mineral resources

Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

ENVIRONMENTAL IMPACT ASSESSMENT REPORT

and

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

SUBMITTED FOR ENVIRONMENTAL AUTHORIZATIONS IN TERMS OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 AND THE NATIONAL ENVIRONMENTAL MANAGEMENT WASTE ACT, 2008 IN RESPECT OF LISTTED ACTIVITIES THAT HAVE BEEN TRIGGERED BY APPLICATIONS IN TERMS OF THE MINERAL AND PETROLEUM RESOURCES DEVELOPMENT ACT, 2002 (MPRDA) (AS AMENDED)

NAME OF APPLICANT: MAFISA MINING (PTY) LTD

TEL NO: **064 214 9546**

FAX NO: **086 510 7120**

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Springbok
8240

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FILE REFERENCE NUMBER SAMRAD: (NC) 30/5/1/2/2/0505 MR WITH RENEWAL NUMBER

(NC) 30/5/1/2/2/10185MR AND SECTION 102 NUMBER NC-00191-MR/102

1. IMPORTANT NOTICE

In terms of the Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002 as amended), the Minister must grant a prospecting or mining right if among others the mining "will not result in unacceptable pollution, ecological degradation or damage to the environment".

Unless an Environmental Authorisation can be granted following the evaluation of an Environmental Impact Assessment and an Environmental Management Programme report in terms of the National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA), it cannot be concluded that the said activities will not result in unacceptable pollution, ecological degradation or damage to the environment.

In terms of section 16(3)(b) of the EIA Regulations, 2014, any report submitted as part of an application must be prepared in a format that may be determined by the Competent Authority and in terms of section 17 (1)(c) the competent Authority must check whether the application has taken into account any minimum requirements applicable or instructions or guidance provided by the competent authority to the submission of applications.

It is therefore an instruction that the prescribed reports required in respect of applications for an environmental authorisation for listed activities triggered by an application for a right or a permit are submitted in the exact format of, and provide all the information required in terms of, this template. Furthermore, please be advised that failure to submit the information required in the format provided in this template will be regarded as a failure to meet the requirements of the Regulation and will lead to the Environmental Authorisation being refused.

It is therefore an instruction that the Environmental Assessment Practitioner must process and interpret his/her research and analysis and use the findings thereof to compile the information required herein. (Unprocessed supporting information may be attached as appendices). The EAP must ensure that the information required is placed correctly in the relevant sections of the Report, in the order, and under the provided headings as set out below, and ensure that the report is not cluttered with un-interpreted information and that it unambiguously represents the interpretation of the applicant.

2. OBJECTIVE OF THE ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

The objective of the environmental impact assessment process is to, through a consultative process—

(a) determine the policy and legislative context within which the activity is located and document how the proposed activity complies with and responds to the policy and legislative context;

(b) describe the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the preferred location;

(c) identify the location of the development footprint within the preferred site based on an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment;

(d) determine the—

  (i) nature, significance, consequence, extent, duration and probability of the impacts occurring to inform identified preferred alternatives; and

  (ii) degree to which these impacts—

    (aa) can be reserved;

    (bb) may cause irreplaceable loss of resources; and

    (cc) can be avoided, managed or mitigated.

(e) identify the most ideal location for the activity within the preferred site based on the lowest level of environmental sensitivity identified during the assessment;

(f) identify, assess, and rank the impacts the activity will impose on the preferred location through the life of the activity;

(g) identify suitable measures to manage, avoid or mitigate identified impacts; and

(h) identify residual risks that need to be managed and monitored.

PART A

SCOPE OF ASSESSMENT AND ENVIRONMENTAL IMPACT ASSESSMENT REPORT

3. Contact Person and Correspondence Address

a) Details of

i) Details of the EAP

Name of the Practitioner:	**ROELINA OOSTHUIZEN**
Tel No.:	**087 527 0713**
Cell No.:	**084 208 9088**
Fax No.:	**086 510 7120**
E-mail address:	**roosthuizen950@gmail.com**

ii) Expertise of the EAP

(1) The qualifications of the EAP

Masters in Environmental Management (UFS)
B-Comm in Human and Industrial- Psychology (NWU)
(With evidence attached as **Appendix 1**)

(2) Summary of the EAP's past experience

(In carrying out the Environmental Impact Assessment Procedure)

Relevant past experiences in carrying out the Environmental Impact Assessment Procedures include Environmental Impact Assessments, Environmental Management Plans/Programmes/ Reports, Performance assessments, Rehabilitation progress assessments, Environmental Liability assessments, Environmental compliance monitoring, Scoping Reports, etc.
Please refer to attached CV.
(with evidence attached as **Appendix 2**)

b) Description of the property

Farm Name:	**Property:** A 442.7358 ha portion of Portion 5 of the Farm Kammagas No. 200 situated in the Nama Khoi Local Municipality and Namakwa District Municipality of the Namakwaland administrative district of the Northern Cape. The property is registered in the name of The Gemeenskap van Komaggas by virtue of Title Deed T102440/1998 (Figure 1). **District:** Namaqualand **Province:** Northern Cape
Application area (Ha)	442.7358 ha (Four hundred and forty-two comma seven three five eight hectares.)
Magisterial district:	Namaqualand

Distance and direction from nearest town	The Buffelsbank mine lies in the Lower Buffels River Valley, which forms part of the vast coastal plain between the Namaqualand Metamorphic Mountain land and the West Coast of South Africa. The road from Springbok descends impressively from the escarpment into the valley below via the Spektakel Pass (Figure 1). The mine is situated off the R335 between Springbok and Kleinzee about 50 km east of Springbok in the Namakwa district, Northern Cape Province. The mine is situated within jurisdiction of the Nama Khoi local authority of the Namakwa District Municipality with an approximate centre Latitude S29.60442 ° and Longitude E17.48358°
21 digit Surveyor General Code for each farm portion	C05300000000020000005

c) Locality map

(show nearest town, scale not smaller than 1:250000)

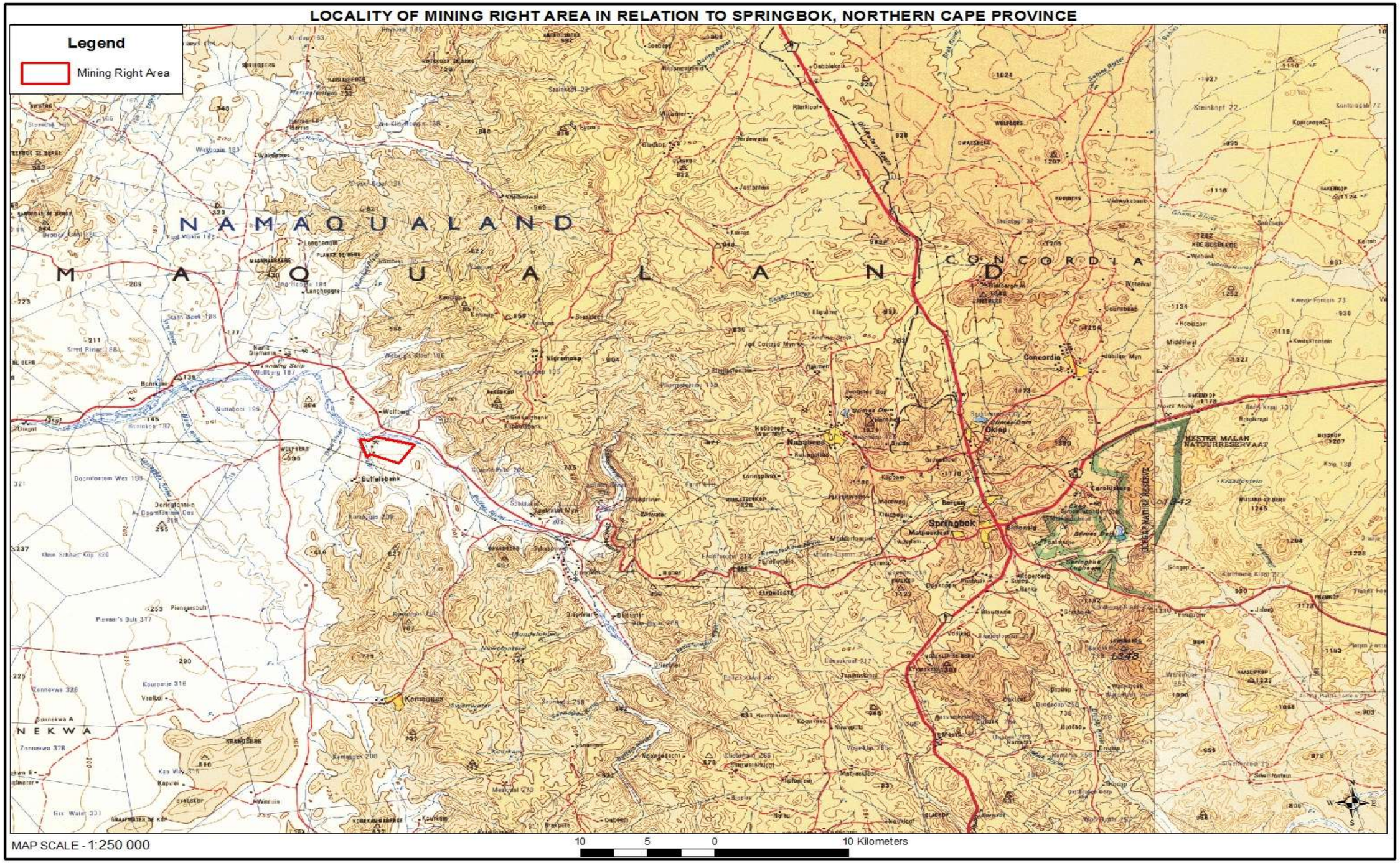


Figure 1. Locality Plan indicating the application area in red.

d) Description of the scope of the proposed overall activity

(provide a plan drawn to a scale acceptable to the competent authority but not less than 1: 10 000 that shows the location, and area (hectares) of all the aforesaid main and listed activities, and infrastructure to be placed on site)

Figure 2. A plan indicating the overall location and extent of listed activities and main infrastructure

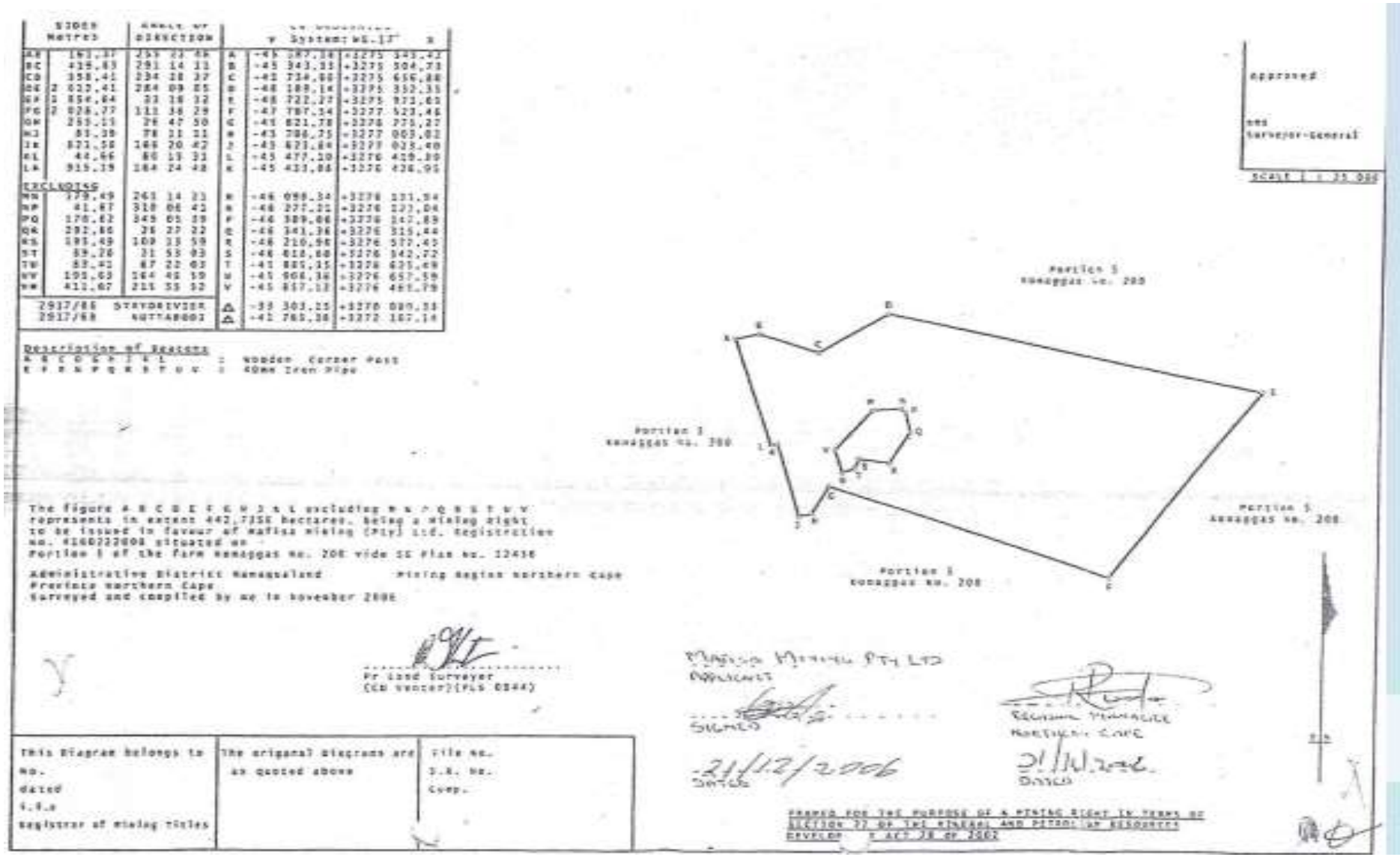


Figure 3. Application map Regulation 42 Map

i) Listed and specified activities

Table 1: Listed and Specified Activities

Name of activity (e.g. Excavations, blasting, stockpiles, discard dumps or dams, loading, hauling and transport, water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc…etc…etc.)	Aerial extent of the activity (Ha or m²)	Listed Activity (mark with an X where applicable or affected)	Applicable Listing Notice (GNR544, GNR545 or GNR546 / Not listed GNR983, GNR984, GNR985/ Not listed)
Activity 9: "The development of infrastructure exceeding 1000 metres in length for the bulk transportation of water or storm water- (vii) with an internal diameter of 0.36 metres or more; or (viii) with a peak throughput of 120 litres per second or more;	Water distribution Pipelines	X	NEMA: LN1 (GNR327)
Activity 12: "The development of— The development of- (i) dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 square metres; or (ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs— (a) within a watercourse; (b) in front of a development setback; or **(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse"** Regulation GN R704, published on 4 June 1999 in terms of the National Water Act (Use of water for mining and related activities)	Clean and dirty water system It is anticipated that the operation will establish storm water control berms and trenches to separate clean and dirty water on the mining site.	X	NEMA: LN1 (GNR327)
Activity 13: The development of facilities or infrastructure for the off-stream storage of water, including dams and reservoirs, with a combined capacity of 50 000 cubic meters or more, unless such storage falls within the ambit of activity 16 in Listing Notice 2 of 2014	Possible storage dam and tanks	X	NEMA: LN1 (GNR327)

Activity 24: The development of a road- (ii) a road with a reserve wider than 13,5 meters or where no reserve exists where the road is wider than 8 metres.	Access and haul roads 10 000m²	X	NEMA: LN1 (GNR327)
Activity 17: Any activity including the operation of that activity which requires a mining right as contemplated in section 22 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including – (a) associated infrastructure, structures and earthworks, directly related to the extraction of a mineral resource; or (b) the primary processing of a mineral resource including winning, extraction, classifying, crushing, screening or washing; But excluding the secondary processing of a mineral resource, including the smelting, beneficiation, reduction, refining, calcining or gasification of the mineral resource in which case activity 6 in Listing notice 2 applies. The Mafisa operation directly relates to mining of a mineral resource (diamonds) and requires a mining right.	442.7358 Ha	X	NEMA: LN2 (GNR325)
Activity 14: The development and related operation of facilities or infrastructure for the storage and handling of dangerous goods (fuel), where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic meters.	2 X 23 000l diesel tanks = 46 000l with capacity for storing of old oils and new oils to be calculated	X	NEMA: LN1 (GNR327)
Activity 15: The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for- (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.	±250 ha	X	NEMA: LN2 (GNR325)
Activity 12(g): The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous	i. Within any critically endangered or endangered ecosystem listed	X	NEMA: LN3 (GNR 324)

vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.	in terms of section 52 of the NEMBA or prior to the publication of such list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004; ii. Within critical biodiversity areas identified in bioregional plans;		
Activity 11: The establishment of residue deposits resulting from activities which require a mining right.	0.3ha		NEMWA: Category B (GNR 633)
Office complexes Temporary workshop facilities Storage facilities Concrete bund walls and diesel depots Ablution facilities Topsoil stockpiles Overburden stockpiles Water tanks	± 200 m² ± 300 m² ± 2 000 m² ± 250 m² ± 30 m² ± 500 m² 5 000 m² 3m x 3m = 9m² each ALL FOOTPRINTS WILL BE CONFIRMED BY SURVEY		Not Listed
Waste disposal site (domestic and industrial waste): It is anticipated that the operation will establish a dedicated, fenced waste disposal site with a concrete floor and bund wall. The following types of waste will be disposed of in this area: • Small amounts of low-level hazardous waste in suitable receptacles. • Domestic waste. • Industrial waste.	15m x 30m = 450m²		Not Listed

ii) Description of the activities to be undertaken

(Describe methodology or technology to be employed, including the type of commodity to be mined and for a linear activity, a description of the route of the activity)

Mining Method

Mafisa Mining will make use of the open cast mining method as described below. Mining is to take place as a continuation of earlier surface mining and briefly entails; the removal of overburden above the diamond bearing gravels and clays by excavator and dozer to expose the gravels and diamondiferous clays which overlie the bedrock; removal of the diamondiferous clays and gravels which will be sent to the plant for processing and diamond recovery; and the sweeping of the paleo bedrock floor by hand to recover pothole gravels for processing.

The first stage of mining will involve the mining of the proven reserves (Areas T1 & T2 as seen in Fig. 2). The reason for this is that these blocks are situated closest to the current plant site. Furthermore, the mining of these areas will also enable the company to create a slot into the paleochannel from where long wall mining can continue as well as to remove terrace gravels in order to unlock more paleo gravels.

The next stage will involve mining of block C1 from where long wall mining will continue to block C2 to C6. Preliminary planning is to move then to the proven reserves (Areas T3 & T4 Figure 4) followed by mining the rest of the paleo channel block C7 and C8. Depending on grade, the final stage would be mining of the terrace gravels block T5, still regarded as an inferred resource. The gravel will be mined by means of strip mining on long benches. The solidified sands (overburden horizon) will be removed in with three benches, each with a BW of 5m and BH of 13m.

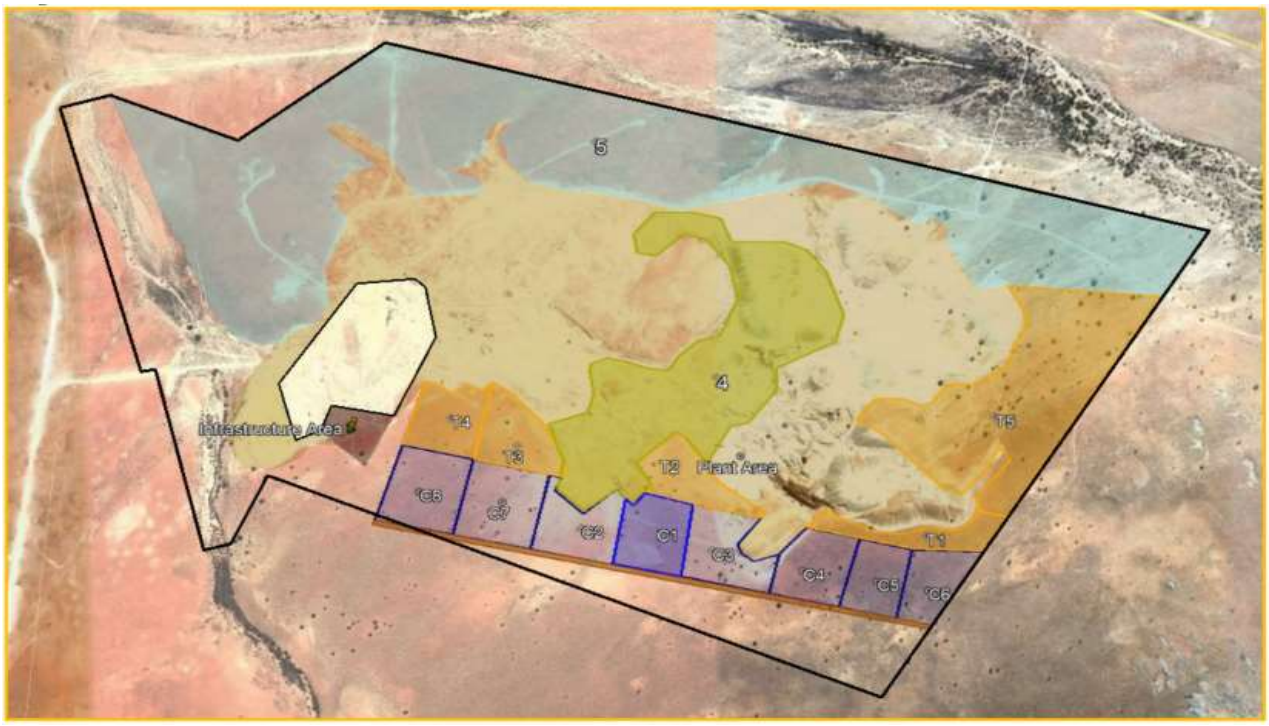


Figure 4. Mine Plan

Shallow paleo channels also exist on the northern and western portions of the mining area and these areas needs to be worked by hand. This will be done by small miners from the local community in partnership with the company under cover of this mining right and EA. In the centre of the mine pit there is also an area where the bedrock still needs to be swept and this will also be done by small miners from the local community in partnership with the company.

Excavation process

A layer of topsoil ±50cm thick will be removed from the new mining blocks. Only 50% of the topsoil recovered will be stockpiled for rehabilitation of the new mining blocks and the rest will be used to cover the existing mined-out sections on a continuous basis as stripping is taking place. will be replaced on the mined-out sections. The topsoil stockpiles for rehabilitation of the new mining blocks will be placed within the mine pit and no new stockpiles will be created above natural ground level.

Overburden handling will generally occur along the principles of a cut & fill strip mining operation where the removed overburden is used immediately in the backfill of previously mined cuts. No overburden will be dumped on natural ground level.

The top layer of gravel is bulldozed onto stockpiles from which it is loaded into Articulated Dump Trucks (ADT's) either by excavator or front-end loader for transport. The remaining 1-1.5 m of gravel is then removed from the uneven calcrete substrate by means of an excavator. Excavation continues to the base of the gravels where higher basal grades are expected to occur. Where the bedrock is soft, approximately 20cm of bedrock is excavated with the gravels, so that any diamonds in the weathered rock will be recovered. The primary gravels are subjected to infield screening to -35mm by means of a mobile screening plant. The screened material (ore) is then transported by ADT's to the diamond processing area where it is stored on the ore stockpile to be processed.

Mineral processing

Material from ore stockpile is fed into the trommel screen feed bin using a front-end loader. The material is combined with water introduced into the scrubber from the clear water return dam. The discharge of the scrubber is directly into the trommel screen which scalps the material at ±35 mm.

All oversize material is transported via a conveyor to a temporary stockpile from where it will be used to backfill excavations. Material 2.5-35 mm is transported to the pan's rotary distributor via a conveyor belt equipped with a weightometer used to record the feed tonnage to the pan, panfeed on average 80tph.

Undersize material and slurry from the trommel screen are pumped to a separator cyclone situated above the pan tailings bin. The cyclone underflow discharges directly into the bin whilst the cyclone overflow discharges into a sump, which is then pumped to an agitated pulp header tank situated above the pan. Pulp from the header tank is

introduced into the rotary distributor where it is combined with the feed material and discharged directly into the pan.

The tailings from the pan (overflow) discharges continually onto an individual dewatering screen, coarse residue (CR) discharges onto common transfer conveyor and the screen undersize and slurry (FR) reports to a central sump. The slurry is pumped to a dewatering cyclone and dry slimes discharges to the mine FRD within the excavation. The CR tailings are transported via conveyor belt to the pan tailings bin where it is combined with the separator cyclone underflow; this material is then dumped into the relevant open excavations as part of the on-going rehabilitation process.

The concentrate from the pan is collected in a concentrate bin and moved to the final recovery area where final concentration takes place by means of pleitz jigs before it is moved to the sorting tables for final sorting by hand.

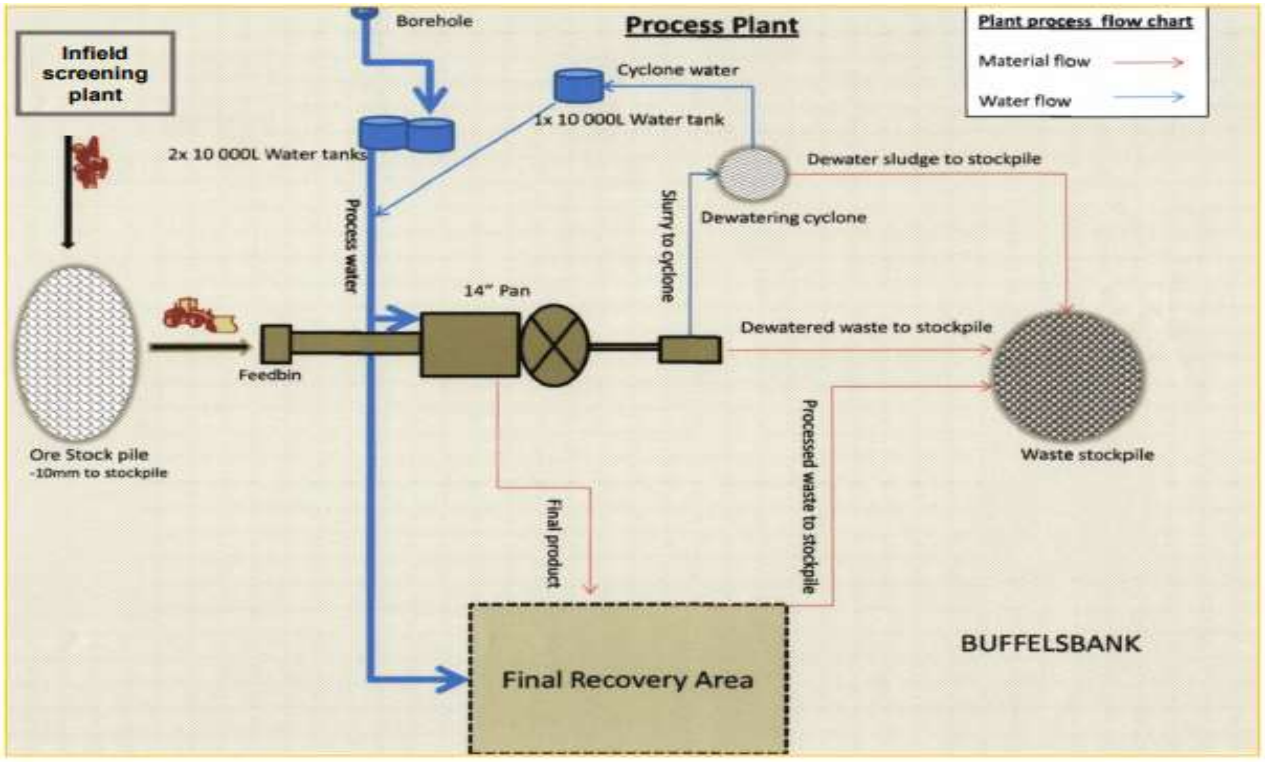


Figure 5. Schematic process flow

Rehabilitation

On completion of the mining operation, the various surfaces, including the access roads, the office area, storage area, will finally be rehabilitated. All remaining material on the surface will be removed to the original topsoil level. This material will then be backfilled into the depressions. Any compacted area will then be ripped to a depth of 300mm, where possible, the topsoil or growth medium returned and landscaped. All infrastructures, equipment, screening plant, and other items used during the operational period will be removed from the site. All available material will be used

during backfilling to avoid the existence of dangerous excavations. After rehabilitation has been completed, all roads will be ripped or ploughed, fertilized and seeded, providing the landowner does not want them to remain that way and with written approval from the Director Mineral Development of the Department of Mineral Resources.

Associated Infrastructure

This is an operational mine with all infrastructure and bulk services already in place. Due to the fact that the mine was not operational fulltime vandalism by illegal diggers did take place and upgrading and maintenance of infrastructure will be required at start up. Activities, such upgrading the existing logistical facilities and roads will not take long and are not critical for production to resume as processing will be by means of mobile wash plants. As part of the construction phase a site perimeter fence around the Project Area will be required for safety and security purposes due to the existing problem with illegal miners. Control measures needs to be put in place as part of future mining operations to restrict and perturb persons from any unauthorised access.

Electricity

Eskom power is available at the infrastructure area via a 1 kV overhead line but the infield wash plants will make use of portable generators. Power supply to the logistical facilities needs to be upgraded and underground cables demarcated. In order to establish power to the project site existing installations will be upgraded. This will include generator bay ancillary services, control room building, protection equipment, metering equipment, and power network control and communication systems for the power station.

Water

The limited volume of potable water will be obtained through the Nababeep, Kleinzee pipeline which runs along the R335 road and supplied by the local authority. Potable water will also be make-up from rainwater collected from the mine infrastructure and stored in tanks.

Service water supply to the logistical facilities needs to be upgraded and underground pipelines demarcated. Service water will be stored in 3 X 10 000 litre plastic tanks. About 90% of the process water is recycled and the top-up will therefore be on average 6m³/hour for an 8-hour working day giving a maximum top up of 48m³/day. Water is stored in in the existing reservoir at the infrastructure area.

As Africa is a water scarce continent and mining activities often pose significant water pollution risk, it is of utmost importance to properly manage water usage and disposal on a mining operation. For this reason, all dirty rainfall run-off and grey water will be collected, stored and recycled as far as possible. All clean rainfall run-off should be diverted from dirty and contaminated areas to minimise the risk of environmental and water pollution. Trenches and/or berms will be constructed to divert clean storm water run-off to natural drainage channels and to collect dirty run-off and route dirty water to suitable evaporation dams.

Ground Water

Process and service water is obtained from Municipal pipeline although two boreholes are present on the mining area. Borehole one is used by another mining company and the borehole at the new plant is decommissioned. The company will inspect the borehole and have pump tests conducted on it. If it is required to supplement the piped water, water will be obtained from this borehole and an application to this regard was submitted to the Department of Water Affairs.

Waste Management

Proper sanitation facilities will be provided for employees. No person will pollute the workings with faeces or urine, misuse the facilities provided or inappropriately foul the surrounding environment with faeces or urine. Sewage will be collected in septic tanks across the operation and fed to a sewage treatment plant for treatment. Water from this plant will be recycled and utilised as service and process make up water. Acceptable hygienic and aesthetic practices will be adhered to.

All domestic waste will be collected in bins located strategically around the site i.e. at the processing plant, offices, workshop and personnel amenities. The domestic waste is to be collected on a weekly basis and placed in the designated temporary waste storage area to be constructed from where it will be disposed of at a municipal dump site in Springbok.

The temporary storage area for waste will include a facility for tyres, oil and fuel waste handling. This facility will have a concreted floor and be fitted with a low ridge at the leading edge, guiding run-off water into an oil trap. This temporary storage area will be securely fenced and a separate area will be identified and demarcated (by fences) for temporary storage of scrap steel and equipment prior to sale as scrap. Regular sale and collection of scrap for the site will be arranged.

Access and Haul Roads

The mine is serviced by a well-maintained gravel road the (R335) from Springbok to Kleinzee. The existing public road from the R355 to Komaggas via Buffelsbank mine will serve as access. This access road is 3.3km in length and average 8 m wide and is therefore sufficient to accommodate 2-way traffic. This road will remain as part of the public road network but regular maintenance by the mining company would be required. Access control needs to be put in place at the mine entrance to minimize travel of locals into the project area and inadvertent contact with large earth moving vehicles.

Haul roads of 1.9Km and less than 8m in width leading between the mine pit and mine logistics are in place. No further access and haul roads are planned.

Sudden heavy thunderstorms with subsequent flooding can destroy roads. Erosion control and management measures including safety aspects such as berms, dust control and road signage will be put in place.

Mining Schedule

The infrastructure of the area for mining is all available, Activities, such upgrading the existing roads will not take as long. The preparations of the excavation site/s will mainly the stripping of overburden and the insertion of proper benches. Production will commence immediately at start-up as mining is to take place as a continuation of earlier surface mining. Although production can be at full scale at start up provision is made for a reduced production rate during the first 3 years to allow for upgrading and maintenance of infrastructure. The production for the first two years is estimated at 50% of full production and 75% for the third year. Production will increase from 15350Mt in year 1 to 30700Mt in year 4. The production will thereafter stay constant and can only be increased by introducing additional wash plants to increase processing. Using the production rate and available resource the life of mine is estimated at 16 years.

Mining Procedures

This is an operational mine with all infrastructure and bulk services already in place. Due to the fact that the mine was not operational fulltime vandalism by illegal diggers did take place and upgrading and maintenance of infrastructure will be required at start up. Activities, such upgrading the existing logistical facilities and roads will not take long and are not critical for production to resume as processing will be by means of mobile wash plants. Production will commence immediately at start-up as mining is to take place as a continuation of earlier surface mining.

The first stage of mining will involve the mining of the proven reserves (Areas T1 & T2 as seen in Fig. 3). The reason for this is that these blocks are situated closest to the current plant site. Furthermore, the mining of these areas will also enable the company to create a slot into the paleochannel from where long wall mining can continue as well as to remove terrace gravels in order to unlock more paleo gravels.

The next stage will involve mining of block C1 from where long wall mining will continue to block C2 to C6. Preliminary planning is to move then to the proven reserves (Areas T3 & T4 Figure 4) followed by mining the rest of the paleo channel block C7 and C8. Depending on grade the final stage would be mining of the terrace gravels block T5 still regarded as an inferred resource. The gravel will be mined by means of strip mining on long benches. The solidified sands (overburden horizon) will be removed in with three benches, each with a BW of 5m and BH of 13m.

Shallow paleo channels also exist on the northern and western portions of the mining area and these areas needs to be worked by hand. This will be done by small miners from the local community in partnership with the company under cover of this mining right and EA. In the centre of the mine pit there is also an area where the bedrock still needs to be swept and this will also be done by small miners from the local community in partnership with the company.

e) Policy and Legislative Context

Table 2: Policy and Legislative context

Applicable Legislation and Guidelines used to compile the report (a description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process.)	Reference where applied	HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE POLICY AND LEGISLATIVE CONTEXT (E.g In terms of the National Water Act:-Water Use License has/has not been applied for).
Conservation of Agricultural Resources Act (Act 43 of 1983) and Regulations (CARA)	- Section 5: Implementation of control measures for alien and invasive plant species; - Section 6: Control measures. - Regulation GN R1048, published on 25 May 1984, in terms of CARA	- Control measures are to be implemented upon the approval of the EMPR.
Constitution of South Africa (Act 108 of 1996)	- Section 24: Environmental right - Section 25: Rights in Property - Section 27: Water and sanitation right	- To be implemented upon the approval of the EMPR.
Environment Conservation Act (Act 73 of 1989) and Regulations (ECA)	- Sections 21, 22, 25, 26 and 28: EIA Regulations, including listed activities that still relate to the existing section of ECA. - Section 28A: Exemptions.	- To be implemented upon the approval of the EMPR.
Fencing Act (Act 31 of 1963)	- Section 17: States that any person erecting a boundary fence may clean any bush along the line of the fence up to 1.5m on each side thereof and remove any tree standing in the immediate line of the fence. However, this provision must be read in conjunction with the environmental legal provisions relevant to protection of flora.	- Control measures are to be implemented upon the approval of the EMPR.
Hazardous Substances Act (Act 15 of 1973) and Regulations read together with NEMA and NEMWA	- Definition, classification, use, operation, modification, disposal or dumping of hazardous substances.	- Noted and Considered measures are to be implemented upon the approval of the EMPR.

Intergovernmental Relations Act (Act 13 of 2005)	- This Act establishes a framework for the National, Provincial and Local Governments to promote and facilitate intergovernmental relations.	
Mine, Health and Safety Act (Act 29 of 1996) and Regulations	- Entire Act.	- Control measures are to be implemented upon the approval of the EMPR.
Mineral and Petroleum Resources Development Act (Act 28 of 2002) and Regulations as amended	- Entire Act. - Regulations GN R527	- A Mining Right (NC) 30/5/1/2/2/0505 MR WITH RENEWAL NUMBER ((NC) 30/5/1/2/2/10185 MR). - Rights and obligations to be adhered to.
National Environmental Management Act (Act 107 of 1998) and Regulations as amended	- Section 2: Strategic environmental management principles, goals and objectives. - Section 24: Foundation for Environmental Management frameworks. - Section 24N: - Section 24O: - Section 28: The developer has a general duty to care for the environment and to institute such measures to demonstrate such care. - Regulations GN R547, more specifically Chapters 5 and 7, where applicable (the remainder was repealed) published on 18 June 2010 in terms of NEMA (Environmental Management Framework Regulations) - Regulations GN R982 to R985, published on 4 December 2014 in terms of NEMA (Listed Activities) - Regulations GN R993, published on 8 December 2014 in terms of NEMA (Appeal) - Regulations GN R994, published on 8 December 2014 in terms of NEMA (exemption)	- Control measures are to be implemented upon the approval of the EMPR.

	- Regulations GN R205, published on 12 March 2015 in terms of NEMA (National appeal Amendment Regulations) - Regulations GN R1147, published on 20 November 2015 in terms of NEMA (Financial Provision)	
National Environmental Management: Air Quality Act (Act 39 of 2004)	- Section 32: Control of dust - Section 34: Control of noise - Section 35: Control of offensive odours - Regulation GN R551, published on 12 June 2015 (amended Categories 1 to 5 of GN 983) in terms of NEM:AQA (Atmospheric emission which have a significant detrimental effect on the environment) - Regulation GN R283, published on 2 April 2015 in terms of NEM:AQA (National Atmospheric Emissions Reporting Regulations) (Group C-Mines)	- Control measures are to be implemented upon the approval of the EMPR. - This is also legislated by Mine Health and Safety from DMR and is to be adhered to.
National Environmental Management: Biodiversity Act (Act 10 of 2004)	- Section 52 of The National Environmental Management Act: Biodiversity Act (NEMBA) (Act 10 of 2004) states that the MEC/Minister is to list ecosystems that are threatened and in need of protection. - Section 53 states that the Minister may identify any process or activity in such a listed ecosystem as a threatening process. - A list of threatened and protected species has been published in terms of Section 56(1) GG 29657 GNR 151 and GNR 152, Threatened or Protected Species Regulations. Commencement of Threatened or Protected Species Regulations 2007 : 1 June 2007 GNR 150/GG 29657/23-02-2007	- A permit application regarding protected plant species need to be lodged with DENC if any protected species is encountered.

	Publication of lists of critically endangered, vulnerable and protected species GNR 151/GG 29657/23-02-2007 * Threatened or Protected Species Regulations GNR 152/GG 296547/23-02-2007 * - Sections 65 – 69: These sections deal with restricted activities involving alien species; restricted activities involving certain alien species totally prohibited; and duty of care relating to alien species. - Sections 71 and 73: These sections deal with restricted activities involving listed invasive species and duty of care relating to listed invasive species. - Regulation GN R151, published on 23 February 2007 (List fo Critically Endangered, Vulnerable and Protected Species, 2007) in terms of NEM: BA - Regulation GN R152, published on 23 February 2007 (TOPS) in terms of NEM:BA - Regulations GN R507 to 509 of 2013 and GN 599 of 2014 in terms of NEM:BA (Alien Species)	
The National Environmental Management Act: Protected Areas Act (NEMPAA) (Act 57 of 2003) provides for the protection of ecologically viable areas that are representative of South Africa"s natural biodiversity and its landscapes and seascapes.	- Chapter 2 lists all protected areas.	If any protected vegetation is identified the necessary permit application will be done.
National Environmental Management: Waste Management Act (Act 59 of 2008)	- Chapter 4: Waste management activities	- To be implemented upon the approval of the EMPR.

	- Regulations GN R634 published on 23 August 2013 in terms of NEM:WA (Waste Classification and Management Regulations) - Regulations GN R921 published on 29 November 2013 in terms of NEM:WA (Categories A to C – Listed activities) - National Norms and Standards for the Remediation of contaminated Land and Soil Quality published on 2 May 2014 in terms of NEM:WA (Contaminated land regulations) - Regulations GN R634 published on 23 August 2013 in terms of NEM: WA (Waste Classification and Management Regulations) - Regulations GN R632 published on 24 July 2015 in terms of NEM: WA (Planning and Management of Mineral Residue Deposits and Mineral Residue Stockpiles) - Regulations GN R633 published on 24 July 2015 in terms of NEM: WA (Amendments to the waste management activities list published under GN921)	
National Forest Act (Act 84 of 1998) and Regulations	- Section 15: No person may cut, disturb, damage, destroy or remove any protected tree; or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a licence granted by the Minister.	- A permit application regarding protected tree species need to be lodged with DAFF if necessary.
National Heritage Resources Act (Act 25 of 1999) and Regulations	- Section 34: No person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority. - Section 35: No person may, without a permit issued by the responsible heritage resources authority destroy, damage, excavate, alter, deface	- Control measures are to be implemented upon the approval of the EMPR.

	or otherwise disturb any archaeological or paleontological site. - Section 36: No person may, without a permit issued by SAHRA or a provincial heritage resources authority destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a forma cemetery administered by a local authority. - Section 38: This section provides for HIA which are not already covered under the ECA. Where they are covered under the ECA the provincial heritage resources authorities must be notified of a proposed project and must be consulted during HIA process. - Regulation GN R548 published on 2 June 2000 in terms of NHRA	
National Water Act (Act 36 of 1998) and regulations as amended, *inter alia* Government Notice No. 704 of 1999	- Section 4: Use of water and licensing. - Section 19: Prevention and remedying the effects of pollution. - Section 20: Control of emergency incidents. - Section 21: Water uses In terms of Section 21 a licence is required for: (a) taking water from a water resource; (b) storing water; (c) impeding or diverting the flow of water in a watercourse; (f) Waste discharge related water use; (g) disposing of waste in a manner which may detrimentally impact on a water resource; (i) altering the bed, banks, course or characteristics of a watercourse;	- A water use application is in the process of preparation and will be lodged with Department of Water and Sanitation (DWS). - Control measures are to be implemented upon the approval of the EMPR.

	(j) removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people; and; - Regulation GN R704, published on 4 June 1999 in terms of the National Water Act (Use of water for mining and related activities) - Regulation GN R1352, published on 12 November 1999 in terms of the National Water Act (Water use to be registered) - Regulation GN R139, published on 24 February 2012 in terms of the National Water Act (Safety of Dams) - Regulation GN R398, published on 26 March 2004 in terms of the National Water Act (Section 21 (j)) - Regulation GN R399, published on 26 March 2004 in terms of the National Water Act (Section 21 (a) and (b)) - Regulation GN R1198, published on 18 December 2009 in terms of the National Water Act (Section 21 (c) and (i) – rehabilitation of wetlands) - Regulations GN R1199, published on 18 December 2009 in terms of the National Water Act (Section 21 (c) and (i)) - Regulations GN R665, published on 6 September 2013 in terms of the National Water Act (Amended GN 398 and 399 – Section 21 (e), (f), (h), (g), (j))	
Nature Conservation Ordinance (Ord 19 of 1974)	- Chapters 2, 3, 4 and 6: Nature reserves, miscellaneous conservation measures, protection of wild animals other than fish, protection of Flora.	- Control measures are to be implemented upon the approval of the EMPR.
Northern Cape Nature Conservation Act (Act 9 of 2009)	- Addresses protected species in the Northern Cape and the permit application process related thereto.	- A permit application regarding provincially protected plant species as well as for large-scale harvesting

		of indigenous flora need to be lodged with DENC if necessary. - Control measures are to be implemented upon the approval of the EMPR.
Occupational Health and Safety Act (Act 85 of 1993) and Regulations	- Section 8: General duties of employers to their employees. - Section 9: General duties of employers and self-employed persons to persons other than their employees.	- Control measures are to be implemented upon the approval of the EMPR.
Road Traffic Act (Act 93 of 1997) and Regulations	- Entire Act.	- Control measures are to be implemented upon the approval of the EMPR.
Water Services Amendment Act (Act 30 of 2007)	- It serves to provide the right to basic water and sanitation to the citizens of South Africa (giving effect to section 27 of the Constitution).	- Control measures are to be implemented upon the approval of the EMPR.
National Land Transport Act, (Act 5 of 1998)		- To take note.
Northern Cape Planning and Development Act (Act 7 of 1998)	- To control planning and development	- To be implemented upon the approval of the EMPR.
Spatial Planning and Land Use Management (Act 16 of 2013 (SPLUMA) and regulations	- To provide a framework for spatial planning and land use management in the Republic; - To specify the relationship between the spatial planning and the land use management, amongst others - Regulations GN R239 published on 23 March 2015 in terms of SPLUMA	- To be implemented upon the approval of the EMPR.
Subdivision of Agricultural Land Act, 70 of 1970 and regulations	- Regulations GN R373 published on 9 March 1979 in terms of Subdivision of Agricultural Land	- To take note.
Basic Conditions of Employment Act (Act 3 of 1997)) as amended	- To regulate employment aspects	- To be implemented upon the approval of the EMPR

Community Development (Act 3 of 1966)	- To promote community development	- To be implemented upon the approval of the EMPR
Development Facilitation (Act 67 of 1995) and regulations	- To provide for planning and development	- To take note.
Development Facilitation (GN24, PG329, 24/07/1998)	- Regulations re Northern Cape LDO's	- To take note.
Development Facilitation (GNR1, GG20775, 07/01/2000)	- Regulations re application rules S26, S46, S59	- To take note.
Development Facilitation (GN732, GG14765, 30/04/2004)	- Determines amount, see S7(b)(ii)	- To take note.
Land Survey Act (Act 8 of 1997)) and regulations, more specifically GN R1130	- To control land surveying, beacons etc. and the like; - Agriculture, land survey S10	- To take note.
National Veld and Forest Fire Act (Act 101 of 1998)) and regulations, more specifically GN R1775	- To regulate law on veld and forest fires - (Draft regulations s21)	- To be implemented upon approval of the EMPR
Municipal Ordinance, 20/1974	- To control pollution, sewers etc.	- To be implemented upon approval of the EMPR
Municipal Ordinance, PN955, 29/08/1975	- Nature conservation Regulations	- To be implemented upon approval of the EMPR
Cape Land Use Planning Ordinance, 15/85	- To control land use planning	- To take note.
Cape Land Use Planning Ordinance, PN1050, 05/12/1988	- Land use planning Regulations	- To take note.

f) Need and desirability of the proposed activities

(Motivate the need and desirability of the proposed development including the need and desirability of the activity in the context of the preferred location)

The Buffelsbank Project is in line with the 'Beneficiation Strategy for the Minerals Industry of South Africa' (DMR, 2011) in terms of aiming to beneficiate diamonds for sale/export. The benefits of this will fall directly to the Northern Cape Province and, specifically, the Namaqua District.

In addition, the South African National Development Plan aims to eliminate poverty and reduce inequality by 2030. South Africa can realise these goals by drawing on the energies of its people, growing an inclusive economy, building capabilities, enhancing the capacity of the state, and promoting leadership and partnerships throughout society. The Buffelsbank Project will contribute to achieving this plan in terms of direct and indirect employment of people from the local and district municipalities as well as investment in the region and on a national scale.

Need

Analysis of the Diamond Industry – ALROSA (website)

The Information on the analysis of the diamond industry was obtained from the ALROSA website which is one of the biggest diamond producers in the world.

The world diamond market is represented by diamond mining and trade in rough diamonds. The bulk of the world diamond mining is concentrated in nine countries, with their share in the global production in physical terms as high as 99%.

The world's largest producers of natural diamonds are Russia, the Democratic Republic of Congo (DRC) and Botswana, all together accounting over 60% of the global diamond production.

Top Countries in the Global Diamond Production 2016: 134.1 mln. Carats

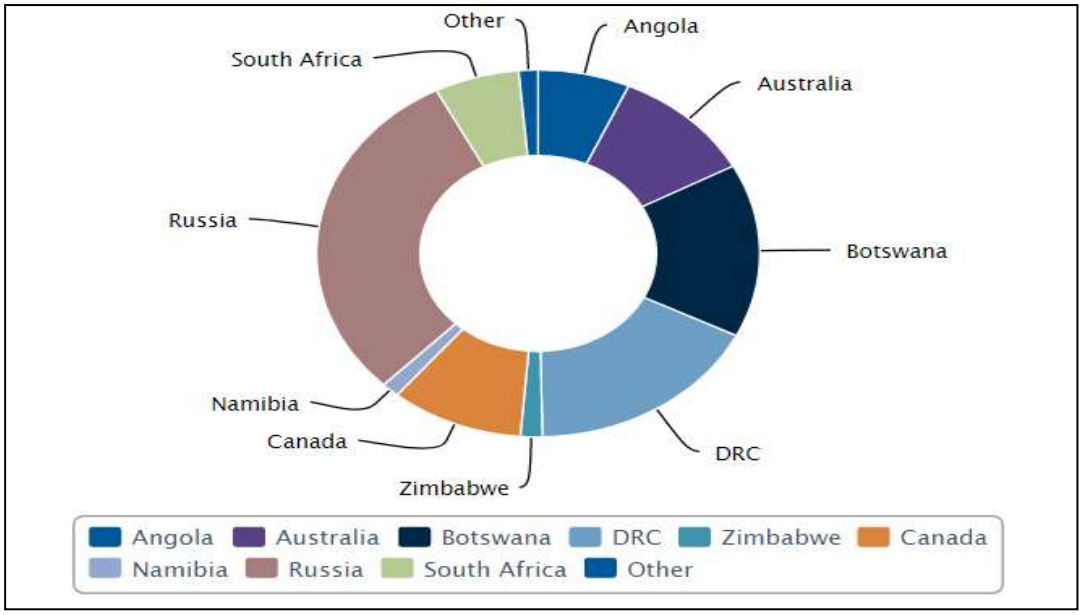


Figure 6. Kimberley Process companies' data Global Diamond Production 2011-16 (thousands carats).

