mineral resources

Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

BASIC 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:	**KAMKUIP BOERDERY (PTY) LTD**
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FAX NO:	**086 231 0371**
POSTAL ADDRESS:	**PO Box 204** **Upington** **8800**
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FILE REFERENCE NUMBER SAMRAD: **NC 30/5/1/3/2/10927 MP**

1. IMPORTANT NOTICE

In terms of the Mineral and Petroleum Resources Development Act (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 (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 BASIC ASSESSMENT PROCESS

The objective of the basic 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) identify the alternatives considered, including the activity, location, and technology alternatives;

(c) describe the need and desirability of the proposed alternatives;

(d) through the undertaking of an impact and risk assessment process inclusive of cumulative impacts which focused on determining the geographical, physical, biological, social, economic, heritage and cultural sensitivity of the sites and locations within sites and the risk of impact of the proposed activity and technology alternatives on these aspects to determine:-

  (i) the nature, significance, consequence, extent, duration and probability of the impacts occurring to; and
  (ii) the degree to which these impacts—
    (aa) can be reserved;
    (bb) may cause irreplaceable loss of resources; and
    (cc) can be managed, avoided, or mitigated.

(e) through a ranking of the site sensitivities and possible impacts the activity and technology alternatives will impose on the sites and location identified through the life of the activity to—
  (i) identify and motivate a preferred site, activity and technology alternative;
  (ii) identify suitable measures to manage, avoid or mitigate identified impacts; and
  (iii) identify residual risks that need to be managed and monitored.

PART A
SCOPE OF ASSESSMENT AND BASIC ASSESSMENT REPORT

Contact Person and Correspondence Address

a) Details of

i) Details of the EAP

Name of the Practitioner:	Roelien Oosthuizen
Tel No.:	087 527 0713
Cell No.:	084 208 9088
Fax No. :	086 510 7120
e-mail address:	roosthuizen950@gmail.com
Physical Address:	Farm Oberon, Kimberley
Postal Address:	P.O. Box 110823; Hadisonpark, Kimberley, 8306

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. See attached CV. (with evidence attached as **Appendix 2**)

b) Description of the property

Farm Name:	A 5 ha Portion of the Remaining Extent of Portion 3 (Rooidam) of the farm Gemsbok Bult no. 120, in the magisterial district of Kenhardt, Northern Cape.
Application area (Ha)	5 ha (Five hectares).
Magisterial district:	Kenhardt
Distance and direction from nearest town	The study area is situated ±35 km north east outside of the town of Kenhardt in the administrative district of Kenhardt, Northern Cape Province.
21-digit Surveyor General Code for each farm portion	**C03600000000012000003** Total Extent of application area: 5 ha

c) Locality map

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

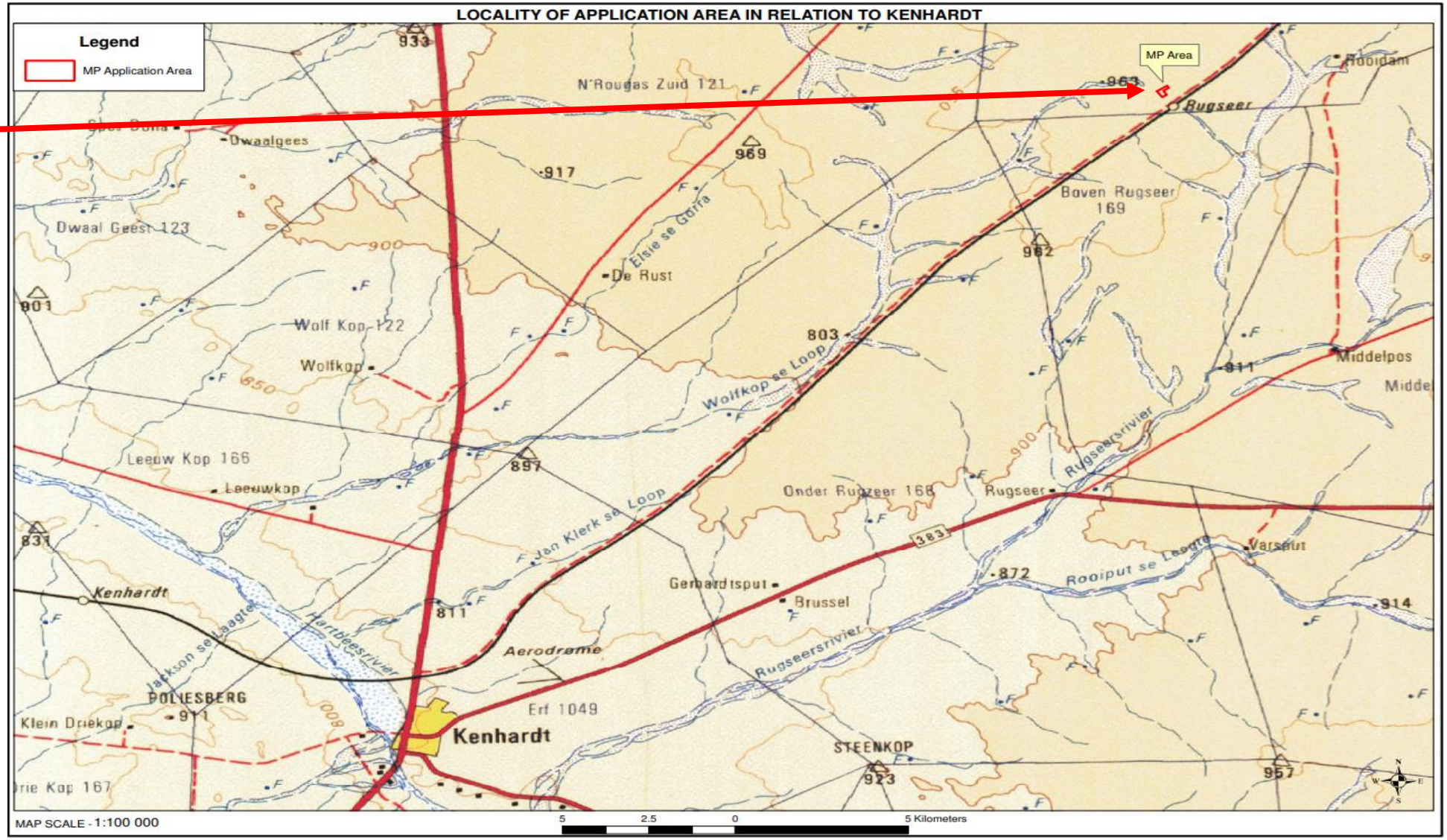


Figure 1. The locality of the proposed mining permit area indicated in the red block and with red arrow.

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)

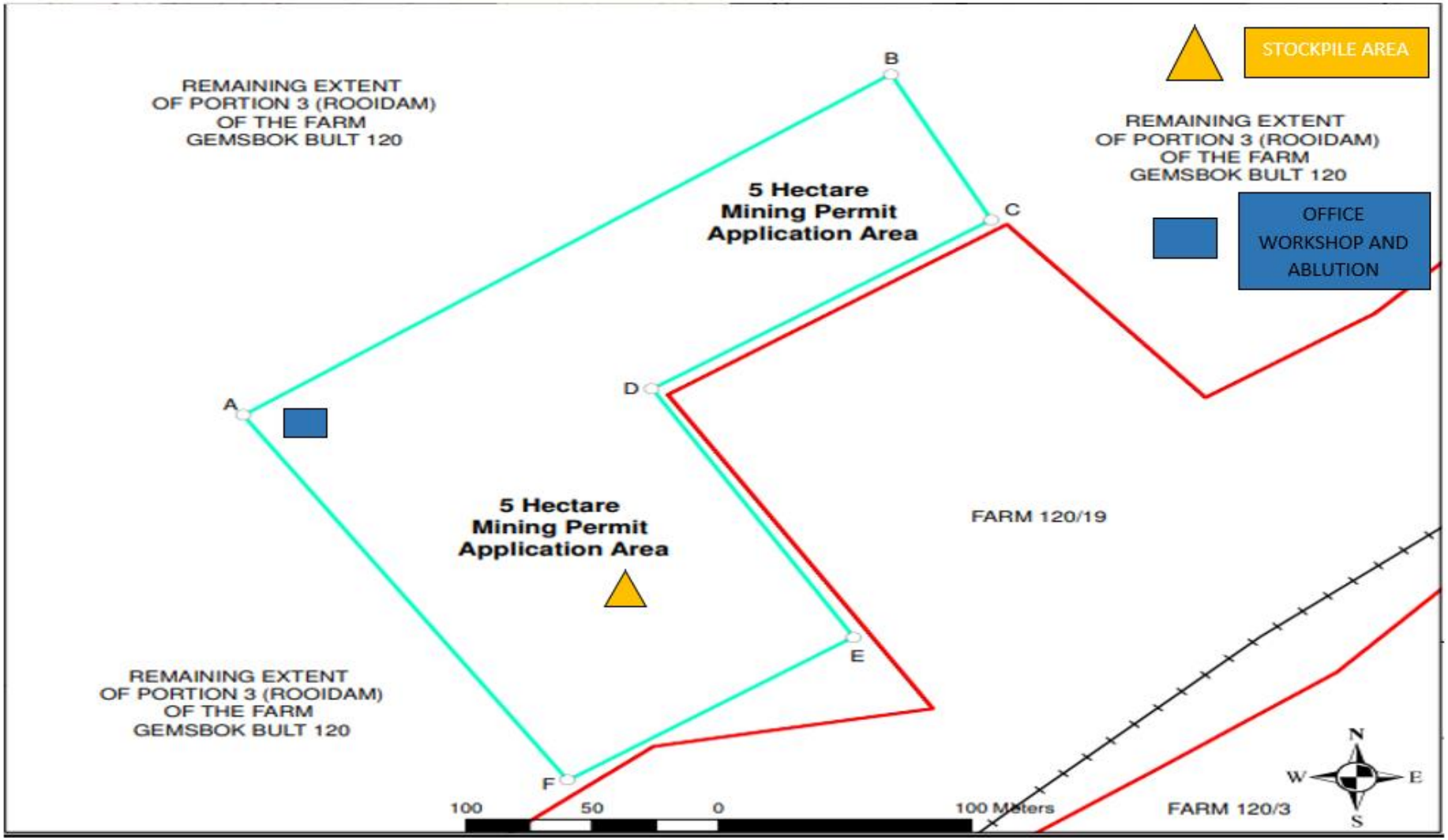


Figure 2. Map showing the aforesaid main and listed activities, and infrastructure to be placed on site

i) Listed and specified activities

Table 1: Listed and Specified Activities

NAME OF ACTIVITY **(E.g. for prospecting** – drill site, site camp, ablution facility, accommodation, equipment storage, sample storage, site office, access route, etc. … etc. … etc. **E.g. for mining** – excavations, blasing, 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 ***(GNR 544, GNR 545 or GNR 546)***	WASTE MANAGEMENT AUTHORISATION (Indicate whether an authorisation is required in terms of the Waste Management Act). **(Mark with an X)**
Activity 14 of NEMA Listing Notice 1 The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres.	±100m² Concrete Bund walls and diesel Depots	X	GNR 327	
Activity 21 of NEMA Listing Notice 1 Any activity including the operation of that activity which requires a mining permit in terms of section 27 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, including activities for which an exemption has been issued in terms of section 106 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002). (b) the primary processing of a mineral resource including winning extraction, classifying, concentrating, 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.	**5ha** .	X	GNR 327	
Activity 27 of NEMA Listing Notice 1	**A total of 5 hectares will be physically disturbed**	X	GNR 327	

The clearance of an area of 1 hectare or more, but less than 20 ha of indigenous vegetation, except 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.	**were the Aggregate will be removed and loaded.**			
Activity 24(ii) of NEMA Listing Notice 1 The development of haul roads with no reserve	±200m² on the Area.	X	GNR327	
Activity 56(ii) of NEMA Listing Notice 1 The continuous lengthening (and rehabilitation) of haul roads with no reserve	±200m² on the Area.	X	GNR327	
OTHER ACTIVITIES (Associated infrastructure not considered to be listed activities) Temporary Workshop Facilities Storage Facilities Ablution Facilities Topsoil Stockpiles Overburden Stockpiles	 ±300m² ±300m² ±9m² ±100m² ±100m²		NOT LISTED	

ii) Description of the activities to be undertaken

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

The construction phase will commence upon granting of the Mining Permit application. The mine site will be established during this phase whereby the dedicated areas will be demarcated. These include the temporary product areas.

The operational phase will consist of the excavating of aggregate and putting it on a stockpile to sell. The excavation of the aggregate will be done using a TLB and Front-end loader and will be loaded into Tipper Trucks.

On completion of the mining operation, the various surfaces, including the access road, the office area, storage areas and the mining area, will finally be rehabilitated. All material on the surface will be removed to the original topsoil level where possible, and the borrow pit excavations sloped and made safe. The surface will be ripped or ploughed to a depth of 300mm, where possible, and the topsoil, previously stored adjacent the site, distributed evenly to its original depth over the whole area. Lastly, the site will be seeded with a vegetation seed mix adapted to reflect the local indigenous flora if necessary, and where practically possible.

The decommissioning phase will only commence once all of the aggregate has been worked out and rehabilitated. During decommissioning all mining related infrastructure will be removed from the site and final rehabilitation of the disturbed areas will take place. Once final rehabilitation has taken place, Kamkuip Boerdery will apply for a closure certificate.

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 Permit has been applied for (NC) 30/5/1/3/2/10927 MP. - 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) - Regulations GN R205, published on 12 March 2015 in terms of NEMA (National appeal Amendment Regulations)	- Control measures are to be implemented upon the approval of the EMPR.

	- 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 DMRE 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 Publication of lists of critically endangered, vulnerable and protected species GNR 151/GG 29657/23-02-2007 *	- A permit application regarding protected plant species need to be lodged with DENC if any protected species is encountered. Control measures are to be implemented upon the approval of the EMPR.

	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.	- Not applicable. The mining operation does not fall within any protected area.
National Environmental Management: Waste Management Act (Act 59 of 2008)	- Chapter 4: Waste management activities - 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)	- To be implemented upon the approval of the EMPR.

	- 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. - Control measures are to be implemented upon the approval of the EMPR.
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 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	- Control measures are to be implemented upon the approval of the EMPR. Fossil finds procedure are attached to the PIA.

	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; (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)	- A water use application will not be a requirement for this application Control measures are to be implemented upon the approval of the EMPR.

	- 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.	- Control measures are to be implemented upon the approval of the EMPR.

	- Section 9: General duties of employers and self-employed persons to persons other than their employees.	
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 activity is based on Opencast mining by semi mechanized system of removing aggregate using a TLB, Front End Loader and tippers/lorries. No need for drilling and blasting.

No exploration is carried out. The quantity and quality of the aggregate available in the area can be easily confirmed by visual survey.

The Aggregate will be loaded directly to the trucks/ tippers/lorries for transportation to the development site (sun farm).

g) Motivation for the overall preferred site, activities and technology alternative

In order to ensure that the proposed development enables sustainable development, a number of feasible options must be explored. Motivation for the footprint of the actual mining operation (i.e. excavations) will not be provided here, as the location of the mine is determined by the geological location of the mineral resource.

Mine Site Location

Mining infrastructure was strategically placed by incorporating mining project demands, environmental sensitivities and IAP concerns, as identified during the EIA process. Thus, the mining site location 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. This renders the consideration of further alternative locations in terms of the mine site location, unnecessary.

h) Full description of the process followed to reach the proposed preferred alternatives within the 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.

The consideration of alternatives is a critical component of the EIA process, where an appropriate range of alternatives require consideration whilst achieving the desired objective of the proposed project. In order to ensure that the proposed development enables sustainable development, a number of feasible options must be explored. The various alternatives were assessed in terms of logistical practicality, environmental acceptability and economic feasibility. Alternatives for the locality of the mining operation do not form part of the discussion as the location of the mine is determined by the geological location of the mineral resources.

Land Use

No specialist comparative land use assessments were conducted, but the mining area has a low agricultural potential. The area has not been irrigated and is engaged by livestock

grazing land. The application area is 5ha and is taken up by an old borrow pit and can be classified as wilderness. Therefore, mining has been determined as the most feasible alternative.

Project Infrastructure

Alternatives and considerations pertaining to the project infrastructure were discussed in section g.

Mining Method

The activity is based on Opencast mining by semi mechanized system of removing aggregate using a TLB and tippers/lorries. No need for drilling and blasting.

No exploration is carried out. The quantity and quality of the aggregate available in the area can be easily confirmed by visual survey.

Proceed without the Mine (No Go)

Land Use

The current land use is grazing, with a low stocking rate for the farm. If the mining operation does not continue, the farming will persist. Cumulative aspects associated with grazing include overgrazing, with potential of desertification.

Socio-Economy

Kamkuip Boerdery mining project is planning to employ 5 to 8 people. The non-approval of this mining operation would impact negatively on the employment rate for the region and the families who are likely to benefit from the positive employment opportunities. Substantial tax benefits to the State and Local Government will also be lost.

Biodiversity

The implementation of Kampkuip Boerdery's mining will have a potential impact on the biodiversity through removal of indigenous vegetation and destruction of habitats. If no mining activities were to continue, the status quo would apply and no damage would accrue to the environment.

Dr. Betsie Milne was appointed by Kamkuip Boerdery to conduct an Ecological Assessment study for the proposed mining area. (Appendix 4)

Heritage and Cultural Resources

In the event that the mining operation does not proceed, the heritage resources will remain as is. The protection and preservation of these resources are therefore not guaranteed. However, if the mining operation is approved, the heritage resources will be protected through the demarcation of no-go zones and fencing off of graves or any other resources.

i) Details of the development footprint alternatives considered

With reference to the site plan provided as Appendix 3 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.

The property on which or location where it is proposed to undertake the activity

The property on which the mining operations (i.e. excavations) are planned to be undertaken is determined by the geological location of the mineral resource (as discussed in section f). Therefore, there are no alternatives for the location of the activity, except for not proceeding with the operation. This will however cause the underutilisation of a national economic resource.

The type of activity, technology and operational aspects

The planned mining activities, as discussed in section d) ii), The mining method of the activity is based on Opencast mining by semi mechanized system of removing aggregate using a TLB and Front-end Loader and tippers/lorries. No need for drilling and blasting.

No exploration is carried out. The quantity and quality of the aggregate available in the area can be easily confirmed by visual survey.

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 access roads, proximity to the areas earmarked for mining as well as limited additional impact on the environmental and heritage resources.

The option of not implementing the activity

Potential land use includes grazing and mining. The majority of the area is classified to have low to moderate potential for grazing land and low suitability for crop yield. The farming of livestock will only be able to continue in areas not affected by mining operations. Cumulative impacts associated to grazing include overgrazing and destruction of natural vegetation, but the cumulative effect of mining activities on the property are expected to outweigh any potential negative effects that agriculture might have.

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.

The initial consultation process with interested and affected parties was completed.

The process as described by NEMA for Environmental Authorisation was followed. See the table in **Appendix 3** for the identification of Interested and Affected Parties to be consulted with. The landowner is also the applicant.

Registered letters were sent to all Interested and Affected parties on 22 June 2022 containing the Background Information Document as well as comment and registration forms for interested and affected parties to complete.

Notices were placed at Kaap Agri, Kai !Garib Municipality, KLK and at the farm gate to the site.

An Advert (Notice) was placed in the Gemsbok on 1 July 2022 to notify all other interested and affected parties.

The BAR was put on the WADALA Mining website and letter with a disc containing a soft copy of the document were send to all identified parties for comments and concerns on 22 August 2022.

iii) Summary of issues raised by I&APs

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

Please refer to the table in Appendix 3 for a summary of issues raised by Interested and Affected parties.

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) <u>Geology:</u>

The following information was obtained from the Geological Survey of South Africa for the area of Kenhardt (Explanation of Geological Page 2920). Slabbert, M.J., Moen, H.F.G., & Boelema, R. 1999. Geological Survey of South Africa: Kenhardt (2920). Council of Geosciences: Pretoria.

The study area falls within the Namaqua Metamorphic Province which is underlain by a diversity of high- to medium-grade metasedimentary sequences as well as granitic, basic and ultrabasic intrusive rocks. The Namaqua Metamorphic Province in the Kenhard area is characterised by complex patterns of folding and faulting which is furthermore complicated by the amount of granite intrusions. Due to the fragmented nature of the outcrops, erratic successions and structure complications it is extremely difficult to correlate rock units with certainty over the span of the entire area. The areas between prominent structures for which the stratigraphy could be determined with certainty are considered to be fragments of the crust. A separate sequence can be compiled for each of these fragments. Within the Kenhardt area there are nine of these fragments namely the Arribees, Drooge Grond, Bry-Paal, T'Caimoeps Laagte, De Kruis, Haakjes Doorn Kolk, Hartbees River, Boks Puts and Karee Leegte Fragmente.

The fragment of importance for the study area is the Hartbees River Fragment. This fragment is located between the Boven Rugzeer Shear (in the north east) and the Hartbees River Fault. According to the lithostratigraphic composition, the fragment consists out of three main groups namely the Hartbees River Complex, the Jacomyns Pan Group and the Korannaland Supergroup as well as a great variety of granitic and mafic intrusions.

The Jacomyns Pan Group is a highly migmatized unit which occurs southwards from Kenhardt. This magmatized unit mainly consists of granetiferous aluminous gneiss (kinzigite) and quartz-feldspar leucognreiss. Rocks of the Jacomyns Pan Group is bordered by the Boven Rugzeer – and Straussheims Shear zones.

The group consist mostly out of a quick alternating and lateral graded metasedimentary successions of which a great component within the lithological composition consists out of metapelite gneiss. Other rocks which

also occurs in the group includes quartzite, leukocratic quartz-feldspar gneiss, amphibolite, lime silicate rocks and marble.

