrians.

15.2.2 Waste Management

From planning and environmental point of view, solid waste is supposed to be collected two days per week in residential areas while those from industrial and commercial areas should be collected on a daily basis. Of the district total households (37 690), the majority of them, 24 596 or 65.3 %, have some form of formal refuse removal which is regularly collected on a weekly basis. At local or town level, however, some municipalities, e.g. Ubuntu, Kareeberg, and Siyancuma municipalities many households still dump refuse in their own dumping grounds. It is important to note here that the use of this form of removal represents great risk to public health, besides the anaesthetic impact it produces to the physical environment.

The Kareeberg Local Municipality has an Integrated Water and Waste Management Plan.

The waste service delivery of the Kareeberg Municipality is co-ordinated from Carnarvon. A regular waste removal service is provided to all the urban areas in the Municipality. The farming areas of the Kareeberg Municipality do not receive a waste removal service. The provision of such a service is at the moment not envisaged by the Municipality. There are also no private waste contractors active within the municipal area.

The service delivery for the various towns is managed from the regional service delivery centres due to the distance of the towns from each other. Each town is therefore responsible for the day to day management of refuse collection.

The Kareeberg Municipality has a set of by-laws that pertain specifically to the Council's responsibility for the removal of refuse, illegal activities, payment of fees and penalties. The current by-laws do not however address the control and management of the landfill sites e.g. access to the site, waste accepted at the site or waste minimisation and are very general.

15.2.3 Energy Supply

Electricity is mainly generated in the Northern Areas of the country and distributed to the surrounding smaller towns of the southern regions via the central corridor.

The Vanderkloof Dam is used by Eskom to generate peak demand electricity. The 112m high dam wall houses two 120-megawatt generators, which supply peak demand. Power is generated by turbine engines with an outflow of 150 cubic metres of water per second, into the second largest dam in South Africa.

15.2.4 Water Supply

According to the IDPs of the Local municipalities, less than half of the total households were provided with a water tap in their own houses and about 36% had access to one outside the house but on their sites. In the farms/ rural areas some households rely on natural water sources and boreholes as an alternative source. The boreholes are not sustainable and an alternative source will have to be found to supply water to these households.

Critical problems regarding water supply:

- Bulk water supply is expensive;

- Bulk water supply is not sufficient, alternative source needs to be identified;
- Additional water supply source required in some municipalities;
- Upgrading of purification plants in all municipalities.

15.2.5 Sanitation

The IDP of Pixley Ka Seme for 2003-2005 indicates that in 2002 there were 20 427 households (45.8%) in Pixley that had sanitation facilities that were below RDP standards. This is worse than the overall Northern Cape situation. Pixley also has a great number of bucket toilets that need to be replaced. Because of the serious water shortages, most of the bucket toilets are being replaced with dry sanitation systems.

15.2.6 Telephone

Access to communication has improved in recent years with the installation of cell phone networks. However, access to these services in poorer communities and farm areas remains a problem.

On the whole the district is well served by a network of automatic and manual telephone exchanges. The main towns have exchanges linked to the smaller sub-centres with local manual exchanges. Local IDP's indicated that most of these exchanges, especially those in the farms are outdated and are in need of upgrading. Telkom is presently installing an electronic telecommunication system which will serve over a large area in the district. The new network is scheduled for completion very soon depending on the availability of funds.

Most households in the district, approximately 66.2% do not have telephones at their homes although many of them have expressed a need for the service. The existing situation results in many households still depending on public phones and other means of telecommunication. The public telephones, according to Telkom authorities, are vandalised frequently. The situation calls for a need to protect these facilities as they will be of help to the residents who depend on them.

15.3 Other Services

15.3.1 Education

A significant proportion of 24.7 % of the population has no qualification and 52.3 % had only primary and secondary level of qualifications. Of the total population 5.0 % are matriculants while only 2.6 % have a degree. The existing situation can only be explained by a substantial number of previously disadvantaged population groups who did not have equal access to education in the past era.

According to the Municipal Profiles of 2002, the primary school population represented 46.3 % of the total population of the district. There are 49 primary schools and 18 secondary schools and combined schools in the district. While the actual number of schools is generally satisfactory according to standard, an acute shortage of schools is experienced in the remote areas of the district. In many cases only one school is serving a wide region in the rural areas. Inadequate schools in rural areas involved long walking distances by children to reach the schools.

As far as provisions of facilities and / or services are concerned, many local IDP's have noted that most schools in the regions are characterised by lack of essential services such as water, electricity and sanitation. De Aar Campus which used to be a satellite of Northern Cape College in Kimberley is the only tertiary institution in the district.

15.3.2 Recreational Facilities

Main towns in the district enjoy a high level of provision of recreational facilities. The facilities provided by local municipalities in some of these areas include rugby pitches, swimming pools, tennis, squash courts, etc. As far as the maintenance of these facilities is concerned, they are regularly maintained by local municipalities. It is only in the main towns that parks are fairly distributed and regularly maintained.

In the townships recreational facilities such as soccer pitches, swimming pools, etc. are also provided but most of them are presently in terms of standards not well developed.

Parks in the townships are mostly overgrown and unkempt. This situation makes the existing parks attractive dumping sites and leads to unsafe and polluted areas within the townships.

15.3.3 Religion Facilities

Church goers in the district are well catered for with many churches of various denominations which are well distributed in towns. Some of these churches, however, are well developed while others are very old, not well developed and needed restoration.

15.3.4 Cemetery

The available records on this facility show that all the towns are well served with cemeteries, some of which are very old and close to or at full capacity. Various smaller cemeteries also exist in the farms.

P O Box 70, Darling, 7345
Telephone: 022 492 3435
Fax: 088 022 492 3435
Email:admin@cles.co.za

SKA PROJECT MEERKAT MINING

Meys Dam Farm 170, Municipal Erf 400616 and Saaifontein Farm 257

Carnarvon, Northern Cape

BIODIVERSITY AND ECOLOGICAL BASELINE

March 2011

Environmental Assessment Practitioner – Mr Nicolaas Hanekom
MTech. Cape Peninsula University of Technology
South African Auditor and Training Certification Association (SAATCA)
Environmental Auditing ISO 19011:2002. North West University
Environmental Management Systems ISO 14001:2004. North West University
Internal Auditor (Reg.No. IE015).
Occupational Health and Safety Law for Managers: North West University
International Association for Impact Assessment (Contact I.D. 106673)

THE INDEPENDENT PERSON WHO COMPILED A SPECIALIST REPORT OR UNDERTOOK A SPECIALIST PROCESS

I **Nicolaas Willem Hanekom**, as the appointed independent specialist hereby declare that I:

- act/ed as the independent specialist in this application;
- regard the information contained in this report as it relates to my specialist input/study to be true and correct, and
- do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the NEMA, the Environmental Impact Assessment Regulations, 2010 and any specific environmental management Act;
- have and will not have no vested interest in the proposed activity proceeding;
- have disclosed, to the applicant, EAP and competent authority, any material information that have or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the NEMA, the Environmental Impact Assessment Regulations, 2010 and any specific environmental management Act;
- am fully aware of and meet the responsibilities in terms of NEMA, the Environmental Impact Assessment Regulations, 2010 (specifically in terms of regulation 17 of GN No. R. 543) and any specific environmental management Act, and that failure to comply with these requirements may constitute and result in disqualification;
- have ensured that information containing all relevant facts in respect of the specialist input/study was distributed or made available to interested and affected parties and the public and that participation by interested and affected parties was facilitated in such a manner that all interested and affected parties were provided with a reasonable opportunity to participate and to provide comments on the specialist input/study;
- have ensured that the comments of all interested and affected parties on the specialist input/study were considered, recorded and submitted to the competent authority in respect of the application;
- have ensured that the names of all interested and affected parties that participated in terms of the specialist input/study were recorded in the register of interested and affected parties who participated in the public participation process;
- have provided the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not; and
- am aware that a false declaration is an offence in terms of regulation 71 of GN No. R. 543.

Note: The terms of reference must be attached.

Signature of the specialist:

Cape Lowlands Environmental Services cc

Name of company:

Date: 7 March 2011

1. Introduction

Cape Lowlands Environmental Services ("CLES") has been appointed by SKA as the independent biodiversity assessment specialist for this project.

CLES are independent and do not have an interest in the business nor receive any payment other than fair remuneration for services rendered as required in terms of regulations.

This report has been prepared by Nicolaas Hanekom, of Cape Lowlands Environmental Services, an environmental consultancy established in 2004, engaged in providing professional services in the field of environmental planning, environmental systems, environmental plans, environmental auditing and biodiversity assessment and management.

Hanekom has postgraduate qualifications in biodiversity assessments and special short courses qualifications in environmental science as well as being a Certified Environmental Auditor under the South African Auditor and Training Certification Association (SAATCA). Environmental Management Systems ISO 14001:2004. Internal Auditor (Reg.No. IE015) and a member of the International Association for Impact Assesment Practitioners (IAIA 106673).

Hanekom has expertise and experience in many aspects of environmental planning, assessment and management, including:

- spatial planning and associated environmental assessment
- environmental planning and the generation of project proposals
- environmental assessment, at both project and strategic levels
- environmental impact mitigation and/or enhancement
- environmental management plans and programmes
- environmental monitoring and evaluation
- environmental management
- environmental auditing
- scoping and stakeholder participation
- biodiversity assessments

Summary of Expertise

Nicolaas Hanekom has worked for more than 18 years in an ecological field. His career started as a student at the Bontebok National Park during 1992. Most of his time as student was spent collecting and identifying species in the park for inclusion onto the database.

As a nature conservation officer for Free State Nature Conservation from 1993 until October 1998, core ecological functions included wildlife monitoring and management and veld and vegetation management. As the reserve veld monitoring official it was his responsibility to collect field data to be analysed by the regional ecologist for the

determination of veld carrying capacity and management recommendations.
N Hanekom joined the Western Cape Nature Conservation Board with line responsibility assigned as a reserve manager from October 1998 to July 2006. During this time he began collecting and sampling data for his MTech Nature Conservation degree which was obtained in March 2007. The results of his research are recorded in the BIOTA SOUTHERN AFRICA database for use by other researchers. It is his exposure to field data gathering and analysis as student at Bontebok National Park, together with his work at both Free State Nature Conservation and CapeNature, and then especially his B Tech and M Tech studies that have equipped him to effectively work as an ecologist.

Nicolaas Hanekom:

- Applied for registration as a professional member of The South African Council for Natural Scientific Professions (Ecological Science). Awaits an interview to finalize application.
- Ecological / Botanical consultant since July 2006
- Conducted over 40 specialist ecological and botanical surveys. These have ranged from botanical and vegetation assessments, to fauna and habitat assessments in a combination of both fauna and flora.
- Published 1 technical scientific report (M Tech Nature Conservation Thesis). The Impact of Different Landuses on the Phytodiversity of the West Coast Strandveld in and around Rocherpan Nature Reserve).
- Lecturer part time from 2003 to 2005 at the Cape Peninsula University of Technology in the subjects 'Conservation Administration' and 'Resource Management' (ecology) as well as being a team member of the experiential training year evaluation committee for the National Diploma in Nature Conservation.

Conditions Relating to this Report

The findings, results, observations, conclusions and recommendations given in this report are based on the author's best scientific and professional knowledge as well as available information. CLES and its staff reserve the right to modify aspects of the report including the recommendations if and when new information may become available from ongoing research or further work in this field, or pertaining to this investigation.

This report must not be altered or added to without the prior written consent of the author. This also refers to electronic copies of this report which are supplied for the purposes of inclusion as part of other reports, including main reports. Similarly, any recommendations, statements, or conclusions drawn from or based on this report must refer to this report. If these form part of a main report relating to this investigation or report, this report must be included in its entirety as an appendix or separate section to the main report.

2. Purpose and Background to the Study

This biodiversity and ecological assessment, covering terrestrial and aquatic aspects,

intends to inform decisions regarding the proposed gravel quarry mining of four 3ha sites on Farm 170 Meys Dam, and two stone quarry mining sites of 16 500m³ on Farm 257 Saaifontein and Municipal Erf 400616, in the Carnarvon area, Northern Cape.

South Africa has been short-listed with Australia to host the world's largest radio telescope, the Square Kilometre Array (SKA). The MeerKAT (Karoo Array Telescope) project is a component of the larger SKA. The MeerKAT is being developed as a pathfinder to the full SKA and will prove South Africa's commitment capability to host the SKA.

The gravel and stone sources are needed for the tarred roads and concrete foundation construction on the KAT project of the proposed MeerKAT & SKA projects.

The proposed MeerKAT radio telescope will be constructed on a portion of the Farms Losberg (73) and Mey's Dam (68) near Carnarvon in the Northern Cape. The area has been identified as the most suitable area in which to construct the SKA and MeerKAT radio telescope due to limited Radio Frequency Interference.

Description of the Area

Locations and Photos

Six study sites were surveyed during the biodiversity baseline assessment.

Site 1 (proposed gravel quarry):
Property name and nr- Farm 170 Meys Dam
GPS co-ordinates- 30° 41' 25.54"S 21° 29' 05.41"E
Distance and direction from Carnarvon- 68km Northwest
Current activities on site- Existing gravel quarry

Photo 1.1: Aerial photo of Site 1 taken 10 March 2004.

Site 2 (proposed gravel quarry):
Property name and nr- Farm 170 Meys Dam
GPS co-ordinates- 30° 41' 33.84"S 21° 29' 18.53"E
Distance and direction from Carnarvon- 68km Northwest
Current activities on site- Agricultural sheep grazing

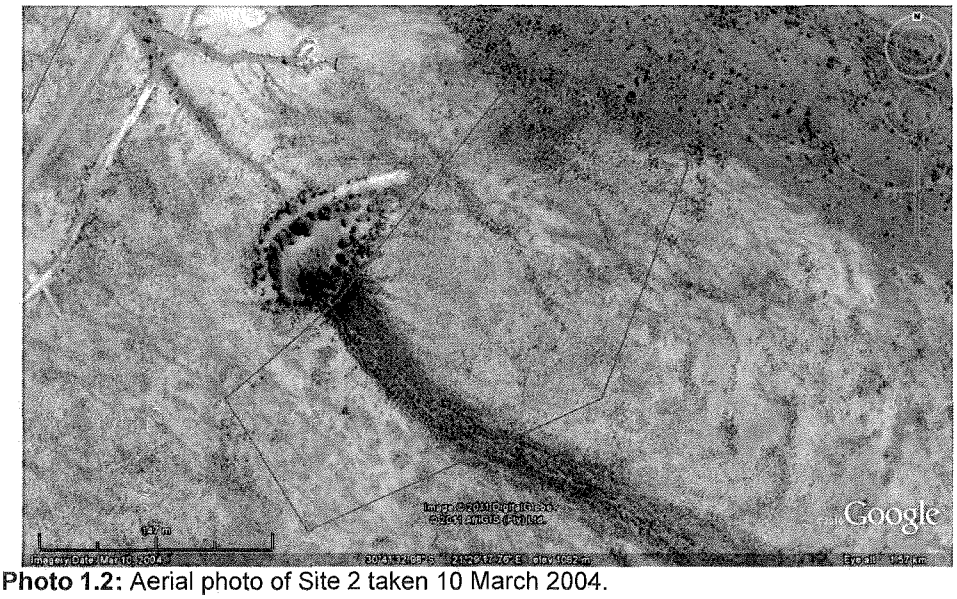


Photo 1.2: Aerial photo of Site 2 taken 10 March 2004.