World diamond production based on the costs of produced rough diamonds are dominated by Russia, Botswana and Canada with a combined production of more than 60% of the total worldwide production.

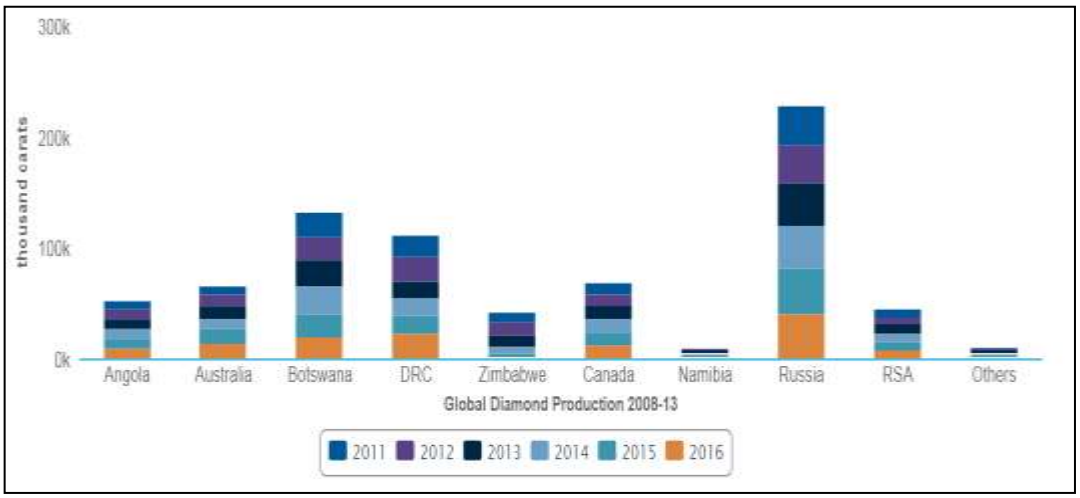


Figure 7. Global Diamond Production 2011-16 (thousands carats) Kimberley Process companies' data

Russia ranks first in the world's diamond production. ALROSA Group accounts for 93% of the total diamond production in the Russian Federation in physical terms, and it is the leader of the global diamond mining industry. Major mining companies are engaged in mining in the main diamond-producing countries, the exception being Zimbabwe and the DRC, where diamond deposits are developed by small companies and prospectors. The graph below represents the geography of the companies' activities including exploration.

Diamond Production by Leading Companies, 2016(* - *including Ekati; Companies' data)*

The world's diamond mining is concentrated in the major primary deposits accounting for about 60% of the global diamond production. The remaining production is concentrated in placer deposits, the principal of them located in the DRC (Mbiji-Mayii) and Zimbabwe (Marange).

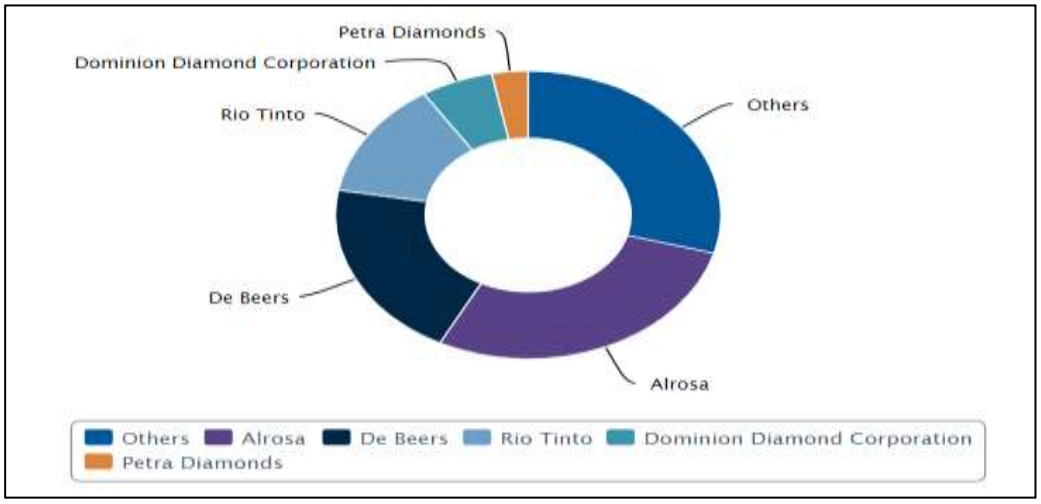


Figure 8. Diamond Production by Leading Companies, 2016(* - including Ekati; Companies' data)

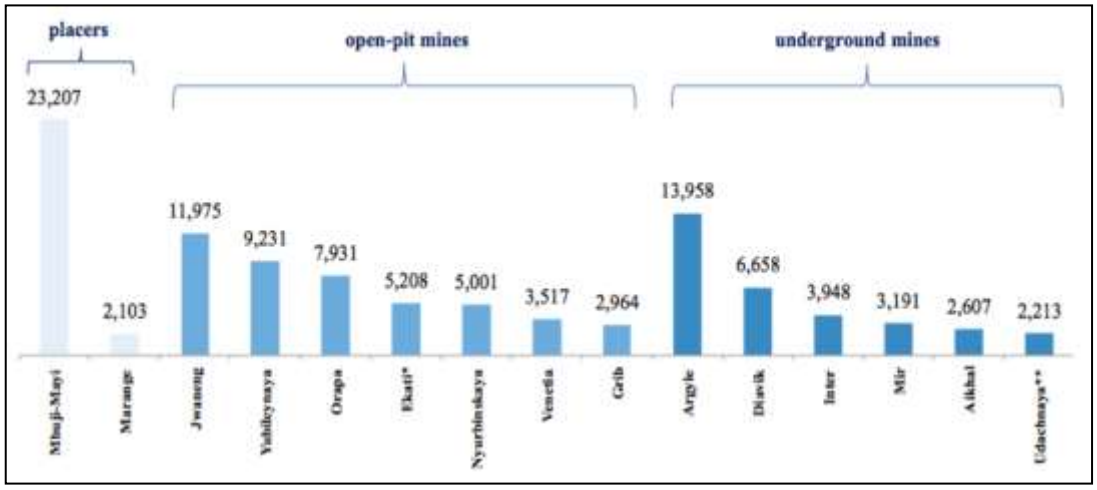


Figure 9. Production Output of the World's Major Diamond Deposits, 2016 (thousand carats) Kimberley Process and companies' data; * - Ekati includes open-pit and underground mining; ** - output, including further development of the open-pit.

By their attributes diamonds from deposits fall into two categories: gem quality and industrial grade diamonds. The former is used in diamond jewellery production, while the latter is used for industrial purposes (manufacture of drills, saws, and abrasive powders). Gem quality rough diamonds are sorted by size, colour, quality and shape, and then are sold to buyers in conformity with the sales policy adopted in a rough diamond production company. Depending on the quality of the mined rough diamonds, the current state of the market, the adopted

marketing policy, companies use different approaches to diamond sales: sights, tenders, auctions, spot transactions and long-term contracts.

The world's largest trading centers, which concentrate the bulk of trade in natural rough diamonds, are India, Belgium, the UAE, the USA, Hong Kong and Israel. Being sold from mines, natural rough diamonds arrive at cutting and polishing plants to become polished diamonds that will be used in jewellery making.

(The information above was sourced from the ALROSA website. ALROSA is a world leader in the world diamond mining industry, a Russian partially state-owned diamond mining company)

The Diamond Pipeline

The Diamond Pipeline can be defined as the route the diamond takes from mine to end consumer. The diamond pipeline, typically, comprises**.**

Figure 10. The Diamond Pipeline

Exploration/Prospecting; involves geologists finding diamond deposits in different areas. Prospecting is vital to the future survival of any diamond business as there is a predicted supply-demand gap.

Mining and Recovery; once diamonds have been discovered and surveys shown that it is financially viable to mine them; they are now recovered from the ground. The manner in which they are mined and recovered depends on their source, thus, where they are found.

Sorting and valuing; process of sorting and valuing of diamonds, categorizing them according to size, quality, model and colour.

Cutting and polishing; refers to manufacturing of diamonds; the process of turning rough diamonds into polished.

Polished Market; this is referred to as the 'diamond exchange bourse', a place where diamonds are traded. These are located in some of the world's major diamond manufacturing centres, e.g. Belgium.

Retailing; polished diamonds find their way to Jewellers and Consumers through Wholesalers and Retailers.

International Diamond Market Trends

Although global financial stability has proven quite volatile over the past 4-5 years, the diamond industry appears to have stabilised somewhat, with moderate increases in diamond prices forecast for the immediate future.

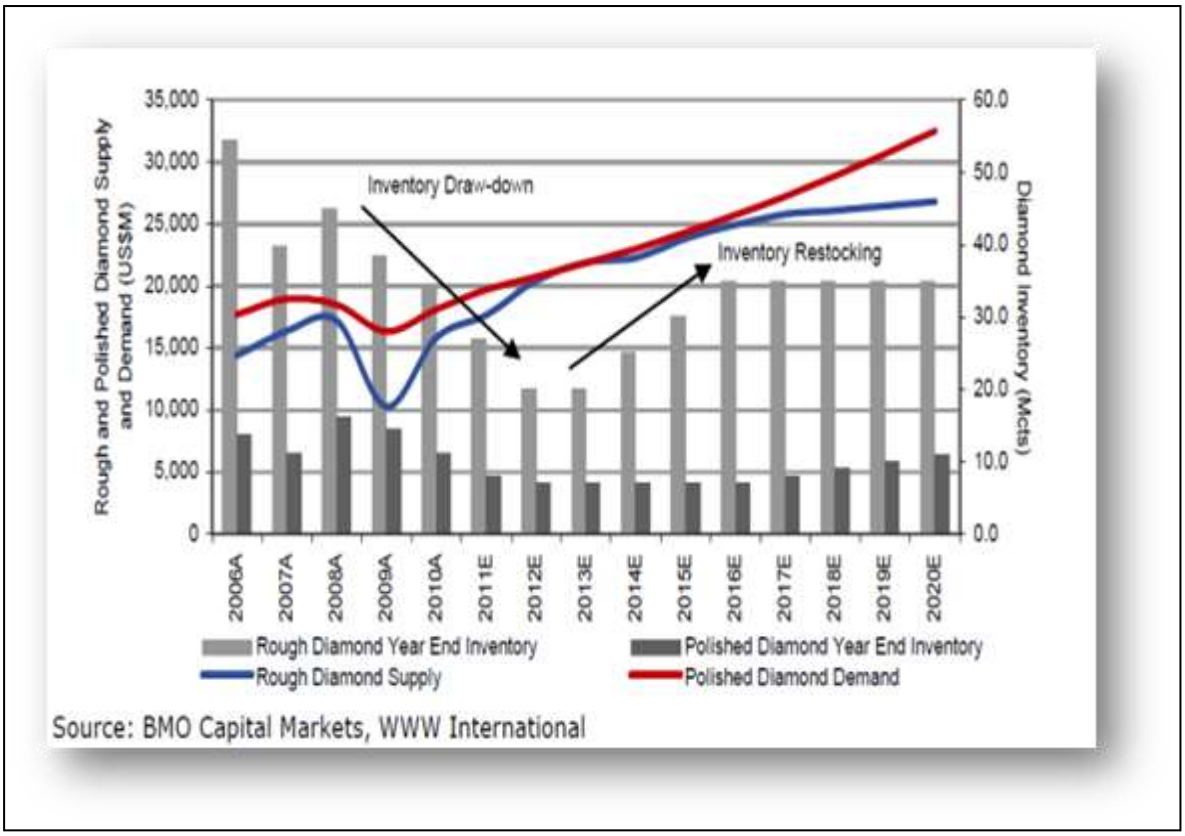


Figure 11. Inventory movements support diamond prices(USDM, Mct)

BMO Capital Markets (Sterck, 2011) estimated at the time that Chinese demand for polished diamonds accounted for 5% or USD1 billion of the market in 2010. While this represents a relatively small proportion of the market currently, growth is extremely strong.

De Beers reported that Chinese demand for polished diamonds grew at 25% in 2010, significantly ahead of GDP growth of 13%. Looking ahead, momentum into 2011 suggests that growth of 15% may be possible. From 2012 onwards, growth in household disposable income is forecast to average 11% to 12% per annum. This translates into minimum growth in diamond demand of 13% per annum.

From 2012 onwards diamond demand is likely to grow in line with economic growth at around 10% per annum. Combining steady demand growth from the established diamond consuming nations and strong growth in demand from emerging consumer's results in a forecast of polished diamond demand almost doubling by 2020, resulting in a total market value of over USD30 billion in nominal terms.

Desirability:

No	Description	Yes/No
1	Does the proposed land use / development fit the surrounding area?	Yes
2	Does the proposed land use / development conform to the relevant structure plans, SDF and planning visions for the area?	Yes
3	Will the benefits of the proposed land use / development outweigh the negative impacts of it?	Yes
4	Will the proposed land use / development impact on the sense of place?	Yes
5	Will the proposed land use / development set a precedent?	No
6	Will any person's rights be affected by the proposed land use / development?	Yes
7	Will the proposed land use / development compromise the "urban edge"?	No

Benefits:

No	Description	Yes/No
1	Will the land use / development have any benefits for society in general?	Yes
2	Will the land use / development have any benefits for the local communities where it will be located?	Yes

g) Motivation for the preferred development footprint within the approved site including a full description of the process followed to reach the proposed development footprint within the approved site

NB!! – This section is about the determination of the specific site layout and the location of infrastructure and activities on site, having taken into consideration the issues raised by interested and affected parties, and the consideration of alternatives to the initially proposed site layout.

Taking into consideration all the information captured in this report, the most appropriate procedure for planning and developing the proposed mining operation will involve the following:

(a) Mining Method

The location of the mine is determined by the geological location of the mineral resource. This site has proven to have alluvial diamonds during the prospecting period. Mining for alluvial diamonds by means of open cast methods, with the understanding that the formulation of an effective Environmental Management Programme and the implementation thereof, as well as the obtainment of an authorisation for the abstraction of water from a resource for mining purposes from the Department of Water and Sanitation in terms of the National Water Act, 1998 (Act No. 36 of 1998), is an inseparable part of the proposed operation.

(b) Labour Force

Employing people who originate from within the boundaries of Namaqualand Municipality. This will guarantee benefits such as a positive contribution to the local economy; a decrease in local unemployment figures; a decrease in the social phenomena normally associated with unemployment, such as crime and alcohol abuse; and a positive contribution to cultural cohabitation.

(c) Rehabilitation

Making financial provision for the implementation of a rehabilitation strategy as is required by Section 41 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) amended by Government Gazette NO. R. 1147 20 NOVEMBER 2015 NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 (ACT NO. 107 OF 1998) REGULATIONS PERTAINING TO THE FINANCIAL PROVISION FOR PROSPECTING, EXPLORATION, MINING OR PRODUCTION OPERATIONS.

(d) Environmental Monitoring

Carrying out environmental monitoring on a regular basis, as is required by Regulation 55 of the Regulations published in Government Notice No. 26275 under the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) and in the NEMA regulations published 20 November 2015.

(e) General

Being open to possible comments, suggestions and complaints received from neighbouring communities or members of the general public that might result from the implementation of the proposed mining operation.

i) Details of the development footprint alternatives considered

With reference to the site plan provided as Figure 2 and the location of the individual activities on site, provide details of the alternatives considered with respect to:

(a) the property on which or location where it is proposed to undertake the activity;
(b) the type of activity to be undertaken;
(c) the design or layout of the activity;
(d) the technology to be used in the activity;
(e) the operational aspects of the activity; and
(f) the option of not implementing the activity.

(a) The registered description of the land to which the mining right application relates:

Property:	A Portion (442.7358 ha) of Portion 5 of the Farm Kammagas No. 200
District:	Namaqualand
Province:	Northern Cape
Extent:	442.7358 ha

Alternatives considered: -

No planned alternative to proposed mining is envisaged. Should mining not proceed the current agricultural land use will continue. Proposed site layout and opencast mining with concurrent rehabilitation where possible will minimise footprint and impact. Any alternative methodology may have greater impact. Alternatives may be looked at in more detail within the Scoping, EIA EMP Report.

The only other alternative would be not to continue with the operation.

(b) The type of activity to be undertaken:

The planned mining technique is that of a typical South African opencast block alluvial diamond operation. The planned mining method is Opencast mining process with oversize material from the gravel scalping and the tailings from the plant, being used as backfill material prior to final rehabilitation. Gravels are excavated, loaded and transported to the nearby treatment facility using articulated dump trucks.

Alternatives considered: -

The mining blocks is within the target area known to carry diamonds and therefor no alternative to the application area can be considered. The only alternative land use on the area that will be selected for the processing plant is grazing however, the applicant's main economic activity is mining and for this reason does not favour any other alternative land use.

(c) The design or layout of the activity:

The site infrastructure will need to be strategically placed by incorporating mining project demands and environmental sensitivities identified during the Environmental Impact Assessment process. Thus, the site layout will primarily be based on proximity to the nearby access roads, proximity to the areas earmarked for bulk sampling as well as limited additional impact on the environmental (non-perennial drainage lines and wind direction), heritage resources and discussions with the relevant Departments.

The following infrastructure will be established and will be associated with the prospecting operation:

- Processing Plant: 1 X 16 feet
- Ablution Facilities: In terms of sewage the decision was made to use septic tanks which can be serviced regularly by the service provider.
- Clean & Dirty water system: Berms

It is anticipated that the operation will establish stormwater control berms and trenches to separate clean and dirty water on the mining site.

- Fuel Storage facility (Concrete Bund walls and Diesel tanks):
  It is anticipated that the operation will utilize 2 x 23 000 litre diesel tanks. This tank must be placed in bund walls, with a capacity of 1.5 times the volume of the diesel tank. A concrete floor must be established where the re-fuelling will take place.

- Mining Area: Area applied for is an open cast mining process with oversize material from the gravel scalping and the tailings from the plant, being used as backfill material prior to final rehabilitation.

- Processing plant: At the plant the diamondiferous gravel will be sorted by means of a grizzly screen grid and all material larger than 100 mm will be separated from the rest. This material will be used in the backfilling stage.

- Roads (both access and haulage road on the mine site):
  Although it is recommended that the operation utilize existing roads as far as possible, it is anticipated that the mining operation will create an additional 1.5 km of roads, with a width of 8 meters where no reserve exists and where the reserve exists 15 meters. The current access road is deemed adequate for a service road into the mining site.

- Salvage yard (Storage and laydown area).

- Product Stockpile area.

- Waste disposal site
  The operation will establish a dedicated, fenced waste disposal site with a concrete floor and bund wall. The following types of waste will be disposed of in this area:

  - Small amounts of low-level hazardous waste in suitable receptacles;
  - Domestic waste;
  - Industrial waste.

- Temporary Workshop Facilities and Wash bay.

- Water distribution Pipeline.

- Water tank: It is anticipated that the operation will establish 1 x 10 000 litre water tanks with purifiers for potable water.

Alternatives considered: -

Alternatives for fuel storage include surface storage, underground storage and the storage of fuel in mobile tanks with a metal bund wall. Underground storage has an adverse negative pollution potential because it is not easy to monitor leakages. Remediation measures are also not as effective as compared to surface storage tanks. Mobile tanks are viable option for infield screening activities, but the best viable long terms option is the instalment of fuel tanks within a concrete bund wall. The final location of the fuel storage tanks will be determined based on proximity to mining operations.

In terms of water use alternatives; the operation is located next to the Buffels River which is a perennial river which may be a source of water for the operation. Plastic pipelines are considered to be the best long-term option for transferring water, due to their temporary nature which causes minimum environmental disturbances.

A diamond rotary plant will be established (1 X 16 feet rotary pan). Water use for a 16 feet rotary pan is in the order of 18000 litres per hour. The operation will only work in daytime hours which will constitute about 8 hours per day which will bring water consumption to 144000 litres per day and 720 000 litres per week 2880000 litres per month per pan. A 16 feet pan can on capacity work about 65 tons per hour which constitutes about 117m³ per hour.

A pipeline route will be designed based on the principle of minimum impacts to the environment.
The locality of the mine residue dam will be selected based on the following considerations, this dam will be very small due to the limited material being processed and the limited water needed:

- The locality is already disturbed or mined out.
- It is within reach of (1 000m) of the treatment plant.
- It is situated near the access road to the mining activities.
- No underlying ore bodies or geological discontinuities.
- No geomorphological impacts.
- No structures, dwellings or other points of risk on down-stream side.
- Convenient material nearby for construction of dam.
- Top soil from the treatment process will be available for final rehabilitation.

A standard slimes dam design will be established in order to maximise the capacity of the slimes dam and to minimise the risks in terms of general safety and the DWS regulation.

In terms of power generation, the options available was for Generators or ESKOM power. The infrastructure area will use electricity provided by ESKOM via a 1 kV overhead line, but the infield wash plants will make use of portable generators.

In terms of sewage the decision was made to use septic tanks.

(d) The technology to be used in the activity:

- Technique

Production will commence immediately at start-up as mining is to take place as a continuation of earlier surface mining and briefly entails:

Year Production Build-up

- the removal of overburden above the diamond bearing gravels and clays by excavator and dozer to expose the gravels and diamondiferous clays which overlie the bedrock;
- removal of the diamondiferous clays and gravels which will be sent to the plant for processing and diamond recovery; and
- the sweeping of the paleo bedrock floor by hand to recover pothole gravels for processing.

Although production can be at full scale at start up provision is made for a reduced production rate during the first 3 years to allow for upgrading and maintenance of infrastructure due to the fact that the mine was not operational fulltime and vandalism by illegal diggers did take place.

As part of the construction phase a site perimeter fence around the Project Area will be required for safety and security purposes due to the existing problem with illegal miners. Control measures needs to be put in place as part of future mining operations to restrict and perturb persons from any unauthorised access.

As can be seen production for the first two years is estimated at 50% of full production and 75% for the third year. Production will increase from 15350Mt in year 1 to 30700Mt in year 4. The production will thereafter stay constant and can only be increased by introducing additional wash plants to increase processing.

The channel gravels to be mined last is still regarded as Inferred Resources as the gravel was partly drilled, but not sufficiently to be classified as indicated. The outline of the channel was drilled sufficiently to clearly identify its extent within the mining area, but its consistency is not yet

proven satisfactory therefore a decline in production is forecast during the last two years.

Basic overview of the mining method

Mining is to take place as a continuation of earlier surface mining and briefly entails;

- the removal of overburden above the diamond bearing gravels and clays by excavator and dozer to expose the gravels and diamondiferous clays which overlie the bedrock;
- removal of the diamondiferous clays and gravels which will be sent to the plant for processing and diamond recovery; and
- the sweeping of the paleo bedrock floor by hand to recover pothole gravels for processing.

Use will be made of open cast mining methods. Due to the ore types and geological setting of the gravel beds, short mining walls will dramatically increase the cost of mining, mainly because of the instantaneous stripping ratio of ore to waste, which is 15:1 on average. As part of security measures, the gravel bed should only be exposed in the area where mining is taking place at any point in time; the rest should be protected by sidewall sliding to cover the exposed faces.

The proven reserves (Watergat Area and Blocks T2 Diagram 5) will be mined first and the reason behind this is:

- To create a slot into the paleochannel from where long wall mining can continue
- To remove terrace gravels in order to unlock more paleo gravels.
- These blocks are situated closest to the current plant site at watergat

The next stage will incolve mining of block C1 from where long wall mining will continue to block C2 to C6. Prelimanary planning is to move then to the proven reserves (Areas T1, T3 & T4 Figure 4) followed by mining the rest of the paleo channel block C7 and C8. Depending on grade the final stage would be mining of the terrace gravels block T5 still regarded as an inferred resources.

The gravel will be mined by means of strip mining on long benches. The solidified sands (overburden horizon) will be removed in with three benches, each with a BW of 5m and BH of 13m. This leaves an bech slope angle of 60° for the benches and a overall slope angle of 80° to prevent rockfalls when becoming unstable for unforeseen reasons. In such a case the result will be a sliding of the face, which is preferable. Once mining is completed at the end of the life of mine, this slope will make rehabilitation easy, as only final high wall sliding will need to be done.

Indicated resources will be mined together with the proven reserves and the inferred resources will be investigated as a last option for mining. Shallow paleo channels also exist on the northern and western portions of the mining area and these areas needs to be worked by hand. This will be done by small miners from the local community in partnership with the company under cover of this mining right and EA.

In the center of the mine pit there is also an area where the bedrock still needs to be swept and this will also be done by small miners from the local community in partnership with the company

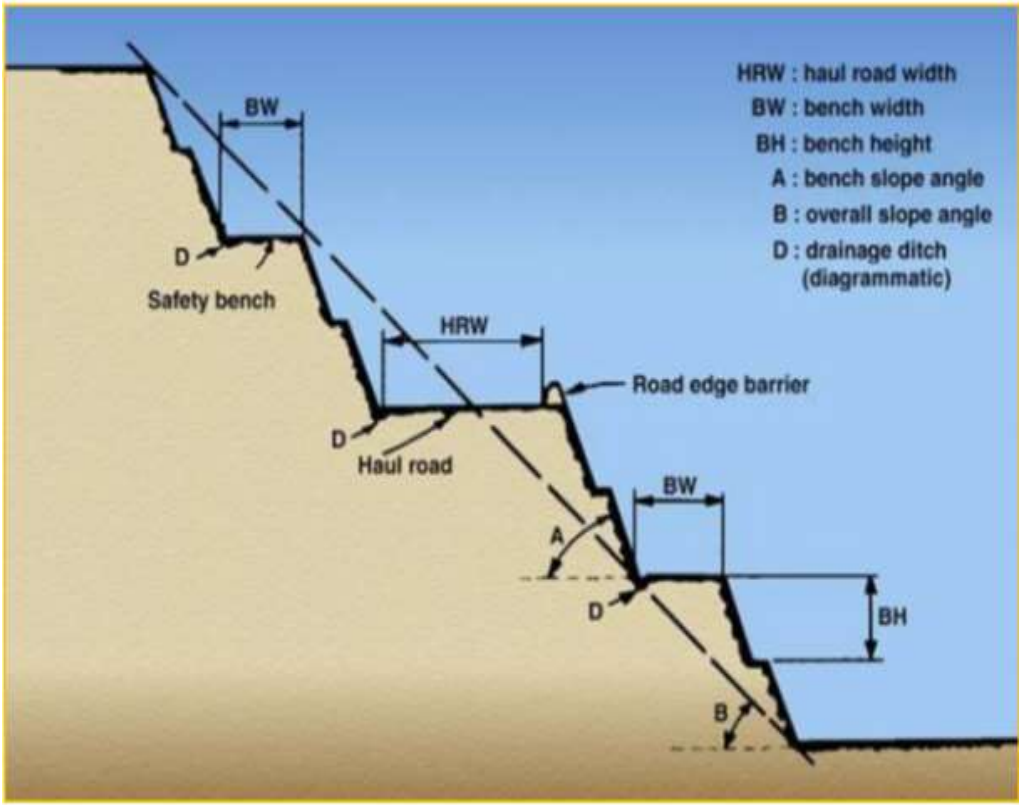


Figure 12. Schematic diagram of mine benches at high walls

Figure 13. General shape of Open Pit Mine at end of operations

Soil Utilisation Guide

Topsoil

The upper windblown sand cover comprises a 10 – 50cm thick layer of loose windblown sand with humus and grass seed in its upper 10 cm that is

considered as topsoil. A layer of topsoil ±50cm thick will be removed from the new mining blocks. Only 50% of the topsoil recovered will be stockpiled for rehabilitation of the new mining blocks and the rest will be used to cover the existing mined-out sections on a continuous basis as stripping is taking place. will be replaced on the mined-out sections.
The topsoil stockpiles for rehabilitation of the new mining blocks will be placed within the mine pit and no new stockpiles will be created above natural ground level.
The topsoil overlies a more cohesive medium grained red Kalahari sand that can be anything from 1 to 30 meters thick regarded as overburden and will be removed.

Overburden
Overburden handling will generally occur along the principles of a cut & fill strip mining operation where the removed overburden is used immediately in the backfill of previously mined cuts. No overburden will be dumped on natural ground level.

Coarse tailings
The top layer of gravel is bulldozed onto stockpiles from which it is loaded into Articulated Dump Trucks (ADT's) either by excavator or front-end loader for transport.
The remaining 1-1.5 m of gravel is then removed from the uneven calcrete substrate by means of an excavator. Care is taken to ensure the sterile excavation of the gravels such that no contamination by the footwall lithologies occurs.
Excavation continues to the base of the gravels where higher basal grades are expected to occur.
Where the bedrock is soft, approximately 20cm of bedrock is excavated with the gravels, so that any diamonds in the weathered rock will be recovered.
The primary gravels are subjected to infield screening to -35mm by means of a mobile screening plant. The screened material (ore) is then transported by ADT's to the diamond processing area where it is stored on the ore stockpile to be processed.

- **Technology**
  Applicable to the extraction and preparation of the mineral to comply with market requirements.

  High level description of the processing plant
  Basic plant design
  The plant flowsheet incorporates a conventional three stage process where the primary gravels screened material (ore) is transported by ADT's to the diamond processing area where it is stored on the ore stockpile to be processed by means of a 16ft-rotating wash plant. The liberation process

ROM is approximately 200tph and pan-feed 80tph. The concentrate on average 10% of panfeed is then transported in bins to the final recovery area for final recovery of diamonds by means of a pleitz jig. About 1% of the concentrate make it to the sorting tables for hand sorting.

Mineral processing

Material from ore stockpile is fed into the trommel screen feed bin using a front-end loader. The material is combined with water introduced into the scrubber from the clear water return dam. The discharge of the scrubber is directly into the trommel screen which scalps the material at ±35 mm.

All oversize material is transported via a conveyor to a temporary stockpile from where it will be used to backfill excavations. Oversize can also be sorted before backfilling to be sold as pebbles for garden decorations. Material 2.5-35 mm is transported to the pan's rotary distributor via a conveyor belt equipped with a weightometer used to record the feed tonnage to the pan, panfeed on average 80tph.

Undersize material and slurry from the trommel screen are pumped to a separator cyclone situated above the pan tailings bin. The cyclone underflow discharges directly into the bin whilst the cyclone overflow discharges into a sump, which is then pumped to an agitated pulp header tank situated above the pan. Pulp from the header tank is introduced into the rotary distributor where it is combined with the feed material and discharged directly into the pan.

The tailings from the pan (overflow) discharges continually onto an individual dewatering screen, coarse residue (CR) discharges onto common transfer conveyor and the screen undersize and slurry (FR) reports to a central sump. The slurry is pumped to a dewatering cyclone and dry slimes discharges to the mine FRD within the excavation. The CR tailings are transported via conveyor belt to the pan tailings bin where it is combined with the separator cyclone underflow; this material is then dumped into the relevant open excavations as part of the on-going rehabilitation process.

The concentrate from the pan is collected in a concentrate bin and moved to the final recovery area where final concentration takes place by means of pleitz jigs before it is moved to the sorting tables for final sorting by hand.

Alternatives considered: -

The planned mining activities include with an excavator up to bedrock. The operation is also associated with processing techniques that make use of modern technologies. These are the most economic viable method currently being used by the diamond fraternity. There is no other feasible, alternative mining method for the bulk sampling of possible alluvial diamonds.

(e) The operational aspects of the activity:

The gravels will be loaded with an excavator on to dump trucks for conveyance to the Processing Plant. At the Processing Plant the run of mine

gravels will be fed onto a grizzly for screening out oversize material. The material will be processed through a screening section for delivery to a recovery plant. Concentrate from the recovery plant will be processed through an X-Ray/Sortex plant to extract the diamonds. An area will be used for all processing and dumping operations. The expected lifespan of the mine is 16 years.

Mining activities will primarily make use of existing roads created by previous mining activities, but there is a possibility for additional roads that could be created.

Alternatives considered: -

The conventional opencast load-haul-mine method has been proven to be the most economic viable method currently being used by the diamond fraternity. There is no other feasible, alternative mine method for the mining and extraction of possible general and alluvial diamonds.

(f) The option of not implementing the activity:

Potential land use includes grazing and mining. The majority of the area is classified to have potential for grazing land. Therefore, mining activities are believed to be the most economically beneficial option for the area to establish any potential for mineral resources.

Socio-Economy

The operation will make provision for 15 to 35 job opportunities. This will be lost if the mining project does not proceed. Substantial tax benefits to the State and Local Government will also be lost.

Biodiversity

There are some parts of the application area that is covered by vegetation, a specialist biodiversity study will be done on the area to establish if any of the flora or fauna is protected.

Heritage and Cultural Resources

No archaeological or historical relics of heritage value were observed in the footprint of the mine by the specialist Dr. Edward Matenga. The mining application can be considered in light of these findings. The study is mindful that some important discoveries during the excavations. If this happens operations should be halted, and the provincial heritage resources authority or SAHRA notified in order for an investigation and evaluation of the finds to take place.

Should any other heritage features and/or objects be located or observed, a heritage specialist will be contacted immediately. Observed or located

heritage features and/or objects may not be disturbed or removed in any way until such time that a heritage specialist has been able to make an assessment as to the significance of the site (or material) in question. If the mining operation is approved, the heritage resources if any other had been encountered will be protected through the demarcation of no-go zones and fencing off.

ii) Details of the Public Participation Process Followed

Describe the process undertaken to consult interested and affected parties including public meetings and one on one consultation. NB the affected parties must be specifically consulted regardless of whether or not they attended public meetings. (Information to be provided to affected parties must include sufficient detail of the intended operation to enable them to assess what impact the activities will have on them or on the use of their land.

(a) The consultation process with interested and affected parties has been done and letters were hand delivered to the Communities. A copy of the Scoping Report with a cover letter as well as a comments form was hand delivered to the Community.

(b) Correspondence of the proposed Mining Right application has been forwarded per registered post on 07 June 2021 to all identified interested and affected parties. This correspondence contained a copy of the Scoping Report with a cover letter and comments form.

(c) The process as described by NEMA for Environmental Authorization was followed. The Community, were consulted personally and through a letter that was given to them by hand. Notices were placed at the Springbok Library, in Springbok, at the Municipal Offices of the Nama Khoi Local Municipality, on the road to Komaggas, on the gravel road towards the mining area and at the entrance to the mine. With this site notice all passers-by are requested to submit any written comments to be forwarded to the consultant.

(d) An Advert (Notice) was placed in the Gemsbok newspaper on 11 June 2021 to notify all other interested parties and affected parties of the application for a Section 102 on a mining right and to invite any person that might be interested and or affected to register.

(e) The EIA EMP was also sent out to all interested and affected parties with a registered letter and the documents on a disc.

Photo 1: Notice and Draft Scoping Report placed at the Public Library in Springbok.

Photo 2: Notices brought up at the enterance of the mine site.

iii) Summary of issues raised by I&APs

(Complete the table summarising comments and issues raised, and reaction to those responses)

PLEASE REFER TO APPENDIX 3

iv) The Environmental attributes associated with the development footprint alternatives (The environmental attributed described must include socio-economic, social, heritage, cultural, geographical, physical and biological aspects)

(1) Baseline Environment

(a) Type of environment affected by the proposed activity

(its current geographical, physical, biological, socio-economic, and cultural character)

(1) *GEOLOGY:*

Sediments of the Namaqualand coastal area overlie the Precambrian Metamorphic Basement Complex, which consists predominantly of granite-gneiss, sparsely interspersed with minor mafic intrusive, and often intersected by quartzite ridges, marble layers and a wide variety of schists (De Villiers & Söhnge, 1959).

The oldest known unmetamorphosed sediments in this area are the Cretaceous silcretes and remaining patches of silicified diamond conglomerate of Late Cretaceous age (~70 m.y.), found on Annex-Kleinsee. The Buffels River palaeo-channel gravels were mainly deposited during wetter climates of Tertiary age, while the raised beach terraces mined on the coastal farms were formed during sea level stillstands since the Late Miocene and throughout the Quaternary period (Kensley & Pether, 1986).

Lower Buffels River alluvium is spread across an extensive coastal floodplain, ~40km long from east to west and up to 10km wide, flanking the river on both sides. The palaeo-channel deposits are interpreted as derived from a widely meandering palaeo-river, with deltaic distribution towards the river mouth. The coastal plain is covered by reddish wind-blown sandy overburden, in which calcrete/kaolin crusts often precipitate.

From their kimberlite sources, diamonds are transported across the landscape by the actions of wind, water and ice (glaciers) under the constant influence of gravity. Diamonds, by far the hardest naturally occurring substance, are able to withstand transportation over thousands of kilometres during many millions of years. Due to high density, diamonds tend to concentrate gravitationally and hydrodynamically. These factors cause diamonds to travel and be deposited together for the most part, resulting in the well-known "jackpot" phenomenon, which is mainly dependent on bedrock morphology. Softer patches in the

bedrock thus form potholes and boulder pits. Diamondiferous gravels are generally only moved during storm and flood conditions, when energy levels rise to more than ten times average.

During floods, boulders and cobbles are moved into bedrock depressions which act as trap sites, where they accumulate to form boulder beds, able to withstand further movement. Once deposited, the boulder beds lie in stable, densely packed (clast-supported) configurations, and in turn act as trap sites for large amounts of pebble-sized gravel infill. Diamond concentrations are protected against remobilization by overlying gravel and boulder lags, as well as by calcrete, ferricrete, silcrete and gypsum cementation.

The Buffelsbank Mine is situated on the western boundary of the so-called Copper District that comprises an area of roughly 3 000 km^2. It's a highly dissected mountainous area lying at a general elevation of 900 m, rising in places to 1 200 m. Rocky outcrops are abundant, the alluvium covered parts being confined to the low-lying areas between the mountains.

The Copper District is underlain by rocks of Proterozoic age that have undergone high-grade metamorphism and polyphase deformation. Lithostratigraphically the rocks can be sub-divided into a Metavolcanosedimentary succession which has been intruded by various granites and granite gneisses in a sheet-like fashion at different stages relative to the structural and metaitiorphic events.

The regional geology of the area is characterised by metasediments (pelitic gneiss, amphibolite, gray biotite gneiss, calc-silicate gneiss, marble and thin lenses of quartzite) of Mokolian age. The ancestral Buffels River and related systems exhibit a complex geological history with the first economically significant occurrence of diamonds relating to palaeo-drainage evolving in the Early to Middle Cretaceous (120-100Ma). Re-use of these fluvial conduits has occurred during the Late Miocene (Proto deposits) and again in the Plio-Pleistocene and Quaternary eras (Meso deposits), culminating in the modern Buffels River. These later Buffels events exploited the 'median' channel of this remnant drainage basin, which now represents an entrenched transverse (east west trending) master stream consequent. In each case, previous valley fills have been exhumed and replaced by successive cycles of aggradation and degradation, resulting in

stepped terraces of remnant older (higher elevation) Cretaceous and younger Miocene deposits (middle elevation) that are blanketed in Meso gravel bars (lowest elevation). The entrenched modern river represents the last Meso phase (of 3 recognisable phases) and is 6-8m below a set of distinctive paired terraces (second Meso phase) fringing the modern river valley.

In each instance, the base of these successive fills is floored by a basal unconformity upon which lies a fining upwards sequence of gravels, grits and coarse sands of varying maturity, terminating in an aggradational valley-flooding sequence of silts and clays. Terrigenous deposits that commonly contain hardpan layers (calcrete, ferricrete) blanket the top of the fluvial sequence. A ubiquitous indurated aeolian sand (Dorbank) layer, overlain by ilmenite-rich aeolian sand sheets and transgressive dune corridors, comprise the final sedimentary succession.

Site specific geology

The present course of the Buffels River forms the Buffelsbank northern boundary. However, during previous geological ages, the palaeo-Buffels River meandered freely across the width of the Buffels River Valley. It is evident from the placement of the primary boulder and cobble gravel deposits, that during the main depositional phase of the palaeo-Buffels River, it followed a meander across Buffelsbank mining area.

It is clear from historic excavations that the palaeo-Buffels River exerted tremendous energy over a considerable period of time to transport and deposit immense boulder-beds. The boulders, cobbles and pebbles generally consist of Nama quartzite, but also of quartzose granite-gneiss from the Namaqualand Metamorphic Mountainland. The pebble fraction also includes vein quartz.

The modern-day Lower Buffels River Valley is a mature valley with a low slope of approximately 1:100, and part of the coastal floodplain between the Mountainland and the West Coast. However, during evolution of the floodplain in very wet climates, the coastward edge of the receding Mountainland formed an S-shaped curve with slopes as high as 1:20, which greatly facilitated the downslope movement of large boulders.

It is generally accepted that all the older tributaries draining the Mountain land and entering the Buffels River Valley contributed diamondiferous gravel derived from older glacial deposits. The

general trend of the regional foliation of the basement gneiss to a large extent controls the direction of mafic lineaments forming within it. Bedrock in the area consists of a series of schist's and granite gneisses of the Namaqualand Metamorphic Complex covered by sands, calcretes and dorbank. The diamonds in this alluvial deposit are found both in the basal lag of the palaeo channels and in potholes scoured into the softer schist bands. The palaeo channels in these deeper plunge pool environments are sealed by sandstone and elsewhere by cemented sands, dorbank and calcrete.

The gravels (0.1 to 1.0 m thick) are invariably white quarts pebbles and cobbles with a sprinkling of larger boulders. Smokey quartz is common. The gravels vary from loose cemented to very hard conglomerate.
The diamond deposit at Buffelsbank mine is the in-situ remnant of the basal layer of a succession of fluvial gravels, sands and clays of a paleo braided river course. Due to the above the alluvial diamonds occur within various horizons, i.e;

- Pothole structures within the gneissic bedrock and in crevasses
- The basal clay horizon, which overlies much of the deposit's paleo bedrock.
- The upper gravel horizon, which directly overlies the basal clays

In general, these diamondiferous horizons are found on and within 3 to 4 meters above the basal gneissic floor and are covered by clayey sand and sand overburden of between 1 and 35m thick. While the deposit is a remnant terrace with a broad (± 1-2 km wide) braided streambed floor, the presence of a thicker "main channel" (basal gravel channel) has been verified. While the bedrock gneiss extends as an undulating paleo river valley floor, the extension of the remnant paleo gravel reserves beyond the lease area boundary is not known in the south and has been eroded away in the north. There are no dykes, sills or faults evident in the mine floor.

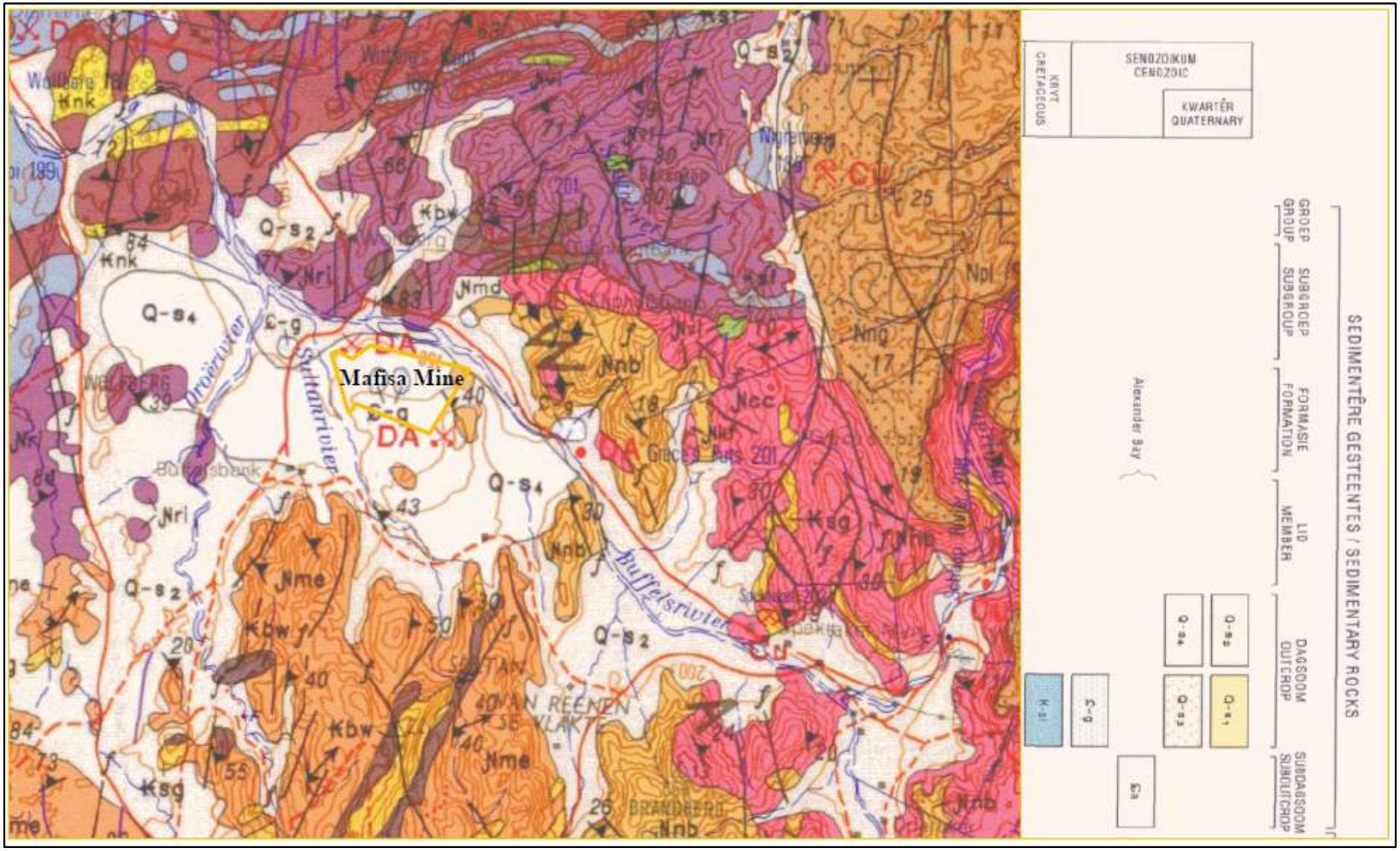


Figure 14. Lithology and geological map of study are

(2) *CLIMATE:*

The site falls within the west coast desert climatic zone of Southern Africa, which is typified by hot dry summers and cooler winters with little rain. The nearest town to the mining site is Springbok. Springbok lies on 982m above sea level Springbok's climate is a local steppe climate. There is not much rainfall in Springbok all year long. According to Köppen and Geiger, this climate is classified as BSk.

Average temperatures measured for Springbok ranges from 22.3 °C in the hottest month, February, to 11.4 °C for the coldest month, July. The average temperatures measured for all of the months can be seen in the table below.

Table 3: Average temperatures and rainfall measured for every month.

	January	February	March	April	May	June	July	August	September	October	November	December
Avg. Temperature (°C)	22	22.3	21.4	18.1	14.6	11.9	11.4	12	14.3	16.7	19.3	20.8
Min. Temperature (°C)	14.7	15.1	14.6	11.6	8.4	6.4	5.8	5.9	7.6	9.7	12	13.5
Max. Temperature (°C)	29.4	29.6	28.3	24.7	20.8	17.4	17	18.1	21.1	23.7	26.7	28.2
Avg. Temperature (°F)	71.6	72.1	70.5	64.6	58.3	53.4	52.5	53.6	57.7	62.1	66.7	69.4
Min. Temperature (°F)	58.5	59.2	58.3	52.9	47.1	43.5	42.4	42.6	45.7	49.5	53.6	56.3
Max. Temperature (°F)	84.9	85.3	82.9	76.5	69.4	63.3	62.6	64.6	70.0	74.7	80.1	82.8
Precipitation / Rainfall (mm)	4	6	11	19	25	32	30	27	12	12	5	6

Rainfall

The rainfall in the area is low. The two closest station is in Springbok which is 50km away. The annual rainfall in Springbok is around 189 mm. The daily rainfall data for Springbok have been summarized to represent the average monthly rainfall, which is graphically presented in Figure 15 below.

Precipitation for the region is the lowest in January with an average rainfall of 4 mm during this month. During the month of June, the precipitation reaches a peak with an average of 32 mm. The difference in precipitation between the driest and wettest months is thus 28 mm.

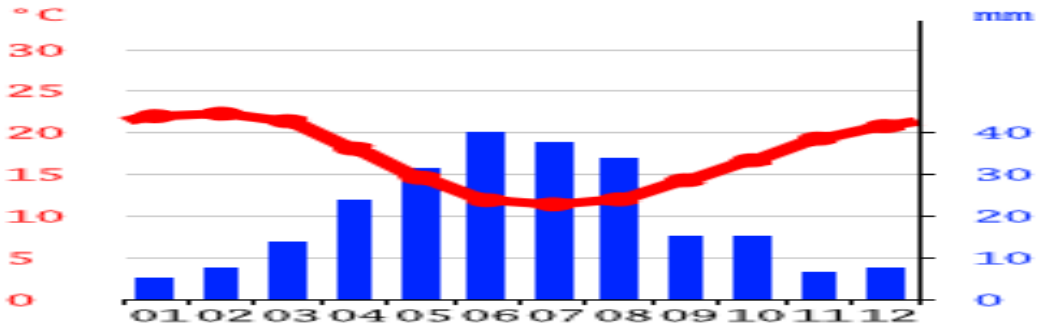


Figure 15. Average rainfall and temperature per month at the nearest rainfall station (Springbok).

