mineral resources

Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

ENVIRONMENTAL IMPACT ASSESSMENT REPORT

and

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

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

NAME OF APPLICANT:	**Renosterkop Mining Company (Pty) Ltd**
TEL NO:	**084 517 0421**
FAX NO:	**086 762 7142**
POSTAL ADDRESS:	**PO Box 110115** **Hadisonpark** **Kimberley** **8306**
PHYSICAL ADDRESS:	**Monridge Office Park** **Kimberley** **8301**
REFERENCE NUMBER:	**S-NC 30/5/2/1/1/0602 PR**
RENEWAL	**(NC) 30/5/2/1/1/10890 PR**
MINING RIGHT	**(NC) 30/5/1/2/2/10172 MR**

1. IMPORTANT NOTICE

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

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

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

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

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

2. OBJECTIVE OF THE ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

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

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

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

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

(d) determine the—

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

  (ii) degree to which these impacts—

    (aa) can be reserved;

    (bb) may cause irreplaceable loss of resources; and

    (cc) can be avoided, managed or mitigated.

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

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

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

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

PART A

SCOPE OF ASSESSMENT AND ENVIRONMENTAL IMPACT ASSESSMENT REPORT

3. Contact Person and Correspondence Address

a) Details of

i) Details of the EAP

Name of the Practitioner:	**ROELINA OOSTHUIZEN**
Tel No.:	**053 8320029**
Cell No.:	**084 208 9088**
Fax No.:	**086 510 7120**
E-mail address:	**roosthuizen950@gmail.com**

ii) Expertise of the EAP

(1) The qualifications of the EAP

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

(2) Summary of the EAP's past experience

(In carrying out the Environmental Impact Assessment Procedure)

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

b) Description of the property

<table>
<tr><td>Farm Name:</td><td>Lot 1288, Lot 1279 and Remainder Lot 1726 (Portion of Lot 1177) Kakamas South Settlement, Kenhardt
<table>
<tr><th>Farm</th><th>Owner</th><th>Extent</th><th>District</th><th>Title Deed</th></tr>
<tr><td>Remaining Extent of Lot 1726</td><td>Trans Hex Operations Pty Ltd Sold in 2012 to Burger du Plessis Familie Trust</td><td>464.3266 ha</td><td>Kenhardt</td><td>T34046/2012</td></tr>
<tr><td>Lot 1288</td><td>Trans Hex Operations Pty Ltd Sold in 2012 to Burger du Plessis Familie Trust</td><td>75.2269 ha</td><td>Kenhardt</td><td>T34046/2012</td></tr>
<tr><td>Lot 1279</td><td>Trans Hex Operations Pty Ltd Sold in 2012 to Burger du Plessis Familie Trust</td><td>0.5608 ha</td><td>Kenhardt</td><td>T34046/2012</td></tr>
</table></td></tr>
<tr><td>Application area (Ha)</td><td>540,1145 (Five hundred and forty comma one one four five) hectares</td></tr>
<tr><td>Magisterial district:</td><td>Kenhardt</td></tr>
<tr><td>Distance and direction from nearest town</td><td>Kakamas, about 25 kilometres from Renosterkop, is the principal regional town and is reached by a tarred road which runs along the southern boundary of the property. This road also gives rapid access to Keimoes and Upington which are further to the east along the valley of the Orange River, and Pofadder and Springbok to the west</td></tr>
<tr><td>21 digit Surveyor General Code for each farm portion</td><td>C03600060000172600000
C03600060000127900000
C03600060000128800000</td></tr>
</table>

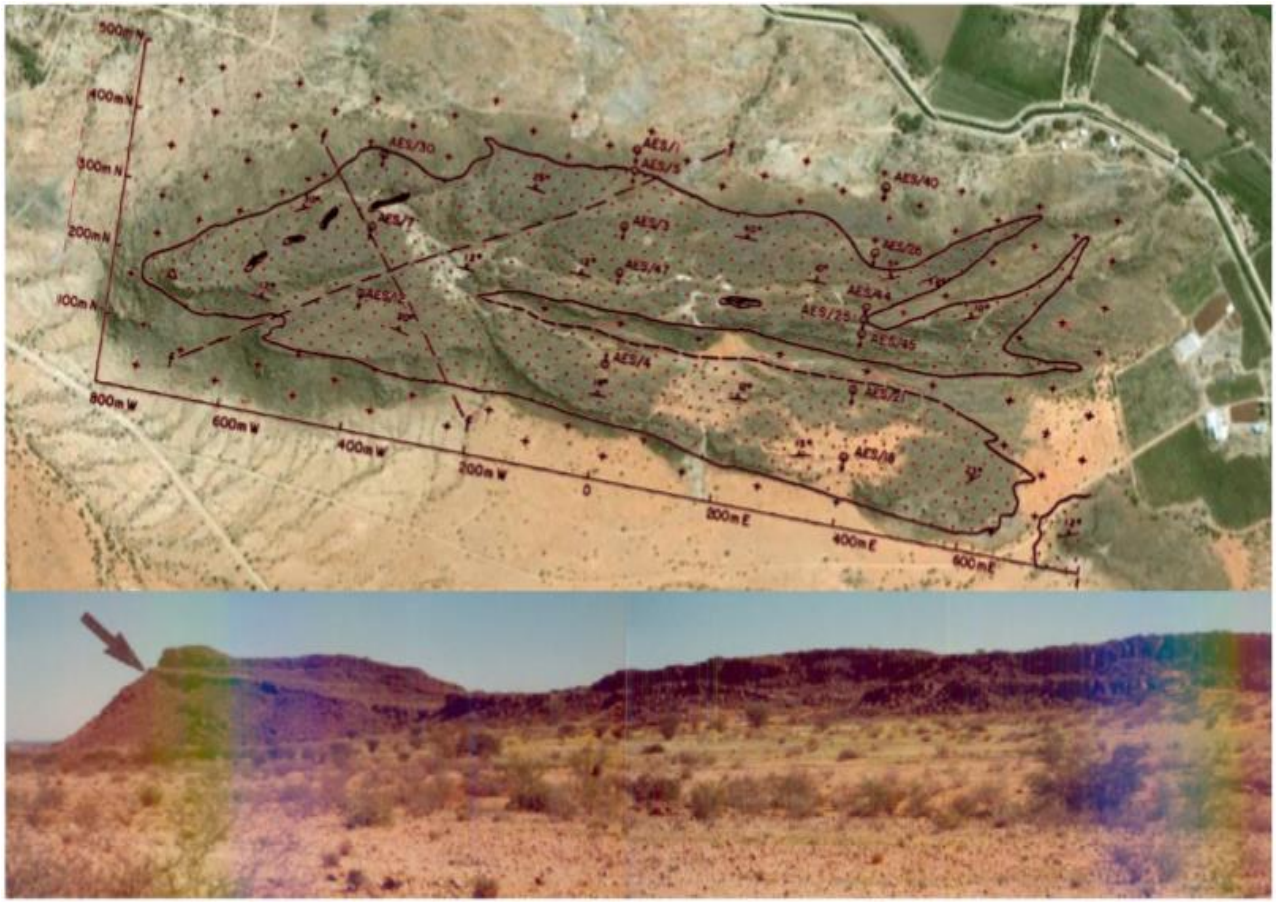


Figure 1. Looking north towards Renosterkop, the prominent topographic nature of the ridge as well as the sheeted nature of the topaz biotite quartz (TBQ), underlain by granite gneiss country rock, are displayed. The contact between the TBQ and the granite gneiss is indicated by an arrow.

c) Locality map

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

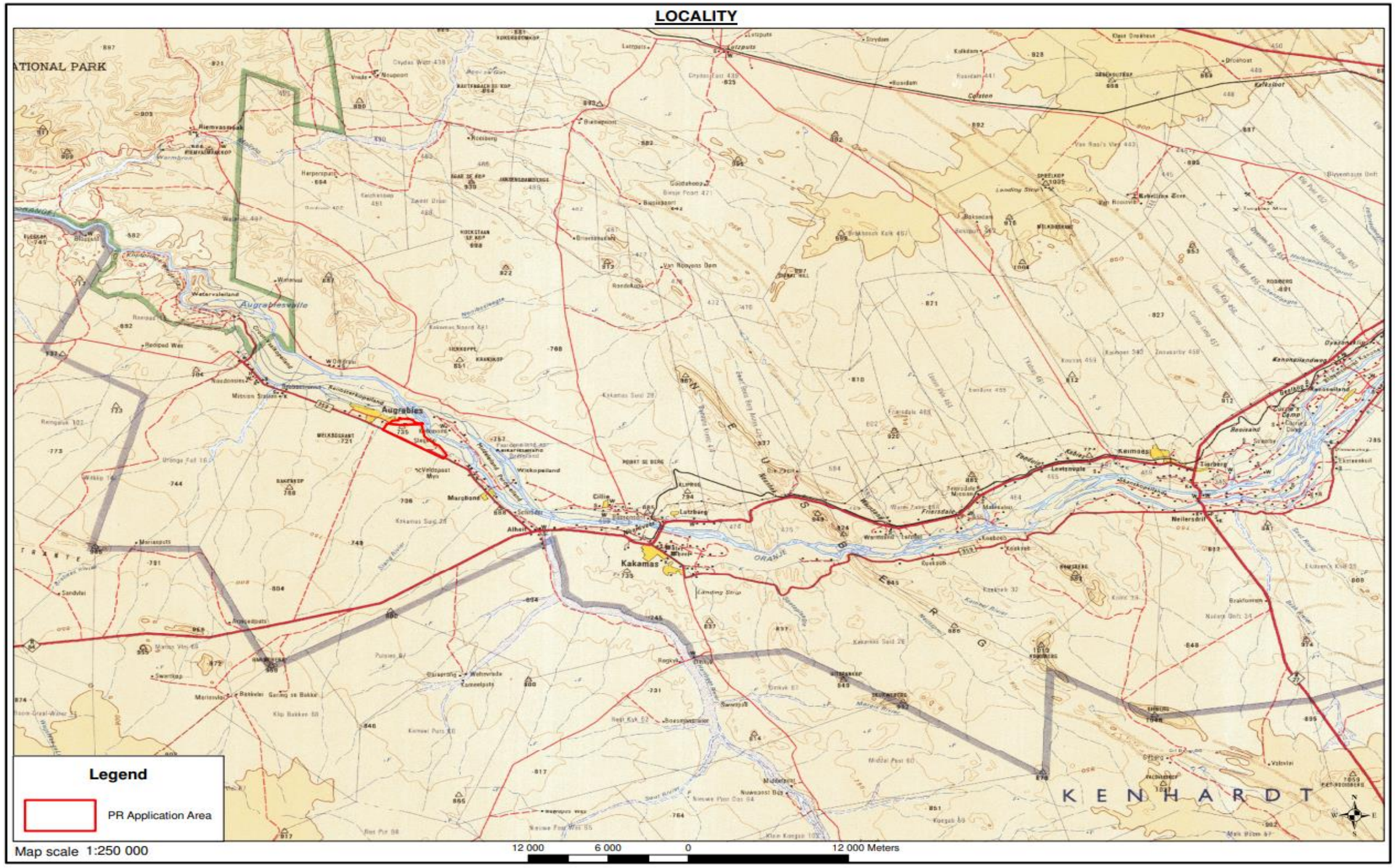


Figure 2. Locality Plan indicating the application area with a RED figure.

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)

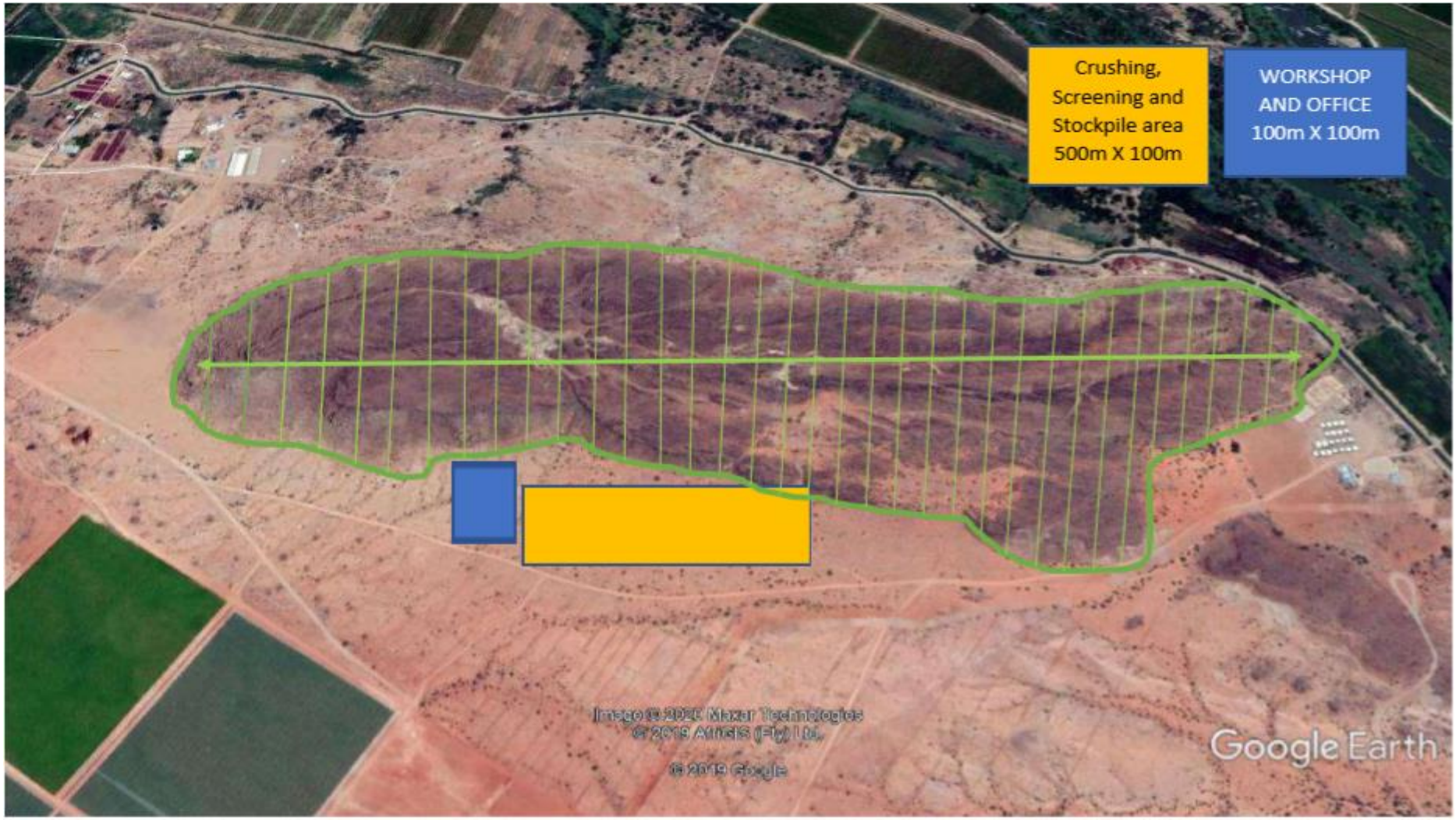


Figure 3. A map of the area indicating the overall location and extent of PROPOSED listed activities and main infrastructure on the mining site

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 17 LN 2 GNR 325 "Any activity including the operation of that activity which requires a mining right [section 22 of MPRDA], including infrastructure, structures and earthworks, directly related to the extraction of a mineral resource …"	**540 ha** Provision is made for a maximum footprint (at full production) of 150 000m² or 15 hectares of excavations of which no more than 3 ha at one time should be open.	X	Listing Notice 2 GNR 325 GNR 984	
Activity 9 LN 1 GNR 327 "The development of infrastructure exceeding 1000 metres in length for the bulk transportation of water or storm water- (i) With an internal diameter of 0,36 metres or more; or (ii) With a peak throughput of 120 litres per second or more; Excluding where- (a) Such infrastructure is for bulk transportation of water or storm water or storm water drainage inside a road reserve or railway line reserve; or (b) Where such development will occur within an urban area.	Water distribution Pipelines HDPE Pipes	X	Listing notice 1 GNR 327 GNR 983	
Activity 12 LN 1 GNR 327 "The development of— (i) canals exceeding 100 square metres in size; (ii) channels exceeding 100 square metres in size; (iii) bridges exceeding 100 square metres in size;	Clean & Dirty water system: Stormwater dam It is anticipated that the operation will establish stormwater control berms and	X	Listing notice 1 GNR 327 GNR 983	

(iv) **dams, where the dam, including infrastructure and water surface area, exceeds 100 square metres in size;** (v) weirs, where the weir, including infrastructure and water surface area, exceeds 100 square metres in size; (vi) bulk storm water outlet structures exceeding 100 square metres in size; (x) buildings exceeding 100 square metres in size; or (xii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs— (a) within a watercourse; (b) in front of a development setback; or **(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse"** Regulation GN R704, published on 4 June 1999 in terms of the National Water Act (Use of water for mining and related activities)	trenches to separate clean and dirty water on the mine site. 110m²			
Activity 24(ii) of LN 1 GNR 327 "The development of – (ii)a road with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 meters."	Roads (both access and haulage road on the mine site): Although it is recommended that the operation utilize existing roads as far as possible, it is anticipated that the mining operation will create an additional 4-5 km of roads, with a width of 20 meter. The width of the road is based on an operating width of the haul trucks of 5 meter. Best practice and the guideline from the DMR are to allow for 4 x Operating width of haul truck, in this case 20-meter-wide roads. The current access road next to the deposit is deemed adequate for a service road into the mine Additional mine haul road = 2000-meter x 20 meter wide = 40 000 (4 ha)	X	Listing Notice 1 GNR 327 GNR 983	

Activity 25 of LN 1 GNR 327: "The development and related operation of facilities or infrastructure for the treatment of effluent, wastewater or sewage with a daily throughput capacity of more than 2000 cubic metres but less than 15000 cubic metres."	2000m² or 0.2ha	X	Listing Notice 1 GNR 327 GNR 983	
Activity 15 LN 2 GNR 325: "The clearance of an area of 20 hectare or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for— (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan."	**Application 540 ha** **Blasting:** The mine will need two magazines to store the different explosive products namely • 200 case detonator ad accessories magazine (3 meter x 6 meter) • 200 case explosives magazine (3 meter x 6 meter) The magazine area will be fenced to comply with the guidelines set out by the Chief inspector of Explosives (CIE). The fence must be further than 10 meter away from the magazine. The CIE determines the safety radius necessary, but the typical approved radiuses have been • 90 meter for the inner radius • 180 for the outer radius No structures are allowed in the area contained by the inner radius and only structures approved by the CIE, for example a guard house, will be allowed in the area contained in by the outer radius. The construction of the magazines and the safety and security measures for the magazines and the magazine area are regulated by the Explosives Act. **Parking Bay:**	X	Listing Notice 2 GNR 325	

	It is anticipated that vegetation will be cleared in this area and superfine material will be used as groundcover. 50m x 50m = 2500m² 0,25ha Additional mine haul road = 500m x 20m (wide) = 10 000m2 **Product Stockpile area** Provision is made for a maximum footprint (at full production) of 5000m² or 0.5 hectare for the stockpile area at any one time. **Ore Stockpile dumps** 5000m² Run of Mine dumps **Subgrade stockpile area** Provision is made for a maximum footprint (at full production) of 1 hectare for this stockpile area at any one time. **Topsoil storage area (temporary) Topsoil dumps X3** Provision is made for a maximum footprint (at full production) of 5000 m³ or 0.5 hectare for this area at any one time. **The Waste Rock Dump** Provision is made for a maximum footprint (at full production) of 100 000 m² or 10 hectares for waste rock dumps at any one time.			
Activity 30 LN 1 GNR 327 "Any process or activity identified in terms of section 53(1) of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)."	540 ha application area The proposed mining site falls within critical biodiversity areas, as defined by the Northern Cape Critical Biodiversity Areas Map (Holness and Oosthuysen 2016)	X	Listing Notice 1 GNR 327 GNR 983	

Activity 56(ii) LN 1 GNR 327 "The widening of a road by more than 6 meters, or the lengthening of a road by more than 1 kilometer – (ii) where no reserve exists, where the existing road is wider than 8 meters…"	Roads (both access and haulage road on the mine site): Although it is recommended that the operation utilize existing roads as far as possible, it is anticipated that the mining operation will create an additional 7-8 km of roads, with a width of 20 meter. The width of the road is based on an operating width of the haul trucks of 5 meter. Best practice and the guideline from the DMR are to allow for 4 x Operating width of haul truck, in this case 20-meter-wide roads. The current access road next to the deposit is deemed adequate for a service road into the mine Additional mine haul road = 5000m x 20m (wide) = 100 000m2	X	Listing Notice 1 GNR 327 GNR 983	
Activity 27(iv) LN 2 GNR 325 "The development of — (iv) a road catering for more than one lane of traffic in both directions;"	Additional mine haul road = 5000m x 20m (wide) = 100 000m2	X	Listing Notice 2 GNR 325 GNR 984	
Activity 10 LN 3 GNR 324: "The development of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic meters."	**Fuel Storage facility** (Diesel tanks): It is anticipated that the operation will utilize 3 x 23 000 litre diesel tanks. These tanks must be placed in bund walls, with a capacity of 1.5 times the volume of the diesel tanks. A concrete floor must be established where the re-fuelling will take place. **Re-fuel and lube station** 2000m² Pipes, concrete, bricks and steel	X	Listing Notice 3 GNR 324 GNR 985	

NEMWA: Category B **GNR 632: Activity 11:** "The establishment or reclamation of a residue stockpile or residue deposit resulting from activities which require a mining right …"	**GNR 632: Activity 11: "The establishment or reclamation of a residue stockpile or residue deposit resulting from activities which require a mining right in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) "** **The waste rock dump will be rehabilitated by sloping it to an angle of 18 degrees and revegetate it by the end of life of mine. The mine will include the concurrent rehabilitation in future mine planning.** **Provision is made for a maximum footprint (at full production) of 50 000 m² or 5 hectares for waste rock dumps at any one time.**		NEMWA: Category B GNR 632: Activity 11:	X
OTHER ACTIVITIES (Associated infrastructure not considered to be listed activities) but included under listed activity 17 which states "Any activity including the operation of that activity which requires a mining right [section 22 of MPRDA], including infrastructure, structures and earthworks, directly related to the extraction of a mineral resource …" **Salvage Yard (storage and laydown area)** **Security Gate and guard house at access control point** **Storm water dam**	 2000m² or 0.2 ha No construction material, area to be levelled with a grader and fenced with a gate and access control. 2000m² or 0.2ha Concrete, bricks, steel and levelled parking area. 20m x 50m = 0.1 Ha		 NOT LISTED	

It is anticipated that the operation will construct a storm water dam. **Waste disposal site** (domestic and industrial waste): It is anticipated that the operation will establish a dedicated, fenced waste disposal site with a concrete floor and bund wall. The following types of waste will be disposed of in this area: • Small amounts of low-level hazardous waste in suitable receptacles. • Domestic waste. • Industrial waste. **Workshop and Wash Bay** **Water tanks:** It is anticipated that the operation will establish 2 x 10 000 litre water tanks with purifiers for potable water. **Weighbridge** **Weighbridge control room – Mobile container**	15m x 30m = 450m² 300m² Concrete and Steel 3m x 3m = 9m² each 3000m² Concrete platforms/ramps, steel 3m x 6m = 18m² (included on mine lay-out plan)			

ii) Description of the activities to be undertaken

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

Mining Method

Mining in the opencast sections will be carried out by Renosterkop Mining utilising their own plant and equipment. Mining operations make use of drill rigs to drill and then blast overburden and ore separately. Shovels and haul trucks will be used to haul the ore to a crushing and screening plant where it is crushed, screened, and sorted to size.

Renosterkop Mining will acquire a fleet of earthmoving equipment in the form of bulldozers, front-end loaders, dump trucks, excavator, graders, drilling rigs, and other ancillary machinery needed for the mining operation based on calculations.
Total material removed will amount to 1,000,000 million tonnes per annum.
Where relevant the mining will also be facilitated by considering contractors and rental equipment to reach targets.

Mining Procedures

The major land uses in the area are agriculture. The region is arable and classified as the Orange River Potential Agricultural Area, which is an area with High Agricultural Potential (B rating). This is due to the Good and Excellent irrigation suitability of the land. The grazing capacity is 36- 42 ha/LSU, with the grazing land being demarcated for sheep. Apart from the proposed mining activities, Renosterkop is currently utilised for extensive irrigation of export crops. Existing landuse features include farm tracks and other supporting infrastructure, with associated surface disturbances. A canal traverses the northern boundary of the site and there is a communal soccer field in the far south-eastern corner and the workers houses. An old field is present in the north-east and disturbances associated with historic mining occur on the hills. The property will be leased by Renosterkop Mining Company (Pty) Ltd from the owner if an agreement can be reached, subject to the approval and granting of a mining right by the Department of Mineral Resources and Energy to Renosterkop Mining Company (Pty) Ltd.

The Renosterkop deposit will be mined, crushed and screened but **will not be beneficiated on the site**. The sold product will be the crushed and screened material that will be beneficiated by the buyers. The beneficiation process is included for completeness.

The beneficiation plant consists of crushing, screening and milling followed by gravity separation for Sn and W recovery and froth flotation for Zn recovery. Final concentrates are filtered for maximum moisture removal prior to packaging for shipment. Tailings are dewatered prior to stacking.

Construction and implementation phases

The construction of the mine will occur in phases. The first phase will commence at least within a year after the Mining Right had been issued (when the mining right had been issued) with first production coming from small scale mining and mobile plant equipment.

The construction of the next phases will be also commence within a year after the Mining Right had been issued, with the completion of the project envisaged for after a year when commissioning of the new facilities will commence after the technical sign-off.

Phase 1: First six months Mobile Plant
Phase 2: Construction Phase second year
Phase 3: Technical sign-off and commissioning next six months
Phase 4: Full Production

The production build-up will be in phases, with the first phase producing an annual 45 000 tons in 2022, 50 000 tons in 2023 and from 2024 full capacity of 90 000 tonnes per month.

The Renosterkop deposit will be mined and crushed and screened but will not be beneficiated on the site. The sold product will be the crushed and screened material that will be beneficiated by the buyers. The beneficiation process is included for completeness.

The beneficiation plant consists of crushing, screening and milling followed by gravity separation for Sn and W recovery and froth flotation for Zn recovery. Final concentrates are filtered for maximum moisture removal prior to packaging for shipment. Tailings are dewatered prior to stacking.

The crushing plant is designed for a processing capacity of 200 tons per hour or 150,000 tons per month.

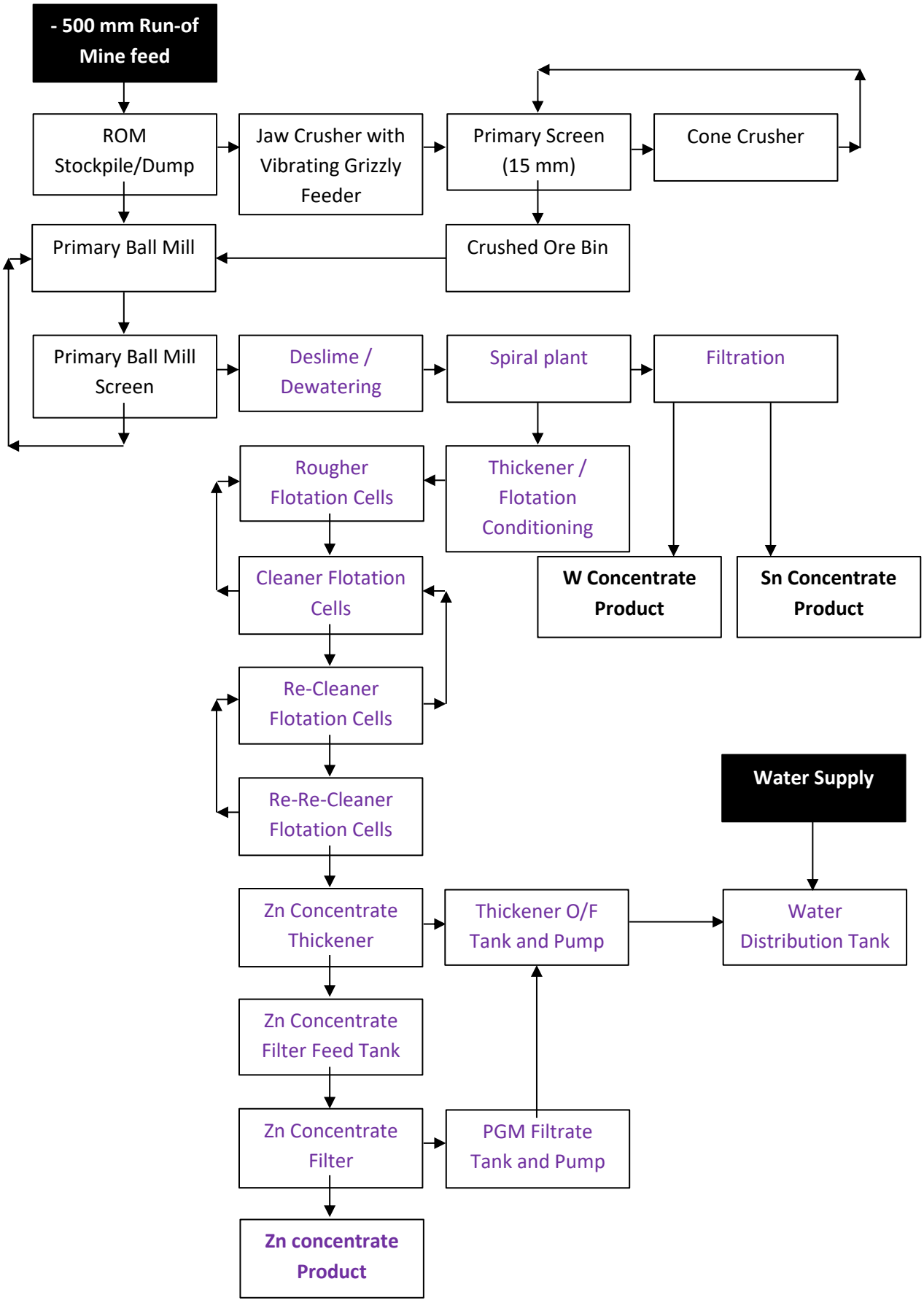


Figure 4. Basic Plant design purple blocks will not be done on site but by the buyer

e) Policy and Legislative Context

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

Hazardous Substances Act (Act 15 of 1973) and Regulations read together with NEMA and NEMWA	- Definition, classification, use, operation, modification, disposal or dumping of hazardous substances.	- Noted and Considered measures are to be implemented upon the approval of the EMPR.
Intergovernmental Relations Act (Act 13 of 2005)	- This Act establishes a framework for the National, Provincial and Local Governments to promote and facilitate intergovernmental relations.	
Mine, Health and Safety Act (Act 29 of 1996) and Regulations	- Entire Act.	- Control measures are to be implemented upon the approval of the EMPR.
Mineral and Petroleum Resources Development Act (Act 28 of 2002) and Regulations as amended	- Entire Act. - Regulations GN R527	- A Mining Right has been applied for (NC) 30/5/1/2/2/10172 MR. - Rights and obligations to be adhered to.
National Environmental Management Act (Act 107 of 1998) and Regulations as amended	- Section 2: Strategic environmental management principles, goals and objectives. - Section 24: Foundation for Environmental Management frameworks. - Section 24N: - Section 24O: - Section 28: The developer has a general duty to care for the environment and to institute such measures to demonstrate such care. - Regulations GN R547, more specifically Chapters 5 and 7, where applicable (the remainder was repealed) published on 18 June 2010 in terms of NEMA (Environmental Management Framework Regulations) - Regulations GN R982 to R985, published on 4 December 2014 in terms of NEMA (Listed Activities) - Regulations GN R993, published on 8 December 2014 in terms of NEMA (Appeal)	- Control measures are to be implemented upon the approval of the EMPR.

	- 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) - Regulations GN R1147, published on 20 November 2015 in terms of NEMA (Financial Provision)	
National Environmental Management: Air Quality Act (Act 39 of 2004)	- Section 32: Control of dust - Section 34: Control of noise - Section 35: Control of offensive odours - Regulation GN R551, published on 12 June 2015 (amended Categories 1 to 5 of GN 983) in terms of NEM: AQA (Atmospheric emission which have a significant detrimental effect on the environment) - Regulation GN R283, published on 2 April 2015 in terms of NEM: AQA (National Atmospheric Emissions Reporting Regulations) (Group C-Mines)	- Control measures are to be implemented upon the approval of the EMPR. - This is also legislated by Mine Health and Safety from DMR and is to be adhered to.
National Environmental Management: Biodiversity Act (Act 10 of 2004)	- Section 52 of The National Environmental Management Act: Biodiversity Act (NEMBA) (Act 10 of 2004) states that the MEC/Minister is to list ecosystems that are threatened and in need of protection. - Section 53 states that the Minister may identify any process or activity in such a listed ecosystem as a threatening process. - A list of threatened and protected species has been published in terms of Section 56(1) GG	- The most profound impacts expected to be related to the proposed mining operation include cumulative loss of intact habitat on landscape level, as well as loss and disturbances to specialised flora and fauna species, especially those restricted to the hills. Permit applications need to be lodged

	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 * 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 of 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)	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 and license application to remove any of the protected tree species need to be lodged with the Department of Forestry and Fisheries.
The National Environmental Management Act: Protected Areas Act (NEMPAA) (Act 57	- Chapter 2 lists all protected areas.	- The proposed mining site falls within critical biodiversity areas, as defined

of 2003) provides for the protection of ecologically viable areas that are representative of South Africa's natural biodiversity and its landscapes and seascapes.		by the Northern Cape Critical Biodiversity Areas Map (Holness and Oosthuysen 2016). This map identifies biodiversity priority areas, called Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs), which, together with protected areas, are important for the persistence of a viable representative sample of all ecosystem types and species as well as the long-term ecological functioning of the landscape. The entire site is classified as Critical Biodiversity Area Two. The Orange River, that borders the study area to the north, is classified as Critical Biodiversity Area One, while the Augrabies National Park (Protected Area) lies 8km north-west of the study area. - Similarly, the Mining and Biodiversity Guidelines (DENC et al. 2013) recognises the site to be of High- and Moderate Biodiversity Importance, which constitute a high and moderate risk for mining. These guidelines were developed to identify and categorize biodiversity priority areas sensitive to the impacts of mining to support mainstreaming of biodiversity issues

		in decision making in the mining sector. - Furthermore, according to the National Web based Environmental Screening Tool the study area is considered to have sensitive environmental features. This tool is a geographically based web-enabled application which allows a proponent intending to apply for environmental authorisation in terms of the Environmental Impact Assessment (EIA) Regulations 2014 (as amended), to screen their proposed site for any environmental sensitivity. - According to this, the Renosterkop study area is of very high sensitivity in terms of the animal species theme, which is based on the suitable habitat and known distribution of the birds Falco biarmicus (Lanner falcon) and Neotis ludwigii (Ludwig's bustard). The Terrestrial Biodiversity Theme is also of very high sensitivity, as a direct function of the Northern Cape Critical Biodiversity Areas Map (discussed above). Renosterkop is of medium sensitivity based on the Plant Species Theme. This sensitivity is attributed to the red listed Aloidendron dichotomum,

		(Vulnerable) that is known from the region. It however does not occur on site. The site is of low sensitivity based on the Aquatic Biodiversity Theme.
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) - 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)	- To be implemented upon the approval of the EMPR.
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,	- The most profound impacts expected to be related to the proposed mining operation include cumulative loss of intact habitat on landscape level, as well as loss and disturbances to specialised flora and

	except under a licence granted by the Minister.	fauna species, especially those restricted to the hills. 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 and license application to remove any of the protected tree species need to be lodged with the Department of Forestry and Fisheries. 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 situated outside	- Control measures are to be implemented upon the approval of the EMPR. Fossil finds procedure are attached to the PIA.

	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;	- A water use application must be submitted and will be submitted as soon as the EIA EMP had been finalized. - Control measures are to be implemented upon the approval of the EMPR.

	- Regulation GN R704, published on 4 June 1999 in terms of the National Water Act (Use of water for mining and related activities) - Regulation GN R1352, published on 12 November 1999 in terms of the National Water Act (Water use to be registered) - Regulation GN R139, published on 24 February 2012 in terms of the National Water Act (Safety of Dams) - Regulation GN R398, published on 26 March 2004 in terms of the National Water Act (Section 21 (j)) - Regulation GN R399, published on 26 March 2004 in terms of the National Water Act (Section 21 (a) and (b)) - Regulation GN R1198, published on 18 December 2009 in terms of the National Water Act (Section 21 (c) and (i) – rehabilitation of wetlands) - Regulations GN R1199, published on 18 December 2009 in terms of the National Water Act (Section 21 (c) and (i)) - Regulations GN R665, published on 6 September 2013 in terms of the National Water Act (Amended GN 398 and 399 – Section 21 (e), (f), (h), (g), (j))	
Nature Conservation Ordinance (Ord 19 of 1974)	- Chapters 2, 3, 4 and 6: Nature reserves, miscellaneous conservation measures, protection of wild animals other than fish, protection of Flora.	- Control measures are to be implemented upon the approval of the EMPR.
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.
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 (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

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 Renosterkop Project is in line with the 'Beneficiation Strategy for the Minerals Industry of South Africa' (DMR, 2011) in terms of aiming to beneficiate tin, tungsten and zinc in concentrate to produce high quality tin, tungsten and zinc ingots for sale/export. The benefits of this will fall directly to the Northern Cape Province and, specifically, the Namakwa District.

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

Need

China is now the largest consumer of tin due to rapid growth in electronics manufacturing – it accounts for 35% of the global market. Global tin demand is 365,000 tonnes or $9 billion dollars at a long-term price of US$25,000 per tonne. Primary tin production at 290,000 tonnes has failed to meet demand for several years with growth in secondary supply to 75,000 tonnes required to bridge the gap. China and Indonesia are the largest primary producers of tin accounting for 67% of global production. Both countries are likely to face declining supply due to falling grade and rising costs. Other established producers in South America and Africa face similar issues.

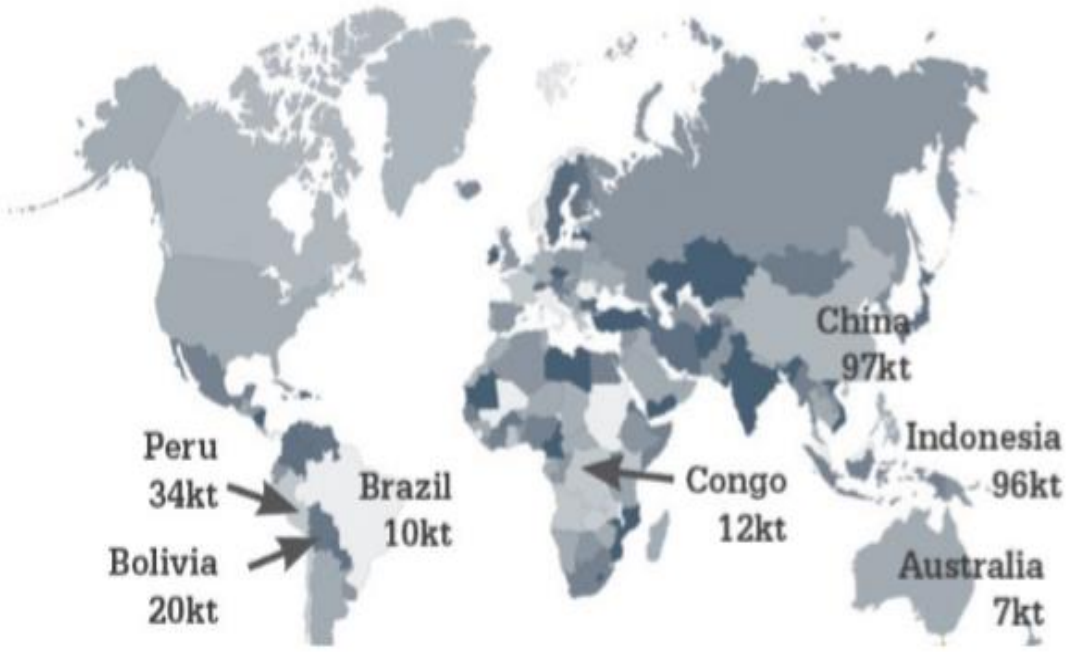


Fig 6. Global tin production.

Declining stocks suggest that secondary may not grow fast enough to meet demand growth and cover the loss of primary supply. New production from the Heemskirk Tin Project and other proposed tin developments is required to help bridge the supply-demand gap in the future. Rising London Metal Exchange tin prices reflect the need for new sources of supply.

