mineral resources & energy
Department:
Mineral Resources and Energy
REPUBLIC OF SOUTH AFRICA

# FINAL

# BASIC ASSESSMENT REPORT

# And

# ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

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

**NAME OF APPLICANT: XHARIEP PLANT AND MINING (PTY) LTD**

**TEL NO: 053 874 3820**
**FAX NO: 053 874 3820**
**POSTAL ADDRESS: P.O. BOX 1776, KIMBERLEY, 8300**
**PHYSICAL ADDRESS: 1 UITZIGHT STREET, ROYLGLEN, KIMBERLEY, 8301**
**FILE REFERENCE NUMBER SAMRAD: (NC) 30/5/1/1/2/13478 PR**

## IMPORANT NOTICE

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

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

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

**It is therefore an instruction that** the prescribed reports required in respect of applications for an environmental authorisation for listed activities triggered by an application for a right or 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 furthermore 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.

## OBJECTIVE OF THE BASIC ASSESSMENT PROCESS

The objective of the basic assessment process is to, through a consultative process:-

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

b) identify the alternatives considered, including the activity, location, and technology alternatives;

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

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

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

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

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## PART A
## SCOPE OF ASSESSMENT AND BASIC ASSESSMENT REPORT

Contact Person and correspondence address:

**a) Details of:**

**i) The EAP who prepared the report:**

Name of the Practitioner: Ms. Tanja Jooste
M and S Consulting (Pty) Ltd
Tel No: 053 861 1765
Fax No: 086 636 0731
Cell No: 084 444 4474
E-Mail address: ms.consulting@vodamail.co.za

**ii) Expertise of the EAP:**

(1) The qualifications of the EAP:
(With evidence attached as Appendix 1)

- Professional registration of EAP:
  Ms. Jooste is a registered EAP with the Environmental Assessment Practitioners Association of South Africa (EAPASA) (Reg. No. 2019/1983).

- The qualifications of the EAP:
  - Fifteen years professional experience, in terms of Section 15(1) of the National Environmental Management Act, 1998 (Act No. 107 of 1998), Section 24H Registration Authority Regulations as published on 22 July 2016 under Government Gazette No. 40154 (849);
  - Environmental Management Certificate; and
  - BA in Environmental Management.

(2) Summary of the EAP's past experience:
(Attach the EAP's curriculum vitae as Appendix 2)

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.

**b) Location of the overall activity:**

| | |
|---|---|
| Farm Name: | Remaining Extent of Consolidated Farm Kappies Kareeboom 540<br><br>Portion 1 of Consolidated Farm Kappies Kareeboom 540<br><br>Remaining Extent of the Farm 544<br><br>Portion 1 of the Farm 616<br><br>Hereinafter referred to as the 'PR Area' |

| | |
|---|---|
| Application area (Ha) | 6 078.5132 Hectares |
| Magisterial district: | Hay |
| Distance and direction from nearest town | The PR Area is situated approximately 12km south-west of the town of Postmasburg in the Northern Cape Province.<br><br>Access to the site can be obtained from the R309. |
| 21 digit Surveyor General Code for each farm portion | C03100000000054000000<br>C03100000000054000001<br>C03100000000054400000<br>C03100000000061600001 |

## c) Locality Map:

(show nearest town, scale not smaller than 1:250 000 attached as Appendix 3)

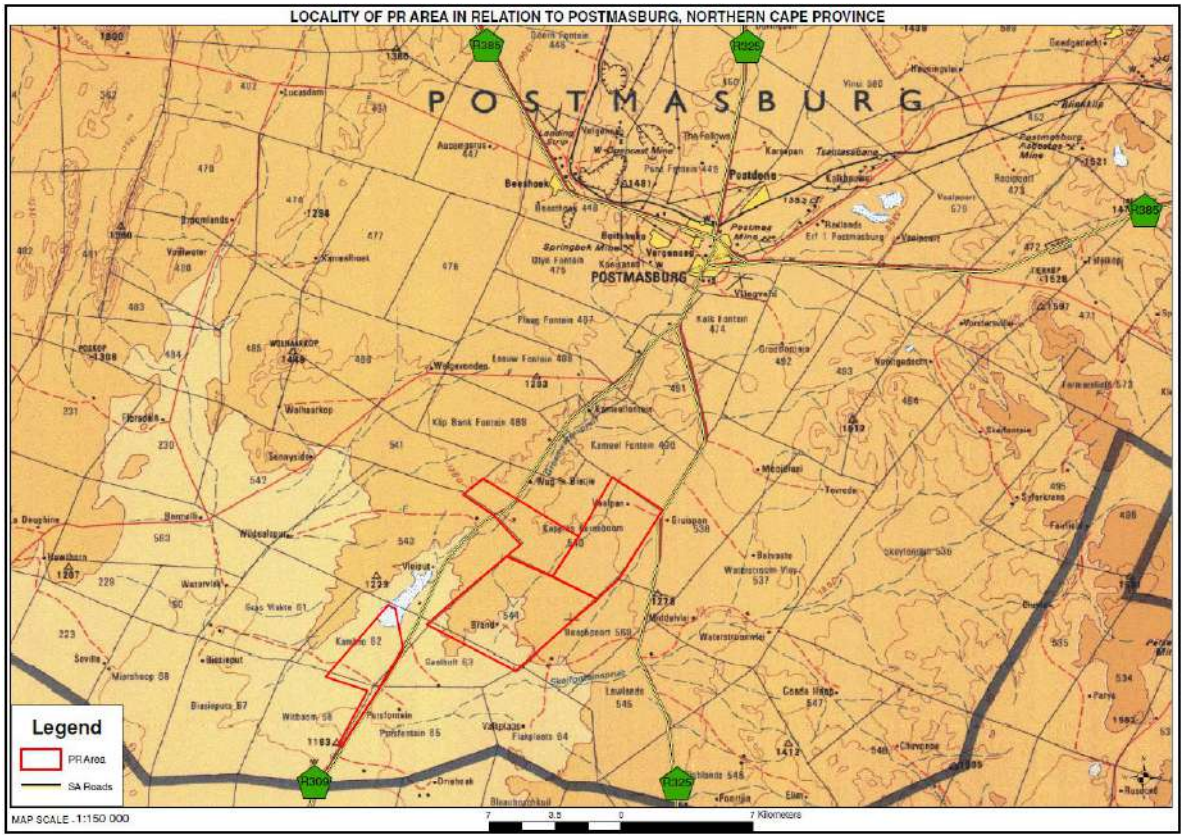


Figure 1 – Locality Map

## d) Description of the scope of the proposed overall activity:

### i) Listed and specified activities:

(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 and attach as Appendix 4)

A detailed Site Plan cannot be provided in this early stage of the application process as the locality of the invasive prospecting activities is dependent on the results of the non-invasive prospecting activities.

We do; however; insert below a Conceptual Site Plan indicating all existing infrastructure (i.e. roads) as well as sensitive environmental features to assist with planning when the results of the abovementioned stages have been obtained. No prospecting related infrastructure will be established at the site.

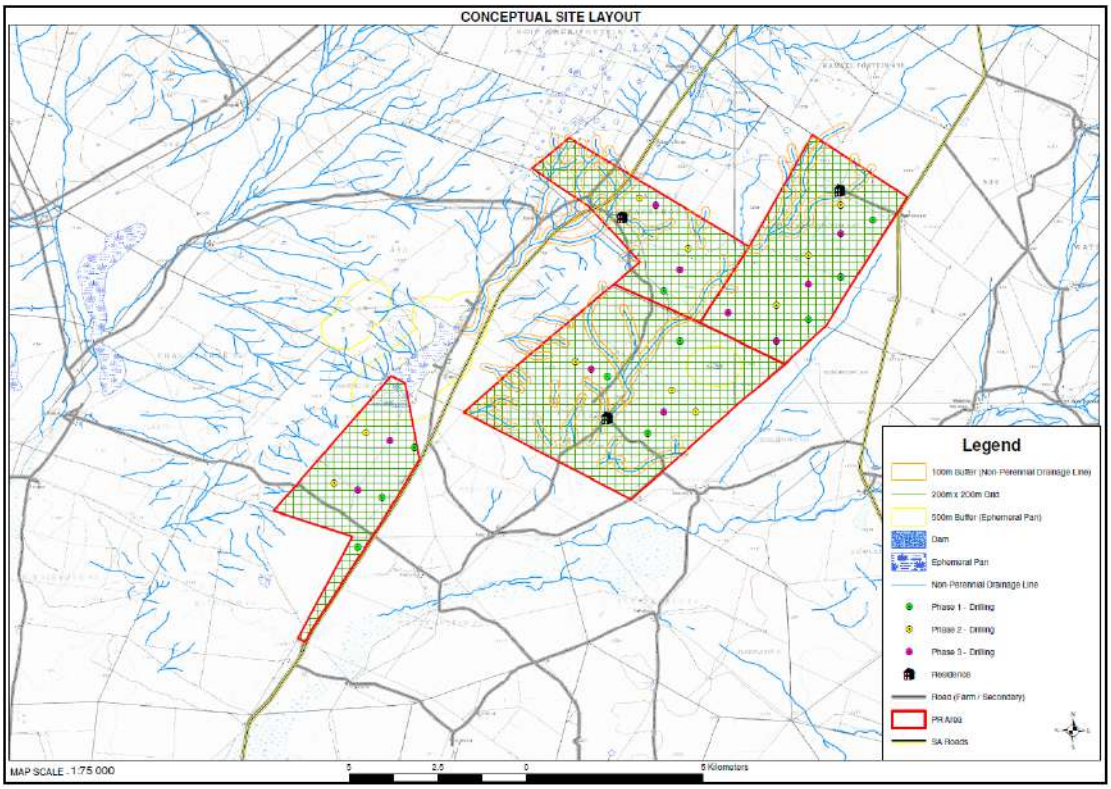


Figure 2 – Conceptual site layout plan

| Name of activity (e.g. Excavations, blasting, stockpiles, discard dumps or dams, loading, hauling and transport, water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc…etc…etc.) | | Aerial extent of the activity (Ha or m²) | Listed Activity (mark with an X where applicable or affected) | Applicable Listing Notice (GNR544, GNR545 or GNR546 / Not listed) |
|---|---|---|---|---|
| 1 | Percussion boreholes<br>30 boreholes with a 20m x 20m surface disturbance around each hole | 12 000m² (1.2 Ha) | X | GNR327 – Activity 20<br>GNR327 – Activity 27 |
| 2 | Access tracks:<br>- Existing roads will be used as far as possible.<br>- It is anticipated that 500m long and 3m wide two-spoor access tracks will be created to access borehole localities. | 1 500m² (0.15 Ha) | X | GNR327 – Activity 20<br>GNR327 – Activity 27 |
| 3 | Chemical toilets | 6m² each | | |