The common characteristic of the aluminous gneiss varies significantly with grey, banded and/or migmatized garnet ± sillimanite ± cordierite carrying biotite gneiss and dark to black, massive quartz-feldspar-biotite ± garnet ± sillimanite ± cordierite gneiss as the most common variances. Outcrops of these rocks can be found on the farm Gemsbok Bult no. 120 and along the Kenhardt – Louisvale road.

Red-brown windblown sand of the Gordonia Formation of the Kalahari Group is present in the vicinity of the study area. These windblown sands builds dunes in places, however, as stated by Slabbert *et. al* (1999) this group is representative of the outmost southern part of the Kalahari dune field and is generally very shallow.

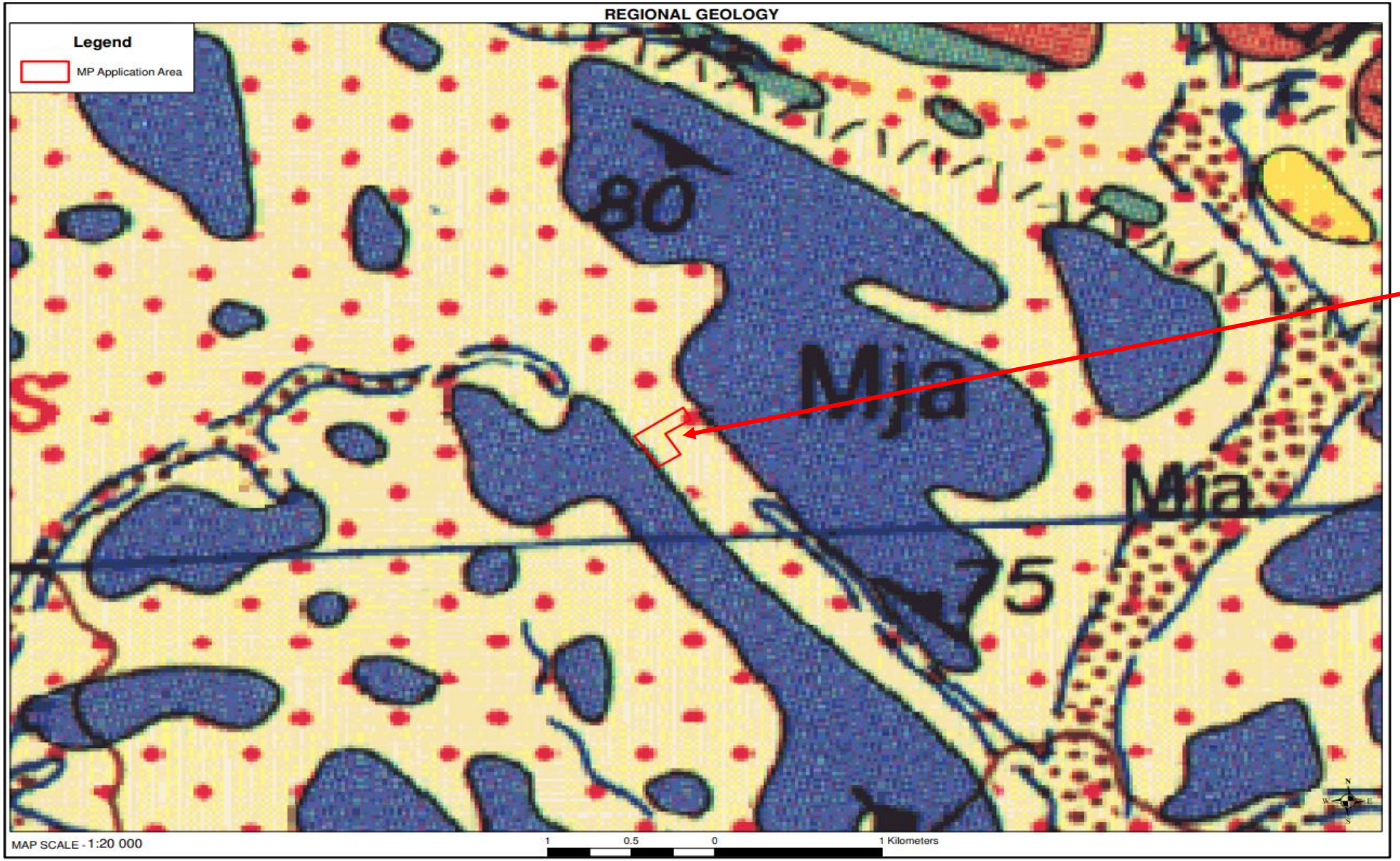


Figure 3. The distribution of geological features in the study area.

2) Climate:

Regional Climate:-

The Northern Cape is classified as a semi-dessert and is known to have late summer rains with high temperatures in the Summer (as high as 38°C to 40°C) and cold Winters (temperatures ranging from -4°C to -6°C). The study areas falls within the Nama-Karoo Biome within the Bushmanland Arid Grassland vegetation unit.

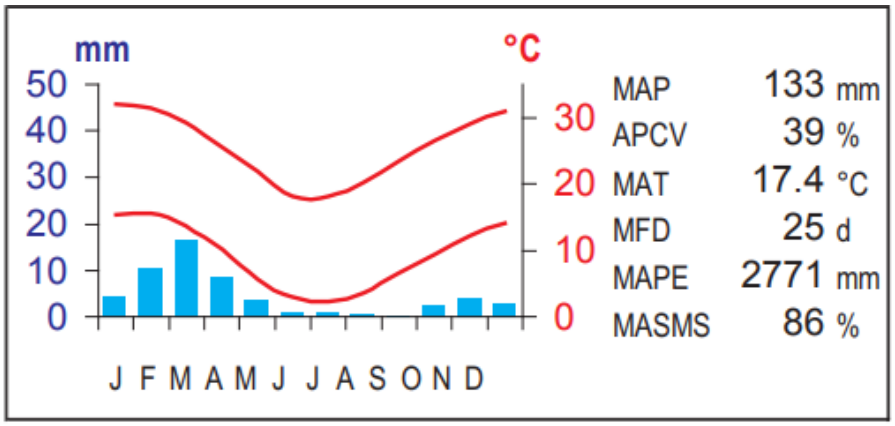


Figure 4. Climate summary of the Bushmanland Arid Grassland. (Blue bars show the median monthly precipitation. The upper and lower red lines show the mean daily maximum and minimum temperature respectively. MAP: Mean Annual Precipitation; APCV: Annual Precipitation Coefficient of Variation; MAT: Mean Annual Temperature; MFD: Mean Frost Days (days when screen temperature was below 0°C); MAPE: Mean Annual Potential Evaporation; MASMS: Mean Annual Soil Moisture Stress (% of days when evaporative demand was more than double the soil moisture supply) (Source: Mucina & Rutherford, 2006).

Rainfall:-

Most of the rainfalls occur during thunderstorms in the late Summer and early Autumn months. The Mean Annual Precipitation is 133mm (fig. 4) however, it can range from 70mm to 200mm (Mucina & Rutherford, 2006).

Average Maximum and Minimum Temperatures:

The average maximum temperature measured during the Summer for Kenhardt is 40.6°C and the minimum during the Winter months is -3.7°C.The highest temperatures are mostly recorded in January and the coldest month of the year is July.

Average Monthly Wind Direction and Speed:-

The prevailing wind direction in the area is mainly from the south and south-southwest to north and north-northeast with the strongest winds from the north that occurs between August and December.

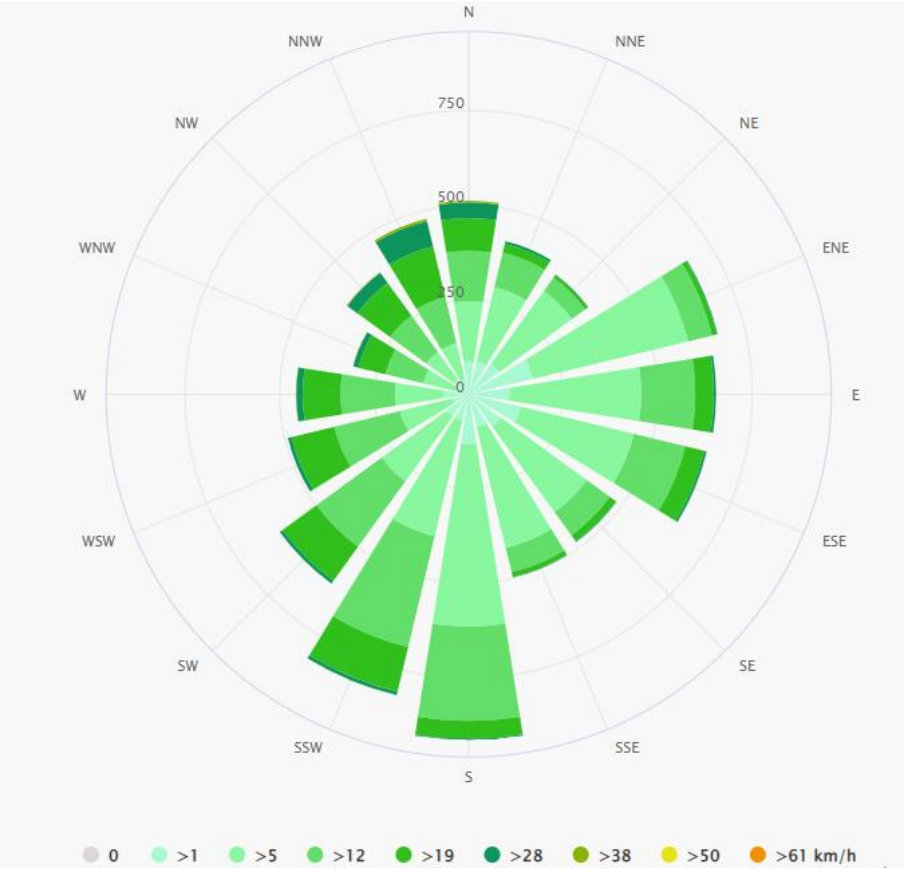


Figure 5. Wind Rose for Kenhardt.
(Source:https://www.meteoblue.com/en/weather/historyclimate/climatemodelled/kenhardt_south-africa_991396)

Evaporation:-

It is estimated that the average annual evaporation rate is approximately 2771mm which indicates the dry climate conditions in this area (Mucina & Rutherford, 2006).

Presence of Extreme Climatic Conditions:-

Frost:	May to September usually 25 days per year (fig 4).
Strong Winds:	Occasional strong winds occur but not often
Droughts:	Normal for a dessert area – approximately 6 out of 10 years

3) <u>Topography:</u>

Dr. Betsie Milne was appointed by Kamkuip Boerdery to conduct an Ecological Assessment study for the proposed mining area. (Appendix 4), topography was described in the report.

The terrain comprises level plains with some relief. Altitude is around 980 m.a.s.l., with very gentle (<1 %) slopes.

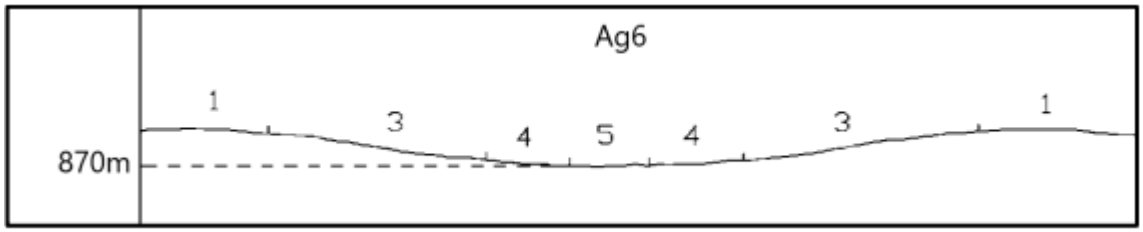


Figure 6. The dominant land type terrain units on Gemsbok Bult.

4) Soils:

Dr. Betsie Milne was appointed by Kamkuip Boerdery to conduct an Ecological Assessment study for the proposed mining area. (Appendix 4), soil was described in the report.

The land type is Ag6, which comprise red-yellow apedal, freely drained soils, red, with high base status, and less than 300 mm deep. The site is primarily associated with terrain unit 1 of the Ag6 landtype (Figure 6).

The terrain on site has low susceptibility to erosion and flooding hazards. The soils of the site have moderately high susceptibility to wind erosion and moderate water erosion susceptibility. The soils are furthermore highly susceptible to crusting and have very high susceptibility to compaction.

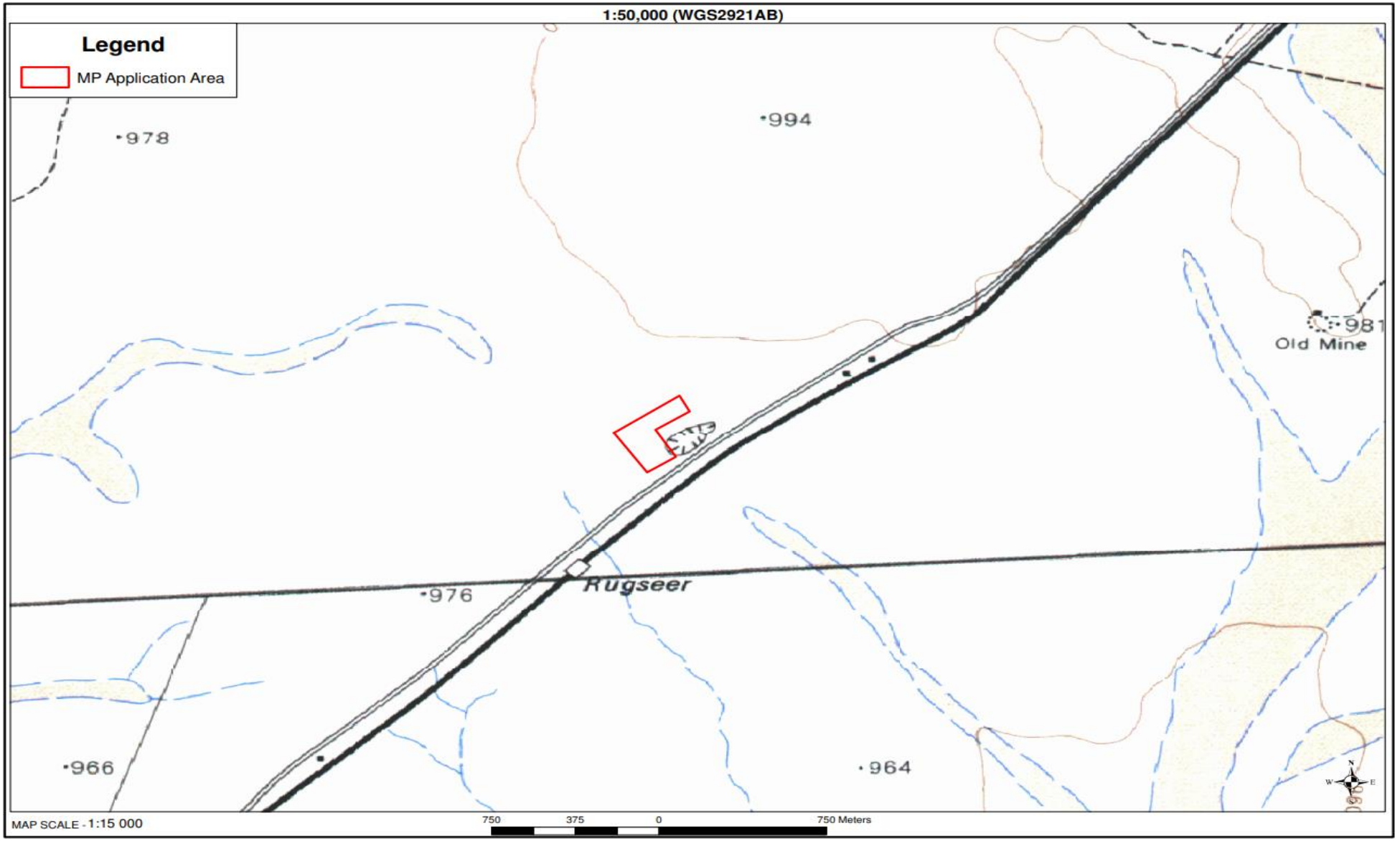


Figure 7. Topographical Map with the proposed mining permit area in the red block.

5) Land Capability and Land Use:

Dr. Betsie Milne was appointed by Kamkuip Boerdery to conduct an Ecological Assessment study for the proposed mining area. (Appendix 4), Land capability and land use was described in the report.

Land use before mining

The major land use in the area is agriculture. The region is non-arable with low land use capability. The region has been demarcated for sheep farming, with a grazing capacity of 37 ha/LSU. Apart from the proposed mining activities, Gemsbok Bult has also been earmarked for the 75MW solar energy facility (Gemsbok PV1) and an existing old borrow pit is present in the south. Currently, the property is utilised for grazing, with the northern half still being in pristine condition.

Evidence of disturbance

an existing old borrow pit is present in the south

Existing structures

an existing old borrow pit is present in the south

6) Surface Water:

Dr. Betsie Milne was appointed by Kamkuip Boerdery to conduct an Ecological Assessment study for the proposed mining area. (Appendix 4), surface water was described in the report.

The Gemsbok Bult study area falls within the Sak-Hartbees quaternary catchment D53B of the Lower Orange Water Management Area (Figure 8). This quaternary catchment has been allocated a Present Ecological State (PES) of 'Largely Natural' (B) by Smook et al. (2002). Information regarding its mean annual rainfall, evaporation potential and runoff is provided inTable 3.

Table 3. Catchment characteristics for the Sak-Hartbees 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)
D53B	1 713	167	2 475	5.72

According to the South African Inventory of Inland Aquatic Ecosystems (SAIIAE), the study area falls within the Bushmanland Bioregion. Here, 4.2 % of the land area is covered by inland wetlands, including depressions, floodplains, seeps and valley-bottom wetland types (Van Deventer et al. 2019). The spatial extent according to the present ecological status per wetland type is depicted in Table 4. Depressional wetlands are most abundant in this bioregion, with the majority being severely modified. Most of the remaining wetland types in this Bioregion are also moderately- to severely modified.

Table 4. Percentage of inland wetland spatial extent according to the present ecological status per wetland type of the Bushmanland Bioregion.

Wetland type	Total Extent (%)	% Natural or near-natural (A/B)	% Moderately modified (C)	% Heavily to severely/critically modified (D/E/F)
Depression	74.9	16.0	33.6	50.4
Floodplains	10.3	1.9	29.4	68.7
Seeps	0.8	38.0	18.7	43.2
Valley-bottom	13.9	1.5	62.6	35.9

No wetlands or rivers occur on Gemsbok Bult, but some minor drainage lines traverse the property towards the old borrow pit (Figure 8). These would have drained southwards towards a tributary drainage of the Rugseers River, which feeds into the Hartbees River further south-west. However, the old burrow pit, gravel road and

railway line has cut through the original flowpath of these drainage lines.

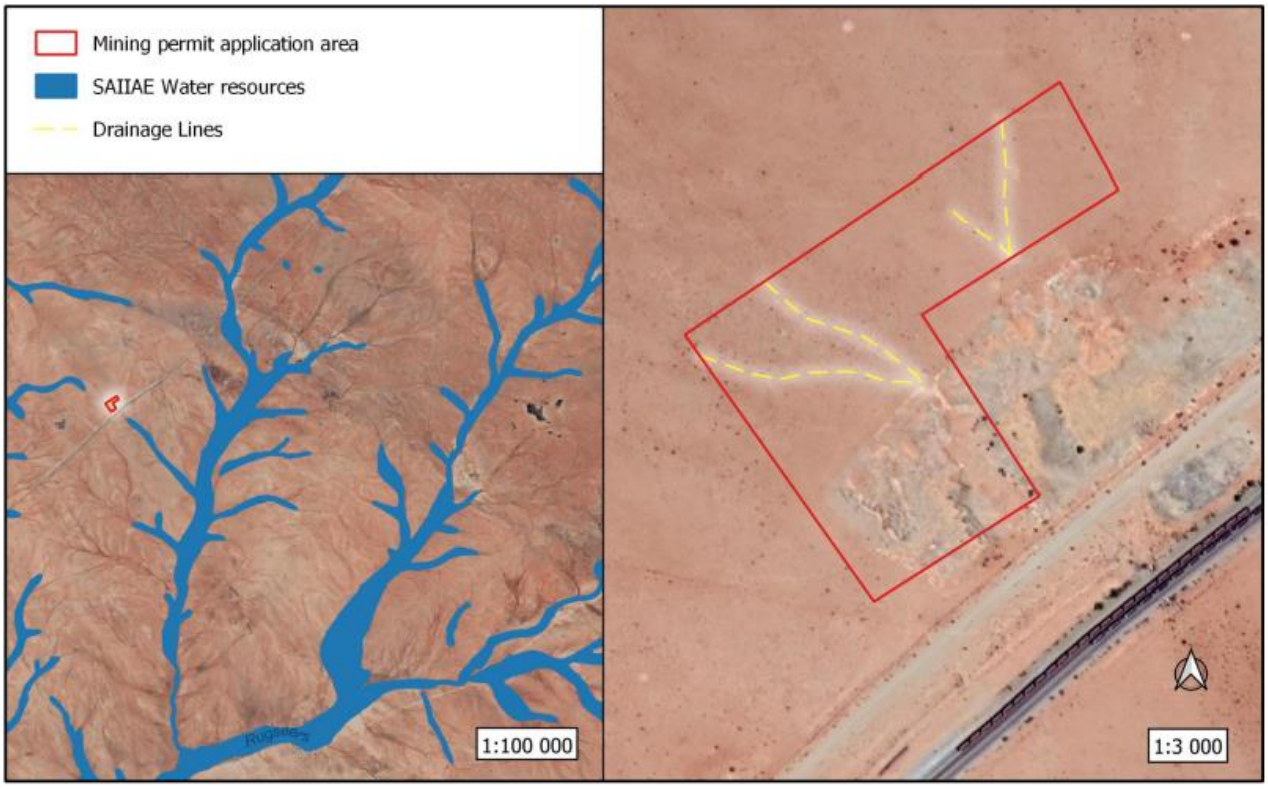


Figure 7. The location of drainage lines on Gemsbok Bult. No SAIIAE watercourses occur on site, but the drainage lines originally formed part of the Rugseers River catchment area, before the old burrow pit, gravel road and railway line cut through its flow path.