Site 3 (proposed gravel quarry):
Property name and nr- Farm 170 Meys Dam
GPS co-ordinates- 30° 42' 53.86"S 21° 28' 28.53"E
Distance and direction from Carnarvon- 68km Northwest
Current activities on site- Agricultural sheep grazing

Photo 1.3: Aerial photo of Site 3 taken 10 March 2004.

Site 4 (proposed gravel quarry):
Property name and nr- Farm 170 Meys Dam
GPS co-ordinates- 30º 43' 51.69"S 21º 28' 05.55"E
Distance and direction from Carnarvon- 68km Northwest
Current activities on site- Agricultural sheep grazing

Photo 1.4: Aerial photo of Site 4 taken 10 March 2004.

Site 5 (proposed stone quarry):
Property name and nr- Municipal Erf 400616
GPS co-ordinates- 30º 59' 22.6"S 22º 06' 26"E
Distance and direction from Carnarvon- 4km Southwest
Current activities on site- Existing stone quarry

Photo 1.5: Aerial photo of Site 5 taken 11 May 2008.

Site 6 (proposed stone quarry):
Property name and nr- Farm 257 Saaifontein
GPS co-ordinates- 30° 50' 47.04"S 22° 06' 00.59"E
Distance and direction from Carnarvon- 17km North
Current activities on site- Agricultural sheep grazing

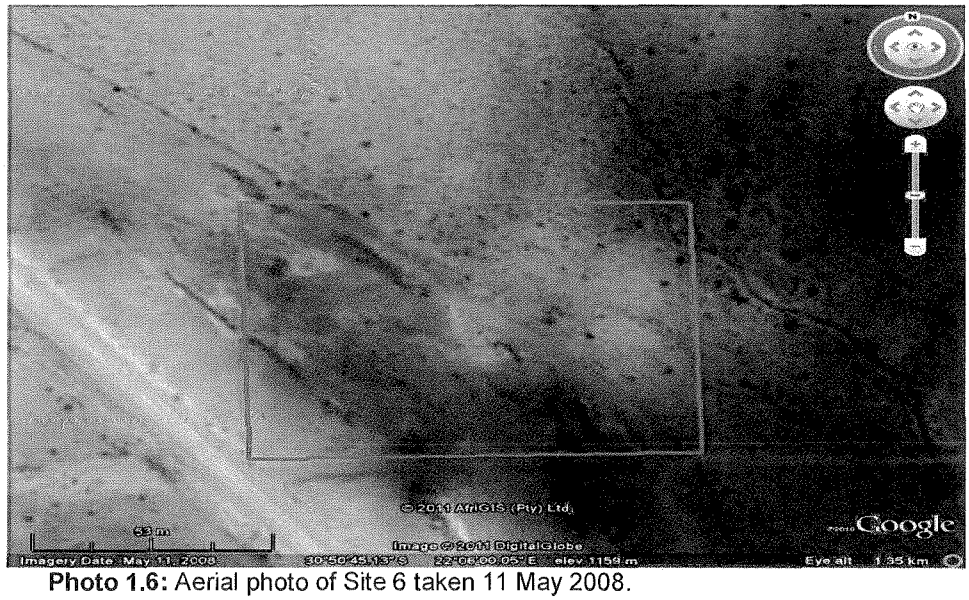


Photo 1.6: Aerial photo of Site 6 taken 11 May 2008.

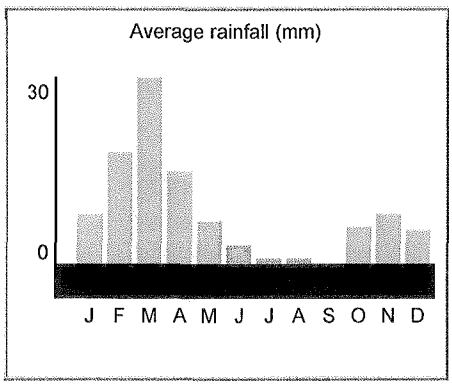
Also see Appendix 1.

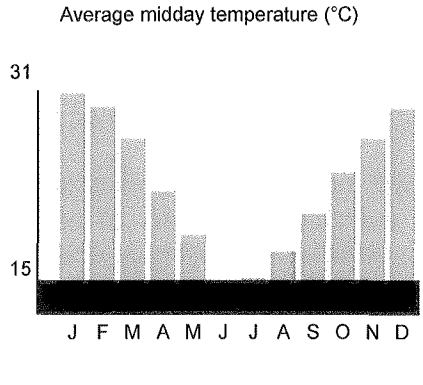
Topography

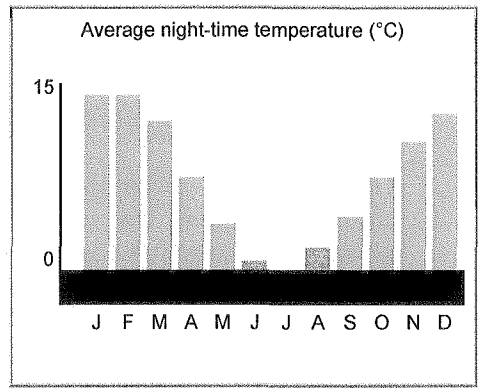
Study sites 1-4 are located on flat plains which is typical of the broader region. Sites 5 and 6 are characterised by hard rock outcrops. All of the study sites are situated at an elevation of approximately 1000 - 1100m. The sites are situated in a very arid part of South Africa.

Climate

Carnarvon normally receives about 102mm of rain per year, with most rainfall occurring mainly during autumn. The chart below (lower left) shows the average rainfall values for Carnarvon per month. It receives the lowest rainfall (0mm) in September and the highest (30mm) in March. The monthly distribution of average daily maximum temperatures (center chart below) shows that the average midday temperatures for Carnarvon range from 15.3°C in June to 30.8°C in January. The region is the coldest during July when the mercury drops to 0.2°C on average during the night. Consult the chart below (lower right) for an indication of the monthly variation of average minimum daily temperatures.







Geology

Sites 1-4 (gravel quarry sites) –The majority of the area is underlain by Permian Karoo Supergroup sediments that have been intruded by Jurassic dolerite. Unconsolidated Quaternary and Tertiary deposits overlay the sediments and dolerite. Shale of the Tierberg Formation underlies most of the study area and is overlain with alluvium and sand. The soil cover is very shallow, generally less than 50cm thick.

Sites 5-6 (stone quarry sites) – Good quality dolerite.

3. Executive Summary

Ecology is essentially a multi-disciplinary science concerned with the relationship between organisms themselves and between organisms and their environment, in which the emphasis may be on the organisms, populations, communities or ecosystems. It is also the scientific study of the interactions between man, living organisms and the abiotic environment (habitats) with one another and with the non-living environment of matter and energy. It concerns substantially the structure and function of nature. An ecologist is someone who has received an appropriate comprehensive training and has experience in biological studies and the analysis of the responses of organisms to the environment and to each other, which then equips you to be an ecologist.

Loss of natural habitat is the single biggest cause of biodiversity loss in South Africa and in much of the world. This means that it often makes sense to focus conservation action on preventing further habitat loss in priority ecosystems, in and out of protected areas, rather than on conserving individual species. Each plant community can therefore be considered as a different ecosystem (Bredenkamp et al. 2002).

It is on the above statement and principle that the National Spatial Biodiversity Assessment is based. This National Spatial Biodiversity Assessment is further mainly based on the phytodiversity or vegetation types. The substrate, which in turn determine the flora component, is however seen as a baseline for all ecosystem functioning.

Faunal species rely on habitat and niches provided in most instances by vegetation types. It is therefore safe to make use of the National Spatial Biodiversity assessment in making recommendations for this ecological and biodiversity study. Differences in environmental parameters result in differences in vegetation. Biodiversity conservation is linked to the preservation of critical habitat in priority ecosystems.

The proposed developments will not impact significantly on the broader ecological characteristics of the site and surrounds in terms of patchiness, patch size, relative isolation, connectivity, corridors, disturbance regimes, eco-tones, buffering, and viability. The proposed development will not impact on biodiversity pattern at the community and ecosystem level.

The report finds that the proposed developments will not have a significant negative impact on any listed fauna or flora species. No significant breeding, roosting or habitat upon the site will be impacted on. Most animals will move to surrounding natural areas when mining activities starts.

No additional survey or further assessment are in our view recommended.

4. Terms of Reference

4.1. Describe the broad ecological characteristics of the site and surrounds in terms of patchiness, patch size, relative isolation, connectivity, corridors, disturbance regimes, eco-tones, buffering, and viability.

4.2. In terms of biodiversity **pattern**, identify or describe;

4.2.1. At Community and ecosystem level-

- The main vegetation type, its aerial extent and interaction with neighbouring types, soils or landforms;
- The types of plant communities that occur on, and in the vicinity of the site. Threatened or vulnerable ecosystems.
- The types of animal communities (fish, invertebrates, avian, mammals, reptiles).

4.2.2. Species level-

- Red Data Book species
- The viability of, and estimated population size of the RDB species that are present. Show the degree of confidence in predictions based on the availability of information and specialist knowledge, i.e. High=70-100% confident, Medium 40-70% confident, low 0-40% confident. The likelihood of other RDB species, or species of conservation concern, occurring in the vicinity. Reflect this in degree of confidence indicator.

4.2.3. Other pattern issues-

- Any significant landscape features or rare or important vegetation/faunal associations such as seasonal wetlands, alluvium, seeps, quartz patches or salt marshes in the vicinity.
- The extents of alien plant cover on the site, and whether the infestation is the result of prior soil disturbance such as ploughing or quarrying (alien cover resulting from disturbance is generally more difficult to restore than infestation of undisturbed sites).
- The condition of the site in terms of current or previous land uses.
- In terms of biodiversity process, identify or describe:
  - The key ecological "drivers" of ecosystems on the site and in the vicinity, such as fire.
  - Environmental gradients (e.g. upland-lowland), biome boundaries, soil interfaces or sand movement corridors on the site or in its vicinity.
  - Any possible changes in key processes e.g. increased fire frequency or drainage/artificial recharge of aquatic systems.
  - The condition and functioning of rivers and wetlands (if present) in terms of: possible changes to the channel, flow regime and naturally-occurring riparian vegetation.
  - Would the conservation of the site lead to greater viability of the adjacent ecosystem by securing any of the functional factors listed?
  - Does the site or neighbouring properties potentially contribute to meeting regional conservation targets for both biodiversity pattern and ecological processes?

4.3. Is this a potential candidate site for conservation?

4.4. What is the significance of the potential impact of the proposed project? What are alternatives and related activities – with and without mitigation – on biodiversity pattern and process at the site, landscape and regional scales?

4.5. Indicate on a topographical map or ortho-map, preferably at a scale of 1:10 000:
- the area that would be impacted by the proposed development;
- the location of vegetation, habitat and spatial components of ecological processes that should not be developed or otherwise transformed; and
- areas that must remain intact as corridors or ecological "stepping stones" to maintain ecosystem functioning, including fire, in fire-prone systems.

4.6. Recommend actions that should be taken to prevent or, if prevention is not feasible, to mitigate impacts and restore disturbed vegetation or ecological processes. Indicate how preventative and remedial actions will be scheduled to ensure long-term protection, management and restoration of affected ecosystems and biodiversity.

4.7. Indicate limitations and assumptions, particularly in relation to seasonality.

4.8. Indicate how biodiversity considerations have been used to inform socio-economic aspects of the proposed project, e.g. through changes to the location

or layout of infrastructure, or retaining public access to biodiversity related amenities or resources such as beaches or grazing.

5. Site Visits and Methods Used

A map of the proposed development sites is included, as provided by CLES (See Appendix 1).

CLES visited sites 1-2 on 8 February 2011 and sites 3-6 on 9 February 2011. Each survey was conducted for at least one to two hours on each site. On both days the weather was partly cloudy and warm with light occasional rainfall.

This report takes recognition of guidelines as in Brownlie (2005), De Villiers *et al.* (2005) and IAIA (2005).

6. General Preamble

6.1. Fundamental objectives

CLES see EIA's and EMP's encompassing two ultimate purposes:

- Maintenance of South Africa's biodiversity, and
- Enhancement of the quality of life of all South Africa's people.

These two objectives are frequently perceived to be in conflict, and are fundamentally aligned to legislation via the Constitution and National Environmental: Biodiversity Act.

CLES believe that they are, in fact, inseparably linked and fundamentally compatible. Research indicates that the availability of natural and wilderness areas are essential to the emotional, intellectual and physical well-being of urban residents, especially children (Miller 2005).

To preserve biodiversity, it is necessary to focus on both ***pattern and process***, that is, the full range of species and habitats (pattern), as well as the ecological and evolutionary processes that allow biodiversity to persist over time (Driver at al. 2003). Animals cannot survive in the absence of their habitat, and neither species nor habitat can survive in the absence of the ecological processes which sustain them.

For this reason, this report may devote as much or more attention, to habitat and ecological processes than to species.

6.2. Guiding Principle

In large-scale development projects (e.g., 10ha or more), CLES believe that it is necessary to apply the principle that *a development should not impact on habitats needed to meet conservation targets and where ecological processes could naturally occur*, especially if the site contains unaltered natural habitats.

This principle is based on the logical premise that unless biodiversity conservation is applied at the micro-scale of individual developments, biodiversity conservation at the macro-scale, that is, in the country as a whole, will not succeed.

Important implications of this principle are that:

- Large-scale developments may need to set aside portions of land specifically for conservation purposes, and
- Such portions need to be appropriately and effectively managed to preserve their ecological and biodiversity value.

6.3. Ascribing Value and Importance

There frequently is an assumption made that certain species, habitats and biotic communities have greater value and importance than others.

The factors which affect value and importance, also in our view, are:

- **Ecological importance**

The contributions of portions of a particular habitat to the overall ecology of an area are not all equal. Some habitat has greater importance because of the rarity factor or because of a specific role within the habitat. Wetland habitat, for example, are usually small components of a landscape in terms of area, but play a vital role in sustaining aquatic biota and in providing essential resources to terrestrial animals.

Any habitat which is needed to maintain ecological processes has added value.

- **Connectivity**

A particular piece of habitat, which may have little importance itself, may acquire considerable, even critical importance and value, if it connects two other areas of ecological importance. Such "corridor" areas sustain the process and movement of biota between areas and thereby promote the long-term sustainability of ecosystems. Similarly, if an area is adjacent or connected to other areas of conservation importance, its value is increased because it functions as a part of a larger ecological system.

- **Sustainability**

Sustainability is a central concept because conservation aims to preserve species, habitats and ecosystem processes in the long term. In fact, the ideal of conservation is to preserve natural systems at temporal and spatial scales that allow evolutionary processes to continue indefinitely. It is therefore essential that conservation planning take into account the factors that are likely to affect the long-term sustainability of systems. Preservation of isolated patches of habitat, no matter how pristine, will not succeed if the larger processes that sustain that patch are not also preserved.

In general, the smaller and more isolated a conserved area is, the more intensive the management of the area needs to be in order to maintain its character. Sustainability interacts with the allocation of value and importance. If a feature is deemed to have high value, but that value is unsustainable, its value tends to be down-graded. Conversely, a feature of lesser intrinsic value may have its value enhanced by a greater degree of sustainability.