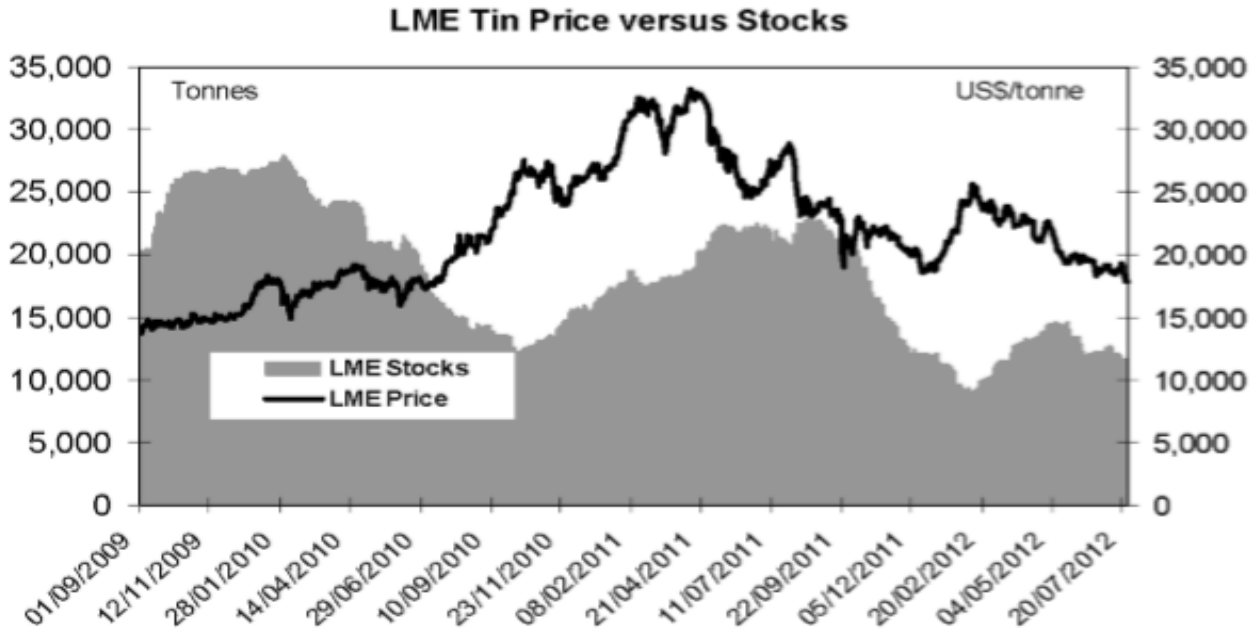


Fig 7. London metal exchange tin price versus stocks.

The principal tin mineral is cassiterite, or tinstone (SnO_2), a naturally occurring oxide of tin containing about 78.8 percent tin. Of less importance are two complex sulfide minerals, stannite (Cu_2FeSnS_4), a copper-iron-tin sulfide, and cylindrite ($PbSn_4FeSb_2S_{14}$), a lead-tin-iron-antimony sulfide. These two minerals occur chiefly in lode deposits in Bolivia, often in association with other metals such as silver.

Unlike most base metals, economically viable deposits of cassiterite are restricted to a few geographic areas. The most important of these is in Southeast Asia and includes the tin-mining areas of China—which accounted for nearly half of all tin production in the early 21st century. Myanmar (Burma), Thailand, Malaysia, Indonesia, Brazil, Australia, Nigeria, and Congo (Kinshasa) are other major tin contributors. Minor producers are Peru, South Africa, the United Kingdom, and Zimbabwe. There is no significant tin deposit in the United States and only relatively small production in Canada.

About 80 percent of the world's tin comes from alluvial or secondary deposits. Most of these occur on land, but in certain areas, notably in Indonesia and Thailand, the deposits are mined offshore by dredging the seabed.

Even in the richest tin fields, the concentration of tin is very low. This means that up to seven or eight tons of ore may have to be mined in order to recover one kilogram of cassiterite.

Desirability:

No	Description	Yes/No

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

- Benefits:

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

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

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

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

(a) Mining Method

The location of the mine is determined by the geological location of the mineral resource. Mineralization at Renosterkop was discovered and investigated by Rio Tinto during the period 1982 to 1989. Exploration carried out on the property during this period included geological mapping, geochemical surveys, diamond drilling, mineralogical studies and bulk sampling. Diamond drilling consisted of 3137,12 metres drilled on 55 boreholes located on a 100-metre grid. Boreholes were inclined 45˚ south and sampled at 2 metre intervals. (taken out of the geological report by Robert Cooke, October 2005).

Metallurgical test work was conducted by Mintek on a 127-ton bulk sample. The material was produced from five sampling pits excavated at locations selected to obtain a representative sample of the fresh mineralized rock. This work indicated a tin recovery of 71%, zinc at 62% and tungsten at 85%.

Trans Hex acquired the property in 1990 and conducted further metallurgical test work on a representative sample of the mineralized rock. This work showed a tin recovery of

78% and a zinc recovery of 67%. (Taken out of the geological report by Robert Cooke, October 2005).

- 55 core drill holes totalling 3 137 m on a 100 m grid
- Bulk sampling of 127 tonnes from 5 pits and metallurgical testing by Mintek
- Resource: 25 531 212 tonnes with 0.134% Sn, 0.619% Zn and 0.035% WO3 and traces of Ag, Au and Cu
- Additional lower grade resource of 4.2 million tonnes
- Rio Tinto achieved the following recoveries: Sn= 72%; Zn = 63% and WO3 = 85%
- Transhex achieved the following recoveries: Sn= 78%; Zn = 67% and WO3 = not satisfactory

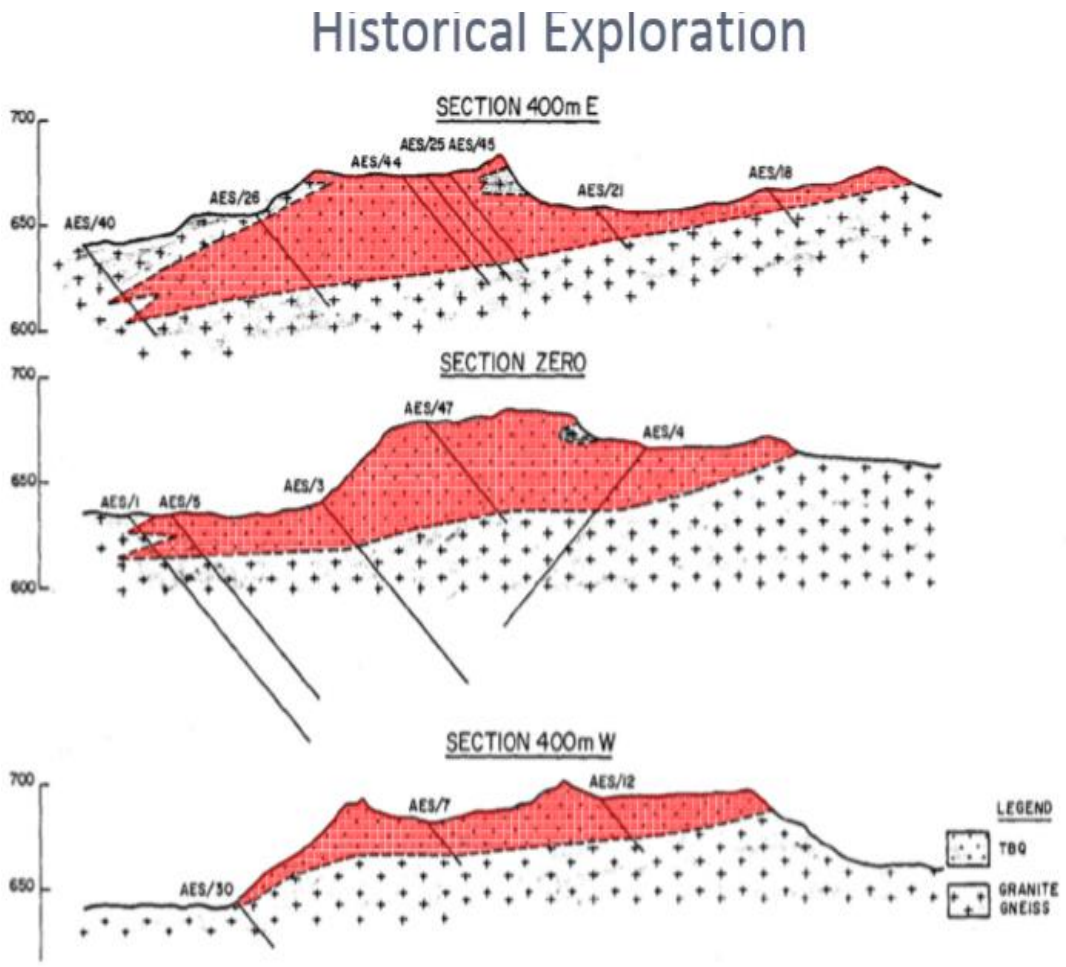


Figure 5. Historical Exploration.

(b) Labour Force

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

(c) Rehabilitation

Making financial provision for the implementation of a rehabilitation strategy as is required by Section 41 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) amended by Government Gazette NO. R. 1147 20 NOVEMBER 2015

NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 (ACT NO. 107 OF 1998) REGULATIONS PERTAINING TO THE FINANCIAL PROVISION FOR PROSPECTING, EXPLORATION, MINING OR PRODUCTION OPERATIONS.

(d) Environmental Monitoring

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

(e) General

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

i) Details of the development footprint alternatives considered

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

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

(a) The property on which or location where it is proposed to undertake the activity:

Lot 1288, Lot 1279 and Remainder Lot 1726 (Portion of Lot 1177) Kakamas South Settlement, Kenhardt

The property on which the Mining right was applied for is determined by the geological location of the mineral resource. 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 area is accessible via tar and gravel roads from different directions. Kakamas, about 25 kilometres from Renosterkop, is the principal regional town and is reached by a tarred road which runs along the southern boundary of the property. This road also gives rapid access to Keimoes and Upington which are further to the east along the valley of the Orange River, and Pofadder and Springbok to the west.

Infrastructure in the Kakamas and Upington area is well developed with good road and rail networks, electricity grid and water. Experienced labour is available in the area as is an extensive network of secondary industries geared towards small and large-scale mining.

Alternatives considered: -

As the area covered under the Mining Right had been selected based on the assumption of the geological location of the mineral resource, it will not be viable to consider an alternative site for the mine. Alternatives for land are thus not available, as the mining right application cannot be considered over another area.
Therefore, there are no alternatives to the area.

(b) The type of activity to be undertaken:

There is no viable mining project alternative since Renosterkop Mining are considering the only technically and economically viable mine design (open-cast) to extract the Mineralized rock.

Alternatives considered: -

The following design alternatives are amongst those which will be considered by Renosterkop Mining and their appointed consulting engineers:

- Alternative box cut (secure and safe portals/accesses to the open-cast mine) positions and direction of mining for opencast mining operations;
- alternative location of box cut soil and spoil stockpiles for opencast mining operations;

(c) The design or layout of the activity:

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

The following infrastructure will be established and will be associated with the mining operation outside the 1:100-year flood line zone with permission of the relevant competent authority and the surface owners:

- **Open Cast Mine**
  The mining process will be initiated by drilling of blast holes. These holes will then be blasted where after the ore will be loaded from Renosterkop and hauled to the crushing and screening plant. Provision is made for a maximum footprint (at full production) of 150000m² or 15 hectares of open cast mining at any one time.

- **Crushing and Screening plant:**
  The crushing of ore will be a dry process, with the option to convert to a 'wet' process after full production has been reached. `10 000m²

- **Product Stockpile area**. Provision is made for a maximum footprint (at full production) of 5 000 m² or 0.5 hectares for the stockpile area at any one time.

- **Ore Stockpile dumps** 5 000m² Run of Mine dumps

- **Subgrade stockpile area**: Provision is made for a maximum footprint (at full production) of 1 hectare for this stockpile area at any one time.

- **The waste rock dump** will be rehabilitated by sloping it to an angle of 18 degrees and revegetate it by the end of life of mine. The mine will include the concurrent rehabilitation in future mine planning. Provision is made for a maximum footprint (at full production) of 50 000 m^2 or 5 hectares for waste rock dumps at any one time.

- **Topsoil storage area** (temporary) Topsoil dumps X3. Provision is made for a maximum footprint (at full production) of 5000 m^3 or 0.5 hectares for this area at any one time.

- **Office** 2000m^2 Bricks, concrete, doors, windows or pre-fabricated office blocks on concrete

- **Parking Bay:**
  It is anticipated that vegetation will be cleared in this area and superfine material will be used as groundcover. 50m x 50m = 0.25ha

- **Sewage facilities**. 2000m^2 or 0.2ha

- **Clean & Dirty water system: Berms**
  It is anticipated that the operation will establish stormwater control berms and trenches to separate clean and dirty water on the mine site. The size and length of the berms, trenches and stormwater dam will be directly affected by the topography of the area and the locality of the infrastructure.

  Stormwater dam
  It is anticipated that the operation will construct a stormwater dam. 20m x 50m = 0.1 Ha

- **Generator: ((2X 2000 KW)**
  The mine infrastructure plan made provision for a brick building that will house the generators for power generation on site. Electricity will be distributed on site per overhead powerlines. 10m x 20m = 200m^2
  Generator, Electric wires/powerlines, building of concrete, bricks and steel

- **Fuel Storage facility (Concrete Bund walls and Diesel tanks):**
  It is anticipated that the operation will utilize 3 x 23 000 litre diesel tanks. These tanks must be placed in bund walls, with a capacity of 1.5 times the volume of the diesel tanks. A concrete floor must be established where the re-fuelling will take place.

- **Roads (both access and haulage road on the mine site):**
  Although it is recommended that the operation utilize existing roads as far as possible, it is anticipated that the mining operation will create an additional 7-8 km of roads, with a width of 20 meter. The width of the road is based on an operating width of the haul trucks of 5 meter. Best practice and the guideline from the DMR are to allow for 4 x Operating width of haul truck, in this case 20-meter-wide roads. The current access road next to the deposit is deemed adequate for a service road into the mine. Additional mine haul road = 2000-meter x 20-meter wide = 40 000m2

- Salvage yard (Storage and laydown area).

- Security Gate and guard house at access control point 2000m² or 0.2ha Concrete, bricks, steel and levelled parking area.

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

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

- Workshop and Wash bay 2500m² with Concrete and Steel.

- Water distribution Pipeline HDPE Pipes.

- Water tanks :
  It is anticipated that the operation will establish 2 x 10 000 litre water tanks with purifiers for potable water. 3m x 3m = 9m² each

- Weighbridge 2500m² Concrete platforms/ramps, steel Weighbridge control room – Mobile container 3m x 6m = 18m²

- Blasting:
  The mine will blast blocks to lubricate the ore. The size of the blasts will be determined by the practical blast block design and the production rate required from the mine.

  Explosive Magazine:
  The mine will need two magazines to store the different explosive products namely
  • 200 case detonator ad accessories magazine (3 meter x 6 meter)
  • 200 case explosives magazine (3 meter x 6 meter)

  The magazine area will be fenced to comply with the guidelines set out by the Chief inspector of Explosives (CIE). The fence must be further than 10 meter away from the magazine. The CIE determines the safety radius necessary, but the typical approved radiuses have been:
  • 90 meter for the inner radius
  • 180 for the outer radius

  No structures are allowed in the area contained by the inner radius and only structures approved by the CIE, for example a guard house, will be allowed in the area contained in by the outer radius.

  The construction of the magazines and the safety and security measures for the magazines and the magazine area are regulated by the Explosives Act.
  50m x 40m = 2000m²
  Inner radius area = 3.14 x (radius squared) = 25 434 m²
  Outer radius area = 3.14 x (radius squared) = 101 736 m² (10.1736ha)

Alternatives considered:-

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

In terms of water use alternatives; the operation is located next to the Orange River and the Mining area is near the river. Plastic pipelines are considered to be the best long-term option for transferring water, due to their temporary nature which causes minimum environmental disturbances.

Therefore, a pipeline route will be designed based on the principle of minimum impacts to the environment.

In terms of power generation, the options available was for Generators or ESKOM power. All of the electricity needs for the operations will be generated by a diesel generator and there would therefore be no additional pressure on the Eskom Electricity Grid.

In terms of sewage the decision was made to use permanent ablution facilities for the life of mine and not chemical toilets which can be serviced regularly by the service provider.

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

- Technique

  Mining in the opencast sections will be carried out by Renosterkop Mining utilising their own plant and equipment. Mining operations make use of drill rigs to drill and then blast overburden and ore separately. Shovels and haul trucks will be used to haul the ore to a crushing and screening plant where it is crushed, screened, and sorted to size.

  Renosterkop Mining will acquire a fleet of earthmoving equipment in the form of bulldozers, front-end loaders, dump trucks, excavator, graders, drilling rigs, and other ancillary machinery needed for the mining operation based on calculations.
  Total material removed will amount to 1,000,000 million tonnes per annum.
  Where relevant the mining will also be facilitated by considering contractors and rental equipment to reach targets.

- Technology

  The Renosterkop deposit will be mined and crushed and screened but will not be beneficiated on the site. The sold product will be the crushed and screened material that will be beneficiated by the buyers. The beneficiation process is included for completeness.

The beneficiation plant consists of crushing, screening and milling followed by gravity separation for Sn and W recovery and froth flotation for Zn recovery. Final concentrates are filtered for maximum moisture removal prior to packaging for shipment. Tailings are dewatered prior to stacking.

The plant is designed for a crushing capacity of 200 tons per hour or 150,000 tons per month.

Alternatives considered: -

The planned mining activities include (opencast method). The operation is also associated with crushing techniques that make use of modern technologies. These are the most economic viable method currently being used by the tin, tungsten and zinc fraternity. There is no other feasible, alternative mining method for the mining and extraction of tin, tungsten and zinc.

(e) The operational aspects of the activity:

Mining operations make use of drill rigs to drill and then blast overburden and ore separately. Shovels and haul trucks will be used to haul the ore to a crushing and screening plant where it is crushed, screened, and sorted to size.

The Renosterkop deposit will be mined and crushed and screened but will not be beneficiated on the site. The sold product will be the crushed and screened material that will be beneficiated by the buyers.

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

Alternatives considered: -

The conventional opencast drill-load-haul-mining method has been proven to be the most economic viable method currently being used by the tin, tungsten and zinc fraternity. There is no other feasible, alternative mining method for the mining and extraction of tin, tungsten and zinc.

(f) The option of not implementing the activity:

Potential land use includes that of vineyard/grapevine farming. The majority of the area is classified to have moderate potential for annual crop cultivation and planted pastures rotation (Taken from Screening Report).

The major land uses in the area are agriculture. The region is arable and classified as the Orange River Potential Agricultural Area, which is an area with High Agricultural Potential (B rating). This is due to the Good and Excellent irrigation suitability of the land. The grazing capacity is 36 - 42 ha/LSU, with the grazing land being demarcated for sheep.

Apart from the proposed mining activities, Renosterkop is currently utilised for **extensive irrigation of export crops** (Figure 6). Existing landuse features include farm tracks and other supporting infrastructure, with associated surface disturbances. A canal traverses the northern boundary of the site and there is a

communal soccer field in the far south-eastern corner. An old field is present in the north-east and disturbances associated with historic mining occur on the hills.

Figure 6. Extensive irrigation of export crops on Renosterkop.

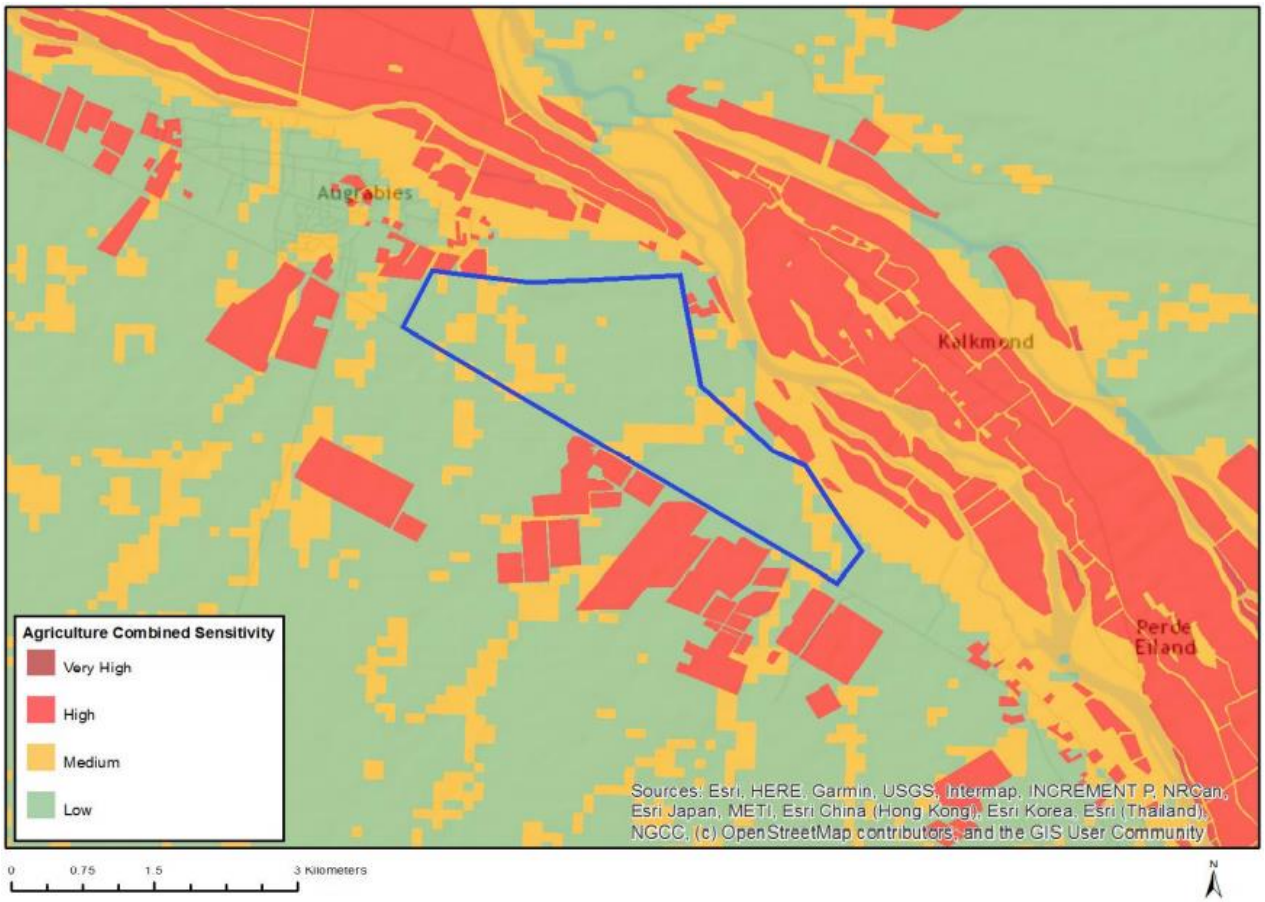


Figure 7. Agricultural Theme (Map taken out of the Screening Report)

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	Annual Crop Cultivation / Planted Pastures Rotation;Land capability;06. Low-Moderate/07. Low-Moderate/08. Moderate
High	Annual Crop Cultivation / Planted Pastures Rotation;Land capability;01. Very low/02. Very low/03. Low-Very low/04. Low-Very low/05. Low
Low	Land capability;01. Very low/02. Very low/03. Low-Very low/04. Low-Very low/05. Low
Medium	Land capability;06. Low-Moderate/07. Low-Moderate/08. Moderate

Socio-Economy

The operation will make provision for 18 job opportunities. This will be lost if the project does not proceed. Substantial tax benefits to the State and Local Government will also be lost.

Biodiversity

- The proposed mining site falls within critical biodiversity areas, as defined by the Northern Cape Critical Biodiversity Areas Map (Holness and Oosthuysen 2016). This map identifies biodiversity priority areas, called Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs), which, together with protected areas, are important for the persistence of a viable representative sample of all ecosystem

types and species as well as the long-term ecological functioning of the landscape. The entire site is classified as Critical Biodiversity Area Two. The Orange River, that borders the study area to the north, is classified as Critical Biodiversity Area One, while the Augrabies National Park (Protected Area) lies 8km north-west of the study area.

- Similarly, the Mining and Biodiversity Guidelines (DENC et al. 2013) recognises the site to be of High- and Moderate Biodiversity Importance, which constitute a high and moderate risk for mining. These guidelines were developed to identify and categorize biodiversity priority areas sensitive to the impacts of mining to support mainstreaming of biodiversity issues in decision making in the mining sector.
- Furthermore, according to the National Web based Environmental Screening Tool the study area is considered to have sensitive environmental features. This tool is a geographically based web-enabled application which allows a proponent intending to apply for environmental authorisation in terms of the Environmental Impact Assessment (EIA) Regulations 2014 (as amended), to screen their proposed site for any environmental sensitivity.

According to this, the Renosterkop study area is of very high sensitivity in terms of the animal species theme, which is based on the suitable habitat and known distribution of the birds Falco biarmicus (Lanner falcon) and Neotis ludwigii (Ludwig's bustard). The Terrestrial Biodiversity Theme is also of very high sensitivity, as a direct function of the Northern Cape Critical Biodiversity Areas Map (discussed above). Renosterkop is of medium sensitivity based on the Plant Species Theme. This sensitivity is attributed to the red listed Aloidendron dichotomum, (Vulnerable) that is known from the region. It however does not occur on site. The site is of low sensitivity based on the Aquatic Biodiversity Theme.

Critical Biodiversity Areas are areas required to meet biodiversity targets for ecosystems, species and ecological processes, as identified in a systematic biodiversity plan. Ecological Support Areas are not essential for meeting biodiversity targets but play an important role in supporting the ecological functioning of Critical Biodiversity Areas and/or in delivering ecosystem services. Critical Biodiversity Areas and Ecological Support Areas may be terrestrial or aquatic.

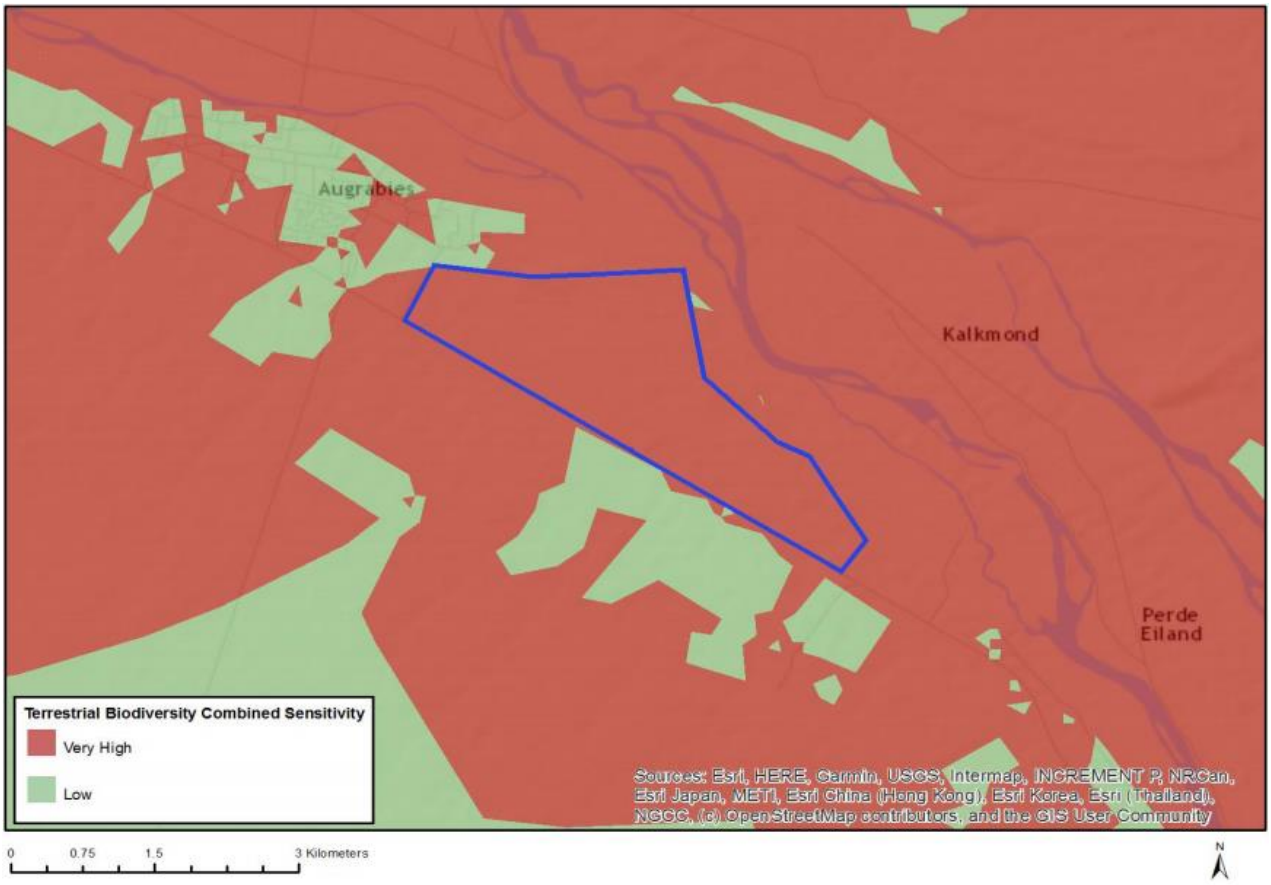


Figure 8. Terrestrial Biodiversity theme (map taken out of the Screening Report)

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Low	None
Very High	Endangered ecosystem
Very High	Critical Biodiversity Area 2
Very High	Critical Biodiversity Area 1

Heritage and Cultural Resources

Dr. Edward Matenga from (AHSA) Archaeological and Heritage Services Africa Pty Ltd has been appointed by Renosterkop Mining to determine the possible impact of mining on heritage resources in the application area.

This Heritage Impact Assessment (HIA) Report has been prepared in support of an application by Renosterkop Mining Company (Pty) Ltd for a mining right on several portions of the farm Kakamas Settlement South, also known as Renosterkop, situated 25 km north of Kakamas in the Kai !Garib Municipality.

The following is a summary of findings of the heritage study and recommendations with regard to the mining right application:

An ethno-historical profile of the area has been reconstructed on the basis of 18th first-hand accounts of a travellers, Jacob Wikar and Colonel R. J. Gordon. The local inhabitants, the !Nawabdanas, were agro-pastoralists and hunters occupying a stretch of the Orange River with islands between Kakamas and the Augrabies Falls. Renosterkop formed a southern backdrop of this beautiful bygone island settlement.

There are no specific references to Renosterkop from Wikar, Gordon and others, but sketches illustrate the people, their settlements and some of their artefacts. Pots and their sizes, the remains of which form a significant part of the assemblages from excavations at Renosterkop are illustrated in certain of these historical accounts.

General observations

The survey in 2022 confirms the importance of the hill on account of the presence of Stone Age material and a ceramic component. The occurrence of pottery together with lithics and an iron artefact urges a rethink of the supposed neat break between the Iron Age and Stone Age Cultures. Renosterkop is therefore significant as an exemplar of a transitional precolonial mixed economy in the semi-arid karoo plains of the Northern Cape.

Renosterkop is a historic cultural landscape. A Cultural landscape is …."the combined works of nature and of man" designated in Article 1 of the Convention. They are illustrative of the evolution of human society and settlement over time, under the influence of the physical constraints and/or opportunities presented by their natural environment and of successive social, economic and cultural forces, both external and internal." The Orange River islands and iconic Renosterkop on the southern flank of the floodplain are the embodiment of a historic cultural landscape which has evolved through at least three centuries. The cultural landscape was and is still firmly present in its physical form and in local public consciousness. For the past nomadic inhabitants and early European travellers, the hill was a prominent directional beacon which could been seen many kilometres from the Orange River. Cultural landscapes have the ability to survive for a long time thereby hosting many successive generations, and in this case Renosterkop is a remarkable example.

Today Renosterkop remains a landmark with a charismatic sense of place. It has a strong spiritual presence and captures the attention of travellers on the road from Kakamas to the Augrabies Falls.

The Stone Age

The recent field survey confirms the presence of Stone Age material as background scatter on the hill largely with no concentrations encountered to indicate significant activity areas.

A rock shelter on the northern aspect of the hill is significant due to the presence of a substantial deposit of Stone Age Material (Site RTK11). It is recommended that the cave is protected.

Burial grounds

One cairn burial located on the south-eastern foot of the hill was recorded (Site RTK01). A 100 m radius protection servitude must be reserved as per the regulations of the heritage authority.

Visual Impact Assessment

A basic assessment was undertaken of the likely significant impacts that the proposed mining will have on cultural landscape characteristics of the hill, strategic and local views, including to the setting of the hill in the broader land. A major and lasting visual impact of the development to the hill are open cast mine pits which will be created, and even if they will be refilled it will be impossible to recreate the original state. Three critical viewpoints have been identified:

(i) View of the hill from the south along the road from Kakamas to Augrabies.
(ii) View of the hill from the west along a north-south trending farm access road.
(iii)View of the hill from the north from a position on the western edge of the Orange floodplain.

Mining by opencast methods on the slopes of the hill will have a negative visual impact from the abovementioned key viewpoints, particularly during the life of the mine. The visual disturbance will be mitigated by backfilling of the pits after the life of the mine.

Conclusion and recommendations

The cairn burial must be protected with a 100 m servitude in which physical works are not allowed without a permit from SAHRA or the provincial heritage resources authority.

The rock shelter on the crest of the hill must be protected.

Mining by opencast methods on the southern, western and northern slopes of Renosterkop will impact negatively on the structural integrity of Renosterkop as a cultural landscape. The impact will be largely visual affecting the tourist value of the hill. The impact may be severe during the life of the mine. Backfilling will mitigate the visual impact although full restoration might not be possible.

A Chance Finds Procedure is appended to this Report and will be used by the Environmental Control Officer as a manual to curate chance finds.

A Conservation Management Plan (CMP) must be prepared for the protection and sustainable management of heritage resources. A CMP will contribute significantly to lowering the risk of uncertainty inherently present in ad hoc decision making and reactive interventions.

The proposed mining activities can be given a greenlight to go ahead provided that the precautions stated above are heeded.

Palaeontology

Prof Marion Bamford, of the University of the Witwatersrand, sub-contracted by Archaeological and Heritage Services Africa (Pty) Ltd, Pretoria, South Africa has been appointed by Renosterkop Mining to provide an Palaeontological Impact Assessment Report to determine the possible impact on palaeontology of mining on the application area.

A Palaeontological Impact Assessment was requested for the Mining Right on Lot 1288, Lot 1279 and Remainder Lot 1726 (Portion of Lot 1177) Kakamas South Settlement (Renosterkop) near Kakamas, Kai !Garib Municipality Northern Cape.

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

The proposed site lies on the non-fossiliferous metamorphic rocks of the Riemvaasmaak Gneiss that are overlain by Quaternary fluvial gravels that are moderately sensitive as far as the palaeontology is concerned. No fossils are likely to be found on this section of the river because there are no traps for transported fossil fragments, such as palaeochannels. 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 contractor, environmental officer or other designated responsible person once excavations, drilling or mining activities have commenced. Since the impact will be low, as far as the palaeontology is concerned, the project should be authorised.

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.

Description of the consultation process: -

(a) The consultation process with interested and affected parties (neighbouring farmers and land owners) has been started with correspondence of the proposed Mining Right application has been forwarded per registered post on 18 August 2020 to all identified interested and affected parties to inform them of the company's application and background information on the application for the Mining Right was attached.

(b) The process as described by NEMA for Environmental Authorization was followed. See table below for the identification of Interested and affected Parties to be consulted with. The landowner, and or occupants and direct neighbours were consulted through a letter that was given to them with registered post. A site notice was placed at the turn off to Kakamas from the R359 and at the farm gate, on the gravel road towards the Renosterkop Mining area. With this site notice all passers-by are requested to submit any written comments to be forwarded to the consultant. See photos attached and proof of consultation.

(c) An Advert (Notice) was placed 28 August 2020 in the DFA to notify all other interested parties and affected parties of the application for a mining right and to invite any person that might be interested and or affected to register.

(d) The Scoping Report of the proposed Mining Right application has been forwarded per registered post on 31 August 2020 to all identified interested and affected parties.

(e) A meeting with the farm owner and his legal representation was held on 22 June 2022 to gain access to the property.

(f) The EIA EMP of the proposed Mining right application has been forwarded per registered post on 4 August 2022 to all identified and registered interested and affected parties.

Proof of consultation (attendance registers, minutes of meetings and response forms) is attached as **Appendix 3**. The consultation process is still in process.

iii) Summary of issues raised by I&APs

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

Please refer to Appendix 3

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

(1) Baseline Environment

(a) Type of environment affected by the proposed activity (its current geographical, physical, biological, socio-economic, and cultural character)

(1) Geology

Renosterkop is a large low-grade tin- tungsten- zinc deposit located 85km WSW of Upington in the northern Cape Province, South Africa. The mineralization is hosted by a number of shallow- dipping, sheeted greisen bodies that are surrounded by, and partly intercalated with a well foliated granite gneiss country rock. The gneiss is taken to belong to the intrusive Riemvasmaak gneiss of the Namaqualand Metamorphic Complex.

The mineralized host (referred to as TBQ) is a grey, homogeneous, fine to medium grained rock composed predominantly of quartz, biotite and topaz with minor amounts of fluorite and accessory opaque minerals, zircon and secondary chlorite. The unmineralized granite gneiss country rock is medium- to coarse- grained, pinkish in colour and composed primarily of microcline, plagioclase, quartz and biotite, with or without hornblende. Rock types, transitional in mineralogy but with clearly distinguishable contacts, are present between the TBQ and the granite gneiss.

A prominant chemical and mineralogical halo, 20 m to 50 m wide, envelopes the Renosterkop deposit. There is a gradational transition from an unaltered hornblende biotite gneiss, through gneiss containing greenishbrown biotite to an approximately 2 m wide transition zone, characterized by the partial replacement of the greenish- brown biotite by chlorite. The transition zone in turn yields to the TBQ in which reddish-brown biotite forms at the expense of the chlorite, and topaz, quartz and fluorite are formed at the expense of the feldspar. Major and trace element analyses show a spectrum of chemical compositions with coherent trends that support a gradational transition from the hornblende- bearing granite gneiss, through the transitional rock types to the TBQ.

The mineralogical and chemical characteristics of the Renosterkop rock types are consistent with an origin by progressive greisenization of a "within plate" A- type granitoid host rock. A genetic model is proposed which involves the formation of the TBQ greisen during intense metasomatic alteration and replacement of the granite gneiss within a zone of structural weakness that provided conduits for migrating, F- rich, metal- bearing solutions, and thereby inherited the foliation and structural features present in the original granite gneiss.

The TBQ occurs as a number of shallow- dipping, sheeted bodies, containing minor intercalations of unmineralized granite gneiss, and forming an erosion resistant ridge measuring 1500 m by 300 m in plan. The combined mineralized TBQ bodies vary in thickness from a maximum of 60 m to a minimum of 10 cm, with an average thickness of 20 m to 30 m.

Regional Geological Setting

The region is underlain by rocks which are described by SACS (Kent, 1980) as forming part of the Korannaland Sequence of the Namaqualand Metamorphic Complex. The lithostratigraphic designation Namaqualand Metamorphic Complex includes metasedimentary, metavolcanic and intrusive rock units which are predominantly gneissic in character. The Complex underlies a Proterozoic tectonic province which has been variously referred to as the Namaqua Mobile Belt, Orange River Belt, Namaqua Province or Sonama Province (Kent, 1980); it is bounded by the Archean Kaapvaal Province, younger cover rocks and the Atlantic coastline.

The lithostratigraphic subdivision of the Namaqualand Metamorphic Complex is presented by SACS (Kent, 1980) as an ad hoc framework for further improvement as more information is obtained, and is given in Table 2.

The Korannaland Sequence loosely groups together a number of rock formations, the stratigraphic relations between which are imperfectly known. These formations are given in Table 3.

The lithology of the constituent formations, and the type areas of the Korannaland Sequence are given in Table 4 and Figure 9 respectively.