Evaporation

Evaporation far exceeds rainfall at the site. Although no records are available from the mine site the gross annual evaporation rate at Springbok is on average 3254 mm.

Wind

There is little or no information available on the wind patterns in this area. The prevailing winds blow from WSW in the summers and ENE in the winters and can reach high speeds. The winds are unfortunately associated with dry conditions and as such will generate high levels of windblown dust in the absence of effective attenuation measures. Daily wind patterns are normally very light NE in the morning switching to SW in the afternoon, with a high percentage of calms in 3 of the 4 seasons.

Incidents of Extreme Weather Conditions

The area is not generally subjected to extreme weather conditions in the form of hail, frost or thunderstorms, although high temperatures associated with strong winds especially in the afternoons from the south do occur.

(3) ***TOPOGRAPHY:***

Dr. Betsie Milne from Boscia Ecological Consultants has been appointed by Mafisa Mining (Pty) Ltd to provide an ecological study in order to highlight the ecological characteristics of the proposed mining area and to determine the possible impact of mining on the diversity and ecological status of the application area. Topography was described and included in this report as part of the ecological study.

The natural topography is classified as irregular plains in the north towards the ephemeral river valleys, while the south is classified as open high hills, which primarily consist of sand dunes.

Altitude ranges from 140 m above sea level along the banks of the Buffels River in the north, increasing southwards, to 230m on top of the sand dunes in the far south-east. The terrain is indicated by a gentle slope of 3 - 5 % in the south-west and increases to steeper slopes of 9 - 13 % along the dunes in the south-east.

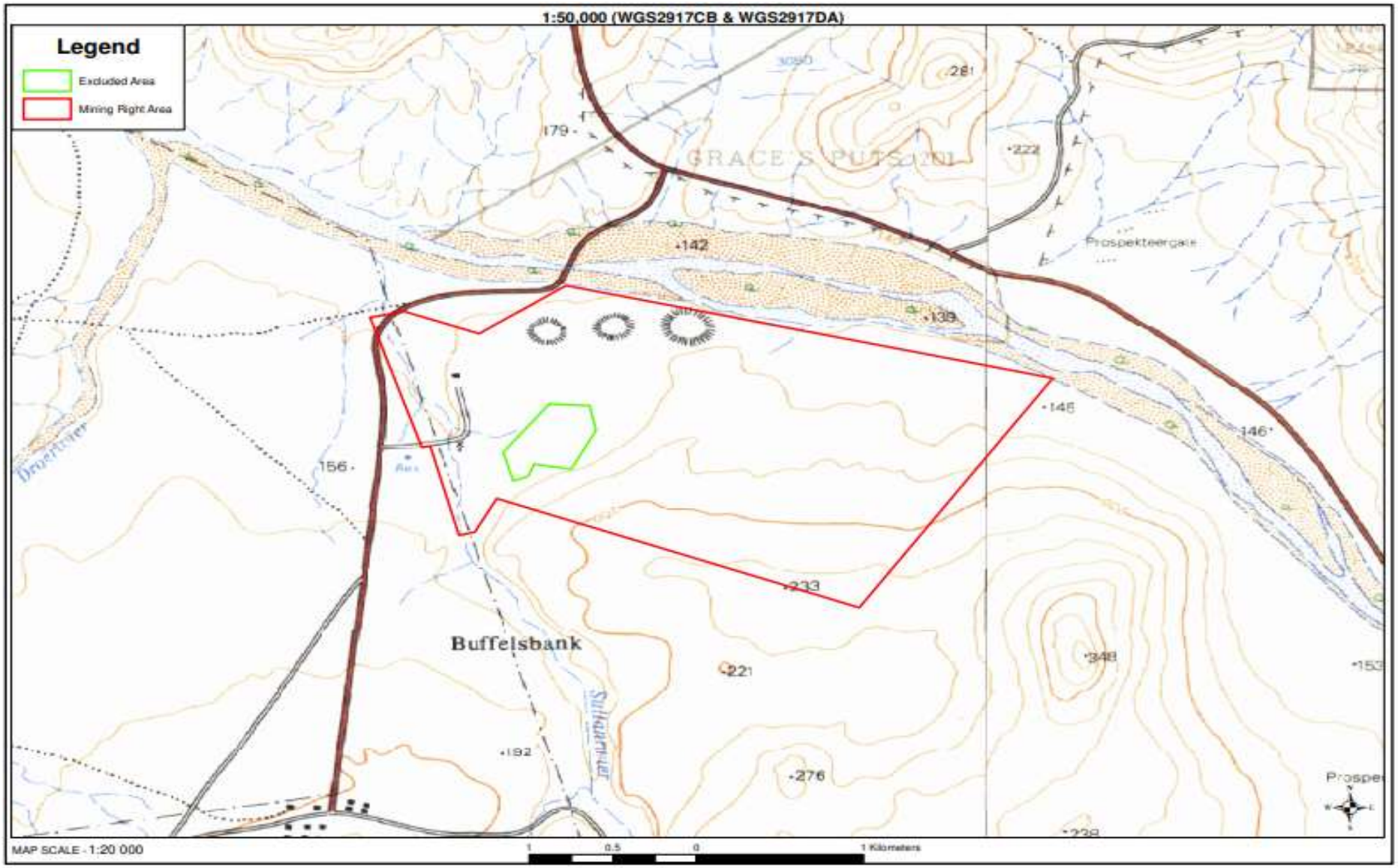
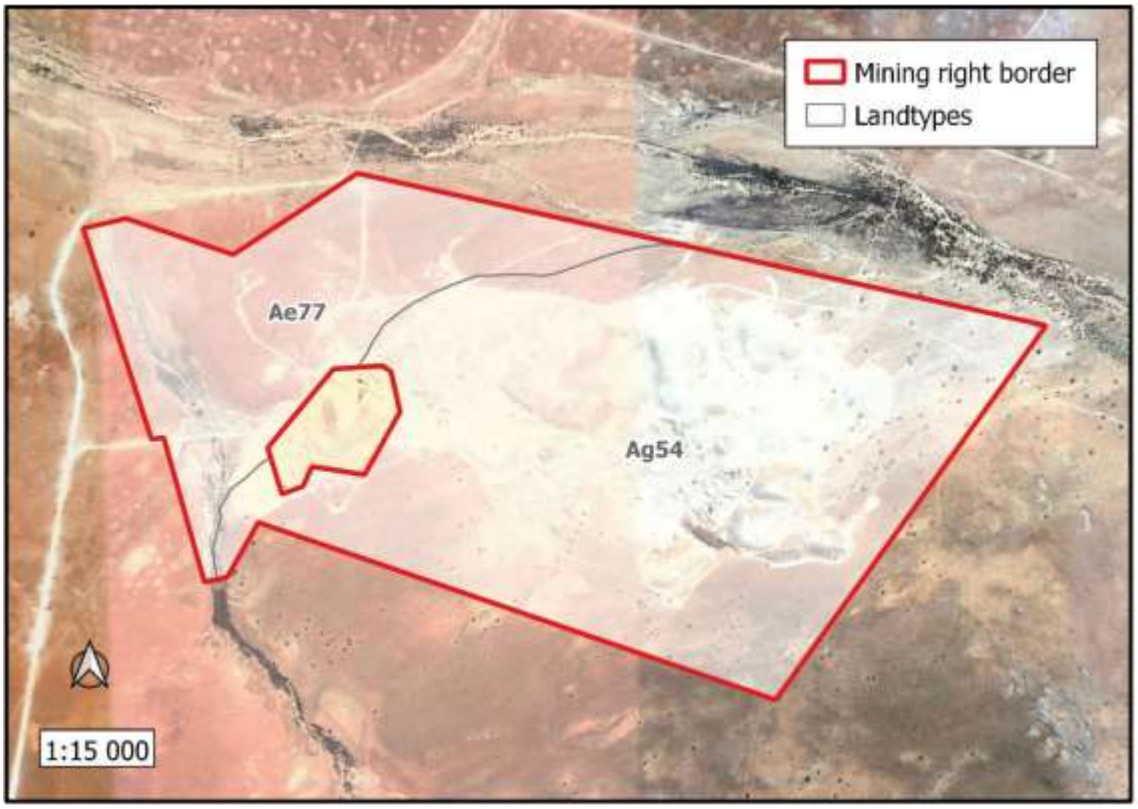


Figure 16. Topographical Map of Buffelsbank 1:20 000 application area indicated by RED line.

(4) ***SOILS:***

Dr. Betsie Milne from Boscia Ecological Consultants has been appointed by Mafisa Mining (Pty) Ltd to provide an ecological study in order to highlight the ecological characteristics of the proposed mining area and to determine the possible impact of mining on the diversity and ecological status of the application area. Soils was described and included in this report as part of the ecological study.

Land types found on the property include Ae77 and Ag54 (Figure 17). The soils associated with these landtypes are red-yellow apedal, freely drained soils, red with high base status. Soil depth varies between < 300 mm deep to > 300 mm deep. Shifting sands are strongly dominant and therefore highly susceptible to wind erosion. Rainfall erosivity is very low due to the arid climate, but the alluvial soils in the ephemeral river channels are most susceptible to water erosion during flooding. In the same way, these soils have a high potential to regenerate if badly eroded, while the sands have a very low chance to regenerate.



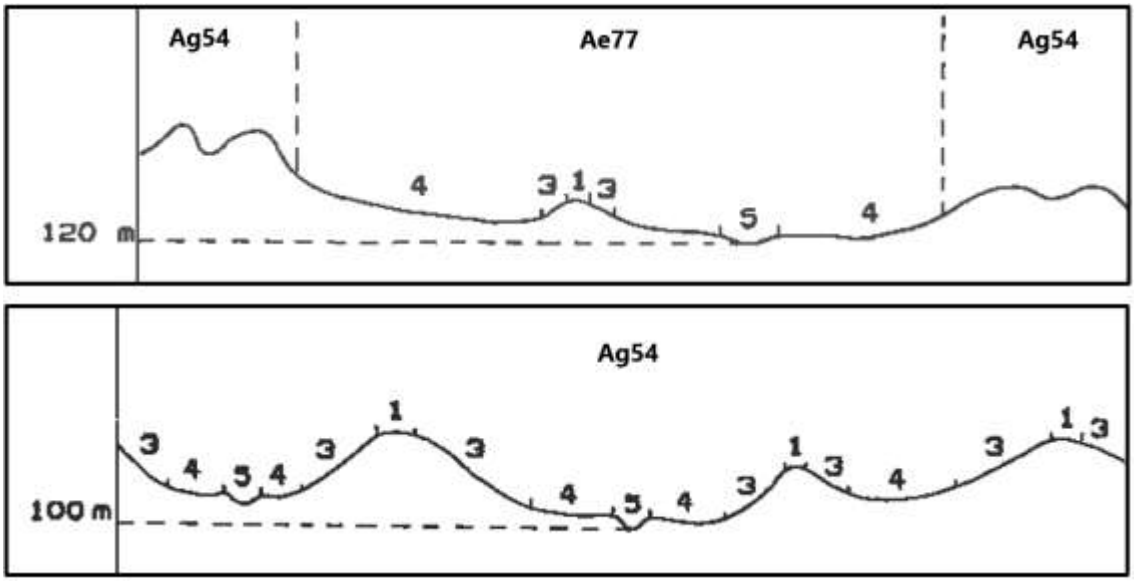


Figure 17. The distribution of land types in the study area (top) and their terrain form sketches (bottom).

(5) *LAND CAPABILITY AND LAND USE:*

Dr. Betsie Milne from Boscia Ecological Consultants has been appointed by Mafisa Mining (Pty) Ltd to provide an ecological study in order to highlight the ecological characteristics of the proposed mining area and to determine the possible impact of mining on the diversity and ecological status of the application area. Land capability and Land use was described and included in this report as part of the ecological study.

The major land uses in the area are mining, agriculture, and tourism. According to AGIS, the land capability of the study site is non-arable with low potential grazing land. The grazing capacity is 72 ha/LSU, with the agricultural region being demarcated for sheep farming. The study area also falls within the Great Karoo Small Stock Livelihood Zone.

Apart from the proposed mining activities, the mining right application area has a very long history of diamond mining operations being conducted on site. The most famous being the 30-year-old TransHex Buffelsbank operation. As a result, most of the application area has already been vastly transformed. Existing infrastructure includes those related to historic mining activities.

Land Use

Land Use Prior to Mining

Prior to the first mining activities the area was used for nomadic goat grazing by local inhabitants.

Before this application the area was mined by Trans Hex and Porta Diamonds as an opencast alluvial diamond mine. The current status of the area is largely due to their activities.

Historical Agricultural Activities
Prior to the first mining activities the area was used for nomadic grazing.

Evidence of Abuse
Mining took place in the past, leaving the area in its current status. Present misuse is in the form of illegal diamond mining by under-digging of the mine sidewalls in the gravel zone, creating extremely dangerous situations because caving can take place, burying the culprits.

Existing Structures
Existing structures on the mine site includes infrastructure from previous mining activities.
Workshops and offices left by Trans Hex
Ex Trans Hex Plant
Power lines

(6) *NATURAL FAUNA:*

Dr. Betsie Milne from Boscia Ecological Consultants has been appointed by Mafisa Mining (Pty) Ltd to provide an ecological study in order to highlight the ecological characteristics of the proposed mining area and to determine the possible impact of mining on the diversity and ecological status of the application area. Fauna was described and included in this report as part of the ecological study Appendix 4 attached to the report).

Faunal communities
According to Section 3(a) and 4(a) of the Northern Cape Nature Conservation (NCNCA) Act No. 9 of 2009, no person may, without a permit by any means hunt, kill, poison, capture, disturb, or injure any protected (Schedule 2) or specially protected (Schedule 1) wild animals. Furthermore, Section 12 (1) of NCNCA states that no person may, on a land of which he or she is not the owner, hunt a wild animal without the written permission from the landowner. According to the act "wild animal" means a live vertebrate or invertebrate animal, and the egg or spawn of such animal. Most of the landscape on Komaggas has already been severely disturbed, but the remaining pristine habitats do provide suitable opportunities to faunal communities. Animals likely to be found in the study area are discussed in their respective faunal groups below.

Mammals

As many as 52 terrestrial mammals and eight bat species have been recorded in the region, of which nine are listed either in the IUCN or the Mammal Red List of South Africa, Lesotho and Swaziland. Virtually all mammals of the study area are protected; either according to Schedule 1, 2 or 3 of NCNCA .

African Straw-coloured Fruit-bat, Geoffroy's horseshoe Bat, Cape Fox, Bat-eared Fox, Honey Badger, Striped Polecat, Aardwolf and African Wild Cat have a high probability to occur on site based on their wide habitat tolerance and affinity for arid regions. Lesser Dwarf Shrew has a moderate potential to occur on site, because they essentially prefer grassland habitats. Aardvark also has a moderate potential to occur on site. Even though their habitat preferences match those on site, no burrows were observed during the field survey, and it is possible that the long mining history on the property have already driven them out.

The remaining mammal species of conservation concern all have a low potential to occur on site. Grant's Golden Mole and Littledale's Whistling Rat prefer the soft sands of coastal dunes or interdune swales with dense vegetation, while the Angolan Wing-gland Bat prefers riverine vegetation. The Stone Dormouse and Grey Rhebok are restricted to rocky hills, while Leopard is not expected to occur on site, based on their secretive nature and severe prosecution. Their occurrence in the region is likely to be restricted to the mountainous areas.

Many Brant's Whistling Rat colonies occur across the shrubland community and their whistles reverberated continuously during field survey. They are protected under Schedule 2 of the NCNCA.

Problem animals (Schedule 4) with a high likelihood to occur on site include Black-backed Jackal, and Caracal.

Reptiles

The Komaggas mining area lies within the distribution range of at least 69 reptile species. One listed species, i.e. Homopus signatus (Speckled Dwarf Tortoise), occurs in the area and is listed as Vulnerable. It is intolerant of habitat modification and is threatened by human-induced habitat destruction and degradation, as well as the international reptile pet trade. They have a strong affinity for rocky terrain and are therefore not expected to be found on site

Most of the remainder reptiles of the study area are protected either according to Schedule 1 or 2 of NCNCA. Specially protected species include all species from the families Cordylidae (Girdled Lizards) and Chamaeleonidae (Chameleons). The Western Dwarf Chameleon is primarily associated with undisturbed Strandveld vegetation, but it has

been recorded in the vicinity of the study area and therefore have a moderate potential to be found in the shrubland community. The Namaqua Chameleon has a high probability to be found on site. None of the Girdled lizards are expected to be found on site. They are all restricted to larger rocky terrain and only have a very low probability to be present on the small, isolated rocky outcrops in the study area.

Amphibians

Nine amphibian species are known from the region, of which none are listed in the IUCN or the SA Frog Atlas. Nearly all species from the study region are endemic to South Africa or adjacent sub-regions. All frog species from the study region are also protected according to Schedule 2 of the NCNCA. Most species from the region are dependent on water. Platannas are strictly aquatic, although opportunistic, while Paradise Toads and Namaqua Stream Frogs are dependent on natural springs or waterholes. Poynton's- and Delalande's River Frogs require permanent water for breeding and are typically associated with rivers or wetlands. Namaqua Cacos and Delalande's Sand Frogs are primarily terrestrial, but the Sultanrivier and open mine pits could potentially provide important breeding habitats for them after rains. Namaqua Rain Frogs on the other hand, are not associated with water. They live in scrub-covered sandy areas and breed by direct development.

Avifauna

The study site does not fall within or near (< 100 km) any of the Important Bird Areas (IBA) defined by Birdlife South Africa. A total number of 175 bird species have been recorded from the study region, of which 13 are listed either according to the IUCN or the SA Red Data Book of Birds. Furthermore, all birds are protected either according to Schedule 1, 2 or 3 of NCNCA.

The Komaggas site is not expected to provide diverse or significant habitat opportunities for birds in the region, mainly because the site has already been vastly transformed. The habitats on site, from grass tufts to succulent shrubs and trees, provide suitable habitats to birds and will indeed host many species. However, the neighbouring pristine farms are expected to attract species less tolerant of disturbances and those with higher habitat selectivity.

No bird species of conservation concern were recorded during the field survey, but those with the highest probability to occur in the terrestrial habitats on site include Burchell's Courser (Vulnerable), Kori Bustard (Near Threatened), Ludwig's Bustard (Endangered), Black Harrier (Endangered), and Secretarybird (Endangered). Protected waterbirds that may be associated to the Sultanrivier include Curlew Sandpiper

(Near Threatened) and Black Stork (Vulnerable). They are however only expected to occur here very seldomly, and only after flooding events. Many of the owls and raptors protected underSchedule 1 of the NCNCA are also expected to occur on site either by occasionally passing over, foraging, or nesting.

Fish

In addition to those regulations in the NCNCA pertaining to wild animals, Section 32 and 33 of the NCNCA states that no person may, without a permit angle and not immediately release, catch, import, export, transport, keep, possess, breed, or trade in a specimen of a specially protected (Schedule 1) or protected (Schedule 2) fish. The Sultanrivier, a tributary of the Buffels River, is an intermittent stream that rarely flows. No fish species are known to occur in the Sultanrivier, or the reaches of the Buffels River located near the study area.

Invertebrates

Invertebrates dominate inland habitats and play a significant role in the overall function of the ecosystem (Kremen et al. 1993, Weisser and Siemann 2004). In general, they are widely distributed, extremely diverse and have not been surveyed as comprehensively as plants, mammals, and birds. Therefore, current available data on their distribution is scarce, which makes it almost impossible to list all species that may possibly occur on any given site without a dedicated and extensive monitoring plan. Nevertheless, key morphospecies and species of conservation concern are discussed here, as well as the major habitats which delimit possible invertebrate communities on site.

Seventeen invertebrate species of the Northern Cape appear on the IUCN Red Data list of threatened species and are listed in Table 10 of the ecological study. Of these, six species are known from the study region, while only three are expected to potentially occur in the pristine areas on site. Brinckiella arboricola, Tree Winter Katydid (Endangered), Brinckiella karooensis, Karoo Winter Katydid (Vulnerable), and Brinckiella mauerbergerorum, Mauerberger's Winter Katydid (Vulnerable) are associated with vegetation of the succulent karoo biome and therefore could potentially occur in the shrubland or woodland community on site.

On the other hand, Harpagophora monodus (Near Threatened), a millipede, is restricted to mountainous shrubland, while Scarabaeus canaliculatus (Data Deficient), a Dung Beetle seems to favour very low open vegetation in coastal areas. These species are therefore not expected to occur on site. Peringueyacris namaqua, Bladder grasshopper (Vulnerable) is restricted to the Namaqualand region where it inhabits succulent Karoo vegetation, particularly Pentzia and Eriocephalus.

Although it could potentially be found in the study are, its host plants were not recorded on site.

In addition, those species that are specially protected according to Schedule 1 of the NCNCA include all Velvet worms as well as some baboon spider species, Stag Beetles and the Flightless Dung Beetle. Baboon spiders have been recorded in the vicinity of the study area and Harpactira namaquensis has a very high probability to be found on site. None of the other specially protected taxa are known to occur in the study region.

All Rock- Creeping- and Burrowing Scorpions are protected according to Schedule 2 of the NCNCA, along with several beetles, butterflies and moths. Of these, the burrowing scorpions, Opistophthalmus granicauda and O. peringueyi, as well as several Gossamerwinged Butterflies, Cigaritis namaqua (Namaqua silverline), Aloeides sp. (Copper), and Azanus sp. (Babul Blue) were recorded on site.

Two major habitats delimit possible invertebrate communities in the study area:

i. Terrestrial vegetation classified as Karoo (Picker et al. 2004)

All the terrestrial vegetation communities on site fall within this habitat and represent unique species assemblages, with an above-average representation of beetles, grasshoppers, flies, wasps, and lacewings. The protected butterflies, scorpions and tiger beetles discussed above are expected to be associated with this habitat. Burrowing Grasshoppers (Acrotylus sp.), Bird Grasshoppers (Cyrtacanthacridinae sp.), Thread-waisted Wasps (Prionyx sp.), Longleg Tokkies (Stenocara sp.), Jewel Beetles (Acmaeotethya sp.), Burrowing Bugs (Cydnidae sp.) and many ant species were also recorded during the field survey. The scorpion Parabuthus capensis and Scarab Beetle Onthophagus cameloides have also been recorded in the vicinity of the site.

ii. Sultanrivier

Invertebrates expected to be associated with the Sultanrivier during its aquatic phase (after flooding) primarily include highly generalist species such as biting midges, chironomids, mosquitoes and house flies.

(7) ***NATURAL FLORA:***

Dr. Betsie Milne from Boscia Ecological Consultants has been appointed by Mafisa Mining (Pty) Ltd to provide an ecological study in order to highlight the ecological characteristics of the proposed mining area and to determine the possible impact of mining on the diversity and ecological status of the application area. Flora was described and

included in this report as part of the ecological study Appendix 4 attached to the report).

Broad-scale vegetation patterns

The study area falls within the Succulent Karoo Biome (Mucina and Rutherford 2006). According to the vegetation map of Mucina and Rutherford (2012), the site is represented by one broad-scale vegetation unit, i.e. Namaqualand Heuweltjieveld (Figure 18).

Namaqualand Heuweltjieveld lies at the western foothills of the Namaqualand Escarpment in the Northern Cape. From west of Steinkopf, it stretches southwestwards to Soebatsfontein and Kotzesrust and occurs at altitudes between 100 and 540 m. The region is characterised by undulating plains leading up to the Escarpment with a mosaic of communities on slightly raised, rounded termite mounds, i.e. Heuweltjies. It is characterised by deep red loamy soils on granite and gneisses of Mokolian age, with Ag and Ae landtypes.

This unit is classified as least concern, with 11 % being protected in the Namaqua National Park. About 3-4 % has already been transformed by cultivation, and Acacia cyclops has infested around 5 % of the unit. Local intensive grazing pressures have also caused some veld degradation. Endemic plants typically include all the Namaqualand endemics.

Even though the broad-scale vegetation unit is classified as Namaqualand Heuweltjieveld, no Heuweltjies occurred on site. The typical Heuweltjieveld were observed further north of the Buffels River. Such discrepancies are normal with broad-scale vegetation mapping, due to the nature of large-scale extrapolations. Therefore, it is vital to perform on-site field surveys, where fine-scale and more accurate vegetation communities can be defined.

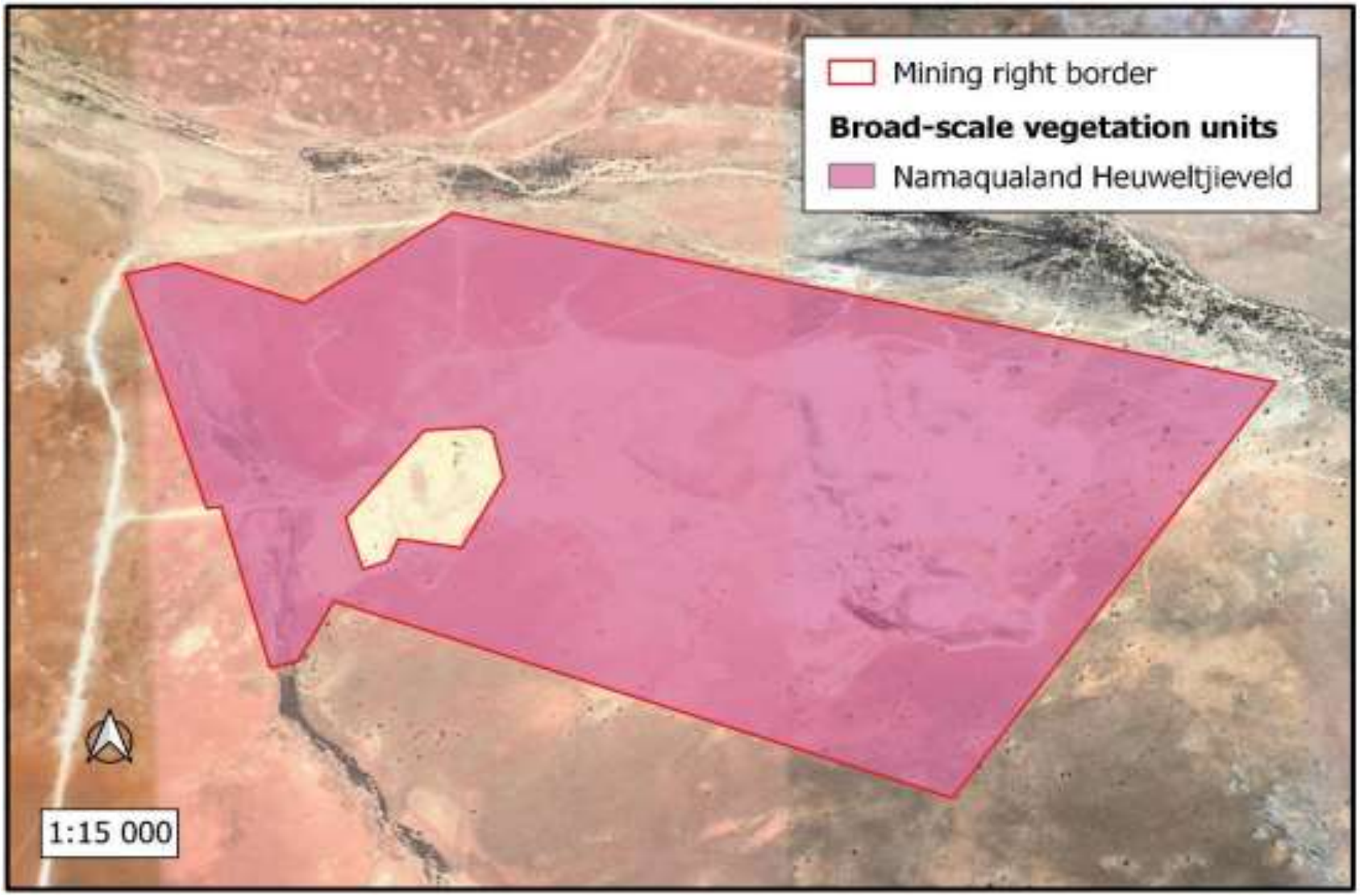


Figure 18. The broad-scale vegetation units (Mucina and Rutherford 2012) present in the study area. (Map Taken out of the ecological assessment study by Dr. Betsie Milne).

Fine-scale vegetation patterns

Plant communities in the study area are delineated according to plant species correspondences and changes in soil structure. They can be divided into three distinct units (Figure 20), which are described below. These descriptions include unique characteristics and the dominant species found in each unit. Those areas that have already been severely transformed by historic mining activities were not included in this assessment.

i) Crassothonna cylindrica – Ehrharta pusilla open shrubland on consolidated sand

This community covers the northern half of the study area (Figure 20). The vegetation is presented as open shrubland, dominated by low succulent shrubs intermixed with herbs, geophytes and a sparse grass layer. It is found on consolidated sand, with granite outcrops protruding in places. Bare ground constitutes about 20 - 30 % of the ground cover.

Stoeberia frutescens dominates the shrub layer, followed by Crassothonna cylindrica and Mesembryanthemum subnodosum. Other common species include Aizoon sarcophyllum, Drosanthemum inornatum, Cheiridopsis robusta, Roepera morgsana, Tetraena retrofracta, Wahlenbergia oxyphylla, Calobota halenbergensis, Hermannia paucifolia and Salsola sp. Vachellia erioloba trees are also found sparsely scattered in this community.

Herbs and geophytes include Oncosiphon grandifloras, Mesembryanthemum guerichianum, Kewa salsoloides, Lessertia diffusa, Dimorphotheca polyptera, Limeum fenestratum, Manulea androsacea, Tribulus terrestris, Heliophila laciniata, Ornithogalum xanthochlorum and Ledebouria sp.

The grass layer is dominated by Ehrharta pusilla, followed by Schismus schismoides, but Stipagrostis ciliata and Cladoraphis spinosa is also found here.

The vegetation along the granite outcrops shares most of the same species mentioned above. However, here Drosanthemum inornatum dominates along with Euphorbia ephedroides. Other species found among to the rocks include Searsia undulata, Lycium bosciifolium, Asparagus capensis, Pteronia divaricata, Dyerophytum africanum, Hirpicium alienatum, Monsonia ciliata, Hermannia trifurca, Anacampseros arachnoides, Leipoldtia schultzei, as well as the grasses Aristida adscensionis and Enneapogon desvauxii.

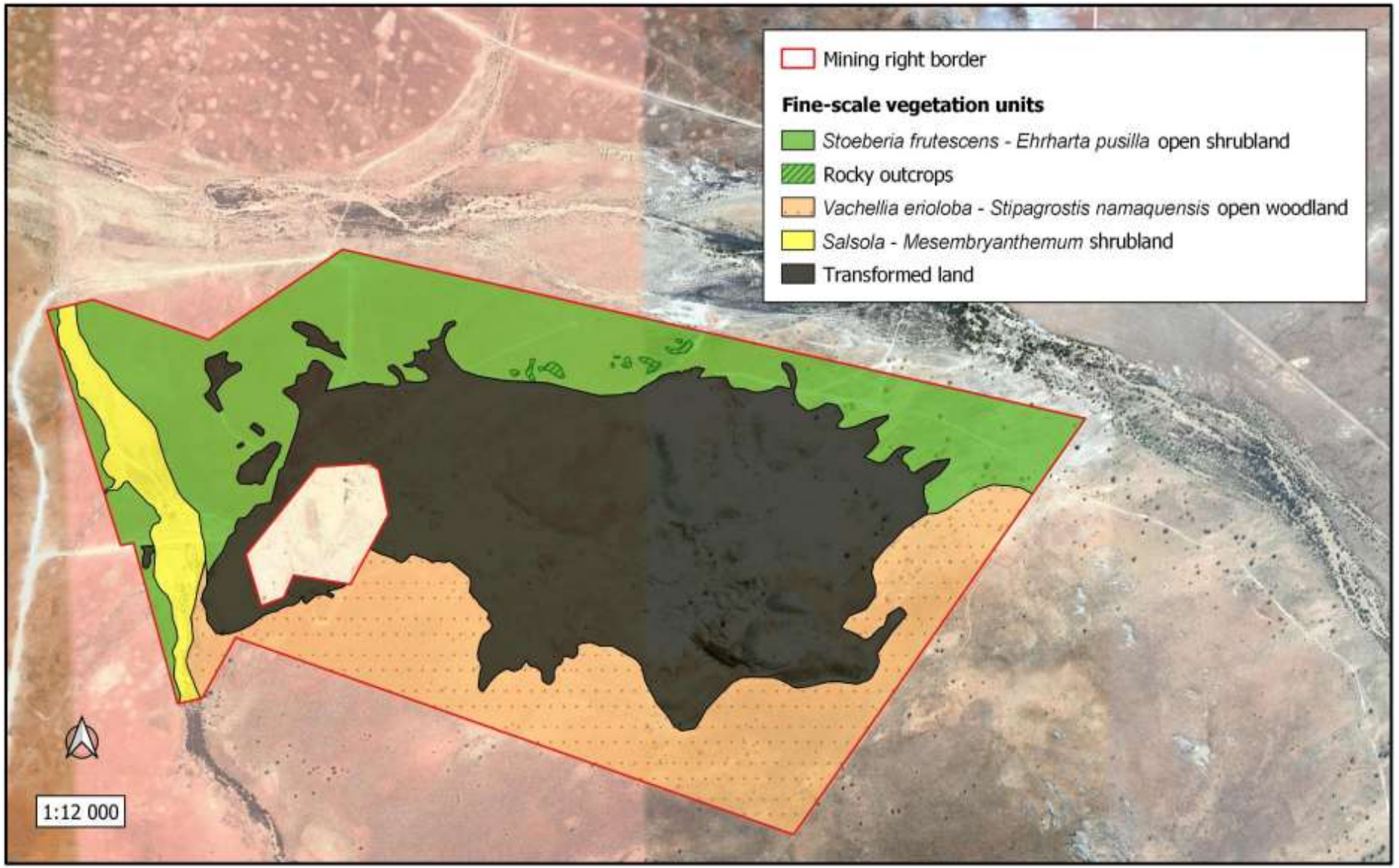


Figure 20. The distribution of finer-scale plant communities in the study area (Map Taken out of the ecological assessment study by Dr. Betsie Milne).

ii) Vachellia erioloba – Stipagrostis namaquensis open woodland on red sand dunes

This community is found on the sand dunes in the southern half of the property. The vegetation is sparse, with red sand constituting about 40% of the ground cover.Tall trees, Vachellia erioloba, are scattered in a grassy matrix, intermixed with low shrubs, herbs and geophytes.

Shrubs include Searsia populifolia, Calobota spinescens, Dyerophytum africanum, Polygala leptophylla, Hermbstaedtia glauca, Euphorbia dregeana, Quaqua mammillaris, Tetraena retrofracta, Crotalaria excisa subsp. namaquensis and Hermannia sp.

The grass layer is dominated by Stipagrostis namaquensis, followed by S. ciliata, but S.obtusa, Cladoraphis spinosa and Schmidtia kalahariensis is also common.

Herbs and geophytes include Limeum fenestratum, Tribulus terrestris, Lessertia diffusa, Cucumis africanus, Indigofera exigua, Wahlenbergia prostrata, Hirpicium echinus, Arctotis fastuosa, Tribulus terrestris, Ammocharis longifolia, Albuca sp. and Iridaceae spp.

iii) Salsola – Mesembryanthemum shrubland on alluvium

This community is associated with the alluvium of the Sultanrivier, which lines the property along the western boundary. The vegetation is far less diverse than the other communities on site and has been modified by historic mining activitiesthrough the construction of roads and water storage damsin the river course. Prosopis glandulosa and Atriplex nummularia have also infested the beds and banks in some places.

The vegetation is presented as a shubland, dominated by Salsola species as well as the succulents Mesembryanthemum subnodosum, M. guerichianum and M.hypertrophicum. Aizoon sarcophyllum is also abundant.

Population of sensitive, threatened, and protected plant species

The SANBI Red List provides information on the national conservation status of South Africa's indigenous plants, which are protected under the National Environmental: Biodiversity Act (Act No. 10 of 2004) (NEMBA), while the National Forests Act (No. 84 of 1998) (NFA) and the Northern Cape Nature Conservation Act (Act No. 9 of 2009) (NCNCA) restricts activities regarding sensitive plant species. Section 15 of the NFA prevents any person to cut, disturb, damage, destroy or remove any protected tree; or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a licence granted by the Minister. Section 49 (1) and 50 (1) of the NCNCA states that no person may, without a permit pick, transport, possess, or trade in a specimen of a specially protected (Schedule 1) or protected (Schedule 2) plants. Furthermore, Section 51(2) states that no

person may, without a permit, pick an indigenous plant (Schedule 3) in such manner that it constitutes large-scale harvesting.

Most species from the region are classified as least concern; a category which includes widespread and abundant taxa. However, a total of eight species are red listed. Four species (Antimima oviformis, Lampranthus suavissimus, Ruschia brevibracteata and R. fugitans) are listed as Data Deficient - Taxonomically Problematic. Distribution ranges and habitats for of these species cannot be well defined because of their taxonomic problems. The remaining species, i.e. Acanthopsis dregeana subsp. longispina (Vulnerable), Aloe komaggasensis (Vulnerable), Lapeirousia barklyi (Near Threatened) and Oxalis crocea (Vulnerable) are threatened by habitat loss to mining, habitat degradation from overgrazing as well as illegal plant collection. None of these listed species were recorded during the field survey.

Species protected in terms of the NFA include Vachellia erioloba. In the shrubland, it was found scattered at very low densities (<1 individual/ha), as young and adult trees of 1 - 7 m in height and 2 - 4 m in diameter. In the woodland, it occurred at higher densities of 6 – 7 individuals per hectare. Here, their entire size range is represented, from saplings of 20 cm in height and 80 cm in diameter, to adult trees ranging between 2 and 6 m in height 1 and 6 m in diameter. A few individuals have also opportunistically established on the slopes of the old mine dumps. To damage or remove any protected trees (seedlings to adults) an application must be submitted to the Northern Cape Department of Agriculture, Forestry and Fisheries (DAFF) and a licence obtained from DAFF at least three months prior to such activities.

In addition to these, specially protected species (Schedule 1) and protected species (Schedule 2) of the NCNCA known from the study region are also indicated in Appendix 1 of the ecological study and those that were recorded during the field survey are listed in Table 4 of the ecological study. Most of these recorded on site are range restricted bulbs and succulents protected at Family- or Genus level.

A photo guide to all species of conservation concern recorded in the study area is provided in Appendix 3 of the ecological study. Furthermore, according to Section 51(2) of NCNCA, a permit is required from the Northern Cape, Department of Environment and Nature Conservation (DENC) for any large-scale clearance of all indigenous (Schedule 3) vegetation, before such activities commence.

Table 4. Red listed plants species from the region as well as species recorded during the field survey that are protected according to the NFA and NCNCA.

FAMILY	Scientific name	Status	NFA	NCNCA
ACANTHACEAE	*Acanthopsis dregeana subsp. longispina*	VU		
AIZOACEAE	*Antimima oviformis*	DDT		S2
	Cheiridopsis robusta			S2
	Drosanthemum inornatum			S2
	Lampranthus suavissimus	DDT		S2
	Leipoldtia schultzei			S2
	Mesembryanthemum guerichianum			S2
	Mesembryanthemum hypertrophicum			S2
	Mesembryanthemum subnodosum			S2
	Ruschia brevibracteata	DDT		S2
	Ruschia fugitans	DDT		S2
	Stoeberia frutescens			S2
AMARYLLIDACEAE	*Ammocharis longifolia*			S2
ANACAMPSEROTACEAE	*Anacampseros arachnoides*			S2
APOCYNACEAE	*Quaqua mammillaris*			S2
ASPHODELACEAE	*Aloe komaggasensis*	VU		S2
EUPHORBIACEAE	*Euphorbia dregeana*			S2
	Euphorbia ephedroides			S2
FABACEAE	*Lessertia diffusa*			S1
	Vachellia erioloba		X	
HYACINTHACEAE	*Ornithogalum xanthochlorum*			S2
IRIDACEAE	*Lapeirousia barklyi*	NT		S2
OXALIDACEAE	*Oxalis crocea*	VU		S2
SCROPHULARIACEAE	*Manulea androsacea*			S2

In addition to these, specially protected species (Schedule 1) and protected species (Schedule 2) of the NCNCA known from the study region are also indicated in Appendix 1 and those that were recorded during the field survey are listed in Table 4 of the ecological study. Most of these recorded on site are range restricted bulbs and succulents protected at Family- or Genus level.

A photo guide to all species of conservation concern recorded in the study area is provided in Appendix 3 of the ecological study. Furthermore, according to Section 51(2) of NCNCA, a permit is required from the Northern Cape, Department of Environment and Nature Conservation (DENC) for any large-scale clearance of all indigenous (Schedule 3) vegetation, before such activities commence.

Weeds and invader plant species

Weeds and invasive species are controlled in terms of the National Environmental Management: Biodiversity (NEMBA) Act 10 of 2004, the Conservation of Agricultural Resources (CARA) Act 43 of 1993, as well as the NCNCA (Schedule 6). These are species that do not naturally occur in a given area and exhibit tendencies to invade that area, and others; at the cost of locally indigenous species. To govern the control of such species, NEMBA and CARA have divided weeds and invader species into categories. All declared weeds and invasive species recorded on site are listed in Table 5 of the ecological study, along with their categories according to CARA, NEMBA and NCNCA.

Table 5. A list of declared weeds and invasive species recorded in the study area.

Scientific name	Common name	CARA	NEMBA	NCNCA
Atriplex nummularia	Old man saltbush	2	2	S6
Nicotiana glauca	Tree Tobacco	1	1b	S6
Prosopis glandulosa	Honey mesquite	2	3	S6

Indicators of bush encroachment

Bush encroacher species are controlled in terms of Regulation 16 of CARA; where land users of an area in which natural vegetation occurs and that contains communities of encroacher indicator plants are required to follow sound practices to prevent the deterioration of natural resources and to combat bush encroachment where it occurs. No declared indicators of bush encroachment were recorded on site.

(8) *SURFACE WATER AND WETLANDS*

Dr. Betsie Milne from Boscia Ecological Consultants has been appointed by Mafisa Mining (Pty) Ltd to provide an ecological study in order to highlight the ecological characteristics of the proposed mining area and to determine the possible impact of mining on the diversity and ecological status of the application area. Surface water and wetlands was described and included in this report as part of the ecological study Appendix 4 attached to the report).

The National Water Act (36 of 1998) (NWA) provides a framework to protect water resources.

According to this Act, a water resource includes a watercourse, surface water, estuary, or aquifer; whereas a water course includes:

a) a river or spring,

b) a natural channel in which water flows regularly or intermittently,

c) a wetland, lake or dam into which, or from which, water flows, and

d) any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse.

Any reference to a watercourse includes its bed and banks and a water resource does not only include the water within the system, but also the entire water cycle; i.e. evaporation, precipitation, the habitats and processes.

The purpose of this Act (Section 2) is to ensure that the nation's water resources are protected, used, developed, conserved, managed and controlled in ways which take into account amongst other factors - (g) protecting aquatic and associated ecosystems and their biological diversity and (h) reducing and preventing pollution and degradation of water resources.

No activity may take place within a watercourse unless authorised by the Department of Water and Sanitation (DWS). Any area within a wetland or riparian zone is therefore excluded from development unless authorisation is obtained from the DWS in terms of Section 21 (c) and (i).

The Komaggas study area falls within the Coastal quaternary catchment F30F of the Lower Orange Water Management Area. This quaternary catchment has been allocated a Present Ecological State (PES) of 'Largely Natural' (B) by Smook et al. (2002) and information regarding its mean annual rainfall, evaporation potential and runoff is provided in Table 6.

Table 6. Catchment characteristics for the Coastal quaternary catchment in which the study area falls, as presented by Smook et al. (2002).

Quaternary catchment	Catchment Area (km^2)	Mean Annual Rainfall (mm)	Mean Annual Evaporation (mm)	Mean Annual Runoff (10^6 m^3)
F30F	1 469	112	2 200	0.56

The Buffels River is located 200 m north of the existing excavation as shown in Figure 21. The Buffels River is non-perennial and it is important to note that the mining programme in terms of this report is inward draining into the old excavation.

The episodic Komaggas River, a small drainage channel west of the old Trans-Hex plant, which has been protected from siltation from the Trans-Hex tailing ponds by:

- Cover of the tailings ponds (May 2001) by Trans-Hex and;
- Construction of proper storm water overflows in the weir of the Komaggas River in order that it can fulfill a full silt retention function and not affect the Buffelsbank River.

This dam previously provided supplementary water to the Trans-Hex plant operation and served as their clear water return dam during earlier mining.

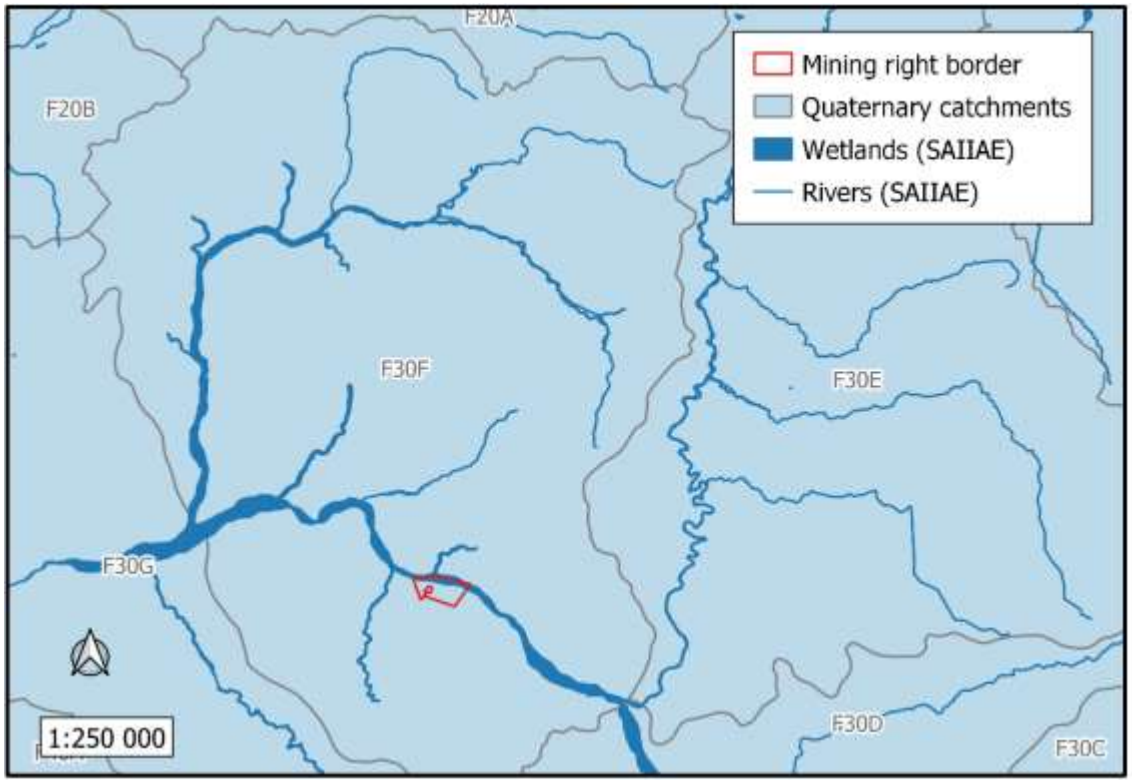


Figure 21. The locality of the proposed mining area in relation to the Coastal quaternary catchment of the Lower Orange Water Management Area.

According to the South African Inventory of Inland Aquatic Ecosystems (SAIIAE), the study area falls within the Namaqualand Hardeveld Bioregion, where less than 1 % (1 347 ha) of the land area is covered by inland wetlands, including depressions, seeps and valley-bottoms (Van Deventer et al. 2019). The spatial extent according to the present ecological status per wetland type is depicted in Table 7. Many of the depressions are still in natural or near-natural condition, but most of the seeps and valley-bottoms have been critically modified. The Buffels River, to the north of the study area, is largely natural. No wetlands occur on Komaggas, but the Sultanrivier, a small ephemeral tributary to the Buffels River, lies along the western boundary of the site. This river was not formally mapped or assessed by the SAIIAE.

Table 7. Percentage of inland wetland spatial extent according to the present ecological status per wetland type of the Namaqualand Hardeveld Bioregion.

Wetland type	Total Extent (%)	% Natural or near-natural (A/B)	% Moderately modified (C)	% Heavily to severely/critically modified (D/E/F)
Depression	6.8	59.1	9.6	31.4
Seep	32	10.2	1.5	88.3
Valley-bottom	61.3	13.5	-	86.5

Surface water Quality
The surface water quality (when it flows) is reported to be too saline for potable use.

Surface water use
Surface water in the weir is not utilized. While the surrounding commonage stock drink from the dam shortly after rains, they are provided with borehole water at stock watering points on the commonage as river water becomes to saline in remaining ponds in the dry periods.

Wetlands
No natural wetlands will be affected by the proposed mining operation as the portion of the proposed area within the Buffelsbank River bed and banks will not be mined.