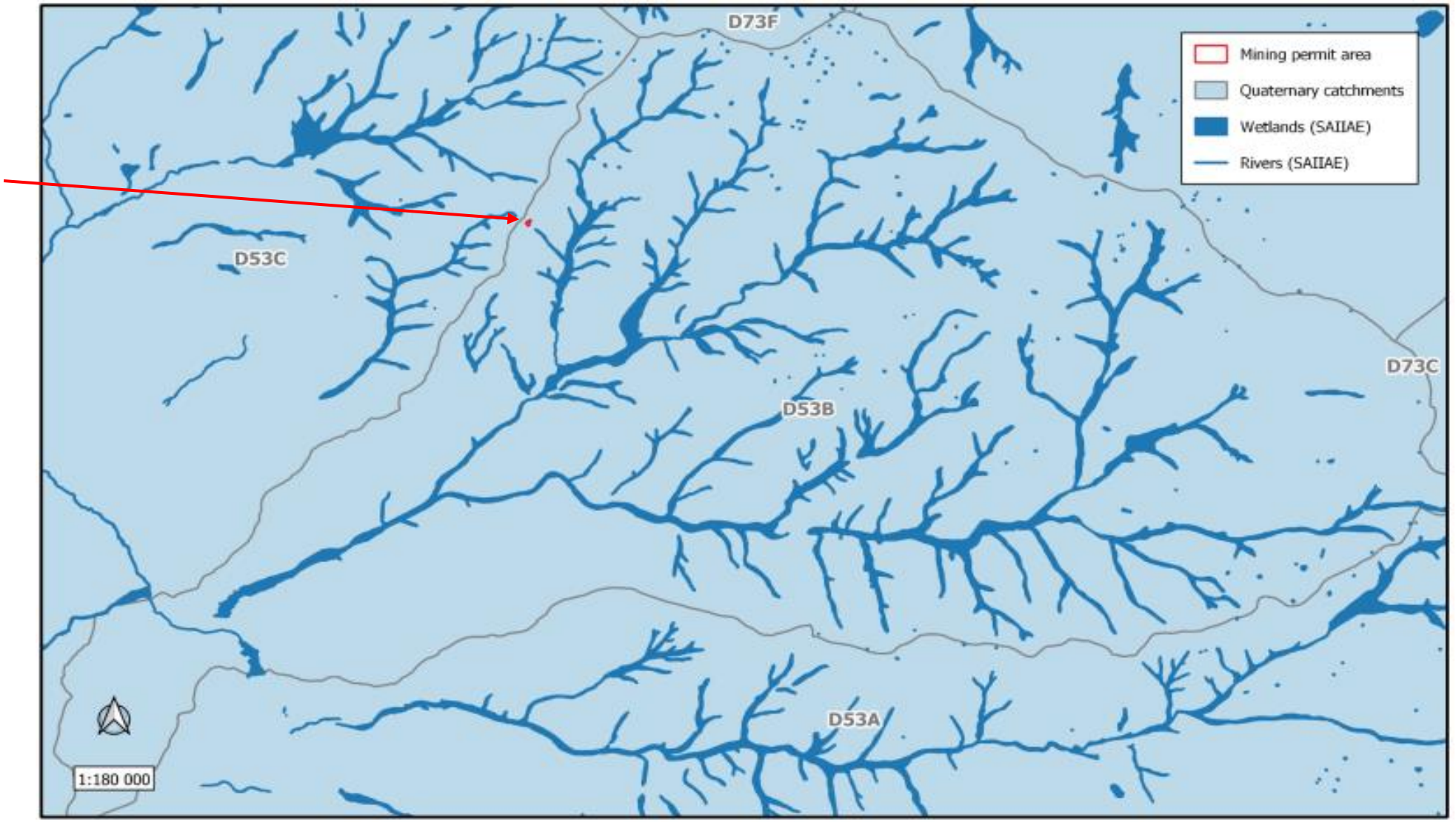


Figure 8. Quaternary Catchment Map

7) Ground Water:

The following information was taken out of the Integrated Development Plan (2021/2022) of the ZF Mgcawu District Municipality.

Underground water is not commonly found in this area as the underground water usually lies too deep beneath the surface. Where ground water is available, it is often too brackish for use by humans and animals. Due to the geological formations being shallow in most of the municipal areas within the ZF Mgcawu District, the characteristics of the aquifer the generally unfavourable except for in the western parts of the district that is underlain by dolomitic Karst aquifers.

8) Air Quality and Noise:

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.

The current source of air pollution in the area stems from mining and from vehicles travelling on the gravel roads of the area. No farming activities related to dust generation, such as ploughing, are known to occur in the area.

The potential source of air pollution on the proposed mine site will be nuisance dust generated by the earth moving equipment as well as from the movement of vehicles on the site roads. Gas emissions from the vehicles will be negligible and within legal limits. Generated dust will be visible from the secondary gravel road and to local farm residents. Any potential fall-out dust will impact those who reside on the farm.

Noise on site will be generated by the earth moving equipment as well as vehicles. Although these activities do generate noise, the overall impact can be described as negligible. The most susceptible receptors of noise will be the local farm residents.

9) Flora:

Dr. Betsie Milne was appointed by Kamkuip Boerdery to conduct an Ecological Assessment study for the proposed mining area. (Appendix 4), flora was described in the report.

Broad-scale vegetation patterns

Gemsbok Bult falls within the Nama 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. Bushmanland Arid Grassland (Figure 9).

Figure 9. The broad-scale vegetation units (Mucina and Rutherford 2012) present in the study area.

Bushmanland Arid Grassland is restricted to the Northern Cape, spanning from Aggeneys in the west to Prieska in the east. Its boundaries are defined by the edges of the Bushmanland Basin (south), desert vegetation near Upington (north) and the edges of the Namaqualand hills (west). Altitude varies from 600 to 1 200 m. The topography includes extensive to irregular plains on a slightly sloping plateau, sparsely vegetated by Stipagrostis grassland. In places low shrubs of Salsola change the vegetation structure. In years of abundant rainfall rich display of annual herbs can be expected. A third of the geology of this unit comprises recent (Quaternary) alluvium and calcrete. Superficial deposits of the Kalahari Group are also present in the east. The extensive Palaeozoic diamictites of the Dwyka Group also outcrop in the area, along with gneisses and metasediments of Mokolian age. Soils are primarily red-yellow apedal soils, freely drained, with a high base status and < 300 mm deep.

However, about a fifth of the area comprises soils deeper than 300 mm. Land types include mainly Ag and Ae. The unit is classified as least threatened with very little being transformed. Small portions are conserved in the Augrabies Falls National Park and Goegap Nature Reserve. Endemic plant

species include Dinteranthus pole-evansii, Larryleachia dinteri, L. marlothii, Ruschia kenhardtensis, Lotononis oligocephala and Nemesia maxii.

Fine-scale vegetation patterns

Plant communities are delineated according to plant species correspondences and changes in soil structure. One distinct plant community was identified on site, which is described below.

i) Schmidtia kalahariensis – Stipagrostis obtusa shrubby grassland

The vegetation of the study area is classified as grassland, with a strong presence of low shrubs and herbs. It grows on shallow consolidated sand intermixed with rocks, which constitute 40 - 60 % of the ground cover. Schmidtia kalahariensis dominates the grass layer, but Stipagrostis obtusa is also abundant. Other common grasses include
Stipagrostis uniplumis, Enneapogon scaber and Eragrostis echinochloidea.
The low shrub layeris dominated by the annual dwarf shrub Tribulus cristatus, but Salsola sp., Aizoon schellenbergii, Aptosimum spinescens, Eriocephalus ambiguus, Lycium cinereum, Asparagus suaveolens and Peliostomum leucorrhizum are also common. Other low shrubs include Psilocaulon articulatum, Jamesbrittenia canescens var. canescens,
Berkheya annectens and Kleinia longiflora. Taller shrubs Lycium bosciifolium and Rhigozum trichotomum are sparsely scattered in the grassland matrix, but their density increases along the drainage lines.
Herbs include Geigeria ornativa subsp. ornativa, Aptosimum procumbens, Dicoma capensis, Heliophila deserticola var. deserticola, Indigastrum argyraeum, Sesamum triphyllum, Osteospermum microcarpum subsp. microcarpum, and Nidorella resedifolia subsp. resedifolia, as well as the bulb Moraea venenata. Laggera decurrens is prominent in the old burrow pits, along with weeds and invasive herbs Chenopodium phillipsianum,
Argemone ochroleuca and Salsola kali.

In addition to these, specially protected species and protected species of the NCNCA known from the study region. Of these, Psilocaulon articulatum, Moraea venenata and Jamesbrittenia canescens var. canescens were recorded in the study areas.

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 species do not naturally occur in an area and exhibit tendencies to invade areas at the cost of indigenous species. To govern the control of such species, NEMBA and CARA have divided weeds

and invader species into categories (see Table 5). No declared weeds and invasive species were recorded in the study area, but those known from the surrounding areas are listed in Table 6, along with their categories according to the Acts.

Table 5. The categorisation of weeds and invader plant species, according to NEMBA and CARA.

NEMBA		CARA	
1a	Listed invasive species that must be combatted or eradicated.	**1**	Plant species that must be removed and destroyed immediately. These plants serve no economic purpose and possess characteristics that are harmful to humans, animals and the environment.
1b	Listed invasive species that must be controlled.	**2**	Plant species that may be grown under controlled conditions. These plants have certain useful qualities and are allowed in demarcated areas. In other areas they must be eradicated and controlled.
2	Listed invasive species that require a permit to carry out a restricted activity within an area.	**3**	Plant species that may no longer be planted. These are alien plants that have escaped from or are growing in gardens and are proven to be invaders. No further planting is allowed. Existing plants may remain (except those within the flood line, 30 m from a watercourse, or in a wetland) and must be prevented from spreading.
3	Listed invasive species that are subject to exemptions and prohibitions		

Table 6. A list of declared weeds and invasive species recorded in and around the study area.

Scientific name	Common name	CARA	NEMBA	NCNCA
Argemone ochroleuca	White-flowered Mexican poppy	1	1b	S6
Prosopis glandulosa	Honey mesquite	2	3	S6
Prosopis velutina	Velvet mesquite	2	3	S6
Salsola kali	Tumbleweed	-	1b	-

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. Declared indicators of bush encroachment in the Northern Cape recorded in and around the study area are listed in Table 7.

Table 7. A list of declared indicators of bush encroachment recorded in and around the study area.

Scientific name	Common name
Rhigozum trichotomum	Three – thorn rhigozum
Vachellia karroo	Sweet thorn

10) Fauna:

Dr. Betsie Milne was appointed by Kamkuip Boerdery to conduct an Ecological Assessment study for the proposed mining area. (Appendix 4), fauna was described in the report.

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 live vertebrate or invertebrate animal, and the egg or spawn of such animal. Species likely to be found on site are discussed in their respective faunal groups.

Mammals

As many as 54 terrestrial mammals and nine bat species have been recorded in the region, of which eight 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. No mammals were recorded during the field survey, but solitary burrows of small rodents were observed.

Cape Fox, Bat-eared Fox, Aardvark, Honey Badger, Black-footed Cat, Striped Polecat, Aardwolf and African Wild Cat have a high probability to occur in the study area, based on their wide habitat tolerance or affinity for open and arid grassland habitats. None of the listed bat species are expected to occur here, based on their preferences for savanna habitats or dependence on trees. Temminck's Pangolin, Leopard and Cheetah are also not expected to occur on site. Cheetah and Pangolin are largely confined to protected areas and leopards prefer densely wooded or rocky areas. Shortridge's Rat is expected to be associated with Vachellia trees and Littledale's Whistling Rat occurs in shrubland habitats, specifically in coastal hummocks, sand dunes, gravel plains and dry riverine systems. Therefore, no suitable habitat for these species is found in the study area either. Those species protected according to Schedule 2 of the NCNCA with the highest likelihood to be found in the study area include Cape Hare, Cape Porcupine, Bushy-tailed Hairy-footed Gerbil, Four-striped Grass Mouse, Pouched Mouse, Yellow Mongoose, South African Ground Squirrel, and Steenbok. Problem animals (Schedule 4) with a high likelihood to occur on site include Black-backed Jackal and Caracal.

Reptiles

The Gemsbok Bult mining area lies within the distribution range of at least 31 reptile species. No red listed species occur in the region, but most of the reptiles of the study area are protected according to Schedule 1 or 2 of NCNCA. Specially protected species include Karusasaurus polyzonus (Southern Karusa Lizard). It is a rock-dwelling species and not expected to occur in the study area. Those protected according to Schedule 2 of the NCNCA with the highest likelihood to occur in the study area include the spotted desert lizard, sand lizards, tent- and leopard tortoise. Regarding common species, the Western Ground Agama was recorded during the field survey.

Amphibians

Five amphibian species are known from the region. Of these, the Giant Bull Frog (Pyxicephalus adspersus) is listed as Near Threatened and is protected according to Schedule 1 of the NCNCA. They prefer seasonal shallow grassy pans, vleis and other rain-filled depressions in open flat areas of grassland or savanna, but mainly remain buried up to 1 m underground until conditions become favourable. The study area lies within the known distribution of this species, but no features in the study area match the typical description of ideal habitats for this species. All other amphibians of the study area are protected according to Schedule 2 of NCNCA. Of these, Vandijkophrynus gariepensis (Karoo Toad) is a regional endemic and expected to be found in the study area. Most of the frog species from the study area are well adapted to arid habitats, but still rely on temporary waterbodies for breeding. This includes any natural or man-made pool where water collects during the rainy season. The Angolan River Frog however is dependent on permanent streams and is not expected to occur in the study area.

Avifauna

Gemsbok Bult does not fall within or near (< 100km) any of the Important Bird Areas (IBA) defined by Birdlife South Africa. A total number of 213 bird species have been recorded from the study area, of which 20 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 study area is small and the habitat, monotonous. Therefore, it does not provide ample micro-habitats for birds and the surrounding pristine habitats provide sufficient alternative habitat space.

No bird species of conservation concern were encountered during the field survey, but those with the highest likelihood to occur in the study area are typically associated with grassy or shrubland habitats, i.e., Kori Bustard, Ludwig’s Bustard, Karoo Korhaan, Black Harrier, Burchell's Courser, Abdim’s Stork, and Secretarybird, as well as many of the remaining owls and raptors of conservation concern.

Those associated with savannahhabitat (Martial Eagle, Red-necked Falcon), dependent on water (Curlew Sandpiper, African Fish-Eagle, Chestnut-banded Plover, Black Stork, Marabou Stork, Maccoa Duck, Lesser Flamingo, Greater Flamingo) or rocky, stony and mountainous habitats (African Rock Pipit, Sclater's Lark, Verreaux's Eagle, Jackal Buzzard, Lanner Falcon, Rock Kestrel) are not expected to occur on site.

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 only watercourses on site include minor drainage lines and no fish species are expected to occur here.

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 and extremely diverse, which makes it almost impossible to list all species that may possibly occur on site without a dedicated study. Invertebrates have also not been surveyed as comprehensively as plants, mammals and birds and therefore current available data on their distribution is much scarcer. Nevertheless, key morphospecies and species of conservation concern are discussed here, as well as the major habitats which delimit possible invertebrate communities on site.Eight invertebrate species of the Northern Cape appear on the IUCN Red Data list of threatened species. None of these species' distribution ranges overlap with that of the study area.

Those invertebrate 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. None of these are known from the study area either.

All Rock- Creeping- and Burrowing Scorpions are protected according to Schedule 2 of the NCNCA, along with several beetles, butterflies, and moths. No historical records indicate the presence of these taxa in the area, and none were observed during the field survey, but Gossamer-winged Butterflies, Skippers, Brush-footed Butterflies and Burrowing Scorpions are expected to occur in the study area.

One major habitat delimits possible invertebrate communities in the study area, i.e.,vegetation classified as Karoo (Picker et al. 2004). This habitat represents unique species assemblages, with an above-average representation of beetles, grasshoppers, flies, wasps, and

lacewings. Insect activity was low during the field survey, but ant nests, bugs (Hemiptera), thrips (Thysanoptera), and tree locusts (Anacridium moestum) were encountered.

11) Cutural and Heritage (Historical Background)

Dr.Edward Matenga was appointed by Kamkuip Boerdery to conduct an Heritage Assessment study for the proposed mining area. (Appendix 5).

This report has been prepared in support of a mining permit application on a Portion of the Remaining Extent of Portion 3 (Rooidam) of the Farm Gemsbokbult 120 HE near Kenhardt within the Kai !Garib Local Municipality, Northern Cape near Kenhardt, within the Kai !Garib Local municipality, Northern Cape Province.

The report complies with Section 38(8) of the National Heritage Resources Act (No 25/1999) which requires screening of the footprint of the development for the possible occurrence of heritage resources that may be impacted by the proposed activities, and on the basis of which appropriate mitigation measures will be prescribed. The report is based on ground survey undertaken om 2nd July 2022

The Stone Age
Stone Age material is widely distributed on the plains, ridges and valleys of the upper Karoo area north and south of the Orange-Vaal basin. The material occurs as background scatters comprising scrapers, blades, cores and flakes typologically dating to the Middle Stone Age/Late Stone Age period. In the present study no material dating to the Stone Age was found in the areas targeted for mining.

Iron Age
No sites or relics dating to the Iron Age were found.

Commercial farming heritage
There are no buildings or structures in the areas of the proposed sand mining.

Burial Grounds
No burial grounds were recorded.

Farmers in the Northern Cape increasingly diversifying their products to mitigate the increasing risk of droughts. In annual cycles and over long periods are increasingly becoming unpredictable due to climate change. Mining provides a fallback when livestock production is affected by incessant droughts. Farmers are venturing into mining on a small and large scale and the mixed economy is turning out to be more viable when compared to livestock farming alone.

CONCLUSION AND RECOMMENDATIONS

The mining project can be allowed to go ahead. If archaeological or other heritage relics deemed of high significance are found during the exploration phase, heritage authorities will be advised immediately and a heritage specialist will be called to attend.

Palaeontology

Prof Marion Bamford was appointed by Archaeological and Heritage Services Africa (Pty) Ltd to conduct an Desktop Palaeontology Assessment study for the proposed mining area. (Appendix 6).
Executive Summary

A Palaeontological Impact Assessment was requested for the Mining Right Application on a Portion of the Remaining Extent of Portion 8 (a Portion of Portion 3 - Rooidam) of the Farm Gemsbokbult 120 HE near Kenhardt, within the Kai !Garib Local Municipality, Northern Cape, hereafter called Rooidam.

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 material to be targeted is likely to be non-fossiliferous granites but the site lies very close to moderately fossiliferous aeolian sands of the Gordonia Formation (Kalahari Group, Quaternary age). Aeolian sands do not preserve fossils but might cover traps such as palaeo-pans and palaeo-springs. No such feature is visible from the satellite imagery. Nonetheless, 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 miners, environmental officer or any other designated responsible person once mining or drilling activities have commenced. Since the impact is low, as far as the palaeontology is concerned, the project should be authorised.

Recommendation

The target of the rock for aggregate is likely to be granite and not the overlying sands. 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 aeolian sands of the Gordonia Formation, Kalahari Group (Quaternary). There is a very small chance that fossils may have been trapped in features such as palaeo-pans or palaeo-springs, and buried by the aeolian sands, but no such feature is visible in the satellite imagery. Nonetheless, a Fossil Chance Find Protocol should be added to the EMPr. If fossils are found by the

environmental officer, or other responsible person once mining activities have commenced then they should be rescued and a palaeontologist called to assess and collect a representative sample. Since the impact on the palaeontological heritage would be very low, as far as the palaeontology is concerned, the project should be authorised.

CHANCE FINDS PROCEDURE Prepared by Edward Matenga (PhD)

The Chance Finds Procedure is a project-specific procedure that outlines actions required if previously unknown heritage resources are encountered during project implementation. It is set of interventions that protect chance finds from further disturbance until an assessment by a competent specialist is made, and mitigation actions consistent with the law and best practice standards are taken.

A principal aim of the CFP is to raise awareness of all personnel in the project regarding the prospect of finding archaeological resources that unseen during the Phase 1 scoping heritage assessment and establish a protocol for the protection of these resources. The appointed Environmental Control Officer (ECO) and Site Manager keep copies of the CPF at the field offices. Training of field personnel on cultural heritage resources that might potentially be found on area should be provided.

PROCEDURE FOR ARCHAEOLOGICAL FINDS

If you discover what you suspect may be a possible archaeological site:

- Stop all work in the area to avoid damaging the site.
- Do not disturb any archaeological remains that you may encounter.
- The finds must be reported to ECO or Site Manager
- The finds must be reported to the heritage authority, i.e. SAHRA and/or the provincial heritage resources agency.
- The heritage authority will send a heritage specialist and /or ask the permit holder to appoint a heritage specialist to make a preliminary assessment of the findings.
- If the potential significance of the finds are deemed to warrant further action and they cannot be avoided, then then heritage specialist will submit a report advising SAHRA accordingly.
- SAHRA will determine the appropriate course of action.