TABLE 2. Lithostratigraphic subdivision of the Namaqualand Metamorphic Complex

Koperberg Suite Spektakel Suite Keimoes Suite Hoogoor Suite Little Namaqualand Suite Gladkop Suite Vioolsdrif Suite	Syntectonic intrusive rock units, radiometrically dated 1100 to 1900 Ma (Kent, 1980)
Orange River Group Okiep Group Bushmanland Group Korannaland Sequence Marydale and Kaaien Groups	Pretectonic metasedimentary and metavolcanic rock units, radiometrically dated 1350 to 2000 Ma (Kent, 1980)

Table 3. Formations of the Korannaland Sequence (Kent, 1980)

Toeslaan Formation	Goede Hoop Formation	Eierdoppan Formation
	Rautenbach se Kop Formation	Jannelsepan Formation
	Kenhardt Formation	
	Biesje Poort Formation	
	Kokerberg Formation	

Table 4. Lithology of the Korannaland Sequence (Kent, 1980)

FORMATION	LITHOLOGY
Goede Hoop	Metaquartzite, muscovite quartzite and conglomerate
Rautenbach se Kop	Quartzo - feldspathic gneiss
Kenhardt	Predominantly a leucocratic biotite gneiss
Biesje Poort	Calc - silicate rocks, streaky leucogneiss, biotite gneiss, marble and amphibolite
Kokerberg	Quartzo - feldspathic gneiss with interlayered metaquartzite
Toeslaan	Garnet - sillimanite - cordierite - biotite gneiss; garnet - bearing quartzo - feldspathic gneiss; biotite gneiss with amphibolite
Eierdoppan	Conglomerate and schist
Jannelsepan	Amphibolitic rocks and associated biotite schists and gneisses; calc silicate rocks; garnet - sillimanite - biotite gneiss

The granite gneiss units found in the immediate vicinity of the study area and underlying the TBQ at Renosterkop are regarded by SACS (Kent, 1980) as belonging to the syntectonic intrusive rocks of the Hoogoor Suite, which are intrusive into the Kokerberg Formations, and are broadly defined as undifferentiated leucocratic quartzo – feldspathic gneiss units that are usually fine- to medium- grained and reddish- brown.in outcrop. In places this gneiss - henceforth referred to as granite gneiss - contains nodules with a variable amount of sillimanite (Kent,1980), or it may assume a coarse granitic aspect or become megacrystic. Bands of fine-grained white quartzo- feldspathic rock as well as lenses of calc- silicate rock, quartzite, schist and amphibolite are common (Kent, 1980). The granite gneiss, also referred to as the pink gneiss, underlies a large area and it may not necessarily represent a single rock unit throughout. Accordingly, it has been interpreted as intrusive granites by some researchers, and granitized metasediments by others. Suggested parent rocks range from arkose (Poldervaart and von Backstrom, 1949; Geringer, 1973; Moore, 19771, to rhyolite (Joubert,1974; Botha et al., 1976) and granitoid (Coetzee, 1941; Lipson and McCarthy, 1977; Colliston, 1979).

Most of these speculations are based either on field relations or on geochemistry. However, owing to the immaturity of clastic sediments such as arkoses and greywackes, the difference in chemical composition between such sediments and igneous rocks may not be pronounced (Schultz, 1978).

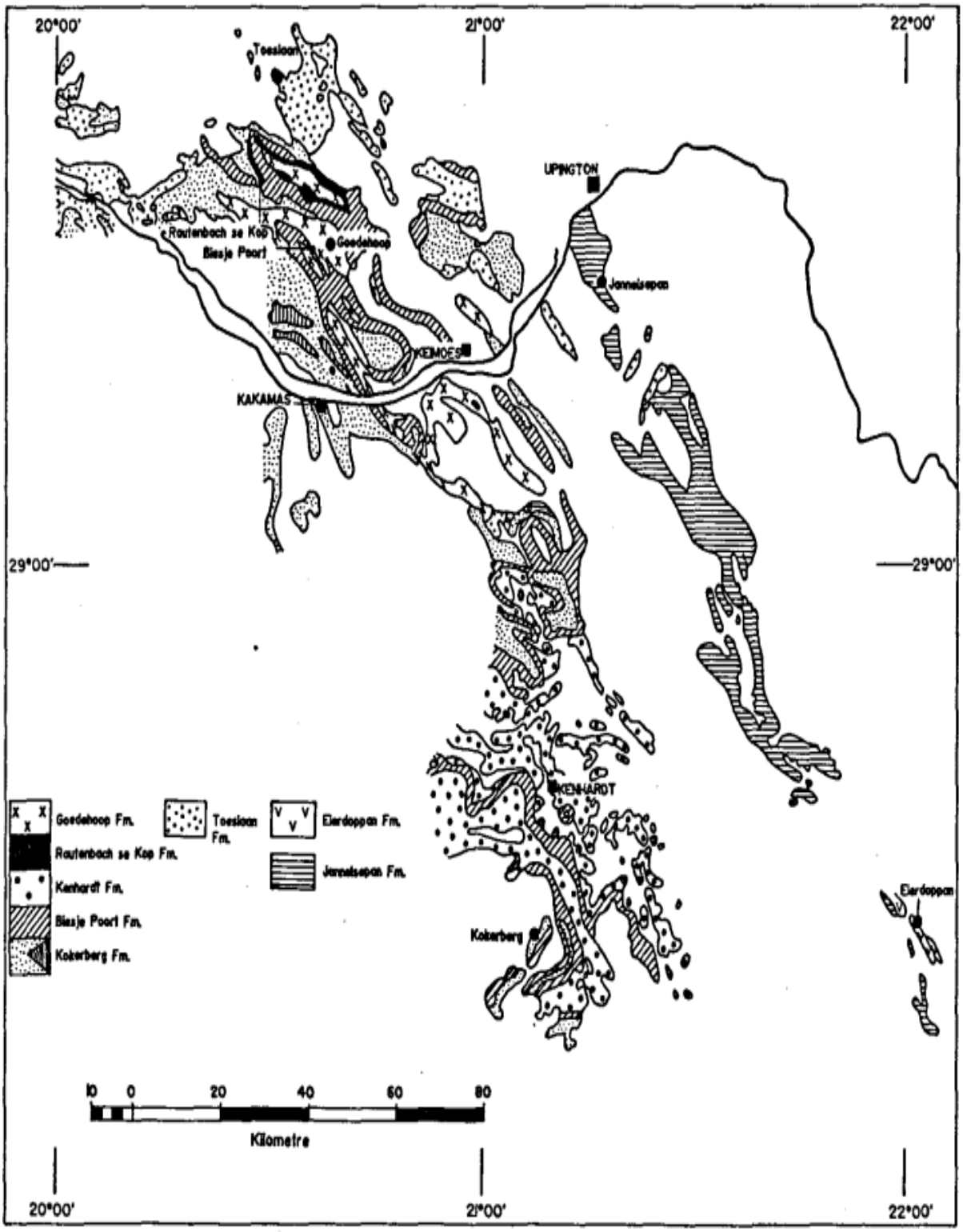


Figure 9. Type areas of the Korannaland Sequence (Kent, 1980)

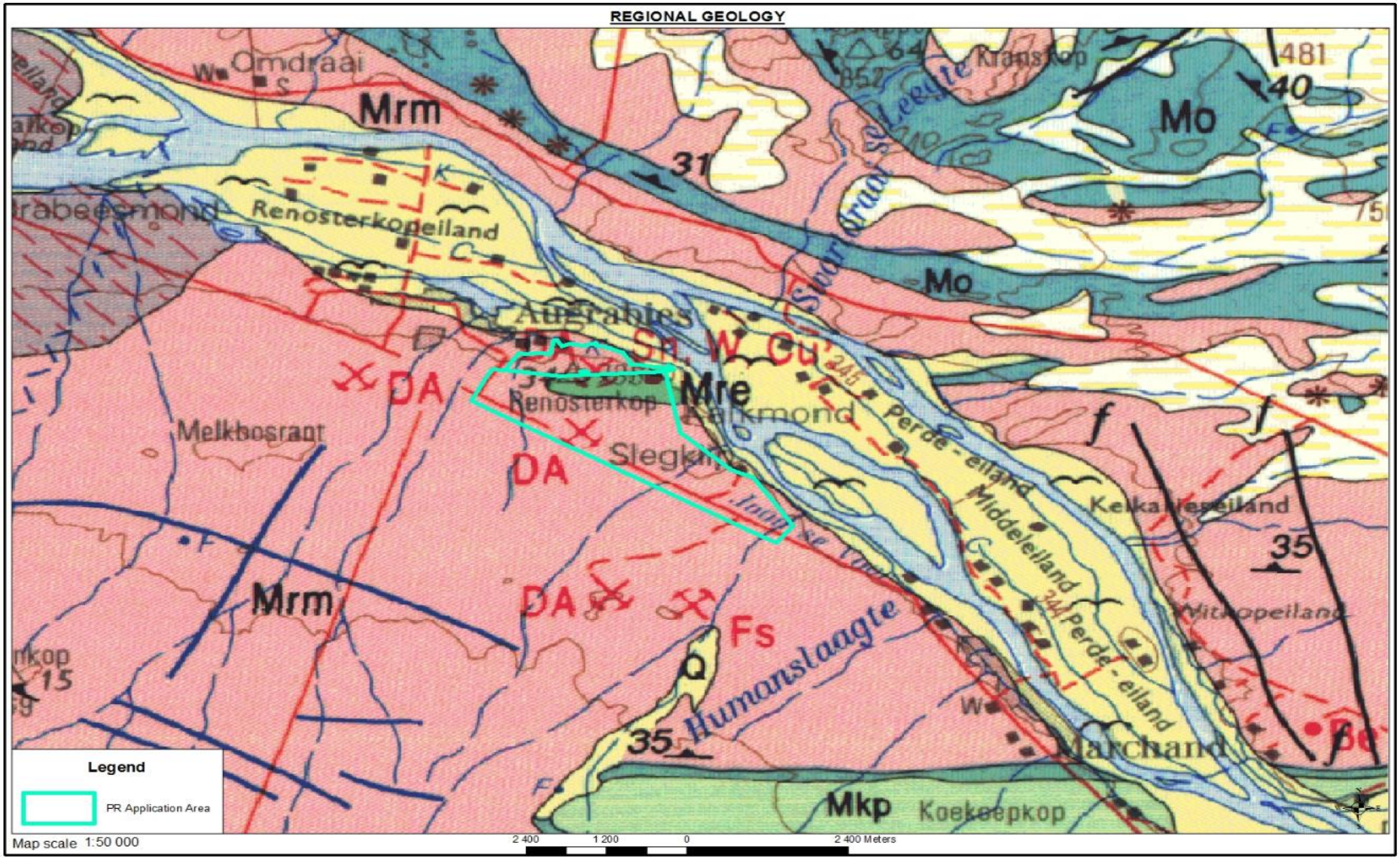


Figure 10. A schematic geological map of the application area.

THE RENOSTERKOP TIN - TUNGSTEN DEPOSIT

General Geology

The Renosterkop deposit consists of large sheeted bodies of shallowdipping topaz biotite quartz rock (TBQ) varying in thickness from centimeters up to 60 m in places. The sheets of TBQ overlie a well foliated pink granite gneiss, i.e. Riemvasmaak gneiss, with a consistently flat shallow- dipping bottom contact. Conformable intercalations of granite gneiss are present between the individual TBQ sheets. No contact is identifiable within the TBQ where two sheets merge.

The TBQ hosts low- grade tin, tungsten and zinc mineralization, whereas the granite is not mineralized. A transition zone, measuring 2 to 3 m in thickness, in which the biotite is partially or totally replaced by chlorite, and in which topaz, quartz and fluorite are formed at the expense of feldspar, is present between the TBQ and the granite gneiss. The contact between this transition zone and the TBQ is generally sharp, but is also seen to be gradational in places. Late stage alteration zones are common within both the TBQ and the granite gneiss.

Structure

An aerial impression of the Renosterkop deposit.i~ that it forms a shallow northerly dipping tight south- vergent synformal fold with a gentle eastward plunge and traversed by prominent faults on which no definite direction of movement can be detected (Hartnady, 1985). No field evidence could however be found to substantiate the presence of such a tight south- vergent synformal fold structure. It would rather appear that the deposit comprises a composite of sheetlike bodies of variable thickness. On a local and regional scale, the dominating fabric element observed in the granite gneiss is a tectonic foliation (Hartnady, 19851, and is for practical purposes here referred to as St. No evidence could be found for S1 being overprinted over an earlier tectonic fabric, and it apparently represents the last major tectonic deformation that was operative in the terrane. As a general rule the sheetlike bodies of TBQ are orientated roughly parallel to this foliation in the granite gneiss. Locally however they cut obliquely across the foliation of the granite gneiss.

In the TBQ, S1 is defined by oriented biotite and also by a mm- to cmscale phase layering defined primarily by variations in biotite abundance. This foliation is parallel to the foliation in the surrounding granite gneiss, which is defined by oriented biotite and elongated Augen- like quartzfeldspar aggregates.

Tight isoclinal folding within certain sheets of TBQ, and in the wedges of granitic gneiss between the sheets, are superimposed on S1. These structures do not display axial plane cleavage or foliation, and are non-penetrative with variable plunges of the fold axes.

The third type of folding seen in the TBQ is represented by open, noncylindrical, gently or doubly- plunging "whaleback" antiforms and

synforms in S1 and may be caused by disharmonic, viscoelastic buckling of the S1 fabric along NW to NNW trends. Later interference patterns trending NE to NNE are superimposed on this event and result in the formation of basin- dome interference patterns.

The major NE and NW trending fault zones and joints are superimposed over all the previously discribed structures.

(2) ***CLIMATE:***

Augrabies Falls National Park is located in a semi-arid region, which implies low annual rainfall and extreme variations of temperature. Occasional thunderstorms occur from October to April.

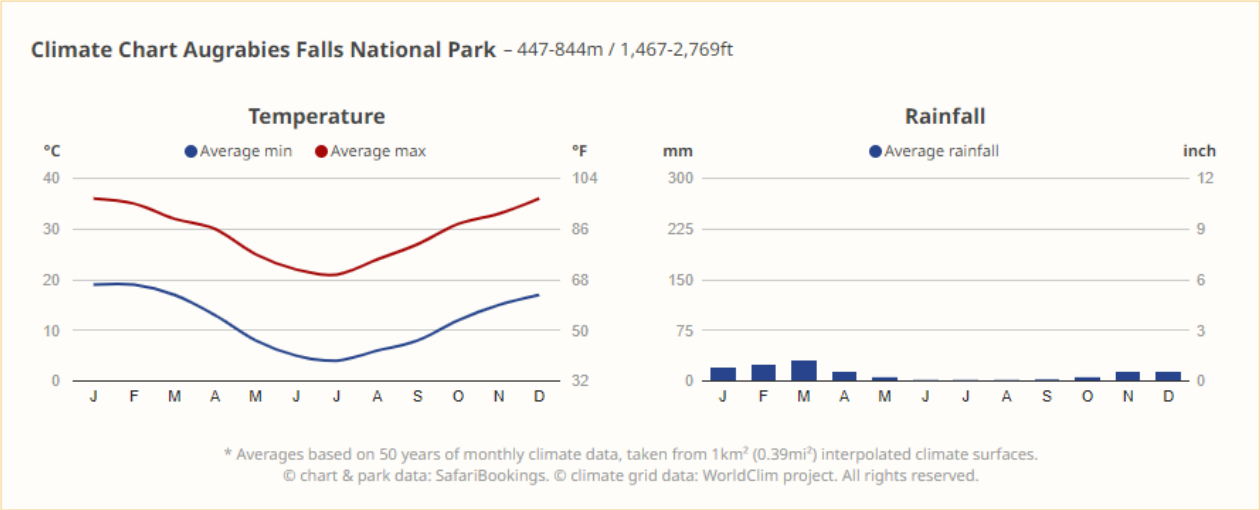


Figure 11. Climate chart for Augrabies National Park

Historically, the wind in Augrabies Falls National Park during July blows at an average speed of 13.0 mph (20.9 kph). The windiest month is November with an average wind speed of 14.8 mph (23.8 kph), while the calmest month is February with an average wind speed of 11.3 mph (18.3 kph).

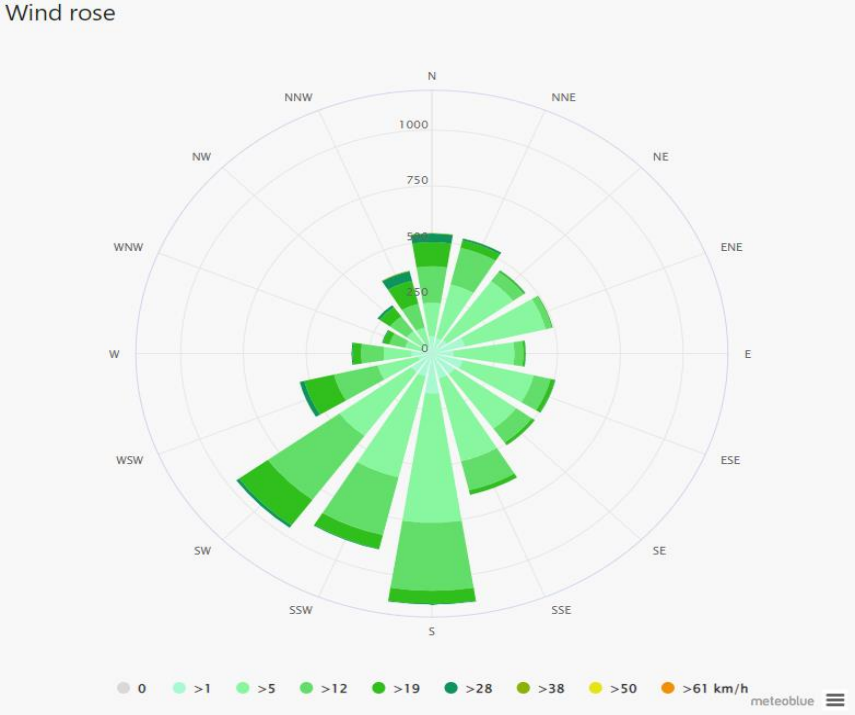


Figure 12. The wind rose for Augrabies Falls National Park shows how many hours per year the wind blows from the indicated direction

Dry season–May to September – Winter
The winter season is devoid of rainfall. The nights tend to be very cold, and frost is common. Winter clothing is recommended for evenings and early mornings. Daytime temperatures are pleasant.

May – With average temperatures of 8°C/46°F in the morning and 25°C/77°F in the afternoon, summer comes to its end.

June, July & August – With cold, and even frost, being commonplace, you should bring warm clothes for night and morning activities. Average temperatures range from 5°C/41°F to 22°C/72°F during the daytime.

September – Afternoon temperatures average 27°C/81°F. Mornings become slightly warmer than previous months, at around 8°C/46°F.

Wet season–October to April – Summer
Extreme heat is prevalent throughout the summer. Regardless of it being the Wet season, the humidity is low. Average daytime temperatures are around 33°C/91°F but can peak at 45°C/113°F and higher. Occasional rain occurs and usually comes in dramatic storms.

October & November – The haziness of the sky disappears with the first summer rains. As the season wears on, precipitation increases, primarily

in the form of occasional afternoon showers. Temperatures hover between 14°C/57°F in the morning and 32°C/90°F in the afternoon.
December, January & February – This period is typified by the highest temperatures of the year. They often ascend to well over the average 36°C/97°F. Early mornings are lovely with temperatures around 18°C/65°F. Occasional showers clear the air and break the heat.

March & April – Daytime average is still around 31°C/88°F, while nights stay warm at 15°C/59°F. Rainfall stops by the end of April, but there can still be an occasional shower prior to that (Weather & Climate – Augrabies Falls NP, By Philip Briggs).

(3) TOPOGRAPHY:

Dr. Betsie Milne from Bocia Ecological Consulting (Pty) Ltd has been appointed by Renosterkop Mining to provide an Ecological Assessment Report and to determine the possible impact of mining on the application area topography was described and included in this report (Appendix 4).

The terrain comprises plains with open low hills or ridges. Altitude rangesfrom 660 - 680 m.a.s.l. on the plains, and 700 - 730 m on the hill. The slope on the plains is gentle (< 1 %) and becomes very steep (20 – 30 %) along the hill. The land type is Ag2, which comprise red-yellow apedal, freely drained soils, red, high base status, and less than 300 mm deep. The hill is represented by terrain units 1 (hill tops) and 2 (slopes), the plains by terrain units 3 and 4, and the drainage lines by terrain unit 5. The terrain on the plains has low susceptibility to erosion and flooding hazards, but the hill terrain is highly susceptible to erosion. The soils of the site have moderately low susceptibility to wind erosion, but moderately high-water erosion susceptibility.

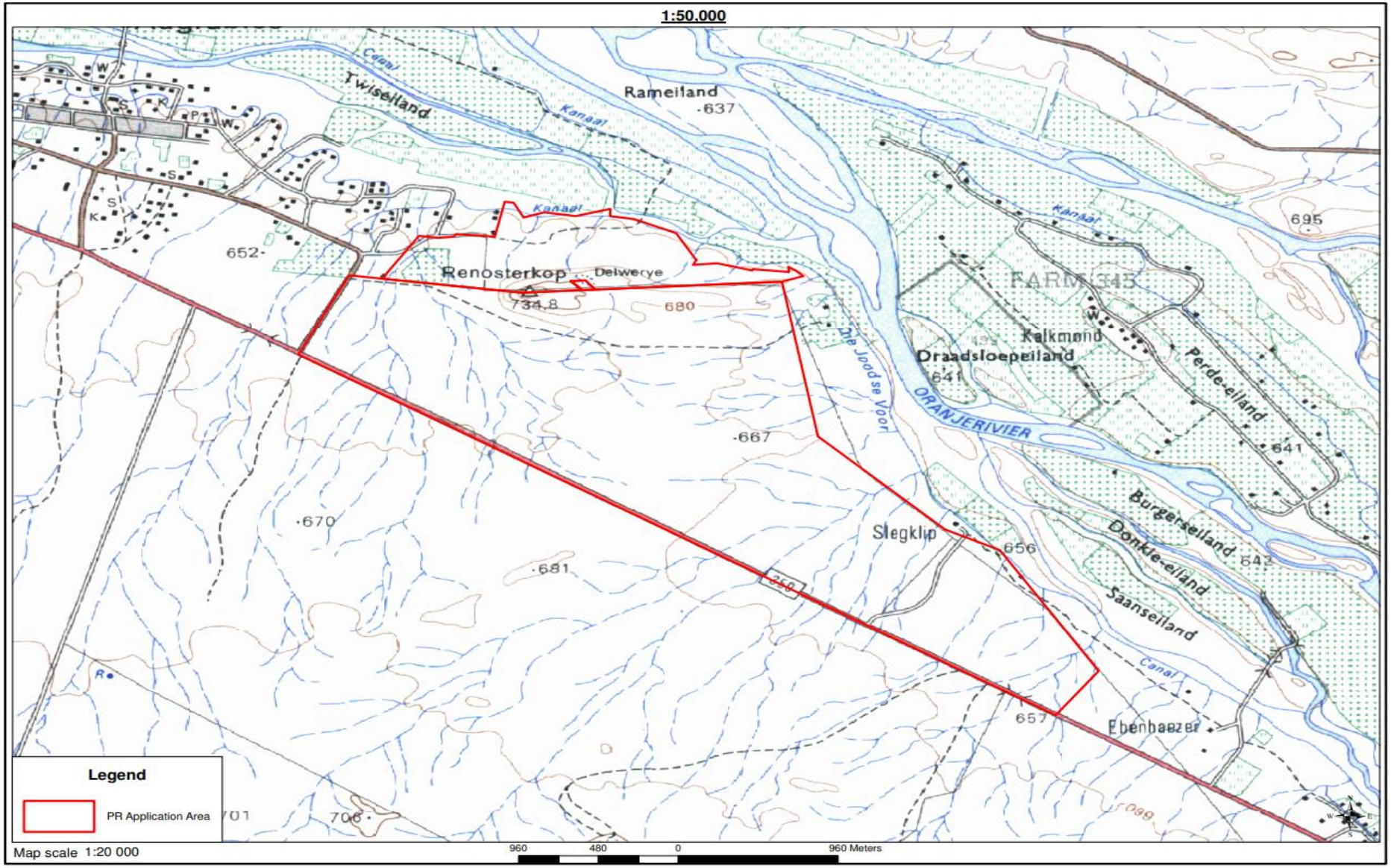


Figure 13. Topographical Map of Renosterkop on ‘n 1:50 000 application area indicated by RED figure.

*(4) **SOILS:***

Dr. Betsie Milne from Bocia Ecological Consulting Pty Ltd has been appointed by Renosterkop Mining to provide an Ecological Assessment Report and to determine the possible impact of mining on the application area soils was described and included in this report (Appendix 4).

According to the 1:250 000 Geological Map of 2820 Upington, published by the Council for Geoscience in 1988, the geological features on Renosterkop comprise Quaternary and Mokolian deposits. The hills earmarked for mining comprise Quartz-topaz gneiss (Renosterkop Formation), while the plains are associated with pink-weathering granite gneiss with a granular texture (Riemvasmaak Formation). A very small section along the river, in the northeast, comprise alluvium. The earmarked deposits are associated with the Renosterkop gneiss.

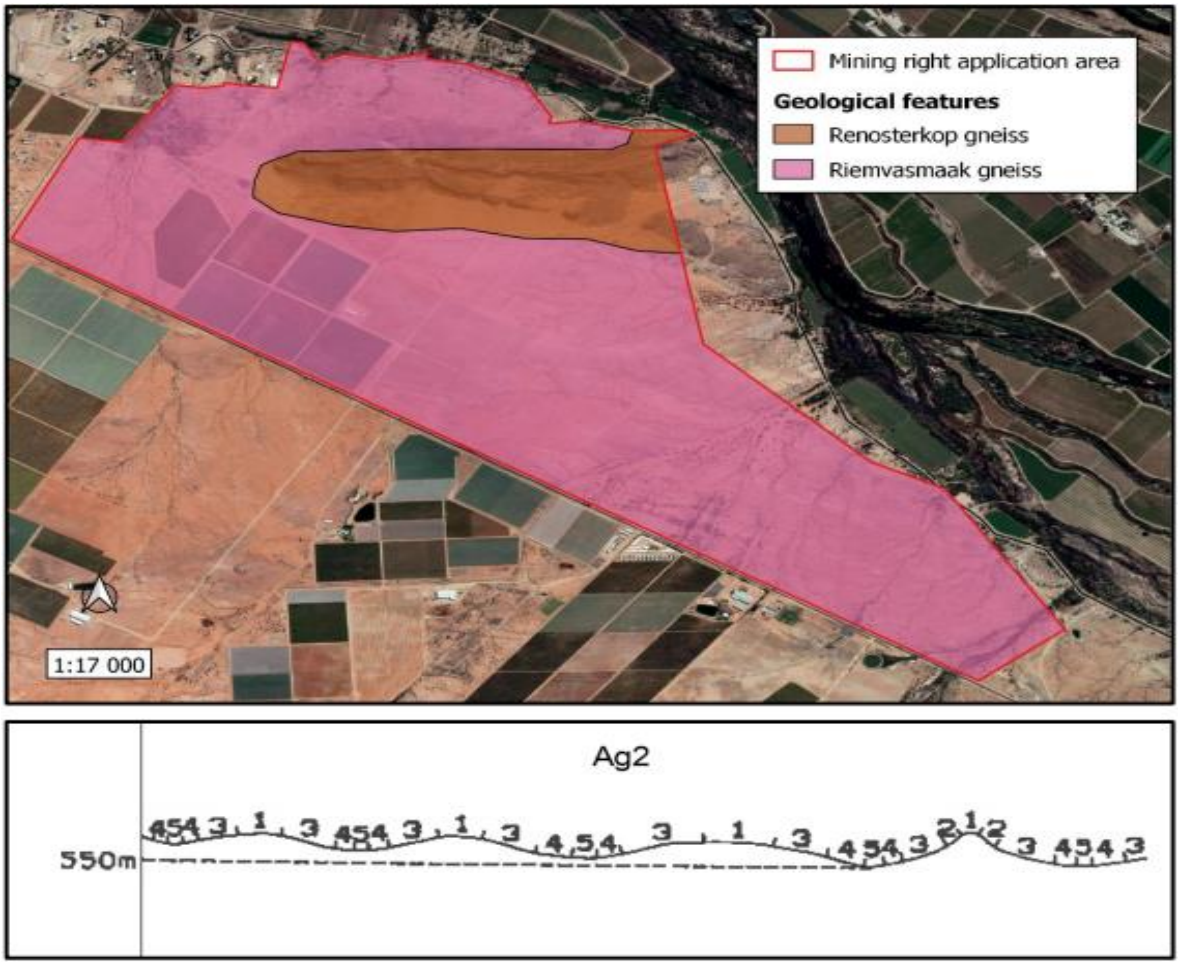


Figure 14. The distribution of geological features in the study area (top) and the dominant land type terrain units (bottom).

The land type is Ag2, which comprise red-yellow apedal, freely drained soils, red, high base status, and less than 300 mm deep. The hill is represented by terrain units 1 (hill tops) and 2 (slopes), the plains by terrain units 3 and 4, and the drainage lines by terrain unit 5 (Figure 14). The terrain on the plains has low susceptibility to erosion and flooding hazards, but the hill terrain is highly susceptible to erosion. The soils of the site have moderately low susceptibility to wind erosion, but moderately high-water erosion susceptibility.

(5) ***LAND CAPABILITY AND LAND USE:***

Dr. Betsie Milne from Bocia Ecological Consulting Pty Ltd has been appointed by Renosterkop Mining to provide an Ecological Assessment Report to determine the possible impact of mining on the application area Land capability and Land Use was described and included in this report.

Pre-mining Land Capability

The major land uses in the area are agriculture. The region is arable and classified as the Orange River Potential Agricultural Area, which is an area with High Agricultural Potential (B rating).

This is due to the Good and Excellent irrigation suitability of the land. The grazing capacity is 36 - 42 ha/LSU, with the grazing land being demarcated for sheep.

An agricultural study has been initiated by Mr. Herbert Hatting but are not finalized yet and this study will be included into the final EIA / EMP and distributed again.

Land Use Prior to Mining

Apart from the proposed mining activities, Renosterkop is currently utilised for **extensive irrigation of export crops**. Existing landuse features include farm tracks and other supporting infrastructure, with associated surface disturbances. A canal traverses the northern boundary of the site and there is a communal soccer field in the far south-eastern corner. An old field is present in the north-east and disturbances associated with historic mining occur on the hills (Figure 16).

Historical Agricultural Activities and evidence of Abuse

An old field is present in the north-east and disturbances associated with historic mining occur on the hills (Figure 16).

Existing Structures

Existing landuse features include farm tracks and other supporting infrastructure, with associated surface disturbances. A canal traverses the northern boundary of the site and there is a communal soccer field in the far south-eastern corner. An old field is present in the north-east and disturbances associated with historic mining occur on the hills (Figure 16).

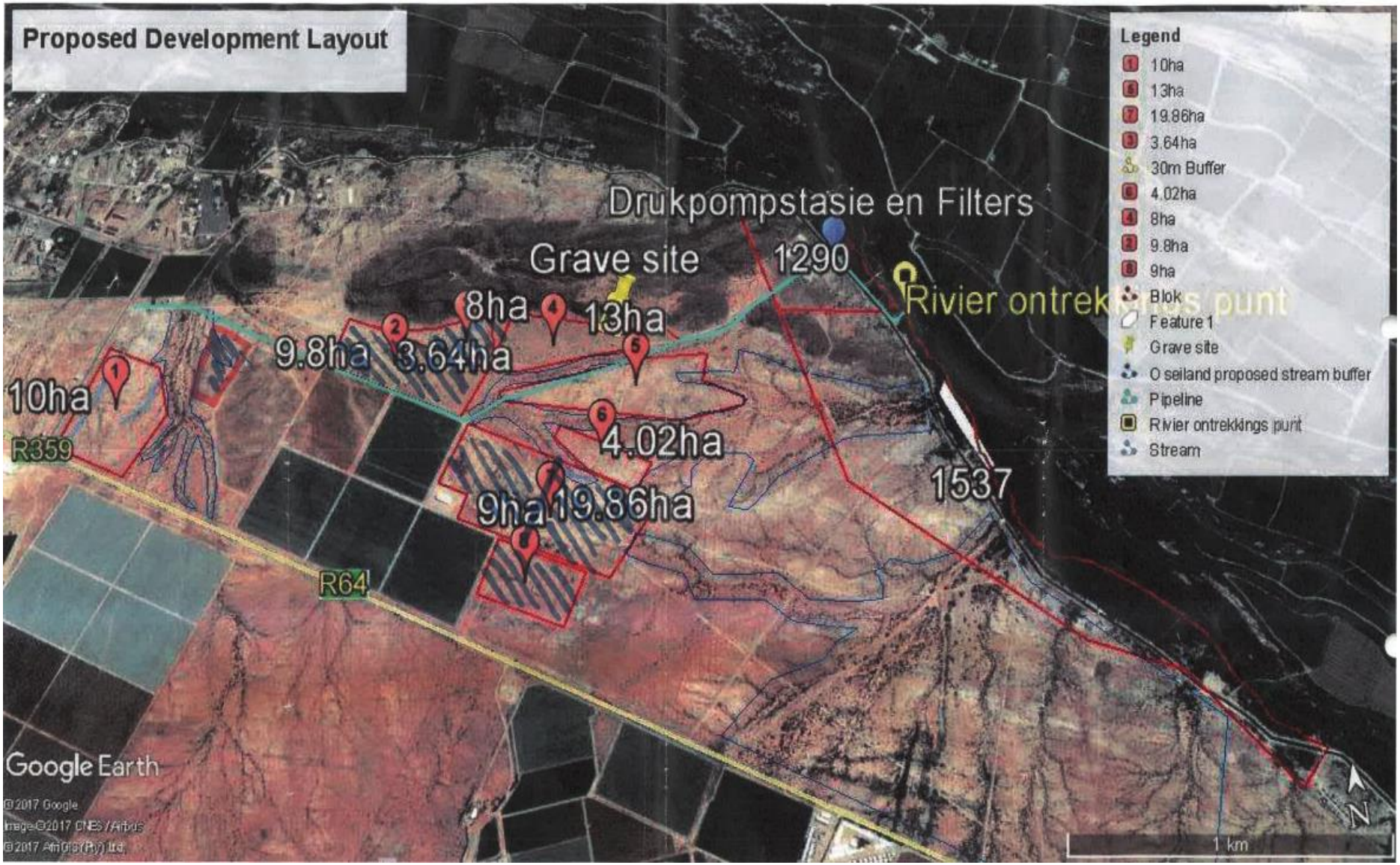


Figure 15. Map with proposed development layout for Oseiland farming (map received from Oseiland farming).

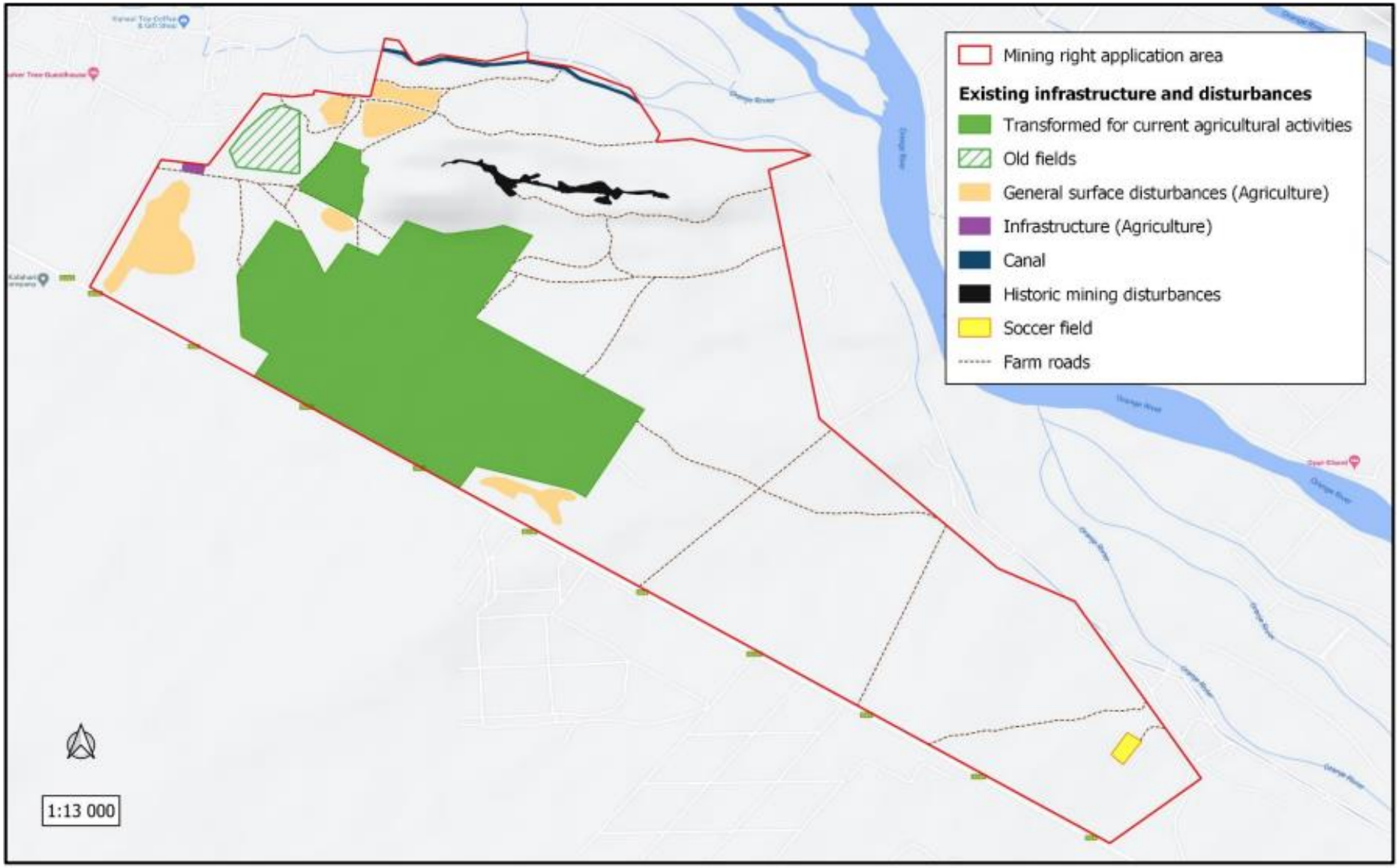


Figure 16. Evidence of existing infrastructure and past disturbance in the study area.

(6) ***NATURAL FAUNA:***

Dr. Betsie Milne from Bocia Ecological Consulting Pty Ltd has been appointed by Renosterkop Mining to provide an Ecological Assessment Report, and to determine the possible impact of mining on the application area Fauna was described and included in this 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 56 terrestrial mammals and ten bat species have been recorded in the region, of which seven 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. Cape Fox, Bat-eared Fox, Honey Badger, Striped Polecat, Aardwolf and African Wild Cat have a high probability to occur across the site based on their wide habitat tolerance and affinity for open and arid grassland habitats.

Aardvark could potentially occur in the deeper sandy habitats, but there is not ample ideal habitat available for them on site. African Straw-coloured Fruit-bat is not expected to occur on site based on the absence of suitable trees on which they feed. Temminck's Pangolin, Black-footed Cat, Leopard and Giraffe are also not expected to occur on site. The small size of the property that isfenced in, and the agricultural activities occurring on site are expected to deter these species. No suitable habitat for Littledale's Whistling Rat is found on site and the African Clawless Otter is expected to be restricted to the aquatic habitat of the Orange River, north of the study area. Yellow Mongoose and South African Ground Squirrel were encountered frequently during the site visit. Rock Hyrax and their middens were abundant on the hills. Problem animals (Schedule 4) with a high likelihood to occur on site include Black-backed Jackal, Caracal and Vervet Monkey.

Reptiles

The Renosterkop mining area lies within the distribution range of at least 60 reptile species. No red listed species occur in the area, but most of

the reptiles of the study area are protected either according to Schedule 1 or 2 of NCNCA. Specially protected species include Chamaeleo dilepis (Common Flap-necked Chameleon) and Karusasaurus polyzonus (Southern Karusa Lizard).

The Common Flap-necked Chameleon occurs in a variety of habitats and is usually found high up in bushes and trees. It therefore is expected to occur on site. The Southern Karusa Lizard is a rock-dwelling species and is expected to be restricted to the hills.

Amphibians

Seven amphibian species are known from the region. None of these species are red listed, but two are regional endemics. Vandijkophrynus gariepensis (Karoo Toad) and Amietophrynus rangeri (Raucous Toad) are regional endemics. All the frog species from the study region are protected according to Schedule 2 of the NCNCA. Most of them are well adapted to arid habitats, but still rely on temporary waterbodies for breeding. The Angolan River Frog however is dependent on permanent streams and is not expected to occur on site. The Marbled Rubber Frog is restricted to inselbergs and rocky areas and is expected to be restricted to the hills on site.