Full description of listed activities applied for:

Full description of listed activities:

- GNR 327 – Activity 20: Any activity including the operation of that activity which requires a prospecting right in terms of Section 16 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including
  a) associated infrastructure, structures and earthworks, directly related to prospecting of a mineral resource; or including activities for which an exemption has been issued in terms of Section 106 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002);
  b) the primary processing of a mineral resource including winning, extraction, classifying, concentrating, crushing, screening or washing;
  but excluding the secondary processing of a mineral resource, including the smelting, beneficiation, reduction, refining, calcining or gasification of the mineral resource in which case Activity 6 of Listing Notice 2 applies.

- GN327: Activity 27: The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for:-
  (i) the undertaking of a linear activity; or
  (ii) maintenance purposes undertaken in accordance with a maintenance management plan.

## ii) Description of the activities to be undertaken:

(Describe methodology or technology to be employed, and for a linear activity, a description of the route of the activity.)

Xhariep's prospecting activities for Iron Ore and Manganese Ore shall be conducted in nine phases over a period of five years.

| Phase | Activity (what are the activities that are planned to achieve optimal prospecting) | Skill(s) required (refers to the competent personnel that will be employed to achieve the required results) | Timeframe (in months) for the activity) | Outcome (What is the expected deliverable, e.g. Geological report, analytical results, feasibility study, etc.) | Timeframe for outcome (deadline for the expected outcome to be delivered) | What technical expert will sign off on the outcome? (e.g. geologist, mining engineer, surveyor, economist, etc) |
|---|---|---|---|---|---|---|
| 1 | **Non-invasive Prospecting** Reconnaissance visit | Geologist | Month 1 | Memorandum to address any problems | Month 2 | Geologist |
| 2 | **Non-invasive Prospecting** Review of historical activities; Desktop study; and Geological Mapping | Geologist | Month 2 - 12 | Map & Report | Month 13 | Geologist |
| 3 | **Invasive Prospecting** Phase 1 Percussion drilling | Geologist & Drilling contractor | Month 13 - 24 | Drill logs | Month 24 | Geologist |
| 4 | **Non-invasive Prospecting** Analysis of drill samples | Laboratory | Month 13 – 24 (Concurrent with drilling) | • Analyses sheets<br>• Laboratory report<br>• Map<br>• Report | Month 24 | Laboratory & Geologist |
| 5 | **Invasive Prospecting** Phase 2 Percussion drilling | Geologist & Drilling contractor | Month 25 – 36 | Drill logs | Month 36 | Geologist |
| 6 | **Non-invasive Prospecting** Analysis of drill samples | Laboratory | Month 25 – 36 (Concurrent with drilling) | • Analyses sheets<br>• Laboratory report<br>• Map<br>• Report | Month 36 | Laboratory & Geologist |
| 7 | **Invasive Prospecting** Phase 3 Percussion drilling | Geologist & Drilling contractor | Month 37 - 48 | Drill logs | Month 48 | Geologist |
| 8 | **Non-invasive Prospecting** Analysis of drill samples | Laboratory | Month 37 - 48 (Concurrent with drilling) | • Analyses sheets<br>• Laboratory report<br>• Map<br>• Report | Month 48 | Laboratory & Geologist |
| 9 | **Non-Invasive Prospecting** Consolidation and interpretation of results / data | Geologist | Month 49 - 60 | Feasibility Report | Month 60 | Geologist & CEO |

Description of planned non-invasive activities:
(These activities do not disturb the land where prospecting will take place)

Phase 1:
A site investigation of the application area will be undertaken to identify infrastructure and determine any potential problems that may need to be addressed.

Phase 2:
In order to direct the exploration programme in an efficient manner, there will be a review of all available information and data. A desktop study will be undertaken of the metal potential of the area.

Any anomalous features identified will be mapped in detail. The various rock types and their contacts will also be mapped.

Phases 4, 6 and 8:
Drill samples will be collected in one-meter intervals and logging will be done by a qualified geologist who will record the lithology, mineralogy, degree of mineralization and structural features. Mineralized samples will be analyzed at an internationally recognized (ISO certified) laboratory.

Phase 9:
All the drill sampling data will then be modeled to obtain a final interpretation of the potential of the deposit. A detailed feasibility report will be compiled after drilling operations have been completed to evaluate the economic viability of the project.

Description of planned invasive activities:
(These activities result in land disturbances)

Phases 3, 5 and 7: Percussion drilling
Percussion drilling will be used to identify the position of a suspected base metal deposit. The position of the boreholes is dependent on the results of the review of historical activities, geological mapping, desktop study and reconnaissance visit.

Thirty boreholes, approximately 50m deep each (can be more or less depending on results), are planned. The collar position of all boreholes will be surveyed. All drilling will be short term and undertaken by a contractor using truck-mounted equipment.

Angled percussion holes are planned to locate and intersect the mineralization. A traverse line or grid drilling is used to identify and define the extent of any mineralization. The sizes of the boreholes drilled will be determined by such factors as cost, proposed sampling, availability of drilling machines and the volume of sample required, among others.

Each drill site will be rehabilitated. The boreholes will be filled with drill chips and covered with topsoil.

Description of site layout:
No offices and storerooms will be established at the site as Xhariep Plant and Mining (Pty) Ltd (hereinafter referred to as 'Xhariep') shall make use of facilities in the town of Kimberley / Postmasburg.

**e) Policy and Legislative Context:**

| Applicable Legislation and Guidelines used to compile the report<br>(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 |
|---|---|
| Conservation of Agricultural Resources Act (Act 43 of 1983) and Regulations | - Section 5: Implementation of control measures for alien and invasive plant species;<br>- Section 6: Control measures.<br>- Regulation GN R1048, published on 25 May 1984, in terms of CARA |
| Constitution of South Africa (Act 108 of 1996) | - Section 24: Environmental right<br>- Section 25: Rights in Property<br>- Section 27: Water and sanitation right |
| Environment Conservation Act (Act 73 of 1989) and Regulations | - Sections 21, 22, 25, 26 and 28: EIA Regulations, including listed activities.<br>- Section 28A: Exemptions. |
| 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. |
| 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. |
| 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. |
| Mineral and Petroleum Resources Development Act (Act 28 of 2002) and Regulations as amended | - Entire Act.<br>- Regulations GN R527 |
| National Environmental Management Act (Act 107 of 1998) and Regulations as amended | - Section 2: Strategic environmental management principles, goals and objectives.<br>- Section 24: Foundation for Environmental Management frameworks.<br>- Section 24N:<br>- Section 24O: |

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| | - Section 28: The developer has a general duty to care for the environment and to institute such measures to demonstrate such care.<br>- Regulations GN R547, published on 18 June 2010 in terms of NEMA (Environmental Management Framework Regulations)<br>- Regulations GN R982 to R985, published on 4 December 2014 in terms of NEMA (Listed Activities)<br>- Regulations GN R993, published on 8 December 2014 in terms of NEMA (Appeal)<br>- Regulations GN R994, published on 8 December 2014 in terms of NEMA (exemption)<br>- Regulations GN R205, published on 12 March 2015 in terms of NEMA (National appeal Amendment Regulations)<br>- 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<br>- Section 34: Control of noise<br>- Section 35: Control of offensive odours<br>- 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)<br>- Regulation GN R283, published on 2 April 2015 in terms of NEM:AQA (National Atmospheric Emissions Reporting Regulations) (Group C-Mines) |
| 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.<br>- Section 53 states that the Minister may identify any process or activity in such a listed ecosystem as a threatening process.<br>- A list of threatened and protected species has been published in terms of Section 56(1) GG 29657 GNR 151 and GNR 152, Threatened or Protected Species Regulations.<br><br>Commencement of Threatened or Protected Species Regulations 2007 : 1 June 2007<br>GNR 150/GG 29657/23-02-2007 |