PROCEDURE FOR GRAVES, BURIAL GROUNDS AND HUMAN REMAINS

If you discover what you suspect may be possible human remains:

- Stop all work in the area to avoid damaging the site.

- Do not disturb any possible human remains that you may encounter.
- The finds must be reported to ECO or Site Manager.
- The finds must be reported to the local area station of SAPS.
- The finds must be reported to the SAHRA Burial Grounds and Graves (BGG) Unit.
- The BGG Unit will send a heritage specialist and /or ask the permit holder to appoint a heritage specialist to make a preliminary assessment of the findings.
- If the graves/human remains cannot be avoided SAHRA will require that the human remains be re-interred in a formal cemetery.
- Public participation to identify interested and affected parties (if any) will be undertaken in terms of NHRA Regulations 39, 41 and 41 in the Government Notice No R548 (year 2000).
- An application will be lodged to the BGG for the relocation of the human remains in terms of NHRA Regulations 34 in the Government Notice No R548 (year 2000).
- If the graves/ human remains must not be relocated, the BGG Unit may require that any damage done to the site is repaired and a 100m buffer zone is enforced around the site.

12) <u>Critical biodiversity areas and broadscale processes:</u>

Dr. Betsie Milne was appointed by Kamkuip Boerdery to conduct an Ecological Assessment study for the proposed mining area. (Appendix 4), critical biodiversity was described in the report.

The proposed mining site does not fall within any critical biodiversity areas (Figure 10), 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 thepersistence of a viable representative sample of all ecosystem types and species as well as the long-term ecological functioning of the landscape. The study area is classified as Other Natural Areas, while all the surrounding drainage systems are classified as Ecological Support Areas (Figure 10). No Critical Biodiversity Area 1, 2, or Protected Areas occur near the study area.

The Mining and Biodiversity Guidelines (DENC et al. 2013) also recognises the drainage lines, along with its broad buffer zones to be of Highest Biodiversity Importance, which constitute the highest risk for mining. The study area falls within this zone (Figure 11). 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.

According to the National Web based Environmental Screening Tool the study area hassensitive environmental features (Figure 12). 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 study area is of very high sensitivity in terms of the animal species theme, which is based on the known distribution range for Neotis ludwigii (Ludwig's bustard). The small size of the site and ample adjacent pristine habitat alleviate any potential threats of the proposed activities to this species. The study area is of medium sensitivity based on the Plant Species Theme, which is attributed to the red listed Aloidendron dichotomum (Vulnerable) and Dinteranthus pole-evansii (Vulnerable) that are known from the region. They, however, do not occur on site. The study area is of low sensitivity based on the Terrestrial- and Aquatic Biodiversity Themes.

According to the Siyanda Environmental Management Framework Report (SEMF) the study area does not fall within one of the proposed conservation areas for the District Municipality. The SEMF further classified the study area to have an overall Environmental Sensitivity of 1 (Low). Therefore, it has been assigned to Environmental Control Zone 7. This zone has relatively less sensitivity than the other zones and no special parameters, except those already implemented or required by law, are proposed for this zone.

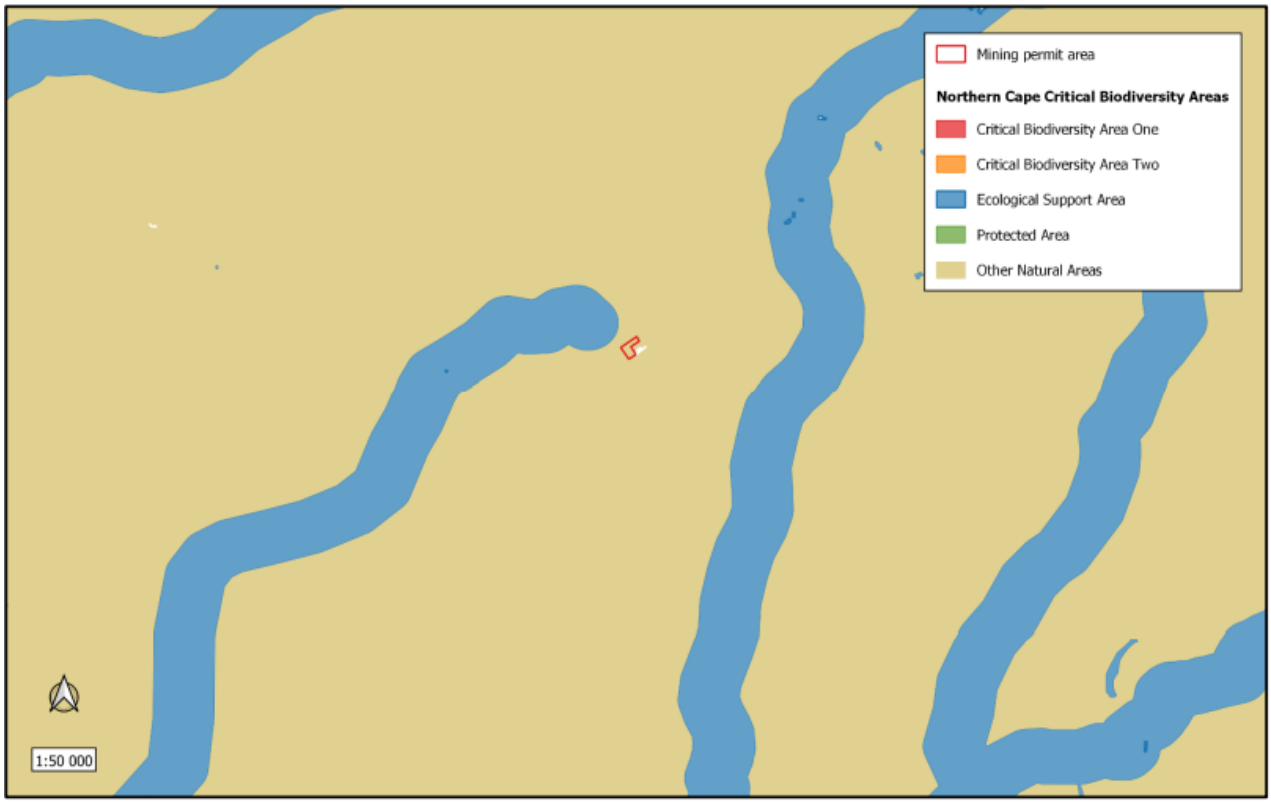


Figure 10. The study area in relation to the Northern Cape Critical Biodiversity Areas.

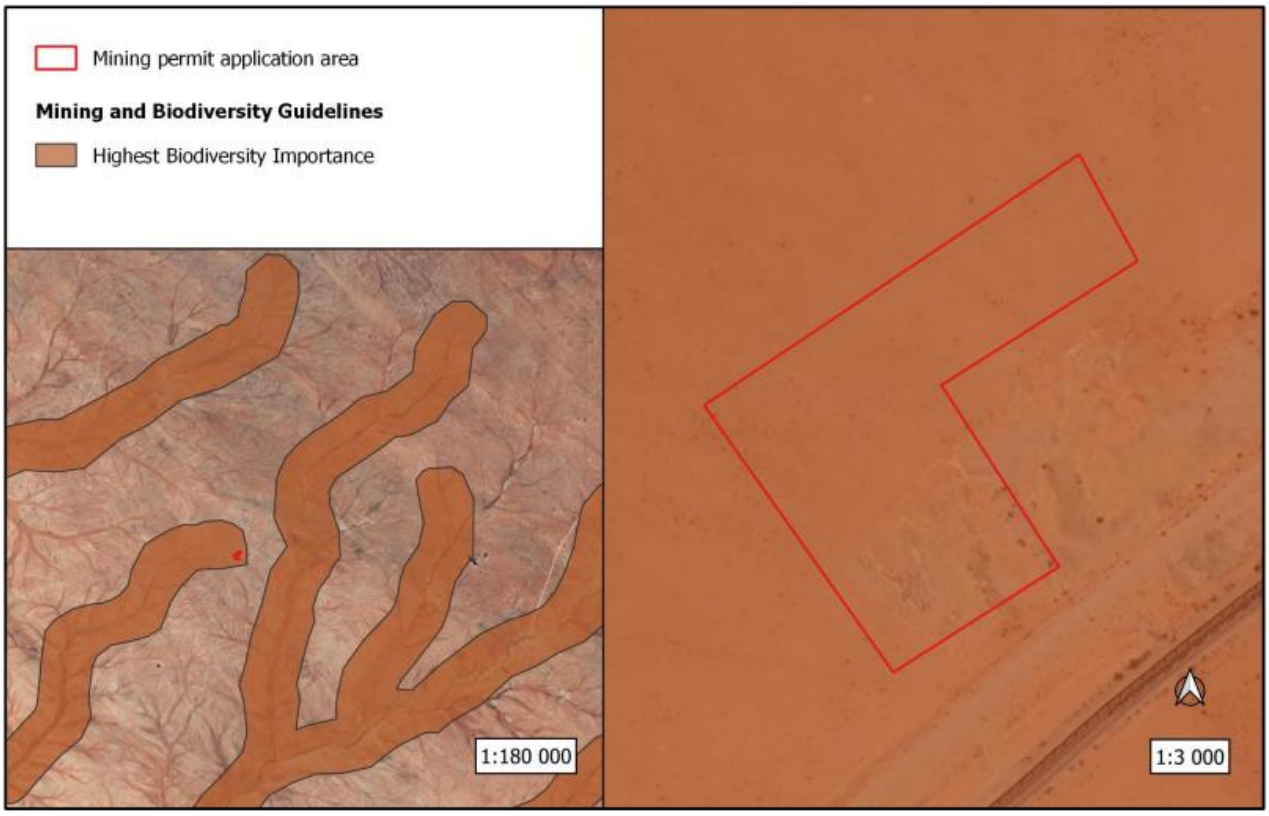


Figure 11. The study area in relation to the Mining and Biodiversity Guidelines.

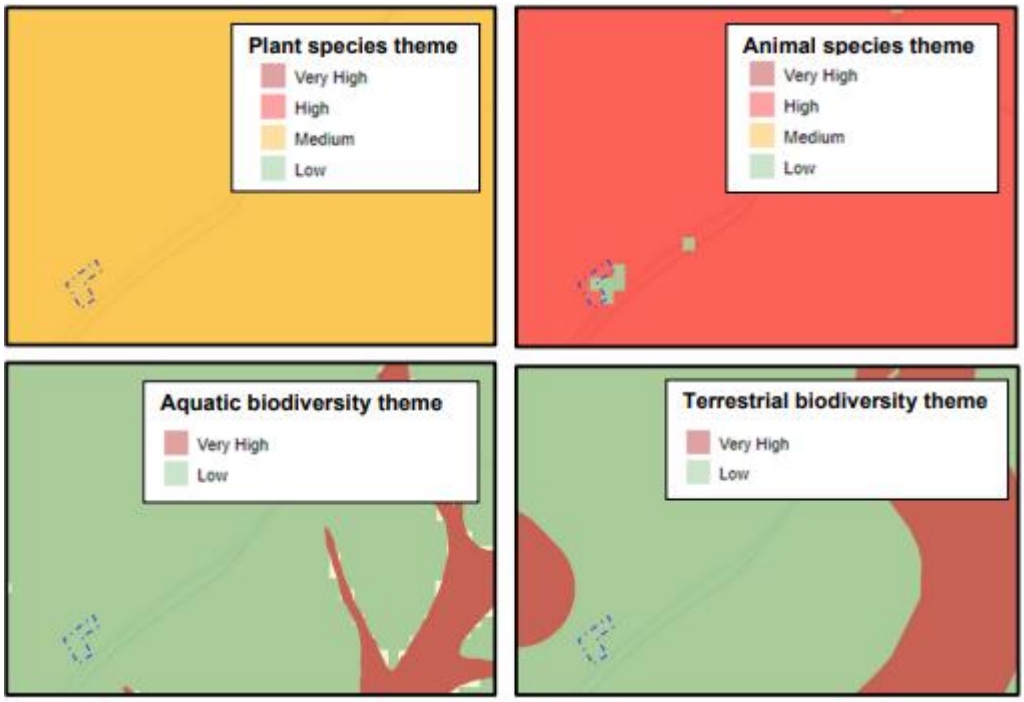


Figure 12. Environmental sensitivities in the study area, according to the National Web based Environmental Screening Tool.

Finally, even though mining is not a major sector within the study region, past and present activities have caused moderate transformation in the region (Figure 13). This increases the proposed operation's cumulative impacts in terms of habitat transformation, slightly.

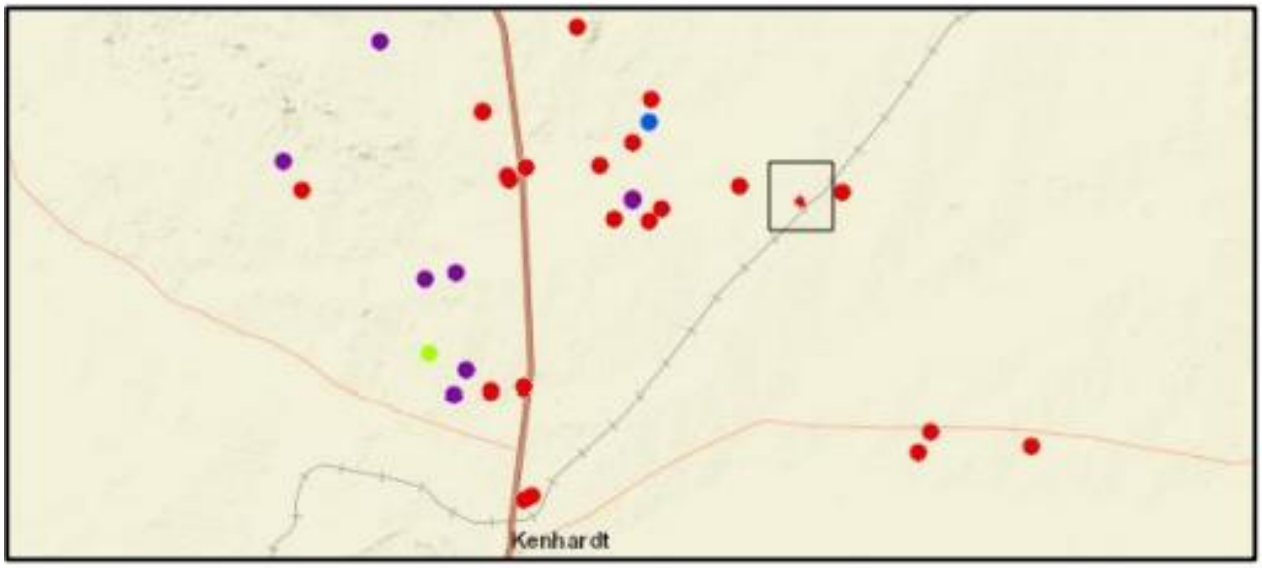


Figure 13. The extent of past and present mining activities near the study area (red polygon in black guiding frame). Purple and red = exploited, green = dormant, and blue = continuously producing.

13) Site Sensitivity:

Dr. Betsie Milne was appointed by Kamkuip Boerdery to conduct an Ecological Assessment study for the proposed mining area. (Appendix 4), site sensitivity was described in the report.

The ecological sensitivity map for Gemsbok Bult is illustrated in Figure 14. The pristine area is of medium sensitivity. Drainage lines are generally considered to be of very high sensitivity due to their vital hydrological functionality and are usually considered as no-go areas. However, on Gemsbok Bult the minor drainage lines that are present have been cut off from the larger drainage network by the old burrow pit, gravel road, and adjacent railway. The grassland habitat harbours several provincial plant species of conservation concern, and provides potential habitat for protected bird-, reptile- and invertebrate species, as highlighted in this report. However, the small size of the site and the ample pristine habitat available in the surrounding landscape, lowers the sensitivity of the site to medium. The burrow pit is of low sensitivity.Therefore, the study area does not consist of any no-go areas and impacts are expected to be largely local. Activities on site can proceed with relatively little ecological impact provided that appropriate mitigation measures are taken.

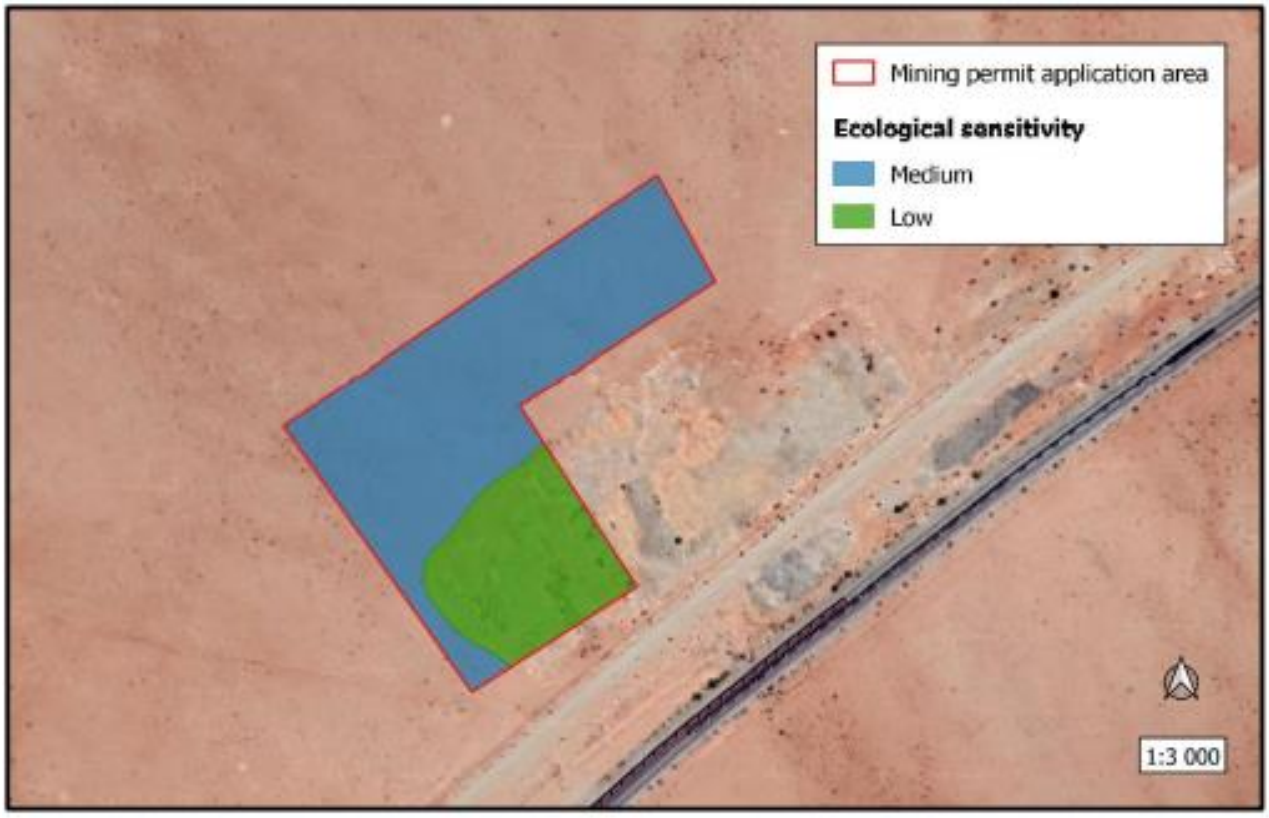


Figure 14. A sensitivity map for the Gemsbok Bult mining area.

14) Socio-Economic Structure of the Region:

The following information was gathered from the Community Survey conducted in 2016 as well as the Final IDP of the Kai !Garib Local Municipality (2022-2023).

(a) *Population Density, Growth and Location:-*

The Community Survey (2016) indicated that the population of the Northern Cape grew with 4.2% from 1 145 861 in 2011 to 1 193 780 in 2016. The population of the ZF Mgcawu District Municipality also grew from 236 783 to 252 692 between 2011 and 2016, respectively. Furthermore, the population of the Kai !Garib Local Municipality also increased for the period of 2011 to 2016 from 65 869 to 68 929, respectively.

With 70 500 people (36 800 males and 33 700 females), the Kai !Garib Local Municipality housed 0.1% of South Africa's total population in 2018. Between 2008 and 2018 the population growth averaged 0.87% per annum which is about half than the growth rate of South Africa as a whole (1.57%). Compared to ZF Mgcawu's average annual growth rate (1.53%), the growth rate in Kai !Garib's population at 0.87% was about half than that of the district municipality.

Based on the present age-gender structure and the present fertility, mortality and migration rates, Kai !Garib's population is projected to grow at an average annual rate of 0.9% from 70 500 in 2018 to 73 900 in 2023 (table 8).