Avifauna

Renosterkop does not fall within any of the Important Bird Areas (IBA) defined by Birdlife South Africa, but it lies near (8km) the Augrabies Falls National Park IBA. This IBA is a formally protected national park, established in 1966. It is an important tourist attraction, drawing up to 89 000 visitors a year. Despite having a low species diversity, this IBA is important for many biome-restricted assemblage birds and a host of other arid-zone species. Globally threatened species found here include Martial Eagle, Kori Bustard and Ludwig's Bustard. Regionally threatened species are Karoo Korhaan, Lanner Falcon and breeding Verreaux's' Eagle. The IBA is well managed, with far fewer threats than the surrounding landscape. Overgrazing of the surrounding farmland is, however, a threat. It results in degradation of habitat outside the park, potentially reducing populations of wideranging species such as bustards, which depend on large foraging areas that fall mostly outside the IBA's borders. Invasive alien plants are a continuing threat, especially in the riparian vegetation zone.

A total number of 221 bird species have been recorded from the study area, of which 19 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.

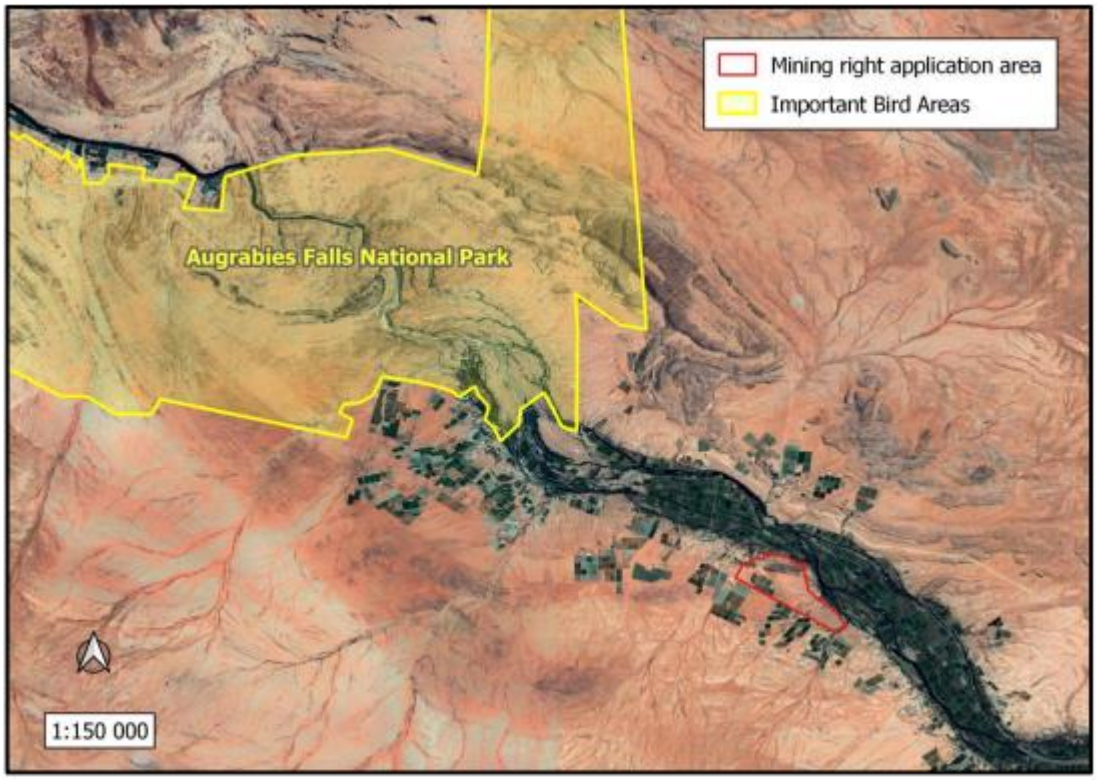


Figure 17. Important Bird Areas in the vicinity of the study area.

The hills, drainage lines and grassland provide ample micro-habitats to several bird species on Renosterkop. No bird species of conservation concern were encountered on site, but those expected to occur in the hills, earmarked for mining, include Verreaux's Eagle, Jackal Buzzard, Lanner Falcon, Rock Kestrel. The grassland habitat is expected to host Sclater's Lark, Kori Bustard, Ludwig's Bustard, Martial Eagle, Burchell's Courser and Secretarybird, as well as many of the remaining owls and raptors of conservation concern. None of the bird species dependent on water (Curlew Sandpiper, African Fish-Eagle, Chestnut-banded Plover, Black Stork, Marabou Stork, Lesser Flamingo, Greater Flamingo) are 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. No fish species are expected to be found in the drainage lines on site.

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 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. Of these, the baboon spider Harpactira sp. has been recorded near the study area.

All Rock- Creeping- and Burrowing Scorpions are protected according to Schedule 2 of the NCNCA, along with several beetles, butterflies and moths. Of these, several Gossamer-winged Butterflies and Brush-footed Butterflies have been recorded in the region, as well as the Burrowing Scorpions, Opistophthalmus wahlbergii and Opistophthalmus carinatus. The Brush-footed Butterflies, Vanessa cardui (Painted lady) and Junonia hierta (Yellow pansy) were also recorded on site during the field visit.

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. The protected butterflies, baboon spiders and scorpions discussed above are all associated with this habitat, which includes the hills and grassland on site. Furthermore, the desert snail, Dorcasia sp. and Short-horned Grasshoppers (Acrididae sp.) were especially abundant on the hills, while Karoo Balbyter Ants (Camponotus fulvopilosus) were common in the grassland. The false crab spiders Thanatus sp. was also observed.

NATURAL FLORA:

Dr. Betsie Milne from Bocia Ecological Consulting Pty Ltd has been appointed by REnosterkop Mining to provide an Ecological Assessment Report, and to determine the possible impact of mining on the application area Flora was described and included in this report.

Broad-scale vegetation patterns

Renosterkop 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 18).

Bushmanland Arid Grassland is restricted to the Northern Cape. It spans from Aggeneys in the west to Prieska in the east, with its boundaries being defined by the edges of the Bushmanland Basin in the south, desert vegetation near Upington in the north and the edges of the Namaqualand hills in the west. Altitude varies from 600 to 1 200 m. The topography includes extensive to irregular plains on a slightly sloping plateau sparsely vegetated by grassland, dominated by Stipagrostis spp. 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. The 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. The land types include mainly Ag and Ae.

Bushmanland Arid Grassland is classified as least threatened with very little being transformed. Small portions are conserved within 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.

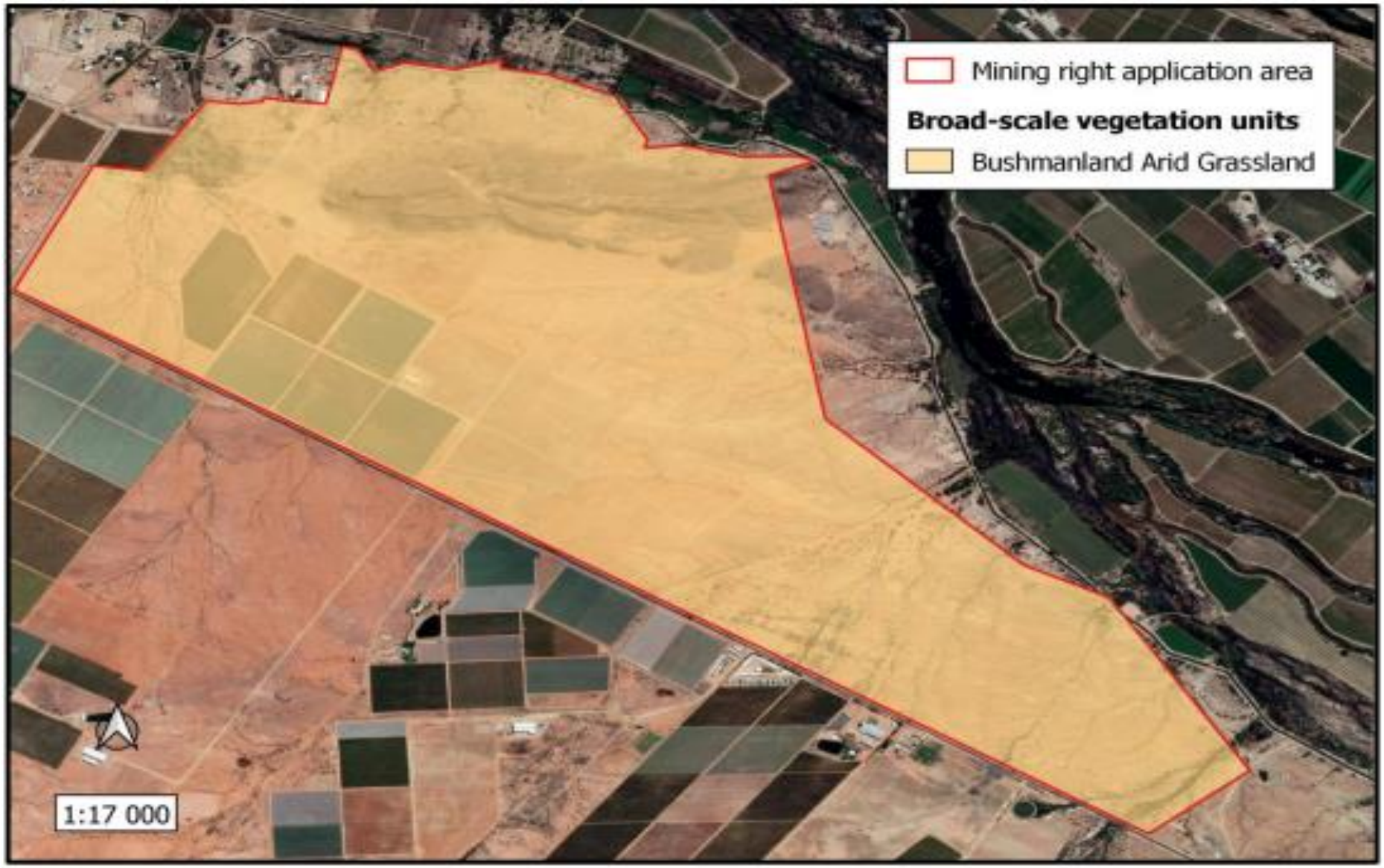


Figure 18. The broad-scale vegetation units (Mucina and Rutherford 2012) present in the study area.

Fine-scale vegetation patterns

Plant communities in the study area are delineated according to plant species correspondences and changes in soil structure. They can be divided into three distinct units (Figure 19), which are described below. These descriptions include unique characteristics and the dominant species found in each unit. A complete plant species list, including those species likely to occur here is presented in Appendix 1 of the ecological study.

i) Justicia spartioides - Stipagrostis uniplumis open shrubland on gneiss hills

This community is restricted to the hills of the study area (Figure 19). The vegetation is presented as an open shrubland, dominated by low shrubs, intermixed with grasses. Shallow soils and rocks constitute approximately 30 - 40% of the ground cover.

The shrub layer is dominated by Justicia spartioides and Indigofera heterotricha, but Rogeria longiflora is also abundant. Other common species include Hermannia stricta, H. minutiflora, Aptosimum spinescens, Justicia australis, Barleria rigida, Tetraena rigida, Berkheya chamaepeuce, Kissenia capensis, Cryptolepis decidua and Solanum tomentosum. Common tall shrubs include Senegalia mellifera, Boscia albitrunca, Boscia foetida, Cadaba aphylla and Phaeoptilum spinosum.

The grass layer is dominated by Stipagrostis uniplumis, but S. ciliata, Stipagrostis obtusa, Panicum arbusculum, Enneapogon scaber, E. cenchroides, E. desvauxii, Eragrostis nindensis, Aristida engleri and A. adscensionis are also common. Other grasses include Triraphis ramosissima, Anthephora pubescens and Cenchrus ciliaris.

Codon royenii dominates the herb layer, but Chascanum garipense and Forsskaolea candida are also common. Other herbs include Osteospermum microcarpum, Senecio sisymbriifolius, Aizoon canariense, Oxalis haedulipes and Tetraena simplex. The bulb Nerine laticoma are also common, while the fern Cheilanthes deltoidea and the moss Riccia okahandjana are abundant in shaded areas.

ii) Stipagrostis grassland on gravelly plains

This community covers the plains that have not yet been transformed by agriculture (Figure 19). Here, the vegetation is defined by grassland growing on shallow sand and gravelly soil, which constitute 10 – 20 % of the ground cover. Stipagrostis uniplumis dominate the grass layer, but S. ciliata and S. obtusa are also abundant. Enneapogon cenchroides is also found here.

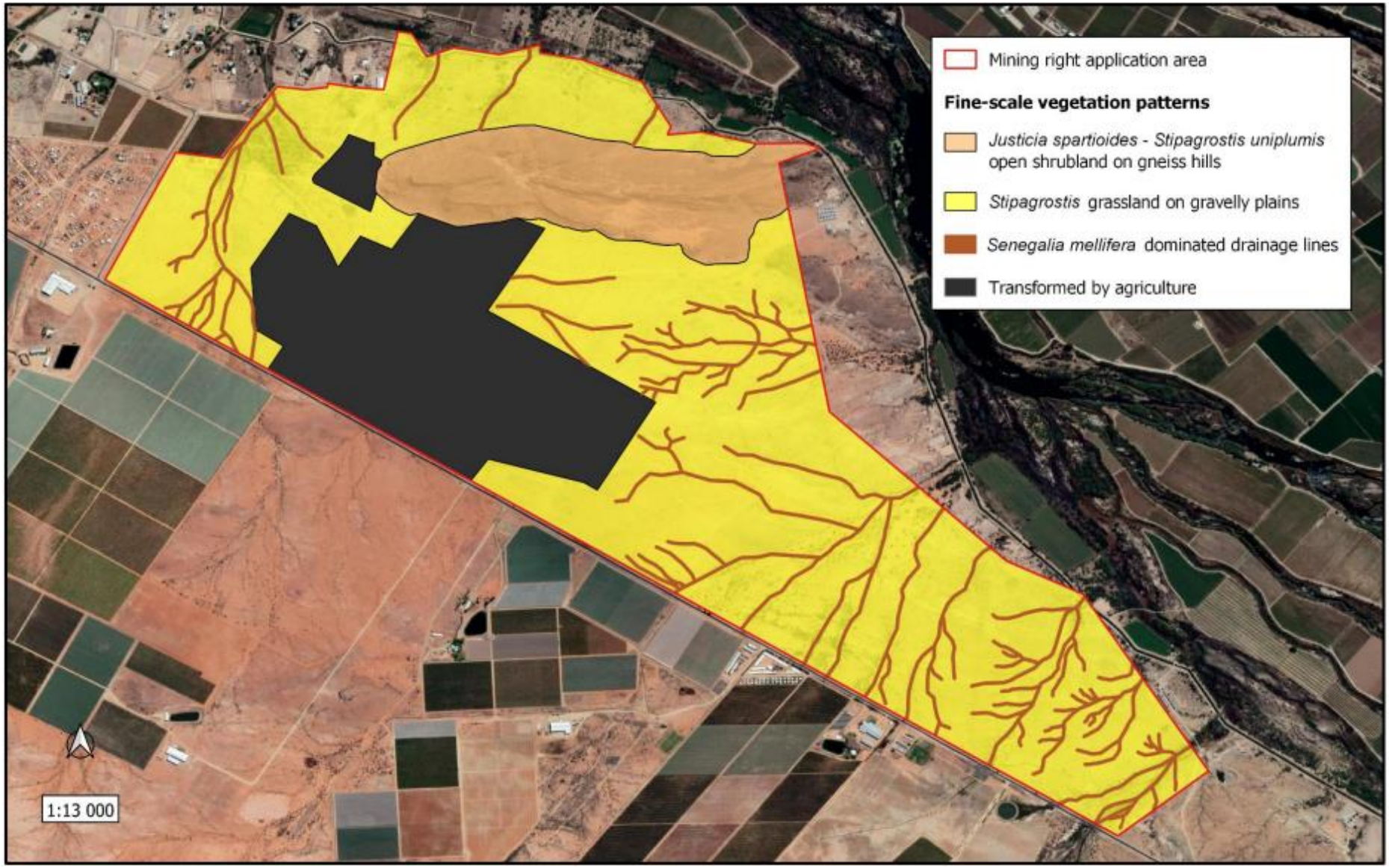


Figure 19. The distribution of fine-scale plant communities in the study area

The grass layer is intermixed with low shrubs, herbs, and succulents. Here, Aizoon schellenbergii, Aptosimum spinescens, Geigeria ornativa, Justicia australis, Blepharis mitrata, Barleria lichtensteiniana, Hermannia stricta, Tetraena microcarpa, T. rigida, Kyphocarpa angustifolia, Dicoma capensis and Salsola sp. are common. Other species include Rhigozum trichotomum, Justicia spartioides, Leucosphaera bainesii, Lotononis rabenaviana, Tephrosia dregeana, Gorteria corymbose, Aizoon burchellii, Chascanum garipense, Ruschia intricata, Jamesbrittenia megadenia, Oxalis extensa, Acanthopsis hoffmannseggiana, Peliostomum leucorrhizum, Aloe claviflora and Euphorbia braunsii. Monsonia crassicaulis, M. umbellata and Anacampseros albissima are important elements on shallow gravel patches.

Tall shrubs and trees are sparsely distributed and include Parkinsonia africana, Senegalia mellifera, Vachellia erioloba and Lycium bosciifolium.

iii) Senegalia mellifera dominated drainage lines

This community lines the natural drainage lines on the property (Figure 19). The vegetation is dominated by Senegalia mellifera growing along the banks of the bare, alluvium channels. Other shrubs include Boscia foetida, Asparagus pearsoni, Lycium bosciifolium, Phaeoptilum spinosum, Rhigozum trichotomum, Indigofera heterotricha, Justicia spartioides and Ptycholobium biflorum. Common grasses include Stipagrostis uniplumis, S. hochstetteriana and S. namaquensis. The herb Kyphocarpa angustifolia and bulb Nerine laticoma are also found here. In contrast, the hydrological regime of the drainage line in the far west, near the entrance gate, have been altered and here dense stands of Phragmites australis has infested the channels.

Population of sensitive, threatened, and protected plant species

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

plant (Schedule 3) in such manner that it constitutes large-scale harvesting.

Most species from the region are classified as least concern; a category which includes widespread and abundant taxa. However, three species are listed, albeit data deficient. Acanthopsis hoffmannseggiana (**Data Deficient - Taxonomically Problematic**), is a widespread and variable species that possibly contains several taxa, some of which may be of conservation concern. More study is needed to find reliable distinguishing characters to separate individual taxa. Salsola tuberculata (**Data Deficient -Taxonomically Problematic**) is part of a complex genus of which species are poorly defined and difficult to separate. The entire Salsola needs taxonomic revision. Based on currently available data, the risk of extinction of this species cannot be assessed. Oxalis extensa (**Data Deficient - Insufficient Information**) was last officially collected in 1936 and not enough is known about the distribution, specific habitat, or population status of this species to determine its status. All three of these species were recorded in the grassland community on site.

Species from the study area protected in terms of the NFA include Boscia albitrunca and Vachellia erioloba. Only one large adult tree of V. erioloba occurs in the grassland, but B. albitrunca is widespread and abundant on the hills. Here, they occur at densities of 3
– 4 individuals per hectare, mainly as stunted adult shrubs (50 - 80 cm (h) x 2 - 3 m (d)) or trees (1.5 - 2 m (h) x 3 - 4 m (d)).

In addition to these, specially protected species (Schedule 1) and protected species (Schedule 2) of the NCNCA known from the study region are also indicated in Table 4 of the study. Of these, Ruschia intricata, Anacampseros albissima, Aloe claviflora, Euphorbia braunsii and Jamesbrittenia megadenia were recorded in the grassland. Cryptolepis decidua and Oxalis haedulipes were restricted to the hills, while Nerine laticoma and Boscia foetida subsp. foetida occurred on the hills and in the drainage lines. 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.

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 on site are listed in Table 5.

Table 5. Declared indicators of bush encroachment in the Northern Cape recorded in the study area.

Scientific name	Common name
Rhigozum trichotomum	Three – thorn rhigozum
Senegalia mellifera subsp. *detinens*	Black thorn
Vachellia karroo	Sweet thorn
Grewia flava	Velvet raisin

(7) ***SURFACE WATER AND WETLANDS***

Dr. Betsie Milne from Bocia Ecological Consulting Pty Ltd has been appointed by Renosterkop Mining to provide an Ecological Assessment Report, and to determine the possible impact of mining on the application area surface water was described and included in this report.

The Renosterkop study area falls within the Vioolsdrif quaternary catchment D81A of the Lower Orange Water Management Area (Figure 20). This quaternary catchment has been allocated a Present Ecological State (PES) of 'Moderately Modified' (C) by Smook et al. (2002). Information regarding its mean annual rainfall, evaporation potential and runoff is provided in Table 6.

Table 6. Catchment characteristics for the Vioolsdrif 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)
D81A	2 311	128	2 700	2.74

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 7. 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 7. 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 Renosterkop, but an extensive network of drainage lines traverse the property (Figure 20). These all drain towards the Orange River in the north and therefore play an important role in the catchment area. However, many drainage lines in the centre of the property have already been destroyed by agricultural activities.

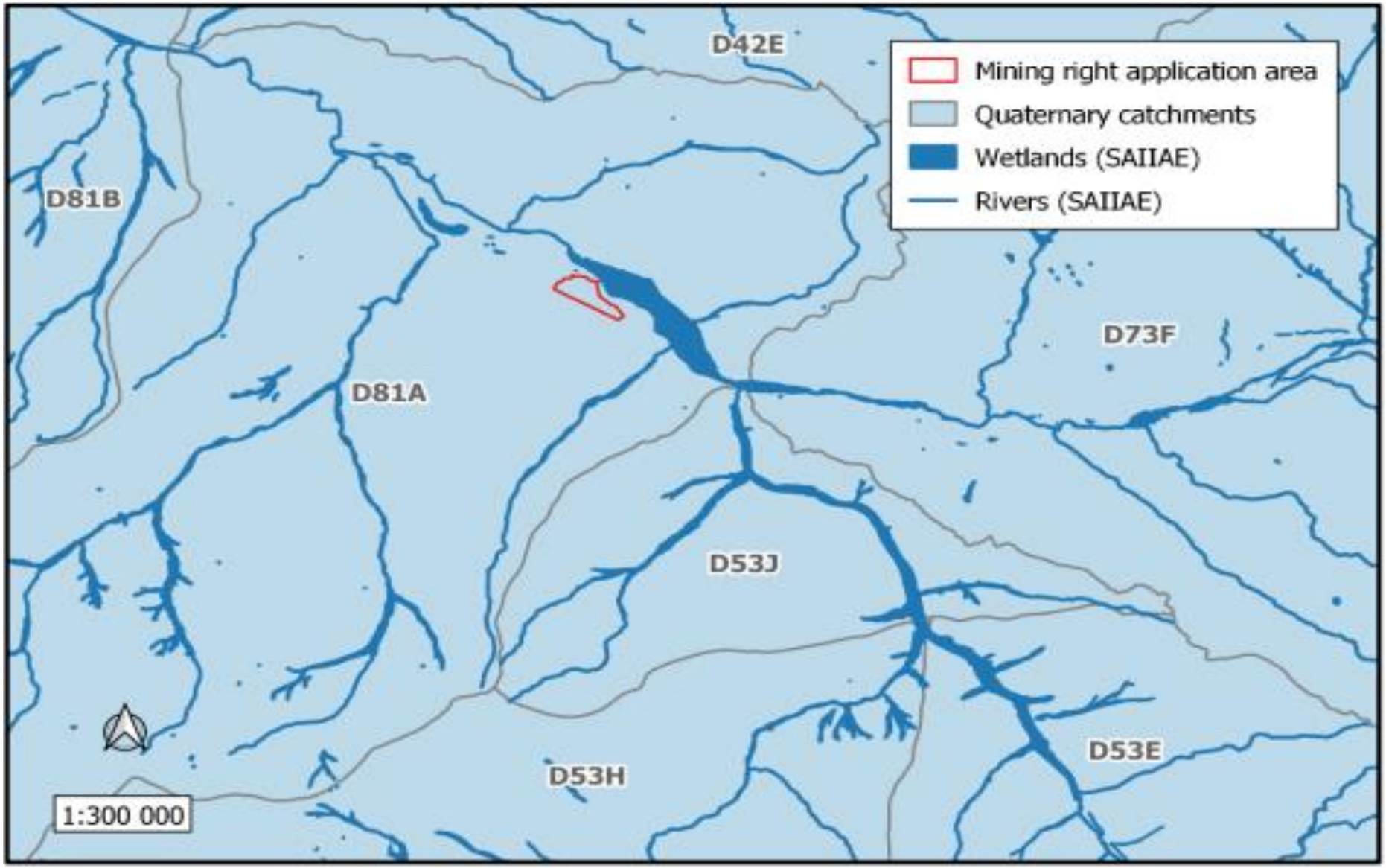


Figure 20. The locality of the proposed mining area in relation to the Vioolsdrif quaternary catchment of the Lower Orange Water Management Area.

Figure 21. The location of drainage lines on the proposed mining right area. No SAIIAE wetlands or rivers occur on the property.

(8) *GROUND WATER:*

Groundwater utilization is important in the area and constitutes the only source of water over much of the rural areas within the Siyanda area. As a result of the low rainfall over the area, the groundwater is mainly used for rural domestic water supplies, stock watering and water supplies to inland towns. Recharge of groundwater is limited and only small quantities can be abstracted on sustainable basis. Aquifer characteristics (borehole yields and storage of ground water) are also typically unfavourable because of the hard geological formation underlying most of the municipal area. The exception to this, is the western part of the area that are underlain by dolomitic Karst aquifers.

In the Orange River tributaries, more than fifty percent of the available water is supplied from groundwater sources. A very small component of the available water in the vicinity of the Orange River is groundwater. It, however, constitutes an important source of water for rural water supplies in this sub-area. A significant amount of groundwater is being abstracted near the river, where the ground water levels are replenished by means of induced recharge from the river.

In the year 2000, the utilization of groundwater in the area was approximately in balance with the sustainable yield from this source. No significant potential for further development exists. Over-exploitation of the groundwater has not been experienced in the EMF area. The quality of groundwater is in general appropriate for the uses which the water is applied to. Brackish (mineralized) water is, however, common in the drier areas. The available water for the EMF area has been included in the Lower Orange Water Management Area LOWMAR (Taken out of the EMF of Siyanda, 2008).

The demand for water requirements has been included in the LOWMAR. The report states that in the year 2000 the LOWMA (inclusive of the EMF area) water requirements came to a total of 1028 million cubic metres per day (including the component of reserve for basic human needs at 25 litres per person per day). This volume is given by the demand of water for irrigation which is 977 million cubic metres per annum, 9 million cubic metres per annum of water for Mining and Bulk Industry, 25 million cubic meters of water per annum for urban and 17 million cubic meters per annum for the areas.

The expected groundwater demand for future use is provided in the LOWMAR. The dolomite area that occurs in the eastern part of Siyanda holds significant groundwater in karst aquifers (Taken out of the EMF of Siyanda, 2008).

(9) CULTURAL AND HERITAGE RESOURCES:

Dr. Edward Matenga from (AHSA) Archaeological and Heritage Services Africa Pty Ltd has been appointed by Renosterkop Mining to determine the possible impact of mining on heritage resources in the application area.

This Heritage Impact Assessment (HIA) Report has been prepared in support of an application by Renosterkop Mining Company (Pty) Ltd for a mining right

on several portions of the farm Kakamas Settlement South, also known as Renosterkop, situated 25 km north of Kakamas in the Kai !Garib Municipality.

The following is a summary of findings of the heritage study and recommendations with regard to the mining right application:

An ethno-historical profile of the area has been reconstructed on the basis of 18th first-hand accounts of a travellers, Jacob Wikar and Colonel R. J. Gordon. The local inhabitants, the !Nawabdanas, were agro-pastoralists and hunters occupying a stretch of the Orange River with islands between Kakamas and the Augrabies Falls. Renosterkop formed a southern backdrop of this beautiful bygone island settlement.

There are no specific references to Renosterkop from Wikar, Gordon and others, but sketches illustrate the people, their settlements and some of their artefacts. Pots and their sizes, the remains of which form a significant part of the assemblages from excavations at Renosterkop are illustrated in certain of these historical accounts.

General observations

The survey in 2022 confirms the importance of the hill on account of the presence of Stone Age material and a ceramic component. The occurrence of pottery together with lithics and an iron artefact urges a rethink of the supposed neat break between the Iron Age and Stone Age Cultures. Renosterkop is therefore significant as an exemplar of a transitional precolonial mixed economy in the semi-arid karoo plains of the Northern Cape.

Renosterkop is a historic cultural landscape. A Cultural landscape is …."the combined works of nature and of man" designated in Article 1 of the Convention. They are illustrative of the evolution of human society and settlement over time, under the influence of the physical constraints and/or opportunities presented by their natural environment and of successive social, economic and cultural forces, both external and internal." The Orange River islands and iconic Renosterkop on the southern flank of the floodplain are the embodiment of a historic cultural landscape which has evolved through at least three centuries. The cultural landscape was and is still firmly present in its physical form and in local public consciousness. For the past nomadic inhabitants and early European travellers, the hill was a prominent directional beacon which could been seen many kilometres from the Orange River. Cultural landscapes have the ability to survive for a long time thereby hosting many successive generations, and in this case Renosterkop is a remarkable example.

Today Renosterkop remains a landmark with a charismatic sense of place. It has a strong spiritual presence and captures the attention of travellers on the road from Kakamas to the Augrabies Falls.

The Stone Age

The recent field survey confirms the presence of Stone Age material as background scatter on the hill largely with no concentrations encountered to indicate significant activity areas.

A rock shelter on the northern aspect of the hill is significant due to the presence of a substantial deposit of Stone Age Material (Site RTK11). It is recommended that the cave is protected.

Burial grounds
One cairn burial located on the south-eastern foot of the hill was recorded (Site RTK01). A 100 m radius protection servitude must be reserved as per the regulations of the heritage authority.

Visual Impact Assessment
A basic assessment was undertaken of the likely significant impacts that the proposed mining will have on cultural landscape characteristics of the hill, strategic and local views, including to the setting of the hill in the broader land. A major and lasting visual impact of the development to the hill are open cast mine pits which will be created, and even if they will be refilled it will be impossible to recreate the original state. Three critical viewpoints have been identified:
(i) View of the hill from the south along the road from Kakamas to Augrabies.
(ii) View of the hill from the west along a north-south trending farm access road.
(iii) View of the hill from the north from a position on the western edge of the Orange floodplain.

Mining by opencast methods on the slopes of the hill will have a negative visual impact from the abovementioned key viewpoints, particularly during the life of the mine. The visual disturbance will be mitigated by backfilling of the pits after the life of the mine.

Conclusion and recommendations

The cairn burial must be protected with a 100 m servitude in which physical works are not allowed without a permit from SAHRA or the provincial heritage resources authority.

The rock shelter on the crest of the hill must be protected.

Mining by opencast methods on the southern, western and northern slopes of Renosterkop will impact negatively on the structural integrity of Renosterkop as a cultural landscape. The impact will be largely visual affecting the tourist value of the hill. The impact may be severe during the life of the mine. Backfilling will mitigate the visual impact although full restoration might not be possible.

A Chance Finds Procedure is appended to this Report and will be used by the Environmental Control Officer as a manual to curate chance finds.

A Conservation Management Plan (CMP) must be prepared for the protection and sustainable management of heritage resources. A CMP will contribute significantly to lowering the risk of uncertainty inherently present in ad hoc decision making and reactive interventions.

The proposed mining activities can be given a greenlight to go ahead provided that the precautions stated above are heeded.

Palaeontology

Prof Marion Bamford, of the University of the Witwatersrand, sub-contracted by Archaeological and Heritage Services Africa (Pty) Ltd, Pretoria, South Africa has been appointed by Renosterkop Mining to provide an Palaeontological Impact Assessment Report to determine the possible impact on palaeontology of mining on the application area.

A Palaeontological Impact Assessment was requested for the Mining Right on Lot 1288, Lot 1279 and Remainder Lot 1726 (Portion of Lot 1177) Kakamas South Settlement (Renosterkop) near Kakamas, Kai !Garib Municipality Northern Cape.

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.

Project location and geological context

The project lies in the Namaqualand sector of the Namaqualand-Natal Province where a variety of metamorphic and intrusive rocks occur. They are unconformably overlain by the transported sands of the Quaternary Kalahari Group.

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

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

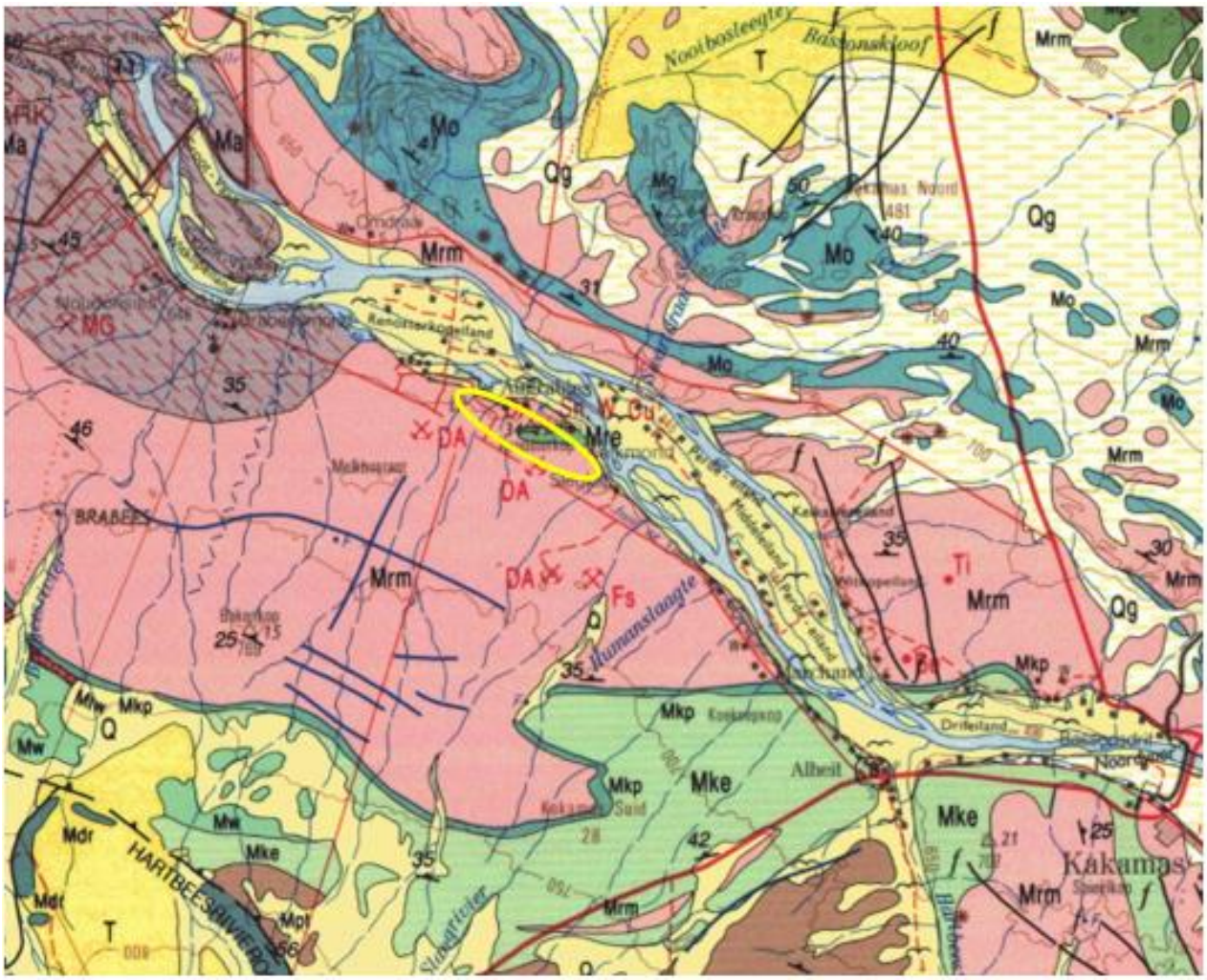


Figure 22. Geological map of the area between Augrabies and Kakamas. The location of the proposed project is indicated within the yellow rectangle. Map enlarged from the Geological Survey 1: 250 000 map 2820 Upington.

The farm lies in the Kakamas Terrane and it has a more or less northwest-southeast extent, bounded on the eastern side by the Boven-Ruzgeer Shear zone and on the western side by the Hartbees River Thrust (Cornell et al., 2006).

Overlying many of these rocks are loose sands and sand dunes of the Gordonia Formation, Kalahari Group of Quaternary Age. The Gordonia Formation is the youngest of six formations and is the most extensive, stretching from the northern Karoo, Botswana, Namibia to the Congo River (Partridge et al., 2006). It is considered to be the biggest palaeo-erg in the world (ibid). The sands have been derived from local sources with some additional material transported into the basin (Partridge et al., 2006). Much of the Gordonia Formation comprises linear dunes that were reworked a number of times before being stabilised by vegetation (ibid). Even younger sands and sandy soils have been deposited in shallow valleys and along ephemeral water courses, while fluvial sands and gravels occur along the Orange River. The current positon and catchment of the Orange River is the farther north than it was during the Cenozoic due to the tectonic uplift along the Etosha-Griqualand-Transvaal Axis (de Wit, 1999; Haddon and McCarthy, 2005).

Palaeontological context

The palaeontological sensitivity of the area under consideration is presented in Figure 23. The site for mining is on the fluvial sands and gravels along the Orange river that overlie the Riemvaasmaak Gneiss (Figure 24) with the Renosterkop Gneiss intruding through the older metamorphic rocks. Gneiss is a high grade metamorphic rock, meaning that it has been subjected to higher temperatures and pressures than schist. It is formed by the metamorphosis of granite, or sedimentary rock. Gneiss displays distinct foliation, representing alternating layers composed of different minerals. Since it is metamorphic it does not preserve any fossils.

The fluvial sands along the river are sources from inland and could have transported fossils from inland but they would be fragmented from the transport, so only robust fossils like heavy bones or silicified wood survive. Their primary context would be lost. Being an actively flowing river, the Orange River transports sands and debris to the sea, so in order to retain fossils they would have to be trapped in palaeochannels, such as has occurred upstream or farther downstream (Pickford et al., 1995; de Wit, 1999; Corbett and Burrell, 2001; de Wit et al., 2008). There are no palaeochannels along this portion of the river.

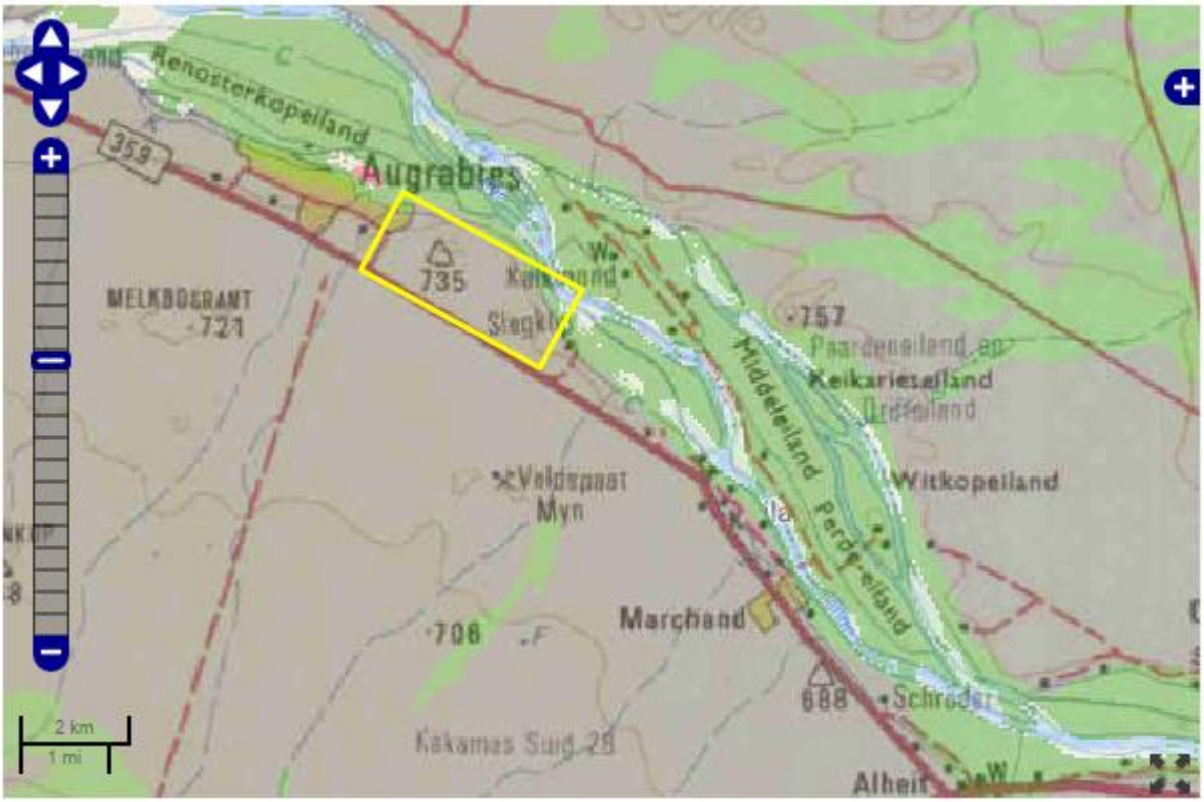


Figure 23. SAHRIS palaeosensitivity map for the site for the proposed Mining Right on Farm Kakamas South shown within the yellow rectangle. Background colours indicate the following degrees of sensitivity: red = very highly sensitive; orange/yellow = high; green = moderate; blue = low; grey = insignificant/zero.