- **Threatened status**

If a species has been designated "Threatened", its value is taken to be higher than that of a non-threatened species. Similarly, the higher the level of threat, the greater is the ascribed value. Levels of threat for species are usually objectively defined in Red Data books and the status of veld types is given in the National Spatial Biodiversity Assessment (Rouget et al. 2005). Special attention is devoted to wetland and lowland habitats because, in general, they are more threatened than dry land and montaine habitats, respectively.

- **Intactness**

The concept applies to habitats, ecosystems and communities. If a system is perceived to be relatively undamaged and functioning normally, it is considered to be "intact". This attribute does not imply long-term sustainability, but merely that, at the time, the habitat and its biotic community are present and functioning.
Intact systems are given greater value because they are generally more functional with regard to ecological- process, -complexity, -rarity and -sensitivity than damaged, disturbed or transformed habitats.

- **Aesthetic, recreational and educational value**

These aspects of value are largely context dependent. That is, the social and economic context of any particular piece of habitat and its associated biotic community is what largely determines whether it has aesthetic, recreational or educational importance. In general, the more developed and densely populated an area, the more relevant these aspects become.

Such aspects need to be viewed as important to the maintenance of the quality of life, in both urban and suburban environments.

6.4. Importance of management

The underlying assumption of development plans tend to be that certain natural features may be destroyed and other natural features must be preserved. This approach is far too simplistic to achieve the fundamental objectives of 4.1 above.

If biodiversity and the quality of life of human inhabitants are to be maintained, the environment has to be managed. This principle is readily accepted for the built

environment where various environmental management services are routinely provided by landowners and local authorities (e.g., refuse removal, drainage, waste-water treatment, etc.), but the principle of management is frequently ignored when applied to the more extensive and natural environment.

While benign neglect may be a valid aspect of a management policy, it is never a complete solution.

6.5. Standard caveats

Surveys such as herewith generally suffer from a number of defects that must be overtly acknowledged.

- **Limited time**

A truly comprehensive survey requires systematic sampling of the entire habitat in all seasons, and at different times of day. Such thoroughness is seldom possible and therefore most records of occurrence are based on literature and reports obtained from local residents. Follow up verification of occurrence of important species is thus recommended in appropriate cases.

- **Taxonomic scope**

A comprehensive survey should examine all biodiversity, not only plants, mammals, birds, reptiles and amphibians. It is probable that important and sensitive species of fish and invertebrate could have been overlooked in surveys limited to the above groups.

- **Limited expertise**

It is not possible to be an expert on all groupings within biodiversity and all aspects of ecology.

CLES trust that this report will *sufficiently identify and address issues of likely importance*, acknowledging that the full appropriate response to some of these aspects may require the inputs of other particular specialists in appropriate instances.

7. Observations and Findings Relative to the Terms of Reference ("ToR")

Study Area

At a regional level the study area falls within the Northern Cape, site 1-4 to the northwest, site 5 southwest and site 6 north of the town Carnarvon.

Methodology

Reports on biodiversity surveys serve as input into either Environmental Scoping Reports, Impact Assessments (EIA's) or Management Plans (EMP's). CLES in doing

such apply certain values and principles. Such values and principles are herewith explicitly stated so the user of this report is apprised of both approach and assumptions.

7.1. Habitats & Ecosystem Process

- ***ToR 4.1.***

Describe the broad ecological characteristics of the site and surrounds in terms of patchiness, patch size, relative isolation, connectivity, corridors, disturbance regimes, eco-tones, buffering, and viability.

Observation:

The study area lies within the Nama Karoo vegetation type of the Northern Cape. The study sites are not isolated as they form part of extended natural veld areas mainly used as extensive grazing for sheep.

Findings:

Study areas 1,3 ,4 ,5 and 6 are not regionally important from a biodiversity point of view and the survey found that the impact of the proposed development will not have any significant effect on the biodiversity and connectivity of the specific site or region. Site 2 is situated within a water catchment area with clear signs of storm water streams flowing across the site. The site therefore has a high connectivity value.

- ***ToR 4.2.***

In terms of biodiversity pattern, identify or describe;
At Community and ecosystem level-

- ***The main vegetation type, its aerial extent and interaction with neighbouring types, soils or landforms;***
- ***The types of plant communities that occur on, and in the vicinity of the site. Threatened or vulnerable ecosystems.***

Individual plant localities were not plotted in detailed. The site was surveyed and plant communities were identified and species recorded. The habitat approach was preferred. Species collection was focused on the different plant communities present on site.

There are an estimated 5400 plant species in the Northern Cape Province. These plants occur in six large vegetation units known as biomes. Each biome is a broad ecological unit that represents major life zones of large natural areas, defined mainly by vegetation structure and climate. There are six biomes in the Northern Cape, namely the Savanna Biome, Nama Karoo Biome, Succulent Karoo Biome, Fynbos Biome, Grassland Biome & Desert. The proposed site falls within the Nama Karoo biome. Each biome is subdivided into vegetation types, which are groups of plant communities that share similar ecosystem processes, and have similar climatic and geological requirements.

There are many vegetation types in the Northern Cape. The Orange River Nama Karoo is an example of one of these vegetation types, within the Nama Karoo Biome. It is found along most of the Orange River from its confluence with the Vaal River near Kimberley to the Richtersveld in the far north western corner of the Northern Cape. A common plant of this vegetation type is the Quiver Tree (Kokerboom) *Aloe dichotoma* that grows on the broken, rocky terrain.

The Nama Karoo Biome is dominated by grassy, dwarf shrub land, with grasses more common in depressions and on sandy soils and less abundant on clayey soils. The landscape is characterised by irregular plants with the dwarf shrub land dominated by a mixture of low sturdy and spiny (and sometime succulent) shrubs (*Rhigozum, Salsola, Pentzia, Eriocephalus*), "white" grasses (*Stipagrostis*) and in years of high rainfall also by abundant annuals such as species of *Gazania* and *Leysera.*

Observations:

Site 1 – The whole site 1 has already been disturbed by quarry activity and very few indigenous vegetation species are present on site. Invader plants such as *Tribulus terrestris* are dominant.

Photo 2.1: Site 1

Site 2 – Situated within a flat river catchment area the site is being grazed by sheep. The indigenous vegetation on site is not significantly diverse and is surrounded by extensive homogenous vegetation.

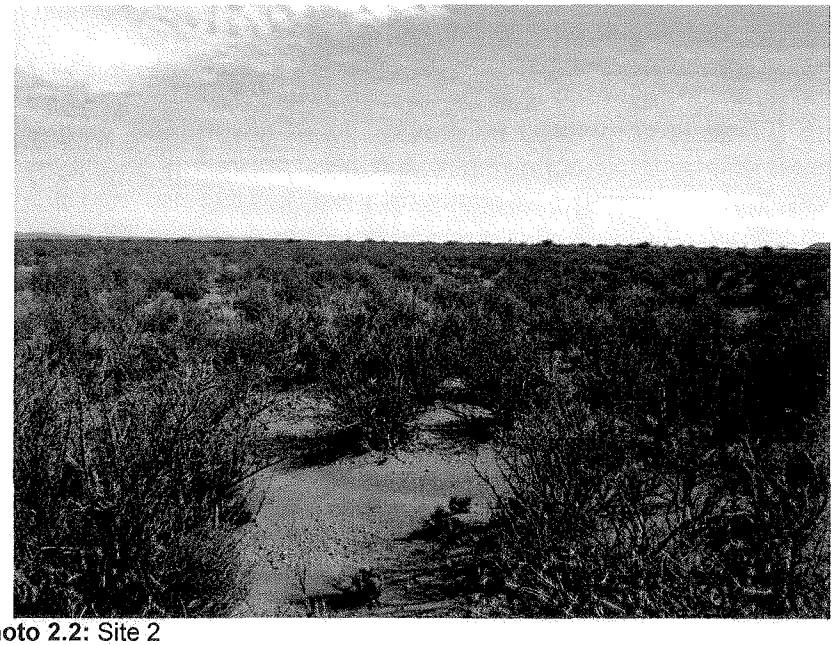


Photo 2.2: Site 2

Site 3 – Situated within a significantly disturbed area due to dam building activities and sheep grazing. The site is dominated by *Acacia karroo* and invader plants such as *Prosopis glandulosa.*

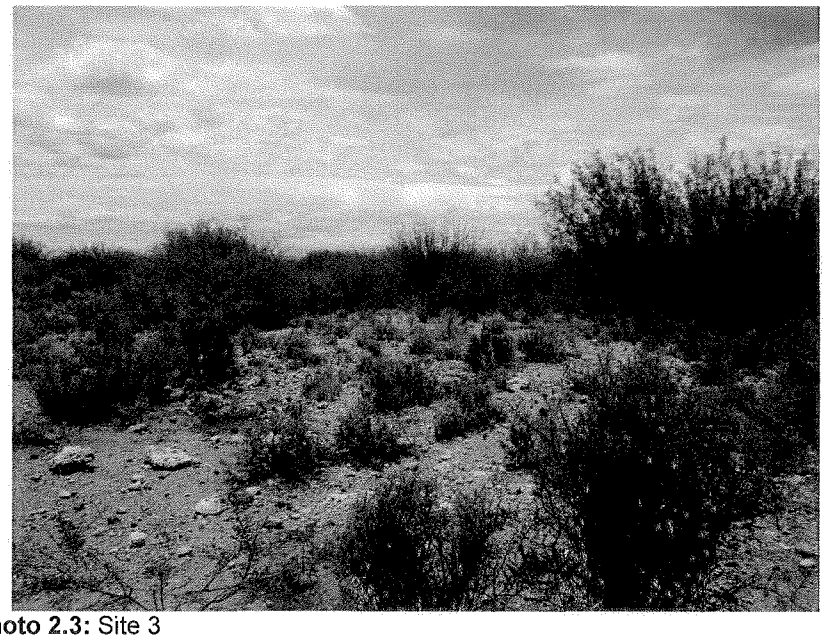


Photo 2.3: Site 3

Site 4 – Significantly disturbed due to intensive sheep grazing activities, homogenous vegetation with dominant invader plants such as *Tribulus terrestris*.

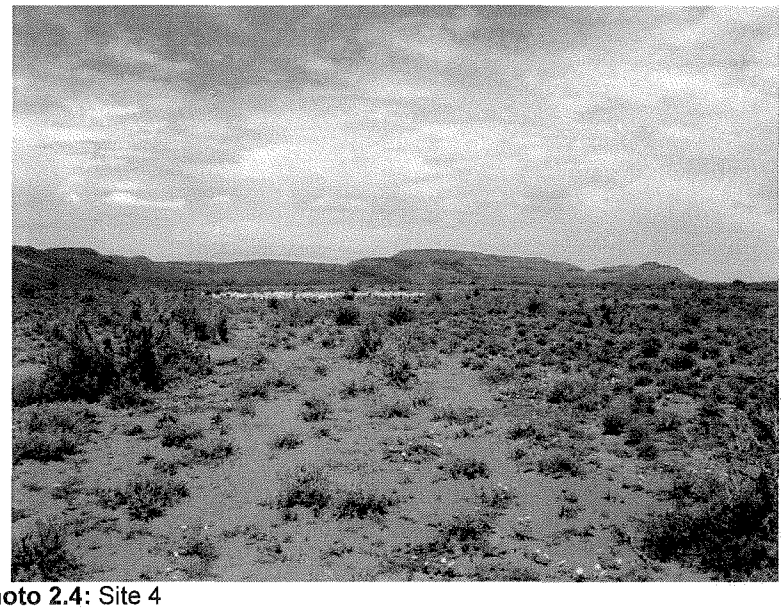


Photo 2.4: Site 4

Site 5 – *Stipagrostis* grass species are dominant on site, surrounded by homogenous vegetation. An existing stone quarry area also exists on site.

Photo 2.5: Site 5

Site 6 - *Stipagrostis* grass species are dominant on site, surrounded by homogenous vegetation and impacted on by sheep grazing.

Photo 2.6: Site 6

Some of the vegetation species identified on the sites during the surveys include:

Sites 1 to 4-

- *Salsola tuberculata*
- *Stipagrostis obtusa*
- *Tribulus terrestris (invader plant)*
- *Pentzia incana*
- *Helichrysum sp*
- *Eriocephalus ericoides*
- *Galenia africana*
- *Ledebouria marginata*
- *Asteraceae sp*
- *Lebeckia spinescens*
- *Monechma incanum*
- *Phaeoptilum spinosum*
- *Atriplex lindleyi subsp. inflata*
- *Acacia karroo*
- *Stipagrostis sp*
- *Psilocaulon absimile*
- *Mesembryanthemacea sp*
- *Lycium sp*
- *Rhigozum trichotomum*
- *Prosopis glandulosa (invader plant)*
- *Phaeoptilum spinosum*

- *Salsola tuberculata*
- *Osteospermum spinescens*
- *Pteronia tricephala*
- *Limeum aethiopicum*
- *Walafrida saxatilis*
- *Pennisetum sp*
- *Zygophyllum gilfillanii*

Site 5-
- *Stipagrostis sp*
- *Aloe sp.*
- *Ganzania krebsiana*
- *Pentzia incana*
- *Sutera atropurpurea*
- *Selago albida*
- *Sutera virgulosa*
- *Walafrida geniculata*
- *Lightfootia nodosa*
- *Tribulus terrestris (invader plant)*

Site 6-
- *Stipagrostis sp.*
- *Psilocaulon absimile*
- *Aloe sp.*
- *Tetragonia calycia*
- *Zygophyllum gilfillanii*
- *Phaeoptilum spinosum*
- *Pteronia tricephala*
- *Tribulus terrestris (invader plant)*

No red data flora species were identified during the surveys.

Findings:

The proposed development will not impact significantly on the biodiversity pattern at neither the community or at an ecosystem level.

The study sites lie mainly in the general area that supports Bushmanland Basin Shrubland, according to the new vegetation map of South Africa (Mucina & Rutherford 2003). This vegetation type is listed as Not Threatened in the South African National Spatial Biodiversity Assessment (Rouget et al 2004). It is only Site 6 that lies in an area which is a combination of Bushmanland Basin Shrubland and Upper Karoo Hardeveld vegetation types; the Upper Karoo Hardeveld is also listed as Not Threatened.

All of the study sites are surrounded by extensive homogenous vegetation areas.

7.2. Fauna

- ***ToR 4.2.***

The types of animal communities (fish, invertebrates, avian, mammals, reptiles)

- **Amphibians And Reptiles (Herpetofauna)**

Approximately 38 reptile and 8 amphibian species are likely to inhabit the area.

Observations:

The following reptiles were observed on site during the survey:

- *Trachylepis capensis* (Cape Skink)
- *Trachylepis varia* (Variable Skink)

The only Red Listed reptile species which may occur within the study area is the Fisk's House Snake (*Lamprophis fiskii*), the IUCN (2001) lists this species as Vulnerable. Very little is known of the habitat requirements of this species therefore it cannot be confirmed that the species is likely to occur within the study area.

No amphibian species were observed on any of the sites during the surveys.

No Red Listed amphibian species are known to occur in the area of the development site.

Findings:

The proposed development will not have significant impacts on reptiles or amphibians. The reptiles and amphibians may move to surrounding areas when quarry activities start.

- **Mammals**

Several mammal species are supported in the Nama Karoo. The big mammal species however were replaced with sheep. Introduced Springbok and Kudu are the largest mammal species occurring within the area.