| | |
|---|---|
| | Publication of lists of critically endangered, vulnerable and protected species GNR 151/GG 29657/23-02-2007 *<br>Threatened or Protected Species Regulations<br>GNR 152/GG 296547/23-02-2007 *<br>- 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.<br>- Sections 71 and 73: These sections deal with restricted activities involving listed invasive species and duty of care relating to listed invasive species.<br>- Regulation GN R151, published on 23 February 2007 (List fo Critically Endangered, Vulnerable and Protected Species, 2007) in terms of NEM: BA<br>- Regulation GN R152, published on 23 February 2007 (TOPS) in terms of NEM:BA<br>- Regulations GN R507 to 509 of 2013 and GN 599 of 2014 in terms of NEM:BA (Alien Species) |
| The National Environmental Management Act: Protected Areas Act (NEMPAA) (Act 57 of 2003) provides for the protection of ecologically viable areas that are representative of South Africa‟s natural biodiversity and its landscapes and seascapes. | - Chapter 2 lists all protected areas. |
| National Environmental Management: Waste Management Act (Act 59 of 2008) | - Chapter 4: Waste management activities<br>- Regulations GN R634 published on 23 August 2013 in terms of NEM:WA (Waste Classification and Management Regulations)<br>- Regulations GN R921 published on 29 November 2013 in terms of NEM:WA (Categories A to C – Listed activities)<br>- 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)<br>- Regulations GN R634 published on 23 August 2013 in terms of NEM: WA (Waste Classification and Management Regulations)<br>- Regulations GN R632 published on 24 July 2015 in terms of NEM: WA (Planning and Management of Mineral Residue Deposits and Mineral Residue Stockpiles) |

| | |
|---|---|
| | - Regulations GN R633 published on 24 July 2015 in terms of NEM: WA (Amendments to the waste management activities list published under GN921) |
| National Forest Act (Act 84 of 1998) and Regulations | - Section 15: No person may cut, disturb, damage, destroy or remove any protected tree; or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a licence granted by the Minister. |
| 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.<br>- 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 palaeontological site.<br>- Section 36: No person may, without a permit issued by SAHRA or a provincial heritage resources authority destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a forma cemetery administered by a local authority.<br>- 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.<br>- Regulation GN R548 published on 2 June 2000 in terms of NHRA |
| National Water Act (Act 36 of 1998) and and regulations as amended, *inter alia* Government Notice No. 704 of 1999 | - Section 4: Use of water and licensing.<br>- Section 19: Prevention and remedying the effects of pollution.<br>- Section 20: Control of emergency incidents.<br>- Section 21: Water uses<br>In terms of Section 21 a licence is required for:<br>(a) taking water from a water resource;<br>(b) storing water;<br>(c) impeding or diverting the flow of water in a watercourse;<br>(f) Waste discharge related water use;<br>(g) disposing of waste in a manner which may detrimentally impact on a water resource;<br>(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;<br>- Regulation GN R704, published on 4 June 1999 in terms of the National Water Act (Use of water for mining and related activities)<br>- Regulation GN R1352, published on 12 November 1999 in terms of the National Water Act (Water use to be registered)<br>- Regulation GN R139, published on 24 February 2012 in terms of the National Water Act (Safety of Dams)<br>- Regulation GN R398, published on 26 March 2004 in terms of the National Water Act (Section 21 (j))<br>- Regulation GN R399, published on 26 March 2004 in terms of the National Water Act (Section 21 (a) and (b) )<br>- Regulation GN R1198, published on 18 December 2009 in terms of the National Water Act (Section 21 ( c ) and (i) – rehabilitation of wetlands)<br>- Regulations GN R1199, published on 18 December 2009 in terms of the National Water Act (Section 21 ( c ) and (i) )<br>- 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. |
| Northern Cape Nature Conservation Act (Act 9 of 2009) | - Addresses protected species in the Northern Cape and the permit application process related thereto. |
| Occupational Health and Safety Act (Act 85 of 1993) and Regulations | - Section 8: General duties of employers to their employees.<br>- 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. |
| 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). |
| National Land Transport Act, (Act 5 of 1998) | |
| Northern Cape Planning and Development Act (Act 7 of 1998) | - To control planning and development |
| Spatial Planning and Land Use Management (Act 16 of 2013 | - To provide a framework for spaitial planning and land use management in |

| | |
|---|---|
| (SPLUMA) and regulations | the Republic;<br>- To specify the relationship between the spatial planning and the land use management, amongst others<br>- Regulations GN R239 published on 23 March 2015 in terms of SPLUMA |
| 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 |
| | |
| Basic Conditions of Employment Act (Act 3 of 1997) ) as amended | - To regulate employment aspects |
| Community Development (Act 3 of 1966) | - To promote community development |
| Development Facilitation (Act 67 of 1995) and regulations | - To provide for planning and development |
| Development Facilitation (GN24, PG329, 24/07/1998) | - Regulations re Northern Cape LDO's |
| Development Facilitation (GNR1, GG20775, 07/01/2000) | - Regulations re application rules S26, S46, S59 |
| Development Facilitation (GN732, GG14765, 30/04/2004) | - Determines amount, see S7(b)(ii) |
| Land Survey Act (Act 8 of 1997) ) and regulations, more specifically GN R1130 | - To control land surveying, beacons etc. and the like;<br>- Agriculture, land survey S10 |
| National Veld and Forest Fire Act (Act 101 of 1998) ) and regulations, more specifically GN R1775 | - To regulate law on veld and forest fires<br>- (Draft regulations s21) |
| | |
| Municipal Ordinance, 20/1974 | - To control pollution, sewers etc. |
| Municipal Ordinance, PN955, 29/08/1975 | - Nature conservation Regulations |
| Cape Land Use Planning Ordinance, 15/85 | - To control land use planning |
| Cape Land Use Planning Ordinance, PN1050, 05/12/1988 | - Land use planning Regulations |
| | |

**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.)

In terms of the Environmental Impact Assessment Regulations, 2014 (GG38282, Government Notice No. R. 982) the need and desirability of any development must be included in the relevant reports to be submitted to the competent authority.

Assessment of the geological information available has determined that the area in question may have various mineral targets. In order to ascertain the above and determine the nature, locality and extent of the mineral targets within the prospecting area, it will be necessary that prospecting be undertaken. The prospecting will also determine if there are any features that may have an impact on the economic extraction of the minerals.

The information that will be obtained from the prospecting to be done will be necessary to determine, should the minerals be found, how and where the minerals will be extracted and how much economically viable mineral reserves are available within the proposed prospecting area.

Should the minerals applied for be found in the application area, Xhariep will be able to ensure employment opportunities and support to the local business for a certain period of time.

Xhariep expects that substantial benefits from the project (should the minerals applied for be found) will accrue to the immediate project area, the sub-region and the Northern Cape Province. These benefits must be offset against the costs of the project, including the impact to the surface owner.

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

- The property on which or location where it is proposed to undertake the activity:
  The Geological formation supports the possibility that the minerals applied for could be found within the application area.

- The operational aspects of the activity:
  Xhariep aims to minimize its impact on the natural environment as much as possible and as such has opted to only use drilling as an invasive prospecting method.

- The technology to be used in the activity:
  A percussion drill rig will be used during phases 3, 5 and 7 of the prospecting activities. There are no alternatives to these types of drill rigs that will ensure high quality samples for analysis.

## h) Full description of the process followed to reach the proposed preferred alternatives within the site:

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

### (i) Details of all alternatives considered:

With reference to the site plan provided as Appendix 4 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:

The registered description of the land to which the prospecting right application relates:

| Property description | District | Title Deed | Extent (Ha) |
|---|---|---|---|
| Remaining Extent of Consolidated Farm Kappies Kareeboom 540 | Hay | T3007/2002 | 1 119.0181 |
| Portion 1 of Consolidated Farm Kappies Kareeboom 540 | Hay | T949/1966 | 1 609.7901 |
| Remaining Extent of the Farm 544 | Hay | T739/2019 | 2 412.3253 |
| Portion 1 of the Farm 616 | Hay | T5263/2004 | 937.3797 |

Alternatives considered:-

Xhariep has considered the following alternatives:

- The Geological formation that supports the possibility that the minerals applied for could be found within the area.
- The availability of farms within the area that is not already occupied by existing prospecting or mining rights.
- The availability of infrastructure, such as a road network, in the immediate surrounding area, which could be utilized to allow easy access to the site.

Taking the above into consideration, Xhariep opted to apply for the properties as above.

#### (b) The type of activity to be undertaken:

Prospecting activities for Iron Ore and Manganese Ore are to take place in the form of percussion drilling.

Alternatives considered:-

The only alternative land use is livestock and/or game farming; however the applicant's main economic activity is prospecting / mining and for this reason does not favour any other alternative land use.

#### (c) The design or layout of the activity:

Infrastructure: No offices and storerooms will be established at the site as Xhariep shall make use of facilities in the town of Kimberley / Postmasburg.

Invasive prospecting: The proposed locality of the exploration boreholes has been placed on a wide grid to determine the economic potential. The final locality of the exploration holes can only be determined after the non-invasive prospecting activities have been completed.

Alternatives considered:-
Infrastructure: The only alternative considered was the establishment of offices and storerooms on the farms under application. As Xhariep aims to minimize its impact on the natural environment as much as possible this option was decided against.

Invasive prospecting: The drilling of boreholes over the entire PR Area was considered, but taking into account that Xhariep aims to minimize its impact on the natural environment as much as possible this option was decided against.

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

A percussion drill rig will be used during phases 3, 5 and 7 of the prospecting activities.

Alternatives considered:-
There are no alternatives to these types of drill rigs that will ensure high quality samples for analysis.

**(e) The operational aspects of the activity:**

Xhariep aims to minimize its impact on the natural environment as much as possible and as such has opted to only use drilling as an invasive prospecting method.

Alternatives considered:-
Xhariep considered conducting bulk sampling as part of its prospecting activities. To ensure the prospecting activities are cost effective, Xhariep opted to only conduct drilling activities during its initial prospecting period.