Based on the nature of the project, surface activities may impact upon the fossil heritage if preserved in the development footprint. The geological structures suggest that the rocks are either much the wrong kind or are transported sands to contain fossils. Furthermore, the material to be mined is metamorphic rocks

and this does not preserve fossils. Since there is an extremely small chance that transported fossils from upstream may be disturbed a Fossil Chance Find Protocol has been added to this report. Taking account of the defined criteria, the potential impact to fossil heritage resources is extremely low.

Recommendation

Based on experience and the lack of any previously recorded fossils from the area, it is extremely unlikely that any fossils would be preserved in the fluvial sands along the river of the Quaternary. No traps for fossils such as palaeochannels occur along this section of the river. There is a very small chance that fossils may occur in the recently deposited sands along the river so 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. The impact on the palaeontological heritage would be low, so as far as the palaeontology is concerned, the mining right should be granted.

The proposed site lies on the non-fossiliferous metamorphic rocks of the Riemvaasmaak Gneiss that are overlain by Quaternary fluvial gravels that are moderately sensitive as far as the palaeontology is concerned. No fossils are likely to be found on this section of the river because there are no traps for transported fossil fragments, such as palaeochannels. 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 contractor, environmental officer or other designated responsible person once excavations, drilling or mining activities have commenced. Since the impact will be low, as far as the palaeontology is concerned, the project should be authorised.

Chance Find Protocol

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

1. The following procedure is only required if fossils are seen on the surface and when drilling/excavations/mining commence.
2. When excavations begin the rocks and must be given a cursory inspection by the environmental officer or designated person. Any fossiliferous material (plants, insects, bone, invertebrates) should be put aside in a suitably protected place. This way the project activities will not be interrupted.
3. Photographs of similar fossils must be provided to the developer to assist in recognizing the fossil plants, vertebrates, invertebrates or trace fossils in the shales and mudstones. This information will be built into the EMP's training and awareness plan and procedures.
4. Photographs of the putative fossils can be sent to the palaeontologist for a preliminary assessment.
5. If there is any possible fossil material found by the developer/environmental officer/miners then the qualified palaeontologist sub-contracted for this project, should visit the

site to inspect the selected material and check the dumps where feasible.

6. Fossil plants or vertebrates that are considered to be of good quality or scientific interest by the palaeontologist must be removed, catalogued and housed in a suitable institution where they can be made available for further study. Before the fossils are removed from the site a SAHRA permit must be obtained. Annual reports must be submitted to SAHRA as required by the relevant permits.
7. If no good fossil material is recovered then no site inspections by the palaeontologist will be necessary. A final report by the palaeontologist must be sent to SAHRA once the project has been completed and only if there are fossils.
8. If no fossils are found and the excavations have finished then no further monitoring is required.

(10) *AIR QUALITY:*

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

Existing Sources

The current source of air pollution in the area stems from numerous farming operations along the Orange River and from vehicles traveling on the gravel roads of the area. Farming activity, especially ploughing or working of the irrigation fields, may generate dust during certain periods of the year.

New Source

The source of air pollution on the farm will be nuisance and fall out dust generated by the opencast mining process, the Crushing of the rock and loading it onto the transport trucks as well as from the movement of trucks and vehicles on the mining roads. Gas emissions from machinery will be kept within legal limits.

Areas of Impact

The prevailing wind (occasionally slightly) is from the north and the north -north east but the strongest winds are from the north-west.

There is a potential for fall-out dust to impact on the surrounding farm properties – which can be described as the nearest potential area of impact. The dust management programme recommended should include daily dosing of access roads and stockpile areas.

Mining can have a devastating effect on the export crops with dust and fall out that will be created by the crushing operations and can impact the exporting in the way that the export crops will not adhere to set protocols that they have to meet to be able to export. This will have devastating consequences in terms of monetary value for crops.

If dust is generated, it is expected to be visible from the surrounding farmland or mines along the Orange River.

(11) Noise:

No significant sources of noise are evident in the study area except for farming practices that can create noise. The access to the mine will be from the R64 Kakamas tar road and a gravel road, as well as farm tracks on the mine property. The tar road R64 that forms the one boundary of the application area and the traffic would be the most prominent source of noise.

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

(12) *VISUAL ASPECTS:*

Renosterkop has been recognised by many successive generations as an icon landform, geographical landmark and cultural emblem, while the land use system around it has been changing over the last 300 years. One of the major characteristics of cultural landscapes are their ability to survive through and serve many generations. Both the Namakwas Khoi and the Afrikaner communities settling in the area from the 19th century could not resist the hill's attraction and gravitas.

A basic assessment was undertaken of the likely significant impacts that the proposed mining will have on cultural landscape characteristics of the hill, strategic and local views, including to the setting of the hill in the broader land. The importance of a viewpoint is determined by any recognition of the impact that its disturbance may have and by its amenity value. In the value system we include aesthetics and tourist appeal. A major and lasting impact of the development to the hill are the open cast mine holes which will be created. Even if they will be refilled it will be impossible to recreate the original state.

Three critical viewpoints have been identified:

(i) View of the hill from the west along the road from Kakamas to Augrabies.

(ii) View of the hill from the north along a farm access road offsetting east from Kakamas-Augrabies Road.

(iii) View of the hill from the East from a position on the western edge of the Orange floodplain (see also Figures 24 - 25).

Figure 24. Google Earth map shows the location of critical viewpoints (in blue) towards Renosterkop. Bottom: View north of the hill from the Kakamas-Augrabies Falls road; Middle: View east from the farm access road; Top: View south from the edge from the Orange River floodplain;

Figure 25. View from the south from a position near the Kakamas-Augrabies Falls road

(13) *CRITICAL BIODIVERSITY AREAS AND BROAD-SCALE PROCESSES:*

Dr. Betsie Milne from Bocia Ecological Consulting Pty Ltd has been appointed by Renosterkop Mining and to determine the possible impact of mining on the application areas Critical biodiversity areas and broad-scale processes was described and included in this report.

The proposed mining site falls within critical biodiversity areas, as defined by the Northern Cape Critical Biodiversity Areas Map (Holness and Oosthuysen 2016). This map identifies biodiversity priority areas, called Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs), which, together with protected areas, are important for the persistence of a viable representative sample of all ecosystem types and species as well as the long-term ecological functioning of the landscape. The entire site is classified as Critical Biodiversity Area Two. The Orange River, that borders the study area to the north, is classified as Critical Biodiversity Area One, while the Augrabies National Park (Protected Area) lies 8km north-west of the study area.

Similarly, the Mining and Biodiversity Guidelines (DENC et al. 2013) recognises the site to be of High- and Moderate Biodiversity Importance, which constitute a high and moderate risk for mining. These guidelines were developed to identify and categorize biodiversity priority areas sensitive to the impacts of mining to support mainstreaming of biodiversity issues in decision making in the mining sector.

Furthermore, according to the National Web based Environmental Screening Tool the study area is considered to have sensitive environmental features. This tool is a geographically based web-enabled application which allows a proponent intending to apply for environmental authorisation in terms of the Environmental Impact Assessment (EIA) Regulations 2014 (as amended), to screen their proposed site for any environmental sensitivity.
According to this, the Renosterkop study area is of very high sensitivity in terms of the animal species theme, which is based on the suitable habitat and known distribution of the birds Falco biarmicus (Lanner falcon) and Neotis ludwigii (Ludwig's bustard). The Terrestrial Biodiversity Theme is also of very high sensitivity, as a direct function of the Northern Cape Critical Biodiversity Areas Map (discussed above). Renosterkop is of medium sensitivity based on the Plant Species Theme. This sensitivity is attributed to the red listed Aloidendron dichotomum, (Vulnerable) that is known from the region. It however does not occur on site. The site is of low sensitivity based on the Aquatic Biodiversity Theme.

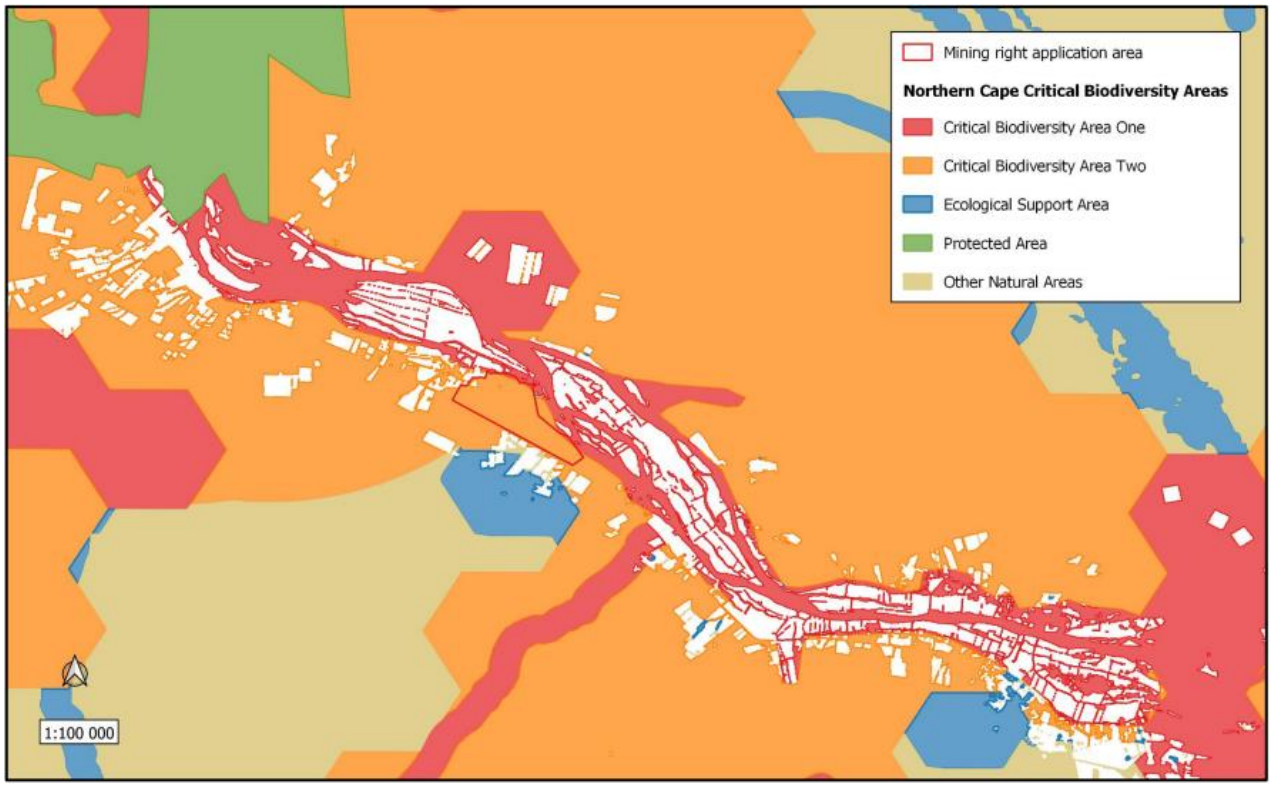


Figure 26. The study area in relation to the Northern Cape Critical Biodiversity Areas.

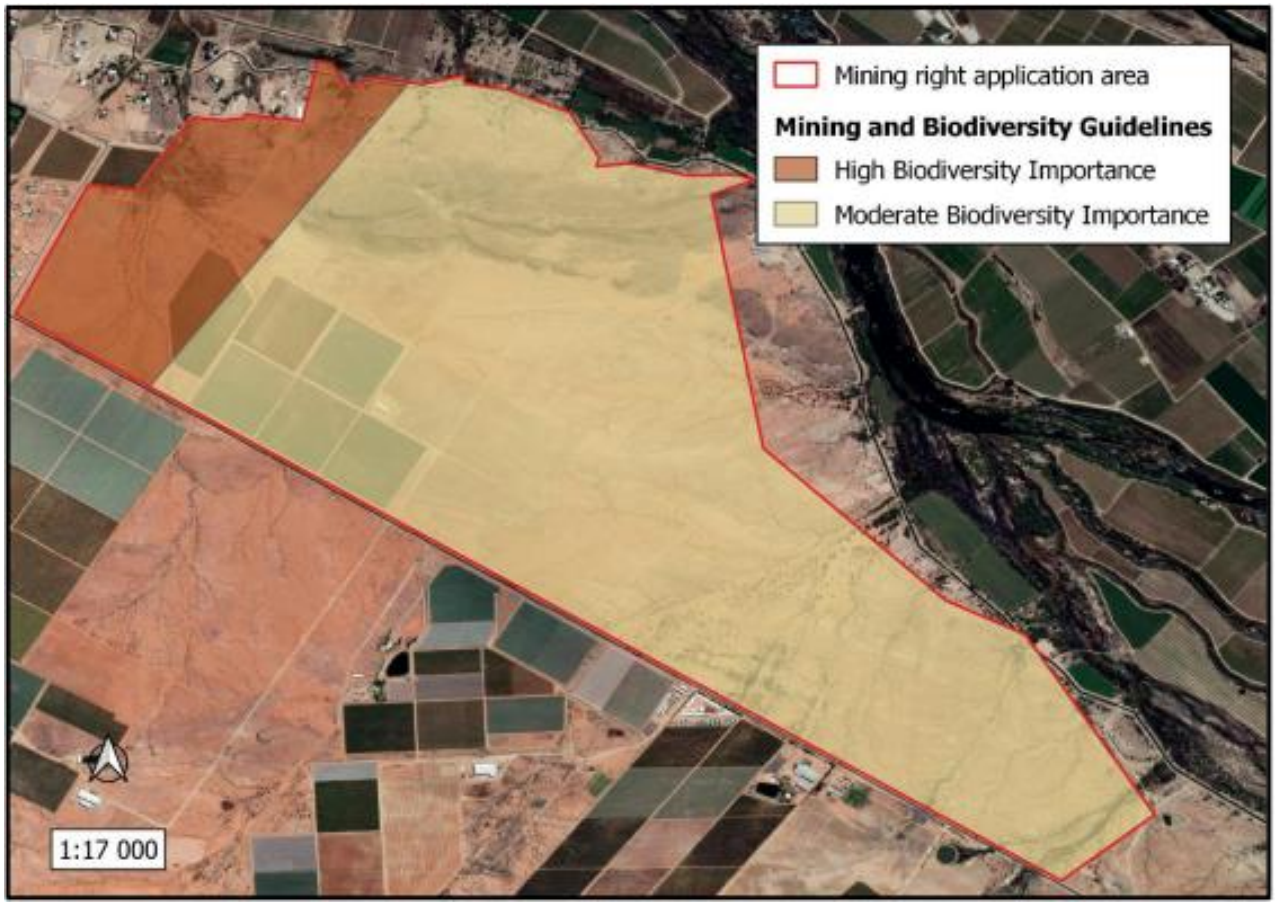


Figure 27. The study area in relation to the Mining and Biodiversity Guidelines.

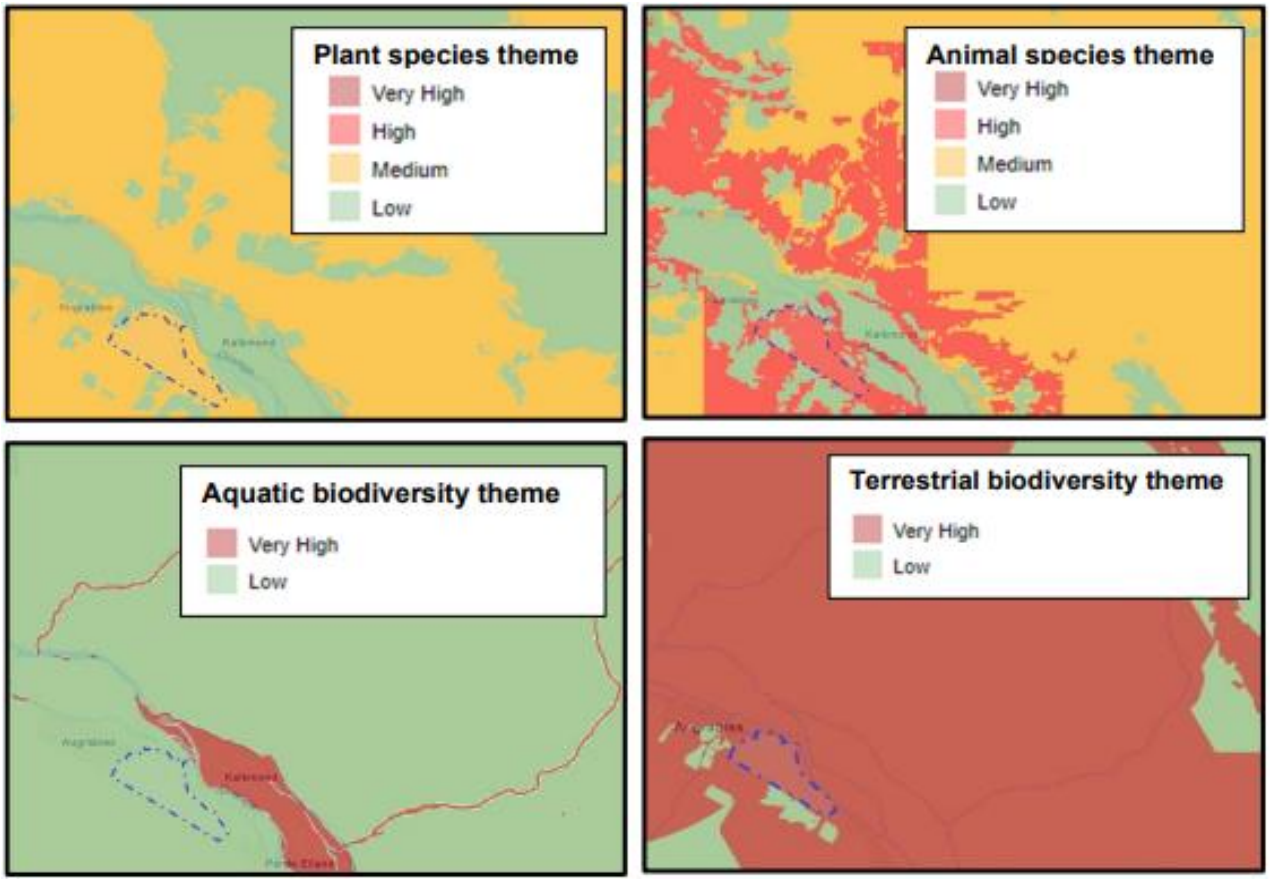


Figure 28. Environmental sensitivities in the study area, according to the National Web based Environmental Screening Tool.

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.

Finally, even though mining is not considered one of the major sectors within the study region, agriculture has transformed extensive areas along the Orange River (Figure 29). These factors increase the proposed operation's cumulative impacts in terms of habitat transformation.

Figure 29. The extent of habitat transformation near the study area.

(14) SOCIO-ECONOMIC STRUCTURE OF THE REGION:

Population Density, Growth and Location

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

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

All information in this section is taken out of the KAI !GARIB MUNICIPALITY: INTEGRATED DEVELOPMENT PLAN – 2019.

TOTAL POPULATION

Population statistics is important when analysing an economy, as the population growth directly and indirectly impacts employment and unemployment, as well as other economic indicators such as economic growth and per capita income. TABLE 8. TOTAL POPULATION - KAI !GARIB, ZF MGCAWU, NORTHERN CAPE AND NATIONAL TOTAL, 2008-2018 [NUMBERS PERCENTAGE]

	Kai !Garib	ZF Mgcawu	Northern Cape	National Total	Kai !Garib as % of district municipality	Kai !Garib as % of province	Kai !Garib as % of national
2008	64,600	228,000	1,060,000	49,100,000	28.3%	6.1%	0.13%
2009	65,000	232,000	1,080,000	49,800,000	28.0%	6.0%	0.13%
2010	65,500	236,000	1,100,000	50,700,000	27.8%	6.0%	0.13%
2011	66,100	240,000	1,120,000	51,500,000	27.6%	5.9%	0.13%
2012	66,700	244,000	1,140,000	52,400,000	27.4%	5.9%	0.13%
2013	67,400	248,000	1,160,000	53,200,000	27.2%	5.8%	0.13%
2014	68,000	252,000	1,180,000	54,100,000	27.0%	5.8%	0.13%
2015	68,600	255,000	1,200,000	54,900,000	26.9%	5.7%	0.13%
2016	69,200	259,000	1,210,000	55,700,000	26.7%	5.7%	0.12%
2017	69,900	263,000	1,230,000	56,500,000	26.6%	5.7%	0.12%
2018	70,500	266,000	1,250,000	57,400,000	26.5%	5.6%	0.12%
Average Annual growth							
2008-2018	0.87%	1.53%	1.66%	1.57%			

Table 8 – Key Statistics (Source: IHS Markit Regional eXplorer version 1692)

POPULATION PROJECTIONS

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.

	Kai !Garib	ZF Mgcawu	Northern Cape	National Total	Kai !Garib as % of district municipality	Kai !Garib as % of province	Kai !Garib as % of national
2018	70,500	266,000	1,250,000	57,400,000	26.5%	5.6%	0.12%
2019	71,100	269,000	1,270,000	58,100,000	26.4%	5.6%	0.12%
2020	71,800	273,000	1,290,000	58,900,000	26.3%	5.6%	0.12%
2021	72,400	276,000	1,300,000	59,600,000	26.2%	5.6%	0.12%
2022	73,100	279,000	1,320,000	60,400,000	26.2%	5.5%	0.12%
2023	73,900	282,000	1,340,000	61,100,000	26.2%	5.5%	0.12%
Average Annual growth							
2018-2023	0.95%	1.21%	1.33%	1.27%			

Table 9. Population projections - Kai !Garib, ZF Mgcawu, Northern Cape and national total, 2018-2023 [numbers percentage] (Source: IHS Markit Regional eXplorer version 1692)

The population projection of Kai !Garib Local Municipality shows an estimated average annual growth rate of 0.9% between 2018 and 2023. The average annual growth rate in the population over the projection period for ZF Mgcawu District Municipality, Northern Cape Province and South Africa is 1.2%, 1.3% and 1.3% respectively. The Northern Cape Province is estimated to have an average growth rate of 1.3% which is very similar than that of the Kai !Garib Local Municipality. The South Africa as a whole is estimated to have an average annual growth rate of 1.3% which is very similar than that of Kai !Garib's projected growth rate.

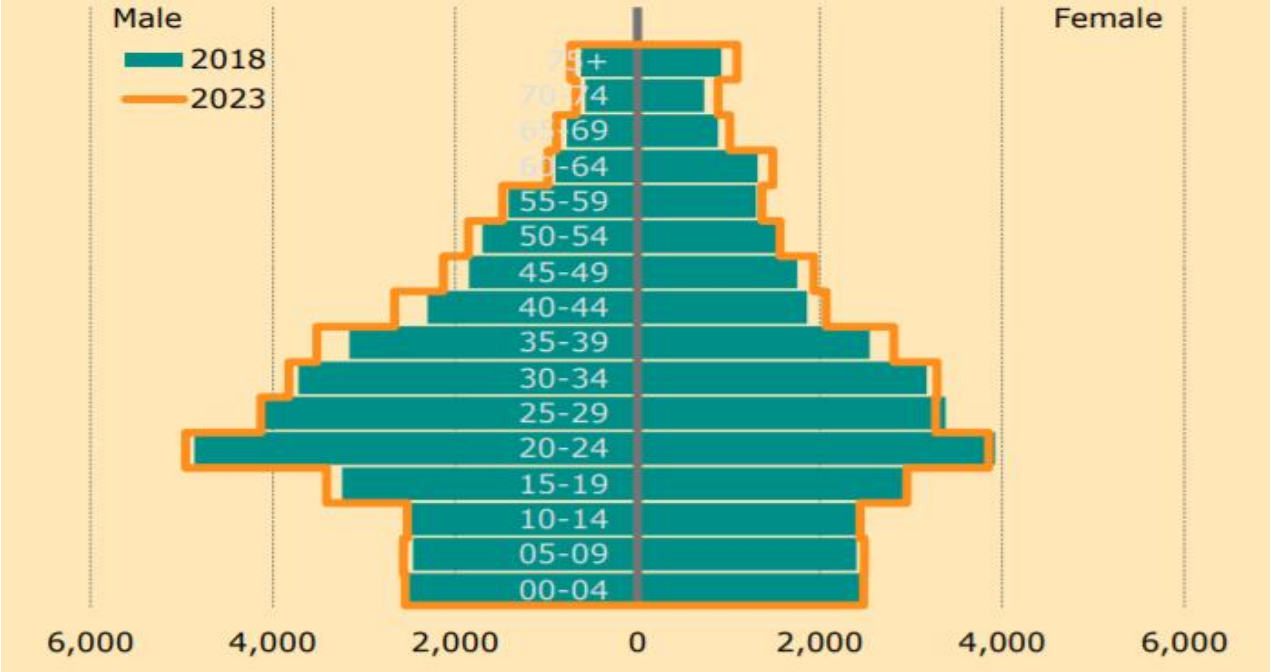


Table 10. Population structure Kai !Garib, 2018 vs. 2023 (Source: IHS Markit Regional eXplorer version 1692)

The population pyramid reflects a projected change in the structure of the population from 2018 and 2023. 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. Population by population group, Gender and Age The total population of a region is the total number of people within that region measured in the middle of the year. Total population can be categorised according to the population group, as well as the sub-categories of age and gender. The population groups include African, White, Coloured and Asian, where the Asian group includes all people originating from Asia, India and China. The age subcategory divides the population into 5-year cohorts, e.g. 0-4, 5-9, 10-13, etc.

	African		White		Coloured		Asian	
	Female	Male	Female	Male	Female	Male	Female	Male
00-04	497	492	107	157	1,840	1,880	63	58
05-09	226	218	116	139	2,020	2,070	45	39
10-14	209	214	140	110	2,090	2,180	51	57
15-19	679	1,020	109	133	2,110	2,070	21	22
20-24	1,880	2,690	127	115	1,890	2,040	26	16
25-29	1,450	2,080	124	140	1,760	1,850	49	21
30-34	1,060	1,770	156	126	1,920	1,800	45	23
35-39	686	1,380	183	217	1,640	1,510	40	47
40-44	407	842	139	160	1,300	1,250	15	53
45-49	273	590	164	131	1,290	1,100	26	30
50-54	137	339	211	177	1,190	1,160	17	24
55-59	91	250	183	206	1,020	951	10	7
60-64	82	114	190	135	1,040	642	9	9
65-69	69	80	172	140	634	552	9	5
70-74	34	57	170	130	520	377	8	7
75+	55	75	279	150	579	387	5	7
Total	**7,830**	**12,200**	**2,570**	**2,360**	**22,800**	**21,800**	**439**	**426**

Table 11. Population by population group, gender and age - Kai !Garib local municipality, 2018 [number]. (Source: IHS Markit Regional eXplorer version 1692)

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 largest share of population is within the young working age (25-44 years) age category with a total number of 24 200 or 34.4% of the total population. The age category with the second largest number of people is the babies and kids (0-14 years) age category with a total share of 21.3%, followed by the teenagers and youth (15-24 years) age category with 14 900 people. The age category with the least number of people is the retired / old age (65 years and older) age category with only 4 500 people is indicated by the statistics. With the Coloured population group representing 63.3%of the Kai !Garib Local Municipality's total population, the overall population pyramid for the region will mostly reflect that of the African population group. The chart below compares Kai !Garib's population structure of 2018 to that of South Africa.

- There is a significantly larger share of young working age people - aged 20 to 34 (32.8%) - in Kai !Garib, compared to the national picture (27.5%).
- The area appears to be a migrant receiving area, with many of people migrating into Kai !Garib, either from abroad, or from the more rural areas in the country looking for better opportunities.
- Fertility in Kai !Garib is significant lower compared to South Africa as a whole.
- Spatial policies changed since 1994.
- The share of children between the ages of 0 to 14 years is significant smaller (21.3%) in Kai !Garib compared to South Africa (29.0%). Demand for expenditure on schooling as percentage of total budget within Kai !Garib Local Municipality will therefore be lower than that of South Africa.

If the number of households is growing at a faster rate than that of the population it means that the average household size is decreasing, and vice versa. In 2018, the Kai !Garib Local Municipality comprised of 18 400 households. This equates to an average annual growth rate of 0.24% in the number of households from 2008 to 2018. With an average annual growth rate of 0.87% in the total 30 population, the average household size in the Kai !Garib Local Municipality is by implication increasing. This is confirmed by the data where the average household size in 2008 increased from approximately 3.6 individuals per household to 3.8 persons per household in 2018.

	Kai !Garib	ZF Mgcawu	Northern Cape	National Total	Kai !Garib as % of district municipality	Kai !Garib as % of province	Kai !Garib as % of national
2008	17,900	61,300	287,000	13,400,000	29.3%	6.2%	0.13%
2009	17,400	61,800	288,000	13,700,000	28.2%	6.1%	0.13%
2010	17,100	62,500	291,000	13,900,000	27.3%	5.9%	0.12%
2011	16,800	63,800	298,000	14,200,000	26.4%	5.6%	0.12%
2012	17,100	65,300	306,000	14,500,000	26.2%	5.6%	0.12%
2013	17,400	66,900	314,000	14,700,000	26.0%	5.5%	0.12%
2014	17,500	67,800	319,000	15,000,000	25.8%	5.5%	0.12%
2015	17,500	68,500	323,000	15,400,000	25.6%	5.4%	0.11%
2016	17,800	69,800	331,000	15,700,000	25.5%	5.4%	0.11%
2017	18,100	71,500	341,000	16,100,000	25.3%	5.3%	0.11%
2018	18,400	73,000	349,000	16,400,000	25.2%	5.3%	0.11%
Average Annual growth							
2008-2018	0.24%	1.76%	1.96%	2.02%			

Table 12. Number of households - Kai !garib, ZF Mgcawu, Northern Cape and national total, 2008-2018 [number percentage] (Source: IHS Markit Regional eXplorer version 1692)

Relative to the district municipality, the Kai !Garib Local Municipality had a lower average annual growth rate of 0.24% from 2008 to 2018. In contrast, the province had an average annual growth rate of 1.96% from 2008. The South Africa as a whole had a total of 16.4 million households, with a growth rate of 2.02%, thus growing at a higher rate than the Kai !Garib. 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. The growth in the number of Coloured headed households was on average 0.35% per annum between 2008 and 2018, which translates in the number of households increasing by 361 in the period. Although the Asian population group is not the biggest in size, it was however the fastest growing population group between 2008 and 2018 at 19.43%. The average annual growth rate in the number of households for all the other population groups has increased with 0.09%.

Labour (Employment and unemployment) The labour force of a country consists of everyone of working age (above a certain age and below retirement) that are participating as workers, i.e. people who are

actively employed or seeking employment. This is also called the economically active population (EAP). People not included are students, retired people, stay-at-home parents, people in prisons or similar institutions, people employed in jobs or professions with unreported income, as well as discouraged workers who cannot find work.

	Kai !Garib		ZF Mgcawu		Northern Cape		National Total	
	2008	2018	2008	2018	2008	2018	2008	2018
15-19	6,280	6,160	22,300	23,000	106,000	105,000	5,150,000	4,600,000
20-24	8,160	8,780	24,300	26,300	105,000	106,000	5,420,000	4,770,000
25-29	7,180	7,470	21,800	24,900	95,000	107,000	4,890,000	5,470,000
30-34	5,340	6,900	18,200	24,400	79,100	105,000	3,830,000	5,520,000
35-39	4,280	5,710	15,100	20,600	65,700	93,700	3,020,000	4,670,000
40-44	3,810	4,160	13,600	16,800	59,900	76,900	2,610,000	3,460,000
45-49	3,310	3,600	12,100	14,100	55,800	63,000	2,340,000	2,660,000
50-54	2,900	3,260	10,300	12,300	48,400	56,800	1,970,000	2,310,000
55-59	2,190	2,720	7,900	10,500	39,500	52,100	1,600,000	2,060,000
60-64	1,760	2,220	6,400	8,740	31,000	44,500	1,250,000	1,720,000
Total	**45,209**	**50,975**	**151,906**	**181,695**	**685,400**	**809,947**	**32,092,108**	**37,241,166**

Table 13. Working age Population In Kai !Garib, Zf Mgcawu, Northern Cape and National total, 2008 And 2018 [Number] (Source: IHS Markit Regional eXplorer version 1692)

The working age population in Kai !Garib in 2018 was 51 000, increasing at an average annual rate of 1.21% since 2008. For the same period the working age population for ZF Mgcawu District Municipality increased at 1.81% annually, while that of Northern Cape Province increased at 1.68% annually. South Africa's working age population has increased annually by 1.50% from 32.1 million in 2008 to 37.2 million in 2018. The graph below combines all the facets of the labour force in the Kai !Garib Local Municipality into one compact view. The chart is divided into "place of residence" on the left, which is measured from the population side, and "place of work" on the right, which is measured from the business side.

Total Employment

Employment data is a key element in the estimation of unemployment. In addition, trends in employment within different sectors and industries normally indicate significant structural changes in the economy. Employment data is also used in the calculation of productivity, earnings per worker, and other economic indicators.

	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%*

Table 14. Total Employment - Kai !Garib, Zf Mgcawu, Northern Cape and National total, 2008 And 2018 [Number] (Source: IHS Markit Regional eXplorer version 1692)

Unemployment

The choice of definition for what constitutes being unemployed has a large impact on the final estimates for all measured labour force variables. The following definition was adopted by the Thirteenth International Conference of Labour Statisticians (Geneva, 1982): The "unemployed" comprise all persons above a specified age who during the reference period were:

- "Without work", i.e. not in paid employment or self-employment;
- "Currently available for work", i.e. were available for paid employment or self-employment during the reference period; and
- "Seeking work", i.e. had taken specific steps in a specified reference period to seek paid employment or self-employment. The specific steps may include registration at a public or private employment exchange; application to employers; checking at worksites, farms, factory gates, market or other assembly places; placing or answering newspaper advertisements; seeking assistance of friends or relatives; looking for land.

	Kai !Garib	ZF Mgcawu	Northern Cape	National Total	Kai !Garib as % of district municipality	Kai !Garib as % of province	Kai !Garib as % of national
2008	3,610	18,400	104,000	4,350,000	*19.6%*	*3.5%*	*0.08%*
2009	3,420	18,000	101,000	4,370,000	*19.0%*	*3.4%*	*0.08%*
2010	3,380	18,200	103,000	4,490,000	*18.6%*	*3.3%*	*0.08%*
2011	3,360	18,800	107,000	4,570,000	*17.9%*	*3.1%*	*0.07%*
2012	3,750	19,900	114,000	4,690,000	*18.8%*	*3.3%*	*0.08%*
2013	4,110	21,500	122,000	4,850,000	*19.1%*	*3.4%*	*0.08%*
2014	4,520	23,000	131,000	5,060,000	*19.7%*	*3.5%*	*0.09%*
2015	4,660	23,300	135,000	5,290,000	*20.0%*	*3.5%*	*0.09%*
2016	4,460	23,000	135,000	5,630,000	*19.4%*	*3.3%*	*0.08%*
2017	4,340	22,400	133,000	5,940,000	*19.4%*	*3.3%*	*0.07%*
2018	4,170	21,700	130,000	6,010,000	*19.2%*	*3.2%*	*0.07%*
Average Annual growth							
2008-2018	*1.45%*	*1.65%*	*2.24%*	*3.30%*			

Table 15. Unemployment ,Kai !Garib, Zf Mgcawu, Northern Cape and National total, 2008 And 2018 [Number] (Source: IHS Markit Regional eXplorer version 1692)

(14) *SENSITIVE LANDSCAPES:*

Site sensitivity

The ecological sensitivity map for Renosterkop is illustrated in Figure 30. The drainage lines are all considered to be of very high sensitivity. They are highly sensitive due to their vital hydrological functionality and all watercourses are unique habitats protected in terms of the National Water Act (Act No 36 of 1998). These areas should be considered as no-go areas.

The hills and grassland habitat harbour several plant species of conservation concern and provide potential habitat for protected bird-, reptile- and invertebrate species, as highlighted in this report. These habitats are of high sensitivity. These areas are not regarded as no-go areas, but activities should proceed with caution as it may not be possible to mitigate all impacts appropriately.

Those areas disturbed by existing land use activities are of medium sensitivity. Activities within these areas can proceed with relatively little ecological impact provided that appropriate mitigation measures are taken. The transformed areas are of low sensitivity. Here, the habitat has already been severely transformed and the proposed mining activities would not have any impact on ecological processes and biodiversity in these areas.

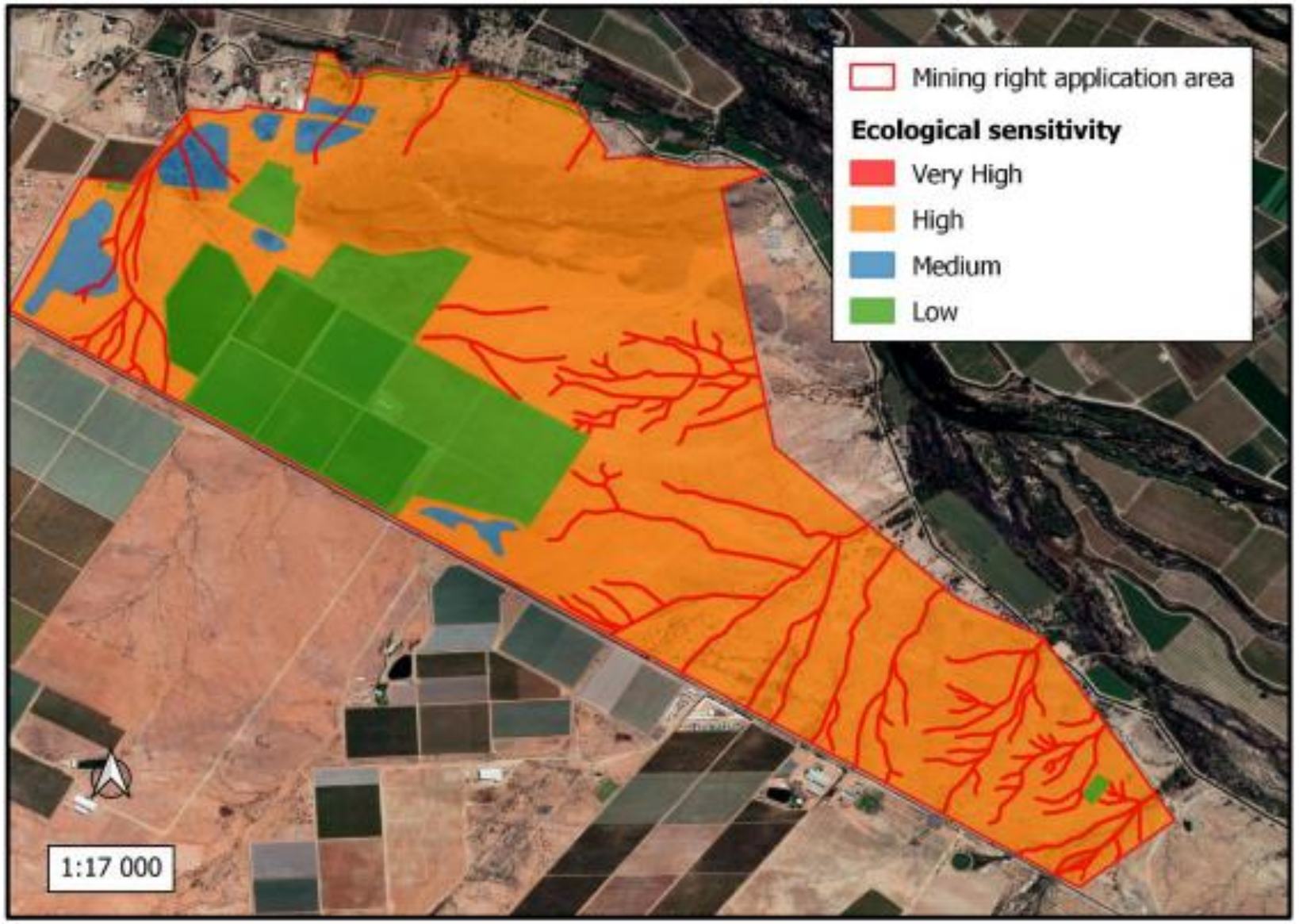


Figure 30. A sensitivity map for the Renosterkop mining area

(b) Description of the current land uses

Dr. Betsie Milne from Bocia Ecological Consulting Pty Ltd has been appointed by Renosterkop Mining and to determine the possible impact of mining on the application area Land capability and Land Use was described and included in this report.