Some 46 mammal species are known to occur in the bigger area (Smithers 1983).

Observation and Findings:

The following mammal species were observed on site during the survey:

Hystrix africaeaustralis (Porcupine spoor)
Raphicerus campestris (Steenbok)

Caracal caracal (Caracal spoor)
Various small borrowing pits were observed within the study area indicating rodent populations.

- **Birds (Avifauna)**

189 bird species are known to occur in the bigger area (Hockey et al 2006).

Observation:

The following species were observed during the survey within the study area:

Alopochen aegyptiaca
Buteo rufofuscus
Corvus albus
Oena capensis
Philetairus socius
Ardea cinerea
Columba guinea
Elanus caeruleus
Falco tinnunculus
Pterocles namaqua
Upupa Africana
Mirafra albescens
Hirundo rustica
Corvus capensis
Cercomela schlegelii
Teylophorus zeylonus

Findings:

The proposed development will not impact significantly on any listed bird species.

Bird species known to occur in the study site that will be impacted upon by the proposed development, would simply fly away and move out to the surrounding areas when mining activities start.

No sensitive breeding or roosting sites were observed on the development site.

- **Other Animals**

Observations:

Insect species observed during the survey includes:

Anax imperator (Blue Emperor)
Ischnura senegalensis (March Bluetail)

Locustana pardalina (Brown Locust)
Empusa guttula (Cone-headed Mantid)
Rhachitopis sp
Oedaleus sp (Yellow Wings)
Quintilia sp (Karoo cicadas)
Julodis cirrosa (Brush Jewel Beetle)
Mylabris oculata (CMR Bean Beetle)
Eurychora sp (Mouldy Beetles)
Danaus chrysippus (African Monarch)
Junonia hierta (Yellow Pansy)
Messor capensis (Harvester Ant)
Camponotus fulvopilosus (Bal-byter)
Arachnid sp

Findings:

The proposed development will not have significant impacts on invertebrate species. No known rare or special species were observed or are known to occur or breed on the site.

- ***ToR 4.2. Species level—***

Red Data Book species
The viability of, and estimated population size of the RDB species that are present. Show the degree of confidence in predictions based on the availability of information and specialist knowledge, i.e. High=70-100% confident, Medium 40-70% confident, low 0-40% confident. Assess the likelihood of other RDB species, or species of conservation concern, occurring in the vicinity. Reflect this in degree of confidence indicator.

7.3. Red Data Species

What is a Rare or Red Data Plant?

This is a plant that is listed in one of the categories in the Red Data List of Plants. It is listed as such because it is under threat of extinction, often endemic to an area, and has a limited distribution. More than 10% of the worlds threatened plant species are found in southern Africa. Approximately 1000 Northern Cape plant species are listed as red data plants. There are various categories in the Red Data List that give us an indication of the conservation status of each species. The categories are "Extinct", "Endangered", "Vulnerable", "Rare", "Indeterminate" and "Insufficiently Known". Plants classified as "Extinct" are those that are no longer known to exist in the wild. Those classified as "Endangered" are in danger of extinction if the factors causing their numbers to decline continue operating. A number of factors can be responsible for a decline in the size of plant populations. They may eventually cause the extinction of a species. Once this species is lost, it can never be replaced. The most common threat too many arid plants are overgrazing. Overgrazing leads to a decrease in the number of plant species, a

change in the ecological balance, and the eventual loss of plant diversity. Plant collectors that collect rare plants for trade or other purposes can pose a serious threat to some species. Fauna and flora have been classified in terms of the ever-increasing threats of over exploitation, illegal trade or habitat transformation and habitat loss. They are rated in terms of their vulnerability to extinction in Red Data books, one for each animal group. Some rare and localized plant species are known to be present in the area.

Flora

Observations and Findings:

No red data plant species were recorded on the study sites during the survey. The proposed development infrastructure will therefore not impact on red data plants. Our confidence in predictions based on the availability of information and specialist knowledge is High = 70-100%.

Reptiles and Amphibians

Observation and Findings:

No rare and localized species were recorded at the time of the survey, and none are expected to be on site. The site is not the preferred habitat of the known rare and endangered species. Our confidence in predictions based on the availability of information and specialist knowledge is High = 70-100%.

Mammals

The following table lists the Red Data listed mammal species which are predicted, or confirmed to occur in the general area and possibly within the study area:
(Friedman & Daly, 2004).

RED DATA MAMMAL SPECIES				
	COMMON NAME	**SCIENTIFIC NAME**	**RED DATA CATEGORY**	**PREDICTED OCCURENCE**
1	Lesueur's Wing-gland Bat	Cistugo lesueuri	Near Threatened	Unlikely
2	Cape Serotine Bat	*Neoromicia capensis*	Least Concern	Possible
3	Egyptian Split Faced Bat	*Nycteris thebaica*	Least Concern	Possible
4	Egyptian Free-tailed Bat	*Tadarida aegyptiaca*	Least Concern	Possible
5	Rock Hyrax	*Procavia capensis*	Least Concern	Confirmed
6	Black-backed Jackal	*Canis mesomelas*	Least Concern	Likely
7	Caracal	*Caracal caracal*	Least Concern	Confirmed
8	Yellow Mongoose	*Cynictis penicillata*	Least Concern	Possible
9	African Wild Cat	*Felis silvestris*	Least Concern	Likely
10	Small Grey Mongoose	*Galerella pulverulenta*	Least Concern	Likely
11	Small-spotted Genet	*Genetta genetta*	Least Concern	Likely
12	Striped Polecat	*Ictonyx striatus*	Least Concern	Possible
13	Honey badger	*Mellivora capensis*	Near Threatened	Unlikely
14	Bat-eared Fox	*Otocyon megalotis*	Least Concern	Likely
15	Leopard	*Panthera pardus*	Least Concern	Unlikely

16	African Weasel	*Poecilogale albinucha*	Data deficient	Possible
17	Aardwolf	*Proteles cristatus*	Least Concern	Unlikely
18	Suricate	*Suricata suricatta*	Least Concern	Possible
19	Cape Fox	*Vulpes chama*	Least Concern	Unlikely
20	Springbok	*Antidorcas marsupialis*	Least Concern	Confirmed
21	Klipspringer	*Oreotragus oreotragus*	Least Concern	Unlikely
22	Gemsbok	*Oryx gazella*	Least Concern	Unlikely
23	Grey Rhebok	*Palea capreolus*	Least Concern	Unlikely
24	Steenbok	*Raphicerus campestris*	Least Concern	Confirmed
25	Common Duiker	*Sylvicapra grimmia*	Least Concern	Likely
26	Reddish-grey Musk Shrew	*Crocidura cyanea*	Data Deficient	Unlikely
27	Riverine Rabbit	*Bunolagus monticularis*	Critically Endangered	Unlikely
28	Cape Hare	*Lepus capensis*	Least Concern	Unlikely
29	Scrub Hare	*Lepus saxatilis*	Least Concern	Likely
30	Smith's Red Rock Rabbit	*Pronolagus rupestris*	Least Concern	Confirmed
31	Namaqua Rock Mouse	*Aethomys namaquensis*	Least Threatened	Possible
32	Short-tailed Gerbil	*Desmodillus auricularis*	Least Concern	Possible
33	Hairy Footed Gerbil	*Gerbillurus paeba*	Least Concern	Possible
34	Brush-tailed Hairy-footed Gerbil	*Gerbillurus vallinus*	Least Concern	Possible
35	Spectacled Dormouse	*Graphiurus ocularis*	Least Concern	Possible
36	Porcupine	*Hystrix africaeaustralis*	Least Concern	Confirmed
37	Large-eared Mouse	*Malacothrix typica*	Least Concern	Possible
38	Multimammate Mouse	*Mastomys coucha*	Least Concern	Possible
39	Karoo Bush Rat	*Otomys unisulcatus*	Least Concern	Likely
40	Brant's Whistling Rat	*Parotomys brantsii*	Least Concern	Likely
41	Littledale's Whistling Rat	*Parotomys littledalei*	Near Threatened	Unlikely
42	Striped Mouse	*Rhabdomys pumilio*	Least Concern	Likely
43	Springhare	*Pedetes capensis*	Least Concern	Likely
44	Pygmy Rock Mouse	*Petromyscus collinus*	Least Concern	Possible
45	Round-eared Elephant Shrew	*Macroscelides proboscideus*	Least Concern	Likely
46	Aardvark	*Orycteropus afer*	Least Concern	Likely

Observations and Findings:

Bats are also classified as near threatened. The bats will be unaffected by development, as there are no roosting sites within the affected area that could be impacted upon by development.

The species listed above occurring on site will not be affected negatively. The impact of the proposed development on them will be of low significance. Their home ranges are much bigger than the proposed development.

Other red data species as listed which are likely to occur in the study area above were not observed during the site survey.

None of the red data listed should be specifically threatened, either in number or habitat by the proposed development, should such species occur on the development site they can simply move to extensive, nearby undisturbed habitat.

Our confidence in predictions based on the availability of information and specialist

knowledge is High (70-100%).

Avifauna

Red Listed species of avifauna could include the following:

Polemaetus bellicosus (Martial Eagle)
Neotis ludwigii (Ludwig's Bustard)
Falco biarmicus (Lanner Falcon)
Falco naumanni (Lesser Kestrel)
Ardeotis kori (Kori Bustard)
Certhilauda burra (Red Lark)
Ciconia nigra (Black Stork)
Sagittarius serpentarius (Secretary Bird)
Falso biarmicus (Lanner Falcon)
Spizocorys sclateri (Sclater's Lark)

Observations and Findings:

None of the above species were observed during the survey and are more likely to occasionally visit the site and will not breed there.

Our confidence in predictions based on the availability of information and specialist knowledge is High = 70-100%.

7.4. Alien Plant Cover on Site

- ***ToR 4.2.***

The extents of alien plant cover on the site, and whether the infestation is the result of prior soil disturbance such as ploughing or quarrying (alien cover resulting from disturbance is generally more difficult to restore than infestation of undisturbed sites)..

The following alien plants were recorded on site:

- *Prosopis glandulosa*
- *Tribulus terrestris*

The invader plants are mainly restricted to disturbed sites 1-4.

7.5. Biodiversity Processes and Conservation Value

- ***ToR 4.2.***

In terms of biodiversity process, identify or describe:

The key ecological "drivers" of ecosystems on the site and in the vicinity, such as fire.

The study sites lies in the general area that supports Bushmanland Basin Shrubland, according to the new vegetation map of South Africa (Mucina & Rutherford 2003). This vegetation type is listed as Not Threatened in the South African National Spatial Biodiversity Assessment (Rouget et al 2004).

Observations and Findings:

The proposed development will not affect the ecological drivers on the sites 1,3,4,5 and 6. The open space and drainage lines not impacted upon by the infrastructure will allow the ecological functioning of the sites to continue.

Site 2 has clearly visible drainage lines crossing the site, these drainage lines should be accommodated by diverting the drainage lines away from the proposed site and thereafter guiding the drainage lines back to the original destination or no development should occur on site 2 and an alternative site should be investigated.

The vegetation types are not fire driven systems. The sites are not proposed as a conservation area or a corridor.

Environmental gradients (e.g. upland-lowland), biome boundaries, soil interfaces or sand movement corridors on the site or in its vicinity.

None of the above ecological features are present on the study site.

Any possible changes in key processes e.g. increased fire frequency or drainage/artificial recharge of aquatic systems.

No significant changes in key processes will occur on sites 1, 3, 4, 5 and 6 due to the proposed development. Artificial ponds may be formed due to excavation activities during quarry mining.

If proposed gravel mining is allowed on site 2, natural drainage lines will be diverted.

The condition and functioning of rivers and wetlands (if present) in terms of: Possible changes to the channel, flow regime and naturally-occurring riparian vegetation.

The flow regime of the drainage lines on site 2 will be impacted upon if the proposed development is allowed, these drainage lines should be accommodated by diverting the drainage lines away from the proposed site and thereafter guiding the drainage lines back to the original flow regime.

Would the conservation of the site lead to greater viability of the adjacent ecosystem by securing any of the functional factors listed and, does the site or

neighbouring properties potentially contribute to meeting regional conservation targets for both biodiversity pattern and ecological processes?

No. In terms of the National Spatial Biodiversity Assessment (Rouget et al. 2004) this vegetation type is still 99% intact: it is not formally protected but rated as Least Threatened in terms of conservation status.

- ***ToR 4.3.***

Is this a potential candidate site for conservation stewardship?

No.

- ***ToR 4.4.***

What is the significance of the potential impact of the proposed project? Assess alternatives and related activities – with and without mitigation – on biodiversity pattern and process at the site, landscape and regional scales?

The proposed developments on sites 1, 3, 4, 5 and 6 will not have a significant impact on biodiversity or ecological functioning of the site and its surrounding areas.

Mitigation measures should be implemented on site 2 to prevent to minimise impacts on drainage flow regimes.

Indicate on a topographical map or ortho-map, preferably at a scale of 1:10 000:

- ***the area that would be impacted by the proposed development;***
- ***the location of vegetation, habitat and spatial components of ecological processes that should not be developed or otherwise transformed; and***
- ***areas that must remain intact as corridors or ecological "stepping stones" to maintain ecosystem functioning, including fire, in fire-prone systems.***

Refer to Appendix 1.

- ***ToR 4.6.***

Recommend actions that should be taken to prevent or, if prevention is not feasible, to mitigate impacts and restore disturbed vegetation or ecological processes. Indicate how preventative and remedial actions will be scheduled to ensure long-term protection, management and restoration of affected ecosystems and biodiversity.

Site 2 has clearly visible drainage lines crossing the site, these drainage lines should be accommodated by diverting the drainage lines away from the proposed site and thereafter guiding the drainage lines back to the original destination or no development should occur on site 2 and an alternative site should be investigated.

- *ToR 4.7.*

Indicate how biodiversity considerations have been used to inform socio-economic aspects of the proposed project, e.g. through changes to the location or layout of infrastructure, or retaining public access to biodiversity related amenities or resources such as beaches or grazing.

The proposed development layout may not lead to the degradation of ecological function, or to the loss of any rare endangered species of the ecosystem.

8. Concluding Remarks

The report finds that the proposed development should not impact negatively on any listed species. No significant breeding, roosting or habitat on the site will be impacted upon. Most animals will move out of the area to similar habitats when construction starts.

CLES is of the opinion, and based on the survey and study done, that the development if designed according to the recommendations will not impact significantly on the biodiversity or affect ecological functioning of the area.

No additional survey or further assessment is recommended in our view.

Further recommendations:

- The project implementation process should be fully subject to regular and up to requisite standard Environmental Management Program prescripts and conditions, inclusive of regular competent ECO supervision.
- Rehabilitation under ECO supervision should be conducted after mining activities have ceased.
- Succulents Search and Rescue operations should be conducted before any mining activities may proceed on any of the sites. The succulents that are removed from the sites should be planted in similar habitats next to the proposed sites that will not be impacted upon.

9. References

Alexander G and Marais J. 2007. A Guide To The Reptiles Of Southern Africa.

Barnes K.N. 2000. The Eskom Red Data book of birds of South Africa, Lesotho and Swaziland. BirdLife South Africa, Johannesburg.

Branch W.R. (ed.) 1988. South African Red Data book – reptiles and amphibians. SA National Scientific programmes Report No. 151. CSIR, Pretoria.