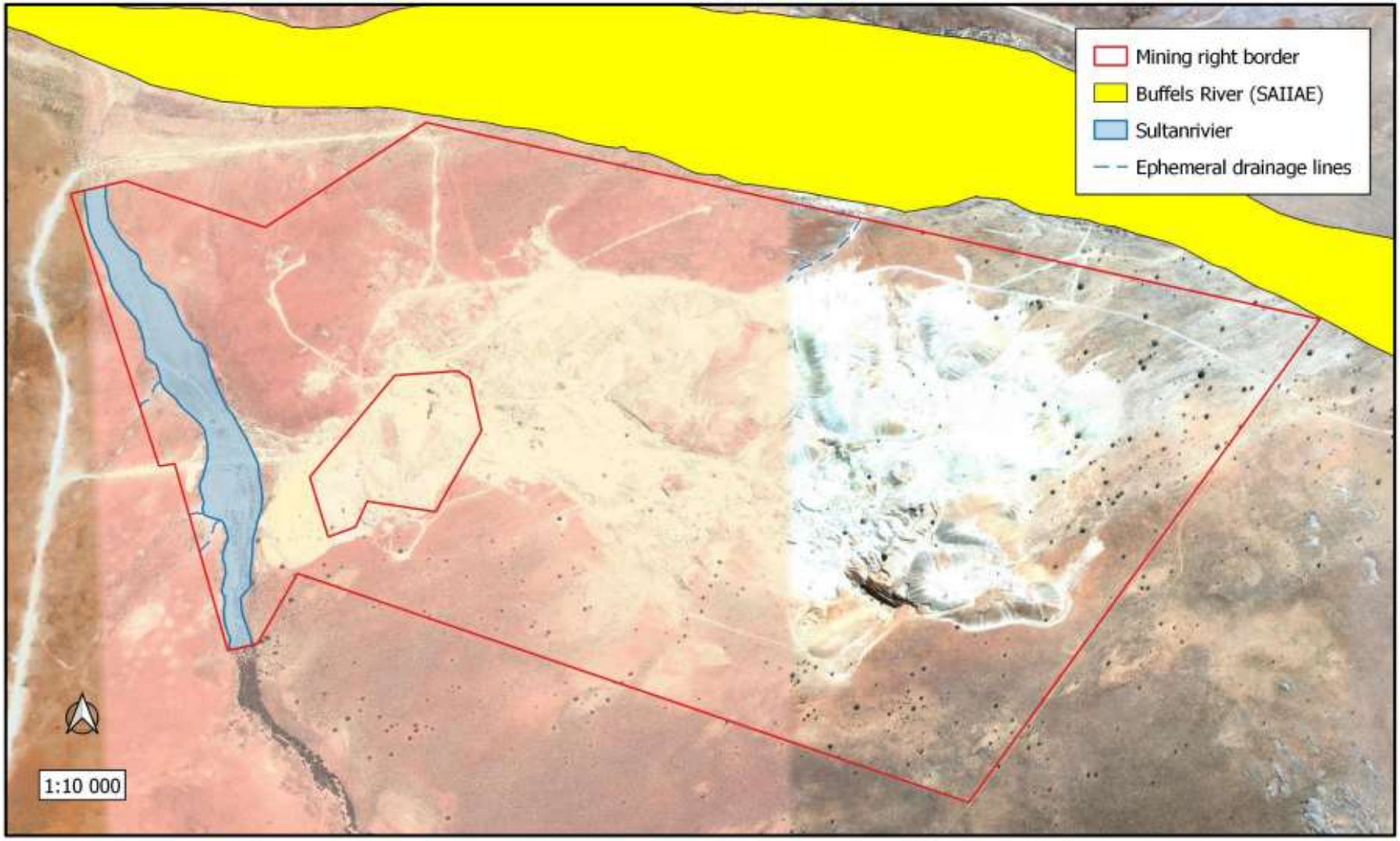


Figure 22. The location of SAIIAE wetlands and drainage lines on the proposed mining right area (Map Taken out of the ecological assessment study by Dr. Betsie Milne).

(9) *GROUND WATER:*

Underlying Aquifers

The groundwater is confined to two types of structures in the area. These are near-surface water above the bedrock below the aeolian soils. This source supplies water to the vegetation and is moved upwards through capillary forces. The second source occurs in fissure structures and is deeper seated. This is the main source of groundwater for agricultural purposes.

While there is a borehole on the site west of the Old Trans- Hex Plant, the depth to the water table is not known. Once mining commences the company will inspect the borehole and have pump tests conducted on it. If it is required to supplement the piped water, they will apply for recommissioning of this borehole to the Department of Water Affairs and Forestry.

Catchment and Process Water Demands

The site is located within Quaternary catchment F30F. This catchment is listed under Zone A of the Groundwater Taking Zones in the Revision of General Authorisations (GA) in Terms of Section 39 of the National Water Act, 1998 (DWAF 2004 & 2012). For Zone A, no water may be taken under GA except as set out under Schedule 11 (DWS, 2016).

Ground Water Quality

It is reported by previous mine employees to be too poor for potable use. Sampling of the water will be done as part of monitoring once mining commences.

(10) *CULTURAL AND HERITAGE RESOURCES:*

Dr. Edward Matenga from (AHSA) Archaeological and Heritage Services Africa Pty Ltd Consultants has been appointed by Mafisa Mining (Pty) Ltd to provide a Heritage Impact Assessment in order to highlight the heritage characteristics of the proposed mining area and to determine the possible impact of mining on the heritage status of the application area. (Appendix 5 attached to the report).

Heritage Impact Assessments are prescribed under Section 38(8) of the National Heritage Resources Act (No 25/1999) which requires that screening is undertaken for the possible occurrence of heritage resources that may be affected by the proposed mining, on the basis of which appropriate mitigation measures will be prescribed.

This report is based on ground survey undertaken on 5 September 2021.

Observations

No archaeological or historical relics were found except for a building complex from where the mine administration operated. The building frame stands, but the roof is missing. The building bears no important architectural elements and is therefore considered of low heritage value.

In the broader area around Springbok it has been observed that there is a sparse occurrence of archaeological finds which are generally expected to date to the Stone Age periods. There is little that remains of the original surface in a large western and northern part of the property due to opencast mining and the presence of large stockpiles of earth and stones. The south-eastern and eastern margins of the mining area which are untouched are occupied by dunes with a fairly deep red sand burden. If there were archaeological artefacts they are buried under the windblown sands.

Conclusion and Recommendations

No archaeological or historical relics of heritage value were observed in the footprint of the mine. The mining application can be considered in light of these findings. The study is mindful that some important discoveries during the excavations. If this happens operations should be halted, and the provincial heritage resources authority or SAHRA notified in order for an investigation and evaluation of the finds to take place.

Palaeontological

Prof Marion Bamford from (AHSA) Archaeological and Heritage Services Africa Pty Ltd Consultants has been appointed by Mafisa Mining (Pty) Ltd to provide a Palaeontological Impact Assessment in order to highlight the palaeontological characteristics of the proposed mining area and to determine the possible impact of mining on the Palaeontology status of the application area. (Appendix 6 attached to the report).

Since the Early Stone Age hundreds of thousands of years ago the constraints presented by the Karoo environs of Namakwaland have had a tight grip on the lifeway of indigenous communities. The communities in turn established an intimate relationship with the environment to the extent that on the basis of contemporary observations researchers have been able to reconstruct modes of existences thousands of years into the past. Historically the interior of Namaqualand is home to the Little Namaqua, a group of Khoikhoi herders with sheep and cattle and lived in encampments of mat/grass huts. The Little Namaqua are known to have moved seasonally with their livestock in a transhumance cycle between the Kamiesberg in the summer months and the Sandveld near the coast

in the winter months (Webley 1992). Due to the nomadic existence the Little Namaqua had no clearly defined territorial boundaries. The Trekboers took advantage of their migratory existence to settle in the area when loan farms were granted after 1750. The Little Namaqua eventually were relocated to `reserves' such as Leliefontein, Steinkopf, Kommaggas, Carolusberg, Concordia and the Richtersveld (ACRM 2016, pp16-17).

The above archaeological and historical synopsis forms the context for the identification of heritage resources in the study area.

Observations

No archaeological or historical relics were found except for a building complex from where the mine administration operated. The building frame without a roof is in a state of dereliction, and bears no important architectural elements.

In the broader area around Springbok it has been observed that there is a sparse occurrence of archaeological finds which are generally expected to date to the Stone Age periods. There is little that remains of the original surface in a large western and northern part of the property due to opencast mining and the presence of large stockpiles of earth and stones. The south-eastern and eastern margins of the mining area which are untouched are occupied by dunes with a fairly deep red sand burden. If there were archaeological artefacts they would be buried under the windblown sands.

CONCLUSION AND RECOMMENDATIONS

No archaeological or historical relics of heritage value were observed in the footprint of the mine. The mining application can be considered in light of these findings. The study is mindful that some important discoveries during the excavations. If this happens operations should be halted, and the provincial heritage resources authority or SAHRA notified in order for an investigation and evaluation of the finds to take place.

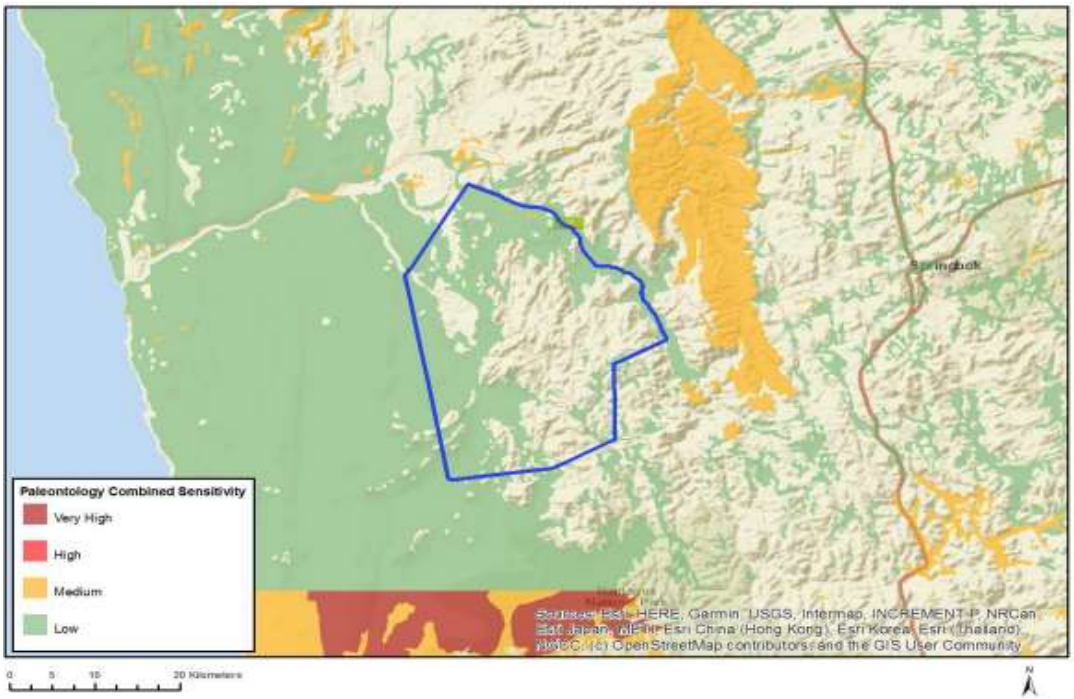


Figure 23. SAHRIS palaeosensitivity map for the site for the proposed MR application on the broader Komaggas area shown within the blue figure. Background colours indicate the following degrees of sensitivity: red = very highly sensitive; orange/yellow = high; yellow = moderate; green = low. (Map Taken off the screening tool done for the broader Komaggas area).

(11) ***AIR QUALITY:***

With reference to the Scheduled Processes under the Second Schedule to the Atmospheric Pollution Prevention Act, 1965 (Act No. 45 of 1965), no scheduled process relates to any proposed mining activity.

Existing Sources

The current source of air pollution in the area stems from numerous gravel roads and from vehicles travelling on the gravel roads of the area. No other significant sources of air- or dust pollution currently exist in the study area. Negligible amounts of exhaust fumes are emitted by the mining machinery and vehicles used on the farm.

New Source

The majority of dust will be deposited on the mining property itself as the soils and overburden consist mainly of heavier particles. Dust control measures are in place at the crushers, which will constitute the main source of fugitive dust.

Areas of Impact

As the prevailing wind direction for the area is north to north-west for the months January to September and changing from north to

sometimes westerly winds during October to December, there is neglible a potential for fall-out dust to impact on the surrounding farm properties, which can be described as the nearest potential area of impact. The dust management programme recommended should including daily dosing of acces roads and stockpile areas.

(12) *NOISE:*

Noise on site will come from the large vehicles (tip trucks, front-end loaders, back actors), from the working pans.

There are other mining operations located within proximity to the mining area. Although these operations do generate noise the overall impact can be described as negligible. It is further negated by very low resident population within earshot.

(13) *VISUAL ASPECTS:*

Due to previous mining in the area and the present unrehabilitated state of the workings, the area is not a tourist attraction. The aesthetics of the area would be negatively affected if large dumps (waste of slimes) were left at closure. The height and sloping of these dumps will have to be weighed against their actual footprint. The mine will be visible from the main road towards Kleinzee due to the size of the pit. The plant area, dumps and processing is within the pit and will not be visible to bypassing traffic.

(14) *BROAD-SCALE ECOLOGICAL PROCESSES:*

Dr. Betsie Milne from Boscia Ecological Consultants has been appointed by Mafisa Mining (Pty) Ltd to provide an ecological study in order to highlight the ecological characteristics of the proposed mining area and to determine the possible impact of mining on the diversity and ecological status of the application area. Critical biodiversity areas and broad scale processes was described and included in this report as part of the ecological study Appendix 4 attached to the report).

The proposed mining site falls within critical biodiversity areas, as defined by the Northern Cape Critical Biodiversity Areas Map (Holness and Oosthuysen 2016). This map identifies biodiversity priority areas, called Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs), which, together with protected areas, are important for the persistence of a viable representative sample of all ecosystem types and species as well as the long-term ecological functioning of the landscape. The Buffels River and its local catchment is classified as

Critical Biodiversity Area One, while the remaining pristine habitats on the mining right area is classified as Other Natural Areas.

Similarly, the Mining and Biodiversity Guidelines (DENC et al. 2013) recognises the Buffels River and its broader catchment to be of Highest Biodiversity Importance, which constitute a high risk for mining. The remainder of the site is classified to have Moderate Biodiversity Importance. These guidelines were developed to identify and categorize biodiversity priority areas sensitive to the impacts of mining to support mainstreaming of biodiversity issues in decision making in the mining sector.

Furthermore, according to the National Web based Environmental Screening Tool the study area is considered to have sensitive environmental features. This tool is a geographically based web-enabled application which allows a proponent intending to apply for environmental authorisation in terms of the Environmental Impact Assessment (EIA) Regulations 2014 (as amended), to screen their proposed site for any environmental sensitivity. According to this, the Komaggas study area is of medium sensitivity based on the Plant- and Animal Species Themes. These sensitivities are attributed to the number of specialised, sensitive and protected plant- and animal species found in these habitats, as discussed in sections 3.4 and 3.5 respectively. The study site is further considered to be of very high sensitivity bases on the Aquatic- and Terrestrial Biodiversity Themes. The aquatic sensitivity is attributed to the Buffels River and its catchment area, while the terrestrial sensitivity is a direct function of the Critical Biodiversity Areas One according to the Northern Cape Critical Biodiversity Areas Map.

According to the Strategic Environmental Management Plan for the Namakwa District Municipality (2011) the study area falls within their Environmental Management Zones: B – Very High, which includes several environmentally sensitive features. Development cannot be excluded where compelling economic and social benefits will be derived, but all legislative requirements should be adhered to, and all biophysical receptors should be considered.

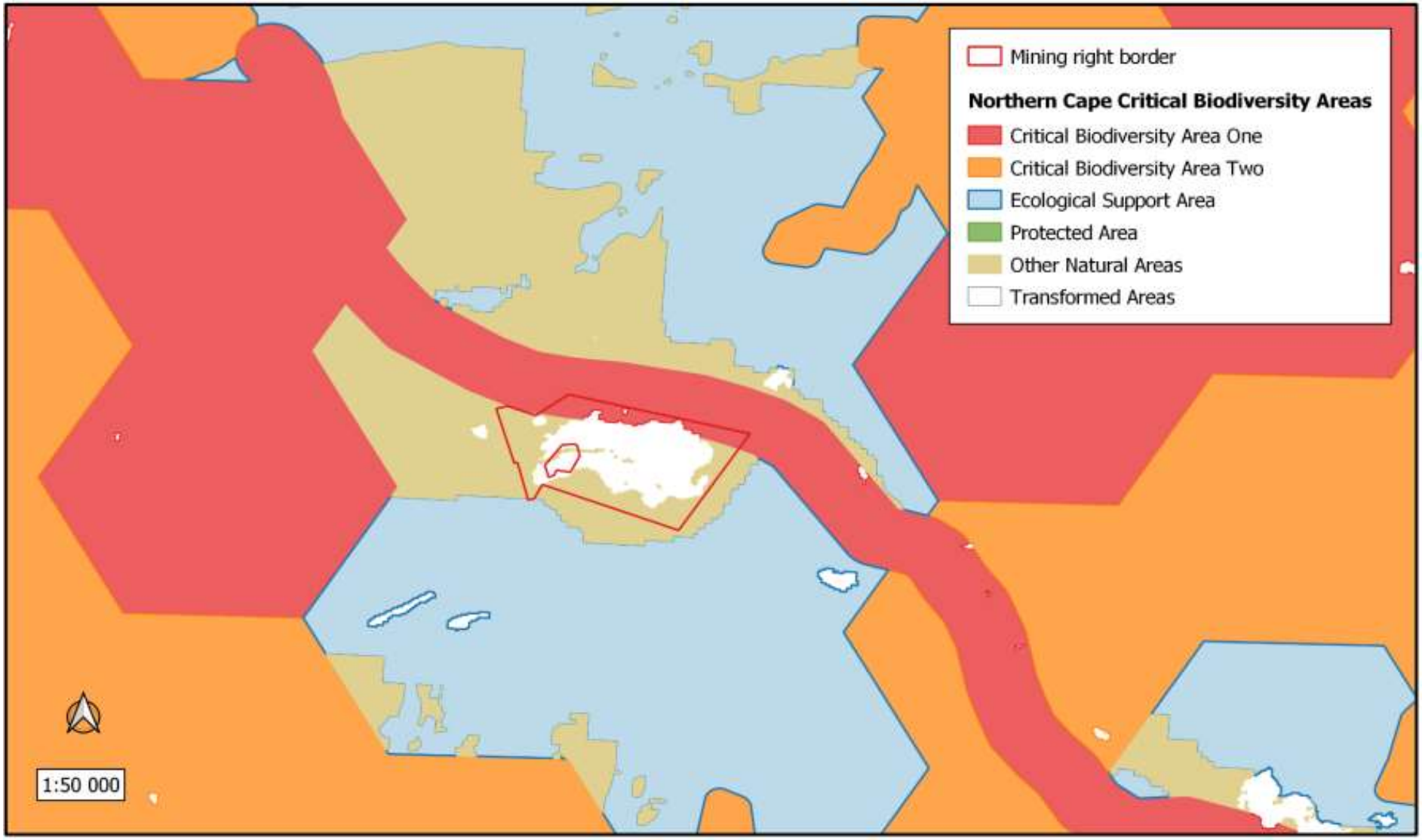


Figure 24. The study area in relation to the Northern Cape Critical Biodiversity Areas (Map Taken out of the ecological assessment study by Dr. Betsie Milne).

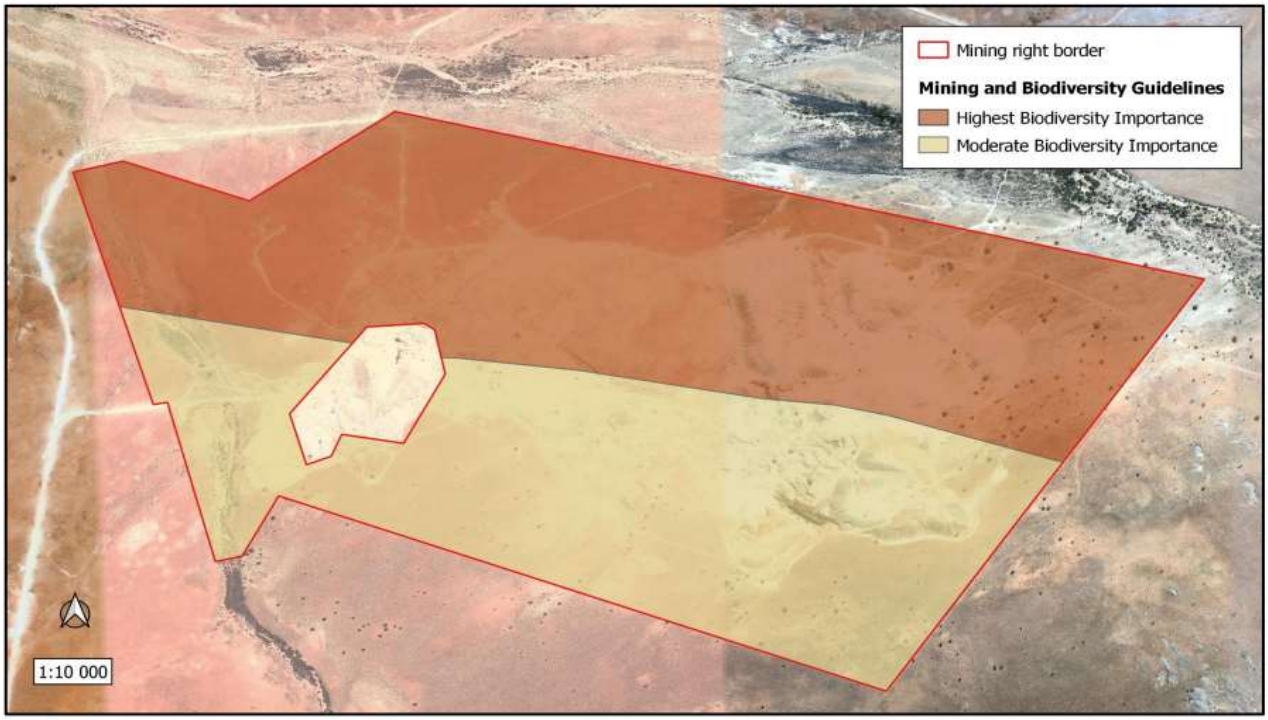


Figure 25. The study area in relation to the Mining and Biodiversity Guidelines (Map Taken out of the ecological assessment study by Dr. Betsie Milne).

The Komaggas application area also falls within the Greater Richtersveld Priority Area of the Succulent Karoo Ecosystem Plan (SKEP). The SKEP is a bi-national initiative, between South African and Namibia, with the aim of promoting the conservation of biodiversity and sustainable landuse in the Succulent Karoo biodiversity hotspot. The Greater Richtersveld Priority Area has the highest succulent and lichen diversity in the world, which is being threatened by overgrazing, diamond mining, illegal harvesting, poaching, and off-road vehicles.

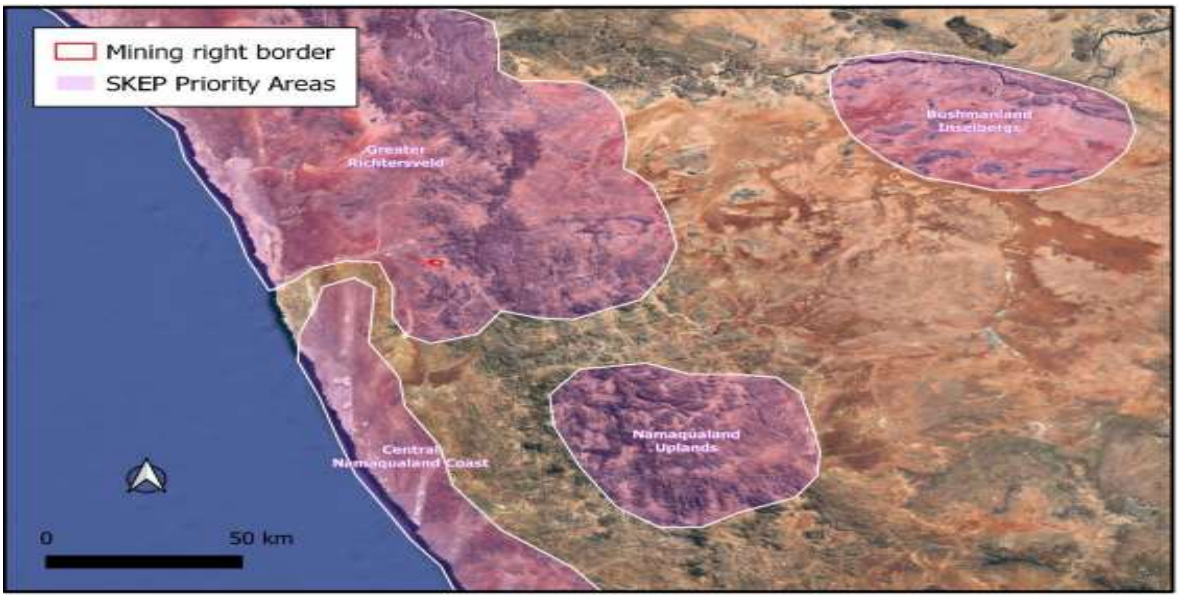


Figure 26. SKEP Priority Areas in the Northern Cape.

Furthermore, the study area falls within the Namaqualand Hardeveld Centre of the Greater Cape Floristic Region (Snijman 2013) (Figure 23). The Namaqualand Hardeveld Centre has been recognised as a centre of endemism. A centre of plant endemism is an area with high concentrations of plant species with very restricted distributions, known as endemics. They are extremely vulnerable; relatively small disturbances in a centre of endemism may easily pose a serious threat to its many range restricted species. The Namaqualand Hardeveld Centre has the largest flora (1 513 species) with the highest degree of species endemism (12.1%) in the Greater Cape Floristic Region.

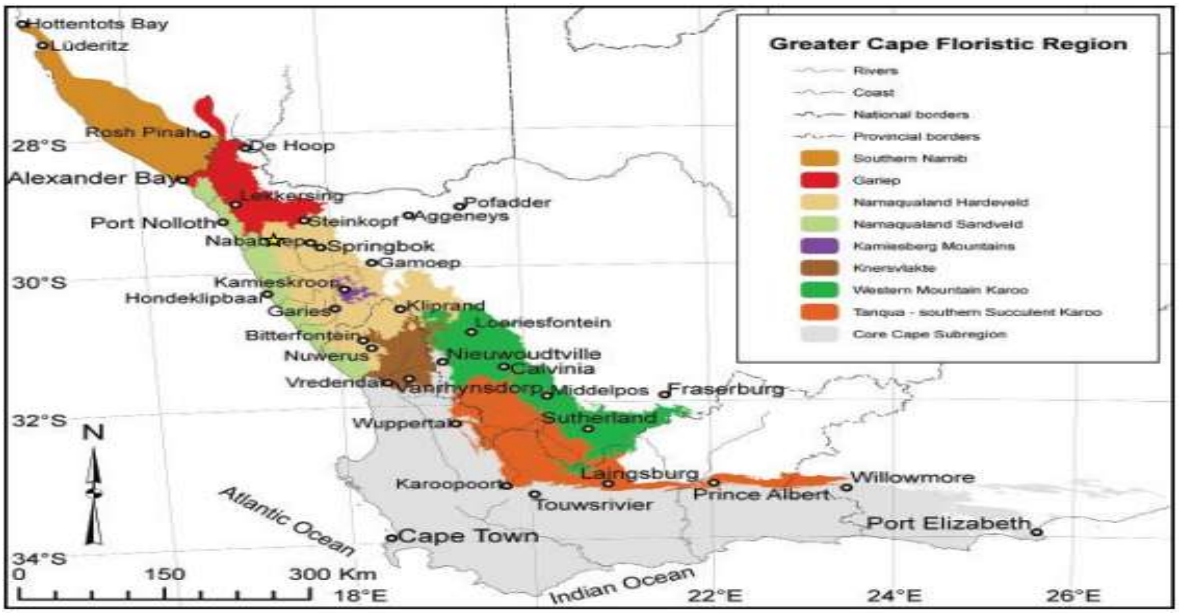


Figure 27. The study area (yellow star) in relation to the Greater Cape Floristic Region (Snijman 2013).

Finally, mining is one of the major sectors within the Namakwa District Municipalities, with current and historic activities already impacting indigenous vegetation in the region (Figure 24). These factors increase the proposed operation's cumulative impacts.

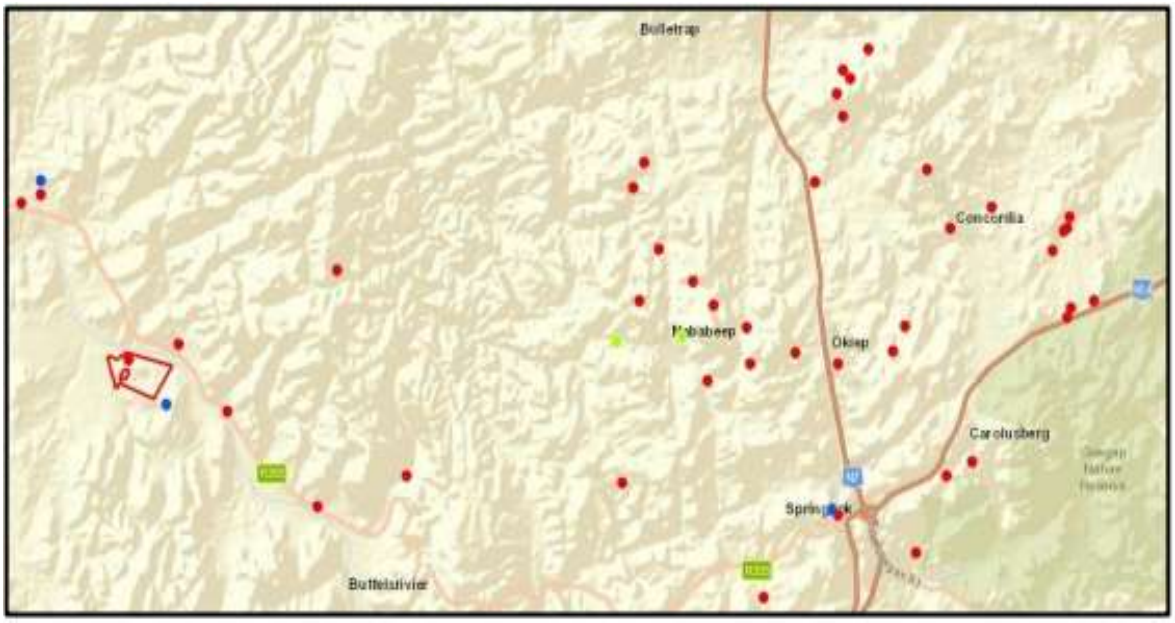


Figure 28. The extent of past (red) and present (blue) mining activities in the Springbok region.

Site sensitivity

The ecological sensitivity map for Komaggas is illustrated in Figure 29. The Sultanrivier and all drainage lines are considered to be of very high sensitivity. They are highly sensitive due to their vital ecological and hydrological functionality and significance. All watercourses are also unique habitats protected in terms of the National Water Act (Act No 36 of 1998). These areas should be considered as no-go areas.

The pristine terrestrial habitats on site harbour a number of very specialised, sensitive, protected endemic plants and provides potential habitat for protected bird-, reptile-, and invertebrate species. Therefore, it is of high sensitivity. It is not regarded as a no-go area, but activities should proceed with caution as it may not be possible to mitigate all impacts appropriately.

The areas transformed by past mining activities are considered to have low ecological sensitivity. There is likely to be a negligible impact on ecological processes and biodiversity here and therefore most types of activities can proceed within these areas with little ecological impact.

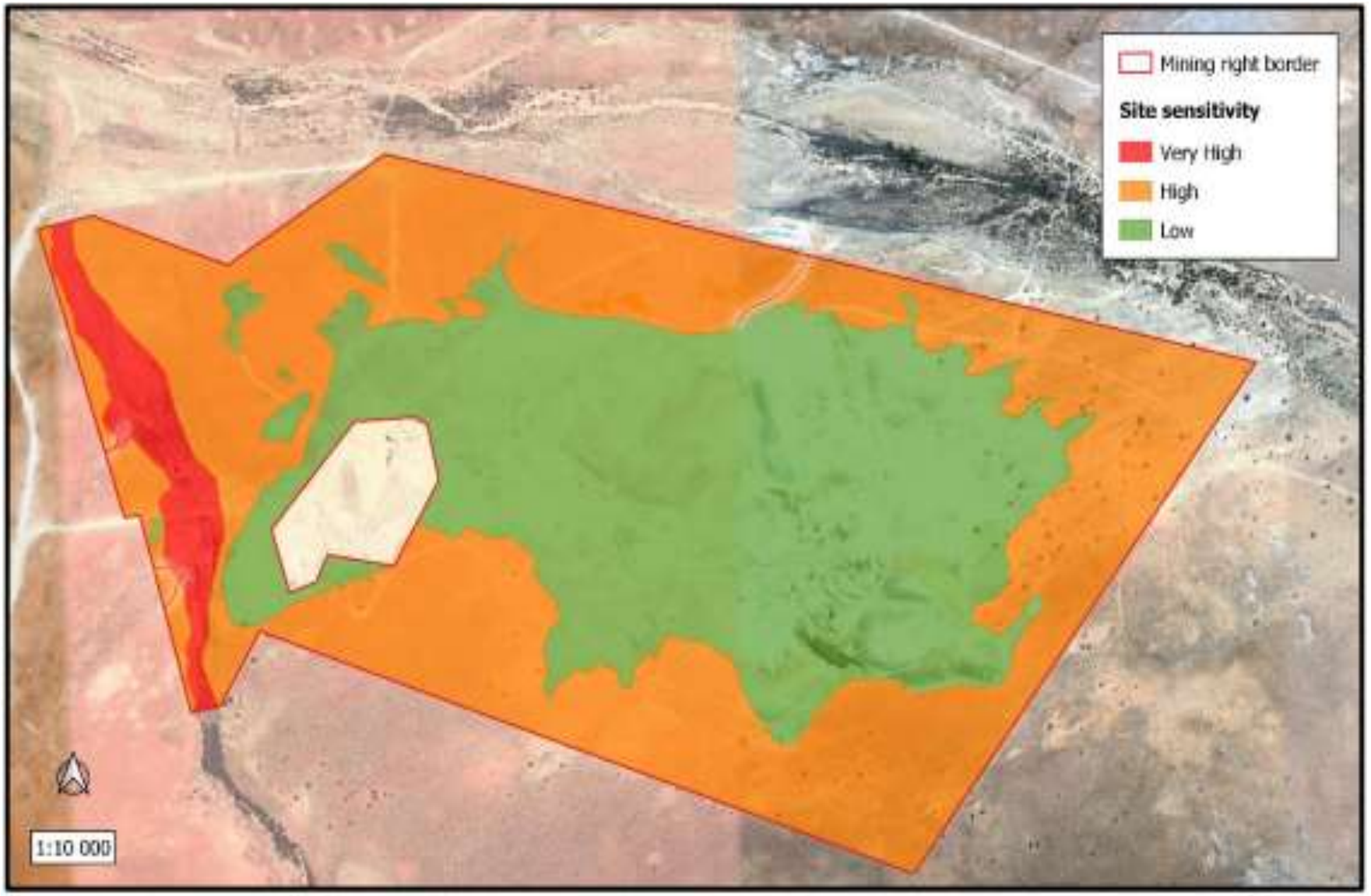


Figure 29. A sensitivity map for the Komaggas mining area. (Map Taken out of the ecological assessment study by Dr. Betsie Milne).

(15) *SOCIO-ECONOMIC STRUCTURE OF THE REGION:*

Population Density, Growth and Location

The Northern Cape is geographically the largest province in South Africa having a land mass increased from 361,830 km² to 373,239 km² with the introduction of the new provincial boundaries and covers approximately one third of the country's surface area.

The Northern Cape is divided into five district councils, namely Namakwa, Siyanda, Pixley ka Seme, Frances Baard and Kgalagadi. These district councils are made up of 27 local Municipalities. The province also has five district management areas.

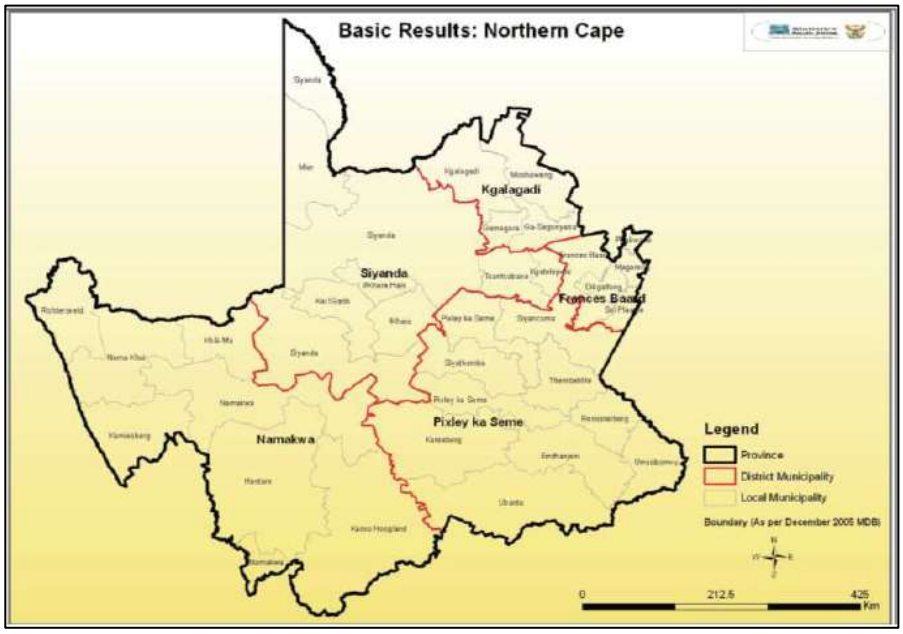


Figure 30. Local Municipal areas in the Northern Cape Province map taken out of the IDP.

The Northern Cape Province is the Province with the lowest population in South Africa with only 2.2% of the total population. The Namakwa District is also the District in the Northern Cape Province with the lowest population in 2016 namely 115 488 people. This is a slight decline from the 2011 census figure of 115 842 and is the least populated district in the province (and Country, although geographically the largest) with a population comprising 10% of the Provincial total population.

Nama Khoi Municipality is the economic hub of the District with the highest population followed by the Hantam Municipality. There was however a slight decline in the populations of Nama Khoi Municipality, Kamiesberg Municipality and Hantam Municipality whilst the population of the other three Municipalities increased marginal.

All information in this section is taken out of the NAMA KHOI MUNICIPALITY: INTEGRATED DEVELOPMENT PLAN – 2017 – 2022.

The demographic information provided below indicates the state of population and the development since 1996 to 2016.

Table 8: Population by sex, 1996-2016

1996			2001			2011			2016*		
Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
21 446	22 395	43 841	22 099	22 801	44 900	23 215	23 826	47 041	22 835	23 677	46 512

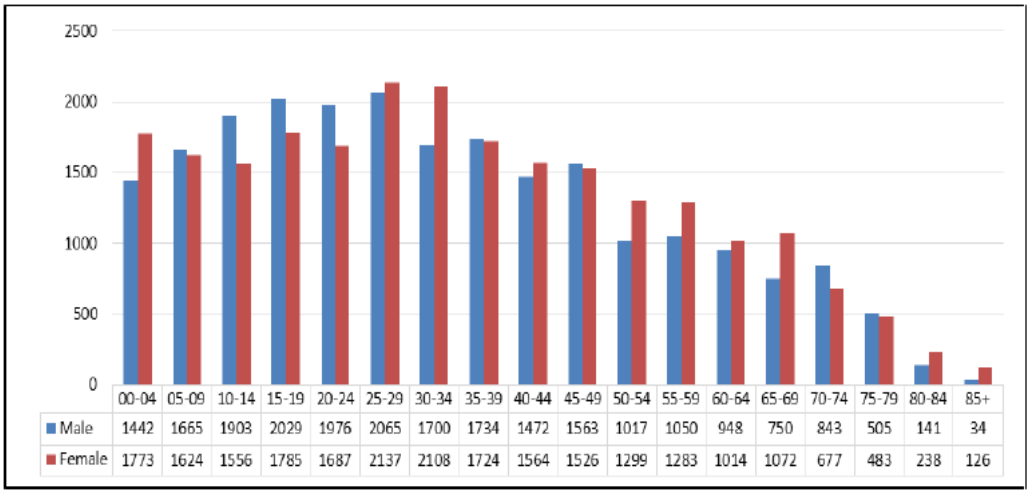
Table 8 shows that the population of Nama Khoi has increased from 43 841 persons in 1996 to 46 512 persons in 2016. The number of males increased by 1 389 persons from 21 446 persons in 1996 to 22 835 persons in 2016, whilst the number of females increased by 1 282 persons over the same period. Gender proportions show that there are more females than males in the municipality.

POPULATION AND POPULATION GROWTH

Table 9 summarizes the population for Nama Khoi by five-year age groups and sex. It shows a general increase in the population for the age groups over the period 1996 to 2016, with the exception of the younger ages 0 to 19, where a decrease in the population is observed. The number of elderly persons aged 65 years and above increased significantly over this period.

Table 9: Population in 5 year age groups and sex, 1996-2016

	1996			2001			2011			2 016		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
00 - 04	2 241	2 175	4 416	1 992	1 932	3 925	1 968	1 789	3 757	1 442	1 773	3 215
05 - 09	2 334	2 282	4 615	2 187	2 136	4 323	1 966	1 830	3 795	1 665	1 624	3 290
10 - 14	2 329	2 485	4 814	2 341	2 304	4 645	2 137	2 009	4 146	1 903	1 556	3 459
15 - 19	2 340	2 320	4 660	2 208	2 304	4 511	2 319	2 128	4 447	2 029	1 785	3 813
20 - 24	1 795	1 743	3 539	1 896	1 774	3 669	1 839	1 773	3 613	1 976	1 687	3 663
25 - 29	1 715	1 849	3 564	1 877	1 686	3 562	1 715	1 735	3 450	2 065	2 137	4 202
30 - 34	1 533	1 748	3 281	1 766	1 790	3 556	1 641	1 677	3 318	1 700	2 108	3 808
35 - 39	1 399	1 526	2 925	1 531	1 636	3 167	1 613	1 622	3 234	1 734	1 724	3 457
40 - 44	1 292	1 413	2 705	1 394	1 509	2 903	1 568	1 778	3 346	1 472	1 564	3 036
45 - 49	1 070	1 137	2 207	1 325	1 440	2 765	1 456	1 592	3 047	1 563	1 526	3 090
50 - 54	908	954	1 862	1 052	1 107	2 159	1 291	1 425	2 716	1 017	1 299	2 316
55 - 59	762	740	1 502	836	908	1 744	1 137	1 276	2 413	1 050	1 283	2 333
60 - 64	535	597	1 132	656	756	1 412	890	1 002	1 892	948	1 014	1 962
65 - 69	384	454	838	426	569	994	671	799	1 471	750	1 072	1 821
70 - 74	216	327	543	303	376	679	500	576	1 076	843	677	1 520
75 - 79	169	227	396	144	259	403	257	393	650	505	483	987
80 - 84	120	178	298	105	162	267	137	241	378	141	238	379
85+	76	129	205	61	153	214	110	183	293	34	126	160
Unspecified	228	109	338	-	-	-	-	-	-	-	-	-
Total	21 446	22 393	43 840	22 100	22 801	44 898	23 215	23 828	47 042	22 837	23 676	46 511



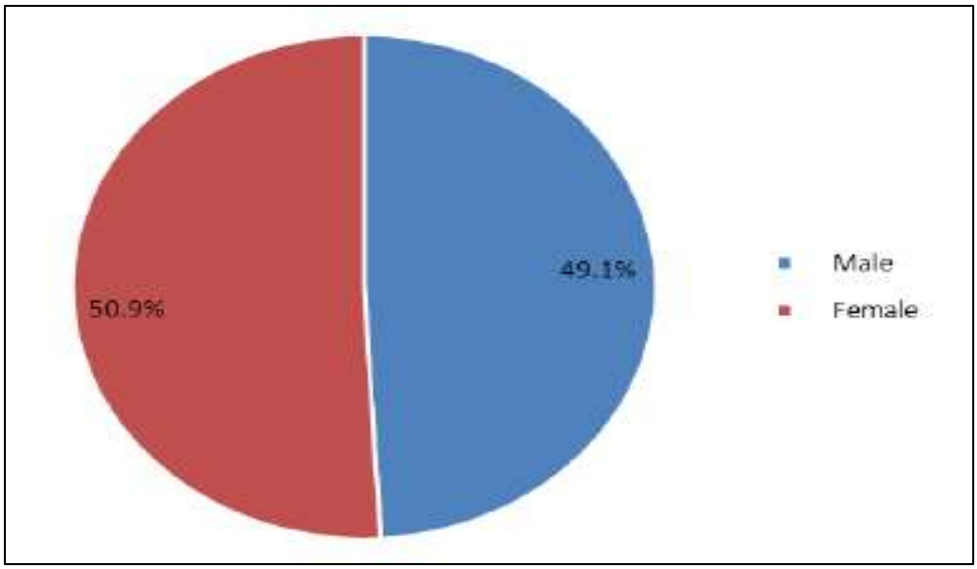
	00-04	05-09	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85+
Male	1442	1665	1903	2029	1976	2065	1700	1734	1472	1563	1017	1050	948	750	843	505	141	34
Female	1773	1624	1556	1785	1687	2137	2108	1724	1564	1526	1299	1283	1014	1072	677	483	238	126

Graph 1: Distribution of the total population by age group and sex, 2016.

Graph 1 indicates that the greater proportion of the population in Nama Khoi is young, consisting mainly of children and youth. There is however a greater proportion of males compared to females for ages from 5 to 24 years, and the female population shows a slightly greater proportion in numbers compared to males for the ages of 50 years and above. This signifies a greater lifespan for females than males.

SEX RATIO AND GENDER

The sex ratio is one of the key measures of sex composition. It gives the number of males for every 100 females. If it is above 100, it shows the predominance of males over females; conversely when it is lower than 100, the reverse is true. Generally, sex ratios at birth are high and decrease gradually as age increases. As seen in graph 2 below 50.9% of the Nama Khoi Municipalities population consists out of females and 49.1% consists of males.



Graph 2: Percentage distribution of the population in Nama Khoi by sex, 2016.

EDUCATION

Table 10 shows an improvement in the level of education in Nama Khoi over the period 1996 to 2016, where there was a decline in the number and proportion of persons aged 20 years and above with no schooling (from 11.1% to 1.5%). It shows an increase in the proportion of persons with a higher education, from 4.7% in 1996 to 7.2% in 2016. There is a significant increase in the proportion of persons who have grade 12/standard 10.

Table 10: Education

Year	No schooling	Some Primary	Complete Primary	Some Secondary	Grade 12/Std 10	Higher	Total
Number							
1996	4 277	11 509	4 381	13 175	3 210	1 814	38 366
2001	2 632	12 256	4 563	14 851	4 873	1 801	40 975
2011	991	11 275	4 149	16 550	6 472	2 381	41 818
2016	467	3 913	2 795	14 338	7 713	2 258	31 485
Percent (%)							
1996	11.1	30.0	11.4	34.3	8.4	4.7	100.0
2001	6.4	29.9	11.1	36.2	11.9	4.4	100.0
2011	2.4	27.0	9.9	39.6	15.5	5.7	100.0
2016	1.5	12.4	8.9	45.5	24.5	7.2	100.0

HOUSEHOLDS

There are 14 547 households in the Nama Khoi District in 2016. Table 11 shows that the total number of households in Nama Khoi increased by 4 818 households over the period 1996 to 2016, from 9 729 to 14 547. It shows a significant increase in the number of three-person households, from 1 610 in 1996 to 3 196 in 2016.

Table 11: Number of household by household size, 1996-2016

	1	2	3	4	5	6	7	8	9	10+	Total
1996	1 143	1 395	1 610	1 940	1 474	861	485	288	316	217	9 729
2001	2 550	1 912	1 975	2 224	1 423	885	475	274	175	272	12 165
2011	2 814	2 726	2 433	2 439	1 313	760	435	236	125	181	13 462
2016	2 301	2 932	3 196	2 735	1 770	743	408	147	133	182	14 547

Table 11 shows an increase in the proportion of households staying in formal dwellings in Nama Khoi. Households occupying formal dwellings increased by 3.4% from 90.2% in 1996 to 93.6% in 2016. It shows a decrease in the proportion in the proportion of informal dwellings, from 3.6% in 1996 to 1.5% in 2016. The proportion of traditional dwellings increased over this period.

Table 12: Type of dwelling occupied by household, 1996-2016

	Formal dwelling	Informal dwelling	Traditional dwelling	Other	Total
1996	90.2	3.6	3.4	1.4	100.0
2001	79.7	3.8	6.2	0.8	100.0
2011	92.8	2.6	1.0	1.6	100.0
2016	93.6	1.5	3.6	1.3	100.0

HOUSEHOLD DYNAMICS

A significant increase in the number of female-headed households when compared to male-headed households in Nama Khoi over the period 1996 to 2016 can be seen in Table 13. Female-headed households increased from 3 069 in 1996 to 5 965 in 2016, whilst those headed by females increased from 6 616 in 1996 to 8 582 in 2016

Table 13: Household head by sex, 1996-2016

	1996	2001	2011	2016
Male	6 616	7 714	8 177	8 582
Female	3 069	4 419	5 263	5 965
Total	9 685	12 133	13 440	14 547

HOUSEHOLD SERVICES

An increase in the proportion of households in Nama Khoi municipality whose refuse is removed weekly can be seen in Table 14. The increase is from 79.0% in 1996 to 89.2% in 2016. It also shows a decrease in the proportion of households that have no rubbish disposal.