Pre-mining Land Capability

The major land uses in the area are agriculture. The region is arable and classified as the Orange River Potential Agricultural Area, which is an area with High Agricultural Potential (B rating).

This is due to the Good and Excellent irrigation suitability of the land. The grazing capacity is 36 - 42 ha/LSU, with the grazing land being demarcated for sheep.

Land Use Prior to Mining

Apart from the proposed mining activities, Renosterkop is currently utilised for **extensive irrigation of export crops**. Existing landuse features include farm tracks and other supporting infrastructure, with associated surface disturbances. A canal traverses the northern boundary of the site and there is a communal soccer field in the far south-eastern corner. An old field is present in the north-east and disturbances associated with historic mining occur on the hills.

Historical Agricultural Activities and evidence of Abuse

An old field is present in the north-east and disturbances associated with historic mining occur on the hills.

Existing Structures

Existing land use features include farm tracks and other supporting infrastructure, with associated surface disturbances. A canal traverses the northern boundary of the site and there is a communal soccer field in the far south-eastern corner. An old field is present in the north-east and disturbances associated with historic mining occur on the hills.

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

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

(d) Environmental and current land use map

(Show all environmental, and current land use features)

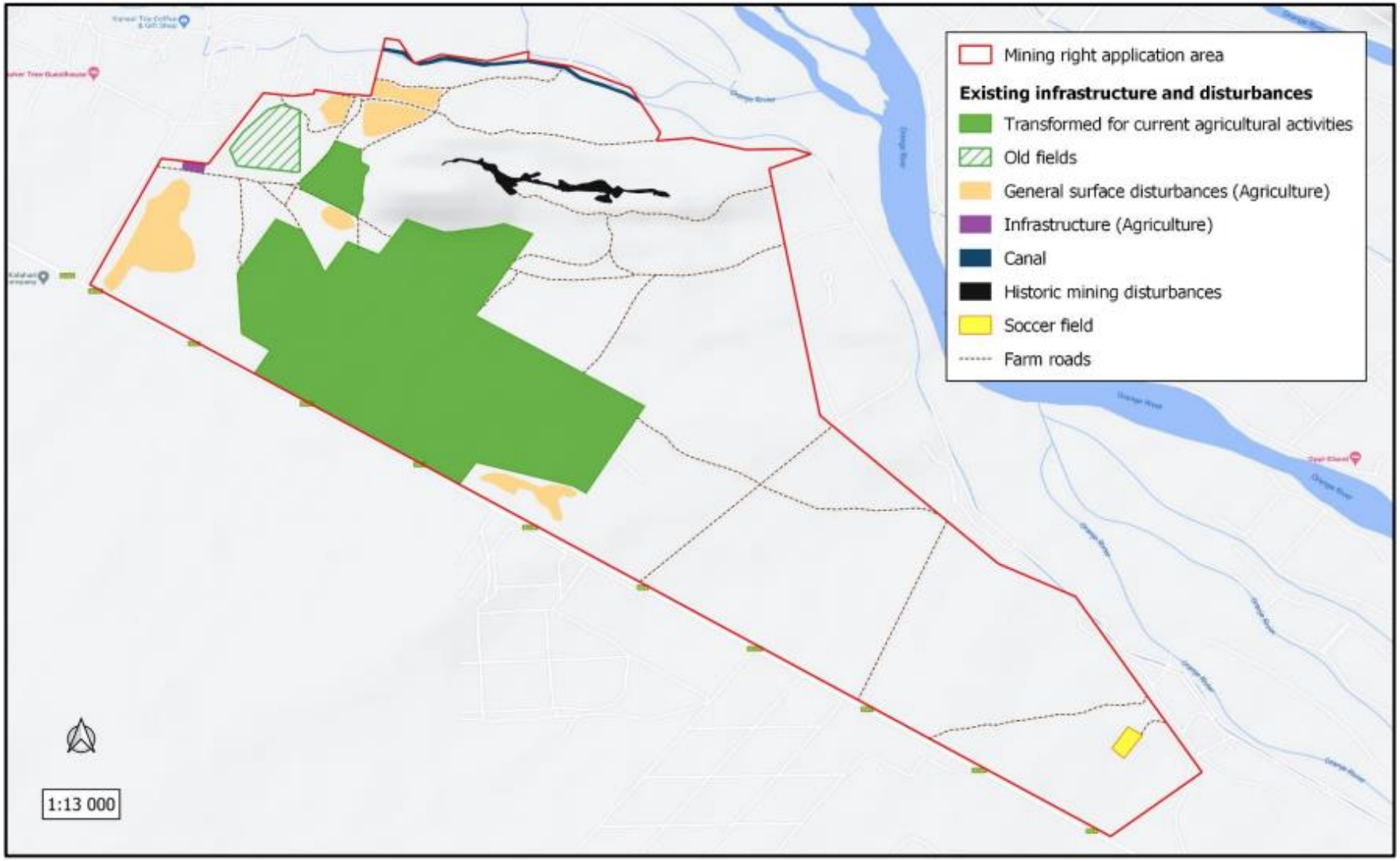


Figure 31. Environmental and current land use map with previous distubances evident

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

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

Environmental Factor	Nature of Impact	Significance	Probability	Duration	Consequence Extent	Management / mitigation
PHYSICAL						
Geology and Mineral Resource	Sterilisation of mineral resources	Low	Highly unlikely	Operational and Decommissioning	insignificant Local	Ensure that optimal use is made of the available mineral resource.
Topography	Changes to surface topography Development of infrastructure; and residue deposits.	Medium - High	Certain for life of operation	Residual	Medium Local	• Mining continuously, if possible and does not influence mining and safety requirements. • Employ effective rehabilitation strategies to restore surface topography of excavations, dumps and Crushing plant site. • Stabilise the Rock dumps. • All temporary infrastructures should be demolished during closure.
Soils	**Soil Character and Quality** During clearing of an area for the excavation of minerals, construction of infrastructure and	Medium - High	Certain for life of operation	Residual	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

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

	subsequently the water infiltration rate into soil.					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 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.
	Loss of soil fertility During clearing of an area for the excavation of	Medium - High	Certain for life of operation	Residual	Medium On-Site	• Topsoil needs to be removed and stored separately during mining and the construction of roads, infrastructure and stockpile areas.

	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 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.					• 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. • 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
	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. Furthermore, any topsoil-, overburden- and ore stockpiles	Low - Medium	Possible frequently	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. • No new roads, infrastructure or mining areas should be developed over the drainage lines. • Disturbances during the rainy season should be monitored and controlled. • Any potential run-off from exposed ground should be controlled with flow retarding barriers. • Regular monitoring during the mining operation should be carried out to identify areas

	can be eroded by wind, rain, and flooding. Exposed sediments in the watercourses can be carried away during runoff causing downstream sediment deposition. Any leaking pipes can also cause additional water erosion.					where erosion is occurring; followed by appropriate remedial actions.
Land Capability	Loss of land capability through topsoil removal, disturbances and loss of fertility.	Very Low	Possible	Short term	Minimal Local	Employ appropriate rehabilitation strategies to restore land capability.
Land use	Loss of land use due to poor placement of surface infrastructure and ineffective rehabilitation	Very low	Possible	Short term	Minimal Local	Carefully plan the placement of infrastructure and employ rehabilitation strategies to restore land capability.
Ground Water Quantity	Nature of Impact	Significance	Probability	Duration	Consequence Extent	Management / mitigation
	Hydrocarbon Spills Hydrocarbon spills from construction vehicles and fuel storage areas may contaminate the groundwater resource locally	Medium	Possible	Construction	Low Local	Staff at Workshop areas, yellow metal laydown zones and fuel storage areas should be sufficiently trained in hydrocarbon spill response. Each area where hydrocarbons are stored or likely to spill should be equipped with sufficient spill

						response kits and personnel, contaminated soil should be disposed of correctly at a suitable location.
Environmental Factor	Nature of Impact	Significance	Probability	Duration	Consequence Extent	Management / mitigation
Surface Water **Alteration / destruction of watercourses** **Siltation of surface water**	During excavation of minerals, construction of infrastructure and roads, stockpiling. During mining activities there is a possibility that the watercourses on site (i.e. pans and drainage lines) might be altered or indirectly affected. This includes direct mining within the watercourses as well as development of roads, infrastructure or stockpiles within their active zones, catchment areas, or buffer zones. Such activities can completely change the	Medium to High	Possible, infrequent	Permanent	Medium Regional	• All activities associated with the mining operation must be planned to avoid any disturbances to the watercourses and their buffer zones. • No new roads should be created across a watercourse and no mining should take place in them. If this is unavoidable, a water use license to alter the beds and banks of each earmarked watercourse should be obtained from DWS prior to such activities. • Employ sound rehabilitation measures to restore characteristics of all affected watercourses. • Bare ground exposure should always be minimised in terms of the surface area and duration.

	hydrologic regime or habitat conditions of the watercourses, which will not only compromise their ecological functioning, but also have downstream effects.					• Re-establishment of plant cover on disturbed areas must take place as soon as possible once activities in the area have ceased. • No new roads, infrastructure or mining areas should be developed over watercourses. • Disturbances during the rainy season should be monitored and controlled. • Any potential run-off from exposed ground should be controlled with flow retarding barriers. • Regular monitoring during the mining operation should be carried out to identify areas where erosion is occurring; followed by appropriate remedial actions.
	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 the mining areas and associated infrastructure. These bare areas will be very susceptible to water erosion without plants to stabilise the soil, creating potential sediment source zones. High runoff					

	events could potentially cause the drainage lines and pans to be filled with silt from mining areas if the sediment source zones lie along the drainage paths towards these watercourses. This may lead to a change in hydrologic regime or character of the watercourses.					
Environmental Factor	Nature of Impact	Significance	Probability	Duration	Consequence Extent	Management
Indigenous Flora	**Loss of and disturbance to indigenous vegetation** During clearing of an area for the excavation of minerals, construction of infrastructure and roads, stockpiling. The Renosterkop mining activities are expected to destroy a	Low to medium	Certain for life of operation	Residual	Low to 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.

	large area of the habitat on the hills. It is expected that the ecological functioning and biodiversity will take many years to fully recover. Furthermore, vehicle traffic and mining activities generate lots of dust which can reduce the growth success and seed dispersal of many small plant species in the adjacent areas.					• Encourage the growth of natural plant species in all affected areas by sowing indigenous seeds or by planting seedlings. • The setup of a small nursery is advisable to maximise translocation and re-establishment efforts of affected areas. • Apply for permits to authorise the clearance of indigenous plants from DENC at least three months before such activities will commence.
	Loss of Red data and / or protected flora 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	Medium High	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

	plant species for non-mine related purposes, e.g., illegal succulent trade. There are numerous plant species of conservation concern present in the Renosterkop Mining Right area, including the red listed Acanthopsis hoffmannseggiana (DDT), Salsola tuberculata (DDT), and Oxalis extensa (DDD), as well as several species protected under Schedule 2 of the NCNCA (Ruschia intricata, Nerine laticoma, Anacampseros albissima, Cryptolepis decidua, Aloe claviflora, Boscia albitrunca, B. foetida subsp. foetida, Euphorbia braunsii, Vachellia erioloba, Oxalis					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-establishment efforts of all the rescued plants. • A management plan should be implemented to ensure proper establishment of ex situ individuals and should include a monitoring programme for at least two years after re-establishment 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

	haedulipes and Jamesbrittenia megadenia. Therefore, it is likely that the mining operation could potentially have a major impact on these species if their local populations are destroyed. Furthermore, any illegal harvesting of these plants of conservation concern for trade by staff, contractors or secondary land users could have devastating effects on the population of these species.					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	Low Medium-	Possible, infrequent	Residual	Low 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

	roads, stockpiling, improper rehabilitation practises. Existing populations. Several invasive species (Salsola kali, Prosopis glandulosa, P. velutina, and Nicotiana glauca) occur within and around the study area. Anthropogenic disturbances to natural vegetation, especially the clearance of large areas of land, provide the opportunity for 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					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.

	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,	Low	Possible, infrequently	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

	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 disturbed areas. If encroaching plants establish in disturbed areas, it may lower the potential for future land use and decrease biodiversity.					needs to be implemented to ensure effective eradication. • Encourage proper rehabilitation of disturbed areas through soil restoration and reseeding of indigenous plant species.

	Senegalia mellifera was especially common on site. However, the removal of these species during mining activities may potentially reduce their abundance and therefore mining could have a positive effect on bush encroachment.					
Fauna	**Loss, damage and fragmentation of natural habitats** 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	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 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

	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 as well as the degradation of ephemeral aquatic habitats in the drainage channels. Small-scale fragmentation disconnects breeding and foraging links, increasing stress and energy budget deficits, which is especially taxing on animals living in arid environments. Larger scale fragmentation results in a subsequent loss of genetic variability					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 for employees, machinery or even visitors. • No new roads should be created across a watercourse. • No mining should take place in the drainage lines. If this is unavoidable, a water use license to alter the beds and banks of the watercourses should be obtained from DWS prior to such activities.

	between meta-populations occurring within the study site. Pockets of fragmented natural habitats hinder the growth and development of populations. The mining activities is expected to result in the loss of connectivity and fragmentation of natural micro-habitats primarily on a local scale.					• 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. The site provides suitable habitat for several species of conservation	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 authorised to do so. Areas surrounding the earmarked site that are not part of the demarcated area should be considered as a no-go zone.

	concern, as discussed in the various faunal taxon groups in this report. The proposed 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 vehicles cause road					• 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. • It is recommended that these individuals be rescued and relocated by a registered professional prior to intended activities. • No mining should take place in the drainage lines and no new roads should be created across drainage lines. If this is unavoidable, a water use license to alter the beds and banks of each earmarked watercourse should be obtained from DWS prior to such activities.

	kills of small mammals, birds, reptiles, amphibians, and many invertebrates. Intentional killing of snakes, reptiles, and owls will negatively affect their local populations.					• 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 exposed during the clearing operations should be captured for later release or translocation by a qualified expert. • Employ measures that ensure adherence to a maximum speed limit of 40 km/h as well as driving mindfully on site to lower the risk of animals being killed on the roads or elsewhere in the mining area.
Cumulative Compromise of Broadscale Ecological Processes	Clearing of vegetation and disturbance during the construction of roads and mining activities; alterations to watercourse habitat	Medium-high	Certain for life of operation	Residual	Low-Medium Regional	• Implement best practise principles to minimise the footprint of transformation. • No new roads should be created across the drainage lines and no mining should take place in the drainage lines. If this is unavoidable, a

	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 to environmental fluctuations. The vast extent of agricultural activities in the region have already transformed large natural landscapes and the proposed mining activities will add to the fragmentation of habitats on a landscape level. Habitat alterations will also destroy connectivity of vital ecological corridors of aquatic food					water use license to alter the beds and banks of each earmarked watercourse should be obtained from DWS prior to such activities. • Employ sound rehabilitation measures to restore characteristics of all affected habitats.

	webs in the ephemeral drainage lines, which could have cascading effects on a catchment level.					
Water Resources	**Alteration/ destruction of watercourses** During excavation of minerals, construction of infrastructure and roads, stockpiling. During mining activities there is a possibility that the watercourses on site (i.e., drainage lines) might be altered or indirectly affected. This includes direct mining within the watercourses as well as development of roads, infrastructure or stockpiles within their channels, catchment areas, or buffer zones. Such	Medium - High	Possible for life of operation	Permanent	Low-Medium Regional	• All activities associated with the mining operation must be planned to avoid any disturbances to the watercourses and their buffer zones. • No new roads should be created across the drainage lines and no mining should take place in the drainage lines. If this is unavoidable, a water use license to alter the beds and banks of each earmarked watercourse should be obtained from DWS prior to such activities. • Employ sound rehabilitation measures to restore characteristics of all affected watercourses.

	activities can completely change the hydrologic regime or habitat conditions of the watercourses, which will not only compromise their ecological functioning, but also have downstream effects.					
	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 the mining areas and associated infrastructure. These bare areas will be susceptible to water erosion	Low-Medium	Possible infrequent	Decommissioning	Low Regional	• Bare ground exposure should always be minimised in terms of the surface area and duration. • Re-establishment of plant cover on disturbed areas must take place as soon as possible once activities in the area have ceased. • No new roads, infrastructure or mining areas should be developed over watercourses. • Disturbances during the rainy season should be monitored and controlled. • Any potential run-off from exposed ground should be controlled with flow retarding barriers. • Regular monitoring during the mining operation should be

	without plants to stabilise the soil, creating potential sediment source zones. High runoff events could potentially cause the drainage lines to be filled with silt from mining areas if the sediment source zones lie along the drainage paths towards these watercourses. This may lead to a change in hydrologic regime or character of the watercourses on site, and the Orange River further downstream.					carried out to identify areas where erosion is occurring; followed by appropriate remedial actions.
Air Quality	Sources of atmospheric emission associated with the mining operation are likely to include fugitive dust from materials handling operations, Crushing wind erosion of stockpiles, and vehicle	High	Certain for life of operation	Residual	High Regional	Effective soil management; identification of the required control efficiencies in order to maintain dust generation within acceptable levels.

	entrainment of road dust.					
SOCIAL SURROUNDINGS						
Environmental Factor	Nature of Impact	Significance	Probability	Duration	Consequence Extent	Management
Noise Impacts	Clearing of footprint areas, stripping of stockpiling of topsoil Noise increase at the boundary of the mine footprint	Medium	Possible	Pre- Construction and Construction	Low Local	Equipment and/or machinery which will be used must comply with the manufacturer's specifications on acceptable noise levels Topsoil stripping should be limited to daytime only.
	Construction of internal Roads	Medium	Possible	Pre- Construction and Construction	Low Local	Equipment and/or machinery which will be used must comply with the manufacturer's specifications on acceptable noise levels Construction of internal roads should be limited to daytime only.
	Construction of the rock dump, soil stock pile and material stock pile.	Medium	Possible	Pre- Construction and Construction	Low Local	Equipment and/or machinery which will be used must comply with the manufacturer's specifications on acceptable noise levels Noise survey to be carried out to monitor the noise levels during these activities.
	Clearing of new open cast mining areas, stripping and stockpiling of topsoil.	Medium	Possible	Operational	Low Local	Equipment and/or machinery which will be used must comply with the manufacturer's specifications on acceptable noise levels.

						Topsoil stripping should be limited to daytime only.
	Diesel generators	Medium	Possible	Operational to closure	Low Local	Equipment and/or machinery which will be used must comply with the manufacturer's specifications on acceptable noise levels. Noise survey to be carried out to monitor the noise levels during these activities.
	Mining activities	Medium	Possible	Operational to closure	Low Local	Equipment and/or machinery which will be used must comply with the manufacturer's specifications on acceptable noise levels Noise survey to be carried out to monitor the noise levels during these activities.
	Maintenance activities at the site.	Medium	Possible	Operational to closure	Low Local	Equipment and/or machinery which will be used must comply with the manufacturer's specifications on acceptable noise levels Noise survey to be carried out to monitor the noise levels during these activities.
	Back fill of mine footprint area	Medium	Possible	Decommissioning	Low Local	Equipment and/or machinery which will be used must comply with the manufacturer's specifications on acceptable noise levels.

						Backfill of mine footprint area activities should be limited to daytime only.
Visual impacts	Potential visual impact	High	Certain	Construction, Operation and Decommissioning	High Regional	The design of the proposed mining development will determine the visual impact. As the visual impact would be High, Correct design will ensure that the development will fit into the surrounding area.
Traffic	Potential negative impacts on traffic safety and deterioration of the existing road networks.	Low	Low likelihood	Decommissioning	Low Local	Utilise existing access roads, where applicable; implement measures that ensure adherence to traffic rules.
Environmental Factor	Nature of Impact	Significance	Probability	Duration	Consequence Extent	Management
Socio-Economic	**Population Impacts** Employment Opportunities and skills Inequities	Medium Positive	Probable	Start-up and Construction	Medium Positive Local	• A community skills audit should be undertaken by Renosterkop. Alternatively, the existing Labour Desk could be used to determine which skills are locally available and which employees could come into consideration for employment. • Training of potential future employees, contract workers and/or community members should focus on mining related skills which would furthermore equip trainees/beneficiaries with the

						necessary portable skills to find employment at the available employment sectors within the study area. Multi-skilling is thus not necessarily the preferred training and skills development method. • Training courses should be accredited and certificates obtained should be acceptable by other related industries. • Guidance concerning legal requirements to which locals should adhere to, to make them employable, such as the standard construction industry requirements should also be attended to.
	Safety and Security Risks	Low Negative	Highly Probable	Construction	Low Negative Local	• A Fire/Emergency Management Plan should be developed and implemented at the outset of the construction phase. • Open fires for cooking and related purposes should not be allowed on site. • Appropriate firefighting equipment should be on site and construction workers should be appropriately trained for fire fighting • The construction area should be fenced or access to the area

						should be controlled to avoid animals or people entering the area without authorisation. • The construction sites should be clearly marked and "danger" and "no entry" signs should be erected. • Speed limits on the local roads surrounding the construction sites should be enforced. • Speeding of construction vehicles must be strictly monitored • Local procurement and job creation should receive preference.
	Health Impacts	Low Negative	Highly probable	Construction	Low Negative Local	• Maximise the employment of locals where possible • First aid supplies should be available at various points at the construction site • Continue and extend the current HIV/AIDS awareness and support programmes, with specific focus on those in and nearby the construction site • The general health of construction workers should be monitored on an on-going basis

Interested and Affected Parties	Loss of trust and a good standing relationship between the IAP's and the mining company.	Low to medium	Possible	Construction, Operational and Decommissioning	Low Local	Ensure continuous and transparent communication with IAP's

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

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

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

1. **Geology**
2. **Topography**
3. **Soil**
4. **Land Capability**
5. **Land Use**
6. **Flora (Vegetation)**
7. **Fauna**
8. **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**

Impact Assessment

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

1	**Crushing Plant**
2	**Ablution Facilities:** In terms of sewage the decision was made to use permanent ablution facilities for the life of mine and not chemical toilets which can be serviced regularly by the service provider.
3	**Clean & Dirty water system: Berms** It is anticipated that the operation will establish stormwater control berms and trenches to separate clean and dirty water on the mine site.
4	**Fuel Storage facility (Concrete Bund walls and Diesel tanks):** It is anticipated that the operation will utilize 2 x 23 000 litre diesel tanks. These tanks must be placed in bund walls, with a capacity of 1.5 times the volume of the diesel tanks. A concrete floor must be established where the re-fuelling will take place.
5	**Mining Area:** Opencast mining to mine for tin, tungsten and zinc.
6	**Salvage yard (Storage and laydown area).**
7	**Product Stockpile area.**
8	**Waste disposal site** The operation will establish a dedicated, fenced waste disposal site with a concrete floor and bund wall. The following types of waste will be disposed of in this area: o Small amounts of low-level hazardous waste in suitable receptacles; o Domestic waste; o Industrial waste.
9	**Roads (both access and haulage road on the mine site):** Although it is recommended that the operation utilize existing roads as far as possible, it is anticipated that the mining operation will create an additional 2 - 4 km of roads, with a width of 6 meters.
10	**Temporary Workshop Facilities and Wash bay.**
11	**Water distribution Pipeline.**
12	**Water tank:** It is anticipated that the operation will establish 1 x 10 000 litre water tanks with purifiers for potable water.

The criteria used to assess the Consequence of the impacts are shown in the table 16 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 16. 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 17. 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 18. 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 19. 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.

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

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

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

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

The loss of land capability and land use can occur in two ways. Firstly, through topsoil removal, disturbances and loss of soil fertility; and secondly through the improper placement of infrastructure. **The major land uses in the area are agriculture**. The region is arable and classified as the Orange River Potential Agricultural Area, which is an area with High Agricultural Potential (B rating).
This is due to the Good and Excellent irrigation suitability of the land. The grazing capacity is 36 - 42 ha/LSU, with the grazing land being demarcated for sheep.

Apart from the proposed mining activities, Renosterkop is currently utilised for **extensive irrigation of export crops**. Existing land use features include farm tracks and other supporting infrastructure, with associated surface disturbances. A canal traverses the northern boundary of the site and there is a communal soccer field in the far south-eastern corner. An old field is present in the north-

east and disturbances associated with historic mining occur on the hills.

During the mining operation the crushing and loading 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.

Mining can have a devastating effect on the export crops with dust that will be created by the crushing operations and can impact the exporting in the way that the export crops will not adhere to set protocols that they have to meet to be able to export. This will have devastating consequences in terms of monetary value for crops.

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

Construction and mining activities on site will reduce the natural habitat for ecological systems to continue their operation. It is not expected that the areas of high ecological function will rehabilitate following disturbance events. Vehicle traffic generates lots of dust which can reduce the growth success and seed dispersal of many small plant species. It is expected that protected species if present will be destroyed during the mining operation, the necessary permits will be obtained after the specialist studies have been completed to confirm the presence of the protected species.

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

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

habitat. Fragmentation of habitat will lead to the loss of migration corridors, in turn resulting in degeneration of the affected population's genetic make-up. This results in a subsequent loss of genetic variability between meta-populations occurring within the site. Pockets of fragmental natural habitats hinder the growth and development of populations.

Mining by opencast methods on the southern, western and northern slopes of Renosterkop will impact negatively on the structural integrity of the hill as a cultural landscape. The impact will be largely visual affecting the tourist value of the hill. The impact may be severe during the life of the mine; backfilling will mitigate the visual distance although full restoration might not be possible.

The mine will add a certain amount of noise to the existing noise in the area. However, levels of noise generated by mining activities in terms of the crushing operation will be substantial.

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

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

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

It is likely, however that there will be residual positive economic impacts that are not fully reversed with the closure of the mine, and that the economy will not decline to its original level prior to the development of this project. This is

because the mine will generate substantial income for the regional and local economy, both directly and indirectly, during its life.

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

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

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

Geology and mineral resource

Level of risk: Low

Mitigation measures

- Ensure that optimal use is made of the available mineral resource through proper planning.
- The mining of Tin, Tungsten and Zinc should be well planned and all infrastructure positions should be selected with the main aim of avoiding sterilization of future resources.

Topography

Level of risk: Low

Mitigation measures

- Mining of tin, tungsten and zinc continuously, if possible, otherwise when they become available;
- Employ effective rehabilitation strategies to restore surface topography of and controlled backfilling at excavations and crushing site;
- Stabilise the Rock Dumps;
- All temporary infrastructures should be demolished during closure.

Soil character and quality

Level of risk: Medium - High

Mitigation measures

- Topsoil needs to be removed and stored separately during mining and the construction of roads, infrastructure, and stockpile areas.
- These topsoil stockpiles must be kept as small as possible to prevent compaction and the formation of anaerobic conditions.
- Topsoil must be stockpiled for the shortest possible timeframes to ensure that the quality of the topsoil is not impaired.
- Topsoil must not be handled when the moisture content exceeds 12 %.

- Topsoil stockpiles must by no means be mixed with sub-soils.
- The topsoil should be replaced as soon as possible on to the disturbed areas, thereby allowing for the re-growth of the seed bank contained within the topsoil. other areas where it is likely to cause erosion, or where water would naturally accumulate;
- 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.
- Vehicles and machinery should be regularly serviced and maintained.
- Refuelling and vehicle maintenance must take place in well demarcated areas and over suitable drip trays to prevent soil pollution.
- Drip trays must be available on site and installed under all stationary vehicles.
- Spill kits to clean up accidental spills 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.

Loss of Soil fertility

Level of risk: Medium High

Mitigation measures

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

Loss of Soil erosion

Level of risk: Low -Medium

Mitigation measures

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

Land capability and land use

Level of risk: Medium

Mitigation measures

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

Ground water

Level of risk: Low

Mitigation measures

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

Surface Water

Alteration/ destruction of watercourses

Level of risk: Medium - High

Mitigation measures

- All activities associated with the mining operation must be planned to avoid any disturbances to the watercourses and their buffer zones.
- No new roads should be created across the drainage lines and no mining should take place in the drainage lines. If this is unavoidable, a water use license to alter the beds

and banks of each earmarked watercourse should be obtained from DWS prior to such activities.
- Employ sound rehabilitation measures to restore characteristics of all affected watercourses.

Siltation of surface water

Level of risk: Low – Medium

Mitigation measures

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

Indigenous flora

Loss of indigenous flora

Level of risk: Medium

Mitigation measures

- Implement best practise principles to minimise the footprint of transformation, by keeping to existing roads and earmarked areas where possible.
- Implement effective avoidance measures to limit any activities in the highly sensitive areas, by applying the no-go principles.
- Ensure measures for the adherence to a maximum speed limit of 40 km/h to minimise dust fallout and associated effects on plants in the adjacent pristine areas.
- Encourage the growth of natural plant species in all affected areas by sowing indigenous seeds or by planting seedlings.
- The setup of a small nursery is advisable to maximise translocation and re-establishment efforts of affected areas.
- Apply for permits to authorise the clearance of indigenous plants from DENC at least three months before such activities will commence

Loss of Red data and / or protected floral species

Level of risk: Medium - High

Mitigation measures

- The footprint areas of the mining activities must be scanned for Red Listed and protected plant species prior to any destructive activities by means of a search-and-rescue operation.

- It is recommended that these plants are identified and marked prior to intended activity. These plants should ideally be incorporated into the design layout and left in situ. However, due to the nature of the proposed mining activities they will most likely all be removed or relocated (if possible). The relevant permits from DENC should be applied for at least three months before such activities will commence.
- The setup of a small nursery is advisable to maximise translocation and re-establishment efforts of all the rescued plants.
- A management plan should be implemented to ensure proper establishment of ex situ individuals and should include a monitoring programme for at least two years after re-establishment 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

Level of risk: Low to medium

Mitigation measures

- Implement best practise principles to minimise the footprint of transformation, by keeping to existing roads and earmarked areas where possible.
- Mechanical methods of control should be implemented pro-actively as soon as invasive species start to emerge.
- Regular follow-up monitoring of invasive control areas needs to be implemented to ensure effective eradication.
- Encourage proper rehabilitation of disturbed areas through soil restoration and reseeding of indigenous plant species.

Encouraging bush encroachment

Level of risk: Low

Mitigation measures

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

Fauna

Habitat Fragmentation

Level of risk: Medium-High

Mitigation measures

- All activities associated with the mining operation must be planned, where possible to encourage faunal dispersal and should minimise dissection or fragmentation of any important faunal habitat type.
- The 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 for employees, machinery or even visitors.
- No new roads should be created across a watercourse.
- No mining should take place in the drainage lines. If this is unavoidable, a water use license to alter the beds and banks of the watercourses should be obtained from DWS prior to such activities.
- Employ sound rehabilitation measures to restore characteristics of all affected habitats.

Disturbance, displacement and killing of fauna

Level of risk: Low -Medium

Mitigation measures

- Careful planning of the operation is needed to avoid the destruction of pristine habitats and minimise the overall disturbance footprint.
- The extent of the mining activities should be demarcated on site layout plans, and no personnel or vehicles may leave the demarcated area except if authorised to do so. Areas surrounding the earmarked site that are not part of the demarcated area should be considered as a no-go zone.
- 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.
- It is recommended that these individuals be rescued and relocated by a registered professional prior to intended activities.
- No mining should take place in the drainage lines and no new roads should be created across drainage lines. If this is unavoidable, a water use license to alter the beds and banks of each earmarked watercourse should be obtained from DWS prior to such activities.

- 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 exposed during the clearing operations should be captured for later release or translocation by a qualified expert.
- Employ measures that ensure adherence to a maximum speed limit of 40 km/h as well as driving mindfully on site to lower the risk of animals being killed on the roads or elsewhere in the mining area.

Air quality

Level of risk: High

Mitigation measures

- Vegetation must be removed when soil stripping is required only. These areas should be limited to include those areas required for mining only, hereby reducing the surface area exposed to wind erosion. Adequate demarcation of these areas should be undertaken.
- Control options pertaining to topsoil removal, loading and dumping are generally limited to wet suppression.
- Where it is logistically possible, control methods for gravel roads should be utilised to reduce the re-suspension of particulates. Feasible methods include wet suppression, avoidance of unnecessary traffic, speed control and avoidance of track-on of material onto paved and treated roads.
- The length of time where open areas are exposed should be restricted. Mining should not be delayed after vegetation has been cleared and topsoil removed.
- Dust suppression methods should, where logistically possible, must be implemented at all areas that may / are exposed for long periods of time.
- For all mining activities management should undertake to implement health measures in terms of personal dust exposure, for all its employees:
    - Speed limits;
    - Spraying of surfaces with water;
    - Mining of Tin, Tungsten and zinc and rehabilitation of disturbed areas; and

Noise and vibration

Level of risk: Medium

Mitigation measures

- Machinery with low noise levels which complies with the manufacturer's specifications to be used.
- Restrict construction and mining activities to take place during daytime period only unless agreements obtained to do 24hr operations.
- Vehicles to comply with manufacturers' specifications and any activity which will exceed 90.0dBA to be done during daytime only.

- Systematic maintenance of all forms of equipment, training of personnel to adhere to operational procedures that reduce the occurrence and magnitude of individual noisy events.
- Generators to be placed in such a manner that it is not a nuisance for any other parties.
- Noise monitoring to be done along the mine footprint and noise sources within the mine boundary on a monthly basis after which the frequency can change to a quarterly basis.
- Actively manage the process and the noise management plan must be used to ensure compliance to the noise regulations and/or standards. The levels to be evaluated in terms of the baseline noise levels.
- Standardised noise measurements should be carried out on individual equipment at the delivery to site to construct a reference data-base and regular checks carried out to ensure that equipment is not deteriorating and to detect increases which could lead to increase in the noise impact over time and increased complaints.

Visual impacts
Level of risk: Low -Medium
Mitigation measures

Mitigation measures may be considered in two categories:

Primary measures that intrinsically comprise part of the development design through an iterative process. Mitigation measures are more effective if they are implemented from project inception when alternatives are being considered; and

Secondary measures designed to specifically address the remaining negative effects of the final development proposals:

- Primary measures that will be implemented should mainly be measures that minimise the visual impact by softening the visibility of the mining activities, by "blending" with the surrounding areas. Such measures will include rehabilitation of the disturbed area, such as the excavations by re-vegetation of the area and using an aesthetically pleasing design for the proposed development.

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

- Ensure that the design fits into the surrounding environment and it is aesthetically pleasing.
- Reduce the construction period through careful planning and productive implementation of resources.
- Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads.

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

Traffic and road safety

Level of risk: Medium

Mitigation measures

- Implement measures that ensure the adherence to traffic rules.

Heritage resources

Level of risk: Medium High

Mitigation measures

- The cairn burial must be protected with a 100 m servitude in which no physical works are allowed without a permit from SAHRA or the provincial heritage resources authority.
- The rock shelter on the crest of the hill must be protected.
- Mining by opencast methods on the southern, western and northern slopes of Renosterkop will impact negatively on the structural integrity of the hill as a cultural landscape. The impact will be largely visual affecting the tourist value of the hill. The impact may be severe during the life of the mine; backfilling will mitigate the visual distance although full restoration might not be possible.
- A Chance Finds Procedure is appended to this Report and will be used by the Environmental Control Officer as a manual to curate chance finds.
- A Conservation Management Plan (CMP) must be prepared for the protection and sustainable management of heritage resources.

Socio-economic

Level of risk: Low - Medium

Mitigation measures

- The mine must ensure that false expectations are not created regarding job creation.
- Jobs must be allocated as advertised and in so far as is possible to local

inhabitants.

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

Interested and affected parties

Level of risk: Low

Mitigation measures

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

ix) Motivation where no alternative sites were considered

No alternative location for the proposed mining operation was considered, as the occurrence of tin, tungsten and zinc have been deposited in this area. There is therefore no other alternative with regard to the overall operation footprint.

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

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

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

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

i) Assessment of each identified potentially significant impact and risk

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

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

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

					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	Medium	Maintenance of Diesel tanks and bund walls. Oil traps Drip tray at re-fuelling point. Refuelling must take place in well demarcated areas and over suitable drip trays to prevent soil pollution. Spill kits to clean up accidental spills from earthmoving machinery must be well-marked and available on site. Workers must undergo induction to ensure that they are prepared for rapid clean-up procedures.	Low

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

	Surface water contamination				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. Appointment of a full-time ECO must render guidance to the staff and contractors with respect to suitable areas for all related disturbance, and must ensure that all contractors and workers undergo environmental induction prior to commencing with work on site. All those working on site must undergo environmental induction with regards to fauna and in particular awareness about not harming or collecting species such as snakes, tortoises and owls which are often persecuted out of superstition. All those working on site must be educated about the conservation importance of the fauna and flora occurring on site. The environmental induction should occur in the appropriate languages for the workers who may require translation.	