**(f) The option of not implementing the activity:**

Five measures of economic impacts can be used to demonstrate the potential effect of the proposed prospecting operation on the local economy:

- Employment - The extent of employment can be measured as number of jobs or in terms of full time equivalents.
- Payroll income - The gross remuneration of employees in terms of salaries and wages.
- Capital Expenditure (CAPEX) - The total amount spent on the purchasing of fixed assets and total spent on construction.
- Operating expenditure and maintenance (OPEX) - The total amount spent locally by businesses on goods and services, excluding salaries and wages as well as rents or interest.
- Revenue - The total value of sales arising from business activity at the prospecting operation.

The abovementioned positive impacts will be lost if the proposed prospecting project is not developed.

## (ii) Details of the Public Participation Process Followed:

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

The following interested and / or affected parties were identified:

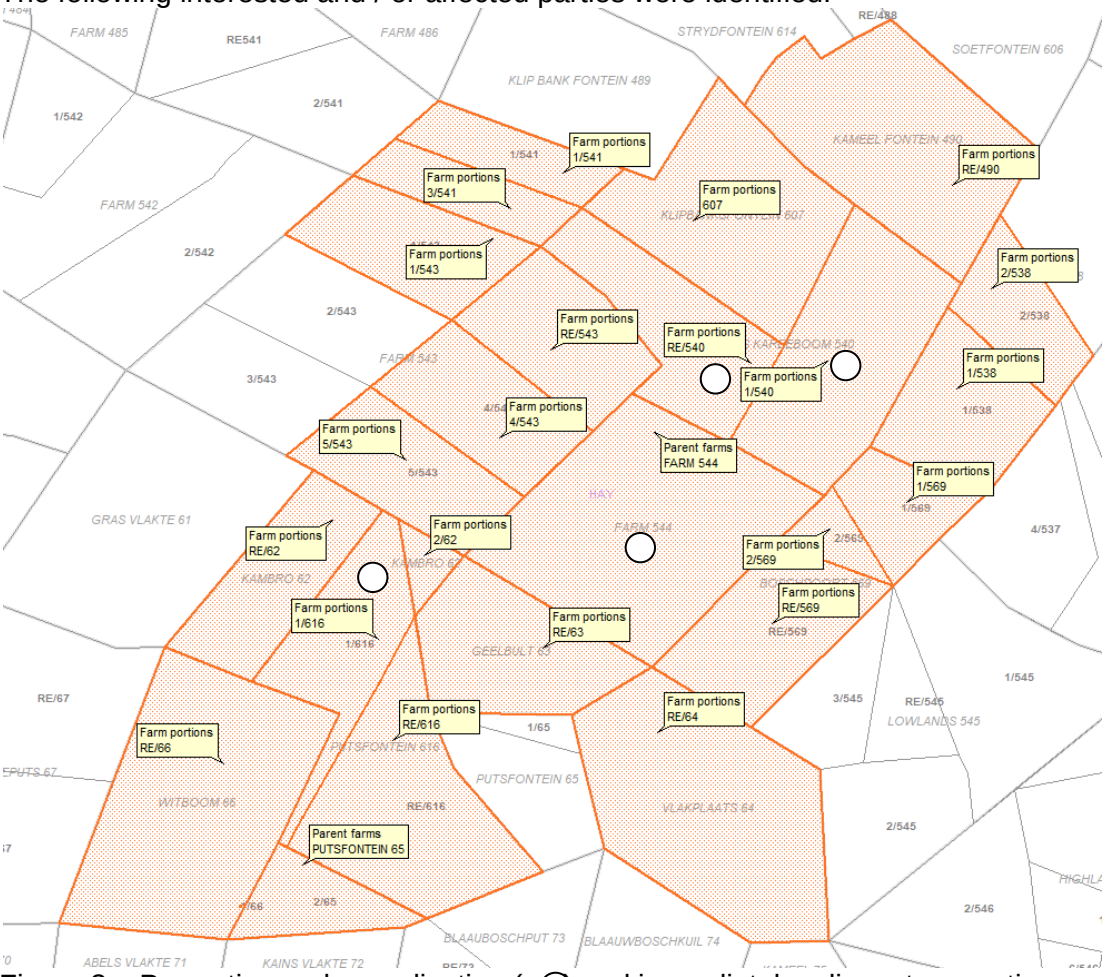



Figure 3 – Properties under application ( ◯ and immediately adjacent properties

| Property description - Surface Owner | Owner |
|---|---|
| Remaining Extent of Consolidated Farm Kappies Kareeboom 540 | Sishen Iron Ore Co (Pty) Ltd |
| Portion 1 of Consolidated Farm Kappies Kareeboom 540 | Ms. A.M.M. du Plooy |
| Remaining Extent of the Farm 544 | Henque 4362 CC |
| Portion 1 of the Farm 616 | Mr. M.C. Lambrechts |
| **Property description - Surrounding Owner** | **Surrounding Owner** |
| Remaining Extent of the Farm Kambro 62 | Mr. T.J. Snyman |
| Portion 2 (Annex Geelbult - a Portion of Portion 1) of the Farm Kambro 62 | Mr. C.F. Viljoen |
| Remaining Extent of the Farm Geelbult 63 | Mr. C.F. Viljoen |
| Farm Vlakplaats 64 | Vlakplaas Trust |
| Remaining Extent of the Farm Putsfontein 65 | Mr. C.F. Viljoen |
| Remaining Extent of the Farm Witboom 66 | Hennie Tjaart Snijman Testamentere Trust |
| Remaining Extent of the Farm Kameel Fontein 490 | Mr. J.dK. Van Zyl |
| Portion 1 (Gruispan) of the Farm 538 | Sishen Iron Ore Co (Pty) Ltd |
| Portion 2 of the Farm 538 | Sishen Iron Ore Co (Pty) Ltd |
| Remaining Extent of Portion 1 of the Farm Kapstevel 541 | Sishen Iron Ore Co (Pty) Ltd |
| Portion 3 (Kalklaagte - a Portion of Portion 1) of the Farm Kapstevel 541 | Sishen Iron Ore Co (Pty) Ltd |
| Remaining Extent of the Farm 543 | Mr. T.G. de Klerk |
| Portion 1 (Grootpan) of the Farm 543 | Sishen Iron Ore Co (Pty) Ltd |
| Portion 4 (Vleiput) of the Farm 543 | Mr. T.G. de Klerk |
| Portion 5 (Bonnet) of the Farm 543 | Mr. C.F. Viljoen |
| Remaining Extent of the Farm Boschpoort 569 | Welgeluk Trust |
| Remaining Extent of Portion 1 (Annex Lowlands) of the Farm Boschpoort 569 | Postmasburg Bospoort Boerdery (Pty) Ltd |
| Portion 2 (Annex Boschpoort - a Portion of Portion 1) of the Farm Boschpoort 569 | Welgeluk Trust |
| Farm Klipbanksfontein 607 | Mr. D.C. Bredenkamp |
| Remaining Extent of the Farm 616 | Coeta-E Trust |

| Interested / Affected Party | Description |
|---|---|
| Tsantsabane Local Municipality | Local Municipality |
| Mayor: Tsantsabane Local Municipality | Mayor |
| ZF Mgcawu District Municipality | District Municipality |
| | |
| Department: Agriculture, Environmental Affairs, Rural Development and Land Reform | Government Department |
| Department: Roads and Public Works | Government Department |
| Department: Water and Sanitation | Government Department |
| | |
| SAHRA | Administrative Body |
| | |
| Commission on Restitution of Land Rights | Government Department |

Notification (refer to Appendix '5'):
Identified interested and/or affected parties were notified of the proposed activity as follows:

- Notification letters were sent to all identified interested and / or affected parties (by registered mail) on the 17th of May 2023. Attached to each of these notices was a Background Information Document, containing information relating to the proposed project.
- Notices were re-sent per e-mail between 26 June 2023 and 7 July 2023. Attached to each of these notices was a copy of the draft BAR/EMPr document.
- A newspaper advert was placed in the 'Kathu Gazette' local newspaper on the 20th of May 2023.
- A notice board was placed at the DMRE.

Responses (refer to Appendix '6'):
Responses have been received from the following IAPs. The responses are summarized in the table below.

- D. Modisane;
- SAHRA;
- W. Voigt (Sishen Iron Ore Co (Pty) Ltd);
- A. Viljoen (Henque 4362 CC);
- J. van der Merwe;
- L. du Plooy (A.M.M. du Plooy); and

Meetings (refer to Appendix '7'):
A meeting was held on the 8th of August 2023 with the surface owners and other interested and/or affected parties. A draft Basic Assessment Report and Environmental Programme Report was provided to all attendees.

The following was discussed in this meeting:

- Ablution;
- BAR/EMPr;
- Boreholes;
- Dust;
- Infrastructure;
- Purpose of prospecting;
- Rehabilitation;
- Security;
- Specialist Studies;
- Surface Use Agreement;
- Timeframes;
- Vegetation; and
- Waste

Objection (refer to Appendix '8'):
Permission was requested (per e-mail) from the surface owners to allow access for the Specialist to conduct a site visit.

Mr. I. Gous sent a letter, signed by Ms. L. Scheepers, per e-mail on the 21st of August 2023, stating the following:
"*We record that SIOC has lodged an objection to the Department of Mineral Resources and Energy (DMRE) against the grant of the prospecting right application submitted by Xhariep Plant and Mining Proprietary Limited (Xhariep) under DMRE reference NC30/5/1/1/2/13478 PR and has requested the DMRE to refer its objection to the Regional Mining Development and Environmental Committee. See attached objection, for your ease of reference.*

*In light hereof, please be advised that SIOC will not at this time permit Xhariep nor any of its consultants nor contractors access to Farm Kappies Kareeboom 540. Any request for access will only be considered, to the extent necessary, after the objection has been finalised.*"

The abovementioned objection was not attached to the e-mail (or letter) and was requested by M&S on the 25th of August 2023. M&S has to date of submission of this BAR/EMPr not received a copy of said objection.