Table 14: Type of refuse removal used by households, 1996-2016

	Removed by local authority at least once a week	Removed by local authority less often	Communal refuse dump	Own refuse dump	No rubbish disposal	Other	Total
1996	79.0	4.2	0.8	13.0	3.0	0.1	100.0
2001	86.4	0.7	0.6	9.9	2.4	0.0	100.0
2011	89.0	0.3	0.1	7.9	2.2	0.5	100.0
2016	89.2	3.8	0.6	4.3	0.8	1.3	100.0

The sanitation facilities used by households in the Nama Khoi municipality can be seen in Table 15 below. Table 15 shows an increase in the proportion of households that use a flush or chemical toilet in Nama Khoi, from 45.7% in 1996 to 83.0% in 2016. There is a decrease in proportion of households using a pit latrine toilet, from 13.3% in 1996 to 12.7% in 2016. There is a decrease in the proportion of households using a bucket latrine between 1996 and 2016.

Table 15: Type of sanitation facilities used by household, 1996-2016

	Flush or chemical	Pit latrine	Bucket latrine	None of the above	Total
1996	45.7	13.3	33.8	6.8	100.0
2001	71.3	5.9	16.4	6.4	100.0
2011	75.9	16.8	1.2	5.9	100.0
2016	83.0	12.7	1.7	2.1	100.0

The energy sources used by households in the Nama Khoi municipality can be seen in the table below (Table 16). Table 16 shows an increase in the proportion of households using electricity connected to the mains for lighting in Nama Khoi local municipality, from 71.8% in 1996 to 97.2% in 2016. It shows a significant

decrease in households that use candles as the main source of energy for lighting.

Table 16: Main source of energy used for lighting, 1996-2016

	Electricity from mains	Gas	Paraffin	Candles	Solar	Other	Total
1996	71.8	0.2	4.1	23.9	0.0	0.0	100.0
2001	85.8	0.3	1.4	11.8	0.5	0.3	100.0
2011	93.6	0.1	0.4	5.1	0.7	0.0	100.0
2016	97.2	0.0	0.1	1.8	0.9	0.1	100.0

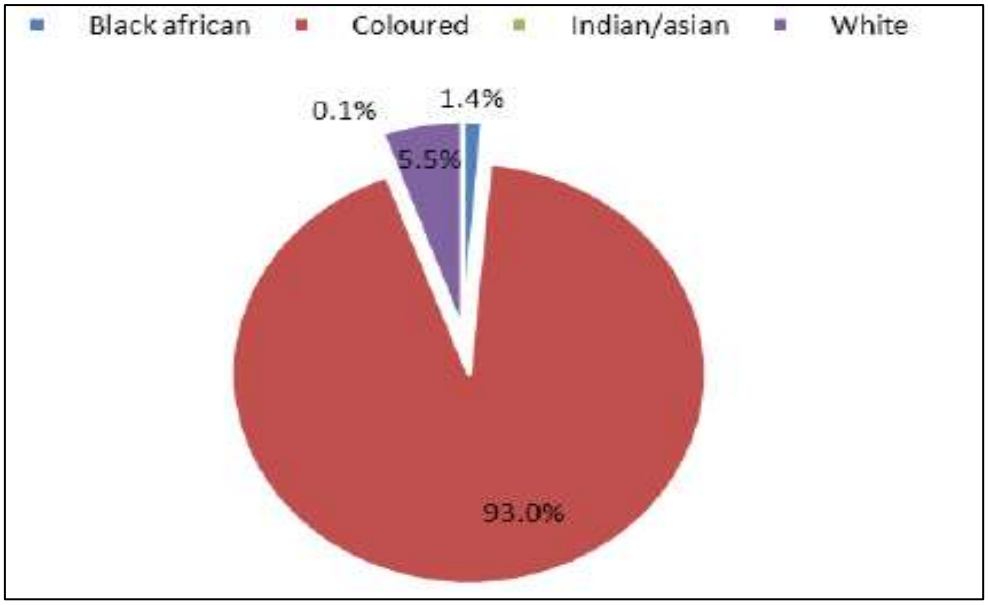
POPULATION GROUPS

Table 17 summarizes the number of persons by population group from 1996 to 2016. There was an increase in the Coloured population over the period 1996 to 2016, whilst the Black African, White and Indian/Asian population shows a decline over the same period. There is a decrease however in the White population over the 20 year period.

Table 17 – Population group

	1996	2001	2011	2016
Black African	961	1 273	1 959	663
Coloured	37 541	39 452	41 425	43 243
Indian or Asian	29	55	219	27
White	4 814	4 120	3 084	2 580
Other	-	-	353	-
Unspecified	496	-	-	-
Total	43 841	44 900	47 041	46 513

Graph 3 below outlines the percentage distribution of the population of Nama Khoi in 2016, where the Coloured population group accounts for 93.0% of the population in the municipality, followed by the White, Black African and the Indian/Asian population groups respectively.



Graph 3: Percentage distribution by population group type, Nama Khoi, 2016.

LANGUAGES SPEAK

The table below (Table 18) shows that Afrikaans is the most dominant language in Nama Khoi with 98.9% of the population indicating that this was the language most often spoken in the home. This is followed by English with 0.5% and IsiXhosa with 0.4%. Other languages spoken in the Nama Khoi district includes sign language, Sepedi and Setswana.

Table 18 – Language

Language spoken in household	Number	Percentage (%)
Afrikaans	45 315	98.9
English	218	0.5
IsiXhosa	186	0.4
Setswana	38	0.1
Sepedi	31	0.1
Sign language	13	0.0
Other	3	0.0
Total	**45 805**	**100.0**

(b) Description of the current land uses

(1) *Land Use:*

The major land uses in the area are mining, agriculture, and tourism. According to AGIS, the land capability of the study site is non-arable with low potential grazing land. The grazing capacity is 72 ha/LSU, with the agricultural region being demarcated for sheep farming. The study area also falls within the Great Karoo Small stock Livelihood Zone.

Apart from the proposed mining activities, the mining right application area is used as natural pastures for livestock grazing and the area along the river is utilised for crop irrigation. There is also a community settlement, guesthouse, and convenience store on the property. Existing infrastructure includes several homesteads and farm buildings, pivots, old ostrich camps, a public gravel road, farm tracks and mining infrastructure. Besides the alluvial diamond deposits, other minerals known to occur here include Jasper and Agate.

(2) Evidence of Disturbance: -

Current mining activities have caused a degree of disturbance in the area however, this impact can be mitigated through effective rehabilitation during the mining operation.

(3) Existing Structures: -

Apart from the proposed mining activities, the mining right application area is used as natural pastures for livestock grazing and the area along the river is utilised for crop irrigation. There is also a community settlement, guesthouse, and convenience store on the property. Existing infrastructure includes several homesteads and farm buildings, pivots, old ostrich camps, a public gravel road, farm tracks and mining infrastructure. Besides the alluvial diamond deposits, other minerals known to occur here include Jasper and Agate.

(c) Description of specific environmental features and infrastructure on the site

The infrastructure on site comprehensively discussed in section d(ii) as part of the mining methodology discussion, as well as in section g as part of the mine footprint description. Furthermore, a comprehensive description of the environment was presented in section (i) as part of the baseline report.

(d) Environmental and current land use map

(Show all environmental, and current land use features)

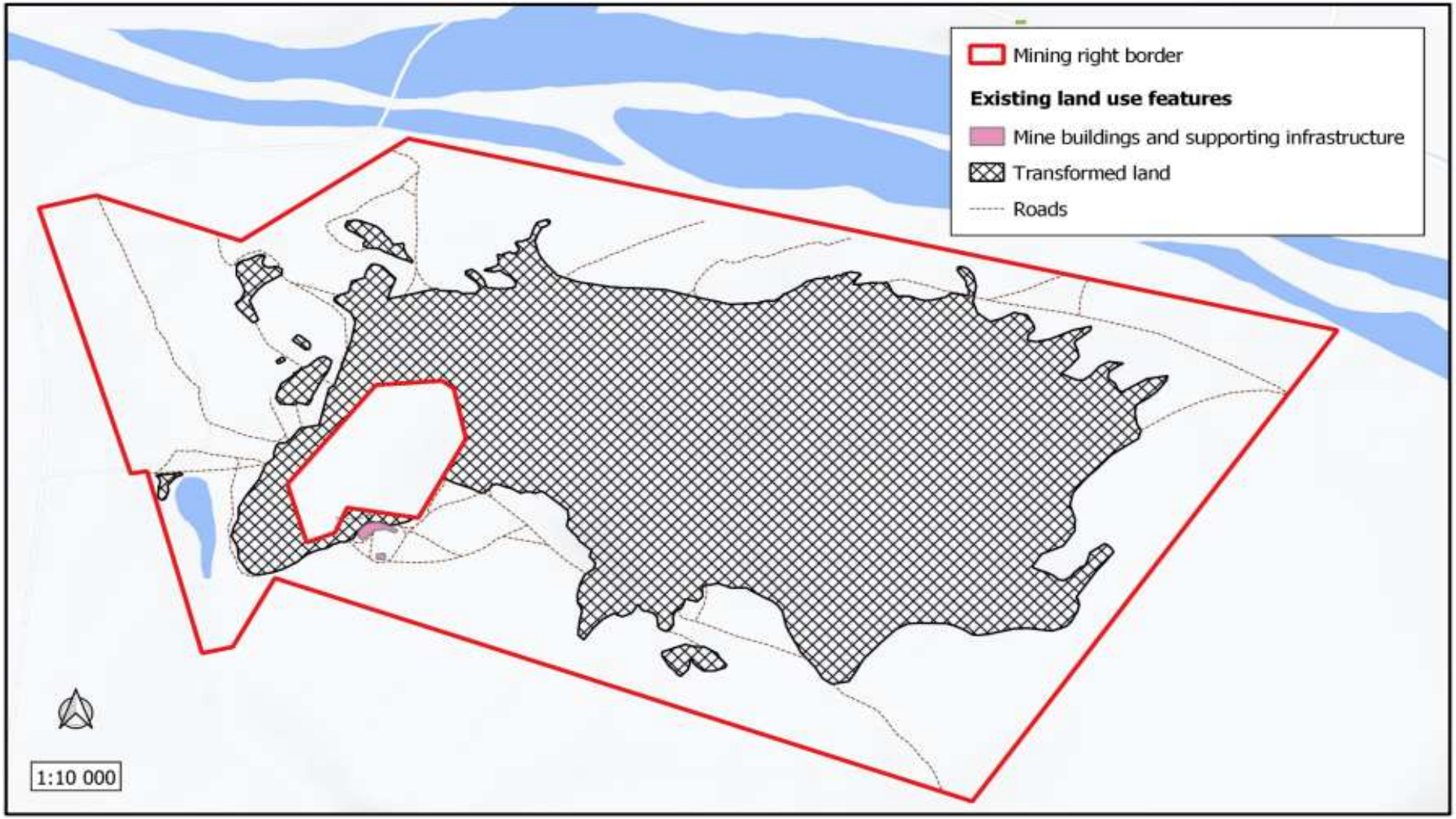


Figure 31. Evidence of existing infrastructure and past disturbances in the study area(Map Taken out of the ecological assessment study by Dr. Betsie Milne).

v) Impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts

(Provide a list of the potential impacts identified of the activities described in the initial site layout that will be undertaken, as informed by both the typical known impacts of such activities, and as informed by the consultations with affected parties together with the significance, probability, and duration of the impacts. Please indicate the extent to which they can be reversed, the extent to which they may cause irreplaceable loss of resources, and can be avoided, managed or mitigated)

Environmental Factor	Nature of Impact	Significance	Probability	Duration	Consequence Extent	Management / mitigation
PHYSICAL						
Geology and Mineral Resource	Sterilisation of mineral resources	Low	Highly unlikely	Operational and Decommissioning	insignificant Local	Ensure that optimal use is made of the available mineral resource.
Topography	Changes to surface topography During clearing of an area for the excavation of minerals, construction of infrastructure and roads, stockpiling, natural events.	Medium-High	Possible frequently	Decommissioning	Medium On-site	• Mining of all alluvial gravels continuously, if possible and does not influence mining and safety requirements. • Employ effective rehabilitation strategies to restore surface topography of excavations, dumps and plant site. • Stabilise the mine residue deposits. • All temporary infrastructures should be demolished during closure.
Soils	Soil Erosion During clearing of an area for the excavation of minerals,	Low-Medium	Possible frequently	Decommissioning	Medium Local	• Bare ground exposure should be minimised at all times in terms of the surface area and duration. • Re-establishment of plant cover on disturbed areas must take place as soon as possible,

	construction of infrastructure and roads, stockpiling, natural events.					once activities in the area have ceased. • No new roads, infrastructure or mining areas should be developed over watercourses, including drainage lines. • Disturbances during the rainy season should be monitored and controlled. • Any potential run-off from exposed ground should be controlled with flow retarding barriers. • Regular monitoring during the mining operation should be carried out to identify areas where erosion is occurring; followed by appropriate remedial actions.
	Nature of Impact	Significance	Probability	Duration	Consequence Extent	Management / mitigation
	Loss of soil fertility During clearing of an area for the excavation of minerals, construction of infrastructure and roads, stockpiling.	Medium High	Certain for life of operation	Residual	Low-Medium On-site	• Topsoil needs to be removed and stored separately during mining and the construction of roads, infrastructure and stockpile areas. • These topsoil stockpiles must be kept as small as possible in order to prevent compaction and the formation of anaerobic conditions.

						• Topsoil must be stockpiled for the shortest possible timeframes to ensure that the quality of the topsoil is not impaired. • Topsoil must not be handled when the moisture content exceeds 12 %. • Topsoil stockpiles must by no means be mixed with sub-soils. • The topsoil should be replaced as soon as possible on to the disturbed areas, thereby allowing for the re-growth of the seed bank contained within the topsoil. • For restoration of the affected areas without topsoil, soils can be sourced from other sustainable areas and chemically changed to match with the surrounding environment. • To restore areas where compacted soil occur, a ripper blade or deep plow can be pulled across the affected area to alleviate compaction. • Encourage the growth of natural plant species in all affected areas by sowing

						indigenous seeds or by planting seedlings.
	Nature of Impact	Significance	Probability	Duration	Consequence Extent	Management / mitigation
	Soil pollution During clearing of a new, pristine area for the excavation of minerals, construction of infrastructure and roads, stockpiling, oil and petrochemical spills.	Medium-High	Certain for life of operation	Residual	On-site	• Topsoil needs to be removed and stored separately during mining and the construction of roads, infrastructure and stockpile areas. • These topsoil stockpiles must be kept as small as possible in order to prevent compaction and the formation of anaerobic conditions. • Topsoil must be stockpiled for the shortest possible timeframes to ensure that the quality of the topsoil is not impaired. • Topsoil must not be handled when the moisture content exceeds 12 %. • Topsoil stockpiles must by no means be mixed with sub-soils. • The topsoil should be replaced as soon as possible on to the disturbed areas, thereby allowing for the re-growth of the seed bank contained within the topsoil. • For restoration of the affected areas without topsoil, soils can

						be sourced from other sustainable areas and chemically changed to match with the surrounding environment. • To restore areas where compacted soil occur, a ripper blade or deep plow can be pulled across the affected area to alleviate compaction. • Encourage the growth of natural plant species in all affected areas by sowing indigenous seeds or by planting seedlings. • Vehicles and machinery should be regularly serviced and maintained. • Refuelling and vehicle maintenance must take place in well demarcated areas and over suitable drip trays to prevent soil pollution. • Drip trays must be available on site and installed under all stationary vehicles. • Spill kits to clean up accidental spills from any accidental spillages must be well-marked and available on site. • Workers must undergo induction to ensure that they

						are prepared for rapid clean-up procedures. • Any soil or area that is contaminated must be cleaned immediately by removing the soil and disposing it as hazardous waste in the correct manner.
Land Capability	Loss of land capability through topsoil removal, disturbances and loss of fertility.	Medium-High	Certain for life of operation	Residual	Low-Medium On-site	Employ appropriate rehabilitation strategies to restore land capability.
Land use	Loss of land use due to poor placement of surface infrastructure and ineffective rehabilitation	Medium-High	Certain for life of operation	Residual	Low-Medium On-site	Carefully plan the placement of infrastructure and employ rehabilitation strategies to restore land capability.
Ground Water Quantity	Nature of Impact	Significance	Probability	Duration	Consequence Extent	Management / mitigation
	Hydrocarbon Spills Hydrocarbon spills from construction vehicles and fuel storage areas may contaminate the groundwater resource locally	Medium	Possible	Construction	Low Regional	Staff at Workshop areas, yellow metal laydown zones and fuel storage areas should be sufficiently trained in hydrocarbon spill response. Each area where hydrocarbons are stored or likely to spill should be equipped with sufficient spill response kits and personnel, contaminated soil should be disposed of correctly at a suitable location.

Environmental Factor	Nature of Impact	Significance	Probability	Duration	Consequence Extent	Management / mitigation
Surface Water	• During excavation of minerals, construction of infrastructure and roads, stockpiling.	Medium to high	Possible infrequent	Permanent	Low Regional	• All activities associated with the mining operation must be planned to avoid any disturbances to the watercourses and their buffer zones. • No new roads should be created across a watercourse and no mining should take place in the Sultanrivier. If this is unavoidable, a water use license to alter the beds and banks of each earmarked watercourse should be obtained from DWS prior to such activities. • Employ sound rehabilitation measures to restore characteristics of all affected watercourses.
	• Spillages that may occur on access and haul roads may impact negatively on surface water quality. • A high potential of soil erosion exists due to an increased percentage of bare surfaces.	Medium to High	Possible infrequent	Decommissioning	Regional	
	• Possible leaching of polluted soil through infiltration and runoff resulting in surface water pollution. • Removal of vegetation could lead to erosion	Medium to High	Possible infrequent	Decommissioning	Regional	• Pipe leakages should be minimized. • Proper clean and dirty water separation techniques must be used to ensure uncontaminated water returning to the environment. • Non mining waste i.e. grease, lubricants, paints, flammable liquids, garbage, historical

	and sediment transportation. • Significant dust levels will emanate from the use of heavy construction vehicles. • Accelerated erosion of areas adjacent to workings that have been de-vegetated leads to increased suspended sediment loads in nearby streams and rivers. • Wind-blown dusts from unprotected tailings and waste rock dumps enter aquatic environment. • Siltation of surface water During clearing of an area for the excavation of minerals,					machinery and other combustible materials generated during activities should be placed and stored in a controlled manner in a proper designed area. • The topography of rehabilitation disturbed areas must be rehabilitated in such a manner that the rehabilitated area blends in naturally with the surrounding natural area. This will reduce soil erosion and improve natural re-vegetation. • Bare ground exposure should always be minimised in terms of the surface area and duration. • Re-establishment of plant cover on disturbed areas must take place as soon as possible once activities in the area have ceased. • No new roads, infrastructure or mining areas should be developed over watercourses. • Disturbances during the rainy season should be monitored and controlled. • Any potential run-off from exposed ground should be controlled with flow retarding

	construction of infrastructure and roads, stockpiling, natural events, abandoned mine dumps.					barriers. • Regular monitoring during the mining operation should be carried out to identify source zones and erosion; followed by appropriate remedial actions.
Environmental Factor	Nature of Impact	Significance	Probability	Duration	Consequence Extent	Management
Indigenous Flora	**Loss of and disturbance to indigenous vegetation** During clearing of an area for the excavation of minerals, construction of infrastructure and roads, stockpiling.	Low to medium	Certain for life of operation	Residual	On-site	• Implement best practise principles to minimise the footprint of transformation, by keeping to existing roads and earmarked areas where possible. • Implement effective avoidance measures to limit any activities in the highly sensitive areas, by applying the no-go principles. • Ensure measures for the adherence to a maximum speed limit of 40 km/h to minimise dust fallout and associated effects on plants in the adjacent pristine areas. • Encourage the growth of natural plant species in all affected areas by sowing indigenous seeds or by planting seedlings. • The setup of a small nursery is advisable to maximise

						translocation and re-establishment efforts of affected areas. • Apply for permits to authorise the clearance of indigenous plants from DENC at least three months before such activities will commence.
	Loss of flora with conservation concern Removal of listed or protected plant species during clearing of an area for the excavation of minerals, construction of infrastructure and roads, stockpiling. Intentional removal of listed or protected plant species for non-mine related purposes, e.g. illegal succulent trade.	Medium-High	Certain for life of operation	Residual	On-site	• The footprint areas of the mining activities must be scanned for Red Listed and protected plant species prior to any destructive activities by means of a search-andrescue operation. • It is recommended that these plants are identified and marked prior to intended activity. These plants should ideally be incorporated into the design layout and left in situ. However, due to the nature of the proposed mining activities they will most likely all be removed or relocated if possible. The relevant permits from DAFF and/or DENC should be applied for at least three months before such activities will commence. • The setup of a small nursery is advisable to maximise translocation and re-

						establishment efforts of all the rescued plants. • A management plan should be implemented to ensure proper establishment of ex situ individuals, and should include a monitoring programme for at least two years after re-establishment in order to ensure successful translocation. • The designation of an environmental officer is recommended to render guidance to the staff and contractors with respect to suitable areas for all related disturbance, and must ensure that all contractors and workers undergo Environmental Induction prior to commencing with work on site. The environmental induction should occur in the appropriate languages for the workers who may require translation. • All those working on site must be educated about the conservation importance of the flora occurring on site as well as the legislation relating to protected species.

						• Employ regulatory measures to ensure that no illegal harvesting takes place.
	Proliferation of alien vegetation During clearing of an area for the excavation of minerals, construction of infrastructure and roads, stockpiling, improper rehabilitation practises, existing populations on historically abandoned mining areas.	Low-Medium	Possible, frequently	Residual	Local	• Implement best practise principles to minimise the footprint of transformation, by keeping to existing roads and earmarked areas where possible. • Mechanical methods of control should be implemented pro-actively to eradicate existing populations as well as new saplings as soon as they start to emerge. • Regular follow-up monitoring of invasive control areas need to be implemented to ensure effective eradication. • Encourage proper rehabilitation of disturbed areas through soil restoration and reseeding of indigenous plant species.
	Encouragement of bush encroachment During clearing of an area for the excavation of minerals, construction of infrastructure and	Low	Possible	Residual	On-site	• Mechanical methods of control should be implemented pro-actively when encroaching species form dense stands. • Regular follow-up monitoring of encroached control areas need to be implemented to ensure effective eradication.

	roads, stockpiling, improper rehabilitation practises.					• Encourage proper rehabilitation of disturbed areas through soil restoration and reseeding of indigenous plant species.
Fauna	**Loss, damage and fragmentation of natural habitats** During clearing of an area for the excavation of minerals, construction of infrastructure and roads, stockpiling.	Medium-High	Certain for life od operation	Residual	Regional	• All activities associated with the mining operation must be planned, where possible to encourage faunal dispersal and should minimise dissection or fragmentation of any important faunal habitat type. • The extent of the earmarked area should be demarcated on site layout plans. No staff, contractors or vehicles may leave the demarcated area unless authorised to do so. • Pristine areas surrounding the earmarked area that are not part of the demarcated area should be considered as a no-go zone for employees, machinery or even visitors. • No new roads should be created across a watercourse. • No mining should take place in the Sultanrivier or along its banks. If this is unavoidable, a water use license to alter the beds and banks of the river

						should be obtained from DWS prior to such activities. • Employ sound rehabilitation measures to restore characteristics of all affected habitats.
	Disturbance, displacement and killing of fauna Vegetation clearing; increase in noise and vibration; human and vehicular movement on site resulting from mining activities.	Low-Medium	Certain for life of operation	Decommissioning	Local	• Careful planning of the operation is needed to avoid the destruction of pristine habitats and minimise the overall disturbance footprint, especially to avoid destruction of whistling rat burrows. • The extent of the mining activities should be demarcated on site layout plans, and no personnel or vehicles may leave the demarcated area except if authorised to do so. • Areas excluded from the demarcated area should be considered as a no-go zone. • If any of the protected wildlife species are directly threatened by habitat destruction or displacement during the mining operation, the relevant permits from DENC should be obtained followed by the relevant mitigation procedures stipulated in the permits.

						• Everyone on site must undergo environmental induction for awareness on not capturing or harming species that are often persecuted out of superstition and to be educated about the conservation importance of the fauna occurring on site. • Reptiles and amphibians that are exposed during the clearing operations should be captured for later release or translocation by a qualified expert. • Employ measures that ensure adherence to a maximum speed limit of 40 km/h as well as driving mindfully on site to lower the risk of animals being killed on the roads or elsewhere in the mining area.
Air Quality	Sources of atmospheric emission associated with the mining operation are likely to include fugitive dust from materials handling operations, wind erosion of stockpiles, and	Low	Certain for life of operation	Operational/ Decommissioning	Low Local	Effective soil management; identification of the required control efficiencies in order to maintain dust generation within acceptable levels.

	vehicle entrainment of road dust.					
Broad-scale ecological processes	Clearing of vegetation and disturbance during the construction of roads and mining activities; alterations to watercourse habitat characteristics.					• Implement best practise principles to minimise the footprint of transformation, by keeping to existing roads and earmarked areas where possible. • No new roads should be created across a watercourse and no mining should take place in the Sultanrivier. If this is unavoidable, a water use license to alter the beds and banks of each earmarked watercourse should be obtained from DWS prior to such activities. • Employ sound rehabilitation measures to restore characteristics of all affected habitats. • For restoration of the affected areas without topsoil, soils can be sourced from other sustainable areas and chemically changed to match with the surrounding environment. • To restore areas where compacted soil occurs, a ripper blade or deep plow can

						be pulled across the affected area to alleviate compaction. • Encourage the growth of natural plant species in all affected areas by sowing indigenous seeds or by planting seedlings. • The setup of a small nursery is advisable to maximise translocation and re-establishment efforts of affected areas.
SOCIAL SURROUNDINGS						
Environmental Factor	Nature of Impact	Significance	Probability	Duration	Consequence Extent	Management
Noise Impacts	Clearing of footprint areas, stripping of stockpiling of topsoil Noise increase at the boundary of the mine footprint	Medium	Possible	Pre- Construction and Construction	Low Local	Equipment and/or machinery which will be used must comply with the manufacturer's specifications on acceptable noise levels
	Construction of internal Roads	Medium	Possible	Pre- Construction and Construction	Low Local	Equipment and/or machinery which will be used must comply with the manufacturer's specifications on acceptable noise levels
	Building activities Noise increase at the boundary of the mine footprint.	Medium	Possible	Pre- Construction and Construction	Low Local	Equipment and/or machinery which will be used must comply with the manufacturer's specifications on acceptable noise levels

						Building activities at the mine foot print and along the conveyer belt should be limited to daytime only.
	Hauling of building material to and from the specific areas. Noise increase at the boundary of the mine footprint.	Medium	Possible	Pre- Construction and Construction	Low Local	Equipment and/or machinery which will be used must comply with the manufacturer's specifications on acceptable noise levels Hauling of material should be limited to daytime only. Noise survey to be carried out to monitor the noise levels during these activities.
	Construction of the Mine Residue dump, soil stock pile and material stock pile. Noise increase at the boundary of the mine footprint.	Medium	Possible	Pre- Construction and Construction	Low Local	Equipment and/or machinery which will be used must comply with the manufacturer's specifications on acceptable noise levels Noise survey to be carried out to monitor the noise levels during these activities.
	Clearing of new open cast mining areas, stripping and stockpiling of topsoil. Noise increase at the boundary of the mine footprint.	Medium	Possible	Operational	Low Local	Equipment and/or machinery which will be used must comply with the manufacturer's specifications on acceptable noise levels Topsoil stripping should be limited to daytime only.
	Diesel generators Noise increase at the boundary of the mine footprint.	Medium	Possible	Operational to closure	Low Local	Equipment and/or machinery which will be used must comply with the manufacturer's

						specifications on acceptable noise levels Noise survey to be carried out to monitor the noise levels during these activities.
	Additional traffic to and from the mine	Medium	Possible	Operational to closure	Low Local	Equipment and/or machinery which will be used must comply with the manufacturer's specifications on acceptable noise levels Noise survey to be carried out to monitor the noise levels during these activities.
	Mining activities	Medium	Possible	Operational to closure	Low Local	Equipment and/or machinery which will be used must comply with the manufacturer's specifications on acceptable noise levels Noise survey to be carried out to monitor the noise levels during these activities.
	Maintenance activities at the site.	Medium	Possible	Operational to closure	Low Local	Equipment and/or machinery which will be used must comply with the manufacturer's specifications on acceptable noise levels Noise survey to be carried out to monitor the noise levels during these activities.
	Backfill of mine footprint area	Medium	Possible	Decommissioning	Low Local	Equipment and/or machinery which will be used must comply with the manufacturer's

	Noise increase at the boundary of the mine footprint and at the residents living close.					specifications on acceptable noise levels Backfill of mine footprint area activities should be limited to daytime only.
	Planting of grass and vegetation at the rehabilitated areas	Medium	Possible	Decommissioning	Low Local	Equipment and/or machinery which will be used must comply with the manufacturer's specifications on acceptable noise levels Planting of grass and/or vegetation should be limited to daytime only
	Removal of infra-structure	Medium	Possible	Decommissioning	Low Local	Equipment and/or machinery which will be used must comply with the manufacturer's specifications on acceptable noise levels Removal of infrastructure should be limited to daytime only. Noise survey to be carried out to monitor the noise levels during these activities.
Visual impacts	Potential visual impact	Medium	Certain	Construction, Operation and Decommissioning	Low Local Site	The design of the proposed mining development will determine the visual impact. Correct design will ensure that the development will fit into the surrounding area and will become a feature of the area.
	Potential Visual Impact on the surrounding land users/ residents	Medium Regional	Highly Likely	Construction, Operation and Decommissioning	Medium Local Site	The design of the proposed mining development will determine the visual impact.

	Potential visual impact of the proposed development on the construction phase of the surrounding land users in close proximity	Medium Regional	Highly Likely	Construction	Low Local Site	Wetting of exposed areas should be undertaken as required to prevent dust pollution having a negative visual impact. • Ensure that the design fits into the surrounding environment and it is aesthetically pleasing; • Reduce the construction period through careful planning and productive implementation of resources; • Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads; • Ensure that rubble, litter and disused construction materials are managed and removed regularly; • Ensure that all infrastructure and the site and general surrounds are maintained in a neat and appealing way; • Reduce and control construction dust emitting activities through the use of approved dust suppression techniques
	Potential visual impact of the proposed development on the	Medium Regional	Highly likely	Operational	Medium Local Site	Wetting of exposed areas should be undertaken as required to prevent dust pollution having a negative visual impact.

	operational phase of the surrounding land users in close proximity.					• Ensure that the design fits into the surrounding environment and it is aesthetically pleasing. • Ensure that all infrastructure and the site and general surroundings are maintained in a neat and appealing way; • Rehabilitation of disturbed areas and re-establishment of vegetation;
Traffic	Potential negative impacts on traffic safety and deterioration of the existing road networks.	Low	Low likelihood	Decommissioning	Low Local	Utilise existing access roads, where applicable; implement measures that ensure adherence to traffic rules.
Environmental Factor	Nature of Impact	Significance	Probability	Duration	Consequence Extent	Management
Socio-Economic	**Population Impacts** Employment Opportunities and skills Inequities	Medium Positive	Probable	Start-up and Construction	Medium Positive Local	• A community skills audit should be undertaken by Mafisa Mining. Alternatively, the existing Namaqualand Labour Desk could be used to determine which skills are locally available and which employees could come into consideration for employment. • Training of potential future employees, contract workers and/or community members should focus on mining related skills which would

						furthermore equip trainees/beneficiaries with the necessary portable skills to find employment at the available employment sectors within the study area. Multi-skilling is thus not necessarily the preferred training and skills development method. • Training of local construction workers during the construction phase to enable them to be employable during the operational phase would not stop the influx of outsiders, but could attempt to minimise the number of "new" outsiders coming to the area in search of employment. • Training courses should be accredited and certificates obtained should be acceptable by other related industries. • Guidance concerning legal requirements to which locals should adhere to, to make them employable, such as the standard construction industry requirements should also be attended to.
	Safety and Security Risks	Low Negative	Highly Probable	Construction	Low Negative Local	• A Fire/Emergency Management Plan should be

						developed and implemented at the outset of the construction phase. • Open fires for cooking and related purposes should not be allowed on site. • Appropriate firefighting equipment should be on site and construction workers should be appropriately trained for fire fighting • The construction area should be fenced or access to the area should be controlled to avoid animals or people entering the area without authorisation. • The construction sites should be clearly marked and "danger" and "no entry" signs should be erected. • Speed limits on the local roads surrounding the construction sites should be enforced. • Speeding of construction vehicles must be strictly monitored • Local procurement and job creation should receive preference.
	Health Impacts	Low Negative	Highly probable	Construction	Low Negative Local	• Maximise the employment of locals where possible

						• First aid supplies should be available at various points at the construction site • Continue and extend the current HIV/AIDS awareness and support programmes, with specific focus on those in and nearby the construction site • The general health of construction workers should be monitored on an on-going basis
Interested and Affected Parties	Loss of trust and a good standing relationship between the IAP's and the mining company.	Low to medium	Possible	Construction, Operational and Decommissioning	Low Local	Ensure continuous and transparent communication with IAP's

vi) Methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks(Describe how the significance, probability, and duration of the aforesaid identified impacts that were identified through the consultation process was determined in order to decide the extent to which the initial site layout needs revision)

Methodology used in determining and ranking the nature, severity, consequences, extent, duration and probability of potential environmental impacts and risks

The Different environmental components on which the project (can) have an impact are:

1. **Geology**
2. **Topography**
3. **Soil**
4. **Land Capability**
5. **Land Use**
6. **Flora (Vegetation)**
7. **Fauna**
8. **Broadscale Ecological processes**
9. **Surface Water**
10. **Ground Water**
11. **Air Quality**
12. **Noise and vibration**
13. **Archaeological and Cultural Sites**
14. **Sensitive Landscapes**
15. **Visual Aspects**
16. **Socio-Economic Structures**
17. **Interested and Affected Parties**

Impact Assessment

Before the impact assessment could be done the different project Activities/infrastructure components were identified.

1	**Processing Plant: 2-6 X 16 feet** Processing plant: 2-6 X 16 feet pan with conveyers and recovery
2	**Ablution Facilities:** In terms of sewage the decision was made to use chemical toilets which can be serviced regularly by the service provider.
3	**Clean & Dirty water system: Berms** It is anticipated that the operation will establish stormwater control berms and trenches to separate clean and dirty water on the mine site.
4	**Fuel Storage facility (Concrete Bund walls and Diesel tanks):** It is anticipated that the operation will utilize 2 x 23 000 litre diesel tanks. These tanks must be placed in bund walls, with a capacity of 1.5 times the volume of the diesel tanks. A concrete floor must be established where the re-fuelling will take place.
5	**Mining Area:** Opencast mining to mine for alluvial diamonds.
6	**Salvage yard (Storage and laydown area).**
7	**Product Stockpile area.**
8	**Processing plant:** At the plant the diamondiferous gravel will be sorted by means of a grizzly screen grid and all material larger than 32mm will be separated from the rest. This material will be used in the backfilling stage.
9	**Waste disposal site** The operation will establish a dedicated, fenced waste disposal site with a concrete floor and bund wall. The following types of waste will be disposed of in this area: o Small amounts of low-level hazardous waste in suitable receptacles; o Domestic waste; o Industrial waste.
10	**Roads (both access and haulage road on the mine site):** Although it is recommended that the operation utilize existing roads as far as possible, it is anticipated that the mining operation will create an additional 2 - 4 km of roads, with a width of 6 meters.
11	**Temporary Workshop Facilities and Wash bay.**
12	**Water distribution Pipeline.**
13	**Water tank:** It is anticipated that the operation will establish 1 x 10 000 litre water tanks with purifiers for potable water.

The criteria used to assess the significance of the impacts are shown in the table 19 below/overleaf. The limits were defined in relation to mining characteristics. Those for probability, intensity/severity and significance are subjective, based on rule-of-thumb and experience. Natural and existing mitigation measures were considered. These natural mitigation measures were defined as natural conditions, conditions inherent in

the project design and existing management measures, which alleviate impacts. The significance of the impacts was calculated by using the following formula:

(Severity + Extent + Duration) x Probability weighting

For the impact assessment, the different project activities and associated infrastructure were identified and considered in order to identify and analyse the various possible impacts.

Table 19. Significance of impacts is defined as follows.

SIGNIFICANCE				
Colour Code	**Significance rating**	**Rating**	**Negative Impact**	**Positive Impact**
	Very low	3 -16	Acceptable/Not serious	Marginally Positive
	Low	17 - 22	Acceptable/Not serious	Marginally Positive
	Medium-Low	23 -33	Acceptable/Not desirable	Moderately Positive
	Medium	34 - 48	Generally undesirable	Beneficial
	Medium-High	49 - 56	Generally unacceptable	Important
	High	57 - 70	Not Acceptable	Important
	Very High	90 - 102	Totally unacceptable	Critically Important

Significance of impacts is defined as follows:

Very Low - Impact would be negligible. Almost no mitigation and/or remedial activity would be needed, and any minor steps which might be needed would be easy, cheap and simple.

Low - Impact would have little real effect. Mitigation and/or remedial activity would be either easily achieved or little would be required or both.

Medium Low- Impact would be real but not substantial within the bounds of those which could occur. Mitigation and/or remedial activity would be both feasible and fairly easily possible.

Medium - Impact would be real but not substantial within the bounds of those which could occur. Mitigation and/or remedial activity would be feasible and possible.

Medium High- Impact would be real but could be substantial within the bounds of those which could occur. Mitigation and/or remedial activity would be both feasible and possible but may be difficult and or costly.

High - Impacts of substantial order. Mitigation and/or remedial activity would be feasible but difficult, expensive, time consuming or some combination of these.

Before any assessment can made the following evaluation, criteria need to be described.

Table 20. Explanation of PROBABILITY of impact occurrence

Weight	Probability of Impact Occurrence	Explanation of Probability
1	Improbable	<20% sure of particular fact or likelihood of impact occurring
2	Low Probability Possible	20 – 39% sure of particular fact or likelihood of impact occurring
3	Probable /Likely	40 – 65% sure of particular fact or likelihood of impact occurring
4	Highly Probable /Likely	66 – 85% sure of particular fact or likelihood of impact occurring
5	Definite	86% - 100% sure of particular fact or likelihood of impact occurring

Table 21. Explanation of EXTENT of impact

Weight	Extent of Impact	Explanation of Extent
1	Footprint	Direct and Indirect impacts limited to the activity, such as footprint occurring within the total site area of impact only.
2	Surrounding Area **Site**	Direct and Indirect impacts affecting environmental elements **within 2 km of site**
3	Local Municipality **Local**	Direct and Indirect impacts affecting environmental elements within the **Springbok area**
4	Regional/District **Regional**	Direct and Indirect impacts affecting environmental elements within **Namaqualand District**
5	**Provincial**	Direct and Indirect impacts affecting environmental elements in the **Northern Cape Province**

Table 22. Explanation of DURATION of impact

Weight	Duration of Impact	Explanation of Duration
1	Temporary (Very Short)	Less than 1 year
2	Short term	1 to 5 years
3	Medium term	6 to 15 years
4	Long term (Life of project)	16 to 50 years
5	Very Long term	Longer than 50 years
6	Permanent	Permanent

Table 23. Explanation of SEVERITY of the impact

Weight	Impact Severity	Explanation of Severity
1	No Impact	There will be no impact at all – not even a very low impact on the system or any of its parts.
2	Very Low	Impact would be negligible. In the cast of negative impacts, almost no mitigation and/or remedial activity would be needed, and any minor steps which might be needed would be easy, cheap and simple. In the case of positive impacts alternative means would almost all likely to be better, if one or a number of ways, then this means of achieving the benefit.
3	Low	Impact would be of a low order and with little real effect. In the case of negative impacts, mitigation and/or remedial activity would be either easily achieved or little would be required or both. In the case of positive impacts alternative means for achieving this benefit would be easier, cheaper, more effective, less time-consuming, or some combination of these.
4	Moderately Severe	Impact would be real but not substantial within the bounds of those which could occur. In the case of negative impacts, mitigation and/or remedial activity would be both feasible and fairly easily

		possible. In the case of positive impacts other means other means of covering these benefits would be about equal in cost and effort.
5	High Severance	Impacts of substantial order. In the case of negative impacts, mitigation and/or remedial activity would be feasible but difficult, expensive, time consuming or some combination of these. In the case of positive impacts other means of achieving this benefit would be feasible, but these would be more difficult, expensive, time-consuming or some combination of these.
6	Very High Severity	Of the highest order possible within the bounds of impacts which could occur, in the case of negative impacts, there would be no possible mitigation and/or remedial activity to offset the impact at the spatial or time scale for which was predicted. In the case of positive impacts there is no real alternative to achieving the benefit.

vii) The positive and negative impacts that the proposed activity (in terms of the initial site layout) and alternatives will have on the environment and the community that may be affected

(Provide a discussion in terms of advantages and disadvantages of the initial site layout compared to alternative layout options to accommodate concerns raised by affected parties)

During construction and operation of the mine, there is a possibility of sterilisation of the mineral reserves and resources due to improper placement of infrastructure. The infrastructure and slimes dam will alter the topography by adding features to the landscape. Topsoil removal and alluvial mining will unearth the natural topography. The construction of infrastructure and various facilities in the mining area can also result in loss of soil due to erosion. Vegetation where present will be stripped in preparation for placement of infrastructure and loading, and therefore the areas will be bare and susceptible to erosion. The topsoil that is stripped and piled on surrounding areas can be eroded by wind and rain. The soil will be carried away during runoff. The declared areas will be rehabilitated, but full restoration of soil might only occur over a number of years, subsequent to the re-establishment of vegetation. Furthermore, improper stockpiling and soil compaction can result in soil sterilisation. Leaching can also occur, resulting in the loss of nutrients.

During the construction and operation of the mine, there is a possibility that equipment might leak oil, thus causing surface spillages. The hydrocarbon soil contamination will render the soil unusable unless they are decontaminated. The storage of fuels on site might have an impact on soil if the tanks that are available on site are not properly monitored and maintained to avoid leakages. Then there is the potential that contaminated soil can be carried through runoff to contaminate water resources and soil stockpiled for rehabilitation. Soil pollution is therefore possible, but through mitigation it can be minimised.

The loss of land capability and land use can occur in two ways. Firstly, through topsoil removal, disturbances and loss of soil fertility; and secondly through the improper placement of infrastructure. The site has a land capability for limited grazing, but grazing activities can still be performed in areas not earmarked for

mining, and with proper rehabilitation the land capabilities and land use potential can be restored.

If oil and fuel spillages occur, then it will seep into the underlying aquifers and contaminate ground water. Improper handling of hazardous material will cause contamination of nearby surface water resources during runoff episodes. Lack of storm control structures will lead to erosion of stockpiles during heavy rains and runoff will carry suspended solids into the downstream environment. This might cause high silt load and affect stream flow.

Construction and mining activities on site will reduce the natural habitat for ecological systems to continue their operation. It is not expected that the areas of high ecological function will rehabilitate following disturbance events. Vehicle traffic generates lots of dust which can reduce the growth success and seed dispersal of many small plant species. It is expected that protected species will be destroyed during the mining operation.

Furthermore, according to Section 51(2) of NCNCA, a permit is required from the Northern Cape, Department of Environment and Nature Conservation (DENC) for any large-scale clearance of all indigenous (Schedule 3) vegetation, before such activities commence.

While general clearing of the area and mining activities destroy natural vegetation, invasive plants can increase due to their opportunistic nature in disturbed areas. If invasive plants establish in disturbed areas, it may cause an impact beyond the boundaries of the mining site. These alien invasive species are thus a threat to surrounding natural vegetation and can result in the decrease of biodiversity and ecological value of the area. Therefore, if alien invasive species are not controlled and managed, their propagation into new areas could have a high impact on the surrounding natural vegetation in the long term. With proper mitigation, the impacts can be substantially reduced.

The transformation of natural habitats to mining and associated infrastructure will result in the loss of habitat affected individual species, and ecological processes. In turn this will result in the displacement of faunal species dependent upon such habitat. Increased noise and vibration due to mining activities will disturb and possibly displace birds and other wildlife. Fast moving vehicles take a heavy toll in the form of road kills of small mammals, birds, reptiles, amphibians and a large number of invertebrates. The construction of the mine and associated infrastructure will result in the loss of connectivity and fragmentation of natural habitat. Fragmentation of habitat will lead to the loss of migration corridors, in turn resulting in degeneration of the affected population's genetic make-up. This results in a subsequent loss of genetic variability between meta-populations occurring within the site. Pockets of fragmental natural habitats hinder the growth and development of populations.

During the mining operation the abovementioned activities have potential for dust generation. It is anticipated that the extent of dust emissions would vary substantially from day to day depending on the level of activity and the specific operations. The mine will add a certain amount of noise to the existing noise in the area. However, levels of noise generated by mining activities are low.

The impact of site generated trips on the traffic of the existing roads is experienced to be low. Nevertheless, if road safety is not administered it can have a high impact on the safety of fellow road users.

The mining operation, especially during construction, will create a number of new employment opportunities. The magnitude of this impact will depend on the number of people that will be employed, and the number of contractors sourced. An influx of people into the area will possibly impact on safety and security of local residents. During the decommissioning and at closure of the mine, staff will most likely be retrenched. This can potentially flood the job market, resulting in people being unable to find new employment for a long period of time. It is normally more difficult for people with highly specialised skills to find employment immediately. Those with fewer skills have more flexibility in the job market.

Economic slump of the local towns after mine closure is an associated potential impact, although small due to the small scale of the operation. Income streams from wage bills as well as goods and services contracts (at all geographical levels) will come to an end, reducing the monetary income of individuals and mine-related businesses. People who have derived income directly or indirectly from the project may be inclined to leave the region in search of employment or business opportunities. This could result in further decline of the economy of the region as well as the abandonment of infrastructure. The loss of the mine workforce income will also impact upon non-mine related industries within the local and regional areas, particularly the rental property market and retail and service industries who would have received income during the life of mine from the salaried workforce.

It is likely, however that there will be residual positive economic impacts that are not fully reversed with the closure of the mine, and that the economy will not decline to its original level prior to the development of this project. This is because the mine will generate substantial income for the regional and local economy, both directly and indirectly, during its life.

It is difficult to predict the actual impact of the mine closure in advance, but it is acceptable to assume that the mine closure will have a negative impact on the local and regional economy with a high probability of occurrence, a Low severity and a Low significance. Positive impacts include employment and training opportunities for people in the local community and local contractors; social upliftment and community development programmes; economic benefits.

viii) The possible mitigation measures that could be applied and the level of risk

(With regard to the issues and concerns raised by affected parties provide a list of the issues raised and an assessment/discussion of the mitigations or site layout alternatives available to accommodate or address their concerns, together with an assessment of the impacts or risks associated with the mitigation or alternatives considered)

Geology and mineral resource

Level of risk: Low

Mitigation measures

- Ensure that optimal use is made of the available mineral resource through proper planning.
- The mining of alluvial gravels should be well planned, and all infrastructure positions should be selected with the main aim of avoiding sterilization of future resources.
- No dumping of materials prior to approval by the mine manager.

Topography

Level of risk: Medium-High

Mitigation measures

- Mining of alluvial gravels continuously, if possible, otherwise when they become available;
- Employ effective rehabilitation strategies to restore surface topography of and controlled backfilling at excavations and plant site;
- Stabilise the mine residue deposit;
- All temporary infrastructures should be demolished during closure.
- Topsoil needs to be removed and stored separately during mining and the
- construction of roads, infrastructure and stockpile areas.
- These topsoil stockpiles must be kept as small as possible in order to prevent compaction and the formation of anaerobic conditions.
- Topsoil must be stockpiled for the shortest possible timeframes to ensure that the quality of the topsoil is not impaired.
- Topsoil must not be handled when the moisture content exceeds 12 %.
- Topsoil stockpiles must by no means be mixed with sub-soils.
- The topsoil should be replaced as soon as possible on to the disturbed areas, thereby allowing for the re-growth of the seed bank contained within the topsoil.
- For restoration of the affected areas without topsoil, soils can be sourced from other sustainable areas and chemically changed to match with the surrounding environment.
- To restore areas where compacted soil occur, a ripper blade or deep plow can be pulled across the affected area to alleviate compaction.
- Encourage the growth of natural plant species in all affected areas by sowing indigenous seeds or by planting seedlings.

Soil erosion

Level of risk: Low – Medium

Mitigation measures

- Bare ground exposure should be minimised at all times in terms of the surface area and duration.
- Re-establishment of plant cover on disturbed areas must take place as soon as possible, once activities in the area have ceased.
- No new roads, infrastructure or mining areas should be developed over watercourses, including drainage lines.
- Disturbances during the rainy season should be monitored and controlled.
- Any potential run-off from exposed ground should be controlled with flow retarding barriers.
- Regular monitoring during the mining operation should be carried out to identify areas where erosion is occurring; followed by appropriate remedial actions.