					Reptiles and amphibians that are exposed during the clearing operations should be captured for later release or translocation by a qualified expert. Employ measures that ensure adherence to the speed limit. Careful consideration is required when planning the placement for stockpiling topsoil and the creation of access routes in order to minimise the overall mining footprint. The footprint areas of the mining activities must be scanned for Red Listed and protected plant species prior to mining Snares & traps removed and destroyed Prevention of exotic vegetation encroachment; Prevent further siltation within the river segment as well as downstream of activities; Unnecessary destruction of marginal and instream habitat should always be avoided during operations.	
Salvage yard (Storage and laydown area)	Groundwater contamination Removal and disturbance of vegetation cover and natural habitat of fauna	Fauna Flora Groundwater Soil Surface Water	Construction Commissioning Operational Decommissioning Closure	Medium	Access Control Maintenance of fence Storm water run-off control Immediately clean hydrocarbon spill	Low

	Soil contamination Surface disturbance Surface water contamination					
Product Stockpile area	Dust Noise Removal and disturbance of vegetation cover and natural habitat of fauna Surface disturbance	Air Quality Fauna Flora Noise Soil Surface Water	Commissioning Operational Decommissioning Closure	Medium	Dust Control and monitoring Noise control and monitoring Drip trays Storm water run-off control Immediately clean hydrocarbon spills Rip disturbed areas to allow re-growth of vegetation cover Noise control Well maintained equipment Selecting equipment with lower sound power levels; Re-locate noise sources to areas which are less noise sensitive, to take advantage of distance and natural shielding; Develop a mechanism to record and respond to complaints.	Low
Waste disposal site (domestic and industrial waste):	Groundwater contamination Contamination of soil Surface water contamination	Groundwater Soil Surface water	Construction Commissioning Operational Decommissioning Closure	Medium	Storage of waste within receptacles Storage of hazardous waste on concrete floor with bund wall Removal of waste on regular intervals	Low
Roads (both access and	Dust	Air quality Fauna	Construction Commissioning	Medium	Maintenance of roads Dust control and monitoring	Low

haulage road on the mine site):	Groundwater contamination Noise Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination Surface disturbance	Flora Groundwater Noise and vibration Soil Surface water	Operational Decommissioning Closure		Noise control and monitoring Speed limits Storm water run-off control Erosion control Immediately clean hydrocarbon spills Rip disturbed areas to allow re-growth of vegetation cover Noise control Well maintained equipment Selecting equipment with lower sound power levels; Re-locate noise sources to areas which are less noise sensitive, to take advantage of distance and natural shielding; Develop a mechanism to record and respond to complaints. Linear infrastructure such as roads and pipelines will be inspected at least monthly to check that the associated water management infrastructure is effective in controlling erosion.	
Temporary Workshop Facilities and Wash bay	Groundwater contamination Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination	Groundwater Soil Surface water	Construction Commissioning Operational Decommissioning Closure	Medium	Concrete floor with oil/water separator Storm water run-off control Immediately clean hydrocarbon spills	Low

Water distribution Pipeline	Surface disturbance	Fauna Flora Surface Water	Construction Commissioning Operational Decommissioning Closure	Medium	Monitor pipeline for water leaks Maintenance of pipeline Linear infrastructure such as roads and pipelines will be inspected at least monthly to check that the associated water management infrastructure is effective in controlling erosion.	Low
Water tanks: 1 X 10 000 litre water tanks and purifiers for potable water.	Surface disturbance	Fauna Flora Surface Water	Construction Commissioning Operational Decommissioning Closure	Medium	Maintain water tanks and structures	Low

j) Summary of specialist reports

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

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS HTAT HAVE BEEN INCLUDED IN THE EIA REPORT (Mark with an X where applicable)	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED
Appendix 4 **ECOLOGICAL ASSESSMENT REPORT Renosterkop Mining Company (Pty) Ltd Renosterkop Tin, Tungsten and Zinc Mining Project** **By Boscia Ecological Consultants Dr. Betsie Milne** **July 2022**	**CONCLUSION, RECOMMENDATIONS AND OPINION REGARDING AUTHORISATION** Three plant communities were identified within the area earmarked for mining activities in the study area. Of these, the drainage lines are most sensitive (Very High), primarily based on their national protection status as watercourses. The remainder of the pristine portion of the site (hills and grassland habitats) are of High sensitivity based on several plant species of conservation concern recorded here, and potential important habitat it provides to protected bird-, reptile- and invertebrate species. The most profound impacts expected to be related to the proposed mining operation include cumulative loss of intact habitat on landscape level, as well as loss and disturbances to specialised flora and fauna species, especially those restricted to the hills. 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 and license application to remove any of the protected tree species need to be lodged with the Department of Forestry and Fisheries. If mining takes place, then the destruction of sensitive natural habitats on site is inevitable. The significance of the ecological impacts will ultimately be affected by the success of the mitigation	X	Contained in the mitigation measures and EMPR

	measures implemented during the mining operation. In my opinion, authorisation for the proposed operation should only be granted if the applicant commits to strictly adhere to effective avoidance, management, mitigation, and rehabilitation measures		
Appendix 5 **Heritage Impact Assessment & Palaeontological Desk Assessment for a Mining Right on Lot 1288, Lot 1279 and Remainder Lot 1726 (Portion of Lot 1177) Kakamas South Settlement (Renosterkop) near Kakamas, Kai !Garib Municipality Northern Cape** **Prepared by Edward Matenga (PhD Archaeology & Heritage, MPhil, Archaeology; Uppsala/Sweden)** **25 July 2022**	**CONCLUSION AND RECOMMENDATIONS** The cairn burial must be protected with a 100 m servitude in which no physical works are allowed without a permit from SAHRA or the provincial heritage resources authority. The rock shelter on the crest of the hill must be protected. Mining by opencast methods on the southern, western and northern slopes of Renosterkop will impact negatively on the structural integrity of the hill as a cultural landscape. The impact will be largely visual affecting the tourist value of the hill. The impact may be severe during the life of the mine; backfilling will mitigate the visual distance although full restoration might not be possible. A Chance Finds Procedure is appended to this Report and will be used by the Environmental Control Officer as a manual to curate chance finds. A Conservation Management Plan (CMP) must be prepared for the protection and sustainable management of heritage resources. The proposed mining activities can be given a greenlight to go ahead provided that the precautions stated above are heeded.	X	Contained in the mitigation measures and EMPR
Appendix 6 Palaeontological Impact Assessment for the Mining Right application on several lots on Farm Kakamas South Settlements, northwest of Kakamas, Northern Cape Province	**Executive Summary** A Palaeontological Impact Assessment was requested for the Mining Right on Lot 1288, Lot 1279 and Remainder Lot 1726 (Portion of Lot 1177) Kakamas South Settlement (Renosterkop) near Kakamas, Kai !Garib Municipality Northern Cape. To comply with the regulations of the South African Heritage Resources Agency (SAHRA) in terms of Section 38(8) of the National	X	Contained in the mitigation measures and EMPR

Desktop Study (Phase 1) **24 July 2022** **Prof Marion Bamford** **Palaeobotanist** **P Bag 652, WITS 2050** **Johannesburg, South Africa** **Marion.bamford@wits.ac.za**	Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA), a desktop Palaeontological Impact Assessment (PIA) was completed for the proposed development. The proposed site lies on the non-fossiliferous metamorphic rocks of the Riemvaasmaak Gneiss that are overlain by Quaternary fluvial gravels that are moderately sensitive as far as the palaeontology is concerned. No fossils are likely to be found on this section of the river because there are no traps for transported fossil fragments, such as palaeochannels. 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 contractor, environmental officer or other designated responsible person once excavations, drilling or mining activities have commenced. Since the impact will be low, as far as the palaeontology is concerned, the project should be authorised. **Recommendation** Based on experience and the lack of any previously recorded fossils from the area, it is extremely unlikely that any fossils would be preserved in the fluvial sands along the river of the Quaternary. No traps for fossils such as palaeochannels occur along this section of the river. There is a very small chance that fossils may occur in the recently deposited sands along the river so 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. The impact on the palaeontological heritage would be low, so as far as the palaeontology is concerned, the mining right should be granted.		

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

k) Environmental impact statement

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

Three plant communities were identified within the area earmarked for mining activities in the study area. Of these, the drainage lines are most sensitive (Very High), primarily based on their national protection status as watercourses. The remainder of the pristine portion of the site (hills and grassland habitats) are of High sensitivity based on several plant species of conservation concern recorded here, and potential important habitat it provides to protected bird-, reptile- and invertebrate species.

The most profound impacts expected to be related to the proposed mining operation include cumulative loss of intact habitat on landscape level, as well as loss and disturbances to specialised flora and fauna species, especially those restricted to the hills. 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 and license application to remove any of the protected tree species need to be lodged with the Department of Forestry and Fisheries.

If mining takes place, then the destruction of sensitive natural habitats on site is inevitable. 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 should only be granted if the applicant commits to strictly adhere to effective avoidance, management, mitigation, and rehabilitation measures (taken out of the ecological study by Boscia Ecological Consultants, July 2022).

The cairn burial must be protected with a 100 m servitude in which physical works are not allowed without a permit from SAHRA or the provincial heritage resources authority.

The rock shelter on the crest of the hill must be protected.

Mining by opencast methods on the southern, western and northern slopes of Renosterkop will impact negatively on the structural integrity of Renosterkop as a cultural landscape. The impact will be largely visual affecting the tourist value of the hill. The impact may be severe during the life of the mine. Backfilling will mitigate the visual impact although full restoration might not be possible.

A Chance Finds Procedure is appended to this Report and will be used by the Environmental Control Officer as a manual to curate chance finds.

A Conservation Management Plan (CMP) must be prepared for the protection and sustainable management of heritage resources. A CMP will contribute significantly to

lowering the risk of uncertainty inherently present in ad hoc decision making and reactive interventions.

The proposed mining activities can be given a greenlight to go ahead provided that the precautions stated above are heeded (taken out of the Heritage Impact Assessment Report by Dr. Edward Matenga, July 2022).

Based on the nature of the project, surface activities may impact upon the fossil heritage if preserved in the development footprint. The geological structures suggest that the rocks are either much the wrong kind or are transported sands to contain fossils. Furthermore, the material to be mined is metamorphic rocks and this does not preserve fossils. Since there is an extremely small chance that transported fossils from upstream may be disturbed a Fossil Chance Find Protocol has been added to this report. Taking account of the defined criteria, the potential impact to fossil heritage resources is extremely low.

Assumptions and uncertainties

Based on the geology of the area and the palaeontological record as we know it, it can be assumed that the formation and layout of the granites, gneisses, sandstones and sands are typical for the country and do not contain fossil plant, insect, invertebrate and vertebrate material. The sands of the Quaternary period would not preserve fossils.

Recommendation

Based on experience and the lack of any previously recorded fossils from the area, it is extremely unlikely that any fossils would be preserved in the fluvial sands along the river of the Quaternary. No traps for fossils such as palaeochannels occur along this section of the river. There is a very small chance that fossils may occur in the recently deposited sands along the river so 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. The impact on the palaeontological heritage would be low, so as far as the palaeontology is concerned, the mining right should be granted (taken out of the Palaeontological Impact assessment by Prof Marion Bamford July 2022).

(ii) Final Site Map;

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

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

No mining operations are carried out within a horizontal distance of 100 (one hundred) metres from reserve land, buildings, roads, railways, dams, waste dumps, or any other

structure whatsoever including such structures beyond the mining boundaries, or any surface, which it may be necessary to protect in order to prevent any significant risk, unless a lesser distance has been determined safe by risk assessment and all restrictions and conditions determined in terms of the risk assessment are complied with;

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

The cairn burial must be protected with a 100 m servitude in which physical works are not allowed without a permit from SAHRA or the provincial heritage resources authority.

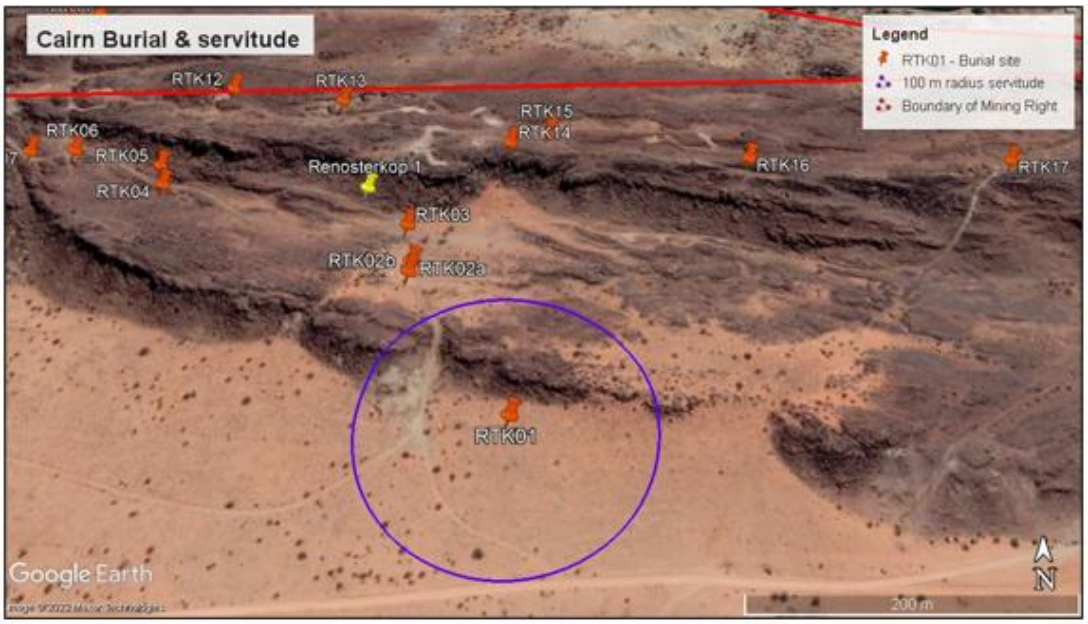
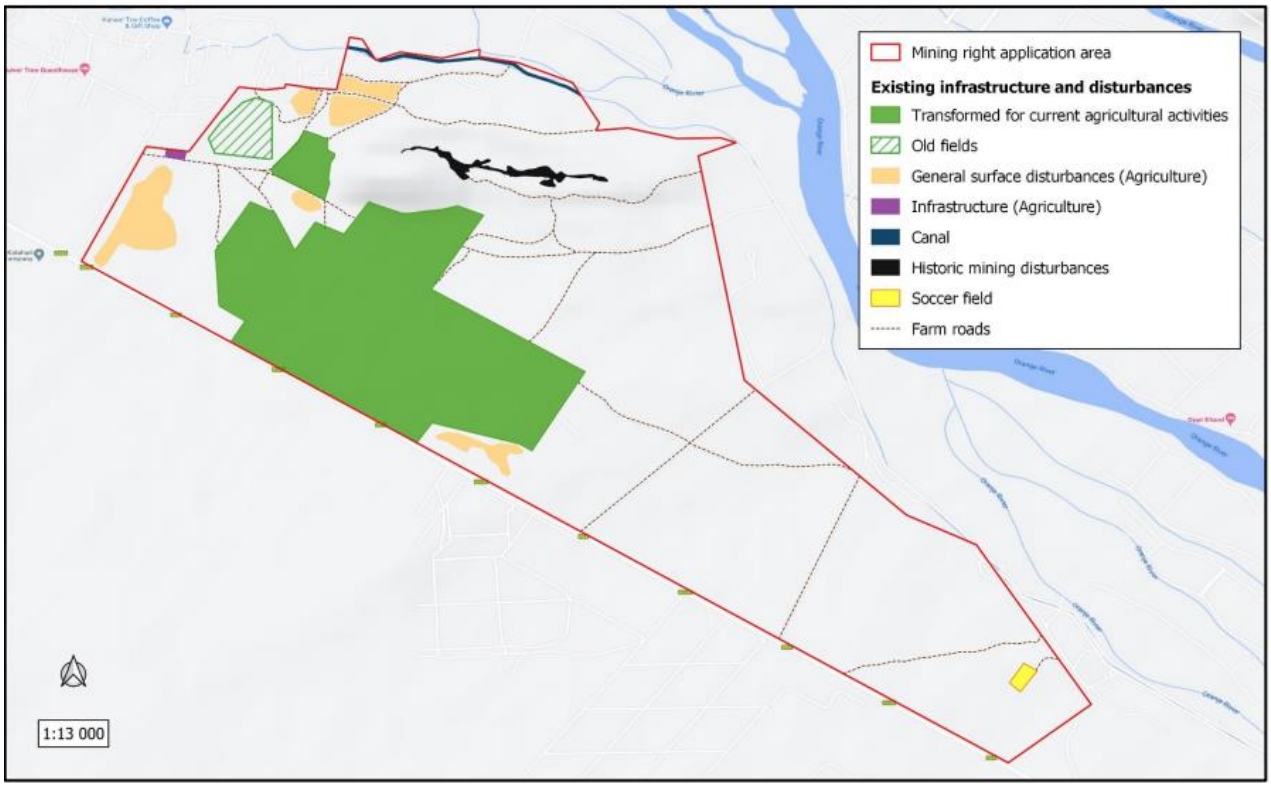


Figure 32. Google Earth map shows the location of a cairn burial (RTK01) and a 100 m protection servitude

No wetlands or rivers occur on Renosterkop, but an extensive network of drainage lines traverse the property. These all drain towards the Orange River in the north and therefore play an important role in the catchment area. A buffer will be kept from drainage lines as indicated by the Department of Water Affairs.

The purpose of this Act (Section 2) is to ensure that the nation's water resources are protected, used, developed, conserved, managed and controlled in ways which take into account amongst other factors - (g) protecting aquatic and associated ecosystems and their biological diversity and (h) reducing and preventing pollution and degradation of water resources. No activity may take place within a watercourse unless authorised by the Department of Water and Sanitation (DWS). Any area within a wetland or riparian zone is therefore excluded from development unless authorisation is obtained from the DWS in terms of Section 21 (c) and (i).

Please see Final Site Map below.



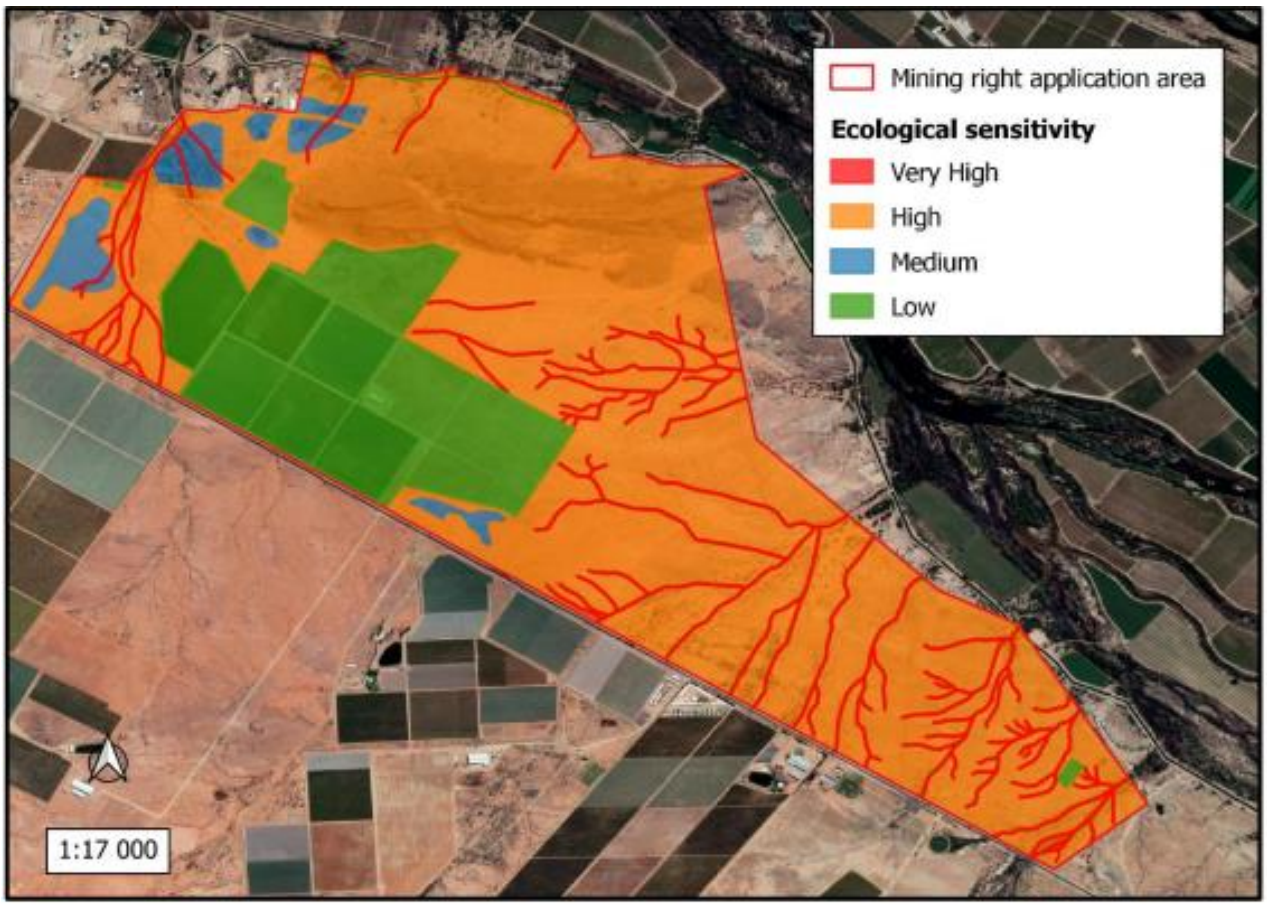


Figure 33. Final Site Surface layout map with sensitivity map.

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

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

The loss of land capability and land use can occur in two ways. Firstly, through topsoil removal, disturbances and loss of soil fertility; and secondly through the improper placement of infrastructure. **The major land uses in the area are agriculture**. The region is arable and classified as the Orange River Potential Agricultural Area, which is an area with High Agricultural Potential (B rating).

This is due to the Good and Excellent irrigation suitability of the land. The grazing capacity is 36 - 42 ha/LSU, with the grazing land being demarcated for sheep.

Apart from the proposed mining activities, Renosterkop is currently utilised for extensive irrigation of export crops. Existing land use features include farm tracks and other supporting infrastructure, with associated surface disturbances. A canal traverses the northern boundary of the site and there is a communal soccer field in the far south-eastern corner. An old field is present in the north-east and disturbances associated with historic mining occur on the hills.

Mining can have a devastating effect on the export crops with dust that will be created by the crushing operations and can impact the exporting in the way that the export crops will not adhere to set protocols that they have to meet to be able to export. This will have devastating consequences in terms of monetary value for crops.

The mining operation will provide 18 jobs and will also add to the increased economic activity and the area surrounding the application area.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

In terms of the Social Impact Assessment findings derived from the information available at this stage it is concluded that the likely benefits of the proposed project

outweigh the potential social risks and/or threats to the local communities. However, as indicated earlier in the report, the possible impact on the infrastructure and service needs due to the inflow of an additional workforce should be addressed. It would remain the responsibility of the Local Municipality, but considering the social framework within which the mine operates, it is important for the mine to engage with the SPM in this regard to minimise any possible negative impacts. Such engagement should also contribute to meaningful contributions to the communities situated in close proximity to the mine.

It is furthermore important to ensure that any negative impacts as a result of the mining activities on the residents should be limited.
The mining activities and associated infrastructure by itself will thus not introduce new social risks and hazards, but only increase the probability and scale of those already associated with the existing mining activities.
On a more detailed level, the following **positive** impacts are anticipated:

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

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

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

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

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

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

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

Air Quality

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

Archaeology:

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

Fauna

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

Flora

- No trees or shrubs must be felled or damaged for the purpose of obtaining firewood.
- Management must take responsibility to control declared invader or exotic species on the site. The following control methods must be used:
    - 'The plants will be uprooted, felled or cut off and can be destroyed completely.'
    - The plants will be treated with an herbicide that is registered for use in connection therewith and in accordance with the directions for the use of such an herbicide.
- Valid permits from DAFF must be obtained before any protected plant species are removed or damaged if encountered.
- Continuous controlled dumping and spreading of previously stored topsoil over the rehabilitated areas.
- All rehabilitated areas, where applicable and possible must be seeded with a vegetation seed mix adapted to reflect the local indigenous flora that was present prior to mining activities commenced if the natural succession of vegetation is unacceptably slow.
- Fires may only be allowed in facilities or equipment specially constructed for this purpose.
- The end objective of the re-vegetation program must be to achieve a stable self-sustaining habitat unit.

Groundwater

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

- The workshops, washing bays and sewage tanks should be constructed far away from significant aquifer systems.
- SOP for storage, handling and transport of different hazardous materials.
- Place oil traps (drip trays) under stationary vehicles, only re-fuel al fuelling stations, construct structures to trap fuel spills at fuelling stations, immediately clean oil and fuel spills and dispose of contaminated material at licensed sites only.
- Ensure good housekeeping rules.

Noise

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

Mechanical equipment

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

Screening / Migration Control:

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

Safety

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

Soil

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

Surface water

- The disposal of oil, grease and related industrial waste must be transported to the stores area where it will be stored in steel containers supplied by an oil recycling contractor. All oil and grease must be removed on a regular basis from the operation by a registered approved contractor.
- All refuse and waste from the different sections must be handled according to NEMA Guidelines. Recycling of waste is encountered in all the consumer sections of the operation, where recyclable materials must be collected before dumping them in the domestic waste disposal area.
- All non-biodegradable (recyclable) refuse such as glass bottles, plastic bags and metal scrap must be stored in a container in the waste area and collected on a regular basis and disposed of at a recognized disposal facility.
- Erosion and storm water control measures must be implemented.
- An application for an integrated Water Use Licence must be submitted at the Department of Water Affairs for all actions to be performed which requires authorization in terms of water uses.
- Vehicle repairs must only take place within the maintenance area for vehicles. Repairs within open excavations must be limited to emergency break downs with drip trays.

- Re-fuelling must only take place in the re-fuelling area. If this is found not to be practical, drip trays must be used whenever re-fuelling takes place outside of this area.
- During rehabilitation the application must endeavour to reconstruct flow patterns in such a way that surface water flow is in accordance with the natural drainage of the area as far as practically possible.
- Implementation of a suitable management action plan during the operation of the proposed mine, based on analysis of bi-annual water quality and biological monitoring data collected at sites upstream and downstream of all activities;
- Prevention of exotic vegetation encroachment;
- Prevent further siltation within the river segment as well as downstream of activities;
- Unnecessary destruction of marginal and in-stream habitat should always be avoided during operations.

Topography

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

Visual

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

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

- To ensure efficient extraction of the Tin, Tungsten and Zinc and to prevent the sterilization of any reserves.
- To limit the alteration of the surrounding topography
- To manage and preserve soil types
- To prevent the loss of land capability
- To ensure the continuation of economically viable land use.
- To ensure that the surrounding ground water resources are not adversely affected to the detriment of the health and welfare of nearby communities; and to ensure suitable quality of ground water resources.
- To ensure that the surrounding surface water resources are not adversely affected to the detriment of the health and welfare of nearby communities; and to ensure suitable quantity and quality of ground water resources.

- Rehabilitation of disturbed areas during the mine life cycle as well as during closure phase has to be done to minimize erosion and/or pollution of natural streams.
- To contain soils and materials within demarcated areas and prevent contamination of storm water runoff.
- To minimise the loss of natural vegetation.
- To prevent the proliferation of alien invasive plants species.
- To protect the wildlife and bird species.
- To protect the natural habitat of wildlife and bird species.
- To maintain visual integrity; and to minimise the extent of the generation of dust in order to minimise the aspect of nuisance and health impacts to sensitive receptors.
- To minimise noise and vibration to a level that disturbances felt by the communities are limited.
- To reduce the impact on visual quality due to intrusive mine infrastructure, activities and facilities.
- To ensure that all traffic generated by the proposed mining development does not negatively impact on existing road networks and infrastructure; and to ensure traffic safety.
- To preserve the historical and cultural artefacts located on site in compliance with the South African Heritage Resources Act, 1999 (Act No 25 of 1999).
- To ensure that the current socio-economic status quo is improved.
- To be transparent and practise effective communication; in order to maintain good relationships with all interested and affected parties.

m) Final proposed alternatives

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

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

It will therefore cause additional impacts if this infrastructure is moved and render the consideration of alternative mining sites useless.
The mining activities and methodologies associated with mining of Tin, Tungsten and Zinc is the only economic viable method currently being used by the Tin, Tungsten and Zinc fraternity. There is no alternative mining method for the mining of Tin, Tungsten and Zinc. The deposit is located as an outcrop and therefore no underground mining will be used.

n) Aspects for inclusion as conditions of Authorisation

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

The most profound impacts expected to be related to the proposed mining operation include cumulative loss of intact habitat on landscape level, as well as loss and disturbances to specialised flora and fauna species, especially those restricted to the hills. 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 and license application to remove any of the protected tree species need to be lodged with the Department of Forestry and Fisheries.

If mining takes place, then the destruction of sensitive natural habitats on site is inevitable. 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 should only be granted if the applicant commits to strictly adhere to effective avoidance, management, mitigation, and rehabilitation measures.

A rock shelter on the northern aspect of the hill is significant due to the presence of a substantial deposit of Stone Age Material (Site RTK11). It is recommended that the cave is protected in terms of the heritage study done by Dr. Edward Matenga.

Burial grounds
One cairn burial located on the south-eastern foot of the hill was recorded (Site RTK01). A 100 m radius protection servitude must be reserved as per the regulations of the heritage authority.

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

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

(Which relate to the assessment and mitigation measure proposed)

An agricultural study has been initiated by Mr. Herbert Hatting but are not finalized yet and this study will be included into the final EIA / EMP and distributed again.

The field survey took place during mid-winter, which was not an optimal time of the year for this summer-rainfall region. However, the area experienced higher than normal rainfall this year, and the vegetation was in a suitable state for the assessment. Most grasses still held seeds and many plants were flowering. Due to the brief duration of the survey, the species list obtained cannot be regarded as comprehensive. Ideally, a site should be visited several times during different seasons to ensure a full complement of plant and animal species present, are captured. However, this is rarely possible due to time and cost constraints related to mining right application processes. (Dr. Betsie Milne out of the Ecological Study, July 2022).

Based on the geology of the area and the palaeontological record as we know it, it can be assumed that the formation and layout of the granites, gneisses, sandstones and sands are typical for the country and do not contain fossil plant, insect, invertebrate and vertebrate

material. The sands of the Quaternary period would not preserve fossils. (Taken out of the PIA assessment by Prof Marion Bamford).

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

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

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

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

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

ii) Conditions that must be included in the authorisation.

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

Apart from the proposed mining activities, Renosterkop is currently utilised for extensive irrigation of **export crops**. Existing land use features include farm tracks and other supporting infrastructure, with associated surface disturbances. A canal traverses the northern boundary of the site and there is a communal soccer field in the far south-eastern corner. An old field is present in the north-east and disturbances associated with historic mining occur on the hills.

Mining can have a devastating effect on the export crops with dust that will be created by the crushing operations and can impact the exporting in the way that the export crops will not adhere to set protocols that they have to meet to be able to export. This will have devastating consequences in terms of monetary value for crops.

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

(2) Rehabilitation requirements

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

Infrastructure areas

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

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

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

Topsoil and Stockpile Deposits:

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

Ongoing Seepage, Control of Rain Water:

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

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

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

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

Water Monitoring Points

Surface water: The Orange River which is a perennial river that is located near the application area although it is not anticipated that the river will be impacted by the mining activity.

Monitoring takes place by collecting surface water samples every quarter.

Implementation of a suitable management action plan during the operation of the proposed Tin, Tungsten and Zinc mine, based on analysis of bi-annual water quality and biological monitoring data collected at sites upstream and downstream of all activities ;

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

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

Final Rehabilitation Roads:

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

Submission of Information:

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

Maintenance (Aftercare):

- Maintenance after closure should include the regular inspection and monitoring and/or completion of the re-vegetation programme.

- The aim of the Environmental Management Programme is for rehabilitation to be stable and self-sufficient, so that the least possible aftercare is required.
- The aim with the closure of the mine should be to create an acceptable post-mine environment and land-use. Therefore, all agreed commitments should be implemented by Mine Management.

After-effects Following Closure:

Acid Mine Drainage: Therefore, limited potential for bad quality leachate or acid mine drainage development is associated with the mine closure as no beneficiation will take place on site. The product will be crushed stone.

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

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

q) Period for which the Environmental Authorisation is required

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

r) Undertaking

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

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

s) Financial Provision

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

i) Explain how the aforesaid amount was derived

The total cost to rehabilitate and mitigate the Renosterkop Mine site as it stands currently (risking premature rehabilitation) is estimated to be R2 374 206 according to the DMR calculations.

Table 20. Financial quantum

No.	Description	Unit	A	B	C	D	E=A*B*C*D
			Quantity	Master Rate	Multiplication factor	Weighting factor 1	Amount (Rands)
Remark:							
1	Dismantling of processing plant and related structures (including overland conveyors and powerlines)	m3	10000	18,42	1	1,2	221040
					1	1,2	
2 (A)	Demolition of steel buildings and structures	m2	0	256,63	1	1,2	0
2(B)	Demolition of reinforced concrete buildings and structures	m2	300	378,15	1	1,2	136134
3	Rehabilitation of access roads	m2	10000	2,29	1	1,2	27480
4 (A)	Demolition and rehabilitation of electrified railway lines	m	0	445,73	1	1,2	0
4 (A)	Demolition and rehabilitation of non-electrified railway lines	m	0	243,13	1	1,2	0
5	Demolition of housing and/or administration facilities	m2	0	513,26	1	1,2	0
6	Opencast rehabilitation including final voids and ramps	ha	3	261224,38	0,52	1,2	489012,0394
7	Sealing of shafts adits and inclines	m3	0	137,77	1	1,2	0
8 (A)	Rehabilitation of overburden and spoils	ha	3	179372,28	1	1,2	645740,208
8 (B)	Rehabilitation of processing waste deposits and evaporation ponds (non-polluting potential)	ha	0	223404,93	1	1,2	0
					1	1,2	
8 (C)	Rehabilitation of processing waste deposits and evaporation ponds (polluting potential)	ha	0	648873,81	1	1,2	0
					1	1,2	
9	Rehabilitation of subsided areas	ha	0	150197,24	1	1,2	0
10	General surface rehabilitation	ha	1,5	142093,10	1	1,2	255767,58
11	River diversions	ha	0	142093,1	1	1,2	0
12	Fencing	m	0	162,08	1	1,2	0
13	Water management	ha	0	54027,79	1	1,2	0
14	2 to 3 years of maintenance and aftercare	ha	0	18909,73	1	1,2	0
15 (A)	Specialist study	Sum	0			1,2	0
15 (B)	Specialist study	Sum	0			1,2	0
					Sub Total 1		1775173,827
1	Preliminary and General		106510,4296		weighting factor 2 1,05		111835,9511
2	Contingencies				177517,3827		177517,3827
					Subtotal 2		2064527,16
					VAT (15%)		309679,07
					Grand Total		**2374206**

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

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

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

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

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

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

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

ii) Motivation for the deviation

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

u) Other information required by the competent Authority

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

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

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

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

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

From a social perspective it can be concluded that the proposed Renosterkop Project would not result in permanent damaging social impacts. The socio-economic benefits associated with the mine outweigh the negative social

impacts. It is thus concluded that the proposed project is acceptable from a social point of view, provided that mitigation measures are implemented.

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

Dr. Edward Matenga from (AHSA) Archaeological and Heritage Services Africa Pty Ltd has been appointed by Renosterkop Mining to determine the possible impact of mining on heritage resources in the application area.

This Heritage Impact Assessment (HIA) Report has been prepared in support of an application by Renosterkop Mining Company (Pty) Ltd for a mining right on several portions of the farm Kakamas Settlement South, also known as Renosterkop, situated 25 km north of Kakamas in the Kai !Garib Municipality.

The following is a summary of findings of the heritage study and recommendations with regard to the mining right application:

An ethno-historical profile of the area has been reconstructed on the basis of 18th first-hand accounts of a travellers, Jacob Wikar and Colonel R. J. Gordon. The local inhabitants, the !Nawabdanas, were agro-pastoralists and hunters occupying a stretch of the Orange River with islands between Kakamas and the Augrabies Falls. Renosterkop formed a southern backdrop of this beautiful bygone island settlement.

There are no specific references to Renosterkop from Wikar, Gordon and others, but sketches illustrate the people, their settlements and some of their artefacts. Pots and their sizes, the remains of which form a significant part of the assemblages from excavations at Renosterkop are illustrated in certain of these historical accounts.

General observations

The survey in 2022 confirms the importance of the hill on account of the presence of Stone Age material and a ceramic component. The occurrence of pottery together with lithics and an iron artefact urges a rethink of the supposed neat break between the Iron Age and Stone Age Cultures. Renosterkop is therefore significant as an exemplar of a transitional precolonial mixed economy in the semi-arid karoo plains of the Northern Cape.

Renosterkop is a historic cultural landscape. A Cultural landscape is …."the combined works of nature and of man" designated in Article 1 of the Convention. They are illustrative of the evolution of human society and settlement over time, under the influence of the physical constraints and/or opportunities presented by their natural environment and of successive social, economic and cultural forces, both external and internal." The Orange River

islands and iconic Renosterkop on the southern flank of the floodplain are the embodiment of a historic cultural landscape which has evolved through at least three centuries. The cultural landscape was and is still firmly present in its physical form and in local public consciousness. For the past nomadic inhabitants and early European travellers, the hill was a prominent directional beacon which could been seen many kilometres from the Orange River. Cultural landscapes have the ability to survive for a long time thereby hosting many successive generations, and in this case Renosterkop is a remarkable example.

Today Renosterkop remains a landmark with a charismatic sense of place. It has a strong spiritual presence and captures the attention of travellers on the road from Kakamas to the Augrabies Falls.

The Stone Age
The recent field survey confirms the presence of Stone Age material as background scatter on the hill largely with no concentrations encountered to indicate significant activity areas.

A rock shelter on the northern aspect of the hill is significant due to the presence of a substantial deposit of Stone Age Material (Site RTK11). It is recommended that the cave is protected.

Burial grounds
One cairn burial located on the south-eastern foot of the hill was recorded (Site RTK01). A 100 m radius protection servitude must be reserved as per the regulations of the heritage authority.

Visual Impact Assessment
A basic assessment was undertaken of the likely significant impacts that the proposed mining will have on cultural landscape characteristics of the hill, strategic and local views, including to the setting of the hill in the broader land. A major and lasting visual impact of the development to the hill are open cast mine pits which will be created, and even if they will be refilled it will be impossible to recreate the original state. Three critical viewpoints have been identified:

(i) View of the hill from the south along the road from Kakamas to Augrabies.
(ii) View of the hill from the west along a north-south trending farm access road.
(iii) View of the hill from the north from a position on the western edge of the Orange floodplain.

Mining by opencast methods on the slopes of the hill will have a negative visual impact from the abovementioned key viewpoints, particularly during the life of the mine. The visual disturbance will be mitigated by backfilling of the pits after the life of the mine.

Conclusion and recommendations

The cairn burial must be protected with a 100 m servitude in which physical works are not allowed without a permit from SAHRA or the provincial heritage resources authority.

The rock shelter on the crest of the hill must be protected.

Mining by opencast methods on the southern, western and northern slopes of Renosterkop will impact negatively on the structural integrity of Renosterkop as a cultural landscape. The impact will be largely visual affecting the tourist value of the hill. The impact may be severe during the life of the mine. Backfilling will mitigate the visual impact although full restoration might not be possible.

A Chance Finds Procedure is appended to this Report and will be used by the Environmental Control Officer as a manual to curate chance finds.

A Conservation Management Plan (CMP) must be prepared for the protection and sustainable management of heritage resources. A CMP will contribute significantly to lowering the risk of uncertainty inherently present in ad hoc decision making and reactive interventions.

The proposed mining activities can be given a greenlight to go ahead provided that the precautions stated above are heeded.

Palaeontology

Prof Marion Bamford, of the University of the Witwatersrand, sub-contracted by Archaeological and Heritage Services Africa (Pty) Ltd, Pretoria, South Africa has been appointed by Renosterkop Mining to provide an Palaeontological Impact Assessment Report to determine the possible impact on palaeontology of mining on the application area.

A Palaeontological Impact Assessment was requested for the Mining Right on Lot 1288, Lot 1279 and Remainder Lot 1726 (Portion of Lot 1177) Kakamas South Settlement (Renosterkop) near Kakamas, Kai !Garib Municipality Northern Cape.

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.

Project location and geological context

The project lies in the Namaqualand sector of the Namaqualand-Natal Province where a variety of metamorphic and intrusive rocks occur. They are unconformably overlain by the transported sands of the Quaternary Kalahari Group.

The Namaqua-Natal Province is a tectono-stratigraphic province and forms the southern and western boundary of the ancient Kaapvaal Craton, and extends below the Karoo Basin sediments to the south (Cornell et al., 2006). It comprises rocks that were formed during the Namaqua Orogeny (mountain-

building) some 1200 – 1000 million years ago. It has been divided by geologists into a number of terranes (similar lithology and bounded by shear zones). There are three main lithologic units used to separate the terranes as well as the shear zones but still there is some debate about the terranes (ibid). Very simply, the lithologic units are older reworked rocks, juvenile rocks formed during tectonic activities and metamorphosed, and intrusive granitoids.

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

The farm lies in the Kakamas Terrane and it has a more or less northwest-southeast extent, bounded on the eastern side by the Boven-Ruzgeer Shear zone and on the western side by the Hartbees River Thrust (Cornell et al., 2006).

Overlying many of these rocks are loose sands and sand dunes of the Gordonia Formation, Kalahari Group of Quaternary Age. The Gordonia Formation is the youngest of six formations and is the most extensive, stretching from the northern Karoo, Botswana, Namibia to the Congo River (Partridge et al., 2006). It is considered to be the biggest palaeo-erg in the world (ibid). The sands have been derived from local sources with some additional material transported into the basin (Partridge et al., 2006). Much of the Gordonia Formation comprises linear dunes that were reworked a number of times before being stabilised by vegetation (ibid). Even younger sands and sandy soils have been deposited in shallow valleys and along ephemeral water courses, while fluvial sands and gravels occur along the Orange River. The current positon and catchment of the Orange River is the farther north than it was during the Cenozoic due to the tectonic uplift along the Etosha-Griqualand-Transvaal Axis (de Wit, 1999; Haddon and McCarthy, 2005).

Palaeontological context
The site for mining is on the fluvial sands and gravels along the Orange river that overlie the Riemvaasmaak Gneiss with the Renosterkop Gneiss intruding through the older metamorphic rocks. Gneiss is a high-grade metamorphic rock, meaning that it has been subjected to higher temperatures and pressures than schist. It is formed by the metamorphosis of granite, or sedimentary rock. Gneiss displays distinct foliation, representing alternating layers composed of different minerals. Since it is metamorphic it does not preserve any fossils.

The fluvial sands along the river are sources from inland and could have transported fossils from inland but they would be fragmented from the transport, so only robust fossils like heavy bones or silicified wood survive. Their primary context would be lost. Being an actively flowing river, the Orange River transports sands and debris to the sea, so in order to retain fossils they would have to be trapped in palaeochannels, such as has occurred upstream or farther downstream (Pickford et al., 1995; de Wit, 1999; Corbett and Burrell, 2001; de Wit et al., 2008). There are no palaeochannels along this portion of the river.