Re-Circulate BAR/EMPr (refer to Appendix '9'):
The final BAR/EMPr document, inclusive of the Specialist Reports (HIA & PIA) has been re-circulated to all registered IAPs on the 3rd of October 2023.

(iii)Summary of issues raised by I&AP's

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

| Interested and Affected Parties<br>List the names of persons consulted in this column, and mark with an X where those who must be consulted were in fact consulted. | | Date comments received | Issues raised | EAPs response to the issue of the I&AP |
|---|---|---|---|---|
| **AFFECTED PARTIES** | | | | |
| Landowner/s | X | | | |
| Sishen Iron Ore Co (Pty) Ltd | X | 08/08/2023 | A meeting was held on the 8th of August 2023 with the surface owners and other interested and/or affected parties. | Refer to Appendix '7' for the Minutes of the Meeting and Attendance Register. |
| | | 21/08/2023 | Mr. I. Gous sent a letter, signed by Ms. L. Scheepers, per e-mail on the 21st of August 2023, stating the following:<br>"*We record that SIOC has lodged an objection to the Department of Mineral Resources and Energy (DMRE) against the grant of the prospecting right application submitted by Xhariep Plant and Mining Proprietary Limited (Xhariep) under DMRE reference NC30/5/1/1/2/13478 PR and has requested the DMRE to refer its objection to the Regional Mining Development and Environmental Committee. See attached objection, for your ease of reference.*<br><br>*In light hereof, please be advised that SIOC will not at this time permit Xhariep nor any of its consultants nor contractors access to Farm Kappies Kareeboom 540. Any request for access will only be considered, to the extent necessary, after the objection has been finalised.*" | The objection was not attached to the e-mail (or letter) and was requested by M&S on the 25th of August 2023. M&S has to date of submission of this BAR/EMPr not received a copy of said objection. |

| | | | | |
|---|---|---|---|---|
| Ms. A.M.M. du Plooy | X | 10/07/2023<br><br><br><br><br><br><br><br><br><br><br><br>08/08/2023 | Ms. du Plooy sent an e-mail stating the following:<br>"According to the person who delivered the document, the document must be signed within 1 month of date on document and returned to you.<br><br>I don't accept this, because the letter was delivered on 4/7/2023 by hand to me on the farm. My son is doing my business on the farm, and he must first look at the letter as well as my attorney.<br><br>So, it will not be possible to reply is such short notice."<br><br>A meeting was held on the 8th of August 2023 with the surface owners and other interested and/or affected parties. | M&S replied on 10 July 2023 confirming the following:<br>"We are aware that the letter was hand delivered on a different date than the date on the letter. As the surface owner you have been registered as an Interested and Affected Party and the consultation process remains open throughout the application process.<br><br><br><br><br><br><br>Refer to Appendix '7' for the Minutes of the Meeting and Attendance Register. |
| Henque 4362 CC | X | 29/07/2023 | Mr. A. Viljoen sent the completed Registration- and Comment Form outlining the following:<br>The proposed project is not supported as there is uncertainty about the company and proposed planning and there will be a disruption in own business and commercial farming.<br><br>Concerns:<br>- Access road;<br>- Dust control;<br>- Water usage and sustainability;<br>- Theft / Safety of livestock;<br>- Damage to current agricultural infrastructure; | M&S acknowledged receipt of the Registration- and Comment Form and confirmed that the concerns will be addressed in the BAR/EMPr. |

| | | | | |
|---|---|---|---|---|
| | | | - Sustainability to continue commercial farming;<br>- Extend of disturbance to farming activities and environment; and<br>- Rehabilitation plan and financing after planned activities. | |
| | | 08/08/2023 | A meeting was held on the 8th of August 2023 with the surface owners and other interested and/or affected parties. | Refer to Appendix '7' for the Minutes of the Meeting and Attendance Register. |
| Mr. M.C. Lambrechts | X | 08/08/2023 | A meeting was held on the 8th of August 2023 with the surface owners and other interested and/or affected parties. | Refer to Appendix '7' for the Minutes of the Meeting and Attendance Register. |
| Lawful occupier/s of the land | | | | |
| The surface owners occupy the land. | | | | |
| Landowners or lawful occupiers on adjacent properties | X | | | |
| Mr. T.J. Snyman | X | N/A | No response has been received from Mr. Snyman. | N/A |
| Mr. C.F. Viljoen | X | 08/08/2023 | A meeting was held on the 8th of August 2023 with the surface owners and other interested and/or affected parties. | Refer to Appendix '7' for the Minutes of the Meeting and Attendance Register. |
| Vlakplaas Trust | | N/A | No contact details could be obtained for this Trust. | |
| Hennie Tjaart Snijman Testamentere Trust | | N/A | No contact details could be obtained for this Trust. | |
| Mr. J. de Klerk van Zyl | X | N/A | No response has been received from Mr. van Zyl. | N/A |
| Mr. T.G. de Klerk | X | N/A | No response has been received from Mr. de Klerk. | N/A |
| Welgeluk Trust | | N/A | No contact details could be obtained for this Trust. | |
| Postmasburg Bospoort Boerdery (Pty) Ltd | X | N/A | No response has been received from this Company. | N/A |
| Mr. D.C. Bredenkamp | X | N/A | No response has been received from Mr. Bredenkamp. | N/A |

| | | | | |
|---|---|---|---|---|
| Coena-E Trust | X | N/A | No response has been received from this Trust. | N/A |
| Municipal Councillor | X | | | |
| Mayor: Ms. H. English | X | N/A | No response has been received from Ms. English. | N/A |
| Municipality | X | | | |
| Tsantsabane Local Municipality | X | N/A | No response has been received from this Municipality. | N/A |
| ZF Mgcawu District Municipality | X | N/A | No response has been received from this Municipality. | N/A |
| Organs of State (Responsible for infrastructure that may be affected Roads Department, Eskom, Telkom, DWA, etc.) | | | | |
| Commission on Restitution of Land Rights | X | N/A | No response has been received from this Organ of State. | N/A |
| Department: Roads and Public Works | X | N/A | No response has been received from this Organ of State. | N/A |
| Department: Water and Sanitation | X | N/A | No response has been received from this Organ of State. | N/A |
| Communities | | | | |
| There are no known communities within the immediate vicinity of the application area. | | | | |
| Department of Land Affairs | | | | |
| Department: Agriculture, Environmental Affairs, Rural Development and Land Reform | X | N/A | No response has been received from this Organ of State. | N/A |
| Traditional Leaders | | | | |
| There are no known communities within the immediate vicinity of the application area. | | | | |
| Department of Environmental Affairs | | | | |
| Department: Agriculture, Environmental Affairs, Rural Development and Land Reform | X | N/A | No response has been received from this Organ of State. | N/A |
| Other Competent Authorities | | | | |
| None identified | | | | |
| Other Interested and / or Affected Parties | | | | |
| SAHRA | X | 09/06/2023 | Ms. N. Higgitt sent an Interim Comment | Dr. Joseph Chikumbirike was |

| | | | | |
|---|---|---|---|---|
| | | | requesting the following:<br>- The field-based assessment of archaeological resources must be conducted by a qualified archaeologist.<br>- A desktop Palaeontological Impact Assessment (PIA) must be undertaken by a qualified palaeontologist. | appointed to conduct the requested specialist studies. A site visit was conducted on 2 – 3 September 2023.<br><br>The HIA and PIA has been received and the findings and recommendations included in this BAR/EMPr document. |
| Dineo Modisane | X | 19/05/2023 | D. Modisane sent an e-mail requesting a copy of the draft BAR. | The draft BAR was sent on the 30th of May 2023.<br><br>No further response has been received. |
| Johan van der Merwe | X | 06/07/2023<br><br>17/07/2023 | Mr. van der Merwe sent an e-mail stating that the application is not on his property.<br><br>Mr. van der Merwe sent the completed Registration- and Comment Form outlining the following:<br>The proposed project is not supported as there are too many mines and too much dust already in Tsantsabane.<br><br>Concerns:<br>- Dust: too many mines already<br>- Water (de-watering): All our water levels are badly affected by the mines.<br>- Our beautiful countryside is being littered and scarred forever.<br>- More mines = more pollution: dust, water, air.<br>- More crime<br>- Less food production<br>- Nature pushed back | M&S responded on the 18th of July 2023 confirming receipt of the completed Registration- and Comment Form. M&S confirmed that the concerns will be addressed in the BAR/EMPr. |

The consultation process was recorded until 2 October 2023.

Any consultation not received before the date of submission of the Final BAR/EMPr, and thus not included in this document, shall be provided to the DMRE as 'additional information' before granting of the PR Application.

IAP concerns addressed:

→ Access Road:
Access to the PR Area will be obtained from the R309. There will be an increase in traffic on this road during phases 3, 5 and 7 of the proposed prospecting operation. Traffic from this operation will include the drilling rig and two LDVs. This increase in traffic has been assessed as insignificant.

→ Dust control:
Appropriate mitigation measures and monitoring requirements have been included in this report.

→ Water usage and sustainability:
The only water use at the site will be for domestic use (drinking water). The drilling team, consisting of five people, will be on the site during Phases 3, 5 and 7 of the prospecting operation (percussion drilling). Provision for 50 litres of water per day is made for drinking water. Xhariep plans to make use of a percussion drill rig. Should an alternative type of drill be utilized, i.e. reverse circulation, water for the drill rig will be needed.