Soil pollution

Level of risk: Medium-High

Mitigation measures

- Topsoil needs to be removed and stored separately during mining and the construction of roads, infrastructure and stockpile areas.
- These topsoil stockpiles must be kept as small as possible in order to prevent compaction and the formation of anaerobic conditions.
- Topsoil must be stockpiled for the shortest possible timeframes to ensure that the quality of the topsoil is not impaired.
- Topsoil must not be handled when the moisture content exceeds 12 %.
- Topsoil stockpiles must by no means be mixed with sub-soils.
- The topsoil should be replaced as soon as possible on to the disturbed areas, thereby allowing for the re-growth of the seed bank contained within the topsoil.
- For restoration of the affected areas without topsoil, soils can be sourced from other sustainable areas and chemically changed to match with the surrounding environment.
- To restore areas where compacted soil occurs, a ripper blade or deep plow can be pulled across the affected area to alleviate compaction.
- Encourage the growth of natural plant species in all affected areas by sowing indigenous seeds or by planting seedlings.
- Vehicles and machinery should be regularly serviced and maintained.
- Refuelling and vehicle maintenance must take place in well demarcated areas and over suitable drip trays to prevent soil pollution.
- Drip trays must be available on site and installed under all stationary vehicles.
- Spill kits to clean up accidental spills from any accidental spillages must be well-marked and available on site.
- Workers must undergo induction to ensure that they are prepared for rapid clean-up procedures.

- Any soil or area that is contaminated must be cleaned immediately by removing the soil and disposing it as hazardous waste in the correct manner.

Loss of soil fertility

Level of risk: Medium - High

Mitigation measures

- Topsoil needs to be removed and stored separately during mining and the construction of roads, infrastructure and stockpile areas.
- These topsoil stockpiles must be kept as small as possible in order to prevent compaction and the formation of anaerobic conditions.
- Topsoil must be stockpiled for the shortest possible timeframes to ensure that the quality of
- the topsoil is not impaired.
- Topsoil must not be handled when the moisture content exceeds 12 %.
- Topsoil stockpiles must by no means be mixed with sub-soils.
- The topsoil should be replaced as soon as possible on to the disturbed areas, thereby allowing
- for the re-growth of the seed bank contained within the topsoil.
- For restoration of the affected areas without topsoil, soils can be sourced from other
- sustainable areas and chemically changed to match with the surrounding environment.
- To restore areas where compacted soil occur, a ripper blade or deep plow can be pulled across the affected area to alleviate compaction.
- Encourage the growth of natural plant species in all affected areas by sowing indigenous seeds or by planting seedlings.

Land capability and land use

Level of risk: Medium - High

Mitigation measures

- Ensure that optimal use is made of the available land through consultation with land owner and proper planning of mining activities.
- Surface agreement to be signed with land owners.
- Employ effective rehabilitation strategies to restore land capability and land use potential of the area.
- All activities to be restricted within the demarcated areas.
- Ensure that land which is not used during construction is made available for grazing.

Ground water

Level of risk: Medium

Mitigation measures

- Refuelling must take place in well demarcated areas and over suitable drip trays to prevent soil pollution.
- Spill kits to clean up accidental spills from earthmoving machinery must be well marked and available on site.
- Workers must undergo induction to ensure that they are prepared for rapid clean-up procedures.
- All facilities where dangerous materials are stored must be contained in a bund wall.
- Vehicles and machinery should be regularly serviced and maintained.

Surface water Alteration/destruction of watercourses

Level of risk: Medium-High

Mitigation measures

- All activities associated with the mining operation must be planned to avoid any disturbances to the watercourses and their buffer zones.
- No new roads should be created across a watercourse and no mining should take place in the Sultan River. If this is unavoidable, a water use license to alter the beds and banks of each earmarked watercourse should be obtained from DWS prior to such activities.
- Employ sound rehabilitation measures to restore characteristics of all affected watercourses.

Siltation of surface water

Level of risk: Low-Medium

Mitigation measures

- Bare ground exposure should always be minimised in terms of the surface area and duration.
- Re-establishment of plant cover on disturbed areas must take place as soon as possible once activities in the area have ceased.
- No new roads, infrastructure or mining areas should be developed over watercourses.
- Disturbances during the rainy season should be monitored and controlled.
- Any potential run-off from exposed ground should be controlled with flow retarding barriers.
- Regular monitoring during the mining operation should be carried out to identify areas where erosion is occurring; followed by appropriate remedial actions.

Indigenous flora

Loss of indigenous vegetation

Level of risk: Low to medium

Mitigation measures

- Implement best practise principles to minimise the footprint of transformation, by keeping to existing roads and earmarked areas where possible.
- Implement effective avoidance measures to limit any activities in the highly sensitive areas, by applying the no-go principles.

- Ensure measures for the adherence to a maximum speed limit of 40 km/h to minimise dust fallout and associated effects on plants in the adjacent pristine areas.
- Encourage the growth of natural plant species in all affected areas by sowing indigenous seeds or by planting seedlings.
- The setup of a small nursery is advisable to maximise translocation and re-establishment efforts of affected areas.
- Apply for permits to authorise the clearance of indigenous plants from DENC at least three months before such activities will commence.

Loss of Red data and / or protected species

Level of risk: Medium-High

Mitigation measures

- The footprint areas of the mining activities must be scanned for Red Listed and protected plant species prior to any destructive activities by means of a search-and-rescue operation.
- It is recommended that these plants are identified and marked prior to intended activity. These plants should ideally be incorporated into the design layout and left in situ. However, due to the nature of the proposed mining activities they will most likely all be removed or relocated if possible. The relevant permits from DAFF and/or DENC should be applied for at least three months before such activities will commence.
- The setup of a small nursery is advisable to maximise translocation and re-establishment efforts of all the rescued plants.
- A management plan should be implemented to ensure proper establishment of ex situ individuals, and should include a monitoring programme for at least two years after re-establishment in order to ensure successful translocation.
- The designation of an environmental officer is recommended to render guidance to the staff and contractors with respect to suitable areas for all related disturbance, and must ensure that all contractors and workers undergo Environmental Induction prior to commencing with work on site. The environmental induction should occur in the appropriate languages for the workers who may require translation.
- All those working on site must be educated about the conservation importance of the flora occurring on site as well as the legislation relating to protected species.
- Employ regulatory measures to ensure that no illegal harvesting takes place.

Alien invasive plants

Level of risk: Low to medium

Mitigation measures

- Implement best practise principles to minimise the footprint of transformation, by keeping to existing roads and earmarked areas where possible.
- Mechanical methods of control should be implemented pro-actively as soon as invasive species start to emerge.

- Regular follow-up monitoring of invasive control areas need to be implemented to ensure effective eradication.
- Encourage proper rehabilitation of disturbed areas through soil restoration and reseeding of indigenous plant species.

Encouraging bush encroachment

Level of risk: Low

Mitigation measures

- Mechanical methods of control should be implemented pro-actively when encroaching species form dense stands.
- Regular follow-up monitoring of encroached control areas need to be implemented to ensure effective eradication.
- Encourage proper rehabilitation of disturbed areas through soil restoration and reseeding of indigenous plant species.

Fauna

Habitat fragmentation

Level of risk: Medium-High

Mitigation measures

- All activities associated with the mining operation must be planned, where possible to encourage faunal dispersal and should minimise dissection or fragmentation of any important faunal habitat type.
- The extent of the earmarked area should be demarcated on site layout plans. No staff, contractors or vehicles may leave the demarcated area unless authorised to do so.
- Pristine areas surrounding the earmarked area that are not part of the demarcated area should be considered as a no-go zone for employees, machinery or even visitors.
- No new roads should be created across a watercourse.
- No mining should take place in the Sultanrivier or along its banks. If this is unavoidable, a water use license to alter the beds and banks of the river should be obtained from DWS prior to such activities.
- Employ sound rehabilitation measures to restore characteristics of all affected habitats.

Disturbance displacement and killing of fauna

Level of risk: Low-Medium

Mitigation measures

- Careful planning of the operation is needed to avoid the destruction of pristine habitats and minimise the overall disturbance footprint.
- The extent of the mining activities should be demarcated on site layout plans, and no personnel or vehicles may leave the demarcated area except if authorised to do so. Areas surrounding the earmarked site that are not part of the demarcated area should be considered as a no-go zone.
- If any of the protected wildlife species are directly threatened by habitat destruction or displacement during the mining operation, then the relevant permits from DENC

should be obtained followed by the relevant mitigation procedures stipulated in the permits.

- Everyone on site must undergo environmental induction for awareness on not capturing or harming species that are often persecuted out of superstition and to be educated about the conservation importance of the fauna occurring on site.
- Reptiles and amphibians that are exposed during the clearing operations should be captured for later release or translocation by a qualified expert.
- Employ measures that ensure adherence to a maximum speed limit of 40 km/h as well as driving mindfully on site to lower the risk of animals being killed on the roads or elsewhere in the mining area.

Broad Scale ecological processes

Level of risk: Medium-High

Mitigation measures

- Implement best practise principles to minimise the footprint of transformation, by keeping to existing roads and earmarked areas where possible.
- No new roads should be created across a watercourse and no mining should take place in the Sultan River. If this is unavoidable, a water use license to alter the beds and banks of each earmarked watercourse should be obtained from DWS prior to such activities.
- Employ sound rehabilitation measures to restore characteristics of all affected habitats.
- For restoration of the affected areas without topsoil, soils can be sourced from other sustainable areas and chemically changed to match with the surrounding environment.
- To restore areas where compacted soil occur, a ripper blade or deep plow can be pulled across the affected area to alleviate compaction.
- Encourage the growth of natural plant species in all affected areas by sowing indigenous seeds or by planting seedlings.
- The setup of a small nursery is advisable to maximise translocation and re-establishment efforts of affected areas.

Air quality

Level of risk: Low-Medium

Mitigation measures

- Vegetation must be removed when soil stripping is required only. These areas should be limited to include those areas required for mining only, hereby reducing the surface area exposed to wind erosion. Adequate demarcation of these areas should be undertaken.
- Control options pertaining to topsoil removal, loading and dumping are generally limited to wet suppression.
- Where it is logistically possible, control methods for gravel roads should be utilised to reduce the re-suspension of particulates. Feasible methods include wet

suppression, avoidance of unnecessary traffic, speed control and avoidance of track-on of material onto paved and treated roads.

- The length of time where open areas are exposed should be restricted. Mining should not be delayed after vegetation has been cleared and topsoil removed.
- Dust suppression methods should, where logistically possible, must be implemented at all areas that may / are exposed for long periods of time.
- For all mining activities management should undertake to implement health measures in terms of personal dust exposure, for all its employees:
    - Speed limits;
    - Spraying of surfaces with water;
    - Mining of alluvial gravels and rehabilitation of disturbed areas; and

Noise and vibration

Level of risk: Low

Mitigation measures

- Machinery with low noise levels which complies with the manufacturer's specifications to be used.
- Restrict construction and mining activities to take place during daytime period only unless agreements obtained to do 24hr operations.
- Vehicles to comply with manufacturers' specifications and any activity which will exceed 90.0dBA to be done during daytime only.
- Systematic maintenance of all forms of equipment, training of personnel to adhere to operational procedures that reduce the occurrence and magnitude of individual noisy events.
- Generators to be placed in such a manner that it is not a nuisance for any other parties.
- Noise monitoring to be done along the mine footprint and noise sources within the mine boundary on a monthly basis after which the frequency can change to a quarterly basis.
- Actively manage the process and the noise management plan must be used to ensure compliance to the noise regulations and/or standards. The levels to be evaluated in terms of the baseline noise levels.
- Standardised noise measurements should be carried out on individual equipment at the delivery to site to construct a reference data-base and regular checks carried out to ensure that equipment is not deteriorating and to detect increases which could lead to increase in the noise impact over time and increased complaints.

Visual impacts

Level of risk: Low -Medium

Mitigation measures

During the construction phase the following mitigation measures should be implemented to minimise the visual impact.

- Ensure that the design fits into the surrounding environment and it is aesthetically pleasing.
- Reduce the construction period through careful planning and productive implementation of resources.
- Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads.
- Ensure that rubble, litter and disused construction materials are managed and removed regularly.
- Ensure that all infrastructure and the site and general surrounds are maintained in a neat and appealing way.
- Reduce and control construction dust emitting activities through the use of approved dust suppression techniques; and
- Restrict construction activities to daylight hours in order to negate or reduce the visual impacts associated with lighting or restrict lighting to certain areas.
- During operational phase, the following mitigation measures should be implemented to minimise the visual impact.
- Ensure that the design fits into the surrounding environment and it is aesthetically pleasing.
- Ensure that all infrastructure and the site and general surroundings are maintained in a neat and appealing way;
- Rehabilitation of disturbed areas and re-establishment of vegetation;

Traffic and road safety

Level of risk: Low

Mitigation measures

- Implement measures that ensure the adherence to traffic rules.

Heritage resources

Level of risk: Low

Mitigation measures

- The heritage and cultural resources (e.g. stone age sites and Mining Heritage etc.) must be protected and preserved by the delineation of a no go zone.
- Stone tools should be avoided where possible and fresh exposure should be recorded before destruction. All stone tool artefacts should be recorded, mapped and collected before destruction.
- Should any further heritage or cultural resources be disturbed, exposed or uncovered during site preparations, these should immediately be reported to an accredited archaeologist.

Socio-economic

Level of risk: Low

Mitigation measures

- The mine must ensure that false expectations are not created regarding job

creation.

- Jobs must be allocated as advertised and in so far as is possible to local inhabitants.
- Contractors and employees should not be permitted to wander outside the mining area.
- Uncontrolled settlement of contractors and workers outside of the site will be prevented.
- The expectations of what benefits can accrue to the community must be managed from the initiation of the project.
- Commitments as set out in the SLP must be attained.

Interested and affected parties

Level of risk: Low-Medium

Mitigation measures

- Maintain active communication with IAPs.
- Ensure transparent communication with IAPs at all times.
- IAPs must be kept up to date on any changes in the mining operation.
- A complaints management system should be maintained by the mine to ensure that all issues raised by community members are followed up and addressed appropriately.

ix) Motivation where no alternative sites were considered

No alternative location for the proposed mining operation was considered, as the alluvial gravels have been deposited in this area. There was an existing prospecting right on the farm on which the presence of diamonds were proved. There is therefore no other alternative with regard to the overall operation footprint.

x) Statement motivating the alternative development location within the overall site (Provide a statement motivating the final site layout that is proposed)

Not applicable. There is no alternative development location for the site as this is the area with the mineable resource as proven under the prospecting right.

h) Full description of the process undertaken to identify, assess and rank the impacts and risks the activity will impose on the preferred site (In respect of the final site layout plan) through the life of the activity (Including (i) a description of all environmental issues and risks that are identified during the environmental impact assessment process and (ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures)

Not applicable. There is no alternative development location for the site and therefore the initial site locality is considered to be the final site locality with the geological resource to mine. The impact assessment provided in section g(v) is therefore sufficient and the process undertaken to identify impacts is the same as in section g(vi).

i) Assessment of each identified potentially significant impact and risk

(This section of the report must consider all the known typical impacts of each of the activities (including those that could or should have been identified by knowledgeable persons) and not only those that were raised by registered interested and affected parties)

ACTIVITY Whether listed or not listed.	POTENTIAL IMPACT (e.g. dust, noise, drainage surface disturbance, fly rock, surface water contamination, groundwater, contamination, air pollution)….	ASPECTS AFFECTED	PHASE In which impact is anticipated (e.g. construction, commissioning, operational, Decommissioning, closure, post closure)	SIGNIFICANCE IF NOT MITIGATED	MITIGATION TYPE (modify, remedy, control or stop) through (e.g. noise control measures, storm water control, dust control, rehabilitation, design measures, blasting controls, avoidance, relocation, alternative activity	SIGNIFICANCE IF MITIGATION
Processing Plant: 2-6 X 16 feet pan	Dust Noise Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination Surface disturbance	Air Quality Fauna Flora Noise Soil Surface water Safety	Construction Commissioning Operational Decommissioning Closure	Medium	Access control Maintenance of processing plant Dust control and monitoring Noise and vibration control and monitoring Drip trays Storm water run-off control Immediately clean hydrocarbon spills Rip disturbed areas to allow re-growth of vegetation cover Noise control Well maintained equipment Selecting equipment with lower sound power levels; Re-locate noise sources to areas which are less noise sensitive, to take advantage of distance and natural shielding; Develop a mechanism to record and respond to complaints.	Medium

Ablution Facilities Chemical Toilets	Soil contamination Possible Groundwater contamination	Soil Groundwater	Construction Commissioning Operational Decommissioning Closure	Low	Maintenance of sewage facilities on a regular basis. Removal of container plants on closure	Low
Clean & Dirty water systems:	Surface disturbance Soil contamination Surface water contamination	Soil Surface Water	Construction Commissioning Operational Decommissioning Closure	Low-Medium	It will be necessary to divert storm water around excavations and dumps areas by construction of a temporary gravel cut-off berm that will prevent surface run-off into the drainage areas. Excavations for Alluvial gravel, where and when applicable, should be rehabilitated concurrently as mining progresses. The re-vegetation of disturbed areas is important to prevent erosion and improve the rate of infiltration. Erosion channels that may develop before vegetation has established should be rehabilitated by filling, levelling and re-vegetation where topsoil is washed away. Maintenance of trenches Monitoring and maintenance of oil traps in relevant areas. Drip trays used. Immediately clean hydrocarbon spill.	Low-Medium

					Linear infrastructure such as roads and pipes will be inspected at least monthly to check that the associated water management infrastructure is effective in controlling erosion. Minimizing – unavoidable impacts shall be minimized by taking appropriate and practicable measures such as transplanting important plant specimens, confining works in specific area or season, restoration (and possibly enhancement) of disturbed areas, etc. Effluents and waste should be recycling and re-use as far as possible.	
Fuel Storage facility (Diesel tanks)	Groundwater contamination Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination Surface disturbance	Soil Groundwater Surface water	Construction Commissioning Operational Decommissioning Closure	Medium	Maintenance of Diesel tanks and bund walls. Oil traps Drip tray at re-fuelling point. Refuelling must take place in well demarcated areas and over suitable drip trays to prevent soil pollution. Spill kits to clean up accidental spills from earthmoving machinery must be well-marked and available on site. Workers must undergo induction to ensure that they are prepared for rapid clean-up procedures.	Low

					All facilities where dangerous materials are stored must be contained in a bund wall. Vehicles and machinery should be regularly serviced and maintained.	
Mining Area	Dust Noise Removal and disturbance of vegetation cover and natural habitat of fauna Accelerated erosion of areas adjacent to workings that have been de-vegetated leads to increased suspended sediment loads in nearby streams and rivers. Wind-blown dusts from unprotected tailings and waste rock dumps enter aquatic environment. Soil contamination Surface disturbance	Air quality Fauna Flora Groundwater Noise and vibration Soil Surface Water Topography Safety	Commissioning Operational Decommissioning Closure	Medium	Access control Dust control and monitoring Noise and vibration control and monitoring Continuous rehabilitation Storm water run-off control Immediately clean hydrocarbon spill Drip trays MRD stability control and monitoring Erosion control Noise control Well maintained equipment Selecting equipment with lower sound power levels; Re-locate noise sources to areas which are less noise sensitive, to take advantage of distance and natural shielding; Develop a mechanism to record and respond to complaints. Minimizing – unavoidable impacts shall be minimized by taking appropriate and practicable measures such as transplanting important plant specimens, confining works in specific area or season,	Low

	Surface water contamination				restoration (and possibly enhancement) of disturbed areas, etc. Effluents and waste should be recycling and re-use as far as possible. The extent of the mining area should be demarcated on site layout plans (preferably on disturbed areas or those identified with low conservation importance). Appointment of a full-time ECO must render guidance to the staff and contractors with respect to suitable areas for all related disturbance, and must ensure that all contractors and workers undergo environmental induction prior to commencing with work on site. All those working on site must undergo environmental induction with regards to fauna and in particular awareness about not harming or collecting species such as snakes, tortoises and owls which are often persecuted out of superstition. All those working on site must be educated about the conservation importance of the fauna and flora occurring on site. The environmental induction should occur in the appropriate languages	

					for the workers who may require translation. Reptiles and amphibians that are exposed during the clearing operations should be captured for later release or translocation by a qualified expert. Employ measures that ensure adherence to the speed limit. Careful consideration is required when planning the placement for stockpiling topsoil and the creation of access routes in order to minimise the overall mining footprint. The footprint areas of the mining activities must be scanned for Red Listed and protected plant species prior to mining Snares & traps removed and destroyed Implementation of a suitable management action plan during the operation of the proposed diamond mine, based on analysis of bi-annual water quality and biological monitoring data collected at sites upstream and downstream of all activities; Prevention of exotic vegetation encroachment; Prevent further siltation within the river segment as well as downstream of activities;	

					Unnecessary destruction of marginal and instream habitat should always be avoided during operations.	
Salvage yard (Storage and laydown area)	Groundwater contamination Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination Surface disturbance Surface water contamination	Fauna Flora Groundwater Soil Surface Water	Construction Commissioning Operational Decommissioning Closure	Medium	Access Control Maintenance of fence Storm water run-off control Immediately clean hydrocarbon spill	Low
Product Stockpile area	Dust Noise Removal and disturbance of vegetation cover and natural habitat of fauna Surface disturbance	Air Quality Fauna Flora Noise Soil Surface Water	Commissioning Operational Decommissioning Closure	Medium	Dust Control and monitoring Noise control and monitoring Drip trays Storm water run-off control Immediately clean hydrocarbon spills Rip disturbed areas to allow re-growth of vegetation cover Noise control Well maintained equipment Selecting equipment with lower sound power levels; Re-locate noise sources to areas which are less noise sensitive, to take advantage of distance and natural shielding;	Low

					Develop a mechanism to record and respond to complaints.	
Waste disposal site (domestic and industrial waste):	Groundwater contamination Contamination of soil Surface water contamination	Groundwater Soil Surface water	Construction Commissioning Operational Decommissioning Closure	Medium	Storage of waste within receptacles Storage of hazardous waste on concrete floor with bund wall Removal of waste on regular intervals	Low
Roads (both access and haulage road on the mine site):	Dust Groundwater contamination Noise Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination Surface disturbance	Air quality Fauna Flora Groundwater Noise and vibration Soil Surface water	Construction Commissioning Operational Decommissioning Closure	Medium	Maintenance of roads Dust control and monitoring Noise control and monitoring Speed limits Storm water run-off control Erosion control Immediately clean hydrocarbon spills Rip disturbed areas to allow re-growth of vegetation cover Noise control Well maintained equipment Selecting equipment with lower sound power levels; Re-locate noise sources to areas which are less noise sensitive, to take advantage of distance and natural shielding; Develop a mechanism to record and respond to complaints. Linear infrastructure such as roads and pipelines will be inspected at least monthly to check that the associated water management	Low

					infrastructure is effective in controlling erosion.	
Temporary Workshop Facilities and Wash Bay	Groundwater contamination Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination	Groundwater Soil Surface water	Construction Commissioning Operational Decommissioning Closure	Medium	Concrete floor with oil/water separator Storm water run-off control Immediately clean hydrocarbon spills	Low
Water distribution Pipeline	Surface disturbance	Fauna Flora Surface Water	Construction Commissioning Operational Decommissioning Closure	Medium	Monitor pipeline for water leaks Maintenance of pipeline Linear infrastructure such as roads and pipelines will be inspected at least monthly to check that the associated water management infrastructure is effective in controlling erosion.	Low
Water tanks: 1 X 10 000 litre water tanks and purifiers for potable water.	Surface disturbance	Fauna Flora Surface Water	Construction Commissioning Operational Decommissioning Closure	Medium	Maintain water tanks and structures	Low

j) Summary of specialist reports

(This summary must be completed if any specialist reports informed the impact assessment and final site layout process and must be in the following tabular form):-

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS HTAT HAVE BEEN INCLUDED IN THE EIA REPORT (Mark with an X where applicable)	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED
Appendix 4 Ecological Study Dr. Betsie Milne	Much of the study area has already been transformed through historic mining activities. However, three pristine habitats occur on site of which the Sultanrivier is classified as a watercourse, and therefore considered to be highly sensitivity. It has already been affected by historic mining activities and should ideally be regarded as a no-go zone. The terrestrial habitats include the shrubland on consolidated sand and woodland on the dunes. Both these communities harbour several plant species of provincial and national conservation concern and are therefore sensitive to disturbances. The most profound impacts related to the proposed mining operation include added cumulative loss of intact habitat and biodiversity of the Succulent Karoo landscape west of Springbok, as well as potential high mortality and displacement of many whistling rat colonies. Permit applications need to be lodged with the Northern Cape Department of Environment and Nature Conservation three months prior to any removal of protected plant species, and an inquiry should be lodged regarding the process to be followed before destroying whistling rat burrows. Similarly, if any of the Vachellia erioloba trees are to be affected, a licence application regarding protected trees should be lodged with Department of Agriculture, Forestry and Fisheries three months prior to any potential disturbances to these trees. It is expected that the Mafisa operation will increase the transformation footprint on Komaggas and therefore the destruction of the natural plant species and habitats is inevitable. The significance of the impacts will ultimately be affected by the success of the mitigation measures implemented during the mining operation. In my opinion, authorisation for the proposed operation can be granted if the applicant commits to the strict adherence of effective avoidance, management, mitigation, and rehabilitation measures.	X	
Appendix 5 Heritage Impact Assessment	No archaeological or historical relics of heritage value were observed in the footprint of the mine. The mining application can be considered in light of these findings. The study is mindful that some important discoveries	X	

Dr. Edward Matenga	during the excavations. If this happens operations should be halted, and the provincial heritage resources authority or SAHRA notified in order for an investigation and evaluation of the finds to take place.		
Appendix 6 Palaeontological Impact Assessment Dr. Marion Bamford	A Palaeontological Impact Assessment was requested for the Mining Rights Application for Portion 5 of Farm Kammagas No 200, in the Nhama Khoi Local Municipality, about 50 km west northwest of Springbok, Northern Cape Province. To comply with the regulations of the South African Heritage Resources Agency (SAHRA) in terms of Section 38(8) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA), a desktop Palaeontological Impact Assessment (PIA) was completed for the proposed development. The proposed mining area lies on non-fossiliferous volcanic rocks of the Namaqua-Natal Province and fluvial Tertiary gravels and sands along the Buffels River. Although the area is shown to be of low significance on the SAHRIS palaeosensitivity map, fossil ferns have been recovered from the adjacent farm, Buffelsbank. Therefore, a Fossil Chance Find Protocol should be added to the EMPr. Based on this information it is recommended that no further palaeontological impact assessment is required unless fossils are found by the environmental officer or other designated responsible person when excavations and mining commence. As far as the palaeontology is concerned, it is recommended that the project be authorised.	X	

Attach copies of the Specialist Reports as appendices (All studies attached as Appendix 4 – 6)

k) Environmental impact statement

(i) Summary of the key findings of the environmental impact assessment;

Dr. Betsie Milne from Boscia Ecological Consultants has been appointed by Mafisa Mining (Pty) Ltd to provide an ecological study in order to highlight the ecological characteristics of the proposed mining area and to determine the possible impact of mining on the diversity and ecological status of the application area. An Ecological Impact Assessment was described and included in this report as part of the ecological study Appendix 4 attached to the report).

Much of the study area has already been transformed through historic mining activities. However, three pristine habitats occur on site of which the Sultanrivier is classified as a watercourse, and therefore considered to be highly sensitivity. It has already been affected by historic mining activities and should ideally be regarded as a no-go zone. The terrestrial habitats include the shrubland on consolidated sand and woodland on the dunes. Both these communities harbour several plant species of provincial and national conservation concern and are therefore sensitive to disturbances. The most profound impacts related to the proposed mining operation include added cumulative loss of intact habitat and biodiversity of the Succulent Karoo landscape west of Springbok, as well as potential high mortality and displacement of many whistling rat colonies.

Permit applications need to be lodged with the Northern Cape Department of Environment and Nature Conservation three months prior to any removal of protected plant species, and an inquiry should be lodged regarding the process to be followed before destroying whistling rat burrows. Similarly, if any of the Vachellia erioloba trees are to be affected, a licence application regarding protected trees should be lodged with Department of Agriculture, Forestry and Fisheries three months prior to any potential disturbances to these trees.

It is expected that the Mafisa operation will increase the transformation footprint on Komaggas and therefore the destruction of the natural plant species and habitats is inevitable. The significance of the impacts will ultimately be affected by the success of the mitigation measures implemented during the mining operation. In my opinion, authorisation for the proposed operation can be granted if the applicant commits to the strict adherence of effective avoidance, management, mitigation, and rehabilitation measures.

Dr. Edward Matenga from (AHSA) Archaeological and Heritage Services Africa Pty Ltd Consultants has been appointed by Mafisa Mining (Pty) Ltd to provide a Heritage Impact Assessment in order to highlight the heritage characteristics of the proposed mining area and to determine the possible impact of mining on the heritage status of the application area. (Appendix 5 attached to the report).

Heritage Impact Assessments are prescribed under Section 38(8) of the National Heritage Resources Act (No 25/1999) which requires that screening is undertaken for the possible occurrence of heritage resources that may be affected by the proposed mining, on the basis of which appropriate mitigation measures will be prescribed.

This report is based on ground survey undertaken on 5 September 2021.

Observations

No archaeological or historical relics were found except for a building complex from where the mine administration operated. The building frame stands, but the roof is missing. The building bears no important architectural elements and is therefore considered of low heritage value.

In the broader area around Springbok it has been observed that there is a sparse occurrence of archaeological finds which are generally expected to date to the Stone Age periods. There is little that remains of the original surface in a large western and northern part of the property due to opencast mining and the presence of large stockpiles of earth and stones. The south-eastern and eastern margins of the mining area which are untouched are occupied by dunes with a fairly deep red sand burden. If there were archaeological artefacts they are buried under the windblown sands.

Conclusion and Recommendations

No archaeological or historical relics of heritage value were observed in the footprint of the mine. The mining application can be considered in light of these findings. The study is mindful that some important discoveries during the excavations. If this happens operations should be halted, and the provincial heritage resources authority or SAHRA notified in order for an investigation and evaluation of the finds to take place.

Palaeontological

Prof Marion Bamford from (AHSA) Archaeological and Heritage Services Africa Pty Ltd Consultants has been appointed by Mafisa Mining (Pty) Ltd to provide a Palaeontological Impact Assessment in order to highlight the palaeontological characteristics of the proposed mining area and to determine the possible impact of mining on the Palaeontology status of the application area. (Appendix 6 attached to the report).

To comply with the regulations of the South African Heritage Resources Agency (SAHRA) in terms of Section 38(8) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA), a desktop Palaeontological Impact Assessment (PIA) was completed for the proposed development.

The farm lies in the Namaqua-Natal Province in the Namaqua section. The Namaqua-Natal Province is a tectono-stratigraphic province and forms the southern and western boundary of the ancient Kaapvaal Craton, and extends below the Karoo Basin sediments to the south (Cornell et al., 2006). It comprises rocks that were formed during the Namaqua Orogeny (mountain-building) some 1200 – 1000 million years ago. It has been divided by geologists into a number of terranes (similar lithology and bounded by shear zones). There are three main lithologic units used to separate the terranes as well as the

shear zones but still there is some debate about the terranes (ibid). Very simply, the lithologic units are older reworked rocks, juvenile rocks formed during tectonic activities and metamorphosed, and intrusive granitoids.

According to Cornell et al. (2006) the five terranes are:
A - Richtersveld Subprovince (undifferentiated terranes)
B – Bushmanland Terrane (granites)
C – Kakamas Terrane (supracrustal metapelite ca 2000 Ma
D – Areachap Terrane (supracrustal rocks and granitoids)
E – Kaaien Terrane (Keisian aged metaquartzites and deformed volcanic rocks).

The project lies in the Bushmanland Terrane with its northern boundary against the Richtersveld Subprovince and the eastern boundary against the Kakamas Terrance (ibid). According to Moore et al. (1990, in Cornell et al., 2006), the Bushmanland Terrane rocks can be divided into three distinct age group:

1. A basement complex (Achab Gneiss, Gladkop Suite) that is mainly composed of granitic rocks of Kheisian age (2050 - 1700 Ma).
2. A variety of supracrustal sequences of mixed sedimentary and volcanic origin and probably fitting into three broad age groups (ca 1900, 1600 and 1200 Ma).
3. Suites of syn- and late-tectonic Namaquan intrusive rocks, generally of granitic to charnockitic composition. This group includes the Little Namaqualand Suite (ca 1200 Ma), the Spektakel Suite (ca 1060 Ma) and the basic rocks of the Koperberg and Wortel Suites and Nouzees Complex (1060 – 1030 Ma), as well as the ca 950 Ma pegmatites.

The Namaqua-Natal Province rocks are volcanic in origin and frequently metamorphosed. Several outcrops occur on the farms along the route and probably underlie the Gordonia sands and Tertiary Calcretes.

Today the Orange River drains the central part of southern Africa into the Atlantic Ocean in the west but the route of this river has not remained the same over time (de Wit, 1999; de Wit et al., 2000; Haddon and McCarthy, 2005). During the Cretaceous there were two major westward-draining rivers, the northerly on called the Kalahari River that exited where the Orange River does today, and the southerly Karoo River that drained the central Highveld and exited where the Olifants River does today. Subsequent tectonic uplift of the continent in the Late Cretaceous, and altered drainage has led to one river capturing another. By the Miocene, the capture of the middle Orange by the lower Orange River had already occurred (de Wit, 1999), and de Wit et al. (2000) believe that the Orange River has followed its present course since at least the late Oligocene. The terraces along the lower Orange River, therefore, represent different times and levels of the river, and deposits from different distant sources.

The Buffels River of today, that exits at Kleinzee, was possibly part of the palaeo-Orange river and might have been since the Miocene. The climate reconstructed for the Orange River most likely applied to the Buffels River but the degree of uplift and erosion could have been different (Pickford, 2016). Nonetheless, the fluvial gravels, sands and alluvium along the river also have entrapped diamonds weathering out from the kimberlites pipes in Namaqualand and eastwards.

Palaeontological context

The rocks of the Namaqua-Natal Province are volcanic in origin and have been metamorphosed so they do not preserve any fossils.

The ubiquitous Aeolian sands of the Gordonia Formation do not preserve fossils because they have been transported and reworked, but in some regions these too may have covered pan or spring deposits and these can trap fossils, and more frequently archaeological artefacts. Usually these geomorphological features of pans and springs can be detected using satellite imagery. No such features are visible.

Along the river there are diamondiferous gravels and although they are shown as have insignificant sensitivity there is a small chance that they are fossiliferous. Fossils have been collected from Buffelsbank and they are in situ stems of a fern and probably Oligocene in age (Bamford, 2000). The transported materials could include alluvial diamonds and some fossils, such as fragments of silicified woods or bones that came from eroded deposits close by or very distant. Their context would be unknown. It is more likely that fossils could be preserved in abandoned river channels or oxbows, such as is the case at Arrisdrift and Daberas (Pickford and Senut, 2003) farther upstream, but these are not adjacent to the present river channel where there is active water and sediment transport.

Assumptions and uncertainties

Based on the geology of the area and the palaeontological record as we know it, it can be assumed that the formation and layout of the gneiss, sandstones, shales and sands are typical for the country and do not contain fossil plant, insect, invertebrate and vertebrate material. The metamorphosed volcanic rocks of the Namaqua-Natal Sequence would not preserve fossils. Only if there are transported fossils amongst the river gravels and sands of Tertiary age or the Quaternary aeolian sands, would any fossils be entrapped.

Recommendation

Based on experience and the lack of any previously recorded fossils from the area, it is extremely unlikely that any fossils would be preserved in the Tertiary gravels and sands along the Buffels River. There is a small chance that fossils may occur because ferns have been collected from the adjacent farm, Buffelsbank. Therefore, a Fossil Chance Find Protocol should be added to the EMPr. If fossils are found by the environmental officer or other responsible person once excavations and mining have commenced then they should be rescued and a palaeontologist called to assess and collect a representative sample.

Chance Find Protocol

Monitoring Programme for Palaeontology – to commence once the excavations / drilling / mining activities begin.

1. The following procedure is only required if fossils are seen on the surface and when drilling/excavations/mining commence.
2. When excavations begin the rocks and must be given a cursory inspection by the environmental officer or designated person. Any fossiliferous material (plants, insects, bone, coal) should be put aside in a suitably protected place. This way the project activities will not be interrupted.
3. Photographs of similar fossils must be provided to the developer to assist in recognizing the fossil plants, vertebrates, invertebrates or trace fossils in the

shales and mudstones. This information will be built into the EMP's training and awareness plan and procedures.

4. Photographs of the putative fossils can be sent to the palaeontologist for a preliminary assessment.
5. If there is any possible fossil material found by the developer/environmental officer/miners then the qualified palaeontologist sub-contracted for this project, should visit the site to inspect the selected material and check the dumps where feasible.
6. Fossil plants or vertebrates that are considered to be of good quality or scientific interest by the palaeontologist must be removed, catalogued and housed in a suitable institution where they can be made available for further study. Before the fossils are removed from the site a SAHRA permit must be obtained. Annual reports must be submitted to SAHRA as required by the relevant permits.
7. If no good fossil material is recovered then no site inspections by the palaeontologist will be necessary. A final report by the palaeontologist must be sent to SAHRA once the project has been completed and only if there are fossils.
8. If no fossils are found and the excavations have finished then no further monitoring is required.

(ii) Final Site Map;

Provide a map at an appropriate scale which superimposes the proposed overall activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicated any areas that should be avoided, including buffers. Attach as **Appendix (Figure 13)**

The final site map below indicates the mining right application area in which all mining will take place. Existing roads are also depicted. The associated infrastructure relating to the mining site is also indicated.

No mining operations are carried out within a horizontal distance of 100 (one hundred) metres from reserve land, buildings, roads, railways, dams, waste dumps, or any other structure whatsoever including such structures beyond the mining boundaries, or any surface, which it may be necessary to protect in order to prevent any significant risk, unless a lesser distance has been determined safe by risk assessment and all restrictions and conditions determined in terms of the risk assessment are complied with;

No construction or excavation work shall be executed within 11 metres from any Eskom power line structure, and/or within 11 metres from any stay wire.

Please see Final Site Map below.

Figure 32. Final Site Surface layout map with sensitivity map.

(iii) Summary of the positive and negative implications and risks of the proposed activity and identified alternatives;

As mentioned before, the specific occurrence of diamonds in the area dictates the selection of the specific mining site and there are no alternatives in terms of project location.

In terms of alternative land use, the proposed mining operation will be done in such a way that grazing will still be possible as the site will be rehabilitated in such a way that it allows the establishment of grass cover again.

The mining operation will provide 20 to 25 jobs and will also add to the increased economic activity and the area surrounding the application area, the community is also a shareholder in the operation.

Excavations, where and when applicable, should be rehabilitated concurrently as mining progresses. The re-vegetation of disturbed areas is important to prevent erosion and improve the rate of infiltration.

During the operational stages of the mining operation, there is a possibility of sterilisation of the mineral reserves and resources due to improper placement of infrastructure. However, the site layout plan has been developed not to place any infrastructure where resource materials could be located. The infrastructure and excavations /dumps will alter the topography by adding features to the landscape. Topsoil removal and Mine Residue Dumps will change the natural topography. The construction of infrastructure and various facilities in the mining area can also result in loss of soil due to erosion. Vegetation will be stripped in preparation for placement of infrastructure and mining of alluvial gravels, and therefore the areas will be bare and susceptible to erosion.

The topsoil that is stripped and piled on surrounding areas can be eroded by wind and rain. The soil will be carried away during runoff. The cleared areas will be rehabilitated, but full restoration of soils might only occur over a number of years, subsequent to the re-establishment of vegetation. Furthermore, improper stockpiling and soil compaction can result in soil sterilisation. Leaching can also occur, resulting in the loss of nutrients.

There is also a possibility that equipment might leak oil, thus causing surface spillages. The hydrocarbon soil contamination will render the soil useless unless they are decontaminated. The storage of fuels on site might have an impact on soil if the tanks that are available on site are not properly monitored and maintained to avoid leakages. Then there is the potential that contaminated soil can be carried through runoff to contaminate water resources and soil stockpiled for rehabilitation. Soil pollution is therefore possible, but through mitigation it can be minimised.

The loss of land capability and land use can occur in two ways. Firstly, through topsoil removal, disturbances and loss of soil fertility; and secondly through the improper placement of infrastructure. Most of the site has a land capability for grazing, but grazing activities can still be performed in areas not earmarked for the operation, and with proper rehabilitation the land capabilities and land use potential can be restored.

Groundwater could be directly affected if any oil and fuel spillages occur during these scenarios and activities, then groundwater will be directly contaminated. Similarly, hazardous surface spillages will seep into the underlying aquifers and contaminate ground water. Improper handling of hazardous material will cause contamination of nearby surface water resources during runoff episodes. Lack of storm control structures will lead to erosion of stockpiles during heavy rains and runoff will carry suspended solids into the downstream environment. This might cause high silt load and affect stream flow. If no, or inadequate ablution facilities are available then workers might feel the need to use the veld for this purpose, which can contaminate natural resources.

Any dumping within the drainage lines will impact on the surface water environment by altering their physical characteristics. These impacts include the alteration of flow patterns, ponding and an increase in the concentration of suspended solids and sedimentation.

Mining activities on site will reduce the natural habitat for ecological systems to continue their operation. While general clearing of the area and mining activities destroy natural vegetation, invasive plants can increase due to their opportunistic nature in disturbed areas. If invasive plants establish in disturbed areas, it may cause an impact beyond the boundaries of the mining site. These alien invasive species are thus a threat to surrounding natural vegetation and can result in the decrease of biodiversity and ecological value of the area. Therefore, if alien invasive species are not controlled and managed, their propagation into new areas could have a high impact on the surrounding natural vegetation in the long term. With proper mitigation, the impacts can be substantially reduced.

The transformation of natural habitats to mining and associated infrastructure will result in the loss of habitat affected individual species, and ecological processes. In turn this will result in the displacement of faunal species dependent upon such habitat. Increased noise and vibration due to operational activities will disturb and possibly displace birds and other wildlife. Fast moving vehicles take a heavy toll in the form of road kills of small mammals, birds, reptiles, amphibians and a large number of invertebrates.

During the operation the abovementioned activities have potential for dust generation. It is anticipated that the extent of dust emissions would vary substantially from day to day depending on the level of activity and the specific operations. The operation will typically have low to moderate levels of noise, along with man-influenced sounds such as traffic on the secondary road and very occasional air traffic. The proposed operation will add a certain amount of noise to the existing noise in the area.

The impact of site generated trips on the traffic and infrastructure of the existing roads is expected to be moderate. Furthermore, if road safety is not administered it can have a high impact on the safety of fellow road users.

The activities on site have the potential to impact upon heritage resources. Heritage sites are fixed features in the environment, occurring within specific spatial confines. Any impact upon these resources will be permanent and irreversible. Any movement of vehicles, equipment or personnel through areas containing these artefacts could result in the permanent destruction of the artefacts and loss of heritage resources.

The operation will create a number of new employment opportunities and uplift the local community. The magnitude of this impact will depend on the number of people that will be employed and the number of contractors sourced. An influx of people into the area could possibly impact on safety and security of local residents. During the decommissioning and at closure of the site, staff will most likely be retrenched, resulting in people being unable to find new employment for a long period of time.

Economic slump of the local towns after site closure is not considered to be an associated potential impact, because there are numerous other mining operations in the region. However, income streams from wage bills as well as goods and services contracts (at all geographical levels) will come to an end, reducing the monetary income of individuals and operation-related businesses.

It is likely, however that there will be residual positive economic impacts that are not fully reversed with the closure of the site, and that the economy will not decline to its original level prior to the development of this project. This is because the operation will generate substantial income for the regional and local economy, both directly and indirectly, during its life.

In terms of the Social Impact Assessment findings derived from the information available at this stage it is concluded that the likely benefits of the proposed project outweigh the potential social risks and/or threats to the local communities. However, as indicated earlier in the report, the possible impact on the infrastructure and service needs due to the inflow of an additional workforce should be addressed. It would remain the responsibility of the Local Municipality, but considering the social framework within which the mine operates, it is important for the mine to engage with the SPM in this regard to minimise any possible negative impacts. Such engagement should also contribute to meaningful contributions to the communities situated in close proximity to the mine.

It is furthermore important to ensure that any negative impacts as a result of the mining activities on the residents should be limited.

The mining activities and associated infrastructure by itself will thus not introduce new social risks and hazards, but only increase the probability and scale of those already associated with the existing mining activities.

On a more detailed level, the following **positive** impacts are anticipated:

- The creation of job opportunities in the area, and associated local economic development;
- Economic and revenue contribution to the local municipal area, as well as the adjacent municipalities;
- The involvement of Mafisa with regards to training and capacity building of his employees and subsequent improvement of the livelihoods of the employees' families, as well as its efforts in sustaining the socio-economic development of the communities in close proximity to the operation;
- The involvement of Mafisa with regards to social development projects and support through the Integrated Development Plans (IDPs);
- The positive impact of mining activity on the regional and local economy; and
- Positive impact of extensive local procurement focus.

Negative impacts as a result of the mining activity refer to:

- Inconvenience and intrusion impact during the start-up and construction phases of the project such as the inflow of an additional workforce to the area, the possible influx of jobseekers, possible increase in the criminal activities (safety and security issues), disruption of social networks, as well as possible health risks;
- Disruptions in the daily living and movement patterns (increased traffic and possible dust pollution);
- Additional pressure on infrastructure development and maintenance;
- General intrusion impacts such as visual and noise pollution

From a social perspective it can be concluded that the proposed Mafisa Project would not result in permanent damaging social impacts. The socio-economic benefits associated with the mine outweigh the negative social impacts. It is thus concluded that the proposed project is acceptable from a social point of view, provided that mitigation measures are implemented.

Negative impacts on the area are expected to be temporary and can be mitigated to a large extent if the recommendations of the EMPR are adhered to e.g. ongoing environmental management and rehabilitation once the mine reaches its end of life.

l) Proposed impact management objectives and the impact management outcomes for inclusion in the EMPr

Based on the assessment and where applicable the recommendations from specialist reports, the recording of proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr as well as conditions of authorisation.

Air Quality

- To limit the creation of nuisance, dust the following management guidelines must be followed:
    - Avoidance of unnecessary removal of vegetation.
    - Routine spraying of unpaved site areas and roads utilized by the mining operation with water.
    - Speed limits of vehicles inside the mining area must be strictly controlled to avoid excessive dust or the excessive deterioration of the roads to be used.
    - Continuous dumping and rehabilitation of disturbed areas.
    - All cleared, disturbed or exposed areas must be re-vegetated as soon as practically possible to prevent the formation of additional sources of dust.

Archaeology:

- All operators of equipment should be made aware of the possibility of the occurrence of sub-surface heritage features and the following procedures should they be encountered:
    - All construction in the immediate vicinity (50m radius of the site) should cease.
    - The heritage practitioner should be informed as soon as possible.
    - In the event of obvious human remains the SAPS should be notified.
    - Mitigation measures (such as refilling) should not be attempted.
    - The area in a 50m radius of the find should be cordoned off with hazard tape.
    - Public access should be limited.
    - No media statement should be released until such time as the heritage practitioner has had sufficient time to analyse the finds.

Fauna

- To ensure a minimum of impact to animals the following management guidelines will be followed:
    - Speed limits of vehicles inside the application area must be strictly controlled to avoid road kills.
    - Continuous controlled dumping and backfilling.
    - Operational areas must be low angled as a preventative measure to ensure an escape route for animals.
    - No hunting (snares) must be allowed at the application area or in the surrounding area.
    - All mining and access roads must be fenced.

Flora

- No trees or shrubs must be felled or damaged for the purpose of obtaining firewood.

- Management must take responsibility to control declared invader or exotic species on the site. The following control methods must be used:
    - The plants will be uprooted, felled or cut off and can be destroyed completely.'
    - The plants will be treated with an herbicide that is registered for use in connection therewith and in accordance with the directions for the use of such an herbicide.
- Valid permits from DAFF must be obtained before any protected plant species are removed or damaged if encountered.
- Continuous controlled dumping and spreading of previously stored topsoil over the rehabilitated areas.
- All rehabilitated areas, where applicable and possible must be seeded with a vegetation seed mix adapted to reflect the local indigenous flora that was present prior to mining activities commenced if the natural succession of vegetation is unacceptably slow.
- Fires may only be allowed in facilities or equipment specially constructed for this purpose.
- The end objective of the re-vegetation program must be to achieve a stable self-sustaining habitat unit.

Groundwater

- Vehicle- and equipment maintenance must only be allowed within the maintenance area. Only emergency breakdowns may be allowed in other areas.
- The following procedure must be followed if a vehicle or piece of equipment would break down inside an excavation and outside of the maintenance area.
    - Drip pans must be placed at all points where diesel, oil or hydraulic fluid may drip and in so doing contaminate the soil.
    - All efforts must be made to move the broken-down vehicle or piece of equipment to the maintenance area.
    - If the vehicle/piece of equipment cannot be moved, the broken part must firstly be drained of all fluid. The part must then be removed and taken to the maintenance area.
- No repairs may be allowed outside the maintenance area except for emergencies.
- Equipment used as part of the proposed operation must be adequately maintained so as to ensure that the oil, diesel, grease or hydraulic fluid does not leak during the operation.
- Fuel and other petrochemicals must be stored in steel receptacles that comply with SANS 10089-1:2003 (SABS 089-1:2003) standards. An adequate bund wall, 150% of volume of the largest storage receptacle, must be provided for fuel and diesel areas to accommodate any spillage or overflow of these substances. The area inside the bund wall must be lined with an impervious lining to prevent infiltration of the fuel into the soil (and ultimately groundwater).
- Proper sanitation facilities must be provided for employees. No person may pollute the workings with faeces or urine, misuse the facilities provided or inappropriately foul the surrounding environment with faeces or urine.
- Acceptable hygienic and aesthetic practices must be adhered to.
- The workshops, washing bays and sewage tanks should be constructed far away from significant aquifer systems.
- SOP for storage, handling and transport of different hazardous materials.