Bredenkamp, G.J. Henning, B., Mostert, T. & Brown, L.R. 2002. A vegetation and wildlife management plan for Folly Farm on Leeuwpoort 357 JQ. Eco-Agent cc.

Brownlie S. 2005. Guideline for involving biodiversity specialists in EIA processes: Edition 1. CSIR Report No. ENV-S-C 2005 053 C. Republic of South Africa, Provincial Government of the Western Cape, Department of Environmental Affairs and Development Planning, Cape Town.

Cowling R. & Heijnis C. 2001. The identification of Broad Habitat Units as biodiversity entities for systematic conservation planning in the Cape Floristic Region. SA J Bot. 67: 15 – 38.

De Villiers C.C., Driver A., Brownlie S., Clark B., Day E.G., Euston-Brown D.I.W., Helme N.A., Holmes P.M., Job N., & Rebelo A.B. 2005. Fynbos Forum ecosystem guidelines for environmental assessment in the Western Cape. Fynbos Forum, c/o Botanical Society of South Africa: Conservation Unit, Kirstenbosch, Cape Town.

Driver A., Cowling R.M., & Maze K. 2003. Planning for living landscapes: perspectives and lessons from South Africa. Center for Applied Biodiversity Science at Conservation International, Washington DC; Botanical Society of South Africa, Cape Town.

Du Preez L. & Carruthers V. 2009. A Complete Guide to the Frogs of Southern Africa. Struik Nature, Cape Town.

Friedmann Y. & Daly B. (eds) 2004. Red Data Book of the mammals of South Africa: a conservation assessment. CBSG Southern Africa, Conservation Breeding Specialist Group (SSC/IUCN), Endangered Wildlife Trust, South Africa.

Goldblatt P. & Manning J. 1996. West Coast. South African Wild Flower Guide 7. Botanical Society of South Africa.

Goldblatt P. & Manning J. 2000. Cape Plants – a conspectus of the Cape flora of South Africa. Strelitzia 9. National Botanical Institute, Pretoria.

Helme N. & D. Raimondo. In prep. Contribution to the updated Red Data Book list of threatened plants of South Africa.

Hockey PAR., Dean WRJ & Ryan PG. 2006. Roberts Birds Of Southern Africa. VIIth Edition.

International Association for Impact Assessment 2005. Biodiversity in impact assessment. IAIA Special Publication Series No. 3. IAIA, North Dakota.

Miller J.R. 2005. Biodiversity conservation and the extinction of experience. Trends in Ecology and Evolution. 20(8): 430-434.

Pence G.Q.K. 2008 (in prep). C.A.P.E. Fine-Scale Systematic Conservation Planning Assessment: Technical Report. Produced for CapeNature. Cape Town, South Africa.

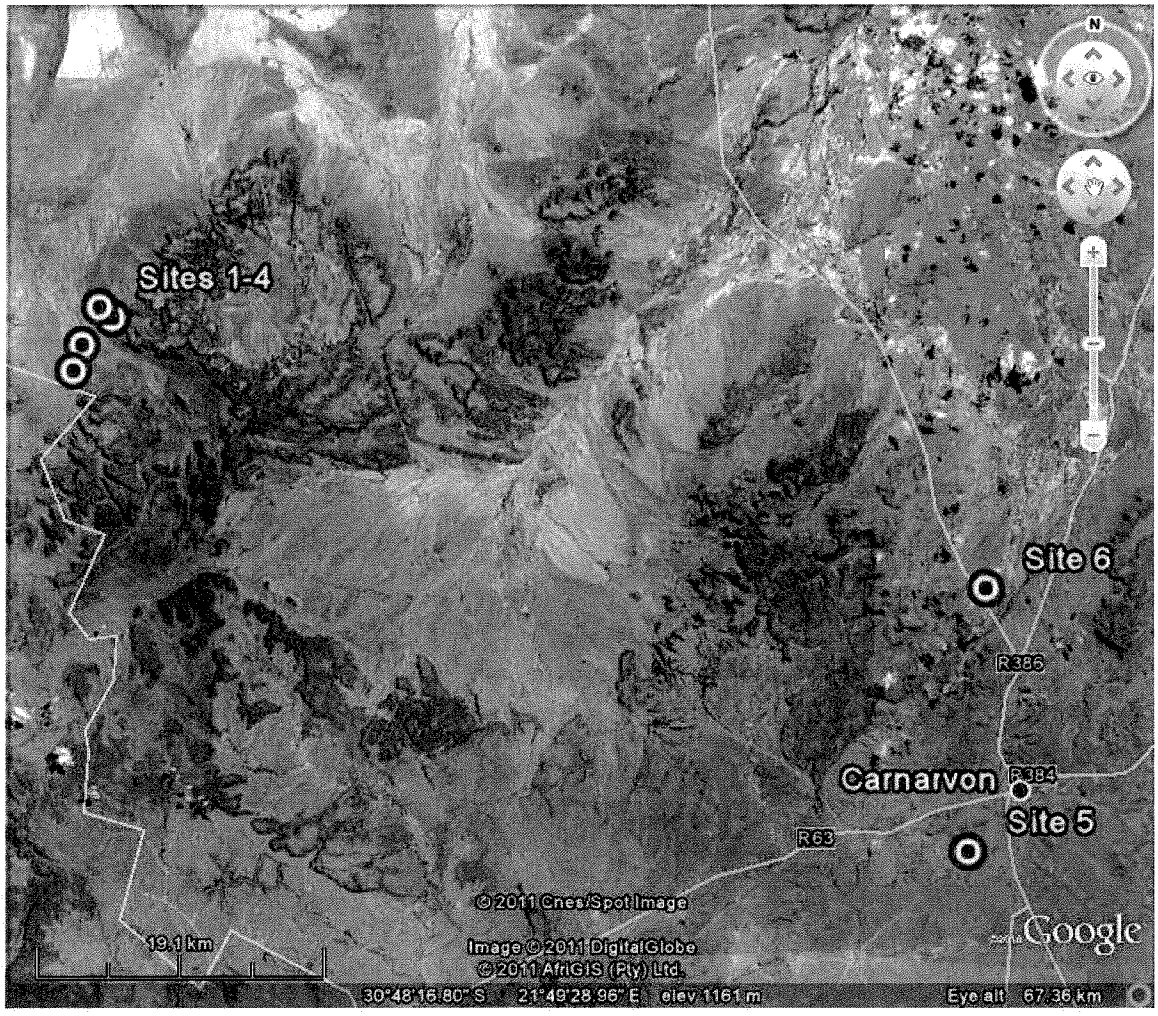
Picker M, Griffiths c and Weaving A. 2004. Field Guide to Insects of Southern Africa. Struik Publishers, Cape Town.

Rouget M., Reyers B., Jonas Z., Desmet P., Driver A., Maze K., Egoh B., Cowling R.M., Mucina L. & Rutherford M.C. 2005. South African National Spatial Biodiversity Assessment 2004: Technical Report. Vol. 1: Terrestrial Component. South African National Biodiversity Institute, Pretoria.

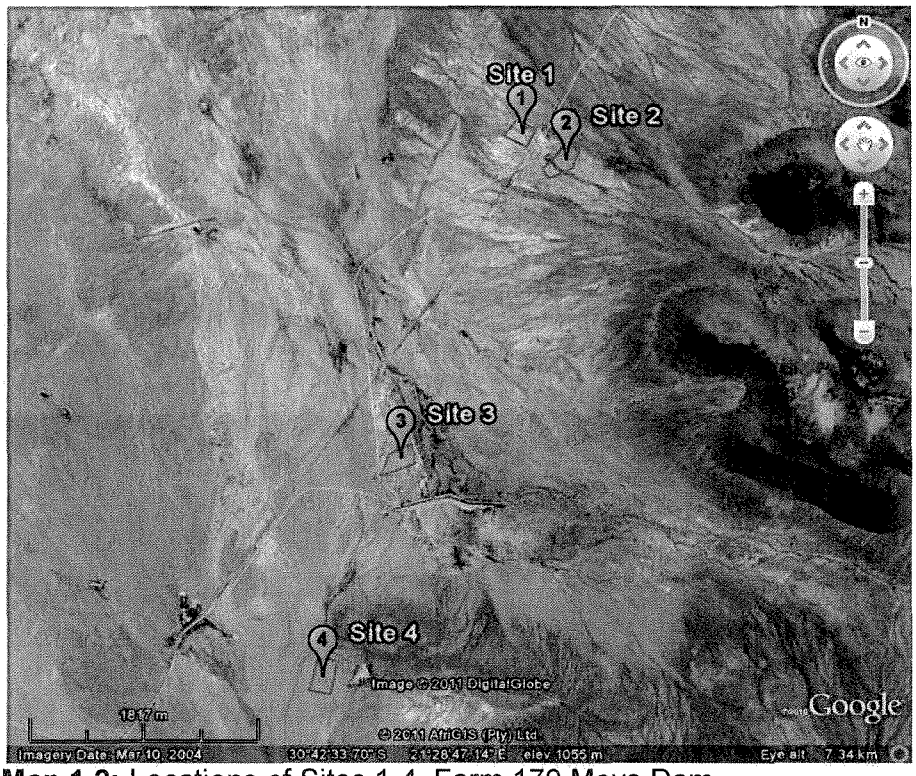
Mucina L & Rutherford M.C. (eds.) 2004. Vegetation Map of South Africa, Lesotho and Swaziland: Shapefiles of basic mapping units. Beta version 4.0, February 2004, National Botanical Institute, Cape Town.

Smithers RHN. 1983. Land Mammals Of Southern Africa. A field Guide.

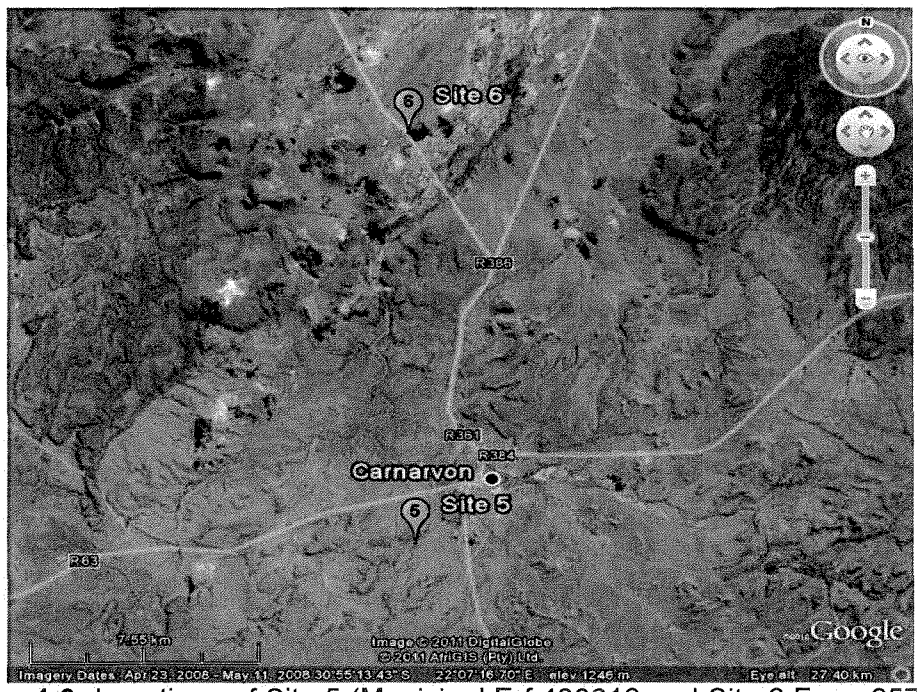
APPENDIX 1: Locality Maps



Map 1.1: Location of all sites in relation to Carnarvon.



Map 1.2: Locations of Sites 1-4, Farm 170 Meys Dam.



Map 1.3: Locations of Site 5 (Municipal Erf 400616 and Site 6 Farm 257 Saaifontein.

AFRICAN HERITAGE CONSULTANTS CC

2001/077745/23

DR. UDO S KÜSEL

Tel/fax: (012) 567 6046
Cell: 082 498 0673
E-mail: udo.heritage@absamail.co.za

P.O. Box 652
Magalieskruin
0150

1st Phase

CULTURAL HERITAGE RESOURCES IMPACT ASSESSMENT FOR PROPOSED MINING OF GRAVEL AND CONCRETE STONE ON A NUMBER OF LOCATIONS NEAR CARNARVON, NORTHERN CAPE PROVINCE.

February 2011

SIDNEY MILLER
B.Sc (Engineering) Civil, M. (Architecture) Conservation.

INDEX

DEFINITION

The broad generic term *Cultural Heritage Resources* refers to any physical and spiritual property associated with past and present human use or occupation of the environment, cultural activities and history. The term includes sites, structures, places, natural features and material of palaeontological, archaeological, historical, aesthetic, scientific, architectural, religious, symbolic or traditional importance to specific individuals or groups, traditional systems of cultural practice, belief or social interaction.

PROTECTED SITES IN TERMS OF THE NATIONAL HERITAGE ACT, Act. NO. 25 OF 1999

The following are the most important sites and objects protected by the National Heritage Act:

a. Structures or parts of structures older than 60 years
b. Archaeological sites and objects
c. Palaeontological sites
d. Meteorites
e. Ship wrecks
f. Burial grounds
g. Graves of victims of conflict
h. Public monuments and memorials
i. Structures, places and objects protected through the publication of notices in the Gazette and Provincial Gazette
j. Any other places or object which are considered to be of interest or of historical or cultural significance
k. Geological sites of scientific or cultural importance
l. Sites of significance relating to the history of slavery in South Africa
m. Objects to which oral traditions are attached
n. Sites of cultural significance or other value to a community or pattern of South African history

METHODOLOGY

Introduction.
It is important to note that the telescope project has been under way for several years and that a number of heritage impact assessments had already been undertaken for the existing structures and roads.

The present study is focussed only on the impacts of **six quarry sites all less that 4 hectares in extent**. Of these two are for the sourcing of gravel for roads, and two are for the sourcing of aggregate (dolerite). Of these it is expected that only two sites will in fact be utilised for gravel and one for stone.

The four suggested gravel pits are all located close to the area where the gravel will be applied.

Unfortunately the Karroo system is poor in volcanic rock such as granite and dolerite. Therefore the closest source for aggregate stone is located over sixty kilometres from the point of use.

Application.

All relevant maps and documents on the site were studied.

The sites were visited and evaluated.

Google Earth was consulted for aerial information.

The public meeting on Thursday 10th February was attended and comments from the public were taken into consideration.

The issue of resettlement of indigenous people were investigated.

The issue of the sites being places of religious importance were investigated.

The issue of land claims were considered.

The investigation was undertaken as a team, working with the environmental consultants on the sites for three days, from the 8th to the 10th of February. Further visual inspection and evaluation gave rise to the results below.

RESULTS

A. Indemnity.
It is always important to note that archaeologists cannot perceive what is occurring underground. It is therefore important that the incidental discovery of archaeological remains during operational excavation will still have to be treated as described by Act 25 of 1999.

B. Social aspects
The investigation of issues regarding resettlement, land claims and places of religious worship resulted in a zero impact.

C. Archaeological matters

1. **Proposed gravel quarry site, site one. (Figure 25)**
   This proposal is based on the extension of an existing quarry. As far as could be determined there exist no undisturbed heritage remains on this site. It is therefore acceptable from a heritage point of view that the site could be extended and used for future application.