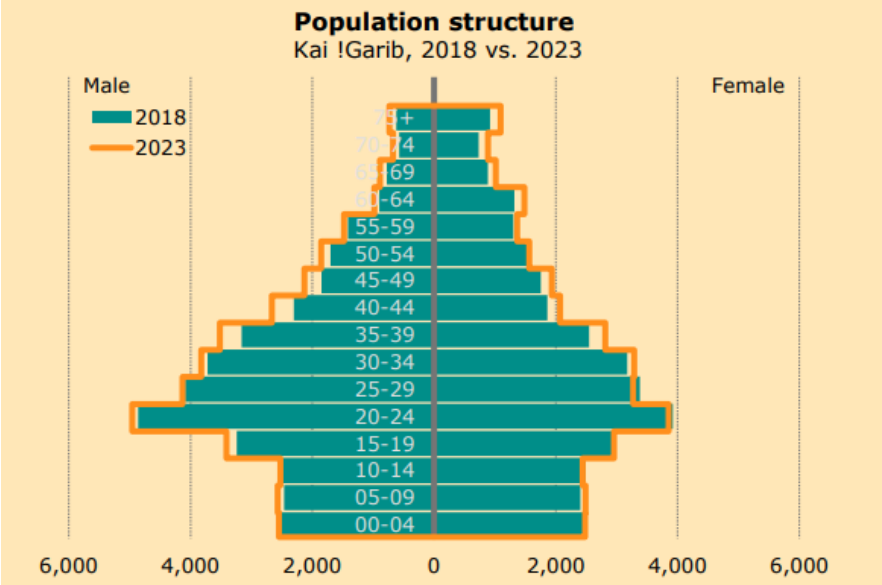
Table 8: Population projections for the Kai !Garib, ZF Mgcawu, Northern Cape and the National total population, 2018-2023. (Source: Kai !Garib Final IDP 2022-2023)

	Kai !Garib	ZF Mgcawu	Northern Cape	National Total
2018	70,500	266,000	1,250,000	57,400,000
2019	71,100	269,000	1,270,000	58,100,000
2020	71,800	273,000	1,290,000	58,900,000
2021	72,400	276,000	1,300,000	59,600,000
2022	73,100	279,000	1,320,000	60,400,000
2023	73,900	282,000	1,340,000	61,100,000
Average Annual growth				
2018-2023	*0.95%*	*1.21%*	*1.33%*	*1.27%*

The population pyramid reflects a projected change in the structure of the population from 2018 to 2023 (Graph 1). The differences can be explained as follows:

- In 2018, there is a significantly larger share of young working age people between 20 and 34 (32.8%), compared to what is estimated in 2023 (31.6%). This age category of young working age population will decrease over time.
- The fertility rate in 2023 is estimated to be slightly higher compared to that experienced in 2018.
- The share of children between the ages of 0 to 14 years is projected to be slightly smaller (20.4%) in 2023 when compared to 2018 (21.3%).

In 2018, the female population for the 20 to 34 years age group amounts to 14.9% of the total female population while the male population group for the same age amounts to 18.0% of the total male population. In 2023, the male working age population at 17.5% still exceeds that of the female population working age population at 14.1%, although both are at a lower level compared to 2018.



Graph 1: Projected population pyramid for the Kai !Garib Local Municipality, 2018 vs 2023. (Source: Kai !Garib Final IDP 2022-2023).

The distribution for the population by population group include African, White, Coloured and Asian (Asian including people originating from Asia, India and China). In 2018, the Kai !Garib Local Municipality's population consisted of 28.46% African (20 100), 7.00% White (4 930), 63.32% Coloured (44 600) and 1.23% Asian (865) people.

The composition of the households by population group consists of 56.6% which is ascribed to the Coloured population group with the largest amount of households by population group. The African population group had a total composition of 30.7% (ranking second). The White population group had a total composition of 10.9% of the

total households. The smallest population group by households is the Asian population group with only 1.8% in 2018.

(b) Education

Within Kai !Garib Local Municipality, the number of people without any schooling decreased from 2008 to 2018 with an average annual rate of -3.17%, while the number of people within the 'matric only' category, increased from 6,420 to 8,920. The number of people with 'matric and a certificate/diploma' increased with an average annual rate of 1.35%, with the number of people with a 'matric and a Bachelor's' degree increasing with an average annual rate of 0.07%. Overall improvement in the level of education is visible with an increase in the number of people with 'matric' or higher education.

Table 9: The highest level of education older than age 15, Kai !Garib, ZF Mgcawu, Northern Cape and National Total (Source: Kai !Garib Final IDP 2022-2023)

	Kai !Garib	ZF Mgcawu	Northern Cape	National Total	Kai !Garib as % of district municipality	Kai !Garib as % of province	Kai !Garib as % of national
No schooling	3,430	11,600	65,300	2,250,000	*29.5%*	*5.3%*	*0.15%*
Grade 0-2	1,500	4,750	19,300	685,000	*31.7%*	*7.8%*	*0.22%*
Grade 3-6	7,620	21,500	97,800	3,110,000	*35.4%*	*7.8%*	*0.25%*
Grade 7-9	14,500	43,300	177,000	6,060,000	*33.6%*	*8.2%*	*0.24%*
Grade 10-11	11,600	38,900	170,000	8,620,000	*30.0%*	*6.8%*	*0.14%*
Certificate / diploma without matric	194	748	3,740	178,000	*26.0%*	*5.2%*	*0.11%*
Matric only	8,920	43,900	197,000	10,700,000	*20.3%*	*4.5%*	*0.08%*
Matric certificate / diploma	1,470	6,780	37,900	2,200,000	*21.7%*	*3.9%*	*0.07%*
Matric Bachelors degree	505	3,250	19,500	1,600,000	*15.5%*	*2.6%*	*0.03%*
Matric Postgrad degree	138	934	6,130	726,000	*14.8%*	*2.3%*	*0.02%*

Source: IHS Markit Regional eXplorer version 1692

The number of people without any schooling in Kai !Garib Local Municipality accounts for 29.53% of the number of people without schooling in the district municipality, 5.26% of the province and 0.15% of the national. In 2018, the number of people in Kai !Garib Local Municipality with a matric only was 8,920 which is a share of 20.33% of the district municipality's total number of people that has obtained a matric. The number of people with a matric and a Postgrad degree constitutes 15.53% of the district municipality, 2.59% of the province and 0.03% of the national.

(c) Employment

In 2018, Kai !Garib employed 27 900 people which is 30.94% of the total employment in ZF Mgcawu District Municipality (90 100), 8.63% of total employment in Northern Cape Province (323 000), and 0.17% of the total employment of 16.1 million in South Africa. Employment within Kai !Garib increased annually at an average rate of 0.88% from

2008 to 2018. The Kai !Garib Local Municipality average annual employment growth rate of 0.88% exceeds the average annual labour force growth rate of 0.72% resulting in unemployment decreasing from 11.17% in 2008 to 12.00% in 2018 in the local municipality.

Table 10: Total Employment, Kai !Garib, ZF Mgcawu, Northern Cape and National Total (Source: Kai !Garib Final IDP 2022-2023)

	Kai !Garib	ZF Mgcawu	Northern Cape	National Total
2008	25,500	77,300	286,000	14,100,000
2009	25,300	77,000	282,000	14,000,000
2010	24,400	75,900	274,000	13,600,000
2011	24,700	78,500	279,000	13,800,000
2012	25,700	79,400	288,000	14,000,000
2013	26,300	82,300	300,000	14,500,000
2014	26,700	85,000	311,000	15,100,000
2015	26,900	86,500	313,000	15,500,000
2016	27,200	87,000	313,000	15,700,000
2017	27,400	88,400	316,000	15,900,000
2018	27,900	90,100	323,000	16,100,000
Average Annual growth				
2008-2018	***0.88%***	***1.54%***	***1.23%***	***1.35%***

Source: IHS Markit Regional eXplorer version 1692

Kai !Garib employs a total number of 27 900 people within its municipality area. In Kai !Garib Local Municipality the economic sectors that recorded the largest number of employments in 2018 were the agriculture sector with a total of 12 400 employed people or 44.6% of total employment in the local municipality. The community services sector with a total of 5 960 (21.4%) employs the second highest number of people relative to the rest of the sectors. The electricity sector with 75.2 (0.3%) is the sector that employs the least number of people in Kai !Garib Local Municipality, followed by the mining sector with 500 (1.8%) people employed.

(d) Housing and Household Services

Kai !Garib Local Municipality had a total number of 6 500 (34.06% of total households) very formal dwelling units, a total of 9 720 (50.95% of total households) formal dwelling units. When looking at the formal dwelling unit backlog (number of households not living in very formal dwelling and not in informal dwellings either). From 2007 the number of informal units increased rapidly to about 6 500 in 2012 and is currently at 9 698.

- **Sanitation**

Kai !Garib Municipality experience huge problems with sanitation in all of the 10 wards. Many settlements are currently making use of the ventilation improved pit (VIP) systems which are currently full and posing health risks to communities. Kai !Garib Local Municipality had a total number of 15 400 flush toilets (80.72% of total households), 867 Ventilation Improved Pit (VIP) (4.54% of total households) and 820 (4.30%) of total households pit toilets. When looking at the sanitation backlog (number of households without hygienic toilets) over time, it can be seen that in 2007 the number of Households

without any hygienic toilets in Kai !Garib Local Municipality was 3 040, increased rapidly as informality persists.

- **Water Services**

Kai !Garib Local Municipality had a total number of 8 480 (or 44.46%) households with piped water inside the dwelling, a total of 7 910 (41.49%) households had piped water inside the yard and a total number of 1 460 (7.64%) households had no formal piped water in 2017. This low rate is as a result of the municipality's consistent delivery of bulk and reticulation water purification programme through the MIG. However, a slow increase is experience due to the rapid informality in the area.

- **Refuse**

Kai !Garib Local Municipality had a total number of 11 500 (60.47%) households which had their refuse removed weekly by the authority, a total of 575 (3.02%) households had their refuse removed less often than weekly by the authority and a total number of 5 110 (26.80%) households which had to remove their refuse personally (own dump). When looking at the number of households with no formal refuse removal, it can be seen that in 2007 the households with no formal refuse removal in Kai !Garib Local Municipality was 7 660, this decreased annually at -0.95% per annum to 6 960 in 2017.

- **Electricity**

Kai !Garib Local Municipality had a total number of 1 160 (6.10%) households with electricity for lighting only, a total of 15 800 (82.95%) households had electricity for lighting and other purposes and a total number of 2 090 (10.95%) households did not use electricity. When looking at the number of households with no electrical connection over time, it can be seen that in 2007 the households without an electrical connection in Kai !Garib Local Municipality was 2 090, this increased annually at 0.01% per annum to 2 090 in 2017.

(b) Description of the current land uses

Please see Baseline Description above.

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

Please see Baseline Description above.

(d) Environmental and current land use map

(Show all environmental, and current land use features)

Figure 15. Environmental and current land use map

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	Very 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 the excavation of minerals. Deep excavations, especially those in which the materials removed will be beneficiated, cannot be back-filled. This significantly alters the natural topography of the landscape by creating unnatural slopes and depressions. Increased slopes can lead to higher runoff rates,	Medium - High	Certain for life of operation	Residual	Medium Local	• Ensure that the shape and slopes of the excavations are similar to pre-mining slope, as far as possible. This can be achieved by using all overburden available in reshaping and grading surfaces. • Ensure the disturbed areas are free-draining by removing all surface flow obstructions and evening out all rough surfaces that hinder free flow runoff patterns. • Re-establish topsoil and vegetation as soon as possible after the slopes and flow paths have been restored. • Regular monitoring during the decommission operation

	which in turn increases soil erosion. Excavations form depressions in which rain-water collects, altering the natural hydrologic regime. With effective rehabilitation methods, the topography can be restored as close as possible to the pre-mining conditions.					should be carried out to identify areas where erosion is occurring; followed by appropriate remedial actions.
Soils	**Soil Erosion** During clearing of an area for the excavation of minerals, construction of infrastructure and roads, stockpiling, natural events. Vegetation will be stripped for construction of new roads, infrastructure, and excavations. As a result, these areas will be bare, and susceptible to wind and water erosion.	Low-Medium	Certain frequently	Residual	Low-Medium Local	• 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. • 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.

	Furthermore, any topsoil-, overburden- and ore stockpiles can be eroded by wind, rain, and flooding. Any leaking pipes can also cause additional water erosion.					
	Nature of Impact	Significance	Probability	Duration	Consequence Extent	Management / mitigation
	Loss of top soil and soil fertility During clearing of an area for the excavation of minerals, construction of infrastructure and roads, stockpiling. Topsoil contains living organisms that naturally regulate the ecological functioning of a habitat. Therefore, any disturbances to the intact soil profile can result in soil sterilisation which will directly affect vegetation communities. Apart	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 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.

	from the direct disturbances caused by the mining activities, loss of soil fertility can also occur through soil compaction by dump loads as well as heavy machinery and vehicles.					• 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 and succulent cuttings.
	Nature of Impact	Significance	Probability	Duration	Consequence Extent	Management / mitigation
	Alteration of Soil character and quality During clearing of an area for the excavation of minerals, construction of temporary	Medium - High	Certain for life of operation	Residual	Low-Medium On site	• Topsoil should be removed and stored separately during mining and the construction of roads, infrastructure, and stockpile areas. • Topsoil stockpiles must be kept small to prevent compaction and anaerobic conditions.

	infrastructure and roads, stockpiling, oil and petrochemical spills. Topsoil contains living organisms and seed banks that provide ecological resilience against disturbances, and any disturbances to the intact soil profile will change its ability to sustain natural ecological functioning. Vehicles and mining equipment may potentially leak hazardous fluids on the soil surface, which will cause soil pollution. Apart from the direct disturbances caused by the mining activities, soil compaction by dump loads as well as heavy machinery and vehicles will cause a decrease in large pores, and					• 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. • 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 and succulent cuttings. • Vehicles and machinery should be regularly serviced and maintained. • Refuelling and vehicle maintenance must take place in well demarcated areas and

	subsequently the water infiltration rate into soil.					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 must be well-marked and available on site. • Workers must undergo induction to ensure 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	Low	Probable	Construction Operational Decommissioning	Low Local	Staff at Workshop areas, yellow metal laydown zones and fuel storage areas should be sufficiently trained in hydrocarbon spill response.

	contaminate the groundwater resource locally					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
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. The Gemsbok Bult mining activities are expected to destroy a relatively small area of the natural habitat. It is expected that the ecological functioning and biodiversity will take many years to fully recover. Furthermore, vehicle traffic and mining	Low-Medium	Certain for life of operation	Residual	Low-Medium 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.

	activities generate lots of dust which can reduce the growth success and seed dispersal of many small plant species in the adjacent 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 floral species 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. There are a few provincially protected plant species in the Gemsbok Bult Mining Permit area	Low-Medium	Certain for life of operation	Residual	Low to Medium 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-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 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-

	(Psilocaulon articulatum, Moraea venenata and Jamesbrittenia canescens var. canescens). The mining operation would have a largely local impact on these species when destroyed. Furthermore, any illegal harvesting of these plant for ornamental purposes or for trade by staff, contractors or secondary land users on site and the surrounding areas could have devastating effects on their regional population.					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 reestablishment 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.
	Introduction or spread of alien species During clearing of an area for the excavation of minerals, construction of infrastructure and roads, stockpiling, improper rehabilitation practises. Existing populations. Invasive species Argemone ochroleuca and Salsola Kali are prominent in the old borrow pits and Prosopis spp. occur around the study area. Anthropogenic disturbances to natural vegetation, especially the clearance of large areas of land, provide the opportunity for	Low-Medium	Possible for life of operation	Residual	Low -Medium 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 as soon as invasive species start to emerge. • Regular follow-up monitoring of invasive control areas needs to be implemented to ensure effective eradication. • Encourage proper rehabilitation of disturbed areas through soil restoration and reseeding of indigenous plant species.

	invasive plants to increase. This is due to their opportunistic nature of dispersal and establishing 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 as well as reduction in the ecological value and land use potential 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.					
	Encouragement of bush encroachment During clearing of an area for the excavation of minerals, construction of infrastructure and roads, stockpiling, improper rehabilitation practises. Existing populations. Bush encroachment is a natural phenomenon characterised by the excessive expansion of certain shrub species at the expense of other plant species. While general clearing of the area and mining activities destroy natural vegetation, bush encroaching plants can increase due to their aggressive nature in	Low	Possible infrequent	Residual	Low 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 needs to be implemented to ensure effective eradication. • Encourage proper rehabilitation of disturbed areas through soil restoration and reseeding of indigenous plant species.

	disturbed areas. If encroaching plants establish in disturbed areas, it may lower the potential for future land use and decrease biodiversity. Rhigozum trichotomum occurs in the study area but does not form dense encroaching stands. If the mining site is not effectively rehabilitated, their abundance can increase significantly in disturbed areas. However, the removal of these species during the mining process will most likely reduce their abundance and therefore mining could have a positive effect on bush encroachment					
Fauna	**Loss, damage and fragmentation of natural habitats**	Medium - High	Certain for life of operation	Residual	Low-Medium Regional	• All activities associated with the mining operation must be planned, where possible to encourage faunal dispersal and should minimise

	During clearing of an area for the excavation of minerals, construction of infrastructure and roads, stockpiling. Fragmentation of habitats typically leads to the loss of migration corridors, in turn resulting in degeneration of the affected population's genetic make-up. This can be in the form of small-scale fragmentation for reptiles, amphibians, and invertebrates, to more large-scale fragmentation that hinder dispersal of birds and plants. It also includes the destruction of burrows, tunnels, and chambers. Small-scale fragmentation disconnects breeding and foraging links, increasing stress and energy budget					dissection or fragmentation of any important faunal habitat type. • The footprint areas of the mining activities must be scanned for any nests and dens prior to any destructive activities by means of a search-and-rescue operation. • It is recommended that nests and dens are identified and marked prior to intended activity and should be incorporated into the design layout and left in situ. However, due to the nature of the proposed mining activities they will most likely be destroyed. The relevant permits from DENC should be applied for at least three months before such activities will commence. • The extent of the earmarked area should be demarcated on site layout plans. No staff, contractors or vehicles may leave the demarcated area except those authorised to do so. • Those pristine areas surrounding the earmarked area that are not part of the demarcated area should be considered as a no-go zone

	deficits, which is especially taxing on animals living in arid environments. Larger scale fragmentation results in a subsequent loss of genetic variability between meta-populations occurring within the study site. Pockets of fragmented natural habitats hinder the growth and development of populations. Mining activities are expected to result in the loss of connectivity and fragmentation of natural micro-habitats, primarily on a local scale.					for employees, machinery or even visitors. • 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; excavations.	Low-Medium	Certain for life of operation	Decommissioning	Low Local	• 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

	The site provides suitable habitat for some species of conservation concern, as discussed in the various faunal taxon groups in this report. The mining activities could lead to the death and displacement of some of these species. The transformation of natural habitats will result in the loss of micro-habitats, affecting individual species and ecological processes. This will result in the displacement of faunal species that depend on such habitats, e.g., birds that nest in trees or animals residing in holes in the ground, among rocks or underneath plants. Increased noise and vibration will disturb and possibly displace wildlife. Fast moving					authorised to do so. Areas surrounding the earmarked site that are not part of the demarcated area should be marked as no-go zones. • The footprint areas of the mining activities must be scanned for any protected faunal species prior to any destructive activities by means of a search-and-rescue operation. • 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. • All reptiles, amphibians as well as bird nests and small mammal litters that are

	vehicles cause road kills of small mammals, birds, reptiles, amphibians, and many invertebrates. Intentional killing of snakes, reptiles, and owls will negatively affect their local populations.					exposed during the 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.
Water Resources	**Alteration/destruction of watercourses** **During excavation of minerals, construction of infrastructure and roads, stockpiling.** During mining activities, those minor drainage lines that occur in the study area will be completely altered through direct excavations. Such activities change the hydrologic regime of the drainage network, which has downstream effects.	Medium - High	Certain for life of operation	Permanent	Low-Medium Local	• All activities associated with the mining operation must be planned to avoid any unnecessary or additional disturbances to surrounding watercourses and their buffer zones. • Ensure that the excavate areas are free-draining, by removing all surface flow obstructions and evening out all rough surfaces that hinder free-flow runoff patterns. • Re-establish topsoil and vegetation as soon as the flow paths have been restored. • Regular monitoring during the decommission operation should be carried out to identify areas where water dams up; followed by appropriate remedial actions.