Xhariep considers the following water use alternatives:

- Municipal water: Xhariep obtains municipal water from a nearby town. The municipal water will be transported to the site.
- Groundwater: Xhariep makes use of groundwater for the drinking water and for the drilling rigs, should a drilling method other than percussion drilling be used.

Xhariep shall obtain relevant authorisation, where necessary, for its intended water use/s before invasive prospecting activities commence. The water use alternative decided upon, once invasive prospecting commences, shall be set out in the surface use agreement/s with the surface owners.

No de-watering activities shall take place.

→ Theft / Safety of livestock / More crime:
Cipla shall appoint a security company to control access to the site.

→ Damage to current agricultural infrastructure:
Xhariep's activities will not be allowed to be conducted within 100m from any existing infrastructure.

→ Sustainability to continue commercial farming / Extent of disturbance to farming activities and environment / Less food production / Nature pushed back:
The total anticipated surface disturbance by Xhariep calculates to approximately 1.35 hectares. The total extent of the application area is 6 078.4132 hectares, thus calculating to a 0.02% surface disturbance by Xhariep. The anticipated impacts associated with the proposed prospecting operation are thus negligible and it is not foreseen that the economic livelihood of the surface owner/s from the livestock farming activities will be irreversibly damaged.

→ Rehabilitation plan and financing:
A rehabilitation plan is included in this BAR/EMPr document. Xhariep shall provide a financial guarantee to the DMRE for environmental rehabilitation before granting of the Prospecting Right.

→ More mines = more pollution.
Xhariep has applied for a Prospecting Right to drill 30 boreholes. This is not an application for a Mining Right.

The following concern has been noted, but not assessed in detail:
→ Our beautiful countryside is being littered and scarred forever.

## (iv) The Environmental attributes associated with the 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.)

- **Air quality:**
  The only current source of nuisance dust is created from vehicles travelling on the gravel (farm) roads transecting the immediate surrounding area. The general air quality on the PR Area is expected to be good.

  The wind rose for shows how many hours per year the wind blows from the indicated direction.

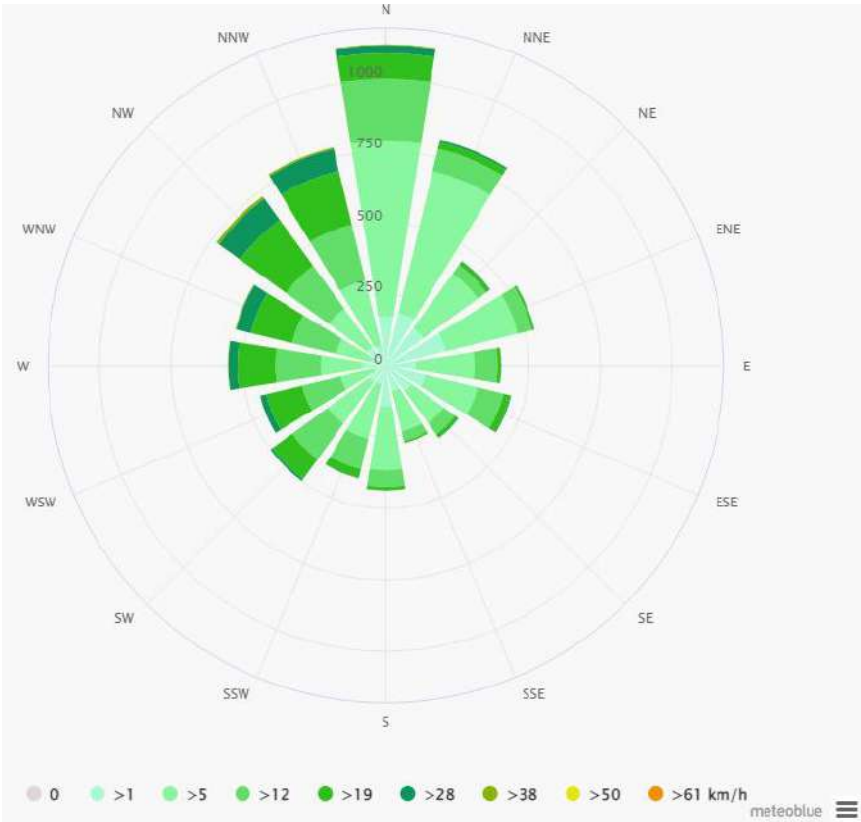



Figure 4 – Wind rose for Postmasburg area

The diagram for Postmasburg shows how many days within one month can be expected to reach certain wind speeds. Monsoons create steady strong winds from December to April, but calm winds from June to October.

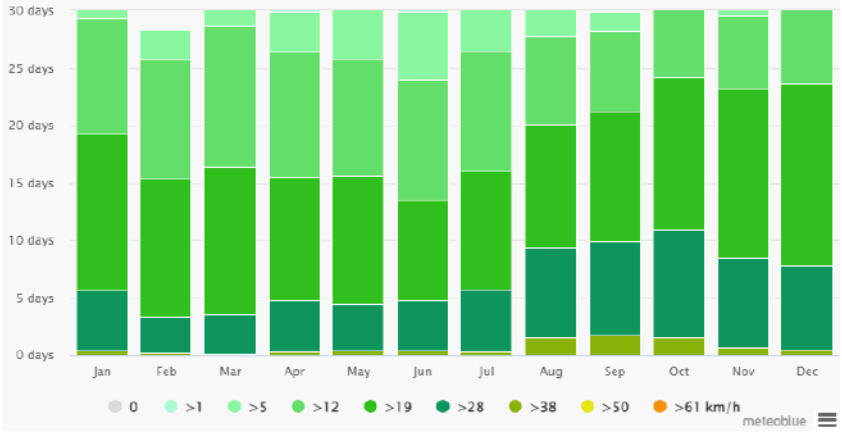



Figure 5 – Wind speed of the Postmasburg area

- **Archaeological, cultural & heritage environment:**
  Regulation 16(1)(v) of the Environmental Impact Assessment Regulations, 2014, as amended, requires that a proponent make use of the online 'National Environmental Screening Tool' to identify specific requirements, including specialist studies applicable to a proposed site based on the environmental sensitivity of the site.

  M&S made use of this Screening Tool to determine the Archaeological, Cultural Heritage and Palaeontology sensitivities of the PR Area. Refer to Appendix '12' for a copy of the Screening Report.

| Property / Development | Archaeological and Cultural Heritage | Palaeontology |
|---|---|---|
| PR Area | High | High |

Furthermore, the online Palaeosensitivity Map of South African Heritage Resources Agency (SAHRA) has been used to determine the palaeontological sensitivity of the application area. In terms of this map the sensitivity of the application area is rated as high and requires a desktop study and based on the outcome of the desktop study, a field assessment is likely.

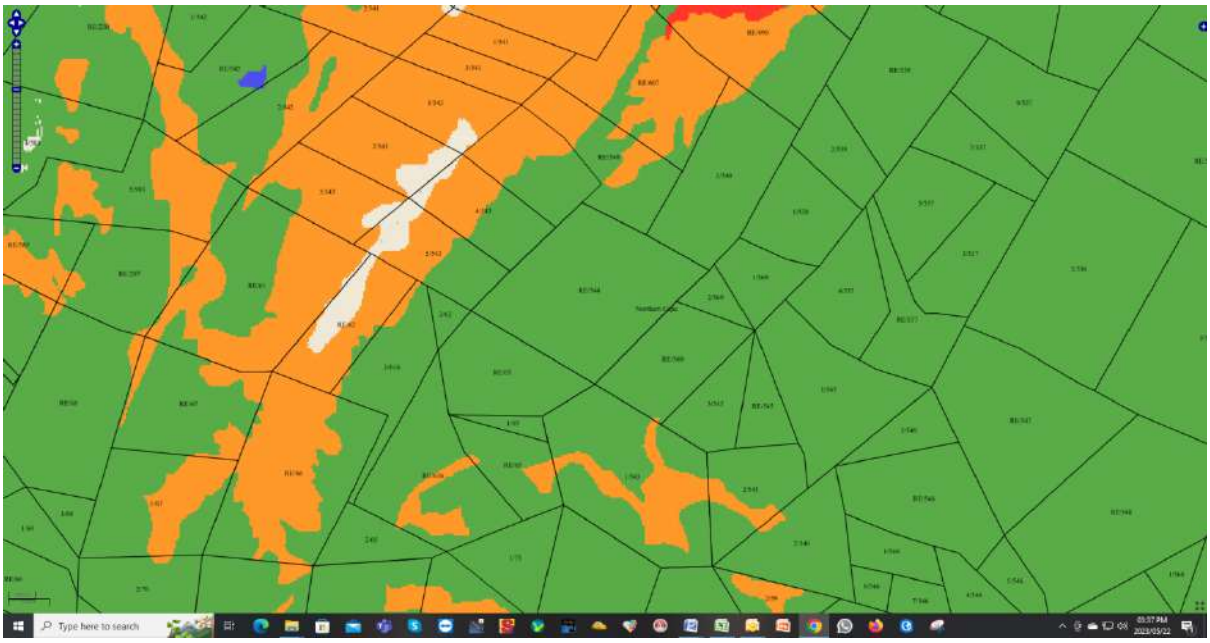


Figure 6 - Screengrab from online Palaeosensitivity Map showing PR area

**Fossil Sensitivity Map**

This map is available on the SAHRIS mapping system as a layer that can be switched on and off. The different colours on the map represent different levels of estimated palaeontological sensitivity.

| Colour | Sensitivity | Required Action |
|---|---|---|
| RED | VERY HIGH | field assessment and protocol for finds is required |
| ORANGE/YELLOW | HIGH | desktop study is required and based on the outcome of the desktop study, a field assessment is likely |
| GREEN | MODERATE | desktop study is required |
| BLUE | LOW | no palaeontological studies are required however a protocol for finds is required |
| GREY | INSIGNIFICANT/ZERO | no palaeontological studies are required |
| WHITE/CLEAR | UNKNOWN | these areas will require a minimum of a desktop study. As more information comes to light, SAHRA will continue to populate the map. |

Figure 7 - Legend of Palaeosensitivity Map

Pulafel 4D Consulting has been appointed to conduct a Heritage Impact Assessment and a Palaeontological Impact Assessment. The following is an abstract of these reports.