2. **Proposed gravel quarry site, site two. (Figure 25)**

The site is located just to the south of a small dam in a drainage line.

Below the dam wall and above the dam wall there can be found a large number of stone tools that appears to be relatively undisturbed.

As the tools do not occur in a 'midden' context it is of **low cultural significance.**

Even so it is suggested that this site should be placed on the lowest priority for mining of gravel for this project. If, for what ever purposes this site becomes a preferred site, then a mitigation process will have to be adhered to. A Stone Age specialist will have to be appointed to follow the mitigation process as described by Act 25 of 1999.

3. **Proposed gravel quarry site, site three. (Figure 26)**
The practise of building large catchment dams in relative 'flat' countryside has been one way that farmers aspired to contain some of the run-off waters that occasionally resulted from storms in these areas.

These dams were constructed by merely using material from the 'inside' of the structure to construct the walls itself, resulting in a total devastation of both natural resources, as well as cultural remains within the 'dam'

This is then also the case with the position of proposed quarry site, site three.

From a cultural point of view this is then a preferred site for a gravel borrow pit.

3. **Proposed gravel quarry site, site four. (Figure 27)**
This site is situated just below a dam, on the 'bank' of a drainage line. Most of the site is still undisturbed and from an aesthetic point of view it is preferable that this will be maintained in lieu of the fact that there are already two disturbed sites available in close proximity.

5 **Proposed aggregate quarry site, site five. (Figure 28)**
This site is located on a dolerite outcrop in Karroo sedimentary deposits. It is also in full view of the Carnarvon, Van Wyks Vlei road and will have marked aesthetic impact on the environment.

The only cultural remains that were identified is a very small fortification, possibly British of origin and dating to the Second South African War.

It appears to be no more than a number of low stone 'walls' and a collection of discarded tins. The cultural significance is **very low to negligible.**

6. **Proposed aggregate quarry site, site six. (Figure 29)**
The proposed site is located on the existing, non operational municipal quarry'

The site has been in use for a number of years, but since 'development' in Carnarvon has ground to a halt, it has been decommissioned.

Both the original use of the site, as well as the 'decommissioning', has done sufficient damage to the cultural integrity of the site, leaving no trace of earlier utilisation or of artefacts.

D. Comment on the quarry pits.

From an archaeological point of view sites one and three (for gravel) and six (for aggregate) are the preferred sites for utilization as it will have no impact.

Sites four and five do not need mitigation, if they are preferred, but from an aesthetic point of view it will be ideal if they are not used.

Site two contains sufficient Stone Age materials that provisionally prohibit work on the site. The remains are deemed to be of 'LOW TO MEDIUM SIGNIFICANCE'. If there is a special need to utilise this site then it is suggested that a formal mitigation process is undertaken with a Stone Age Specialist as mitigator as prescribed by Act 25 of 1999.

E. Other historical structures.

A secondary but important impact that the transport of the stone aggregate may have is to structurally affect old dwellings that are located along the one route to the building site. The specific dwellings that are referred to are the two corbelled structures that are also national monuments. **These are located at 30 54 45,64 S and 21 54 27,14 E.**

If this route is to be used for the transport of aggregate, then a maximum speed limit of 10 kilometres per hour (within 500 meters from the buildings for the duration of the building contract) should be enforced onto the transport contractor in his letter of appointment. A 'loss of contract' clause, as well as a maximum fine for any damage to the structures must be written into the transport contract.

If this route is to be use for the transport of any other materials in access of 5 metric tonnes, then a maximum speed limit of 10 kilometres per hour (within 500 meters from the buildings for the duration of the building contract) should be enforced onto the transport contractor in his letter of appointment. A 'loss of contract' clause, as well as a maximum fine for any damage to the structures must be written into the transport contract.

SIDNEY MILLER
B.Sc (Engineering) Civil, M. (Architecture) Conservation
Contact details.

1. DESCRIPTION OF FARM/S

A. Borrow pit 1: Meys Dam 170. B. Borrow pit 2: Meys Dam 170. C. Borrow pit 3: Meys Dam 17. D. Borrow pit 4: Meys Dam 170. E. Stone Quarry Municipal: Erf 400616. F. Stone Quarry Saaifontein: Saaifontein 257.
District Pixley Ka Seme District Municipality, Kareeberg Local Municipality Province. Northern Cape

2 OWNER /S

A , B, C , and D .Name. Square Kilometre Array South Africa (SKA SA)
Tel.011 442 2434 E-mail. Tracy Cheetham [tcheetham@ska.ac.za]
E. Name: Kareeberg Local Municipality Tel: 053 382 3012
F. Name: Salomon Jacobus Jacobs Tel: 053 382 3235

3 DEVELOPERS

Name. Square Kilometre Array South Africa (SKA SA)
Tel.011 442 2434 E-mail. Tracy Cheetham [tcheetham@ska.ac.za]

4 CONSULTANTS

a. Environmental
Company. Shangoni Management Services
Contact name. Salome Venter
Contact cel. 071 609 1078
Contact e-mail. salome@shangoni.co.za
b. Engineering
Company. **Aaurecongroup**
Contact name. **Stephan.vandenBerg**
Contact cel. 084 869 9262
Contact e-mail. **Stephan.vandenBerg@af.aurecongroup.com**

LOCAL AUTHORITY

Municipality.Kareeberg LM
Contact name.Albertus van Schalkwyk
Contact cel. 053 382 3012

5. TYPE OF DEVELOPMENT

Astronomical research

6. ZONING OF THE IMPACT SITES

Site one. Agriculture Site two. Agriculture Site three. Agriculture
Site four. Agriculture Site five. Agriculture Site five. Agriculture

7. GPS POSITION OF THE BEACONS OF THE SITES.

See Google Earth Maps supplied and included in this report as figures25 to 30

Documentation site One

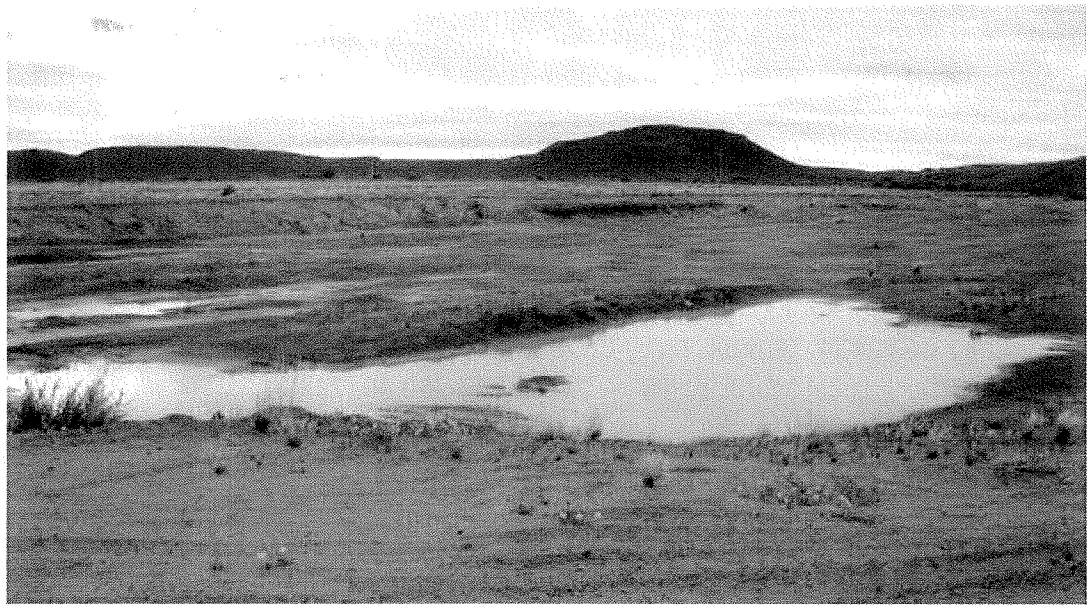


Figure 1. Looking in a westerly direction over the potential quarry site, site one. It has already been used in the past. Approximately one hectare is already mined to a depth of two meters.

Figure 2. Looking North over the potential quarry site, site one. The top soil of the excavated area has been placed on the border of the quarry for eventual rehabilitation. This action has already disturbed the integrity of the archaeological context of the site.

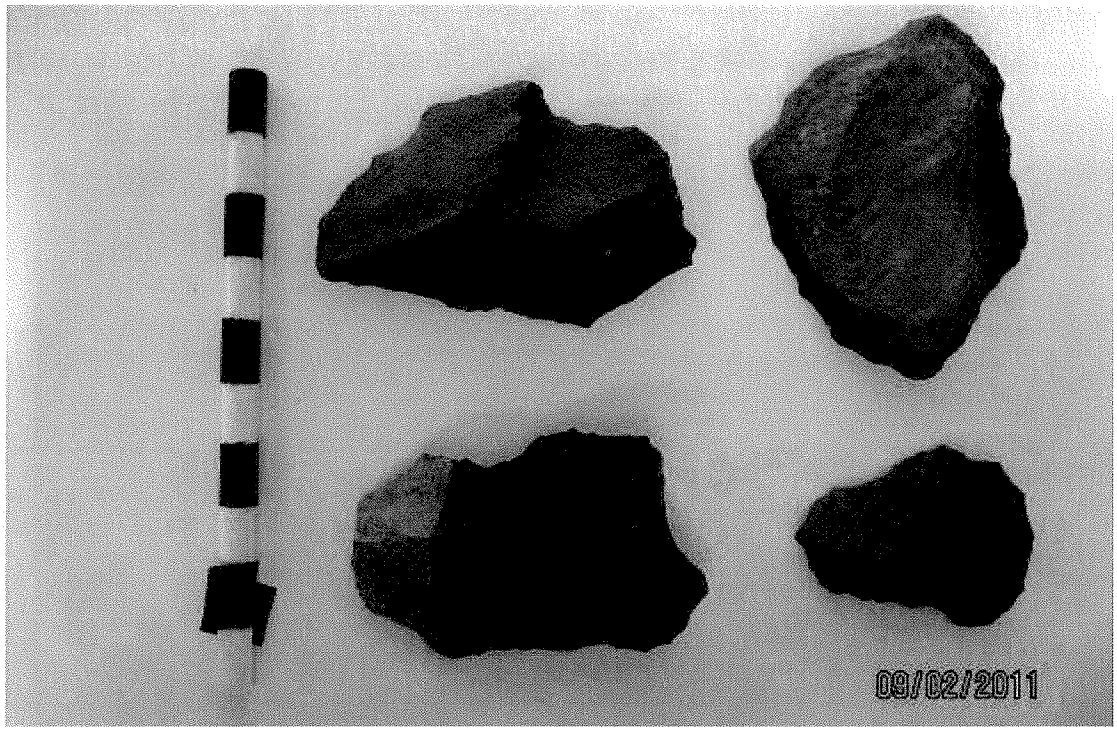


Figure 3. A search of the disturbed areas turned out to be nearly futile. Only a few and obviously displaced tools were observed.

Documentation site Two.

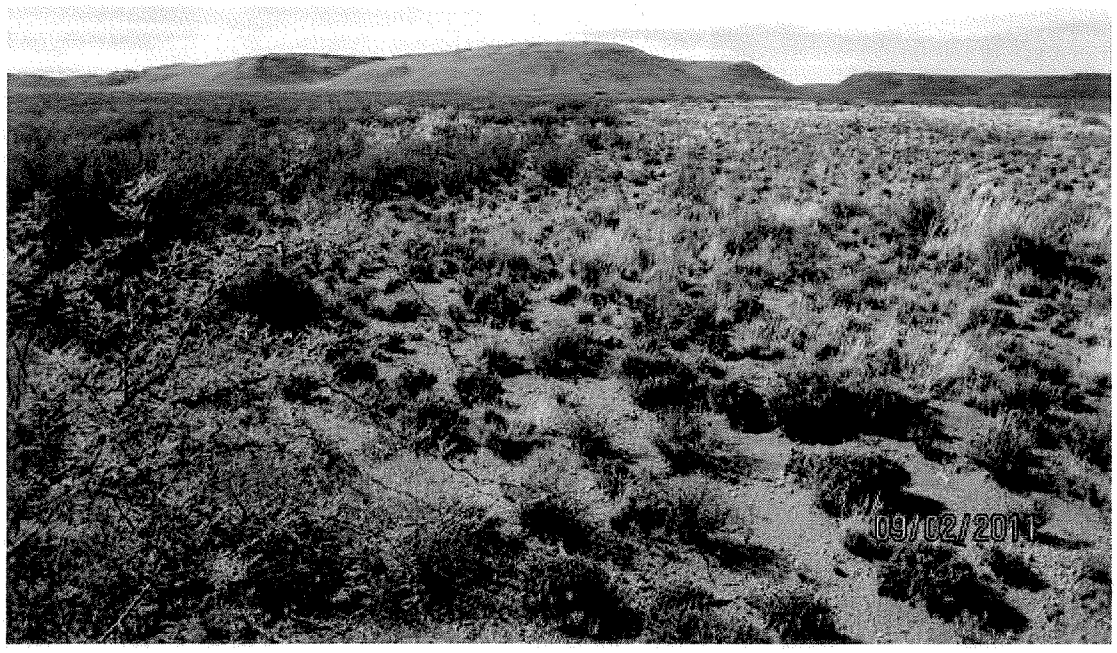


Figure 4. Looking southeast over potential quarry site, site two. From appearances in the veldt and from Google Earth imagery this may have been a fountain or spring site in the past.

Figure 5. Looking northwards into the interior of the 'dam'.

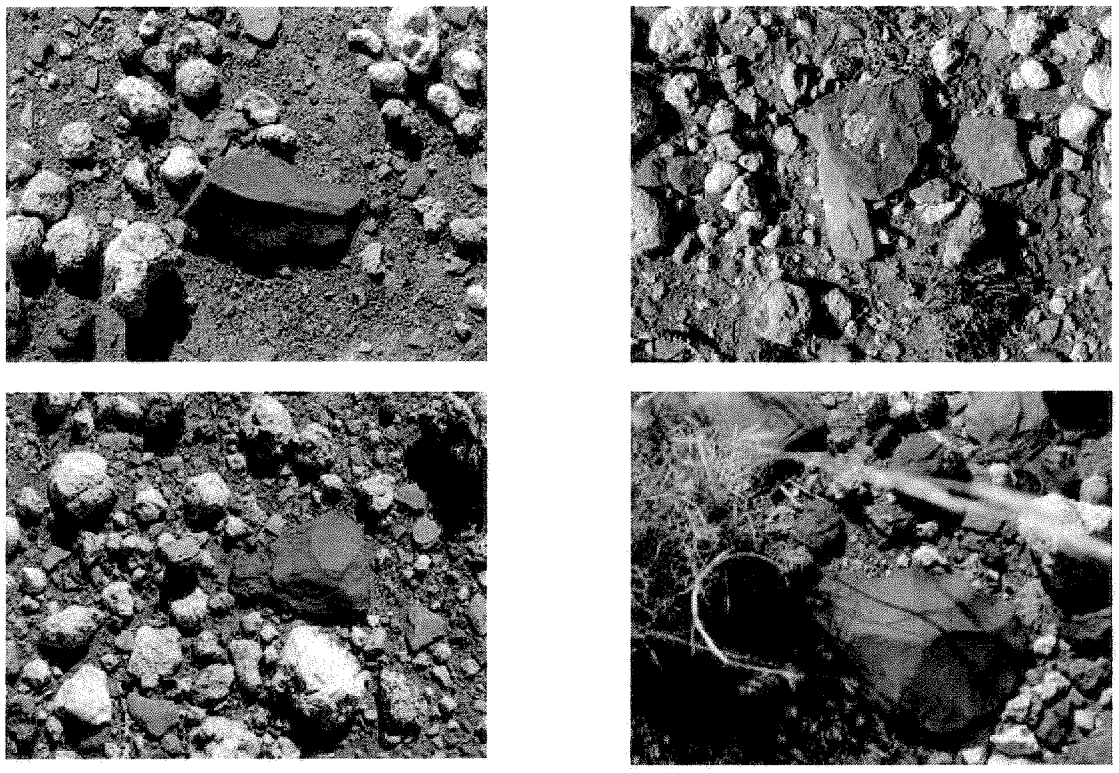


Figure 6. There occurs a 'noticeable' distribution of middle stone age artefacts distributed through most of the research area.