- Place oil traps (drip trays) under stationary vehicles, only re-fuel al fuelling stations, construct structures to trap fuel spills at fuelling stations, immediately clean oil and fuel spills and dispose of contaminated material at licensed sites only.
- Ensure good housekeeping rules.

Noise

- Working hours must be kept between sunrise and sunset as far as possible.
- As a minimum, ambient noise levels emanating from the mining activities may not exceed 82dBA at the site boundary.
- The Company must comply with the Occupational Noise Regulations of the Occupational Health and Safety Act, Act 85 of 1993.
- The company must comply with the measures for good practice with regard to management of noise related impacts during construction and operation.
- The management objective must be to reduce any level of noise, shock and lighting that may have an effect on persons or animals, both inside the plant area and that which may migrate outside the plant area.
- When the equivalent noise exposure, as defined in the South African Bureau of Standards Code of Practice for the Measurement and Assessment of Occupational Noise for Hearing Conservation Purposes, SABS 083 as amended, in any place at or in any mine or works where persons may travel or work exceeds 82 dB (A), the site manager will take the necessary steps to reduce the noise below this level.
- Hearing protection must be provided to all employees where attenuation cannot be implemented.
- If any complaints are received from the public or state department regarding noise levels the levels will be monitored at prescribed monitoring points.

Mechanical equipment

- All mechanical equipment must be in good working order and vehicles must adhere to the relevant noise requirements of the Road Traffic Act.
- All vehicles in operation must be equipped with a silencer on its exhaust system.
- Safety measures, which generate noise such as reverse gear alarms on large vehicles, must be appropriately calibrated / adjusted.

Screening / Migration Control:

- Appropriate measures must be specifically installed and / or employed at the plant to act as screen and to reflect/reduce the noise.
- Appropriate non-metallic washers/insulation must be used with any joining of apparatus made from materials such as corrugated iron. Such apparatus must be maintained in a fixed position.

Safety

- No employees may reside on the mine site without permission from the surface owner.
- Access and haul roads must be maintained.
- Security access point to ensure monitoring of access to the site.

Soil

- In all places of development, the first 300mm of loose or weathered material found will be classified as a growth medium. The topsoil must be removed where possible, from all areas where physical disturbance of the surface will occur.
- In all areas where the above growth medium will be impacted on, it must be removed and stockpiled on a dedicated area. The maximum height of stockpiles may not exceed 2 meters.
- The growth medium/topsoil must be used during the rehabilitation of any impacted areas, after sloping in order to re-establish the same land capability.
- If any soil is contaminated during the life of the mining area, it must either be treated on site or be removed together with the contaminant and placed in acceptable containers to be removed with the industrial waste to a recognized facility or company.
- Erosion control in the form of re-vegetation and contouring of slopes must be implemented on disturbed areas in and around the site.
- Topsoil must be kept separate from overburden and may not be used for building or maintenance of access roads.
- The stored topsoil must be adequately protected from being blown away or being eroded.
- Compacted areas must be ripped to a depth of 300mm, where possible, during the continuous rehabilitation, decommissioning and closure phases of the operation in order to establish a growth medium for vegetation.
- Vehicle movement must be confined to establish roads for as far as practical in order to prevent the compaction of soils.

Surface water

- The disposal of oil, grease and related industrial waste must be transported to the stores area where it will be stored in steel containers supplied by an oil recycling contractor. All oil and grease must be removed on a regular basis from the operation by a registered approved contractor.
- All refuse and waste from the different sections must be handled according to NEMA Guidelines. Recycling of waste is encountered in all the consumer sections of the operation, where recyclable materials must be collected before dumping them in the domestic waste disposal area.
- All non-biodegradable (recyclable) refuse such as glass bottles, plastic bags and metal scrap must be stored in a container in the waste area and collected on a regular basis and disposed of at a recognized disposal facility.
- Erosion and storm water control measures must be implemented.
- An application for an integrated Water Use Licence must be submitted at the Department of Water Affairs for all actions to be performed which requires authorization in terms of water uses.
- Vehicle repairs must only take place within the maintenance area for vehicles. Repairs within open excavations must be limited to emergency break downs with drip trays.
- Re-fuelling must only take place in the re-fuelling area. If this is found not to be practical, drip trays must be used whenever re-fuelling takes place outside of this area.

- During rehabilitation the application must endeavour to reconstruct flow patterns in such a way that surface water flow is in accordance with the natural drainage of the area as far as practically possible.
- Implementation of a suitable management action plan during the operation of the proposed diamond mine, based on analysis of bi-annual water quality and biological monitoring data collected at sites upstream and downstream of all activities;
- Prevention of exotic vegetation encroachment;
- Prevent further siltation within the river segment as well as downstream of activities;
- Unnecessary destruction of marginal and in-stream habitat should always be avoided during operations.

Topography

- All alluvial gravel excavations must be rehabilitated if and when possible and made safe so as to reflect as far as possible the pre-mining topography of the area.
- All temporary features e.g. plant, containers and stockpiling must be removed and handled in the prescribed manner during rehabilitation.

Visual

- Security Lights must be fixed at an angle to ensure that it does not cause a disturbance to the surrounding environment at night
- Alluvial Excavations must be subject to progressive backfilling and made safe (including the re-establishment of vegetation).
- Permanent structures or features that are part of the proposed mining operation must be kept neat and well presented.
- Waste material of any description must be removed from the mining area on a regular basis and be disposed of at a recognized landfill facility.

The impact management objectives for the Mafisa planned mining operation should include:

- To ensure efficient extraction of the diamonds and to prevent the sterilization of any diamond reserves.
- To limit the alteration of the surrounding topography
- To manage and preserve soil types
- To prevent the loss of land capability
- To ensure the continuation of economically viable land use.
- To ensure that the surrounding ground water resources are not adversely affected to the detriment of the health and welfare of nearby communities; and to ensure suitable quality of ground water resources.
- To ensure that the surrounding surface water resources are not adversely affected to the detriment of the health and welfare of nearby communities; and to ensure suitable quantity and quality of ground water resources.
- Rehabilitation of disturbed areas during the mine life cycle as well as during closure phase has to be done to minimize erosion and/or pollution of natural streams.
- To contain soils and materials within demarcated areas and prevent contamination of storm water runoff.

- To minimise the loss of natural vegetation.
- To prevent the proliferation of alien invasive plants species.
- To protect the wildlife and bird species.
- To protect the natural habitat of wildlife and bird species.
- To maintain visual integrity; and to minimise the extent of the generation of dust in order to minimise the aspect of nuisance and health impacts to sensitive receptors.
- To minimise noise and vibration to a level that disturbances felt by the communities are limited.
- To reduce the impact on visual quality due to intrusive mine infrastructure, activities and facilities.
- To ensure that all traffic generated by the proposed mining development does not negatively impact on existing road networks and infrastructure; and to ensure traffic safety.
- To preserve the historical and cultural artefacts located on site in compliance with the South African Heritage Resources Act, 1999 (Act No 25 of 1999).
- To ensure that the current socio-economic status quo is improved.
- To be transparent and practise effective communication; in order to maintain good relationships with all interested and affected parties.

Heritage and Palaeontology

- Some important discoveries might occur during the prospecting and mining phases. If this happens operations should be halted, and the provincial heritage resources authority or SAHRA notified in order for an investigation and evaluation of the finds to take place.

m) Final proposed alternatives

(Provide an explanation for the final layout of the infrastructure and activities on the overall site as shown on the final site map together with the reasons why they are the final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment)

The location of the central mining site and associated infrastructure is primarily based on proximity to the access roads, proximity to the areas earmarked for mining and limited additional impact on the environment and heritage resource.

It will therefore cause additional impacts if this infrastructure is moved and render the consideration of alternative mining sites useless.

The mining activities and methodologies associated with mining of alluvial diamonds is the only economic viable method currently being used by the diamond's fraternity. There is no alternative mining method for the mining of alluvial diamonds.

n) Aspects for inclusion as conditions of Authorisation

Any aspects which have not formed part of the EMPr that must be made conditions of the Environmental Authorisation

The site proposed for mining operations has been rated as being acceptable for the development. However, this is subject to the Sultan River and associated floodplain being excluded as far as possible from mining activities and that comprehensive rehabilitation is implemented.

Much of the study area has already been transformed through historic mining activities. However, three pristine habitats occur on site of which the Sultanrivier is classified as a watercourse, and therefore considered to be highly sensitivity. It has already been affected by historic mining activities and should ideally be regarded as a no-go zone. The terrestrial habitats include the shrubland on consolidated sand and woodland on the dunes. Both these communities harbour several plant species of provincial and national conservation concern and are therefore sensitive to disturbances. The most profound impacts related to the proposed mining operation include added cumulative loss of intact habitat and biodiversity of the Succulent Karoo landscape west of Springbok, as well as potential high mortality and displacement of many whistling rat colonies.

Permit applications need to be lodged with the Northern Cape Department of Environment and Nature Conservation three months prior to any removal of protected plant species, and an inquiry should be lodged regarding the process to be followed before destroying whistling rat burrows. Similarly, if any of the Vachellia erioloba trees are to be affected, a licence application regarding protected trees should be lodged with Department of Agriculture, Forestry and Fisheries three months prior to any potential disturbances to these trees.

It is expected that the Mafisa operation will increase the transformation footprint on Komaggas and therefore the destruction of the natural plant species and habitats is inevitable. The significance of the impacts will ultimately be affected by the success of the mitigation measures implemented during the mining operation. In my opinion, authorisation for the proposed operation can be granted if the applicant commits to the strict adherence of effective avoidance, management, mitigation, and rehabilitation measures.

Some important discoveries might occur during the prospecting and mining phases. If this happens operations should be halted, and the provincial heritage resources authority or SAHRA notified in order for an investigation and evaluation of the finds to take place.

Chance Find Protocol

Monitoring Programme for Palaeontology – to commence once the excavations / drilling / mining activities begin.

1. The following procedure is only required if fossils are seen on the surface and when drilling/excavations/mining commence.
2. When excavations begin the rocks and must be given a cursory inspection by the environmental officer or designated person. Any fossiliferous material (plants, insects, bone, coal) should be put aside in a suitably protected place. This way the project activities will not be interrupted.
3. Photographs of similar fossils must be provided to the developer to assist in recognizing the fossil plants, vertebrates, invertebrates or trace fossils in the shales and mudstones.

This information will be built into the EMP's training and awareness plan and procedures.

4. Photographs of the putative fossils can be sent to the palaeontologist for a preliminary assessment.
5. If there is any possible fossil material found by the developer/environmental officer/miners then the qualified palaeontologist sub-contracted for this project, should visit the site to inspect the selected material and check the dumps where feasible.
6. Fossil plants or vertebrates that are considered to be of good quality or scientific interest by the palaeontologist must be removed, catalogued and housed in a suitable institution where they can be made available for further study. Before the fossils are removed from the site a SAHRA permit must be obtained. Annual reports must be submitted to SAHRA as required by the relevant permits.
7. If no good fossil material is recovered then no site inspections by the palaeontologist will be necessary. A final report by the palaeontologist must be sent to SAHRA once the project has been completed and only if there are fossils.
   If no fossils are found and the excavations have finished then no further monitoring is required.

The general conditions; including management of activity, monitoring, recording and reporting to the Department, commissioning of the activity, operation of the activity, site closure and decommissioning as well as non-compliances; as required in terms of the Environmental Impact Assessment Regulations promulgated in terms of NEMA (Act 107 of 1998) as well as objectives and requirements of relevant legislation, policies and guidelines must be included in the Authorization.

o) Description of any assumptions, uncertainties and gaps in knowledge

(Which relate to the assessment and mitigation measure proposed)

The study took place during early summer. This is not an optimal time of the year for this habitat type, which receives winter rainfall. Some plants were flowering or in fruit, but many annuals have already died off. Due to this, combined with the brief duration of the survey, the species list obtained during the site visit cannot be regarded as comprehensive. Ideally, a site should be visited several times during different seasons to ensure that the full complement of plant species present, are captured. However, this is rarely possible due to time and cost constraints related to mining right application processes. The survey was still conducted in a way to ensure that all representative communities, common and important species are included. (Taken out of the Ecological Assessment Report of Dr. Betsie Milne).

No archaeological or historical relics were found except for a building complex from where the mine administration operated. The building frame stands, but the roof is missing. The building bears no important architectural elements and is therefore considered of low heritage value.

In the broader area around Springbok it has been observed that there is a sparse occurrence of archaeological finds which are generally expected to date to the Stone Age periods. There is little that remains of the original surface in a large western and northern part of the property due to opencast mining and the presence of large stockpiles of earth and stones. The south-eastern and eastern margins of the mining area which are untouched are occupied by dunes

with a fairly deep red sand burden. If there were archaeological artefacts they are buried under the windblown sands. (Taken out of the PIA of Prof Marion Bamford).

All possible care was taken to identify and document heritage resources during the survey in accordance with best practices in archaeology and heritage management. However, it is always possible that some hidden or subterranean sites are overlooked during a survey.

The above mitigation measures are tried and tested over many years in the diamond mining industry. The Company must monitor the potential impacts throughout the life of operation, and mitigate any deviations detected. This has been proven to be very effective in existing operations.

The EAP who compiled this document and the specialists who compiled the respective specialist reports have extensive knowledge in their field and it is therefore assumed that the above assumptions are adequate, and that the information provided is correct.

p) Reasoned opinion as to whether the proposed activity should or should not be authorised

i) Reasons why the activity should be authorized or not.

There are no significant reasons why the activity should not be authorised. However, if the proposed management and mitigation measures are not properly applied or if the mining operation intentionally disregards any of these measures, it will negatively affect the environment and have more long-term consequences. Therefore, the competent authority should take all the necessary steps to ensure that the mining operation complies with the conditions set out in the approval of the EMPR.

ii) Conditions that must be included in the authorisation.

(1) Specific conditions to be included into the compilation and approval of EMPr

The site proposed for mining operations has been rated as being acceptable for the development. However, this is subject to the Sultan River and associated floodplain being excluded as far as possible from mining activities and that comprehensive rehabilitation is implemented.

According to the South African Inventory of Inland Aquatic Ecosystems (SAIIAE), the study area falls within the Namaqualand Hardeveld Bioregion, where less than 1 % (1 347 ha) of the land area is covered by inland wetlands, including depressions, seeps and valley-bottoms (Van Deventer et al. 2019). The spatial extent according to the present ecological status per wetland type is depicted in the ecological study. Many of the depressions are still in natural or near-

natural condition, but most of the seeps and valley-bottoms have been critically modified. The Buffels River, to the north of the study area, is largely natural. No wetlands occur on Komaggas, but the Sultanrivier, a small ephemeral tributary to the Buffels River, lies along the western boundary of the site. This river was not formally mapped or assessed by the SAIIAE.

Much of the study area has already been transformed through historic mining activities. However, three pristine habitats occur on site of which the Sultanrivier is classified as a watercourse, and therefore considered to be highly sensitivity. It has already been affected by historic mining activities and should ideally be regarded as a no-go zone. The terrestrial habitats include the shrubland on consolidated sand and woodland on the dunes. Both these communities harbour several plant species of provincial and national conservation concern and are therefore sensitive to disturbances. The most profound impacts related to the proposed mining operation include added cumulative loss of intact habitat and biodiversity of the Succulent Karoo landscape west of Springbok, as well as potential high mortality and displacement of many whistling rat colonies.

The pristine terrestrial habitats on site harbour a number of very specialised, sensitive, protected endemic plants and provides potential habitat for protected bird-, reptile-, and invertebrate species. Therefore, it is of high sensitivity. It is not regarded as a no-go area, but activities should proceed with caution as it may not be possible to mitigate all impacts appropriately.

The areas transformed by past mining activities are considered to have low ecological sensitivity. There is likely to be a negligible impact on ecological processes and biodiversity here and therefore most types of activities can proceed within these areas with little ecological impact.

Permit applications need to be lodged with the Northern Cape Department of Environment and Nature Conservation three months prior to any removal of protected plant species, and an inquiry should be lodged regarding the process to be followed before destroying whistling rat burrows. Similarly, if any of the Vachellia erioloba trees are to be affected, a licence application regarding protected trees should be lodged with Department of Agriculture, Forestry and Fisheries three months prior to any potential disturbances to these trees.

It is expected that the Mafisa operation will increase the transformation footprint on Komaggas and therefore the destruction of the natural plant species and habitats is inevitable. The significance of the impacts will ultimately be affected by the success of the mitigation measures implemented during the mining operation. In my opinion, authorisation for the proposed operation can be granted if the applicant commits to the strict adherence of effective avoidance, management, mitigation, and rehabilitation measures.

The general conditions; including management of activity, monitoring, recording and reporting to the Department, commissioning of the activity, operation of the activity, site closure and decommissioning as well as non-compliances; as required in terms of the Environmental Impact Assessment Regulations promulgated in terms of NEMA (Act 107 of 1998) as well as objectives and requirements of relevant legislation, policies and guidelines must be included in the Authorization.

(2) Rehabilitation requirements

A Detailed rehabilitation plan will be appended to the EMPR. The Mine had to provide to the DMRE, a financial rehabilitation guarantee to the amount as calculated in terms of the financial quantum Guideline and approved by the DMR.

Infrastructure areas

On completion of the mining operation, the various surfaces, including the access road, the office area, storage areas and the plant site, will finally be rehabilitated as follows: All other material on the surface will be removed to the original topsoil level where possible. This material will then be backfilled into any open pits. Any compacted area will then be ripped to a depth of 300mm, where possible, the topsoil or growth medium returned and landscaped.

All infrastructures, equipment, plant, and other items used during the operational period will be removed from the site.

On completion of operations, all buildings, structures or objects on the office site will be dealt with in accordance with regulation 44 of the Minerals and Petroleum Resources Development Act, 2002.

Topsoil and Stockpile Deposits:

Disposal Facilities: Waste material of all description inclusive of receptacles, scrap, rubble and tyres should be removed entirely from the mining area and disposed of at a recognized landfill facility. It should not be permitted to be buried or burned on the site.

Ongoing Seepage, Control of Rain Water:

Water Quality Management in accordance with the South African Water Quality Guidelines must be adhered to in order to provide timely and accurate water data to the Department of Water and Sanitation (DWS) as well as to manage impacts caused by the activity. Specific objectives of such a program are to:

- Determine whether water quality comply with water quality standards.
- Provide timely data for intervention as and when required.
- Assess the status of water quality in the surrounding areas.

- Provide analytical water quality information describing trends (present conditions and changes).

The objectives are to limit the adverse effect of pollutants in the water resource. The setting of in-stream Resource Water Quality Objectives (RWQO) is based on the South African Water Quality Guidelines.

Water Monitoring Points

Surface water: The Sultan River which may be impacted by the mining activity are non-perennial. Monitoring takes place by collecting surface water samples every quarterly if the Water Use Licence (WUL) from DWS is requesting the monitoring to take place quarterly otherwise the collecting will take place as directed by the WUL.

Long Term Stability and Safety: It should be the objective of mine management to ensure the long-term stability of all rehabilitated areas including the backfilled excavations. This should be done by the monitoring of all areas until a closure certificate has been issued.

Final rehabilitation in respect of erosion and dust control: Self-sustaining vegetation will result in the control of erosion and dust and no further rehabilitation is deemed necessary, unless vegetation growth is not returned to a desirable state by the time of mine closure.

Final Rehabilitation Roads:

- After rehabilitation has been completed, all roads should be ripped or ploughed, fertilized and providing the landowner does not want them to remain that way and with written approval from the Director: Mineral Development of the Department of Mineral Resources and Energy.

Submission of Information:

- Reports on rehabilitation and monitoring should be submitted annually to the Department of Mineral Resources and Energy – Kimberley, as described in Regulation 55 and amended with new legislation promulgated in the new NEMA regulations NO. R. 1147 20 NOVEMBER 2015 NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998, (ACT NO. 107 OF 1998) REGULATIONS PERTAINING TO THE FINANCIAL PROVISION FOR PROSPECTING, EXPLORATION, MINING OR PRODUCTION OPERATIONS.

Maintenance (Aftercare):

- Maintenance after closure should include the regular inspection and monitoring and/or completion of the re-vegetation programme.
- The aim of the Environmental Management Programme is for rehabilitation to be stable and self-sufficient, so that the least possible aftercare is required.

- The aim with the closure of the mine should be to create an acceptable post-mine environment and land-use. Therefore, all agreed commitments should be implemented by Mine Management.

After-effects Following Closure:

Acid Mine Drainage: No potential for bad quality leachate or acid mine drainage development is associated with diamond mine closure.

Long Term Impact on Ground Water: No after effect on the groundwater yield or quality is expected.

Long-term Stability of Rehabilitated Land: One of the main aims of any rehabilitated ground should be to obtain a self-sustaining and stable end result. The concurrent monitoring of all material and replacement of topsoil where available should be ensured.

q) Period for which the Environmental Authorisation is required

20 years. Thus, the period required is for the Life of Mine of the Mining Right.

r) Undertaking

Confirm that the undertaking required to meet the requirements of this section is provided at the end of the EMPr and is applicable to both the Basic Assessment Report and the Environmental Management Programme Report.

The undertaking required to meet the requirements of this section is provided at the end of the EMPR and is applicable to both the Environmental Impact Assessment Report and the Environmental Management Programme Report.

s) Financial Provision

State the amount that is required to both manage and rehabilitate the environment in respect of rehabilitation

i) Explain how the aforesaid amount was derived

The total cost to rehabilitate and mitigate the Mafisa Mine site as it stands currently (risking premature rehabilitation) is estimated to be R878 416,88 according to the DMR calculations.

ii) Confirm that this amount can be provided from operating expenditure

(Confirm that the amount, is anticipated to be an operating cost and is provided for as such in the Mining Work Programme, Financial and Technical Competence Report or Prospecting Work Programme as the case may be)

It is confirmed that the amount for outstanding rehabilitation can be provided from operating expenditure.

t) Deviations from the approved scoping report and plan of study

i) Deviations from the methodology used in determining the significance of potential environmental impacts and risks

(Provide a list of activities in respect of which the approved scoping report was deviated from, the reference in this report identifying where the deviation was made, and a brief description of the extent of the deviation)

Not applicable – No deviations from the methodology proposed in the Scoping Report.

ii) Motivation for the deviation

Not applicable – No deviations from the methodology proposed in the Scoping Report.

u) Other information required by the competent Authority

i) Compliance with the provisions of sections 24 (4)(a) and (b) read with section 24 (3)(a) and (7) of the National Environmental Management Act (Act 107 of 1998), the EIA Report must include the:-

(1) Impact on the socio-economic conditions of any directly affected person

(Provide the results of investigation, assessment, and evaluation of the impact of the mining, bulk sampling or alluvial diamond prospecting on any directly affected person including the landowner, lawful occupier, or, where applicable, potential beneficiaries of any land restitution claim, attach the investigation report as **Appendix 2.19.1** and confirm that the applicable mitigation is reflected in 2.5.3; 2.11.6 and 2.12 therein)

From a social perspective the following objectives and measures should be included as part of the Social Management Plan (SMP) as part of the Environmental Management Plan (EMP).

It should be noted that the responsibility of the mitigation lies with the owner, operator, and/or with the local municipality. The mitigation measures would have to form part of the respective stakeholder's expenditure predictions or operations and management within the area; therefore, the monitoring activities cannot be expressed in financial terms.

From a social perspective it can be concluded that the proposed Mafisa Project would not result in permanent damaging social impacts. The socio-economic benefits associated with the mine outweigh the negative social impacts. It is thus concluded that the proposed project is acceptable from a social point of view, provided that mitigation measures are implemented.

(2) Impact on any national estate referred to in section 3(2) of the National Heritage Resources Act

(Provide the results of investigation, assessment, evaluation of the impact of the mining, bulk sampling or alluvial diamond

prospecting on any national estate referred to in section 3(2) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) with the exception of the national estate contemplated in section 3(2)(*i)*(vi) and (vii) of that Act, attach the investigation report as **Appendix 2.19.2** and confirm that the applicable mitigation is reflected in 2.5.3; 2.11.6 and 2.12 herein)

Dr. Edward Matenga from (AHSA) Archaeological and Heritage Services Africa Pty Ltd Consultants has been appointed by Mafisa Mining (Pty) Ltd to provide a Heritage Impact Assessment in order to highlight the heritage characteristics of the proposed mining area and to determine the possible impact of mining on the heritage status of the application area. (Appendix 5 attached to the report).

Heritage Impact Assessments are prescribed under Section 38(8) of the National Heritage Resources Act (No 25/1999) which requires that screening is undertaken for the possible occurrence of heritage resources that may be affected by the proposed mining, on the basis of which appropriate mitigation measures will be prescribed.

This report is based on ground survey undertaken on 5 September 2021.

Observations

No archaeological or historical relics were found except for a building complex from where the mine administration operated. The building frame stands, but the roof is missing. The building bears no important architectural elements and is therefore considered of low heritage value.

In the broader area around Springbok it has been observed that there is a sparse occurrence of archaeological finds which are generally expected to date to the Stone Age periods. There is little that remains of the original surface in a large western and northern part of the property due to opencast mining and the presence of large stockpiles of earth and stones. The south-eastern and eastern margins of the mining area which are untouched are occupied by dunes with a fairly deep red sand burden. If there were archaeological artefacts they are buried under the windblown sands.

Conclusion and Recommendations

No archaeological or historical relics of heritage value were observed in the footprint of the mine. The mining application can be considered in light of these findings. The study is mindful that some important discoveries during the excavations. If this happens operations should be halted, and the provincial heritage resources authority or SAHRA notified in order for an investigation and evaluation of the finds to take place.

Palaeontological

Prof Marion Bamford from (AHSA) Archaeological and Heritage Services Africa Pty Ltd Consultants has been appointed by Mafisa Mining (Pty) Ltd to provide a Palaeontological Impact Assessment in order to highlight the palaeontological characteristics of the proposed mining area and to determine the possible impact of mining on the Palaeontology status of the application area. (Appendix 6 attached to the report).

To comply with the regulations of the South African Heritage Resources Agency (SAHRA) in terms of Section 38(8) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA), a desktop Palaeontological Impact Assessment (PIA) was completed for the proposed development.

The farm lies in the Namaqua-Natal Province in the Namaqua section. The Namaqua-Natal Province is a tectono-stratigraphic province and forms the southern and western boundary of the ancient Kaapvaal Craton, and extends below the Karoo Basin sediments to the south (Cornell et al., 2006). It comprises rocks that were formed during the Namaqua Orogeny (mountain-building) some 1200 – 1000 million years ago. It has been divided by geologists into a number of terranes (similar lithology and bounded by shear zones). There are three main lithologic units used to separate the terranes as well as the shear zones but still there is some debate about the terranes (ibid). Very simply, the lithologic units are older reworked rocks, juvenile rocks formed during tectonic activities and metamorphosed, and intrusive granitoids.

According to Cornell et al. (2006) the five terranes are:
A - Richtersveld Subprovince (undifferentiated terranes)
B – Bushmanland Terrane (granites)
C – Kakamas Terrane (supracrustal metapelite ca 2000 Ma
D – Areachap Terrane (supracrustal rocks and granitoids)
E – Kaaien Terrane (Keisian aged metaquartzites and deformed volcanic rocks).

The project lies in the Bushmanland Terrane with its northern boundary against the Richtersveld Subprovince and the eastern boundary against the Kakamas Terrance (ibid). According to Moore et al. (1990, in Cornell et al., 2006), the Bushmanland Terrane rocks can be divided into three distinct age group:

1. A basement complex (Achab Gneiss, Gladkop Suite) that is mainly composed of granitic rocks of Kheisian age (2050 - 1700 Ma).
2. A variety of supracrustal sequences of mixed sedimentary and volcanic origin and probably fitting into three broad age groups (ca 1900, 1600 and 1200 Ma).
3. Suites of syn- and late-tectonic Namaquan intrusive rocks, generally of granitic to charnockitic composition. This group includes the Little Namaqualand Suite (ca 1200 Ma), the Spektakel Suite (ca 1060 Ma) and the basic rocks of the Koperberg and Wortel Suites and Nouzees Complex (1060 – 1030 Ma), as well as the ca 950 Ma pegmatites.

The Namaqua-Natal Province rocks are volcanic in origin and frequently metamorphosed. Several outcrops occur on the farms along the route and probably underlie the Gordonia sands and Tertiary Calcretes.

Today the Orange River drains the central part of southern Africa into the Atlantic Ocean in the west but the route of this river has not remained the same over time (de Wit, 1999; de Wit et al., 2000; Haddon and McCarthy, 2005). During the Cretaceous there were two major westward-draining rivers, the northerly on called the Kalahari River that exited where the Orange River does today, and the southerly Karoo River that drained the central Highveld and exited where the Olifants River does today. Subsequent tectonic uplift of the continent in the Late Cretaceous, and altered drainage has led to one river capturing another. By the Miocene, the capture of the middle Orange by the lower Orange River had already occurred (de Wit, 1999), and de Wit et al. (2000) believe that the Orange River has followed its present course since at least the late Oligocene. The terraces along the lower Orange River, therefore, represent different times and levels of the river, and deposits from different distant sources.

The Buffels River of today, that exits at Kleinzee, was possibly part of the palaeo-Orange river and might have been since the Miocene. The climate reconstructed for the Orange River most likely applied to the Buffels River but the degree of uplift and erosion could have been different (Pickford, 2016). Nonetheless, the fluvial gravels, sands and alluvium along the river also have entrapped diamonds weathering out from the kimberlites pipes in Namaqualand and eastwards.

Palaeontological context

The rocks of the Namaqua-Natal Province are volcanic in origin and have been metamorphosed so they do not preserve any fossils.

The ubiquitous Aeolian sands of the Gordonia Formation do not preserve fossils because they have been transported and reworked, but in some regions these too may have covered pan or spring deposits and these can trap fossils, and more frequently archaeological artefacts. Usually these geomorphological features of pans and springs can be detected using satellite imagery. No such features are visible.

Along the river there are diamondiferous gravels and although they are shown as have insignificant sensitivity there is a small chance that they are fossiliferous. Fossils have been collected from Buffelsbank and they are in situ stems of a fern and probably Oligocene in age (Bamford, 2000). The transported materials could include alluvial diamonds and some fossils, such as fragments of silicified woods or bones that came from eroded deposits close by or very distant. Their context would be unknown. It is more likely that fossils could be preserved in abandoned river channels or oxbows, such as is the case at Arrisdrift and Daberas (Pickford and Senut, 2003) farther upstream, but these are not adjacent to the present river channel where there is active water and sediment transport.

Assumptions and uncertainties

Based on the geology of the area and the palaeontological record as we know it, it can be assumed that the formation and layout of the gneiss, sandstones, shales and sands are typical for the country and do not contain fossil plant, insect, invertebrate and vertebrate material. The metamorphosed volcanic rocks of the Namaqua-Natal Sequence would not preserve fossils. Only if there are transported fossils amongst the river gravels and sands of Tertiary age or the Quaternary aeolian sands, would any fossils be entrapped.

Recommendation

Based on experience and the lack of any previously recorded fossils from the area, it is extremely unlikely that any fossils would be preserved in the Tertiary gravels and sands along the Buffels River. There is a small chance that fossils may occur because ferns have been collected from the adjacent farm, Buffelsbank. Therefore, a Fossil Chance Find Protocol should be added to the EMPr. If fossils are found by the environmental officer or other responsible person once excavations and mining have commenced then they should be rescued and a palaeontologist called to assess and collect a representative sample.

Chance Find Protocol

Monitoring Programme for Palaeontology – to commence once the excavations / drilling / mining activities begin.

1. The following procedure is only required if fossils are seen on the surface and when drilling/excavations/mining commence.
2. When excavations begin the rocks and must be given a cursory inspection by the environmental officer or designated person. Any fossiliferous material (plants, insects, bone, coal) should be put aside in a suitably protected place. This way the project activities will not be interrupted.
3. Photographs of similar fossils must be provided to the developer to assist in recognizing the fossil plants, vertebrates, invertebrates or trace fossils in the shales and mudstones. This information will be built into the EMP's training and awareness plan and procedures.
4. Photographs of the putative fossils can be sent to the palaeontologist for a preliminary assessment.
5. If there is any possible fossil material found by the developer/environmental officer/miners then the qualified palaeontologist sub-contracted for this project, should visit the site to inspect the selected material and check the dumps where feasible.
6. Fossil plants or vertebrates that are considered to be of good quality or scientific interest by the palaeontologist must be removed, catalogued and housed in a suitable institution where they can be made available for further study. Before the fossils are removed from the site a SAHRA permit must be obtained. Annual reports must be submitted to SAHRA as required by the relevant permits.

7. If no good fossil material is recovered then no site inspections by the palaeontologist will be necessary. A final report by the palaeontologist must be sent to SAHRA once the project has been completed and only if there are fossils.
8. If no fossils are found and the excavations have finished then no further monitoring is required.

v) Other matters required in terms of sections 24(4)(a) and (b) of the Act

(the EAP managing the application, must provide the competent authority with detailed, written proof of an investigation as required by section 24(4)(b)(i) of the Act and motivation if no reasonable or feasible alternatives, as contemplated in sub-regulation 22(2)(h), exist. The EAP must attach such motivation as **Appendix 4**)

There are no alternatives, as the application area applied for is the area where the applicant has proven diamonds and has found potential for a diamond mining operation.

PART B

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

1) Draft environmental management programme

a) Details of the EAP (Confirm that the requirement for the provision of the details and expertise of the EAP are already included in PART A, section 1(a) herein as required)

I hereby confirm that the requirement for the provision of the details and expertise of the EAP is already included in Part A as required.

b) Description of the Aspects of the Activity (Confirm that the requirement to describe the aspects of the activity that are covered by the draft environmental management programme is already included in PART A, section (1)(h) herein as required)

I hereby confirm that the requirement for the aspects of the activity is already included in Part A as required.

c) Composite Map

(Provide a map **(Attached as an Appendix)** at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that any areas that should be avoided, including buffers)

Figure 33. A sensitivity map for the proposed mining area, (Map Taken out of the ecological assessment study by Dr. Betsie Milne).

d) Description of impact management objectives including management statements

i) Determination of closure objectives (ensure that the closure objectives are informed by the type of environment described in 2.4 herein)

The main closure objectives of the planned mining operation are:

- To restore the site to its current land capability in a sustainable manner.
- To prevent the sterilization of any diamond reserves.
- To prevent the establishment of any permanent structures or features.
- To manage and limit any impact to the surface and groundwater aquifers in such a way that an acceptable water quality and yield can still be obtained when a closure certificate is issued.
- To establish a stable and self-sustainable vegetation cover.
- To limit and rehabilitate any erosion features and prevent any permanent impact to the soil capability.
- To limit and manage the visual impact of the mining activities.
- To safeguard the safety and health of humans and animals on the site.
- To close the mining operation efficiently, cost effectively and in accordance with Government Policy.

The key aim decommissioning and closure is to ensure that all the significant impacts are ameliorated. All rehabilitated areas should be left in a stable, self-sustainable state. Proof of this should be submitted at closure. Specific objectives include:

Rehabilitation of infrastructure areas

The objectives for the removal of infrastructure and the subsequent rehabilitation of the areas they occupied include:

- To ensure that infrastructure identified for removal is successfully demolished and removed.
- To ensure that infrastructure identified to remain after mine closure is maintained until the issue of a closure certificate.
- The removal, decommissioning and disposal of all mining infrastructure, will comply with all conditions contained in the MPRDA. To this end, decommissioning and rehabilitation of all infrastructure areas will follow the following principles:
- The plant and associated disused infrastructure will be dismantled or demolished. Any building foundations will be removed and land exposed to the demolition and dismantling of infrastructure and all other disturbed land will be rehabilitated.
- Rubble will be disposed of at a suitable site. The site will be selected in consultation with DENC.

- Any surface water management infrastructure will be maintained to ensure they are stable and functional.
- Just before closure, when disturbed land has been rehabilitated and erosion is controlled by vegetation cover, all disused surface water management facilities will be decommissioned.

Mine Residue Dump (Slimes Dam)

The objectives pertaining to the effective management and rehabilitation of the Mine Residue Dump include:

- To ensure that the Mine Residue Dump deposit are stable and that there is an acceptably low risk of failure of these deposits during the decommissioning phase and following mine closure;
- To establish self-sustainable vegetation cover on the Mine Residue dump so that the visual impact of the Mine Residue dump is improved and in order to prevent erosion.

Management principles pertaining to Mine Residue dump include:

- The Mine Residue dump will continuously be inspected by a suitable qualified professional engineer to ensure their stability. If they are unstable, the appropriate remedial measures will be implemented.
- Inspection and monitoring should continue until a suitable qualified profession engineer has confirmed the long-term stability of the Mine Residue dump.
- Any infrastructure or facilities that serve the Mine Residue dump will be maintained to ensure that they are both stable and functional.

Maintenance

The necessary agreements and arrangement will be made by Mafisa Mining (Pty) Ltd to ensure that all natural physical, chemical and biological processes for which a closure condition were specified are monitored until they reach a steady state or for three (3) years after closure or as long as deemed necessary at the time.

- Such processes include erosion of the Mine Residue dump, rehabilitated surfaces, surface water drainage, air quality, surface water quality, ground water quality, vegetative re-growth, weed encroachment.
- The closure plan will be reviewed yearly.
- Rehabilitation of the land will be maintained until a closure certificate is granted or until the land use is regarded as sustainable.
- All rehabilitated areas will be monitored and maintained until such time as required to enable the mine to apply for closure of these different areas.

Performance assessments

As per the MPRDA and associated Regulations, as well as NEMA and associated Regulations, this Environmental Management Programme will be continually assessed in terms of its appropriateness and adequacy. In order to achieve this, Mafisa Mining (Pty) Ltd will undertake the following:

- Implement the necessary monitoring programmes, as discussed as part of this EMPR;
- Conduct performance assessments of this EMPR; and
- Compile and submit the afore-mentioned performance assessment reports to the DMRE. The frequency of the performance assessments will be annually. An independent and competent person will undertake all performance assessments.

Decommissioning and closure objectives

The key aim of decommissioning and closure is to ensure that all the significant impacts are ameliorated. All rehabilitated areas will be left in a stable, self-sustainable state. Proof of this will be submitted at closure. Specific objectives include:

- To identify potential post-closure land uses in consultation with the surrounding landowners and land users. This should be done during the operational phase of the mine;
- Rehabilitate disturbed land to a state suitable for its post-closure uses;
- Rehabilitate disturbed land and mine residue deposits to a state that facilitates compliance with applicable environmental quality objectives;
- Limit the impact on staff whose positions become redundant at the time of mine closure, as addressed in the SLP;
- Keep relevant authorities informed of the progress of the decommissioning phase;
- Submit monitoring data to the relevant authorities;
- Maintain required pollution control facilities and rehabilitated land until closure.

Negative economic impacts

The objective is to alleviate the negative socio-economic impacts that will result from mine closure. Management principles to achieve this include:

- Mafisa Mining will undertake a carefully planned step-wise decommissioning process.
- Closure planning will form an integral part of mine planning.
- Strategies for sustainable development have been and will continue to be developed by the project in collaboration with district and local authorities, local businesses and other interested parties. Early warning of impending closure will be given to IAPs.
- In conjunction with long-term closure planning, the mine will actively participate in regional and local planning to enhance the economic

benefits of the project through development of alternative forms of income generation.

- Mafisa Mining will initiate and participate in regional planning exercises that will mitigate the impacts of closure of the mine, the local and regional economies and associated abandonment of community infrastructures surrounding the mine.
- The mine will fulfil the requirements for closure.

ii) The process for managing any environmental damage, pollution, pumping and treatment of extraneous water or ecological degradation as a result of undertaking a listed activity

A water application has been submitted to the Department of Water and Sanitation which include a Section 21 (a), (b) and (g) applications, upon assessment the Department may require additional water uses and/ or additional studies to accompany the application.

No activity may take place within a watercourse unless authorised by the Department of Water and Sanitation (DWS). Any area within a riparian zone is therefore excluded from development unless authorisation is obtained from the DWS in terms of Section 21 (c) and (i).

iii) Potential risk of Acid Mine Drainage (Indicate whether or not the mining can result in acid mine drainage)

No potential risk for Acid Mine Drainage exists.

iv) Steps taken to investigate, assess, and evaluate the impact of acid mine drainage

Not applicable, there is no potential risk of acid mine drainage.

v) Engineering or mine design solutions to be implemented to avoid or remedy acid mine drainage

Not applicable, there is no potential risk of acid mine drainage.

vi) Measures that will be put in place to remedy any residual or cumulative impact that may result from acid mine drainage

There is no residual or cumulative impact that may result from acid mine drainage.

vii) Volumes and rate of water use required for the mining, trenching or bulk sampling operation

The only activity relating to the cost of water in the mining operations relates to dust suppression in the mining area and on the roads when hauling and transporting material to the processing plant and doing continuous backfilling as part of the rehabilitation process.

It must however be noted that the water supply to the activities will be sourced from the existing borehole on the mining area. There will be an industrial rate applied for water used and the cost will be the pumping cost (a sun pump) is used and the water stored in an existing dam.

The processing plant (diamond pan), scrubbers and final recovery will have an impact on the cost of water used. The cost of water will have an upward trend over time as a result of the national capacity and demand situation. Water is however recycled as far as possible and redirected to the processing plants. It must however be noted that the water supply to the activities will be sourced from the existing borehole.

viii) Has a water use licence been applied for?

A water application has been submitted to the Department of Water and Sanitation which include a Section 21 (a), (b) and (g) applications, upon assessment the Department may require additional water uses and/ or additional studies to accompany the application.

No activity may take place within a watercourse unless authorised by the Department of Water and Sanitation (DWS). Any area within a riparian zone is therefore excluded from development unless authorisation is obtained from the DWS in terms of Section 21 (c) and (i).

ix) Impact to be mitigated in their respective phases

Measure to rehabilitate the environment affected by the undertaking of any listed activity

ACTIVITY Whether listed or not listed. (E.g. Excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc…etc…etc.).	**PHASE** of operation in which activity will take place. State; Planning and design, Pre-Construction' Construction, Operational, Rehabilitation, Closure, Post closure.	**SIZE AND SCALE** of disturbance (volumes, tonnages and hectares or m²)	**MITIGATION MEASURES** (describe how each of the recommendations in herein will remedy the cause of pollution or degradation and migration of pollutants)	**COMPLIANCE WITH STANDARDS** (A description of how each of the recommendations herein will comply with any prescribed environmental management standards or practices that have been identified by Competent Authorities)	**TIME PERIOD FOR IMPLEMENTATION** Describe the time period when the measures in the environmental management programme must be implemented Measures must be implemented when Required. With regard to Rehabilitation specifically this must take place at the earliest opportunity. .With regard to Rehabilitation, therefore state either:-.. Upon cessation of the individual activity or. Upon the cessation of mining, bulk sampling or alluvial diamond prospecting as the case may be.
Processing Plant 2-6 X 16 feet pan	Construction Commissioning Operational Decommissioning Closure	0.5 ha Steel, concrete, electric wires	Access control Maintenance of processing plant Dust control and monitoring Noise control and monitoring Drip trays Storm water run-off control Immediately clean hydrocarbon spills		Removal of processing plant upon closure of mining right.

			Rip disturbed areas to allow re-growth of vegetation cover		
Ablution facilities Chemical toilets	Construction Commissioning Operational Decommissioning Closure	25m² or 0.0025ha	Maintenance of container Plants Removal of container plants upon closure		Removal of container plant upon closure of the Mining Right.
Clean & Dirty water systems: Berms	Construction Commissioning Operational Decommissioning Closure	This area also includes the re-fuel and lubrication station, wash bay and office area.	Maintenance of berms and trenches Oil traps used in relevant areas. Drip trays used. Immediately clean hydrocarbon spill.		Upon cessation of the individual activity (continuous rehabilitation)
Fuel Storage facility (Diesel tanks)	Construction Commissioning Operational Decommissioning Closure	250m² Concrete, bricks, and steel	Maintenance of diesel tanks and bund walls. Oil traps Drip tray at re-fuelling point Immediately clean hydrocarbon spill.		Removal of diesel tanks upon closure of Mining Right.
Mining Area	Commissioning Operational Decommissioning Closure	Provision is made for a maximum footprint of ±140 hectares of alluvial diamond target areas for excavations.	Proper planning of excavations Access control Dust control and monitoring Noise control and monitoring Continuous rehabilitation		Upon cessation of the individual activity (continuous rehabilitation)

			Stormwater run-off control Immediately clean hydrocarbon spill Drip trays Dump control and monitoring Erosion control		
Salvage yard (Storage and laydown area)	Construction Commissioning Operational Decommissioning Closure	1000m² or 0.1 ha No construction material, area to be levelled with a grader and fenced with a gate and access control	Access control Maintenance of fence Storm water run-off control Immediately clean hydrocarbon spill		Removal of fence around salvage yard and ripping of salvage yard area upon closure of the mining right.
Waste disposal site (domestic and industrial waste):	Construction Commissioning Operational Decommissioning Closure	15m x 30m = 450m²	Storage of Waste within receptacles Storage of hazardous waste on concrete floor with bund wall Removal of waste on regular intervals		Removal of waste receptacles, breaking and removal of rubble from the concrete floors and bund walls upon closure of mining right.
Roads (both access and haulage road on the mine site):	Construction Commissioning Operational Decommissioning Closure	Additional mine haul road = 10 000m²	Maintenance of roads Dust control and monitoring Noise control and monitoring Speed limits Storm water run-off control Erosion control		Upon cessation of the individual activity (continuous rehabilitation) Ripping of roads upon closure of the mining right.

			Immediately clean hydrocarbon spills Rip disturbed areas to allow re-growth of vegetation cover		
Workshop and Wash bay	Construction Commissioning Operational Decommissioning Closure	300m² Concrete and Steel	Concrete floor with oil/water separator Storm water run-off control Immediately clean hydrocarbon spills		Removal of wash bay equipment, breaking and removal of rubble from the concrete floors and bund walls upon closure of mining right
Water distribution Pipeline	Construction Commissioning Operational Decommissioning Closure	HDPE Pipes	Maintain water pipeline and structures		Removal of pipeline upon closure of the mining right.
Water tanks:	Construction Commissioning Operational Decommissioning Closure	3m X 3m = 9m²	Maintain water tanks and structures		Removal of water tank and steel structure upon closure of the mining right.

e) Impact Management Outcomes

(A description of impact management outcomes, identifying the standard of impact management required for the aspects contemplated in paragraph()

ACTIVITY **Whether listed or not listed.**	**POTENTIAL IMPACT** **(e.g. dust, noise, drainage surface disturbance, fly rock, surface water contamination, groundwater, contamination, air pollution)….**	**ASPECTS AFFECTED**	**PHASE** **In which impact is anticipated** **(e.g. construction, commissioning, operational, Decommissioning, closure, post closure)**	**MITIGATION TYPE** (modify, remedy, control or stop) through (e.g. noise control measures, storm water control, dust control, rehabilitation, design measures, blasting controls, avoidance, relocation, alternative activity	**STANDARD TO BE ACHIEVED** **(impact avoided, noise levels, dust levels, rehabilitation standards, end use objectives) etc.**
Processing Plant 2-6 X 16 feet pan	Dust Noise Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination Surface disturbance	Air Quality Fauna Flora Noise Soil Surface water Safety	Construction Commissioning Operational Decommissioning Closure	Access control Maintenance of processing plant Dust control and monitoring Noise and vibration control and monitoring Drip trays Storm water run-off control Immediately clean hydrocarbon spills Rip disturbed areas to allow re-growth of vegetation cover Noise control Well maintained equipment Selecting equipment with lower sound power levels; Re-locate noise sources to areas which are less noise sensitive, to take advantage of	Safety ensured. Dust levels minimized Minimize potential for hydrocarbon spills to infiltrate into groundwater Noise levels minimized Rehabilitation standards and closure objectives to be met. Erosion potential minimized.

				distance and natural shielding; Develop a mechanism to record and respond to complaints. Minimizing – unavoidable impacts shall be minimized by taking appropriate and practicable measures such as transplanting important plant specimens, confining works in specific area or season, restoration (and possibly enhancement) of disturbed areas, etc. Effluents and waste should be recycling and re-use as far as possible.	
Ablution facilities Chemical Toilets	Soil contamination Possible Groundwater contamination	Soil Groundwater	Construction Commissioning Operational Decommissioning Closure	Maintenance of sewage facilities on a regular basis. Removal of container on closure	Minimize the potential for a chemical spill on soil, which could infiltrate to groundwater.
Clean & Dirty water systems:	Surface disturbance Groundwater Contamination Soil contamination	Soil Groundwater Surface Water	Construction Commissioning Operational Decommissioning Closure	The re-vegetation of disturbed areas is important to prevent erosion and improve the rate of infiltration. Erosion channels that may develop before vegetation	Safety ensured. Minimize potential for hydrocarbon spills to infiltrate into groundwater.