	However, the proposed operation's effects are greatly reduced by the existing modifications that the old borrow pit, gravel road and railway have caused already.					
	Siltation of surface water During clearing of an area for the excavation of minerals, construction of infrastructure and roads, stockpiling, natural events. Vegetation will be stripped in preparation for mining and infrastructure. Bare areas will be susceptible to water erosion without plants to stabilise the soil, creating potential sediment source zones. Runoff events could cause adjacent drainage lines to be filled with silt from mining areas if these	Low	Possible infrequent	Decommissioning	Low Local	• 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. • 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.

	source zones lie along the flow paths of these watercourses. This may lead to changes in hydrologic regime but is not expected to be a significant impact of the proposed operation due to the arid climate and existing alterations to the drainage lines.					
Broad-scale ecological processes	Clearing of vegetation and disturbance during the construction of roads and mining activities; alterations to watercourse habitat characteristics. Transformation of intact habitat on a cumulative basis would contribute to the fragmentation of the landscape and would potentially disrupt the connectivity of the landscape for fauna and flora and impair their ability to respond	Medium High	Certain for life of operation	Residual	Low-Medium Regional	• Implement best practise principles to minimise the footprint of transformation. • All activities associated with the mining operation must be planned to avoid any unnecessary or additional disturbances to surrounding habitats and watercourses. • Ensure that the excavate areas are free-draining, by removing all surface flow obstructions and evening out all rough surfaces that hinder free-flow runoff patterns. • Employ sound rehabilitation measures to restore characteristics of all affected habitats by re-establishing topsoil and vegetation as soon as the slopes of the

	to environmental fluctuations. The extent of existing disturbances in the region is moderately low, and as a result, large natural landscapes adjacent to the study area, are still intact. The small size of the proposed activities will have a moderately low cumulative effect to the fragmentation of habitats on a landscape level.					excavations, and flow paths have been restored.
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 vehicle entrainment of dust road.	Low	Certain	Decommissioning	Low Local	Effective soil management; identification of the required control efficiencies in order to maintain dust generation within acceptable levels.
SOCIAL SURROUNDINGS						
Environmental Factor	Nature of Impact	Significance	Probability	Duration	Consequence Extent	Management
Noise Impacts	Clearing of footprint areas, stripping of stockpiling of topsoil	Medium	Possible	Decommissioning	Low Local	Equipment and/or machinery which will be used must comply with the manufacturers

						specifications on acceptable noise levels Topsoil stripping should be limited to daytime only.
	Clearing of new open cast mining areas, stripping and stockpiling of topsoil. Noise increase at the boundary of the mine footprint.	Medium	Possible	Decommissioning	Low Local	Equipment and/or machinery which will be used must comply with the manufacturers specifications on acceptable noise levels Topsoil stripping should be limited to daytime only.
	Additional traffic to and from the mine	Medium	Possible	Decommissioning	Low Local	Equipment and/or machinery which will be used must comply with the manufacturers 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	Decommissioning	Low Local	Equipment and/or machinery which will be used must comply with the manufacturers specifications on acceptable noise levels Noise survey to be carried out to monitor the noise levels during these activities.
	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 manufacturers 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 manufacturers 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	Low Site	Certain	Decommissioning	Low Local Site	The design of the proposed mining development will determine the visual impact. As the visual impact would be low, 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	Low site	Highly Likely	Decommissioning	Low Local Site	The design of the proposed mining development will determine the visual impact.
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.
Heritage resources	The Deterioration of sites of cultural and heritage importance.	Low	Certain	Construction, Operational	Low	Any heritage and cultural resources must be protected and preserved by the delineation of a no-go zone if any have been identified. **No such sites** were identified but should any resources be discovered, exposed or

						uncovered during site preparations; these should immediately be reported to an accredited archaeologist. Should any Burial remains be uncovered, it should not be disturbed or removed until inspected by an archaeologist or for fossil finds by a palaeontologist.
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	• 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 courses should be accredited and certificates obtained should be acceptable by other related industries.
	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 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 the mine site • Continue and extend the current HIV/AIDS awareness and support programmes, with specific focus on those in and nearby the construction site

	Heritage Features	Low Negative	Highly probable	Construction	Low Negative Local	• Any heritage and cultural resources must be protected and preserved by the delineation of a no-go zone if any have been identified. • **No such sites were identified** but should any resources be discovered, exposed or uncovered during site preparations, these should immediately be reported to an accredited archaeologist. Should any Burial remains be uncovered it should not be disturbed or removed until inspected by an archaeologist or for fossil finds by a palaeontologist.
	Noise Impact	Low Negative	Probable	Construction	Low Negative Local	• Construction vehicles should be in a good working order • Construction activities should be kept to normal working hours e.g. 7 am until 5 pm during weekdays
	Health and safety risks	Low Negative	Highly Probable	Operational	Low Negative Local	• The general health of employees should be monitoring on an on-going basis • EMP Guidelines should be strictly adhered to and international best practice should be sought
	Noise Impact	Low Negative	Probable	Operational	Low Negative Local	• Noise generating activities should be kept to normal

						working hours (e.g. 7 am until 5 pm) where possible
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. **Surface Water**
9. **Ground Water**
10. **Air Quality**
11. **Noise and vibration**
12. **Archaeological and Cultural Sites**
13. **Sensitive Landscapes**
14. **Visual Aspects**
15. **Socio-Economic Structures**
16. **Interested and Affected Parties**

The criteria used to assess the Consequence of the impacts are shown in the table 11 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 11. Consequence of impacts is defined as follows.

CONSEQUENCE				
Colour Code	**Consequence rating**	**Rating**	**Negative Impact**	**Positive Impact**
	Very low	3 -16	Acceptable/Not serious	Marginally Positive
	Low	17 - 22	Acceptable/Not serious	Marginally Positive
	Low- Medium	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

Consequence 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.

Low Medium 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 12. Criteria used to assess the **SIGNIFICANCE** of impacts

Weight	Severity	Spatial scope (Extent)	Duration
5	Disastrous	Trans boundary effects	Permanent
4	Catastrophic / Major	National / Severe environmental damage	Residual
3	High / Critical / Serious	Regional effect	Decommissioning
2	Medium / slightly harmful	Immediate surroundings / local / outside mine fence	Life of Operation
1	Minimal/potentially harmful	Slight permit deviation / on-site	Short term / construction (6 months – 1 year)
0	Insignificant/ non harmful	Activity specific / No effect / Controlled	Immediate (0 – 6 months)

Table 13. Explanation of **PROBABILITY** of impact occurrence

Weight number		1	2	3	4	5
Frequency						
Probability	Frequency of impact	Highly unlikely	Rare	Low likelihood	Probable / Possible	Certain
		Practically impossible	Conceivable but very unlikely	Only remotely possible	Unusual but possible	Definite
	Frequency of activity	Annually or less	6 months/ temporarily	Infrequent	Frequently	Life of Operation

Table 14. Explanation of SEVERITY of the impact

Weight	Impact Severity	Explanation of Severity
0	Insignificant/ non harmful	There will be no impact at all – not even a very low impact on the system or any of its parts.
1	Minimal/potentially harmful	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.
2	Medium / slightly harmful	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.
3	High / Critical / Serious	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.
4	Catastrophic / Major	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.
5	Disastrous	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.

The impact is of great importance. Failure to mitigate, with the objective to reduce the impact to acceptable levels, could render the entire development option or entire project proposal unacceptable. Mitigation is therefore essential.

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 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. The infrastructure and stockpiles/dumps will alter the topography by adding features to the landscape. 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 removing of dumps, 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 the area has been converted due to the aggregate mining and material but with proper rehabilitation the land capabilities and land use potential can be restored.

Groundwater could be 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 (drainage lines) 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.

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.

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 will not impact on heritage resources. Any heritage and cultural resources must be protected and preserved by the delineation of a no-go zone if any have been identified. No such sites were identified but should any resources be discovered, exposed or uncovered during site preparations; these should immediately be reported to an accredited archaeologist. Should any Burial remains be uncovered it should not be disturbed or removed until inspected by an archaeologist or for fossil finds by a palaeontologist. 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.

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.

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

Impact	Mitigation	Risk
Air quality	• Speed limits; • Spraying of surfaces with water; • Avoidance of unnecessary removal of vegetation; • Re-vegetation; • Monitoring; • Rehabilitation of disturbed areas; and • Controlled excavation operations, preferably on wind-free days.	Medium
Fauna	• Minimise the footprint of transformation. • Encourage proper rehabilitation of cleared areas. • Encourage the growth of natural plant species. • Ensure measures for the adherence to the speed limit. • 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). No construction personnel or vehicles may leave the demarcated area except those authorized to do so. Those areas surrounding the mining site that are not part of the demarcated development area should be considered as a no-go zone for employees and machinery or even visitors. • 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	Medium

	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. • In the case of any mortalities resulting from birds flying into power lines, these should be recorded including the date of the observation and the species affected and any other relevant information. • 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 pristine habitats and minimise the overall mining footprint. • The extent 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.	
Flora	• Minimise the footprint of transformation. • Encourage proper rehabilitation of cleared areas. • Encourage the growth of natural plant species. • Ensure measures for the adherence to the speed limit. • Footprint areas of the mining activities must be scanned for Red Listed and protected plant species prior to mining; • It is recommended that these plants are identified and marked prior to mining. • These plants should where possible, be incorporated into the design layout and left in situ. • However, if threatened of destruction by mining these plants should be removed (with the relevant permits from DAFF and DENC) and relocated if possible. • 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.	Medium

	• All those working on site must be educated about the conservation importance of the fauna and flora occurring on site. • Minimise the footprint of transformation • Encourage proper rehabilitation of mining areas • Encourage the growth of natural plant species (diverse selection of natural plant species). • Mechanical methods (hand-pulling) of control to be implemented extensively. • Annual follow-up operations to be implemented. • Ensure measures for the adherence to speed limit. • Maintenance of firebreaks; • No trees felled for firewood;	
Ground water	• Refuelling must take place in well demarcated areas and over suitable drip trays to prevent ground water pollution. • Spill kits to clean up accidental spills from the 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 should be regularly serviced and maintained. • Monitoring of groundwater abstraction and quality; and • Clean & Dirty water system must be well maintained.	Low
Noise	• Hearing protection; • Non-metallic washers to join infrastructure; • Working hours be minimised to daytime only; • Controlled excavation operations; • Silencers on equipment and vehicles; • Acoustic enclosure for generators; and • Distance from residence of surface owner.	Medium
Soil	• At no point may plant cover be removed within the no-development zones; • All attempts must be made to avoid exposure of dispersive soils; • Re-establishment of plant cover on disturbed areas must take place as soon as possible, once activities in the area have ceased; • Ground exposure should be minimized in terms of the surface area and duration, wherever possible; • The mining operation must co-ordinate different activities in order to optimise the utilisation of the yellow fleet and thereby	Medium

	prevent repeated and unnecessary excavations. • Construction that requires the clearing of large areas of vegetation for excavations should ideally occur during the dry season only. • The run-off from the exposed ground should be controlled with the careful placement of flow retarding barriers. • The soil that is excavated during construction should be stock-piled in layers and protected by berms to prevent erosion. • All stockpiles must be kept as small as possible, with gentle slopes (18 degrees) in order to avoid excessive erosional induced losses. • Excavated and stockpiled soil material are to be stored and bermed on the higher lying areas of the footprint area and not in any storm water run-off channels or any other areas where it is likely to cause erosion, or where water would naturally accumulate. • Stockpiles susceptible to wind erosion are to be covered during windy periods. • Audits must be carried out at regular intervals to identify areas where erosion is occurring. • Appropriate remedial action, including the rehabilitation of eroded areas, must occur. • Rehabilitation of the erosion channels and gullies. • Linear infrastructure such as roads will be inspected at least monthly to check that the associated water management infrastructure is effective in controlling erosion. • 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 in order to ensure that the quality of the topsoil is not impaired. • Topsoil stockpiles must be kept separate from sub-soils. • The topsoil should be replaced as soon as possible on to the backfilled areas, thereby allowing for the re-growth of the seed bank contained within the topsoil. • 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	• Refuelling must take place in well demarcated areas and over suitable drip trays to prevent surface water pollution. • Spill kits to clean up accidental spills from 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. • Storm water control; • Clean & dirty water management plan.	Low
Topography	• Backfill all excavations continuously • Employ effective rehabilitation strategies to restore surface topography of excavations; • All temporary infrastructures should be demolished during closure.	Medium
Visual	• Continuous backfilling of excavations; • Replacing layer of topsoil over backfilled areas; • Sloping of rehabilitated and disturbed areas; • Removal of all infrastructures upon mine closure.	Low

ix) Motivation where no alternative sites were considered

No viable alternative sites were identified for the following reasons:

- The applicant is also the farm owner and knows the viability of the specific area.
- The location of the aggregate indicates that the mining within the boundaries of the abovementioned property can be a viable project.

x) Statement motivating the alternative development location within the overall site

Not applicable. There is no alternative development location for the site.

i) 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

Not applicable. There is not alternative development location for the site and therefore the initial site locality is considered to be the final site locality. 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).

j) 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)

In this section, the potential impacts and associated risk factors that may be generated by the proposed mining operation on Gemsbok Bult are identified. In order to ensure that the impacts identified are broadly applicable and inclusive, all the likely or potential impacts that may be associated with the mining activities are listed.

NAME OF ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE In which impact is anticipated	SIGNIFICANCE If not mitigated	MITIGATION TYPE	SIGNIFICANCE If mitigate
Roads	Air quality	Nuisance dust will be created by the mining fleet.	Construction	High	Dust control Water spraying. Well maintained equipment	Medium
	Fauna	Where new haulage roads will be created the natural habitat of the animals will be disturbed and/or destroyed.	Construction	High	Speed limits Environmental Awareness	High
	Flora	Where new haulage roads will be created the vegetation will be disturbed and/or destroyed.	Construction	High	Stripping of topsoil and concurrent rehabilitation excavations	High
	Ground water	No impact to groundwater is expected from the roads that will be used by the planned mining operation.	Construction	No significance	Pollution control and good housekeeping practice	No significance
	Noise	Noise from the mining equipment on the roads will be created.	Construction	Medium	Noise control Well maintained equipment	Low
	Soil	No impact to soil is expected from the roads that will be used by the planned mining operation.	Construction	No Significance	Stripping of topsoil and concurrent rehabilitation	No Significance

	Surface water	No impact to surface water is expected from the roads that will be used by the planned mining operation.	Construction	No significance	Pollution control and on-going housekeeping	No Significance
	Topography	No impact to topography is expected from the roads that will be used by the planned mining operation.	Construction	No Significance	Concurrent rehabilitation	No Significance
	Visual	The mining roads will be visible to some extent from the immediate surroundings.	Construction	No Significance	Concurrent Rehabilitation	No Significance
Excavation	Air quality	Nuisance dust will be created by the excavations.	Operational	High	Dust control Well maintained equipment	Medium
	Fauna	Where new excavations will be created the natural habitat of the animals will be disturbed and/or destroyed.	Operational	High	Speed limits Environmental Awareness	High
	Flora	Where new excavations will be created the vegetation will be disturbed and/or destroyed.	Operational	High	Stripping of topsoil and concurrent rehabilitation	High
	Ground water	No impact to groundwater is expected from the creation of the excavations. It is not expected that ground water will be intercepted.	Operational	No Significance	Pollution control and good housekeeping practice	No Significance
	Noise	Noise impact from the yellow gear will be created.	Operational	High	Noise control Well maintained equipment	Medium
	Soil	The disturbance of the soil structure during mining activities.	Operational	High	Stripping of topsoil and concurrent rehabilitation	High

	Surface water	No impact to surface water is expected during excavation activities.	Operational	No Significance	Pollution control and on-going housekeeping	No Significance
	Topography	Breaking of the Sky-line by the equipment and mining activities.	Operational	Medium	Concurrent rehabilitation	Low
	Visual	The mining will be visible to some extend from the immediate surroundings.	Operational	No Significance	Concurrent Rehabilitation	No Significance

Vegetation and floristics

- Loss of natural and unique habitats

  The vegetation in the path of excavations will be damaged or completely removed. Vegetation clearing during these activities will lead to loss of intact habitat within the mining area and habitat disturbances. Such disturbances destroy primary vegetation and can allow secondary pioneers species or invasive plants to enter and recolonize disturbed area. As primary vegetation is more functional in an ecosystem, this could irreversibly transform the vegetation characteristics in the area.

- Loss of Red data and/or protected floral species

  It is possible that there can be some protected species present at the site.
  It is possible that some of the protected species would be impacted by the operation. The most profound impacts will most likely be on larger trees or individuals that occur in the excavation areas. Apart from its conservation concern, a tree is a valuable source of shade, especially in arid areas, where mammals seek protection and shade from its canopy.
  Other fauna also utilises trees for nesting. Furthermore, the shade that the tree provides serves as a significant microhabitat for invertebrates, suggesting its importance in continuing biodiversity patterns in the region. Further ecological functions provided by the tree include nutrient cycling, diminishing nutrient leaching, mitigating soil degradation, preventing soil erosion, sequestering carbon and replenishing organic matter.

- Introduction or spread of alien species

  The disturbance created during the operation could encourage the invasion of the disturbed areas by alien species. This includes *Opuntia spp*, *Prosopis glandulosa* and *Eucalyptus sp*. Some of these species, especially the *Opuntia spp*. will rapidly increase in abundance and expand into the disturbed areas if given the opportunity.

- Encouraging bush encroachment

The disturbance created during the mining operation could potentially encourage bush encroachment. This is especially likely during the clearing of diverse habitats where opportunity is provided for highly competitive encroaching species like *Senegalia mellifera* to establish.

Fauna

- Habitat fragmentation

  The mining operation is not expected to cause major habitat transformation or habitat loss. Terrestrial habitats such as rock crevices, burrows, nests and vegetation on which small mammals, insects, amphibians, reptiles and birds are heavily reliant could however be disturbed during the clearing activities associated with the mining operation, causing temporary displacement of these animals.
  During the creating of mine roads vegetation will be cleared, which will create unnatural open spaces within the landscape. This might restrict the movement of smaller species and limit their access to foraging sites, but it is not expected to have major impacts on the nutrient cycle or ecological functioning.

- Intentional/accidental killing of fauna

  Smaller fauna might be killed along with their habitat during the clearing of land. Some species, particularly snakes and lizards are often intentionally killed as they are thought to be dangerous, while vultures and owls are killed for cultural and religious beliefs or for medicinal purposes. Furthermore, vehicular traffic is often a significant cause of accidental road kill.

- Anthropogenic disturbances

  Disturbance, like excavation activities and vehicular movement, result in disturbances to the naturally occurring faunal species. Possible associated disturbances include increased levels of noise, pollution, vibrations, illumination and human presence. Sensitive and shy fauna would move away from the area during the operation as a result of the noise and human activities present, while some slow-moving species would not be able to avoid the activities and might be killed.

Topography, soil erosion and associated degradation of ecosystems

The plains of the site are fairly flat; the minimal amount of disturbances and vegetation clearing created during mining activities are not expected to leave the site vulnerable to soil erosion. Furthermore, no change to surface topography is expected and therefore local runoff erosion is not considered a likely impact during the operation.

Broadscale ecological processes

Transformation of intact habitat on a cumulative basis would contribute to the fragmentation of the landscape and would potentially disrupt the connectivity of the landscape for fauna and flora and impair their ability to respond to environmental fluctuations.

k) Summary of specialist reports

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT 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
Ecological Impact Assessment *Dr. Betsie Milne* *Appendix 4*	One plant community was identified within the study area and is regarded to be of medium sensitivity, along with the drainage lines on site. Major past alterations to the drainage lines have decreases the sensitivity of these watercourses. Only a few provincially protected plant species occur on site and although the study area is also potentially important habitat for protected bird-, reptile- and invertebrate species, the site is small, and the adjacent habitat is pristine and extensive. Therefore, the proposed activities are only expected to have moderate impacts to the ecological integrity of the study area. Nevertheless, permit applications need to be lodged with the Northern Cape Department of Environment and Nature Conservation three months prior to any destruction, death or displacement of protected flora and fauna species. The most profound impacts expected to be related to the proposed mining operation include altering the natural topography through deep excavations and subsequent beneficiation of the excavated material. Therefore, the excavations will not be effectively backfilled, and alternative rehabilitation methods will need to be employed. The mining of aggregate relates to inevitable destruction of habitat and changes to the natural topography. The small	X	

	size of the proposed operation alleviates these impacts, but the significance of the ecological 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, but the applicant should still adhere to effective avoidance, management, mitigation, and rehabilitation measures.		
Phase 1 Heritage Impact Assessment & Palaeontological Desktop Assessment for a Mining Right Application on a Portion of the Remaining Extent of Portion 3 (Rooidam) of the Farm Gemsbokbult 120 HE near Kenhardt within the Kai !Garib Local Municipality, Northern Cape *Dr. Edward Matenga* *Appendix 5*	**EXECUTIVE SUMMARY** This report has been prepared in support of a mining right application on a Portion of the Remaining Extent of Portion 3 (Rooidam) of the Farm Gemsbokbult 120 HE near Kenhardt within the Kai !Garib Local Municipality, Northern Cape near Kenhardt, within the Kai !Garib Local municipality, Northern Cape Province. The report complies with Section 38(8) of the National Heritage Resources Act (No 25/1999) which requires screening of the footprint of the development for the possible occurrence of heritage resources that may be impacted by the proposed activities, and on the basis of which appropriate mitigation measures will be prescribed. The report is based on ground survey undertaken om 2nd July 2022 **The Stone Age** Stone Age material is widely distributed on the plains, ridges and valleys of the upper Karoo area north and south of the Orange-Vaal basin. The material occurs as background scatters comprising scrapers, blades, cores and flakes typologically dating to the Middle Stone Age/Late Stone Age period. In the present study no material dating to the Stone Age was found in the areas targeted for mining. **Iron Age**		

	No sites or relics dating to the Iron Age were found. Commercial farming heritage There are no buildings or structures in the areas of the proposed sand mining. **Burial Grounds** No burial grounds were recorded. Farmers in the Northern Cape increasingly diversifying their products to mitigate the increasing risk of droughts. In annual cycles and over long periods are increasingly becoming unpredictable due to climate change. Mining provides a fallback when livestock production is affected by incessant droughts. Farmers are venturing into mining on a small and large scale and the mixed economy is turning out to be more viable when compared to livestock farming alone. **Conclusion and recommendations** The mining project can be allowed to go ahead. If archaeological or other heritage relics deemed of high significance are found during the exploration phase, heritage authorities will be advised immediately and a heritage specialist will be called to attend.		
Palaeontological Impact Assessment for the proposed Kamkuip Mining Right Application, Farm Gemsbokbult 120, NE of Kenhardt, Northern Cape Province Desktop Study (Phase 1) 01 August 2022 *Prof. Marion Bumford*	**Executive Summary** A Palaeontological Impact Assessment was requested for the Mining Right Application on a Portion of the Remaining Extent of Portion 8 (a Portion of Portion 3 - Rooidam) of the Farm Gemsbokbult 120 HE near Kenhardt, within the Kai !Garib Local Municipality, Northern Cape, hereafter called Rooidam. To comply with the regulations of the South African Heritage Resources Agency (SAHRA) in terms of Section 38(8) of the National Heritage Resources		

Appendix 6	Act, 1999 (Act No. 25 of 1999) (NHRA), a desktop Palaeontological Impact Assessment (PIA) was completed for the proposed development. The material to be targeted is likely to be non-fossiliferous granites but the site lies very close to moderately fossiliferous aeolian sands of the Gordonia Formation (Kalahari Group, Quaternary age). Aeolian sands do not preserve fossils but might cover traps such as palaeo-pans and palaeo-springs. No such feature is visible from the satellite imagery. Nonetheless, 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 miners, environmental officer or any other designated responsible person once mining or drilling activities have commenced. Since the impact is low, as far as the palaeontology is concerned, the project should be authorised. **Recommendation** The target of the rock for aggregate is likely to be granite and not the overlying sands. 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 aeolian sands of the Gordonia Formation, Kalahari Group (Quaternary). There is a very small chance that fossils may have been trapped in features such as palaeo-pans or palaeo-springs, and buried by the aeolian sands, but no such feature is visible in the satellite imagery. Nonetheless, a Fossil Chance Find Protocol should be added to the EMPr. If fossils are found by the environmental officer, or other responsible person once mining activities have commenced then they		

	should be rescued and a palaeontologist called to assess and collect a representative sample. Since the impact on the palaeontological heritage would be very low, as far as the palaeontology is concerned, the project should be authorised.		

l) Environmental impact statement

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

The nature of impacts can vary widely depending on the type of physical environment, the size of activity and the perceptions and values of each of the affected parties. It was the objective of the assessment to identify both positive and negative impacts. The existing information was reviewed to assess the present status of the environment and the extent to which they have already been modified. The planned activities and associated infrastructure were used as reference to assess potential impacts.