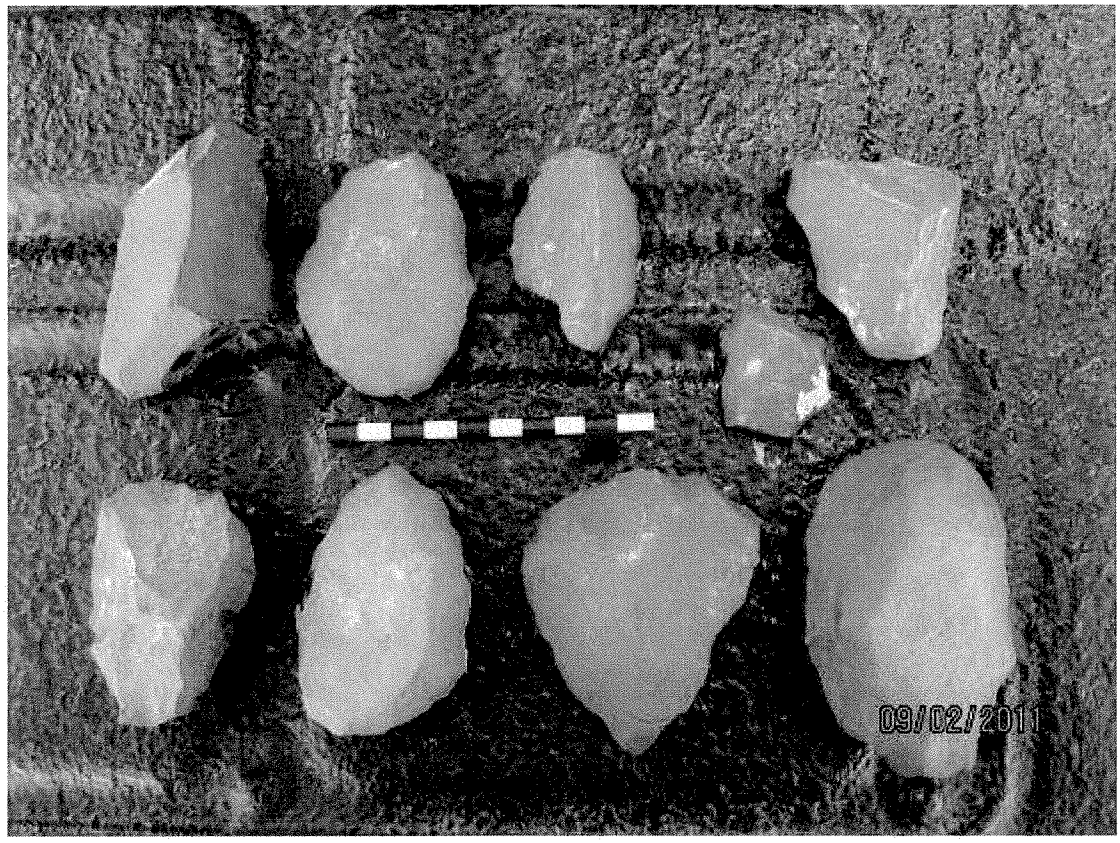


Figure 7. Only a few of the artefacts were collected for purposes of evidence. These were again redistributed to there point of origin.

Documentation site Three

Figure 8. The research area is located within the walls of an old dam.

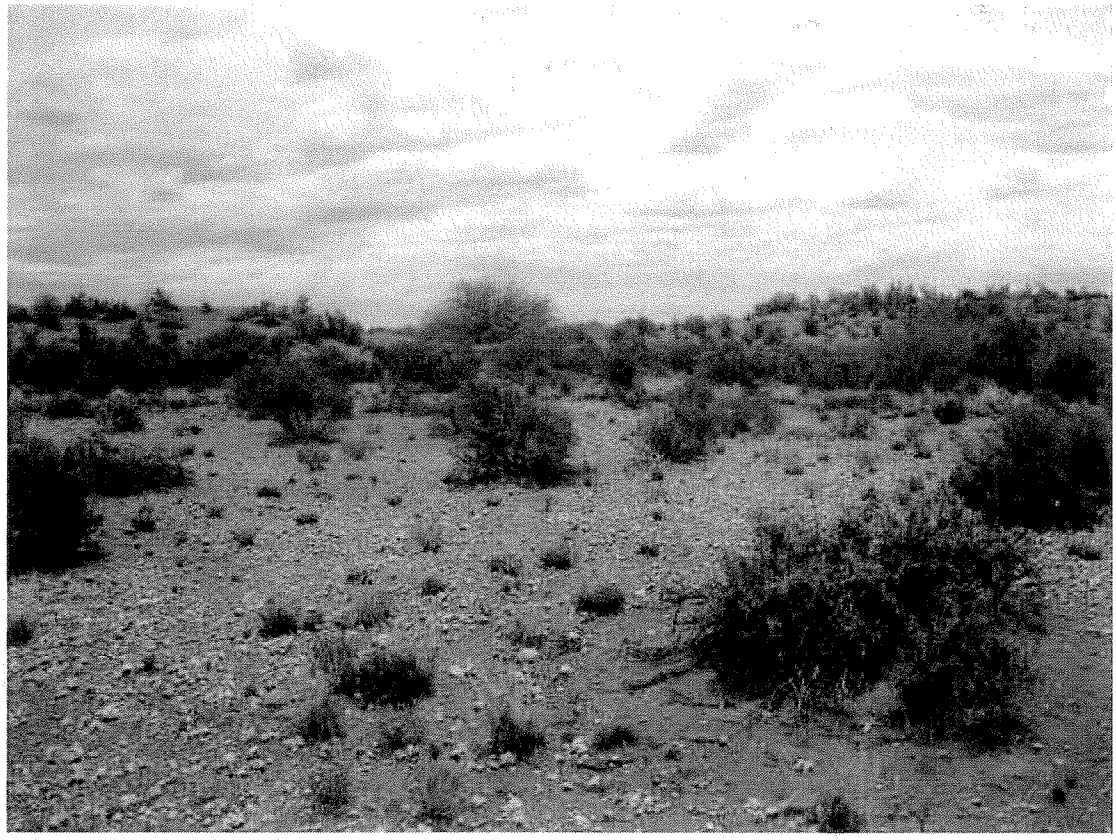


Figure 9. The 'interiors' of the dams were scraped for material to build the dam walls.

Figure 10. A later stone age core that was found on one of the interior slopes of one of the walls of the dam.

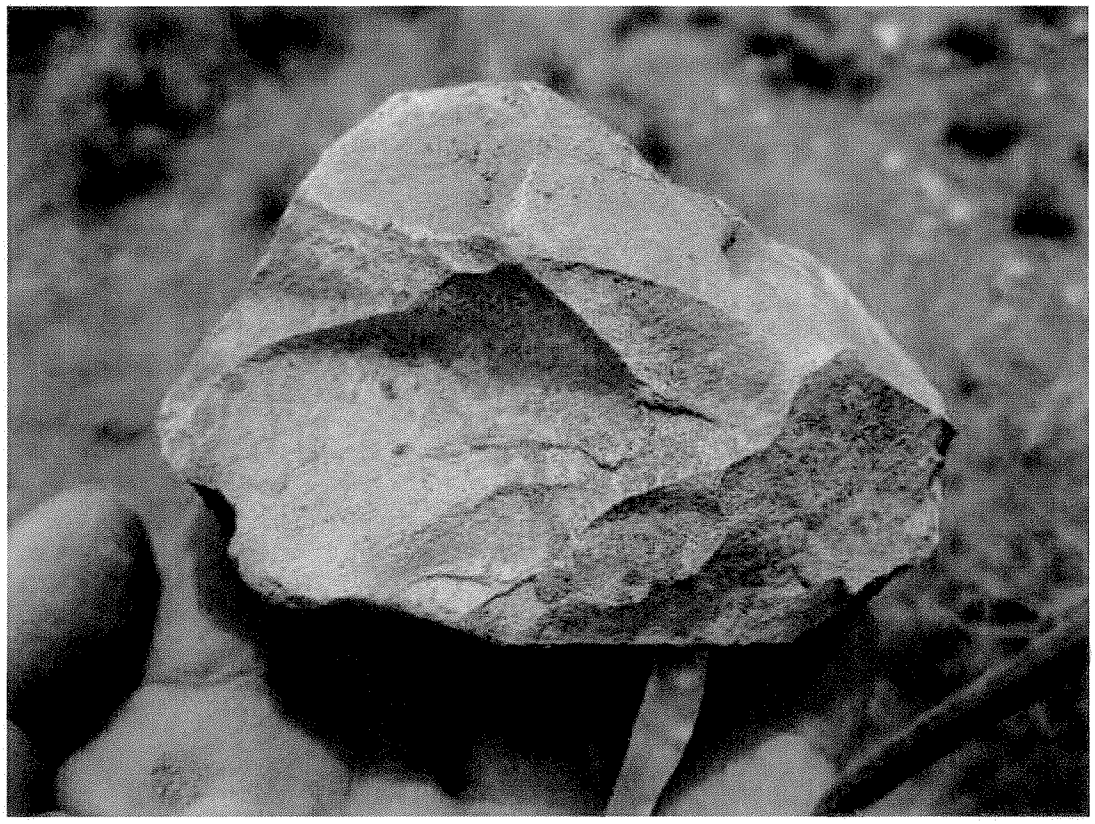


Figure 11. This is the only other artefact that was found in the research area

Documentation site Four.

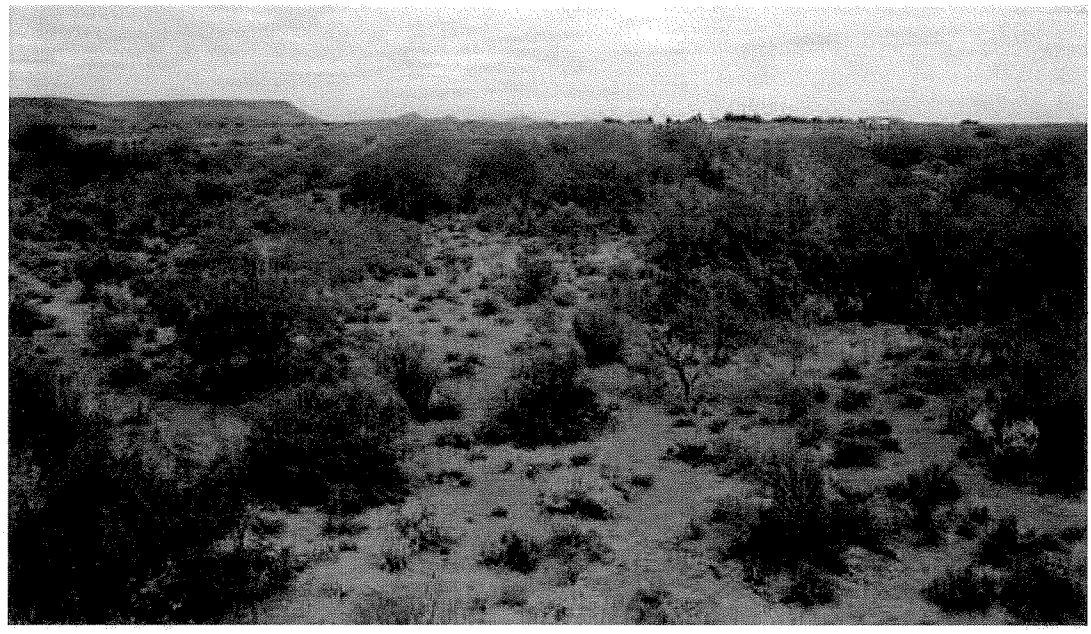


Figure 12. View to the Southeast over the research area.

Figure13. One of the two stone tools that were found in the research area.

Figure 14. One of the two stone tools that were found in the research area.

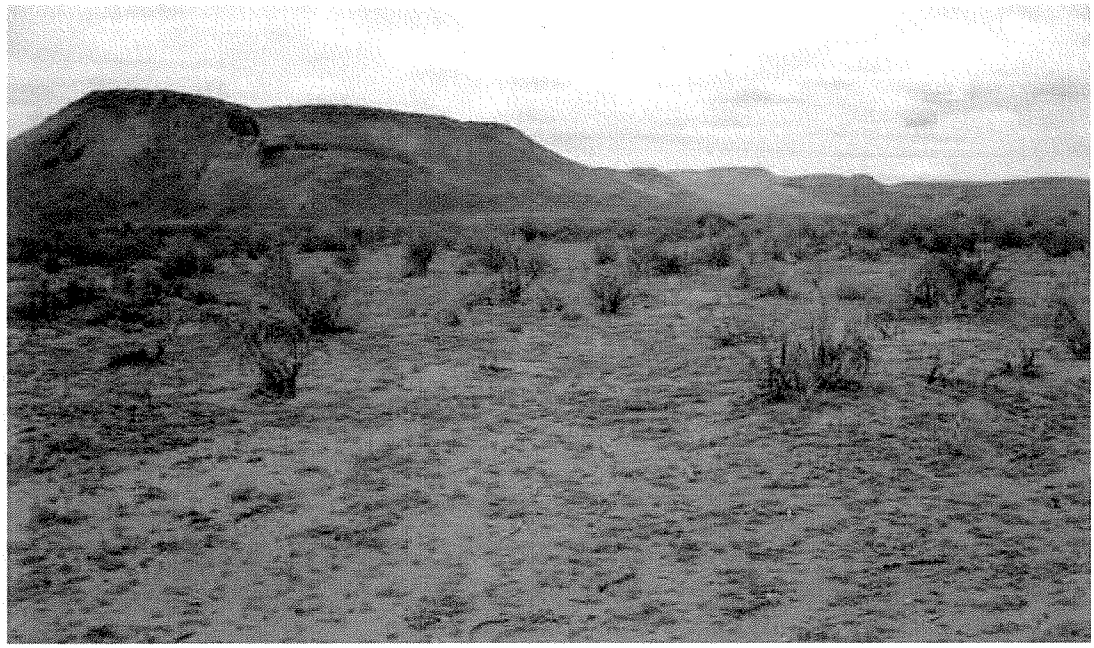


Figure 15. The research area is located away from the drainage line.

Documentation site Five.

Figure 16. North view over the research area. The dolomitic intrusion is an outcrop in the Karroo sedimentary system.

Figure 17. Remains of a British fortification that exists at the north-eastern side of the research area.

Figure 18. Remains of a British fortification that exists at the north-eastern side of the research area.