<u>Heritage Impact Assessment:</u>

- Archaeological: Stone tools
  A deficit of significant archaeological sites particularly those that are still well preserved and undisturbed in their primary context were observed. However, isolated scatters of Stone Age material culture of low significance were observed which were highly weathered with probably secondary context. Some of the Stone Age material culture recorded includes stone tool scrapers, flakes and cores.
- Graves/burials:
  Historical structures that include an old farmhouse and cemetery were recorded. These, however, are of low significance, and mining or prospecting activities can ovoid areas where these structures are sited.

Recommendations:
The stone tools discovered in the study area require no further action, as they mostly occur in secondary contexts such as roads or tracks. The historical structure and cemetery are found on current homestead and are not directly threatened by the prospecting activities.

Without identifiable cultural material, there are therefore no heritage grounds to halt the prospecting activities. Chance findings are still possible and reporting procedures have to be followed.

Palaeontological Impact Assessment:
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 Aeolian sands, sandstones and calcrete are typical for the country and do not contain fossil plant, insect, invertebrate and vertebrate material. No palaeo-pans or palaeo-springs that could entrap fossil are visible in the satellite imagery; therefore it is extremely unlikely that they occur in the prospecting area.

Recommendations:
Based on experience and the lack of any previously recorded fossils from the area, it is extremely unlikely that any fossils in the loose sands or calcretes of the Quaternary Kalahari Sands.

There is a very small chance that fossils may occur in palaeo-pans but no such feature is visible. Therefore, a Fossil Chance Find Protocol should be added to the EMPr.

- **Climate:**
The Northern Cape experiences typical semi-desert and desert climatic conditions. The summers are hot and dry and the winters cold and frosty.

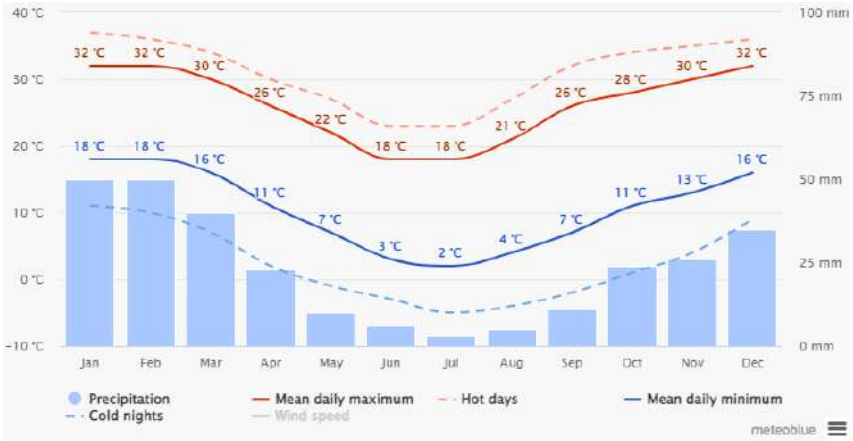


Figure 8 – Average temperatures and precipitation of the Postmasburg area

The "mean daily maximum" (solid red line) shows the maximum temperature of an average day for every month for Postmasburg. Likewise, "mean daily minimum" (solid blue line) shows the

average minimum temperature. Hot days and cold nights (dashed red and blue lines) show the average of the hottest day and coldest night of each month of the last 30 years.

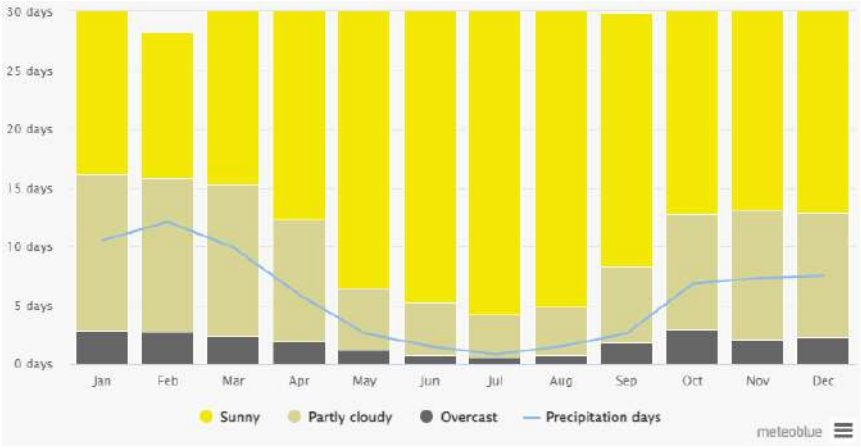



Figure 9 – Cloudy, sunny and precipitation days in the Postmasburg area

The graph shows the monthly number of sunny, partly cloudy, overcast and precipitation days. Days with less than 20% cloud cover are considered as sunny, with 20-80% cloud cover as partly cloudy and with more than 80% as overcast.

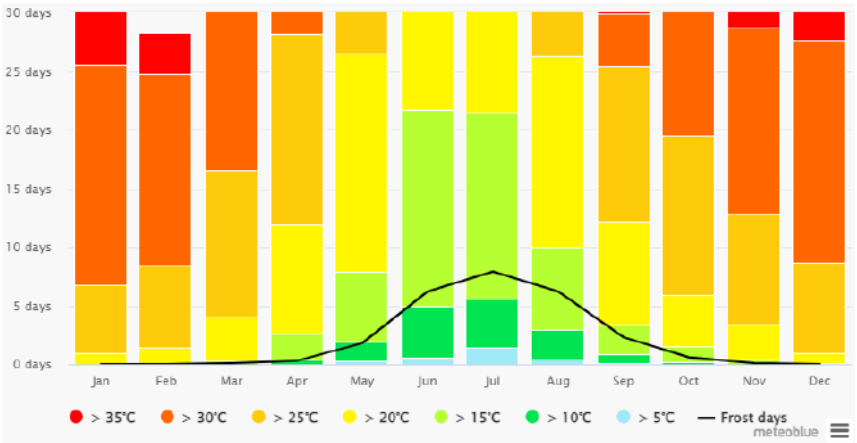



Figure 10 – Maximum temperatures in the Postmasburg area

The maximum temperature diagram for Postmasburg displays how many days per month reach certain temperatures.

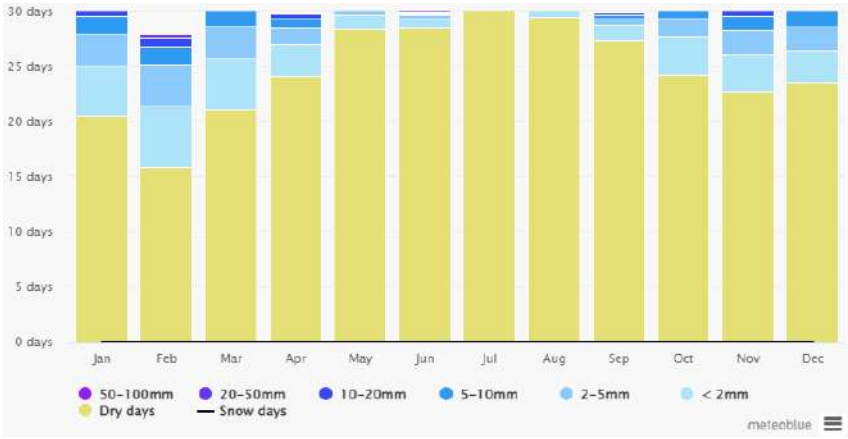



Figure 11 – Precipitation of the Postmasburg area

The precipitation diagram for Postmasburg shows on how many days per month, certain precipitation amounts are reached.

- **Fauna:**
  Animals likely to be found on the farm and surrounding environment include small mammals and birds that are associated with the Northern Upper Karoo, Postmasburg Thornveld and the Southern Kalahari Salt Pans Vegetation Types.

- **Flora:**
  There are three broad vegetation types found within the PR Area.

  Northern Upper Karoo (NKu 3):
  Shrubland dominated by dwarf karoo shrubs, grasses and *Acacia mellifera* subsp. *detinens* and some other low trees. Flat to gently sloping, with isolated hills of Upper Karoo Hardeveld in the south and Vaalbos Rocky Shrubland in the northeast and with many interspersed pans.

  Biogeographically Important Taxa:
  → Herb: *Convolvulus boedeckerianus*
  → Tall Shrub: *Gymnosporia szyszylowiczii* subs. *namibiensis*

  Endemic Taxa:
  → Succulent Shrubs: *Lithops hookeri*, *Stomatium pluridens*
  → Low Shrubs: *Atriplex spongiosa*, *Galenia exigua*
  → Herb: *Manulea deserticola*

  Conservation:
  → Least threatened.
  → Target 21%.
  → None conserved in statutory conservation areas.
  → About 4% has been cleared for cultivation or irreversibly transformed by building of dams.
  → Erosion is moderate (46.2%), very low (32%) and low (20%).

→ *Prosopis glandulosa*, regarded as one of the 12 agriculturally most important invasive alien plants in South Africa, is widely distributed in this vegetation type.