The most profound impacts expected to be related to the proposed mining operation include altering the natural topography through deep excavations and subsequent beneficiation of the excavated material. Therefore, the excavations will not be effectively backfilled, and alternative rehabilitation methods will need to be employed.

The mining of aggregate relates to inevitable destruction of habitat and changes to the natural topography. The small size of the proposed operation alleviates these impacts, but the significance of the ecological 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, but the applicant should still adhere to effective avoidance, management, mitigation, and rehabilitation measures.

Positive impacts include the demarcation and subsequent protection of heritage resources and the eradication of alien invasive species. Positive social impacts include the creation of jobs, social upliftment, training opportunities, community development and numerous benefits.

To conclude, the proposed mining activities will not have a major impact on the ecological integrity of Gemsbok Bult, with associated impacts mainly considered to be low. Authorisation should nevertheless be granted on condition that the applicant commits to the adherence of effective avoidance, management, mitigation and rehabilitation measures.

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

The proposed mining operation will be done in such a way that farming will still be possible on the rest of the farm. If mining is done the loss of land use will be temporary as the site will be rehabilitated in such a way that it allows the establishment of a grass cover again. The rest of the farm will still be able to be used for grazing purposes.

This mining operation will provide 5 - 8 temporary jobs. This will also add to the increased economic activity and area surrounding the farm.

Negative impacts on the area are expected to be temporary and can be mitigated to a large extent if the recommendations of the EMP are adhered to e.g. rehabilitation.

No concerns in terms of the mining itself have been raised.

The specific occurrence of aggregate in the area dictates the selection of the specific mining site.

(ii) Final Site Map;

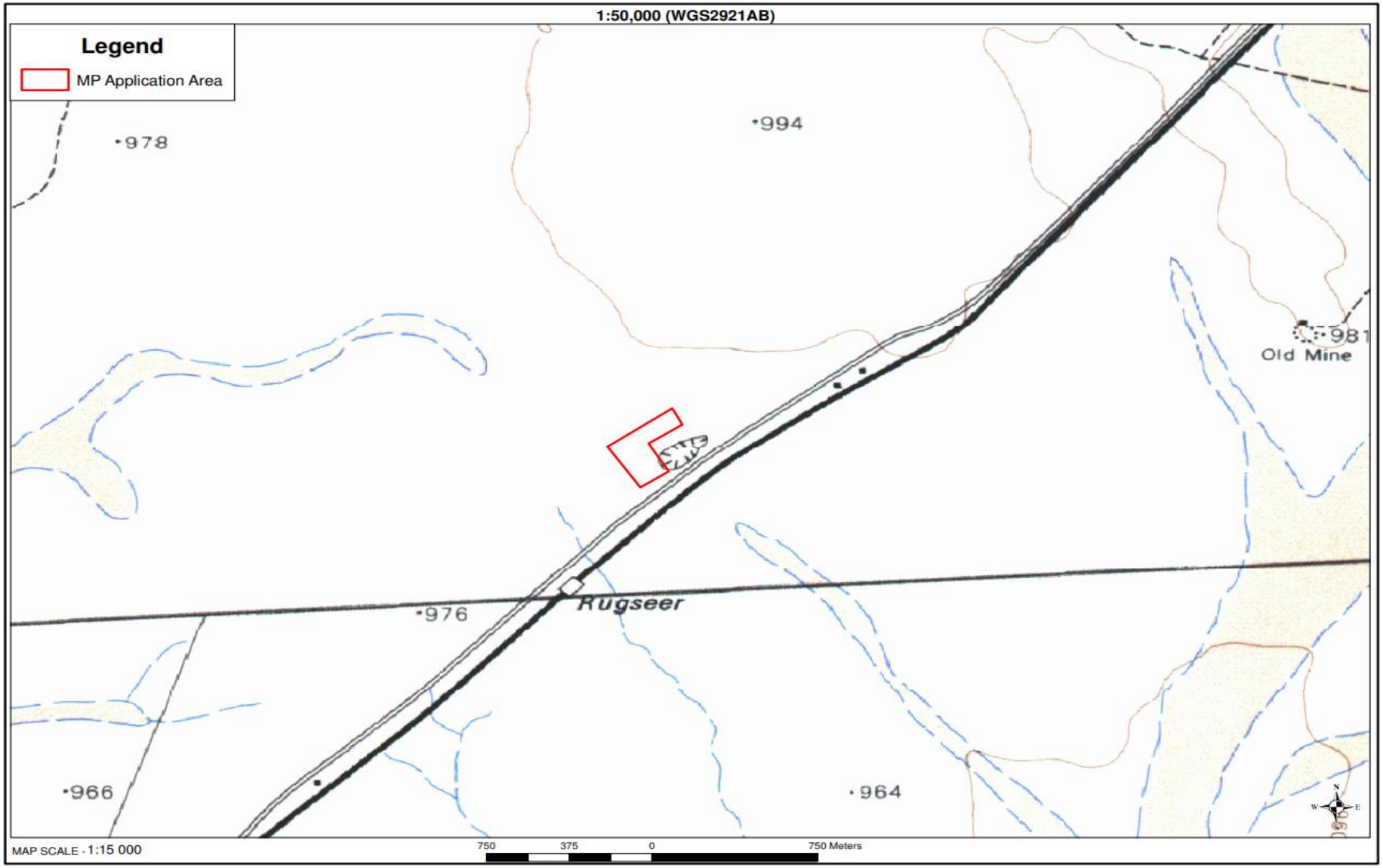


Figure 16. Final Site Map

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

The main closure objective of Kamkuip Boerdery planned mining operation is to restore the site to its current land capability in a sustainable matter.

- To prevent the sterilization of any aggregate 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.
- The mine also has the objective 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 of the mine.
- To limit and manage the visual impact of the mine.
- To safeguard the safety and health of humans and animals on the mine.
- The last closure objective is that the mine is closed efficiently, cost effectively and in accordance with government policy.

Rehabilitation Plan

Infrastructure areas

On completion of the mining operation, the various surfaces, including the access road, the excavations will finally be rehabilitated as follows:
All material on the surface will be removed to the original level where possible. This material will then be backfilled into the excavations. 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, and other items used during the operational period will be removed from the site.

Final rehabilitation of 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 and Energy.

Submission of information

Reports on rehabilitation and monitoring will be submitted annually to the Department of Mineral Resources and Energy – Kimberley, as described in regulation 55.

Maintenance (Aftercare)

Maintenance after closure will mainly concern the regular inspection and monitoring and/or completion of the re-vegetation programme.

The aim of the Basic Assessment Report 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 will be to create an acceptable post-mine environment and land-use. Therefore, all agreed commitments will be implemented by Mine Management.

After-effects following closure

- *Acid mine drainage*
  No potential for bad quality leachate or acid mine drainage development exists after mine closure.

- *Long term impact on ground water*
  No after effect on the ground water yield or quality is expected.

- *Long-term stability of rehabilitated land*
  One of the main aims of any rehabilitated ground will be to obtain a self-sustaining and stable end result. As the open pits will be mined onto bedrock these areas will have long term stability.

n) Aspects for inclusion as conditions of Authorisation

There are no aspects which have not formed part of the EMPR that must be made conditions of the Environmental Authorisation.

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

This report was compiled by incorporating information provided by the applicant and the appointed specialists and no warranty or guarantee, whether expressed or implied, is made by the EAP with respect to the completeness, accuracy or truth of any aspect of this document with reference to the instructions, information and data supplied by the aforementioned parties.

The impact assessment was conducted based on the EAPs knowledge and experience. The probability, intensity/severity and significance pertaining to the criteria used to assess the significance of the impacts were based on rule-of-thumb and experience.

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 and the applicant 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.

None other than the implementation of the EMPR.

q) Period for which the Environmental Authorisation is required

It is required for 5 years.

r) Undertaking

We hereby undertake to meet the requirements as provided at the end of the EMPr and is applicable to both the Basic Assessment Report and the Environmental Management Programme Report.

s) Financial Provision

The progressive rehabilitation cost that will be paid into the fund to make provision for premature closure and end of life closure is estimated at **R119 183,78.**

i) Explain how the aforesaid amount was derived

The quantum of the financial provision contemplated in Regulation 54 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) will be revised and adjusted accordingly annually, based on a survey assessment of the environmental liability of Kamkuip Boerdery. Surveys of excavations are conducted by a registered surveyor and results are forwarded to the Environmental Manager who calculates the outstanding rehabilitation as per the agreed rate in the DMR Guideline. A bank guarantee is prepared for the amount and submitted to the DMRE.

Financial provision for the rehabilitation or management of negative environmental impacts caused by the mining operation [as required by Section 41 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)] will be made in the form of a financial guarantee from a South African registered bank. This document will guarantee the financial provision relating to the Environmental Management Programme in a format as approved by the Director-General.

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

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

t) Specific 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

The applicant is also the owner of the farm it can therefore be said that the mining operation was thoroughly discussed with the landowners.

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

The Stone Age
Stone Age material is widely distributed on the plains, ridges and valleys of the upper Karoo area north and south of the Orange-Vaal basin. The material occurs as background scatters comprising scrapers, blades, cores and flakes typologically dating to the Middle Stone Age/Late Stone Age period. In the present study no material dating to the Stone Age was found in the areas targeted for mining.

Iron Age
No sites or relics dating to the Iron Age were found.

Commercial farming heritage
There are no buildings or structures in the areas of the proposed sand mining.

Burial Grounds
No burial grounds were recorded.

Farmers in the Northern Cape increasingly diversifying their products to mitigate the increasing risk of droughts. In annual cycles and over long periods are increasingly becoming unpredictable due to climate change. Mining provides a fallback when livestock production is affected by incessant droughts. Farmers are venturing into mining on a small and large scale and the mixed economy is turning out to be more viable when compared to livestock farming alone.

Conclusion and recommendations
The mining project can be allowed to go ahead. If archaeological or other heritage relics deemed of high significance are found during the exploration phase, heritage authorities will be advised immediately and a heritage specialist will be called to attend. (Taken out of the report done by Dr. Edward Matenga, 2022).

Palaeontology

Prof Marion Bamford was appointed by Archaeological and Heritage Services Africa (Pty) Ltd to conduct an Desktop Palaeontology Assessment study for the proposed mining area. (Appendix 6).

Executive Summary

A Palaeontological Impact Assessment was requested for the Mining Right Application on a Portion of the Remaining Extent of Portion 8 (a Portion of Portion 3 - Rooidam) of the Farm Gemsbokbult 120 HE near Kenhardt, within the Kai !Garib Local Municipality, Northern Cape, hereafter called Rooidam.

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 material to be targeted is likely to be non-fossiliferous granites but the site lies very close to moderately fossiliferous aeolian sands of the Gordonia Formation (Kalahari Group, Quaternary age). Aeolian sands do not preserve fossils but might cover traps such as palaeo-pans and palaeo-springs. No such feature is visible from the satellite imagery. Nonetheless, 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 miners, environmental officer or any other designated responsible person once mining or drilling activities have commenced. Since the impact is low, as far as the palaeontology is concerned, the project should be authorised.

Recommendation

The target of the rock for aggregate is likely to be granite and not the overlying sands. 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 aeolian sands of the Gordonia Formation, Kalahari Group (Quaternary). There is a very small chance that fossils may have been trapped in features such as palaeo-pans or palaeo-springs, and buried by the aeolian sands, but no such feature is visible in the satellite imagery. Nonetheless, a Fossil Chance Find Protocol should be added to the EMPr. If fossils are found by the environmental officer, or other responsible person once mining activities have commenced then they should be rescued and a palaeontologist called to assess and collect a representative sample. Since the impact on the palaeontological heritage would be very low, as far as the palaeontology is concerned, the project should be authorised

CHANCE FINDS PROCEDURE Prepared by Edward Matenga (PhD)

The Chance Finds Procedure is a project-specific procedure that outlines actions required if previously unknown heritage resources are encountered during project implementation. It is set of interventions that protect chance finds from further disturbance until an assessment by a competent specialist is made, and mitigation actions consistent with the law and best practice standards are taken.

A principal aim of the CFP is to raise awareness of all personnel in the project regarding the prospect of finding archaeological resources that unseen during the Phase 1 scoping heritage assessment and establish a protocol for the protection of these resources. The appointed Environmental Control Officer (ECO) and Site Manager keep copies of the CPF at the field offices. Training of field personnel on cultural heritage resources that might potentially be found on area should be provided.

PROCEDURE FOR ARCHAEOLOGICAL FINDS

If you discover what you suspect may be a possible archaeological site:

- Stop all work in the area to avoid damaging the site.
- Do not disturb any archaeological remains that you may encounter.
- The finds must be reported to ECO or Site Manager
- The finds must be reported to the heritage authority, i.e. SAHRA and/or the provincial heritage resources agency.
- The heritage authority will send a heritage specialist and /or ask the permit holder to appoint a heritage specialist to make a preliminary assessment of the findings.
- If the potential significance of the finds are deemed to warrant further action and they cannot be avoided, then then heritage specialist will submit a report advising SAHRA accordingly.
- SAHRA will determine the appropriate course of action.

PROCEDURE FOR GRAVES, BURIAL GROUNDS AND HUMAN REMAINS

If you discover what you suspect may be possible human remains:

- Stop all work in the area to avoid damaging the site.
- Do not disturb any possible human remains that you may encounter.
- The finds must be reported to ECO or Site Manager.
- The finds must be reported to the local area station of SAPS.
- The finds must be reported to the SAHRA Burial Grounds and Graves (BGG) Unit.
- The BGG Unit will send a heritage specialist and /or ask the permit holder to appoint a heritage specialist to make a preliminary assessment of the findings.
- If the graves/human remains cannot be avoided SAHRA will require that the human remains be re-interred in a formal cemetery.
- Public participation to identify interested and affected parties (if any) will be undertaken in terms of NHRA Regulations 39, 41 and 41 in the Government Notice No R548 (year 2000).
- An application will be lodged to the BGG for the relocation of the human remains in terms of NHRA Regulations 34 in the Government Notice No R548 (year 2000).
- If the graves/ human remains must not be relocated, the BGG Unit may require that any damage done to the site is repaired and a 100m buffer zone is enforced around the site.

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

There are no alternatives, as the application area applied for is the area where the applicant has proven aggregate and has found potential for a aggregate 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 requirements for the provision of the details and expertise of the EAP are already included in PART A, section 1(a).

Confirmed (Mark with an X)	**X**

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 requirements to describe the aspects of the activity that are covered by the draft environmental management programme are already included in PART A, section 1(h).

Confirmed (Mark with an X)	**X**

c) Composite Map

The final site map below indicates the mining permit application area in which all mining will take place. Existing roads are also depicted. The associated infrastructure relating to the mining site will be placed in the area marked as the "mine infrastructure footprint".

The only buffers that must be implemented is the 100m away from any fixed infrastructure like the tar road and the farm house and out buildings in terms of the Mine Health and Safety Act 1996 (Act No. 29 of 1996) Regulations relating to surveying, mapping and mine plans.

These regulations states that mine must take reasonable measures to ensure that:

No mining operations are carried out within a horizontal distance of 100 (one hundred) metres from reserve land, buildings, roads, railways or any other structure whatsoever including such structure 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.

Figure 17. Composite map

d) Description of impact management objectives including management statements

i) Determination of closure objectives

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 and infrastructure and the subsequent rehabilitation of the areas they occupied include:

- To ensure the 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.

Maintenance

The necessary agreements and arrangement will be made by Kamkuip Boerdery 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 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, this Environmental Management Programme will be continually assessed in terms of its appropriateness and adequacy. In order to achieve this, Kamkuip Boerdery will undertake the following:

- Implement the necessary monitoring programmes, as discussed as part of the EMPR;
- Conduct performance assessments of this EMPR as required by the MPRDA and associated Regulations; and
- Compile and submit the afore-mentioned performance assessment reports to the DMRE. The frequency of the performance assessments

will occur every year. 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 land owners 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 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.
- 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:

- Kamkuip Boerdery will undertake a carefully planned step-wise decommissioning process.
- Closure planning will form an integral part of planning.
- Strategies for sustainable development of surrounding towns 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.
- Kamkuip Boerdery 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.

ii) Volumes and rate of water use required for the operation

No water except for a little bit of domestic water will be required for the 5 to 8 workers on site.

iii) Has a water use licence been applied for?

No, as no other water uses is anticipated.

iv) Impact to be mitigated in their respective phases

Table 15: Impact to be mitigated in their respective phases

Activity and Phase	Potential Impact	Size and Scale	Mitigation or control measure related to compliance with standards
ENVIRONMENTAL IMPACTS			
Construction Activities Control measures are to be applied during the implementation of respective activities	**Geology** Sterilisation of mineral resources	Local	- Proper planning of excavations.
	Topography Changes to surface topography due to placement of excavations.	Local	- Prominent natural features will not be disturbed such as heritage sites and grave sites if any is encountered; - All temporary infrastructure will be demolished during closure; - Waste will be disposed of at Municipal waste disposal site; - All disturbed areas will be rehabilitated.
	Soils Loss of soils resources due to erosion Soil contamination due to hydrocarbon spillages	Local	- All temporary infrastructures will be demolished during closure; - Waste will be disposed of at a Municipal waste disposal site; - Agreement to use this site will be sought from the municipality; - All disturbed areas (excavations) will be backfilled and rehabilitated; - Topsoil will be stripped according to the soil type and the available soil depth in the areas to be disturbed (up to 150mm) as per soil analysis of the area; - Soil will be stockpiled in windrows not higher than 2m with as little compaction as possible; - Stockpiling will be done as close as possible to areas where the soils will be replaced and single handling practised; - Soil stockpiles will be kept in a weed-free condition; - Stockpiled soil will be used in ongoing rehabilitation of disturbed areas; - Rehabilitation will include:- ✓ removing of all debris, ✓ replacement of soil with as little compaction as possible, ✓ reshaping, ploughing or ripping to break compaction; and ✓ introduction of organic matter as necessary. - Soil contamination will be prevented through:- ✓ bunding of all above-ground storage facilities, ✓ construction on impervious floors for hazardous substances such as diesel, oil and chemicals; and ✓ regular inspections of equipment and vehicles for leaks Spillages of oil, grease and hydraulic fuels will be reported. The spillages will be cleaned up by removing the soil and disposing such soil in a waste receptacle for removal by an industrial waste collector. - Contractors, staff and drivers will be trained on how to deal with spillage of hydrocarbons and other potential contaminants. - All domestic and industrial waste generated on site will be contained in skips and appropriate receptacles, collected and if required sorted by the approved contractor, and removed to approved waste disposal site. - Linear infrastructure such as roads will be inspected at least monthly to check that the associated water

			management infrastructure is effective in controlling erosion. - All surface water management infrastructure constructed from soil (berms, canals and bunds) will be inspected at least monthly, with more frequent inspections during periods of high rainfall and after major rainfall events. - The disturbed areas will be rehabilitated to grazing potential and appropriate erosion control measures will be implemented. Available soils will be used for top soiling. - Any excavation of topsoil's will be done such that the cleared area is also ripped and allow to re-vegetate.
	Land capability Loss of land capability	Local	- All construction activities to be restricted within the demarcated areas. - Check, service and maintain vehicles and equipment to minimise the risk of hydrocarbon and chemical leakages and spillages.
	Land use Fragmentation of farm land	Local	- Restrict construction activities to demarcated areas and consider all other areas as no-go areas to minimise loss of grazing land. - Do not disturb grave sites. - Ensure that land which is not used during construction is made available for grazing and recreational activities.
	Fauna and Flora Loss of habitat	Local	- Service and maintain construction vehicles in order to reduce noise emissions. - Advise persons entering the site not to disturb or harm animals. - Implement a biodiversity action plan that is available as part of the Biodiversity Specialist Report. - Avoid sensitive areas, such as pans and streams banks- no infrastructure within 100m of any road or water course.
	Drainage channels Loss or disturbance of habitat through encroachment of mining related activities	Local	- Educate employees, contractors and visitors on biodiversity and land management principles. - Planning & Surveying Department to be provided with relevant buffer areas to incorporate in future planning. - Applicable Water Use Licenses should be applied for disturbance of any pans.
	Alien Species Contamination by chemical control agents (users need to be registered and certified for use of dangerous products) Large areas denuded of vegetation (small-scale rehabilitation of denuded areas to be implemented)	Local and regional	- Mechanical and chemical methods will be implemented initially to bring about a quick reduction in these species that pose the greatest invasive threat to the area. - Mechanical (tree-felling) and chemical (stump treatment) methods to be implemented. Market for harvested wood to be investigated. - Mechanical methods (hand-pulling) of control to be implemented extensively in the early stages of establishment of the mine. - Annual follow-up operations to be implemented. - Control measures to be implemented on an opportunistic basis. - Landscaping and gardening to be based on the use of indigenous plants only. Alien plants are to be removed whenever possible.
	Biodiversity Loss of biodiversity	Local, regional and national	- Conduct rehabilitation. - Provide training in the identification of protected species. - Re-establish using mix of indigenous locally occurring species. - Re-establish tree species on the field away from the mining areas. - Set up fixed point monitoring sites to check progress of rehabilitation. - Fence off newly rehabilitated areas and protect from grazing until well established.
	Ground water Contamination of ground water	Regional	- Implement waste management plan for handling hazardous waste. - Conduct ground water monitoring as per the monitoring plan.