Based on the nature of the project, surface activities may impact upon the fossil heritage if preserved in the development footprint. The geological structures suggest that the rocks are either much the wrong kind or are transported sands to contain fossils. Furthermore, the material to be mined is metamorphic rocks and this does not preserve fossils. Since there is an extremely small chance that transported fossils from upstream may be disturbed a Fossil Chance Find Protocol has been added to this report. Taking account of the defined criteria, the potential impact to fossil heritage resources is extremely low.

Recommendation

Based on experience and the lack of any previously recorded fossils from the area, it is extremely unlikely that any fossils would be preserved in the fluvial sands along the river of the Quaternary. No traps for fossils such as palaeochannels occur along this section of the river. There is a very small chance that fossils may occur in the recently deposited sands along the river so 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. The impact on the palaeontological heritage would be low, so as far as the palaeontology is concerned, the mining right should be granted.

The proposed site lies on the non-fossiliferous metamorphic rocks of the Riemvaasmaak Gneiss that are overlain by Quaternary fluvial gravels that are moderately sensitive as far as the palaeontology is concerned. No fossils are likely to be found on this section of the river because there are no traps for transported fossil fragments, such as palaeochannels. 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 contractor, environmental officer or other designated responsible person once excavations, drilling or mining activities have commenced. Since the impact will be low, as far as the palaeontology is concerned, the project should be authorised.

Chance Find Protocol

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

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

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

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

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

There are no alternatives, as the application area applied for is the area where the applicant has proven Tin, Tungsten and Zinc and has found potential for mining operation. No other area will have mining potential for Tin, Tungsten and Zinc.

PART B

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

1) Draft environmental management programme

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

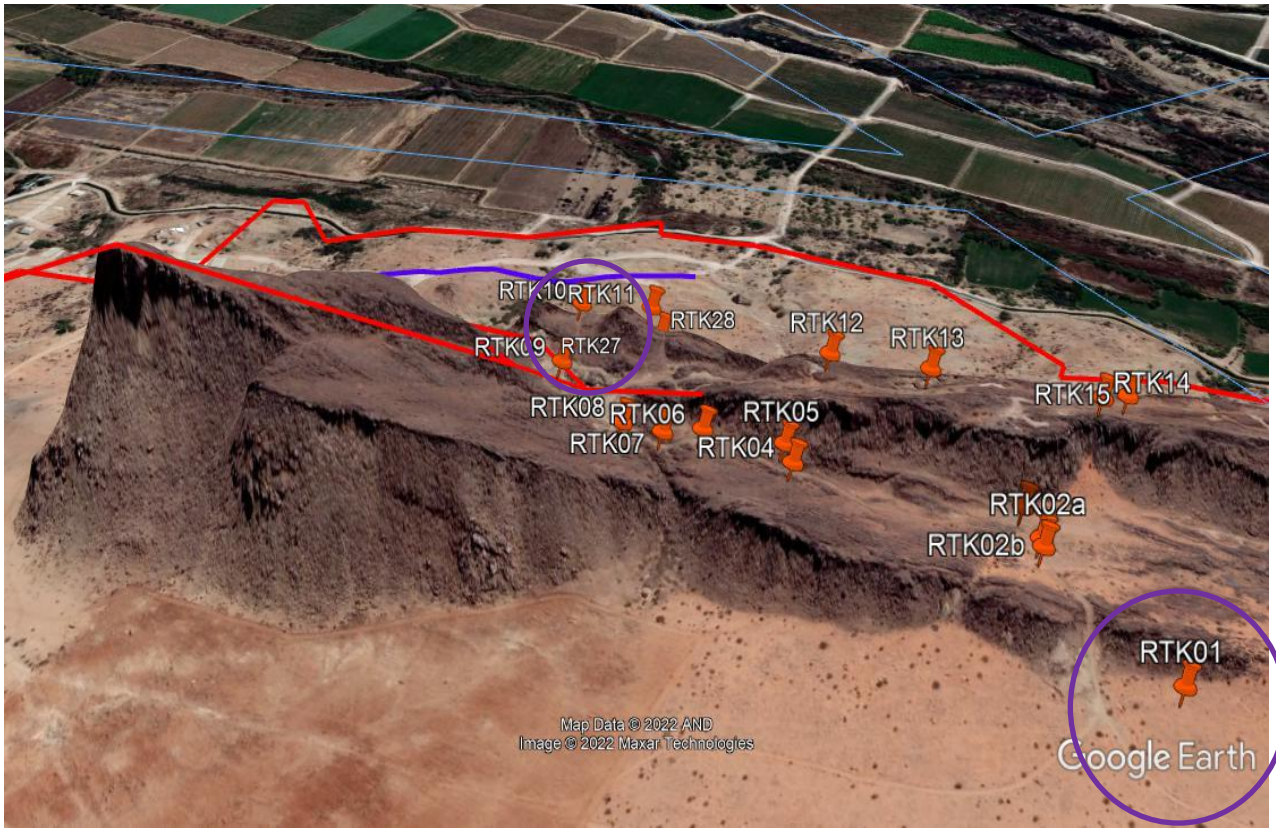
I hereby confirm that the requirement for the provision of the details and expertise of the EAP is already included in Part A as required.

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

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

c) Composite Map

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



RTK 01 On the south-eastern foot of the hill. A cairn burial WITH BUFFER ZONE OF 100M
RTK 9 Revetment wall of good workmanship with a terrace at the bottom to be protected and
RTK 11 On the crest of Renosterkop. A shelter with a northern aspect. In the shelter a shallow arced tunnel with two entrances. On the floor a substantial Stone Age deposit – flakes, pebbles, ostrich eggshell fragments and one potsherd to be protected.

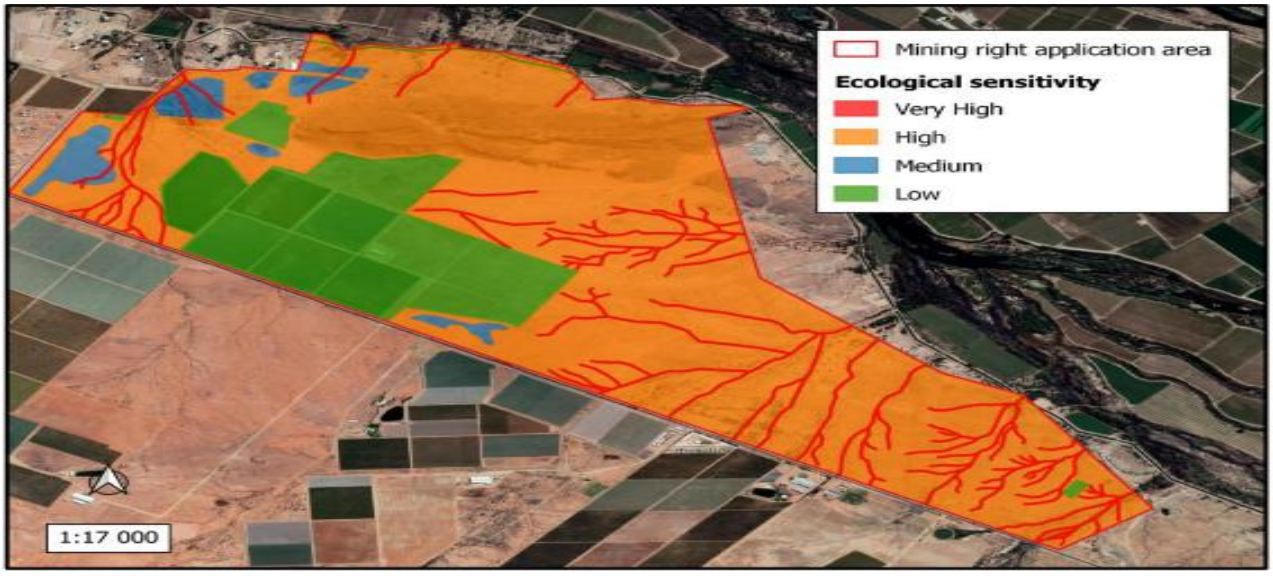


Figure 34. A sensitivity map for the proposed mining area, indicating the SITE SENSITIVITY in red taken out of the ecological study by Boscia Ecological Services.

d) Description of impact management objectives including management statements

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

The main closure objectives of the planned mining operation are:

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

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

Rehabilitation of infrastructure areas

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

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

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

Rock **Dump**

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

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

Management principles pertaining to the Rock dump include:

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

Maintenance

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

Performance assessments

As per the MPRDA and associated Regulations, as well as NEMA and associated Regulations, this Environmental Management Programme will be continually

assessed in terms of its appropriateness and adequacy. In order to achieve this, Renosterkop will undertake the following:

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

Decommissioning and closure objectives

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

- To identify potential post-closure land uses in consultation with the surrounding 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 and Rock dumps to a state that facilitates compliance with applicable environmental quality objectives;
- Limit the impact on staff whose positions become redundant at the time of mine closure, as addressed in the SLP;
- Keep relevant authorities informed of the progress of the decommissioning phase;
- Submit monitoring data to the relevant authorities;
- Maintain required pollution control facilities and rehabilitated land until closure.

Negative economic impacts

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

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

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

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

There won't be a need for this, as based on the specialist reports (Ecological study by Boscia Ecological Services).

The National Water Act (36 of 1998) (NWA) provides a framework to protect water resources. According to this Act, a water resource includes a watercourse, surface water, estuary, or aquifer; whereas a water course includes:
a) a river or spring,
b) a natural channel in which water flows regularly or intermittently,
c) a wetland, lake or dam into which, or from which, water flows, and
d) any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse.
Any reference to a watercourse includes its bed and banks and a water resource does not only include the water within the system, but also the entire water cycle; i.e., evaporation, precipitation, the habitats and processes.

The purpose of this Act (Section 2) is to ensure that the nation's water resources are protected, used, developed, conserved, managed and controlled in ways which take into account amongst other factors - (g) protecting aquatic and associated ecosystems and their biological diversity and (h) reducing and preventing pollution and degradation of water resources. No activity may take place within a watercourse unless authorised by the Department of Water and Sanitation (DWS). Any area within a wetland or riparian zone is therefore excluded from development unless authorisation is obtained from the DWS in terms of Section 21 (c) and (i).

The Renosterkop study area falls within the Vioolsdrif quaternary catchment D81A of the Lower Orange Water Management Area. This quaternary catchment has been allocated a Present Ecological State (PES) of 'Moderately Modified' (C) by Smook et al. (2002).

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). 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.

No wetlands or rivers occur on Renosterkop, but an extensive network of drainage lines traverse the property (Figure 8). These all drain towards the Orange River in the north and therefore play an important role in the catchment area. However, many drainage lines in the centre of the property have already been destroyed by agricultural activities.

Three plant communities were identified within the area earmarked for mining activities in the study area. Of these, the drainage lines are most sensitive (Very High), primarily based on their national protection status as watercourses. The remainder of the pristine portion of the site (hills and grassland habitats) are of High sensitivity based on several plant species of conservation concern recorded here, and potential important habitat it provides to protected bird-, reptile- and invertebrate species.

The most profound impacts expected to be related to the proposed mining operation include cumulative loss of intact habitat on landscape level, as well as loss and disturbances to specialised flora and fauna species, especially those restricted to the hills. 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 and license application to remove any of the protected tree species need to be lodged with the Department of Forestry and Fisheries.

If mining takes place, then the destruction of sensitive natural habitats on site is inevitable. 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 should only be granted if the applicant commits to strictly adhere to effective avoidance, management, mitigation, and rehabilitation measures. (Taken out of the Ecological study done by Dr. Betsie Milne July 2022).

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

The following information is taken out of the fact sheet for Tungsten by the EPA, 2014). Tungsten is considered a "lithophilic" element (preferring terrestrial over atmospheric or aquatic environments) based on its low vapor pressure and atmospheric interference factor. Tungsten compounds are expected to exist as ions or insoluble solids in the environment; therefore, volatilization from soil surfaces is not considered an important fate and transport process (Koutsospyros and others 2006; NIEHS 2003).

The sorption coefficients for tungsten increase as pH decreases, indicating low to moderate mobility of tungsten in soil under low to neutral environmental conditions. Sorption coefficients for the tungstate ion range from 100 to 50,000 at about pH 5, 10 to 6,000 at about pH 6.5 and 5 to 90 at pH 8 to 9 (Meijer and others 1998).

Studies indicate that an elevated pH in soil may increase the solubility of tungsten by decreasing its sorption coefficient, which may cause it to leach more readily into the groundwater table (ATSDR 2005; ASTSWMO 2011).

Therefore limited potential for bad quality leachate or acid mine drainage development is associated with the mine closure as no beneficiation will take place on site. The product will be crushed stone.

In Beneficiation as a result, the major pollutants released from tungsten mine waste do not necessarily relate to tungsten due to its low concentration and low mobility, but other contaminants present in tailings, such as-, Zn- and Pb-bearing sulfides, carbonates, and sulfates. Acid mine drainage (AMD) generated from tungsten tailings storage facilities (TSFs) proved to be another environmental and health risk. Acid mine drainage (AMD) generated from tungsten tailings storage facilities (TSFs) proved to be another environmental and health risk.

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

Therefore limited potential for bad quality leachate or acid mine drainage development is associated with the mine closure as no beneficiation will take place on site. The product will be crushed stone.

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

Therefore limited potential for bad quality leachate or acid mine drainage development is associated with the mine closure as no beneficiation will take place on site. The product will be crushed stone.

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

Therefore limited potential for bad quality leachate or acid mine drainage development is associated with the mine closure as no beneficiation will take place on site. The product will be crushed stone.

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

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

It must however be noted that the water supply to the activities will be sourced from the nearby Orange River. There will be an industrial rate applied for water used and the cost will be the pumping cost.

The crushing plant will have an impact on the cost of water used for dust suppression. The cost of water will have an upward trend over time as a result of the national capacity and demand situation.

viii) Has a water use licence been applied for?

A WULA application will be prepared and submitted. The EIA EMP is a minimum requirement for the application and therefor the application will be submitted shortly after the EIA EMP had been submitted to the competent authority. The Proof of submission will be sent onto the competent authority as soon as it is received.

ix) Impact to be mitigated in their respective phases

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

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

			Rip disturbed areas to allow re-growth of vegetation cover		
Ablution facilities	Construction Commissioning Operational Decommissioning Closure	25m² or 0.0025ha	Maintenance of container Plants Removal of container plants upon closure		Removal of infrastructure upon closure of the Mining Right.
Clean & Dirty water systems: Berms	Construction Commissioning Operational Decommissioning Closure	This area also includes the re-fuel and lubrication station, wash bay and office area.	Maintenance of berms and trenches Oil traps used in relevant areas. Drip trays used. Immediately clean hydrocarbon spill.		Upon cessation of the individual activity (continuous rehabilitation)
Fuel Storage facility (Diesel tanks)	Construction Commissioning Operational Decommissioning Closure	250m² Concrete, bricks, and steel	Maintenance of diesel tanks and bund walls. Oil traps Drip tray at re-fuelling point Immediately clean hydrocarbon spill.		Removal of diesel tanks upon closure of Mining Right.
Mining Area	Commissioning Operational Decommissioning Closure	Provision is made for a maximum footprint of ±15 hectares of areas for excavations.	Proper planning of excavations Access control Dust control and monitoring Noise control and monitoring Continuous rehabilitation		Upon cessation of the individual activity (continuous rehabilitation)

			Stormwater run-off control Immediately clean hydrocarbon spill Drip trays Dump control and monitoring Erosion control		
Salvage yard (Storage and laydown area)	Construction Commissioning Operational Decommissioning Closure	2000m² or 0.2 ha No construction material, area to be levelled with a grader and fenced with a gate and access control	Access control Maintenance of fence Storm water run-off control Immediately clean hydrocarbon spill		Removal of fence around salvage yard and ripping of salvage yard area upon closure of the mining right.
Waste disposal site (domestic and industrial waste):	Construction Commissioning Operational Decommissioning Closure	15m x 30m = 450m²	Storage of Waste within receptacles Storage of hazardous waste on concrete floor with bund wall Removal of waste on regular intervals		Removal of waste receptacles, breaking and removal of rubble from the concrete floors and bund walls upon closure of mining right.
Roads (both access and haulage road on the mine site):	Construction Commissioning Operational Decommissioning Closure	Additional mine haul road = 10 000m²	Maintenance of roads Dust control and monitoring Noise control and monitoring Speed limits Storm water run-off control Erosion control		Upon cessation of the individual activity (continuous rehabilitation) Ripping of roads upon closure of the mining right.

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

e) Impact Management Outcomes

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

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

				distance and natural shielding; Develop a mechanism to record and respond to complaints. 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.	
Ablution facilities	Soil contamination	Soil Groundwater	Construction Commissioning Operational Decommissioning	Maintenance of sewage facilities on a regular basis.	Minimize the potential for a spill on soil, which could infiltrate to groundwater.

	Possible Groundwater contamination		Closure	Removal of container on closure	
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. Linear infrastructure such as roads and pipelines will be inspected at least monthly to check that the associated water management infrastructure is effective in controlling erosion.	Safety ensured. Minimize potential for hydrocarbon spills to infiltrate into groundwater. Rehabilitation standards and closure objectives to be met.

				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	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.	Minimize potential for hydrocarbon spills to infiltrate into groundwater. Rehabilitation standards and closure objectives to be met.

	Surface disturbance			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.	
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	Air quality Fauna Flora Groundwater Noise and vibration Soil Surface Water Topography Safety	Commissioning Operational Decommissioning Closure	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	Safety ensured. Dust levels minimized Minimize potential for hydrocarbon spills to infiltrate into groundwater Noise levels minimized Rehabilitation standards and closure objectives to be met. Erosion potential minimized.

	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			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. 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; Prevent further siltation within the river segment as well as downstream of activities; Unnecessary destruction of marginal and in-stream habitat should always be avoided during operations.	
Salvage yard (Storage and laydown area)	Groundwater contamination Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination Surface disturbance Surface water contamination	Fauna Flora Groundwater Soil Surface Water	Construction Commissioning Operational Decommissioning Closure	Access Control Maintenance of fence Storm water run-off control Immediately clean hydrocarbon spill	Minimize potential for hydrocarbon spills to infiltrate into groundwater Rehabilitation standards and closure objectives to be met. Erosion potential minimized.
Product Stockpile area	Dust Noise	Air Quality Fauna Flora Noise	Commissioning Operational Decommissioning Closure	Dust Control and monitoring Noise control and monitoring	Dust levels minimized Minimize potential for hydrocarbon spills to

	Removal and disturbance of vegetation cover and natural habitat of fauna Surface disturbance	Soil Surface Water		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; Taking advantage during the design stage of natural topography as a noise buffer; Develop a mechanism to record and respond to complaints.	infiltrate into groundwater Noise levels minimized Rehabilitation standards and closure objectives to be met. Erosion potential minimized.
Waste disposal site (domestic and industrial waste):	Groundwater contamination Contamination of soil	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

	Surface water contamination				Rehabilitation standards and closure objectives to be met.
Roads (both access and haulage road on the mine site):	Dust Noise Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination Surface disturbance	Air quality Fauna Flora Noise and vibration Soil Surface water	Construction Commissioning Operational Decommissioning Closure	Maintenance of roads Dust control and monitoring Noise control and monitoring Speed limits Storm water run-off control Erosion control Immediately clean hydrocarbon spills 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;	Dust levels minimized Minimize potential for hydrocarbon spills to infiltrate into groundwater Noise levels minimized Rehabilitation standards and closure objectives met. Erosion potential minimized.

				Develop a mechanism to record and respond to complaints. Linear infrastructure such as roads and pipelines will be inspected at least monthly to check that the associated water management infrastructure is effective in controlling erosion.	
Workshop and Wash bay	Removal and disturbance of vegetation cover 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 distribution Pipeline	Surface disturbance	Fauna Flora Surface Water	Construction Commissioning Operational Decommissioning Closure	Monitor pipeline for water leaks Maintenance of pipeline Linear infrastructure such as roads and pipelines will be inspected at least monthly to check that the associated water management	Rehabilitation standards and closure objectives to be met. Erosion potential minimized.

				infrastructure is effective in controlling erosion.	
Water tanks:	Surface disturbance	Fauna Flora Surface Water	Construction Commissioning Operational Decommissioning Closure	Maintain water tanks and structures	Safety ensured. Rehabilitation standards and closure objectives to be met.

f) Impact Management Actions

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

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

	Soil contamination Surface disturbance	Rip disturbed areas to allow re-growth of vegetation cover Noise control Well maintained equipment Selecting equipment with lower sound power levels; Re-locate noise sources to areas which are less noise sensitive, to take advantage of distance and natural shielding; Taking advantage during the design stage of natural topography as a noise buffer; Develop a mechanism to record and respond to complaints. 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.		Management and staff must be trained to understand the contents of these documents and to adhere thereto. • Environmental Awareness training must be provided to employees. • The operation must have a rehabilitation and closure plan. • Management and staff must be trained to understand the contents of these documents, and to adhere thereto. Annual performance Assessment Reports and quantum Calculations must be done to ensure that the operation adheres to the contents of the EIA and EMPr documents.

		Effluents and waste should be recycling and re-use as far as possible.		
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 Right.	The following must be placed at the site and is applicable to all activities: • Relevant Legislation; • Acts; • Regulations • COP's • SOP's Management and staff must be trained to understand the contents of these documents and to adhere thereto. • Environmental Awareness training must be provided to employees. • The operation must have a rehabilitation and closure plan. • Management and staff must be trained to understand the contents of these documents, and to adhere thereto.

				Annual performance Assessment Reports and quantum Calculations must be done to ensure that the operation adheres to the contents of the EIA and EMPr documents.
Clean & Dirty water systems: Berms	Surface disturbance Groundwater Contamination Soil contamination Surface water contamination	It will be necessary to divert storm water around dump areas by construction of a temporary gravel cut-off berm that will prevent surface run-off into the mining area. Excavations, where and when applicable, should be rehabilitated concurrently as mining progresses. The re-vegetation of disturbed areas is important to prevent erosion and improve the rate of infiltration. Erosion channels that may develop before vegetation has established should be rehabilitated by filling, levelling and re-vegetation where topsoil is washed away. Maintenance of trenches Monitoring and maintenance of oil traps in relevant areas. Drip trays used. Immediately clean hydrocarbon spill.	Upon cessation of the individual activity (continuous rehabilitation) Levelling of storm water berms upon closure of Mining Right	The following must be placed at the site and is applicable to all activities: • Relevant Legislation; • Acts; • Regulations • COP's • 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

		Linear infrastructure such as roads and pipelines will be inspected at least monthly to check that the associated water management infrastructure is effective in controlling erosion. 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.		contents of these documents, and to adhere thereto. Annual performance Assessment Reports and quantum Calculations must be done to ensure that the operation adheres to the contents of the EIA and EMPr documents.
Fuel Storage facility (Diesel tanks)	Groundwater contamination Removal and disturbance of vegetation cover	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	Removal of diesel tanks upon closure of Mining Right.	The following must be placed at the site and is applicable to all activities: • Relevant Legislation; • Acts;

	and natural habitat of fauna Soil contamination Surface disturbance	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.		• Regulations • COP's • SOP's Management and staff must be trained to understand the contents of these documents and to adhere thereto. • Environmental Awareness training must be provided to employees. • The operation must have a rehabilitation and closure plan. • Management and staff must be trained to understand the contents of these documents, and to adhere thereto. Annual performance Assessment Reports and quantum Calculations must be done to ensure that the operation adheres to the contents of the EIA and EMPr documents.
Mining Area.	Dust Noise	Access control Dust control and monitoring Noise and vibration control and monitoring Continuous rehabilitation	Upon cessation of the individual activity (continuous rehabilitation)	The following must be placed at the site and is applicable to all activities: • Relevant Legislation;

	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 Surface water contamination	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. Minimizing – unavoidable impacts shall be minimized by taking appropriate and practicable measures such as transplanting important plant specimens, confining works in		• Acts; • Regulations • COP's • SOP's Management and staff must be trained to understand the contents of these documents and to adhere thereto. • Environmental Awareness training must be provided to employees. • The operation must have a rehabilitation and closure plan. • Management and staff must be trained to understand the contents of these documents, and to adhere thereto. Annual performance Assessment Reports and quantum Calculations must be done to ensure that the operation adheres to the contents of the EIA and EMPr documents.

		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; Prevent further siltation within the river segment as well as downstream of activities;		
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 right.	The following must be placed at the site and is applicable to all activities: • Relevant Legislation; • Acts; • Regulations • COP's • SOP's

	Soil contamination Surface disturbance Surface water contamination			Management and staff must be trained to understand the contents of these documents and to adhere thereto. • Environmental Awareness training must be provided to employees. • The operation must have a rehabilitation and closure plan. • Management and staff must be trained to understand the contents of these documents, and to adhere thereto. Annual performance Assessment Reports and quantum Calculations must be done to ensure that the operation adheres to the contents of the EIA and EMPr documents.
Product Stockpile area	Surface Water contamination Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination		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	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.

	Surface disturbance Surface water contamination		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 Surface Water contamination Contamination of soil Surface water contamination	Storage of Waste within receptacles Storm water control Ground water monitoring Storage of hazardous waste on concrete floor with bund wall Removal of waste on regular intervals	Removal of waste receptacles, breaking and removal of rubble from the concrete floors and bund walls upon closure of mining right.	The following must be placed at the site and is applicable to all activities: • Relevant Legislation; • Acts; • Regulations • COP's • SOP's Management and staff must be trained to understand the contents of these documents and to adhere thereto. • Environmental Awareness training must be provided to employees.

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

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

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

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

				• SOP's Management and staff must be trained to understand the contents of these documents and to adhere thereto. • Environmental Awareness training must be provided to employees. • The operation must have a rehabilitation and closure plan. • Management and staff must be trained to understand the contents of these documents, and to adhere thereto. Annual performance Assessment Reports and quantum Calculations must be done to ensure that the operation adheres to the contents of the EIA and EMPr documents.

i) Financial Provision

(1) Determination of the amount of Financial Provision

(a) Describe the closure objectives and the extent to which they have been aligned to the baseline environment described under Regulation 22(2)(d) as described in 2.4 herein.

Closure:

The main closure objective of this mine is to rehabilitate the mined areas in such a way to ensure that the rehabilitated topographical landscape would blend in with the surrounding landscape, would not pose a safety hazard for human and animal, but at the same time allow a certain alternative land use. Establish a self-sustaining and stable vegetation cover in order to mitigate the visual impact, to control erosion and to create some habitat for animals. The rehabilitated environment also needs to be aesthetically acceptable according to the principle of BPEO.

Renosterkop Mining will ensure that the mine site is:

- Neither a danger to public health and safety nor to animal health and safety.
- Not a source of any pollution.
- Stable (ecological and geophysical).
- Rehabilitated to the state that is suitable for the predetermined and agreed land use.
- Compatible with the surrounding biophysical environment.
- A sustainable environment.
- Aesthetically acceptable.
- Not an economic, social or environmental liability to the local community or the state now or in the future.

Renosterkop Mining will ensure that the physical and chemical stability of the rehabilitated mining site will be such that risk to the environment is not increased by naturally occurring forces to the extent that such increased risk cannot be contended with by the installed measures.

Renosterkop Mining will subscribe to the optimal exploitation and utilization of South Africa's mineral resources (Tin, Tungsten and Zinc).

Renosterkop Mining will ensure that the mining site is closed efficiently and cost effectively.

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

Renosterkop Mining will ensure that the interest of all interested and affected parties will be considered.

Renosterkop Mining will ensure that the all-relevant legislation regarding mine closure will be adhered to, and all relevant application procedures followed.

The management of environmental impacts:

With regard to the extension, the mitigation of all environmental impacts on all applicable aspects uses BPEO (Best practical environmental option) principles.

- Optimal utilization and maintenance of existing mine facilities in a well-planned manner.
- To take care that no new land surface, habitats of vegetation and animals are destroyed, disturbed or alienated unnecessarily.
- To contain and prevent any pollution (physical and chemical) from the mining operation within structures, facilities provided therefore.
- To ensure an effective surface run-off control system in order to deal with the separation of clean and dirty water environment.
- The sustainable and responsible utilization (re-use) of all water resources and the prevention of pollution thereof.
- The sustainable rehabilitation of the mining site (excavations, topsoil- & overburden stockpiles, rest of terrain) in order to address all environmental impacts as far as practical.

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

The Burger du Plessis Familie Trust is the landowner of the proposed mine site. The first meeting that was conducted with the land owner and his representing attorneys was on 22 June 2022, and this is also seen as the beginning of consultation. This was also the first time that access was arranged and the competent persons for the specialist studies was on the site 1 July 2022. **The Agricultural study is not finalized yet and will be added to the draft EIA EMP as soon as it is received.**

(c) Provide a rehabilitation plan that describes and shows the scale and aerial extent of the main mining activities,

including the anticipated mining area at the time of closure.

The rehabilitation of land disturbed by the operation during the life of the mining right will be accompanied by ongoing monitoring of the environment, until a stable state is reached. The main objectives are to have an uncontaminated, rehabilitated and safe environment, and to restore the area and habitats to a condition acceptable for obtaining a closure certificate.

Final rehabilitation of the site is expected to be within 10 years after the right has been granted and all deposits mined. Final rehabilitation will be executed systematically and will consist of the elements and procedures as listed below. More realistic closure elements will be fully determined by a Professional Mine Surveyor once the operation is active.

Dismantling of Crushing plant and related structures:

- The Crushing plant in total is expected to cover an area of ±10 000 m^2, of which all should be dismantled and removed. This includes related infrastructures, equipment, machinery, screening plant, and other items used during the crushing activities, such as conveyor belts, pipelines and power lines.
- The topography should then be restored to its natural contours, and any compacted area should be ripped to a depth no deeper than 300 mm;
- The prepared surfaces should then be covered with 300 mm of topsoil or suitable growth medium, which includes a viable seed bank; in order to encourage restoration of natural vegetation.

Demolition of steel buildings and structures:

- All steel buildings and structures are expected to amount to 0 m^2. These include mobile stores, workshops, offices, ablutions, water tanks, etc. Those in disuse and which cannot be sold, donated, or used for future purposes should be dismantled and removed or demolished.
- Any associated foundations associated with dismantled steel buildings and structures should also be demolished to 1 m below ground level;
- The topography should then be restored to its natural contours, and any compacted area should be ripped to a depth no deeper than 300 mm;
- The prepared surfaces should then be covered with 300 mm of topsoil or suitable growth medium, which includes a viable seed bank; in order to encourage restoration of natural vegetation.

Demolition of reinforced concrete buildings and structures

- All brick buildings and concrete structures are expected to amount to ± 250 m². These include French drains, wash bays, refuelling depots and concrete floors. Those in disuse and which cannot be donated or used for future purposes should be demolished.
- The foundations of these buildings should also be demolished and to a depth of 1 m below ground level;
- The topography should then be restored to its natural contours, and any compacted area should be ripped to a depth no deeper than 300 mm;
- The prepared surfaces should then be covered with 300 mm of topsoil or suitable growth medium, which includes a viable seed bank; in order to encourage restoration of natural vegetation.

Rehabilitation of access roads

- Mine roads in total, is expected to cover an area of 10 000 m². After general site rehabilitation has been completed, all redundant roads should be ripped or ploughed.
- The prepared surfaces should then be covered with 300 mm of topsoil or suitable growth medium, which includes a viable seed bank; in order to encourage restoration of natural vegetation.

Demolition and rehabilitation of electrified railway lines

- There are no electrified railway lines associated with the mining activities.

Demolition and rehabilitation of non-electrified railway lines

- There are no non-electrified railway lines associated with the mining activities.

Demolition of housing and/or administration facilities

- There are no other housing or administration facilities associated with the mining activities, other than those in the form of mobile containers. These were however included in the section for demolition of steel buildings and structures.

Opencast rehabilitation including final voids and ramps

- Opencasts and ramps associated with the mining activities are expected to cover 3ha at any time.
- In-filling of the pits should take place concurrently and by obtaining material from the closest adjacent excess material heaps;
- The topography should then be shaped to the natural contours;

- The prepared surfaces should finally be covered with 300 mm of topsoil or suitable growth medium, which includes a viable seed bank; in order to encourage restoration of natural vegetation.

Sealing of shafts, adits and inclines

- There are no shafts associated with the mining activities.

Rehabilitation of overburden and spoils

- The total final overburden and spoils are estimated to amount to 3 ha and includes waste dumps as well as earth walls. Pre-planning should be conducted in order decide the fate of these features. For example, if the material from these features will be used for in-filling, or if the features will remain after closure.
- The slopes of those features selected to remain after closure, should be downgraded to such an extent that they are not visually intrusive to the skyline after closure, and/or at least have an average outer slope of 1:3 (18°); or as predetermined by a specialist, depending on the type of material;
- The prepared surfaces should then be covered with 300 mm of topsoil or suitable growth medium, which includes a viable seed bank; in order to encourage restoration of natural vegetation, to ensure stability, improve the visual impact, and minimise erosion.

Rehabilitation of waste rock deposits with pollution potential

- The only waste rock dumps that will be left on site is rock that was not sold due to too low quantity of Tin, Tungsten and Zinc minerals. However, the probability of pollution potential for this waste rock is not huge due to the low content of the target minerals but still possible.

The slopes of those features selected to remain after closure, should be downgraded to such an extent that they are not visually intrusive to the skyline after closure, and/or at least have an average outer slope of 1:3 (18°); or as predetermined by a specialist, depending on the type of material;

- For backfilled excavations the topography should be shaped to be in line with the natural contours, but where compaction occurred, the areas should be ripped to a depth no deeper than 300 mm;
- The prepared surfaces should then be covered with 300 mm of topsoil or suitable growth medium, which includes a viable seed bank; in order to encourage restoration of natural vegetation, to ensure stability, improve the visual impact, and minimise erosion.

Storm water management

Storm water runoff arising from the upper and outer slopes of the rehabilitated rock dump should be managed to

(1) prevent uncontrolled runoff from the rock dump, which in turn creates surface erosion and resultant damage to the cover material and could also expose deposited material;
(2) route the runoff arising from the rehabilitated rock dump into the surrounding surface water drainage regime in a manner that would limit the creation of secondary erosion in the receiving surface water environment and/or possible damage to downstream surface infrastructure; and
(3) allow for the control routing of the runoff collected on the rehabilitated residue deposit across cut-off, seepage or solution trenches provided to handle excess contaminated seepage from the residue deposit.

Rehabilitation of subsided areas

The EAP is not currently aware of any areas of subsidence on site. However, any potential for such occurrences should be actively investigated and should be included in the rehabilitation plan, if and when such areas are identified.

General surface rehabilitation

- Final surface rehabilitation of areas disturbed by mining and related activities should be aligned to the selected final land use. General surface rehabilitation encompasses the reinstatement of natural topography, the top soiling and the re-vegetation of all those areas where infrastructure have been dismantled and removed or demolished. It also includes any industrial waste or scrap material that need to be removed from site. The total area that will need general surface rehabilitation at the time mine closure is estimated to be ± 1,5 ha.

River diversions

No river diversions are planned.

Fencing

It is not known at this stage if any fencing is planned.

Water management

No treatment of water will be necessary for the mining activities.

Maintenance and aftercare

Maintenance and aftercare should be planned for two to three years after mine production have ceased and should include the following:

- Annual fertilising of rehabilitated areas.

- Monitoring of surface and subsurface water quality,
- Control of alien plants, and
- General maintenance, including rehabilitation of cracks and subsidence.
- Erosion control and monitoring of the slopes of the Rock dump;

Specialist study

A screening level risk assessment should be completed by a specialist environmental practitioner during mine closure in order to ensure that all of the rehabilitation objectives have been met and that all of the potential risks have been eliminated and/or are controlled. This assessment should specifically emphasise those risks relating to river disturbances, groundwater quality and slope stabilities, but should not neglect progress made in natural vegetation restoration or success in alien invasive eradications. The current average specialist fees are estimated at R 50 000.

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

The rehabilitation plan was primarily designed with the closure objectives in mind and therefore it relates to all the various objectives as set out above in Section 1) g) 1) a) of this EMPR. In general, the main objectives are to have an uncontaminated, rehabilitated and safe environment, and to restore the mining area to a condition acceptable for obtaining a closure certificate. Each and every element in the rehabilitation plan was designed in order to meet these closure objectives.

The ultimate rehabilitation of the mining site that involves the sloping, levelling, replacement of topsoil and the seeding of an grass seed mix in areas that does not recover acceptably as agreed to by the land owner will ensure that the site could be regarded as safe for humans and animals and will also ensure that the site is stable from an erosion point of view and also ensuring that the site could be used for grazing again.

The removal of waste material of any description from the mining area and the disposal thereof at a recognised landfill facility.

- ❖ The removal of infrastructure, equipment, crushing plant and other items from the site.

- ❖ The ripping of compacted areas to a level of 300mm and the levelling of such areas in order to re-establish a growth medium for plants (such areas will furthermore be seeded with a

vegetation seed mix adapted to reflect the local indigenous flora that was present prior to the prospecting operation, if the re-establishment of vegetation is unacceptably slow.

- The mining of Tin, Tungsten and Zinc and the backfilling and covering thereof with previously stored topsoil (where-after this area will also be seeded with a vegetation seed mix adapted to reflect the local indigenous flora that was present prior to the proposed operation, and seedlings protected for a period of one) if the re-establishment of vegetation is unacceptably slow.

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

The total cost to rehabilitate and mitigate the Renosterkop Mine site as it stands currently (risking premature rehabilitation) is estimated to be R2 374 206 according to the DMR calculations. The detailed calculation DMR quantum is presented in Table 20. The total rehabilitation costing is based on the assumption that the mining operation will do continuous concurrent rehabilitation throughout the project.

(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 20º.	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.
Fauna	To minimise vegetation destruction in mining areas, and therefore a habitat for wildlife; and To eliminate poaching and the extermination of animal species within the boundaries of the study area as well as the surrounding areas.	To ensure that the species diversity and abundance is not significantly reduces.	Site Manager/ Environmentalists	Monitoring will be done at rehabilitated area on an *annually basis* to investigate species diversity and abundance.
Flora	To minimise the destruction of vegetation units; and To control invasion of exotic and invasive plant species.	To ensure that the rehabilitated areas become self-maintaining.	Site Manager/ Environmentalists	Monitoring will be done at the rehabilitated areas on a *twice a year basis* (mid-summer and mid-winter), where species diversity and vegetation cover will be investigated.

SOURCE ACTIVITY	IMPACTS REQUIRING MONITORING PROGRAMMES	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES (FOR THE EXECUTION OF THE MONITORING PROGRAMMES)	MONITORING AND REPORTING FREQUENCY and TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS
Noise and Vibration	To ensure that the legislated noise and ground vibration levels will be adhered to at all times. To control the incidence of unacceptable noise levels on site.	The management objective will be to reduce any level of noise, shock and lighting that may have an effect on persons or animals, both inside the crushing plant area and that which may migrate outside the plant area.	The manager during the construction phase and the responsible person (Manager / Environmental Department) during the Operational phase of the project.	Quarterly reports on fall-out 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.	The Orange River are the nearest source in the vicinity of the mine. The Orange River will be monitored by collecting surface water samples quarterly.	Site Manager/Water Supply	Monitoring takes place by collecting surface water samples every quarter. Implementation of a suitable management action plan during the operation of the proposed mine, based on analysis of bi-annual water quality and biological monitoring data collected at sites upstream and downstream of all activities .

l) Indicate the frequency of the submission of the performance assessment report

Auditing of compliance with environmental authorisation, the environmental management programme and the closure plan should be conducted 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 Renosterkop 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 Renosterkop 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

(Among others, confirm that the financial provision will be reviewed annually)

According to Section 41(3) of the MPRDA the holder of a Mining right must annually assess (and revise, if necessary) the total quantum of environmental liability for the operation and ensure that financial provisions are sufficient to cover the current liability (in the event of premature closure) as well as the end-of-operation liability.

An Annual Rehabilitation Plan should be developed to match the various requirements set out in the NEMA regulations pertaining to the financial provision for prospecting, exploration, mining or production operations (as amended in 2015).

Officials in the DMR Regional Offices are required to assess, review and approve the quantum of financial provision submitted (that is, the monetary value of the financial provision that has been computed by the holder of a prospecting right, mining right or mining permit during the annual review) as being sufficient to cover the environmental liability at that time and for closure of the site at that time.

It is hereby confirmed that the financial provision shall be reviewed annually.

2) UNDERTAKING

The EAP herewith confirms

a) the correctness of the information provided in the reports;

b) the inclusion of comments and inputs from stakeholders and I&APs;

c) the inclusion of inputs and recommendations from the specialist reports where relevant; and

d) the acceptability of the project in relation to the finding of the assessment and level of mitigation proposed.

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Signature of the Environmental Assessment Practitioner:

Wadala Mining and Consulting (Pty) Ltd

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Name of Company:

Date: 04 August 2022

- END –