	Surface water contamination			has established should be rehabilitated by filling, levelling and re-vegetation where topsoil is washed away. Monitoring and maintenance of oil traps in relevant areas. Drip trays used. Immediately clean hydrocarbon spill. Linear infrastructure such as roads and pipelines will be inspected at least monthly to check that the associated water management infrastructure is effective in controlling erosion. Minimizing – unavoidable impacts shall be minimized by taking appropriate and practicable measures such as transplanting important plant specimens, confining works in specific area or season, restoration (and possibly	Rehabilitation standards and closure objectives to be met.

				enhancement) of disturbed areas, etc. Effluents and waste should be recycling and re-use as far as possible.	
Fuel Storage facility (Diesel tanks)	Groundwater contamination Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination Surface disturbance	Soil Groundwater Surface water	Construction Commissioning Operational Decommissioning Closure	Maintenance of Diesel tanks and bund walls. Oil traps Drip tray at re-fuelling point. Refuelling must take place in well demarcated areas and over suitable drip trays to prevent soil pollution. Spill kits to clean up accidental spills from earthmoving machinery must be well-marked and available on site. Workers must undergo induction to ensure that they are prepared for rapid clean-up procedures. All facilities where dangerous materials are stored must be contained in a bund wall. Vehicles and machinery should be regularly serviced and maintained.	Minimize potential for hydrocarbon spills to infiltrate into groundwater. Rehabilitation standards and closure objectives to be met.
Mining Area	Dust	Air quality Fauna	Commissioning Operational	Access control	Safety ensured. Dust levels minimized

	Noise Removal and disturbance of vegetation cover and natural habitat of fauna Accelerated erosion of areas adjacent to workings that have been de-vegetated leads to increased suspended sediment loads in nearby streams and rivers. Excavation of flood terraces and riverbanks increases the instability of these riverbanks and enhances the likelihood of increased flood scouring. Excavation of river sediments	Flora Groundwater Noise and vibration Soil Surface Water Topography Safety	Decommissioning Closure	Dust control and monitoring Noise and vibration control and monitoring Continuous rehabilitation Storm water run-off control Immediately clean hydrocarbon spill Drip trays Dump stability control and monitoring Erosion control Noise control Well maintained equipment Selecting equipment with lower sound power levels; Develop a mechanism to record and respond to complaints. Minimizing – unavoidable impacts shall be minimized by taking appropriate and practicable measures such as transplanting important plant specimens, confining works in specific area or season, restoration (and possibly	Minimize potential for hydrocarbon spills to infiltrate into groundwater Noise levels minimized Rehabilitation standards and closure objectives to be met. Erosion potential minimized.

	exposes these sediments to oxidising conditions and enhances the solubility and release of any metal ions that may previously have been trapped as insoluble sulphides. Wind-blown dusts from unprotected tailings and waste rock dumps enter aquatic environment. Soil contamination Surface disturbance Surface water contamination			enhancement) of disturbed areas, etc. Effluents and waste should be recycling and re-use as far as possible. Mining activities must be planned, where possible in order to encourage faunal dispersal and should minimise dissection or fragmentation of any important faunal habitat type. The extent of the mining area should be demarcated on site layout plans (preferably on disturbed areas or those identified with low conservation importance). Appointment of a full-time ECO must render guidance to the staff and contractors with respect to suitable areas for all related disturbance, and must ensure that all contractors and workers undergo Environmental Induction prior to commencing with work on site.	

				All those working on site must undergo environmental induction with regards to fauna and in particular awareness about not harming or collecting species such as snakes, tortoises and owls which are often persecuted out of superstition. All those working on site must be educated about the conservation importance of the fauna and flora occurring on site. The environmental induction should occur in the appropriate languages for the workers who may require translation. Reptiles and amphibians that are exposed during the clearing operations should be captured for later release or translocation by a qualified expert. Employ measures that ensure adherence to the speed limit.	

				Careful consideration is required when planning the placement for stockpiling topsoil and the creation of access routes in order to avoid the destruction of habitats and minimise the overall mining footprint. The footprint areas of the mining activities must be scanned for Red Listed and protected plant species prior to mining; Snares & traps removed and destroyed; and Maintenance of firebreaks. It will be necessary to divert storm water around dump areas by construction of a temporary gravel cut-off berm that will prevent surface run-off into the drainage lines. The re-vegetation of disturbed areas is important to prevent erosion and improve the rate of infiltration. Erosion	

				channels that may develop before vegetation has established should be rehabilitated by filling, levelling and re-vegetation where topsoil is washed away. Implementation of a suitable management action plan during the operation of the proposed diamond mine, based on analysis of bi-annual water quality and biological monitoring data collected at sites upstream and downstream of all activities; Prevention of exotic vegetation encroachment; Prevent further siltation within the river segment as well as downstream of activities; Unnecessary destruction of marginal and in-stream habitat should always be avoided during operations.	

Salvage yard (Storage and laydown area)	Groundwater contamination Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination Surface disturbance Surface water contamination	Fauna Flora Groundwater Soil Surface Water	Construction Commissioning Operational Decommissioning Closure	Access Control Maintenance of fence Storm water run-off control Immediately clean hydrocarbon spill	Minimize potential for hydrocarbon spills to infiltrate into groundwater Rehabilitation standards and closure objectives to be met. Erosion potential minimized.
Product Stockpile area	Dust Noise Removal and disturbance of vegetation cover and natural habitat of fauna Surface disturbance	Air Quality Fauna Flora Noise Soil Surface Water	Commissioning Operational Decommissioning Closure	Dust Control and monitoring Noise control and monitoring Drip trays Storm water run-off control Immediately clean hydrocarbon spills Rip disturbed areas to allow re-growth of vegetation cover Noise control Well maintained equipment Selecting equipment with lower sound power levels;	Dust levels minimized Minimize potential for hydrocarbon spills to infiltrate into groundwater Noise levels minimized Rehabilitation standards and closure objectives to be met. Erosion potential minimized.

				Re-locate noise sources to areas which are less noise sensitive, to take advantage of distance and natural shielding; Taking advantage during the design stage of natural topography as a noise buffer; Develop a mechanism to record and respond to complaints.	
Waste disposal site (domestic and industrial waste):	Groundwater contamination Contamination of soil Surface water contamination	Groundwater Soil Surface water	Construction Commissioning Operational Decommissioning Closure	Storage of Waste within receptacles Storage of hazardous waste on concrete floor with bund wall Removal of waste on regular intervals	Minimize potential for hydrocarbon spills to infiltrate into groundwater Noise levels minimized Rehabilitation standards and closure objectives to be met.
Roads (both access and haulage road on the mine site):	Dust Noise Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination	Air quality Fauna Flora Noise and vibration Soil Surface water	Construction Commissioning Operational Decommissioning Closure	Maintenance of roads Dust control and monitoring Noise control and monitoring Speed limits Storm water run-off control Erosion control Immediately clean hydrocarbon spills	Dust levels minimized Minimize potential for hydrocarbon spills to infiltrate into groundwater Noise levels minimized Rehabilitation standards and closure objectives met. Erosion potential minimized.

	Surface disturbance			Rip disturbed areas to allow re-growth of vegetation cover Noise control Well maintained equipment Selecting equipment with lower sound power levels; Re-locate noise sources to areas which are less noise sensitive, to take advantage of distance and natural shielding; Taking advantage during the design stage of natural topography as a noise buffer; Develop a mechanism to record and respond to complaints. Linear infrastructure such as roads and pipelines will be inspected at least monthly to check that the associated water management infrastructure is effective in controlling erosion.	
Workshop and Wash bay	Removal and disturbance of vegetation cover	Groundwater Soil Surface water	Construction Commissioning Operational	Concrete floor with oil/water separator	Minimize potential for hydrocarbon spills to

	and natural habitat of fauna Soil contamination		Decommissioning Closure	Storm water run-off control Immediately clean hydrocarbon spills	infiltrate into groundwater Noise levels minimized Rehabilitation standards and closure objectives to be met. Erosion potential minimized.
Water distribution Pipeline	Surface disturbance	Fauna Flora Surface Water	Construction Commissioning Operational Decommissioning Closure	Monitor pipeline for water leaks Maintenance of pipeline Linear infrastructure such as roads and pipelines will be inspected at least monthly to check that the associated water management infrastructure is effective in controlling erosion.	Rehabilitation standards and closure objectives to be met. Erosion potential minimized.
Water tanks:	Surface disturbance	Fauna Flora Surface Water	Construction Commissioning Operational Decommissioning Closure	Maintain water tanks and structures	Safety ensured. Rehabilitation standards and closure objectives to be met.

f) Impact Management Actions

(A description of impact management actions, identifying the manner in which the impact management objectives and outcomes contemplated in paragraph (c)

ACTIVITY **Whether listed or not listed.**	**POTENTIAL IMPACT** **(e.g. dust, noise, drainage surface disturbance, fly rock, surface water contamination, groundwater, contamination, air pollution)….**	**MITIGATION TYPE** (modify, remedy, control or stop) through (e.g. noise control measures, storm water control, dust control, rehabilitation, design measures, blasting controls, avoidance, relocation, alternative activity	**TIME PERIOD FOR IMPLEMENTATION** **Describe the time period when the measures in the environmental management programme must be implemented. Measures must be implemented when required.** **With regard to Rehabilitation specifically this must take place at the earliest opportunity.** **With regard to Rehabilitation, therefore state either:- Upon cessation of the individual activity or Upon the cessation of mining, bulk sampling or alluvial diamond prospecting as the case may be.**	**COMPLIANCE WITH STANDARDS** (A description of how each of the recommendations in 2.11.6 read with 2.12 and 2.15.2 herein will comply with any prescribed environmental management standards or practices that have been identified by Competent Authorities)
Processing Plant: 2-6 X 16 feet pan	Dust Noise Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination Surface disturbance	Access control Maintenance of processing plant Dust control and monitoring Noise and vibration control and monitoring Drip trays Storm water run-off control Immediately clean hydrocarbon spills Rip disturbed areas to allow re-growth of vegetation cover Noise control Well maintained equipment Selecting equipment with lower sound power levels;	Removal of processing plant upon closure of mining right.	The following must be placed at the site and is applicable to all activities: • Relevant Legislation; • Acts; • Regulations • COP's • SOP's Management and staff must be trained to understand the contents of these documents and to adhere thereto.

		Re-locate noise sources to areas which are less noise sensitive, to take advantage of distance and natural shielding; Taking advantage during the design stage of natural topography as a noise buffer; Develop a mechanism to record and respond to complaints. Minimizing – unavoidable impacts shall be minimized by taking appropriate and practicable measures such as transplanting important plant specimens, confining works in specific area or season, restoration (and possibly enhancement) of disturbed areas, etc. Effluents and waste should be recycling and re-use as far as possible.		• Environmental Awareness training must be provided to employees. • The operation must have a rehabilitation and closure plan. • Management and staff must be trained to understand the contents of these documents, and to adhere thereto. Annual performance Assessment Reports and quantum Calculations must be done to ensure that the operation adheres to the contents of the EIA and EMPr documents.
Ablution Facilities Chemical Toilets.	Soil contamination Groundwater contamination	Maintenance of sewage facilities on a regular basis. Removal of container plants on closure	Removal of container plant upon closure of the Mining Right.	The following must be placed at the site and is applicable to all activities: • Relevant Legislation; • Acts; • Regulations • COP's • SOP's

				Management and staff must be trained to understand the contents of these documents and to adhere thereto. • Environmental Awareness training must be provided to employees. • The operation must have a rehabilitation and closure plan. • Management and staff must be trained to understand the contents of these documents, and to adhere thereto. Annual performance Assessment Reports and quantum Calculations must be done to ensure that the operation adheres to the contents of the EIA and EMPr documents.
Clean & Dirty water systems: Berms	Surface disturbance Groundwater Contamination Soil contamination Surface water contamination	It will be necessary to divert storm water around dump areas by construction of a temporary gravel cut-off berm that will prevent surface run-off into the mining area. Excavations, where and when applicable, should be	Upon cessation of the individual activity (continuous rehabilitation) Levelling of storm water berms upon closure of Mining Right	The following must be placed at the site and is applicable to all activities: • Relevant Legislation; • Acts; • Regulations • COP's

		rehabilitated concurrently as mining progresses. The re-vegetation of disturbed areas is important to prevent erosion and improve the rate of infiltration. Erosion channels that may develop before vegetation has established should be rehabilitated by filling, levelling and re-vegetation where topsoil is washed away. Maintenance of trenches Monitoring and maintenance of oil traps in relevant areas. Drip trays used. Immediately clean hydrocarbon spill. Linear infrastructure such as roads and pipelines will be inspected at least monthly to check that the associated water management infrastructure is effective in controlling erosion. Minimizing – unavoidable impacts shall be minimized by taking appropriate and practicable measures such as transplanting important plant specimens, confining works in specific area or season,		• SOP's Management and staff must be trained to understand the contents of these documents and to adhere thereto. • Environmental Awareness training must be provided to employees. • The operation must have a rehabilitation and closure plan. • Management and staff must be trained to understand the contents of these documents, and to adhere thereto. Annual performance Assessment Reports and quantum Calculations must be done to ensure that the operation adheres to the contents of the EIA and EMPr documents.

		restoration (and possibly enhancement) of disturbed areas, etc. Effluents and waste should be recycling and re-use as far as possible.		
Fuel Storage facility (Diesel tanks)	Groundwater contamination Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination Surface disturbance	Maintenance of diesel tanks and bund walls. Oil traps Drip tray at re-fuelling point. Refuelling must take place in well demarcated areas and over suitable drip trays to prevent soil pollution. Spill kits to clean up accidental spills from earthmoving machinery must be well-marked and available on site. Workers must undergo induction to ensure that they are prepared for rapid clean-up procedures. All facilities where dangerous materials are stored must be contained in a bund wall. Vehicles and machinery should be regularly serviced and maintained.	Removal of diesel tanks upon closure of Mining Right.	The following must be placed at the site and is applicable to all activities: • Relevant Legislation; • Acts; • Regulations • COP's • SOP's Management and staff must be trained to understand the contents of these documents and to adhere thereto. • Environmental Awareness training must be provided to employees. • The operation must have a rehabilitation and closure plan. • Management and staff must be trained to understand the

				contents of these documents, and to adhere thereto. Annual performance Assessment Reports and quantum Calculations must be done to ensure that the operation adheres to the contents of the EIA and EMPr documents.
Mining Area.	Dust Noise Removal and disturbance of vegetation cover and natural habitat of fauna Accelerated erosion of areas adjacent to workings that have been de-vegetated leads to increased suspended sediment loads in nearby streams and rivers. Excavation of flood terraces and riverbanks increases the instability of	Access control Dust control and monitoring Noise and vibration control and monitoring Continuous rehabilitation Storm water run-off control Immediately clean hydrocarbon spill Drip trays Dump stability control and monitoring Erosion control Noise control Well maintained equipment Selecting equipment with lower sound power levels; Re-locate noise sources to areas which are less noise sensitive, to take advantage of distance and natural shielding; Taking advantage during the design stage of natural topography as a noise buffer;	Upon cessation of the individual activity (continuous rehabilitation)	The following must be placed at the site and is applicable to all activities: • Relevant Legislation; • Acts; • Regulations • COP's • SOP's Management and staff must be trained to understand the contents of these documents and to adhere thereto. • Environmental Awareness training must be provided to employees. • The operation must have a rehabilitation and closure plan.

	these riverbanks and enhances the likelihood of increased flood scouring. Excavation of river sediments exposes these sediments to oxidising conditions and enhances the solubility and release of any metal ions that may previously have been trapped as insoluble sulphides. Wind-blown dusts from unprotected tailings and waste rock dumps enter aquatic environment. Soil contamination Surface disturbance Surface water contamination	Develop a mechanism to record and respond to complaints. Minimizing – unavoidable impacts shall be minimized by taking appropriate and practicable measures such as transplanting important plant specimens, confining works in specific area or season, restoration (and possibly enhancement) of disturbed areas, etc. Effluents and waste should be recycling and re-use as far as possible. Mining activities must be planned, where possible in order to encourage (faunal dispersal) and should minimise dissection or fragmentation of any important faunal habitat type. The extent of the mining area should be demarcated on site layout plans (preferably on disturbed areas or those identified with low conservation importance). Appointment of a full-time ECO must render guidance to the staff and contractors with respect to suitable areas for all		• Management and staff must be trained to understand the contents of these documents, and to adhere thereto. Annual performance Assessment Reports and quantum Calculations must be done to ensure that the operation adheres to the contents of the EIA and EMPr documents.

		related disturbance and must ensure that all contractors and workers undergo environmental induction prior to commencing with work on site. All those working on site must undergo environmental induction with regards to fauna and in particular awareness about not harming or collecting species such as snakes, tortoises and owls which are often persecuted out of superstition. All those working on site must be educated about the conservation importance of the fauna and flora occurring on site. The environmental induction should occur in the appropriate languages for the workers who may require translation. Reptiles and amphibians that are exposed during the clearing operations should be captured for later release or translocation by a qualified expert. Employ measures that ensure adherence to the speed limit. Careful consideration is required when planning the placement for stockpiling topsoil and the creation of access routes in		

		order to avoid the destruction of habitats and minimise the overall mining footprint. The footprint areas of the mining activities must be scanned for Red Listed and protected plant species prior to mining; Snares & traps removed and destroyed; and Maintenance of firebreaks. Excavations, where and when applicable, should be rehabilitated concurrently as mining progresses. The re-vegetation of disturbed areas is important to prevent erosion and improve the rate of infiltration. Erosion channels that may develop before vegetation has established should be rehabilitated by filling, levelling and re-vegetation where topsoil is washed away. Implementation of a suitable management action plan during the operation of the proposed diamond mine, based on analysis of bi-annual water quality and biological monitoring data collected at sites upstream and downstream of all activities;		

		Prevention of exotic vegetation encroachment; Prevent further siltation within the river segment as well as downstream of activities; Unnecessary destruction of marginal and instream habitat should always be avoided during operations.		
Salvage yard (Storage and laydown area)	Surface Water contamination Groundwater contamination Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination Surface disturbance Surface water contamination	Access Control Maintenance of fence Storm water run-off control Immediately clean hydrocarbon spill	Removal of fence around salvage yard and ripping of salvage yard area upon closure of the mining right.	The following must be placed at the site and is applicable to all activities: • Relevant Legislation; • Acts; • Regulations • COP's • SOP's Management and staff must be trained to understand the contents of these documents and to adhere thereto. • Environmental Awareness training must be provided to employees. • The operation must have a rehabilitation and closure plan. • Management and staff must be trained to understand the

				contents of these documents, and to adhere thereto. Annual performance Assessment Reports and quantum Calculations must be done to ensure that the operation adheres to the contents of the EIA and EMPr documents.
Product Stockpile area	Surface Water contamination Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination Surface disturbance Surface water contamination	Dust Control and monitoring Noise control and monitoring Drip trays Storm water run-off control Immediately clean hydrocarbon spills Rip disturbed areas to allow re-growth of vegetation cover Noise control Noise levels minimized Well maintained equipment Selecting equipment with lower sound power levels; Re-locate noise sources to areas which are less noise sensitive, to take advantage of distance and natural shielding; Taking advantage during the design stage of natural topography as a noise buffer; Develop a mechanism to record and respond to complaints. Dust levels minimized	Upon cessation of the individual activity (continuous rehabilitation)	The following must be placed at the site and is applicable to all activities: • Relevant Legislation; • Acts; • Regulations • COP's • SOP's Management and staff must be trained to understand the contents of these documents and to adhere thereto. • Environmental Awareness training must be provided to employees. • The operation must have a rehabilitation and closure plan. • Management and staff must be trained to understand the

		Minimize potential for hydrocarbon spills to infiltrate into groundwater Rehabilitation standards and closure objectives to be met. Erosion potential minimized.		contents of these documents, and to adhere thereto. Annual performance Assessment Reports and quantum Calculations must be done to ensure that the operation adheres to the contents of the EIA and EMPr documents.
Waste disposal site (domestic and industrial waste):	Groundwater contamination Surface Water contamination Contamination of soil Surface water contamination	Storage of Waste within receptacles Storm water control Ground water monitoring Storage of hazardous waste on concrete floor with bund wall Removal of waste on regular intervals	Removal of waste receptacles, breaking and removal of rubble from the concrete floors and bund walls upon closure of mining right.	The following must be placed at the site and is applicable to all activities: • Relevant Legislation; • Acts; • Regulations • COP's • SOP's Management and staff must be trained to understand the contents of these documents and to adhere thereto. • Environmental Awareness training must be provided to employees. • The operation must have a rehabilitation and closure plan.

				• Management and staff must be trained to understand the contents of these documents, and to adhere thereto. Annual performance Assessment Reports and quantum Calculations must be done to ensure that the operation adheres to the contents of the EIA and EMPr documents.
Roads (both access and haulage road on the mine site):	Dust Surface Water contamination Groundwater contamination Noise Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination Surface disturbance	Maintenance of roads Dust control and monitoring Noise control and monitoring Speed limits Storm water run-off control Erosion control Immediately clean hydrocarbon spills Rip disturbed areas to allow re-growth of vegetation cover Noise control Well maintained equipment Selecting equipment with lower sound power levels; Re-locate noise sources to areas which are less noise sensitive, to take advantage of distance and natural shielding; Taking advantage during the design stage of natural topography as a noise buffer;	Upon cessation of the individual activity (continuous rehabilitation) Ripping of roads upon closure of the mining right.	The following must be placed at the site and is applicable to all activities: • Relevant Legislation; • Acts; • Regulations • COP's • SOP's Management and staff must be trained to understand the contents of these documents and to adhere thereto. • Environmental Awareness training must be provided to employees.

		Develop a mechanism to record and respond to complaints. Linear infrastructure such as roads and pipelines will be inspected at least monthly to check that the associated water management infrastructure is effective in controlling erosion.		• The operation must have a rehabilitation and closure plan. • Management and staff must be trained to understand the contents of these documents, and to adhere thereto. Annual performance Assessment Reports and quantum Calculations must be done to ensure that the operation adheres to the contents of the EIA and EMPr documents.
Workshop and Wash bay	Surface Water contamination Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination	Concrete floor with oil/water separator Storm water run-off control Immediately clean hydrocarbon spills	Removal of wash bay equipment, breaking and removal of rubble from the concrete floors and bund walls upon closure of mining right	The following must be placed at the site and is applicable to all activities: • Relevant Legislation; • Acts; • Regulations • COP's • SOP's Management and staff must be trained to understand the contents of these documents and to adhere thereto.

				• Environmental Awareness training must be provided to employees. • The operation must have a rehabilitation and closure plan. • Management and staff must be trained to understand the contents of these documents, and to adhere thereto. Annual performance Assessment Reports and quantum Calculations must be done to ensure that the operation adheres to the contents of the EIA and EMPr documents.
Water distribution Pipeline	Surface disturbance	Monitor pipeline for water leaks Maintenance of pipeline Linear infrastructure such as roads and pipelines will be inspected at least monthly to check that the associated water management infrastructure is effective in controlling erosion.	Removal of pipeline upon closure of the mining right.	The following must be placed at the site and is applicable to all activities: • Relevant Legislation; • Acts; • Regulations • COP's • SOP's Management and staff must be trained to understand the

				contents of these documents and to adhere thereto. • Environmental Awareness training must be provided to employees. • The operation must have a rehabilitation and closure plan. • Management and staff must be trained to understand the contents of these documents, and to adhere thereto. Annual performance Assessment Reports and quantum Calculations must be done to ensure that the operation adheres to the contents of the EIA and EMPr documents.
Water tanks:	Surface disturbance	Maintain water tanks and structures	Removal of water tank and steel structure upon closure of the mining right.	The following must be placed at the site and is applicable to all activities: • Relevant Legislation; • Acts; • Regulations • COP's • SOP's

				Management and staff must be trained to understand the contents of these documents and to adhere thereto. • Environmental Awareness training must be provided to employees. • The operation must have a rehabilitation and closure plan. • Management and staff must be trained to understand the contents of these documents, and to adhere thereto. Annual performance Assessment Reports and quantum Calculations must be done to ensure that the operation adheres to the contents of the EIA and EMPr documents.

i) Financial Provision

(1) Determination of the amount of Financial Provision

(a) Describe the closure objectives and the extent to which they have been aligned to the baseline environment described under Regulation 22(2)(d) as described in 2.4 herein.

Closure:

The main closure objective of this mine is to rehabilitate the mined areas in such a way to ensure that the rehabilitated topographical landscape would blend in with the surrounding landscape, would not pose a safety hazard for human and animal, but at the same time allow a certain alternative land use. Establish a self-sustaining and stable vegetation cover in order to mitigate the visual impact, to control erosion and to create some habitat for animals. The rehabilitated environment also needs to be aesthetically acceptable according to the principle of BPEO.

Mafisa Mining (Pty) Ltd will ensure that the mine site is:

- Neither a danger to public health and safety nor to animal health and safety.
- Not a source of any pollution.
- Stable (ecological and geophysical).
- Rehabilitated to the state that is suitable for the predetermined and agreed land use.
- Compatible with the surrounding biophysical environment.
- A sustainable environment.
- Aesthetically acceptable.
- Not an economic, social or environmental liability to the local community or the state now or in the future.

Mafisa Mining will ensure that the physical and chemical stability of the rehabilitated mining site will be such that risk to the environment is not increased by naturally occurring forces to the extent that such increased risk cannot be contended with by the installed measures.

Mafisa Mining will subscribe to the optimal exploitation and utilization of South Africa's mineral resources (diamonds).

Mafisa Mining will ensure that the mining site is closed efficiently and cost effectively.

Mafisa Mining will ensure that the operation is not abandoned but closed in accordance with the relevant requirements.

Mafisa Mining will ensure that the interest of all interested and affected parties will be considered.

Mafisa Mining will ensure that the all-relevant legislation regarding mine closure will be adhered to, and all relevant application procedures followed.

The management of environmental impacts:
With regard to the extension, the mitigation of all environmental impacts on all applicable aspects uses BPEO (Best practical environmental option) principles.

- Optimal utilization and maintenance of existing mine facilities in a well-planned manner.
- To take care that no new land surface, habitats of vegetation and animals are destroyed, disturbed or alienated unnecessarily.
- To contain and prevent any pollution (physical and chemical) from the mining operation within structures, facilities provided therefore.
- To ensure an effective surface run-off control system in order to deal with the separation of clean and dirty water environment.
- The sustainable and responsible utilization (re-use) of all water resources and the prevention of pollution thereof.
- The sustainable rehabilitation of the mining site (excavations, topsoil- & overburden stockpiles, rest of terrain) in order to address all environmental impacts as far as practical.

Historical and Cultural aspects:
The mining right area has been disturbed by previous mining activities.

No archaeological or historical relics of heritage value were observed in the footprint of the mine. The mining application can be considered in light of these findings. The study is mindful that some important discoveries during the excavations. If this happens operations should be halted, and the provincial heritage resources authority or SAHRA notified in order for an investigation and evaluation of the finds to take place.

The sites are of low significance.

Finally, it should be noted that the subterranean presence of archaeological and/or historical sites, features or artefacts are always a distinct possibility. Care should therefore be taken during any development activities that if any of these are accidentally discovered, a qualified archaeologist be called in to investigate.

(b) Confirm specifically that the environmental objectives in relation to closure have been consulted with landowner and interested and affected parties.

A copy of the draft Scoping Report (burned to disc) was sent to all interested and affected parties. All Government Departments identified were also notified by registered letters. The surface owner also received a registered letter with the scoping report and an e-mail with the scoping report. The draft EIA EMP will also be sent to the surface owners (Please refer to Appendix 3).

(c) Provide a rehabilitation plan that describes and shows the scale and aerial extent of the main mining activities, including the anticipated mining area at the time of closure.

The rehabilitation of land disturbed by the operation during the life of the mining right will be accompanied by ongoing monitoring of the environment, until a stable state is reached. The main objectives are to have an uncontaminated, rehabilitated and safe environment, and to restore the area and habitats to a condition acceptable for obtaining a closure certificate.

Final rehabilitation of the site is expected to be within 20 years after the right has been granted and all deposits mined. Final rehabilitation will be executed systematically and will consist of the elements and procedures as listed below. More realistic closure elements will be fully determined by a Professional Mine Surveyor once the operation is active.

Dismantling of processing plant and related structures:

- The processing plant in total is expected to cover an area of ± 300 m^2, of which all should be dismantled and removed. This includes related infrastructures, equipment, machinery, screening plant, and other items used during the processing activities, such as conveyor belts, pipelines and power lines.
- The topography should then be restored to its natural contours, and any compacted area should be ripped to a depth no deeper than 300 mm;
- The prepared surfaces should then be covered with 300 mm of topsoil or suitable growth medium, which includes a viable seed bank; in order to encourage restoration of natural vegetation.

Demolition of steel buildings and structures:

- All steel buildings and structures are expected to amount to 0 m^2. These include mobile stores, workshops, offices, ablutions, water tanks, etc. Those in disuse and which cannot be sold, donated, or used for future purposes should be dismantled and removed or demolished.
- Any associated foundations associated with dismantled steel buildings and structures should also be demolished to 1 m below ground level;
- The topography should then be restored to its natural contours, and any compacted area should be ripped to a depth no deeper than 300 mm;
- The prepared surfaces should then be covered with 300 mm of topsoil or suitable growth medium, which includes a viable seed bank; in order to encourage restoration of natural vegetation.

Demolition of reinforced concrete buildings and structures

- All brick buildings and concrete structures are expected to amount to ± 0 m^2. These include French drains, wash bays, refuelling depots and concrete floors. Those in disuse and which cannot be donated or used for future purposes should be demolished.
- The foundations of these buildings should also be demolished and to a depth of 1 m below ground level;
- The topography should then be restored to its natural contours, and any compacted area should be ripped to a depth no deeper than 300 mm;
- The prepared surfaces should then be covered with 300 mm of topsoil or suitable growth medium, which includes a viable seed bank; in order to encourage restoration of natural vegetation.

Rehabilitation of access roads

- Mine roads in total, is expected to cover an area of 10 000 m^2. After general site rehabilitation has been completed, all redundant roads should be ripped or ploughed.
- The prepared surfaces should then be covered with 300 mm of topsoil or suitable growth medium, which includes a viable seed bank; in order to encourage restoration of natural vegetation.

Demolition and rehabilitation of electrified railway lines

- There are no electrified railway lines associated with the mining activities.

Demolition and rehabilitation of non-electrified railway lines

- There are no non-electrified railway lines associated with the mining activities.

Demolition of housing and/or administration facilities

- There are 200m² housing or administration facilities associated with the mining activities.

Opencast rehabilitation including final voids and ramps

- Opencasts and ramps associated with the mining activities are expected to cover 3ha at any time.
- In-filling of the pits should take place concurrently and by obtaining material from the closest adjacent excess material heaps;
- The topography should then be shaped to the natural contours;
- The prepared surfaces should finally be covered with 300 mm of topsoil or suitable growth medium, which includes a viable seed bank; in order to encourage restoration of natural vegetation.

Sealing of shafts, adits and inclines

- There are no shafts associated with the mining activities.

Rehabilitation of overburden and spoils

- The total final overburden and spoils are estimated to amount to 0,5ha and includes waste dumps as well as earth walls. Pre-planning should be conducted in order decide the fate of these features. For example, if the material from these features will be used for in-filling, or if the features will remain after closure.
- The slopes of those features selected to remain after closure, should be downgraded to such an extent that they are not visually intrusive to the skyline after closure, and/or at least have an average outer slope of 1:3 (18°); or as predetermined by a specialist, depending on the type of material;
- The prepared surfaces should then be covered with 300 mm of topsoil or suitable growth medium, which includes a viable seed bank; in order to encourage restoration of natural vegetation, to ensure stability, improve the visual impact, and minimise erosion.

Rehabilitation of processing waste deposits and evaporation ponds with pollution potential

- No processing waste deposits and evaporation ponds with pollution potential are associated with the mining activities.

Rehabilitation of processing waste deposits and evaporation ponds with no pollution potential

- The processing waste deposits on the mining area is estimated to cover an area of ± 0.5 ha. Pre-planning should be conducted in order decide the fate of this feature. For example, if the material

from these features will be used for in-filling, or if the features will remain after closure.

- The toe trenches should be backfilled by obtaining material from the closest adjacent heaps deemed appropriate for such purpose;

The slopes of those features selected to remain after closure, should be downgraded to such an extent that they are not visually intrusive to the skyline after closure, and/or at least have an average outer slope of 1:3 (18°); or as predetermined by a specialist, depending on the type of material;

- For backfilled trenches the topography should be shaped to be in line with the natural contours, but where compaction occurred, the areas should be ripped to a depth no deeper than 300 mm;
- The prepared surfaces should then be covered with 300 mm of topsoil or suitable growth medium, which includes a viable seed bank; in order to encourage restoration of natural vegetation, to ensure stability, improve the visual impact, and minimise erosion.

Storm water management

Storm water runoff arising from the upper and outer slopes of the rehabilitated residue deposit should be managed to

(1) prevent uncontrolled runoff from the residue deposit, which in turn creates surface erosion and resultant damage to the cover material and could also expose deposited material;
(2) route the runoff arising from the rehabilitated residue deposit into the surrounding surface water drainage regime in a manner that would limit the creation of secondary erosion in the receiving surface water environment and/or possible damage to downstream surface infrastructure; and
(3) allow for the control routing of the runoff collected on the rehabilitated residue deposit across cut-off, seepage or solution trenches provided to handle excess contaminated seepage from the residue deposit.

Rehabilitation of subsided areas

The EAP is not currently aware of any areas of subsidence on site. However, any potential for such occurrences should be actively investigated and should be included in the rehabilitation plan, if and when such areas are identified.

General surface rehabilitation

- Final surface rehabilitation of areas disturbed by mining and related activities should be aligned to the selected final land use. General surface rehabilitation encompasses the reinstatement of natural topography, the top soiling and the re-vegetation of all those areas

where infrastructure have been dismantled and removed or demolished. It also includes any industrial waste or scrap material that need to be removed from site. The total area that will need general surface rehabilitation at the time mine closure is estimated to be ± 3 ha.

River diversions
No river diversions are planned.

Fencing
It is not known at this stage if any fencing is planned.

Water management
No treatment of water will be necessary for the mining activities.

Maintenance and aftercare 3ha
Maintenance and aftercare should be planned for two to three years after mine production have ceased and should include the following:

- Annual fertilising of rehabilitated areas.
- Monitoring of surface and subsurface water quality,
- Control of alien plants, and
- General maintenance, including rehabilitation of cracks and subsidence.
- Erosion control and monitoring of the slopes of the slimes dams;

Specialist study
A screening level risk assessment should be completed by a specialist environmental practitioner during mine closure in order to ensure that all of the rehabilitation objectives have been met and that all of the potential risks have been eliminated and/or are controlled. This assessment should specifically emphasise those risks relating to river disturbances, groundwater quality and slope stabilities, but should not neglect progress made in natural vegetation restoration or success in alien invasive eradications. The current average specialist fees are estimated at R 50 000.

(d) Explain why it can be confirmed that the rehabilitation plan is compatible with the closure objectives.

The rehabilitation plan was primarily designed with the closure objectives in mind and therefore it relates to all the various objectives as set out above in Section 1) g) 1) a) of this EMPR. In general, the main objectives are to have an uncontaminated, rehabilitated and safe environment, and to restore the mining area to a condition acceptable for obtaining a closure certificate. Each and every element in the

rehabilitation plan was designed in order to meet these closure objectives.

The ultimate rehabilitation of the mining site that involves the sloping, levelling, replacement of topsoil and the seeding of a grass seed mix in areas that does not recover acceptably as agreed to by the land owner will ensure that the site could be regarded as safe for humans and animals and will also ensure that the site is stable from an erosion point of view and also ensuring that the site could be used for grazing again.

The removal of waste material of any description from the mining area and the disposal thereof at a recognised landfill facility.

- The removal of infrastructure, equipment, plant and other items from the site.

- The ripping of compacted areas to a level of 300mm and the levelling of such areas in order to re-establish a growth medium for plants (such areas will furthermore be seeded with a vegetation seed mix adapted to reflect the local indigenous flora that was present prior to the prospecting operation, if the re-establishment of vegetation is unacceptably slow.

- The mining of alluvial diamonds and the backfilling and covering thereof with previously stored topsoil (where-after this area will also be seeded with a vegetation seed mix adapted to reflect the local indigenous flora that was present prior to the proposed operation, and seedlings protected for a period of one) if the re-establishment of vegetation is unacceptably slow.

(e) Calculate and state the quantum of the financial provision required to manage and rehabilitate the environment in accordance with the applicable guideline.

The total cost to rehabilitate and mitigate the Mafisa Mining (Pty) Ltd Mine site as it stands currently (risking premature rehabilitation) is estimated to be R968 441 according to the DMR calculations. The detailed calculation DMR quantum is presented in Table 24. The total rehabilitation costing is based on the assumption that the mining operation will do continuous concurrent rehabilitation throughout the project.

Table 24: Financial Quantum

No.	Description	Unit	A	B	C	D	E=A*B*C*D
			Quantity	Master Rate	Multiplication factor	Weighting factor 1	Amount (Rands)
Remark:							
1	Dismantling of processing plant and related structures (including overland conveyors and powerlines)	m3	300	15,68	1	1	4704
					1	1	
2 (A)	Demolition of steel buildings and structures	m2	0	218,41	1	1	0
2(B)	Demolition of reinforced concrete buildings and structures	m2	0	321,86	1	1	0
3	Rehabilitation of access roads	m2	10000	2,29	1	1	22900
4 (A)	Demolition and rehabilitation of electrified railway lines	m	0	379,34	1	1	0
4 (A)	Demolition and rehabilitation of non-electrified railway lines	m	0	206,91	1	1	0
5	Demolition of housing and/or administration facilities	m2	200	436,81	1	1	87362
6	Opencast rehabilitation including final voids and ramps	ha	3	222313,32	0,04	1	26677,5984
7	Sealing of shafts adits and inclines	m3	0	117,25	1	1	0
8 (A)	Rehabilitation of overburden and spoils	ha	0,5	152653,61	1	1	76326,805
8 (B)	Rehabilitation of processing waste deposits and evaporation ponds (non-polluting potential)	ha	0,5	190127,32	1	1	95063,66
					1	1	
8 (C)	Rehabilitation of processing waste deposits and evaporation ponds (polluting potential)	ha	0	552219,84	1	1	0
					1	1	
9	Rehabilitation of subsided areas	ha	0	127824,41	1	1	0
10	General surface rehabilitation	ha	3	120927,41	1	1	362782,23
11	River diversions	ha	0	120927,41	1	1	0
12	Fencing	m	0	137,94	1	1	0
13	Water management	ha	0	45980,00	1	1	0
14	2 to 3 years of maintenance and aftercare	ha	3	16093,00	1	1	48279
15 (A)	Specialist study	Sum	0			1	0
15 (B)	Specialist study	Sum	0			1	0
					Sub Total 1		724095,2934
1	Preliminary and General		43445,7176		**weighting factor 2** 1,05		45618,00348
2	Contingencies				72409,52934		72409,52934
					Subtotal 2		842122,83
					VAT (15%)		126318,42
					Grand Total		**968441**

(f) Confirm that the financial provision will be provided as determined.

It is hereby confirmed that the financial provision will be provided as determined.

Mechanisms for monitoring compliance with and performance assessment against the environmental management programme and reporting thereon, including

g) Monitoring of Impact Management Actions
h) Monitoring and Reporting Frequency
i) Responsible persons
j) Time Period for Implementing Impact Management Actions
k) Mechanisms for Monitoring Compliance

SOURCE ACTIVITY	IMPACTS REQUIRING MONITORING PROGRAMMES	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES (FOR THE EXECUTION OF THE MONITORING PROGRAMMES)	MONITORING AND REPORTING FREQUENCY and TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS
Topography	To minimise the reduction of land capability.	To ensure that rehabilitation post-mining slopes are stable, free draining and no slopes have an angle in excess of 20°.	Site Manager/ Environmentalists	Monitoring will be done on an *annual basis or after a heavy rain event*, to ensure that the levels and the slopes are in order.
Soil	To prevent soil pollution; To limit soil compaction; To curb soil erosion; and To reinstate a growth medium able to sustain plant life.	Soil depth and chemical composition will be tested and possible erosion damage will be assisted and rectified.	Site Manager/ Environmentalists	Monitoring will be done on an *annual basis* or after a heavy rain event.
Air Quality	To control the incidence of unacceptable levels of dust pollution on site.	To ensure that the mine minimizes dust omissions, so that dust does not become a nuisance for affected parties and a health hazard.	Site Manager/Foreman appointed SHE Consultant	Visual inspections will be done and managed by dust suppression by a water tanker. Quarterly tests will also be conducted by a Safety Health and Environmental Consultant and submitted to Mine Health and Safety for monitoring purposes.
Fauna	To minimise vegetation destruction in mining areas, and therefore a habitat for wildlife; and To eliminate poaching and the extermination of animal species within the boundaries of the study area as well as the surrounding areas.	To ensure that the species diversity and abundance is not significantly reduces.	Site Manager/ Environmentalists	Monitoring will be done at rehabilitated area on an *annually basis* to investigate species diversity and abundance.
Flora	To minimise the destruction of vegetation units; and To control invasion of exotic and invasive plant species.	To ensure that the rehabilitated areas become self-maintaining.	Site Manager/ Environmentalists	Monitoring will be done at the rehabilitated areas on a *twice a year basis* (mid-summer and mid-winter), where species diversity and vegetation cover will be investigated.

SOURCE ACTIVITY	IMPACTS REQUIRING MONITORING PROGRAMMES	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES (FOR THE EXECUTION OF THE MONITORING PROGRAMMES)	MONITORING AND REPORTING FREQUENCY and TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS
Noise and Vibration	To ensure that the legislated noise and ground vibration levels will be adhered to at all times. To control the incidence of unacceptable noise levels on site.	The management objective will be to reduce any level of noise, shock and lighting that may have an effect on persons or animals, both inside the plant and that which may migrate outside the plant area.	The manager during the construction phase and the responsible person (Manager / Environmental Department) during the Operational phase of the project.	Quarterly reports on fall-out dust and noise monitoring will be conducted as required by legislation. If any complaints are received from the public or state department regarding noise or dust levels the levels will be monitored at prescribed monitoring points.
Surface Water	To conserve water; and To eliminate the contamination of run-off.	The Sultan River are the nearest source in the vicinity of the mine. The Sultan River runs into the Buffels River but both is non-perrennial rivers.	Site Manager/Water Supply	The komaggas study area comprises no wetlands, but the Sultan River channel lines the boundary of the mining right application area. Monitoring takes place by collecting surface water samples every quarter or as required by DWS on the Water Use Licence conditions Both the Sultan and Buffels River is non-perrennial.

l) Indicate the frequency of the submission of the performance assessment report

Auditing of compliance with environmental authorisation, the environmental management programme and the closure plan should be conducted biennially by an independent EAP and an Environmental Audit Report should be compiled in such a way that it meets the requirements in terms of Regulation 34 of the National Environmental Management Act 107 of 1998): Environmental Impact Assessment Regulation, 2014.
The rehabilitation plan should also be reviewed annually in order to fulfil the requirements of Section 41(3) of the MPRDA and should be conducted by an independent EAP. Subsequently, an Annual Rehabilitation Plan should be developed to meet the various requirements set out in the National Environmental Management Act (No 107 of 1998) (NEMA) Regulations pertaining to the financial provision for prospecting, exploration, mining or production operations (as amended in 2015).
These reports should be submitted annually to the Northern Cape DMRE offices in Kimberley.

m) Environmental Awareness Plan

The objective of the environmental awareness plan is to ensure that:

- Training needs are identified and all personnel whose work may create a significant impact upon the environment have received appropriate training;
- All employees are aware of the impact of their activities
- Procedures are established and maintained to make appropriate employees aware of:
    - The significant environmental impacts (actual or potential) of their work activities and environmental benefits of improved personal performance,
    - Their roles and responsibilities in achieving conformance with environmental policies, procedures, and any implementation measures,
    - The potential consequences of departure from specified operating procedures.
- Personnel performing tasks, which can cause significant environmental impacts, are competent in terms of appropriate education, training and / or experience.

Environmental awareness will be part of the existing training and development plan. Key personnel with environmental responsibilities will be identified and the following principles will apply:

- Procedures will be developed to facilitate training of employees, on-site service providers and contractors;
- Environmental awareness will focus on means to enhance the ability of personnel and ensure compliance with the environmental requirements;

Top management will build awareness and motivate and reward employees for achieve environmental objectives;

- Environmental policies will be availed to mine employees and contractors;
- Environmental inductions will be conducted for employees, contractors and visitors;
- There will be an ongoing system of identifying training needs.

General environmental awareness training as part of the induction at the Mafisa Mining operation should focus on the following:

- General environmental awareness
- The mine policies and vision concerning environmental management
- Legal requirements
- Mine activities and their potential impacts
- Different management measures to manage identified impacts
- Mine personnel's role in implementing environmental management objectives and targets

(1) Manner in which the applicant intends to inform his or her employees of any environmental risk which may result from their work.

It is the responsibility of management to ensure that all employees, contractors and visitors are trained to understand the impacts of their tasks on the environment and to reduce them wherever possible. Environmental awareness should be part of the existing training and development plan. Key personnel with environmental responsibilities should be identified and the following principles should be applied:

- Procedures should be developed to facilitate training of employees, on-site service providers and contractors;
- Environmental awareness should focus on means to enhance the ability of personnel and ensure compliance with the environmental requirements;
- Top management should build awareness and motivate and reward employees for achieving environmental objectives;
- There should be an ongoing system of identifying training needs.
- An environmental, health and safety induction programme should be provided to all employees, contractors and visitors prior to commencing work or entering the site, and they should sign acknowledgement of the induction. An attendance register and agenda/programme should be filed for each induction.
- A daily "toolbox talk" should be held prior to commencing work, which will include discussions on health, safety and environmental considerations. The toolbox talks should be led by the site manager or the appointed supervisor/s.
- Refresher training should also be given to permanent employees and long-term contractors on an annual basis, to ensure that all are competent to perform their duties, thereby eliminating negative impacts on their safety, health and environment.

General environmental awareness training as part of the induction at the Mafisa Mining project should focus on the following:

- General environmental awareness, which incorporates environmental, ecological and heritage elements;
- The mine policies and vision concerning environmental management;
- Legal requirements;
- Mine activities and their potential impacts;
- Different management measures to manage identified impacts;
- Mine personnel's role in implementing environmental management objectives and targets.

Environmental awareness topics to be covered in training should include:

- Natural resource management and conservation;
- Biodiversity awareness and conservation principles;
- Heritage resource awareness and preservation principles;
- Hazardous substance use and storage;
- Waste management; and
- Incident and emergency actions and reporting;

(2) Manner in which risks will be dealt with in order to avoid pollution or the degradation of the environment.

Environmental incident reporting will be a vital part of communication in order to deal with risks and ultimately avoid pollution or the degradation of the environment. Such communication should take place through the management, administrative and worker sectors of the operation, as well as contractors and visitors. Employees should be required to report any and all environmentally related problems, incidents and pollution, so that the appropriate mitigation actions can be implemented timeously. In the event of an environmental incident, the reporting procedure as indicated in the table below should be followed.

ENVIRONMENTAL INCIDENT REPORTING STRUCTURE	ACTIONS REQUIRED
Person causing or observing the incident	The first person causing or observing the incident shall report the incident to an immediate supervisor where the environmental incident is observed.
Line management in the relevant area of responsibility where the incident occurred	Line management in the relevant area of responsibility where the incident occurred shall: • Investigate the incident and record the following information: - How the incident happened; - The reasons the incident happened; - How rehabilitation or clean up needs to take place; - The nature of the impact that occurred; - The type of work, process or equipment involved; - Recommendations to avoid future such incidents and/or occurrences; • Inform the environmental manager/ECO and the Operations Manager on a daily basis of all incidents that were reported on site; • Consult with the relevant department/person for recommendations on actions to be taken or implemented where appropriate (e.g. clean-ups). • Assist the Environmental Manager and/or Operations Manager with applicable data in order to accurately capture the incident into the reporting database; • Ensure that remediation measures are implemented as soon as possible.

Site managers	The site managers shall: • Forward a copy of the incident form to other line managers; • Forward a copy of the incident form to the Environmental manager/ECO; • Inform the relevant department/person on a weekly basis of the incident by e-mail or by submitting a copy of the incident report. Once a High-Risk Incident (any incident which results from a significant aspect and has the potential to cause a significant impact on the environment) occurred it must be reported immediately to the Environmental Manager and the Operations Manager by telephone or email to ensure immediate response/action. • Forward a copy of the completed Incident Reporting Form (and where applicable a copy of the incident investigation) to the relevant department/person.
Environmental manager/ECO	The appointed environmental manager or ECO shall: • Complete an incident assessment form to assess what level of incident occurred; • Make recommendations for clean-up and/or appropriate alternate actions; • Enter actions necessary to remediate environmental impacts into the database in conjunction with the responsible line manager; • Enter the incident onto the database in order to monitor the root causes of incidents; • Include the reported incidents in an appropriate monthly/quarterly report; • Highlight all incidents for discussion at HSEC meetings.

n) Specific information required by the Competent Authority

(Among others, confirm that the financial provision will be reviewed annually)

According to Section 41(3) of the MPRDA the holder of a Mining right must annually assess (and revise, if necessary) the total quantum of environmental liability for the operation and ensure that financial provisions are sufficient to cover the current liability (in the event of premature closure) as well as the end-of-operation liability.

An Annual Rehabilitation Plan should be developed to match the various requirements set out in the NEMA regulations pertaining to the financial provision for prospecting, exploration, mining or production operations (as amended in 2015).

Officials in the DMRE Regional Offices are required to assess, review and approve the quantum of financial provision submitted (that is, the monetary value of the financial provision that has been computed by the holder of a prospecting right, mining right or mining permit during the annual review) as being sufficient to cover the environmental liability at that time and for closure of the site at that time.

It is hereby confirmed that the financial provision shall be reviewed annually.

2) UNDERTAKING

The EAP herewith confirms

a) the correctness of the information provided in the reports;

b) the inclusion of comments and inputs from stakeholders and I&APs;

c) the inclusion of inputs and recommendations from the specialist reports where relevant; and

d) the acceptability of the project in relation to the finding of the assessment and level of mitigation proposed.

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Signature of the Environmental Assessment Practitioner:

Wadala Mining and Consulting (Pty) Ltd

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Name of Company:

Date: 8 December 2021

- END -