	Air quality Deterioration of air quality	Regional	- Rehabilitate and maintain disturbed surfaces that are not going to be utilised after construction. - Promote use of PPE such as dust masks.
	Noise Increase in ambient noise level	Regional	- Service construction vehicles and equipment on a regular basis to ensure noise suppression mechanisms are functioning. - Construct enclosures/bunds and berms for generators and other noise generating equipment. - Equip vehicles with noise silencers. - Switch equipment off when not in use. - Demarcate and clearly mark noise zones. - Adhere to occupation health and safety noise limits. - Maintain occupational noise monitoring to determine noise levels from equipment as increased noise may indicate other issues. A noise monitoring programme and grievance procedure must be implemented.
	Visual Visual intrusion	Regional	- Carry adjustments to the siting and design of the project, the careful selection of finishes and colours, the use of earthworks (such as berms) and planting to provide visual screening, as well as dust control where required. Penalties for non-compliance should be considered. - Turn lights off using a timer or occupancy sensor or manually when not needed. - Both on-site and off-site landscape rehabilitation of areas affected by the project should be considered. This may include re-instating landforms and natural vegetation, provision of landscaped open space, or other agreed upon facilities.
	Sensitive areas Destruction of sensitive areas	Local	- Conduct monitoring programme for water, soil and biodiversity. - Introduce a hydrocarbon management system to ensure that hydrocarbon pollution is minimised. - Commence with construction during the low floor or during low rainfall in the wet season. - Comply with Regulation 704 of the National Water Act of 1998 for all designs of mine residue disposal infrastructure. - Minimise the removal of vegetation during stripping.
	Traffic and safety	Local	- Allocate and adhere to speed limits. - To reduce negative impacts of increased traffic on and around the site. - Restrict traffic to demarcated areas. - Public to be given right of way on public roads and contractors shall make use of approved methods to control the movement of vehicles so as not to constitute a road hazard. - Erect safety signs in the local languages to warn people of the danger on roads. - Keep in constant liaison with the local Department of Roads who will need to be aware of any proposed road plans and who may be able to assist in terms of making recommendations and road maintenance. - Ensure that all site access points are clearly visible from the main road. - Ensure that all drivers employed are certified with appropriate training levels for the required vehicle. - Ensure that all vehicles entering and leaving the site use demarcated routes.
	Surface water Contamination of surface water resources	Regional	- Clean surface water or runoff will be prevented from entering dirty areas by diverting it around these areas; - The discharge positions might also require additional reinforcement in the form of a suitably designed gabion or similar structure to prevent erosion at the discharge positions.
	Fauna and flora Loss of natural vegetation and	Local, regional and national	- Ensure that vegetation is not unnecessarily removed. - Remove with care and relocate Red Data List Species to avoid destruction.

	species of conservation value		- Manage and control plant species declared as invasive and declared weeds.
Operational activities Control measures are to be applied during the implementation of respective activities	**Air quality** Deterioration in air quality	Local	- Minimise the removal of vegetation in order to reduce the possibility of dust pollution. - Vegetate topsoil stockpiles as soon as possible to reduce dust and particulate emissions. - Locate topsoil stockpiles in order to reduce its exposure to wind, thereby reducing the likelihood of particle entrainment. - Spray road surfaces with water and treat it with a dust binding agent to minimise emissions of fugitive dust. The type of dust-binding agent should determine the amount of watering.
	Topography Change in surface topography	Local	Mine owner and environmental consultant should supervise vegetation and rehabilitation activities in accordance with post mining topographical plan.
	Land capability Loss of land capability	Local	- Plan all construction activities to prevent the incorrect stripping of topsoil which leads to the reduction in land capability. - Restrict all construction activities to demarcated areas.
	Soils Loss of soil fertility	Local	- Vegetate soil stockpiles and berms to minimise the risk of erosion. - Implement erosion control measures, such as contour banks in the area prone to erosion, including slopes and uneven ground; c) Vegetate preferential flow paths of storm water runoff. - Remove soils in dryer months, due to their increased susceptibility to compaction and erosion during rains. - Separate topsoil (A horizon) and sub-soils (B horizon) where possible and stockpile separately. - Construct berms around soil stockpiles in order to divert water away from the stockpile to prevent erosion. - Restrict stockpile height to less than 3m and shape to reduce soil compaction. - Minimise the removal of topsoil in order to reduce dust and particulate emissions.
	Surface water Deterioration in water quality	Regional	- Ensure that construction activities are at least 100m from drainage channels and flood lines. - Stabilise soil stockpiles with vegetation in order to reduce exposure to erosion and minimise the effects of slit loading of surface water running over exposed soil.
	Surface water Deterioration of a water resource	Regional	- Dispose of domestic and hazardous waste originating from temporary and permanent offices and workshops at an authorised landfill facility to minimise the risk of surface water pollution. - Dispose of hazardous waste and effluent at an authorised landfill facility.
	Ground water Contamination of ground water	Regional	- Check, service and maintain vehicles used during infrastructure construction to reduce the risk of hydrocarbon and chemical leakages and spillages. - Contain and remediate hydrocarbon or chemical leakages and spillages to prevent leaching into the ground water. - Develop an emergency spill response plan and train all construction contractors in the emergency spill response procedure.
	Fauna and flora Loss of natural vegetation and species of conservation nature	Local, regional and national	- Plan and construct strip areas carefully to minimise the impact on flora species. - Avoid the unnecessary removal of vegetation. - Set and enforce speed limits to prevent accidental injury or death to animals. - Restrict vehicles movement to road and demarcated areas to prevent damage to vegetation. - Prevent disposal of waste in non-designated areas and the reputable clearing and disposal of any such waste, as these can cause harm to animals, particularly poisonous waste and plastics.

	Noise Noise disturbance	Local	- Restrict operational activities to normal working hours. - Service vehicles and equipment on a regular basis to ensure noise suppression mechanisms are functioning. - Limit the speed of vehicles to 40km/h. - Train workers in safety and the use of personal protective equipment to prevent damage to their hearing.
SOCIO-ECONOMIC IMPACTS			
Construction, operational and decommissioning Control measures are to be applied during the implementation of respective activities	**Socio-Economic** negative impacts on employment and loitering of people in the area resulting in lack of security and safety	Local and regional	- Where possible local service providers and workers will be recruited during the construction phase. - Ad-hoc, informal recruitment at the gate or through other unapproved channels by setting up recruitment stands in built up areas will be prohibited. - A skills audit should also be undertaken to determine local skills available. - HIV/AIDS awareness programmes/ Voluntary Counselling & Testing Program will be introduced. - Relationships with local government through LED programmes should be developed. - Stakeholder database will be established to identify partners and develop collaborative networks. - Uncontrolled settlement of contractors outside of the site will be prevented. - The recruitment selection process to promote gender equality and the employment of women wherever possible.
	Interested and affected parties Lack of communication with stakeholders and loss of trust	Local and regional	- Implementation of EMP recommendations, involvement of communities in LED initiatives, ongoing communication to provide feedback and updates. - IAPs must be kept up to date on any changes to mining or of alternative routes. - 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.
	Heritage resources Destruction of heritage resources	Local	- In the event that any major features such as a burial or cache of ostrich eggshell flasks is uncovered during mining operation, an archaeologist should be called in to evaluate the finds. - In the event of an archaeological artefact being unearthed, an accredited archaeologist will inspect the site and make recommendations. - Promote archaeological awareness and investigate sustainable initiatives with communities to promote the local culture.
	Land use Loss of land use Proliferation of alien invasive species	Local	- Incorporate an alien invasive eradication and control programme into the rehabilitation efforts. This programme should be formulated according to relevant legislation. - All temporary infrastructures will be demolished during closure.
	Employment Loss of jobs and employment	Local and regional	- Opportunities for additional resources and redeployment, integration of employees and communities into sustainable LED projects, equip suppliers through mentoring and training. - Increased employment opportunities during decommissioning for local contractors. - Where short term employment opportunities exist during decommissioning, local contractors and jobs seekers will receive preference. - The workforce should undergo multiple skills training during the operation of the mine so that they can be productively absorbed into the local economy after mine closure. - Where retrenchments are unavoidable, they will be managed humanely according to legislative requirements.

			- The workforce should be empowered to develop skills that will equip them to obtain employment in other sectors of the economy. - The LED plan should be implemented to assist local business development. - Local partners should be supported to diversify economy and decrease dependence on mining. - A strategy for saving jobs and management of downscaling and/or retrenchment should be implemented. - Assistance should be given for help with redeployment of retrenches in other operations or assistance with alternative livelihood strategies. - Identify and implement training needs and training programmes for decommissioning and closure. - Consultation with communities and local government on future uses for the infrastructure and facilities should be implemented.

e) Impact Management Outcomes

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.**
Ablution facilities	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 spill on soil, which could infiltrate to groundwater.
Clean & Dirty water systems:	Surface disturbance Groundwater Contamination Soil contamination Surface water 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 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.	Safety ensured. Minimize potential for hydrocarbon spills to infiltrate into groundwater. Rehabilitation standards and closure objectives to be met.

				Linear infrastructure such as roads will be inspected at least monthly to check that the associated water management infrastructure is effective in controlling erosion. Maintain a buffer zone around the streams. Note that these buffer zones are essential to ensure healthy functioning and maintenance of drainage channels. 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	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 Noise Removal and disturbance of vegetation cover	Air quality Fauna Flora Groundwater Noise and vibration Soil Surface Water	Commissioning Operational Decommissioning Closure	Access control Dust control and monitoring Noise and vibration control and monitoring Continuous rehabilitation Storm water run-off control	Safety ensured. Dust levels minimized Minimize potential for hydrocarbon spills to infiltrate into groundwater Noise levels minimized

	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 Surface water contamination	Topography Safety		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. Maintain a buffer zone around the streams. Note that these buffer zones are essential to ensure healthy functioning and maintenance of drainage channels. 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.	Rehabilitation standards and closure objectives to be met. Erosion potential minimized.

				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.	

				Prevention of exotic vegetation encroachment;	
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	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.

				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.	
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	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	Dust levels minimized Minimize potential for hydrocarbon spills to infiltrate into groundwater Noise levels minimized Rehabilitation standards and closure objectives met. Erosion potential minimized.

	Soil contamination Surface disturbance			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; Develop a mechanism to record and respond to complaints. Linear infrastructure such as roads 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 and natural habitat of fauna Soil contamination	Groundwater Soil Surface water	Construction Commissioning Operational Decommissioning Closure	Concrete floor with oil/water separator Storm water run-off control Immediately clean hydrocarbon spills	Minimize potential for hydrocarbon spills to infiltrate into groundwater Noise levels minimized 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

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)
Ablution Facilities	Soil contamination Groundwater contamination	Maintenance of sewage facilities on a regular basis. Removal of infrastructure on closure	Removal of infrastructure upon closure of the Mining Permit.	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 BAR 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 rehabilitated concurrently as mining progresses. The re-vegetation of disturbed areas	Upon cessation of the individual activity (continuous rehabilitation) Levelling of storm water berms upon closure of Mining Permit	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

		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 will be inspected at least monthly to check that the associated water management infrastructure is effective in controlling erosion. Maintain a buffer zone around the streams. Note that these buffer zones are essential to ensure healthy functioning and maintenance of drainage channels. Minimizing – unavoidable impacts shall be minimized by taking appropriate and practicable measures such as transplanting important plant specimens, confining works in		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 BAR and EMPr documents.

		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	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 Permit.	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 BAR 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. Wind-blown dusts from unprotected tailings and waste rock dumps enter aquatic environment. Soil contamination Surface disturbance	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; Develop a mechanism to record and respond to complaints. Maintain a buffer zone around the streams. Note that these buffer zones are essential to ensure healthy functioning and maintenance of drainage channels.	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 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 BAR and EMPr documents.

	Surface water contamination	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 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. Prevention of exotic vegetation encroachment;		
Salvage yard (Storage and laydown area)	Surface Water contamination Groundwater contamination Removal and disturbance of vegetation cover and natural habitat of fauna	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 permit.	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

	Soil contamination Surface disturbance Surface water contamination			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 BAR 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 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;	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.

			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 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 permit.	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 BAR 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; Develop a mechanism to record and respond to complaints. Linear infrastructure such as roads will be inspected at least monthly to check that the associated water management infrastructure is effective in controlling erosion.	Upon cessation of the individual activity (continuous rehabilitation) Ripping of roads upon closure of the mining permit.	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 BAR 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 permit	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 BAR and EMPr documents.
Water tanks:	Surface disturbance	Maintain water tanks and structures	Removal of water tank and steel structure upon closure of the mining permit.	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 BAR 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 the Regulation.

REGULATION 51(a):
DESCRIPTION OF THE ENVIRONMENTAL OBJECTIVES AND SPECIFIC GOALS FOR MINE CLOSURE

Closure

The main closure objective of this mining operation 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.

Kamkuip Boerdery will ensure that the mining operation 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.

Kamkuip Boerdery 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.

Kamkuip Boerdery will subscribe to the optimal exploitation and utilization of South Africa's mineral resources (Aggregate).

Kamkuip Boerdery will ensure that the mining site is closed efficiently and cost effectively.

Kamkuip Boerdery will ensure that the operation is not abandoned but closed in accordance with the relevant requirements.

Kamkuip Boerdery will ensure that the interest of all interested and affected parties will be considered.

Kamkuip Boerdery 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 environment impacts on all applicable aspects uses BPEO (Best practical environmental option) principles.

- Optimal utilization and maintenance of existing 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 stockpiles, rest of terrain) in order to address all environmental impacts as far as practical.

Socio-Economic conditions

- Promote employment and advance the social and economic welfare of all South Africans.
- Contribute to the transformation of the mining industry.

Historical and Cultural aspects

There was a previous operation on the farm for a borrow. The application mining area has not been previously disturbed by previous mining activities.

(b) Confirm specifically that the environmental objectives in relation to closure have been consulted with landowner and interested and affected parties.

The consultation process with interested and affected parties (neighbouring farmers and land owners) was initiated. Regular

contact sessions will be held with neighbouring farmers and land owners which will be affected by the mining operations. Records will be kept of the complaints and mitigation measures will be implemented. An advert in the Gemsbok was also placed in order for other interested parties to come forward and register as interested parties in the project. This is an ongoing process.

(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.

Infrastructure Areas

On completion of the mining operation, the various surfaces, including the access road and the excavation site, should finally be rehabilitated as follows:

- All remaining material on the surface should be removed to the original topsoil level. This material should then be backfilled into the excavation area. Any compacted area should be ripped to a depth of 300 mm, where possible, the topsoil or growth medium returned and landscaped.
- All infrastructures and other items used during the operational period should be removed from the site.
- On completion of operations, all structures or objects on the site should 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: It is not foreseen that any monitoring of ground or surface water should take place after mine closure, except is so requested by the DWS – Kimberley.

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 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 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.

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

Long Term Impact on Ground Water: No after effect on the ground water 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 cleaning of all waste material and replacement of topsoil where available should be ensured.

(d) Explain why it can be confirmed that the rehabilitation plan is compatible with the closure objectives.

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:

Rehabilitation of excavation areas will be done concurrently as each excavation is completed. Access road rehabilitation is carried out when all mining are completed at the end of the mining activity. Rehabilitated sites will be monitored after backfilling and sloping has been completed to ensure vegetation growth re-occurs.

- Rubble will be disposed of at a suitable site. The site will be selected in consultation with DENC.

Maintenance

The necessary agreements and arrangement will be made by Kamkuip Boerdery 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 rehabilitated surfaces, surface water drainage, air quality, surface water quality, groundwater 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, this Environmental Management Programme will be continually assessed in terms of its appropriateness and adequacy. In order to achieve this, Kamkuip Boerdery will undertake the following:

- Implement the necessary monitoring programmes, as discussed as part of the EMPR.
- Conduct performance assessments of the EMPR as required by the MPRDA and associated Regulations.
- Compile and submit the afore-mentioed performance assessment reports to the DMRE. The frequence of the performance assessments will occur every year. An independent and competent person will undertake all performance assessments.

Decommissioning and closure objectives

The key aim 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 land owners 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 to a state that facilitates compliance with applicable environmental quality objectives.
- Limit the impact on staff whose positions become redundant at the time of closure.
- 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:

- Kamkuip Boerdery will undertake a carefully planned step-wise decommissioning process.
- Closure planning will form an integral part of mine planning.
- Strategies for sustainable development of surrounding towns 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.
- Kamkuip Boerdery 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 and the management of downscaling.

(e) Calculate and state the quantum of the financial provision required to manage and rehabilitate the environment in accordance with the applicable guideline.

The financial provision was calculated in accordance with Regulation 54 of the Minerals and Petroleum Resources Development Act, 2002 (Act 28 of 2002). The quantum was calculated taking into consideration what the outstanding rehabilitation will be in the event of sudden and/or premature closure, decommissioning and final closure of the operational and post closure management of residual

environmental impacts. on the assumption that the mining operation will do continuous concurrent rehabilitation throughout the project. The total extent of the outstanding rehabilitation in the event of sudden or premature closure was taken into consideration in determining the quantum.

No.	Description	Unit	A Quantity	B Master Rate	C Multiplication factor	D Weighting factor 1	E=A*B*C*D Amount (Rands)
1	Dismantling of processing plant and related structures (including overland conveyors and powerlines)	m3	0	18,42	1	1	-
2 (A)	Demolition of steel buildings and structures	m2	0	256,63	1	1	-
2(B)	Demolition of reinforced concrete buildings and structures	m2	0	378,15	1	1	-
3	Rehabilitation of access roads	m2	200,00	32,00	1	1	6 400,00
4 (A)	Demolition and rehabilitation of electrified railway lines	m	0	445,73	1	1	-
4 (A)	Demolition and rehabilitation of non-electrified railway lines	m	0	243,13	1	1	-
5	Demolition of housing and/or administration facilities	m2	0	513,26	1	1	-
6	Opencast rehabilitation including final voids and ramps	ha	0,5	261 224,38	0,04	1	5 224,49
7	Sealing of shafts adits and inclines	m3	0	137,77	1	1	-
8 (A)	Rehabilitation of overburden and spoils	ha	0,2	179 372,28	1	1	35 874,46
8 (B)	Rehabilitation of processing waste deposits and evaporation ponds (non-polluting potential)	ha	0,00	223 404,93	1	1	-
8 (C)	Rehabilitation of processing waste deposits and evaporation ponds (polluting potential)	ha	0	648 873,81	1	1	-
9	Rehabilitation of subsided areas	ha	0	150 197,24	1	1	-
10	General surface rehabilitation	ha	0,3	142 093,10	1	1	42 627,93
11	River diversions	ha	0	142 093,10	1	1	-
12	Fencing	m	0	162,08	1	1	-
13	Water management	ha	0	54 027,79	1	1	-
14	2 to 3 years of maintenance and aftercare	ha	0	18 909,73	1	1	-
15 (A)	Specialist study	Sum	0			1	-
15 (B)	Specialist study	Sum	0			1	-
					Sub Total 1		90 126,87
1	Preliminary and General			5 407,61	weighting factor 2 1		5 407,61
2	Contingencies				9 012,69		9 012,69
					Subtotal 2		104 547,17
					VAT (14%)		14 636,60
					Grand Total		119 183,78

(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* 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 if required.
Fauna	To minimise vegetation destruction in excavation, 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.
Noise	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.	Site Manager/Foreman appointed SHE Consultant.	Quarterly reports on fall-out noise monitoring will be conducted as required by legislation. If any complaints are received from the public or state department regarding noise levels the levels will be monitored at prescribed monitoring points.

Surface Water	To conserve water; and To eliminate the contamination of run-off and sources of surface water.	There are no sources in the vicinity of the mine.	Site Manager/Water Supply	No monitoring will be done to monitor the quality of the surface water.
Ground Water	To minimise and prevent as far as practically possible the contamination of ground water.	No ground water is used.	Site Manager/Water Supply	No monitoring will be done to monitor the levels and quality.

l) Indicate the frequency of the submission of the performance assessment/environmental audit report

Auditing of compliance with environmental authorisation, the environmental management programme and the closure plan should be conducted annually 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 DMR offices in Springbok.

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 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 Kamkuip 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 uses 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

Section 41 of the MPRDA and regulation 53 and 54 promulgated in terms of the MPRDA deal with financial provision for mine rehabilitation and closure.

The holder of a right/ permit as described in the relevant sections of the MPRDA and its regulations must provide the Department of Mineral Resources and Energy (DMRE) with sufficient financial provision. 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 mine at that time.

The holder of a prospecting right, mining right or mining permit is required to annually assess the total quantum of environmental liability for the mining operation and to ensure that financial provision are sufficient to cover the current liability (in the event of premature closure) as well as the end-of-mine liability.

It is hereby confirmed that the financial provision will 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) that the information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested and affected parties are correctly reflected herein.

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Signature of the EAP

Date: 22 August 2022

END