Figure 19. An array of supply tins that were identified around the fortification. It was not possible to identify a midden.

Documentation site Six.

Figure 20. Western view of the municipal quarry. The old activities have disturbed archaeological evidence even if it had existed before work commenced in the 1960's

Affected sites

Figure 21. Several old farmyards exist along the one route of access that may be affected by heave duty vehicles transporting the stone aggregate. This is one of the two homesteads belonging to the Low family.

Figure 22. Several old farmyards exist along the one route of access that may be affected by heave duty vehicles transporting the stone aggregate. This is the site on which the corbelled structures occur.

Figure 23. A dry stone walled sheep byre directly adjacent to one of the proposed routes along which heavy duty transport vehicles will be possible used.

Figure 24. These corbelled dwellings, declared national monuments' are the two most important buildings that may be affected by heavy duty transport vehicle. The main road literally passes within four meters of the stone constructions.

Figure 25. Sites one and two demarcated in red outline.

Figure 26. Site three demarcated in red outline.

Figure 27. Site four demarcated in red outline.

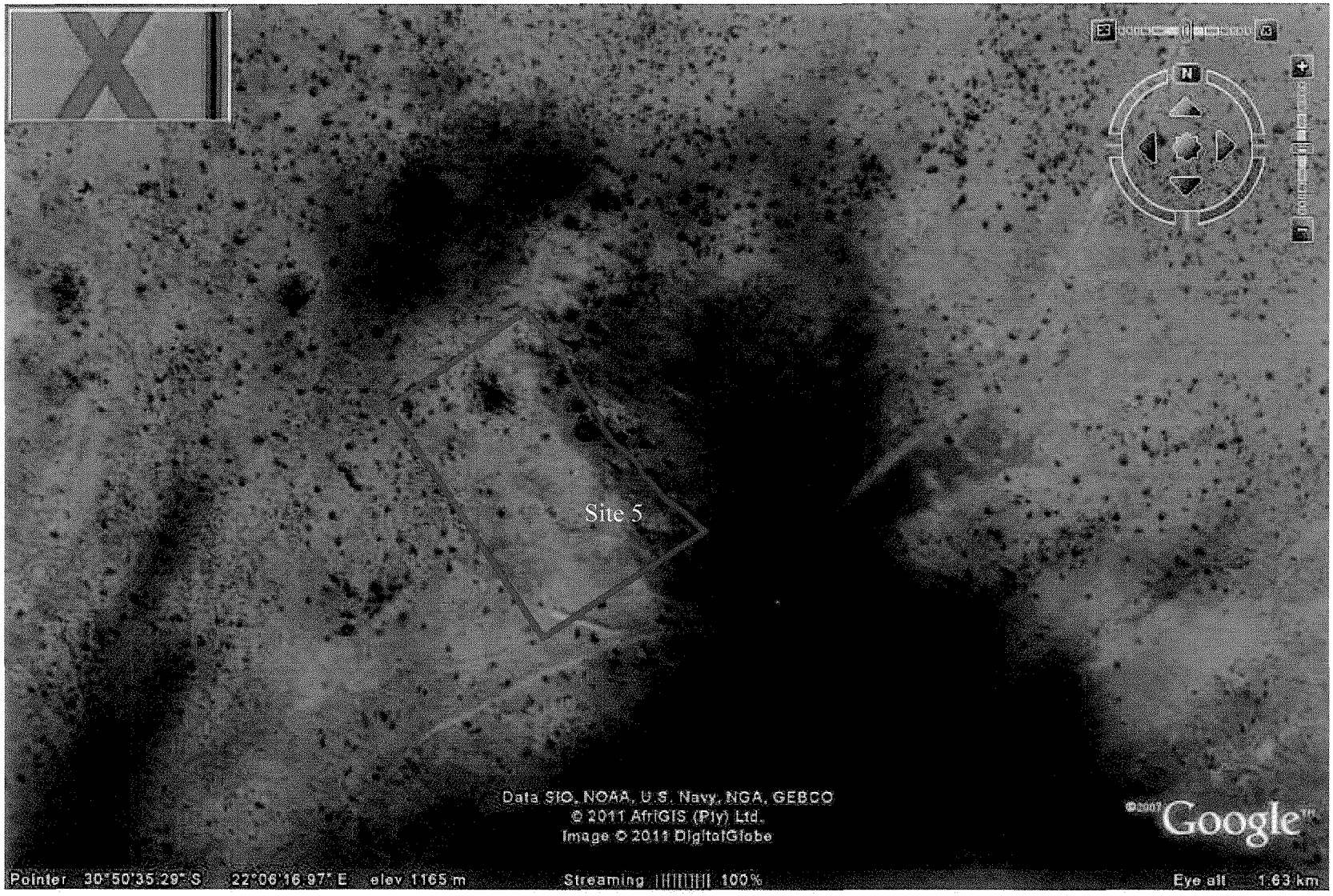
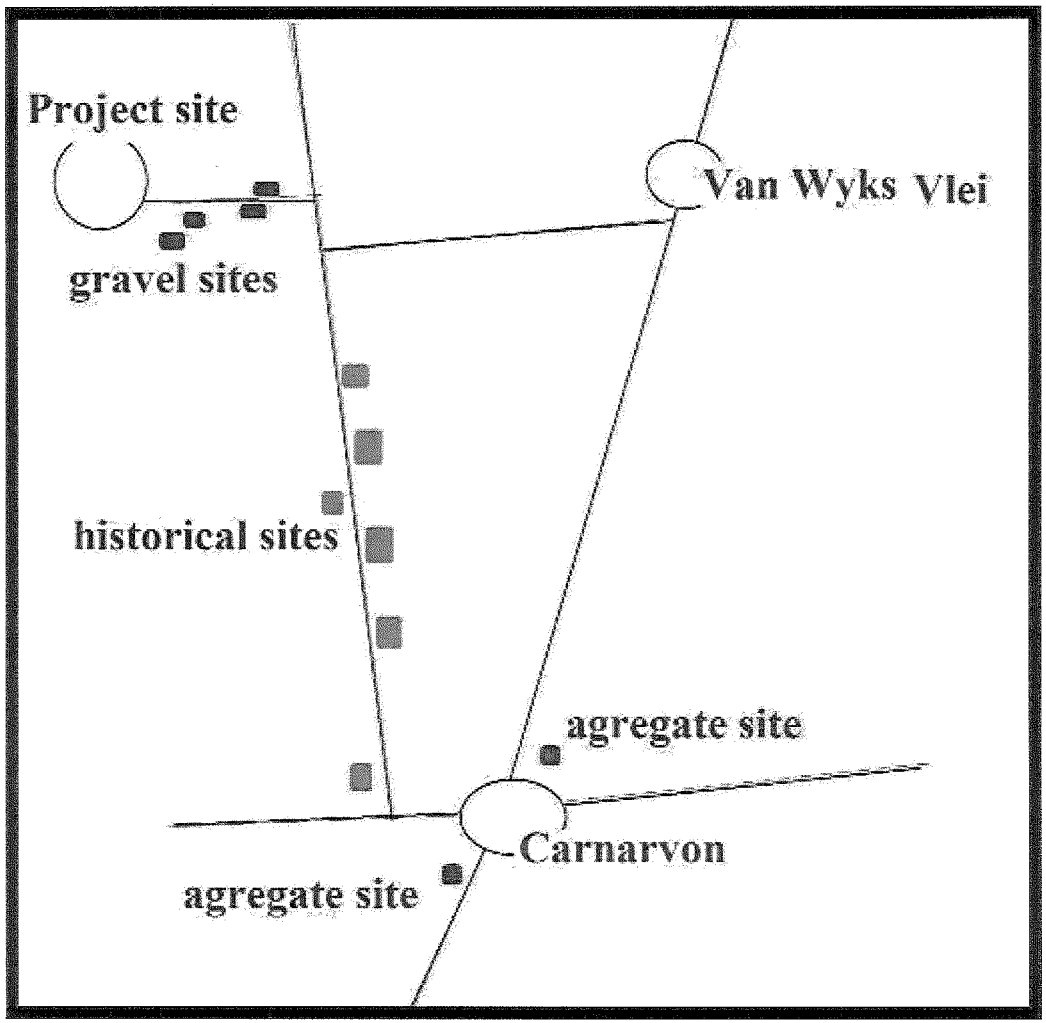


Figure 28. Site five demarcated in red outline.

Figure 29. Site six demarcated in red outline.

Figure 30. Position of Corbelled structures relative to road.



Transport from the gravel sites will not impact historical buildings.

Transport from the aggregate sites will impact historical buildings.

The distance between the project site and Carnarvon is equidistant on either of the two routes.

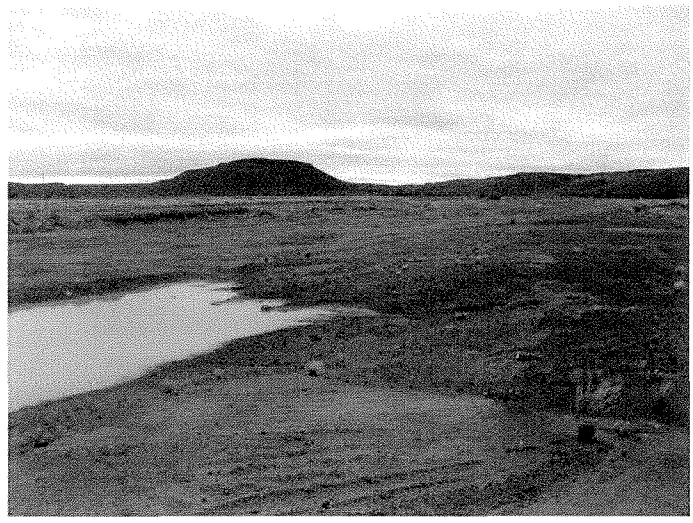
Figure 30. Relative positions of towns, quarries, roads and historical farm buildings. .

BIBLIOGRAPHY

Garth Sampson. The Stone Age Archaeology of South Africa.

ADDENDUM 6
PHOTOS OF THE SITE

SHANGONI
Management Services (Pty) Ltd



ADDENDUM 7
PROOF OF NO LAND CLAIMS

SHANGONI
Management Services (Pty) Ltd

rural development
& land reform
Department:
Rural Development & Land Reform
REPUBLIC OF SOUTH AFRICA

Regional Land Claims Commission: Free State and Northern Cape
11th Floor, New Public Building, Cnr Knight and Stead Streets, KIMBERLEY 8300
P.O. Box 2458, KIMBERLEY, 8300
Tel: (053) 807 5700 Fax: (053) 831 6501

NATIONAL RESEARCH FOUNDATION

VIA FAX: 011 442-2454

Your Ref: Tracy Cheetham **Our Ref: Nqabisa Mkalipi**

RE: LAND CLAIMS: FARM MEY'S DAM 68, CARNAVON DISTRICT

Dear Sir/Madam

I refer to the above and to your letter land claim, received by our office on the 14 April 2011. The enquiry was to confirm if there are any claims lodged against the property mentioned above and according to our database no claims lodged against the mentioned property. However, it should be borne in mind that our database is continuously being updated therefore this information may be subjected to change.

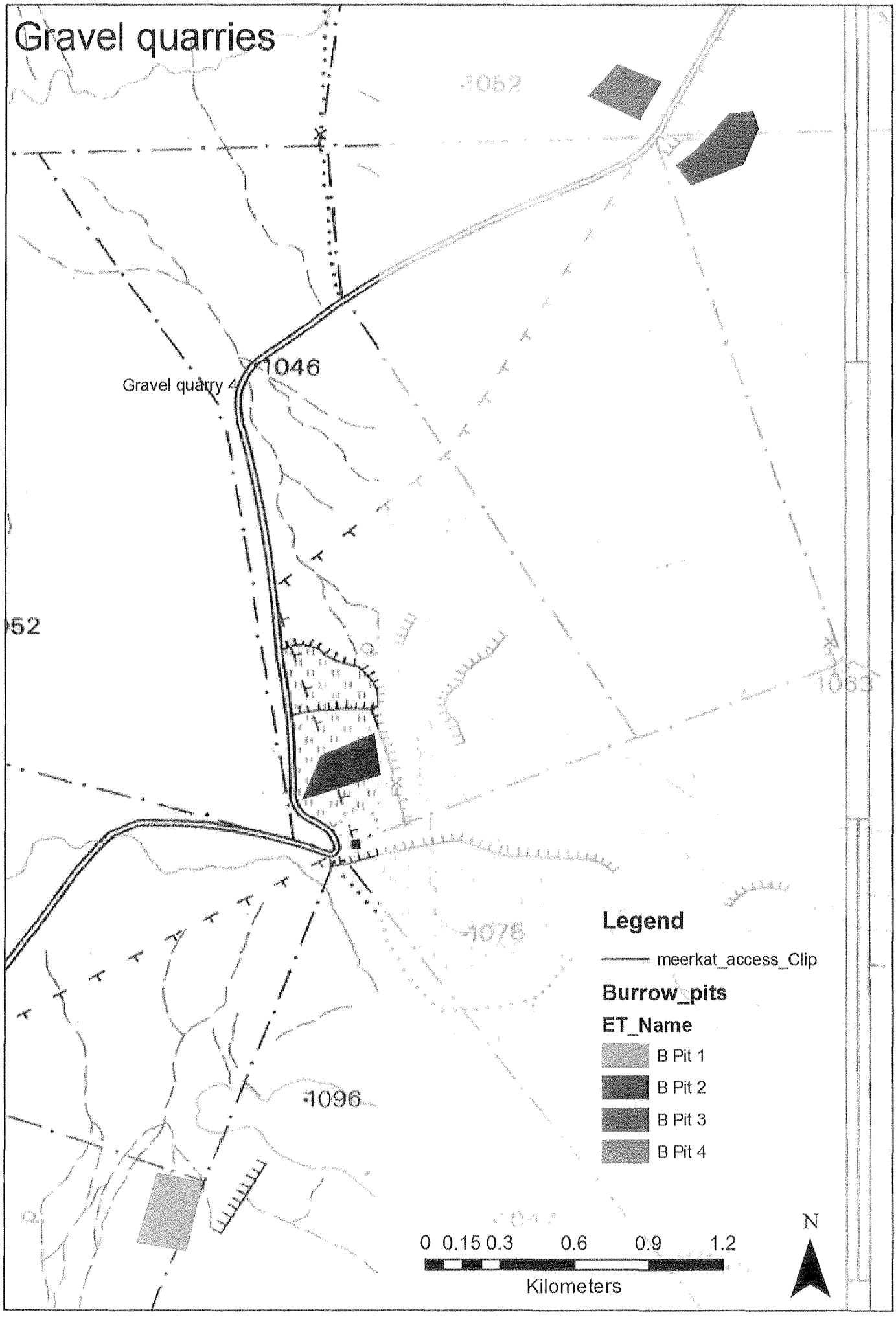
Regards,

.....

NQABISA MKALIPI
SENIOR COMMUNICATION OFFICER
REGIONAL LAND CLAIMS COMMISSION: FREE STATE & NORTHERN CAPE
DATE: 14/04/2011

Addendum 8

Topographical Map


Gravel quarries
1052
1046
Gravel quarry 4
1063
1075
1096
Legend
meerkat_access_Clip
Burrow_pits
ET_Name
B Pit 1
B Pit 2
B Pit 3
B Pit 4
0 0.15 0.3 0.6 0.9 1.2
Kilometers
N