Postmasburg Thornveld (SVk 14):
Flats surrounded by mountains supporting open, shrubby thornveld charaterised by a dense shrub layer and often lacking a tree layer; the grass layer is very sparse. Shrubs are generally low and with a karroid affinity.

Biogeographically Important Taxa:
→ Succulent Shrub: *Euphorbia bergii*
→ Graminoid: *Digitaria polyphylla*

Conservation:
→ Least threatened.
→ Target 16%.
→ None conserved in statutory conservation areas.
→ Very little has been transformed.
→ Erosion is very low.

Southern Kalahari Salt Pans (AZi 4):
Low grasslands on pan bottoms (these often devoid of vegetation) often dominated by *Sporobolus* species, with a mixture of dwarf shrubs. The low shrubland dominated by *Lycium* and/or *Rhigozum* usually forms the outer belt of the salt-pan zonation systems.

Important Taxa:
→ Succulent Shrubs: Zygophyllum tenue (d), *Salsola scopiformis*.
→ Herbs: *Hirpicium gazanioides*, *Tribulus terrestris*.
→ Succulent Herb: *Trianthema triquetra* subsp. *parvifolia*.
→ Graminoids: *Enneapogon desvauxii* (d), *Eragrostis truncata* (d), *Sporobolus coromandelianus* (d), *S. rangei* (d), *Panicum impeditum*.

Conservation:
→ Least threatened.
→ Target 24%.
→ About 8% statutorily conserved in the Kgalagadi Transfrontier Park.
→ The vegetation of the pans is subject to natural degradation / regeneration cycles controlled by concentration of grazing animals (antelopes in particular).

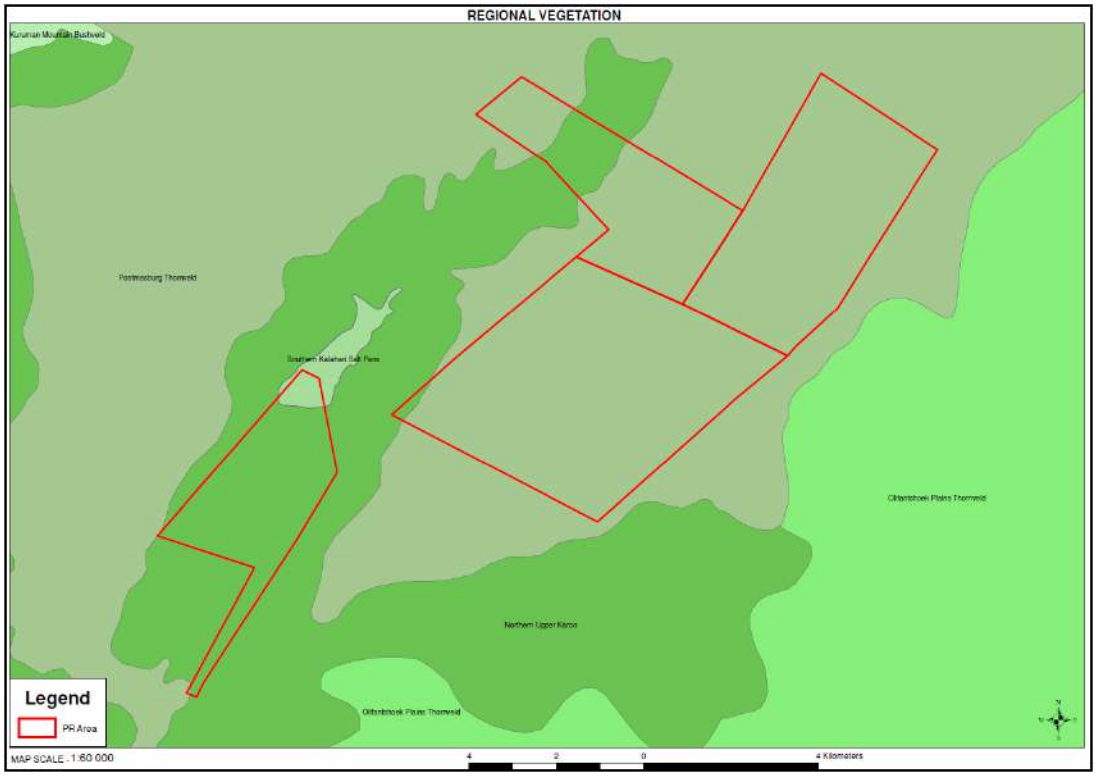



Figure 12 – Regional vegetation map

The total anticipated surface disturbance by Xhariep calculates to approximately 1.35 hectares. The total extent of the application area is 6 078.4132 hectares, thus calculating to a 0.02% surface disturbance by Xhariep. The anticipated impacts associated with the proposed prospecting operation are thus negligible and it is not foreseen that the economic livelihood of the surface owner/s from the livestock farming activities will be irreversibly damaged.

- **Geology:**
  The 1:250,000 Geological Map '2822 Postmasburg' describes the geology as follows:
  - ❖ Ongeluk Formation:
    The *Ongeluk Formation* is probably more than 1 000m thick and is a monotonous succession of greyish-green andesitic lava, locally amygdaloidal, with lenses of tuff and agglomerate up to 15m thick.

  - ❖ Tertiary to Quaternary Deposits:
    Surface limestone covers large tracts of the area, especially on the Ghaap Plateau where it attains an appreciable thickness. Cliff limestone is found along the escarpment, while diatomaceous limestone and kieselguhr occur in depressions in the central and western portions of the area.

    Reddish-brown wind-blown sand is found mainly in the west where it builds seif dunes striking north-northwest.

- Economic Geology:
  Iron ore (hematite) is mined at Beeshoek and Manganore from ferruginous subsidence breccia (blinkklip breccia) which caps some of the hills north of Postmasburg, as well as an eluvial detrital ore from scree on the hillsides. The basal shale of the Gamagara Formation is locally ferruginised where it overlies banded ironstone, and is also mined at Beeshoek and Manganore, while the banded ironstone itself has in places also been enriched to high-grade ore.

  Manganese ore is recovered from the basal shale of the Gamagara Formation where it overlies dolomite. The most important mines are at Glosam, Lohatlha and Beeshoek. Manganiferous chert breccia, also known as the 'silica breccia' or 'manganese marker', found at the top of the Ghaapplato dolomite, is exploited on a small scale at Manganore.

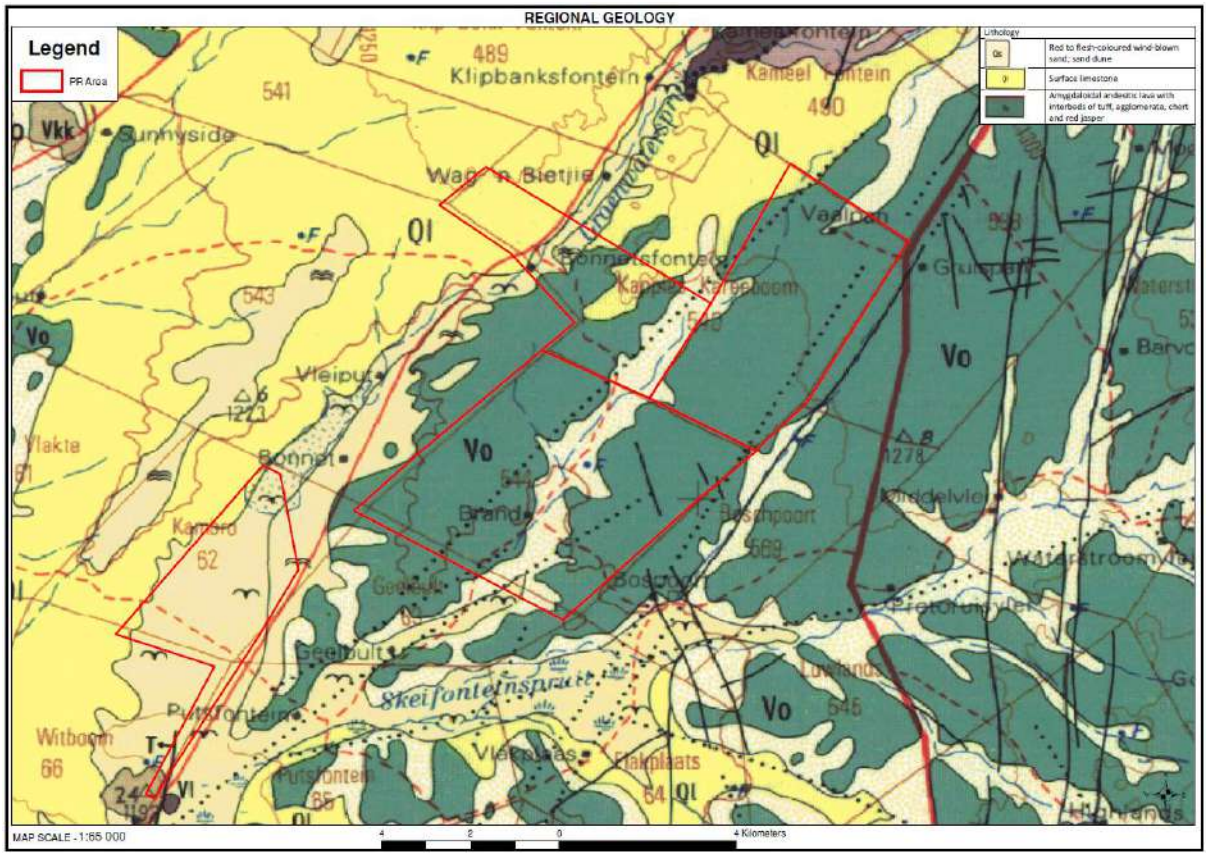


Figure 13 – Geological map

- **Groundwater:**

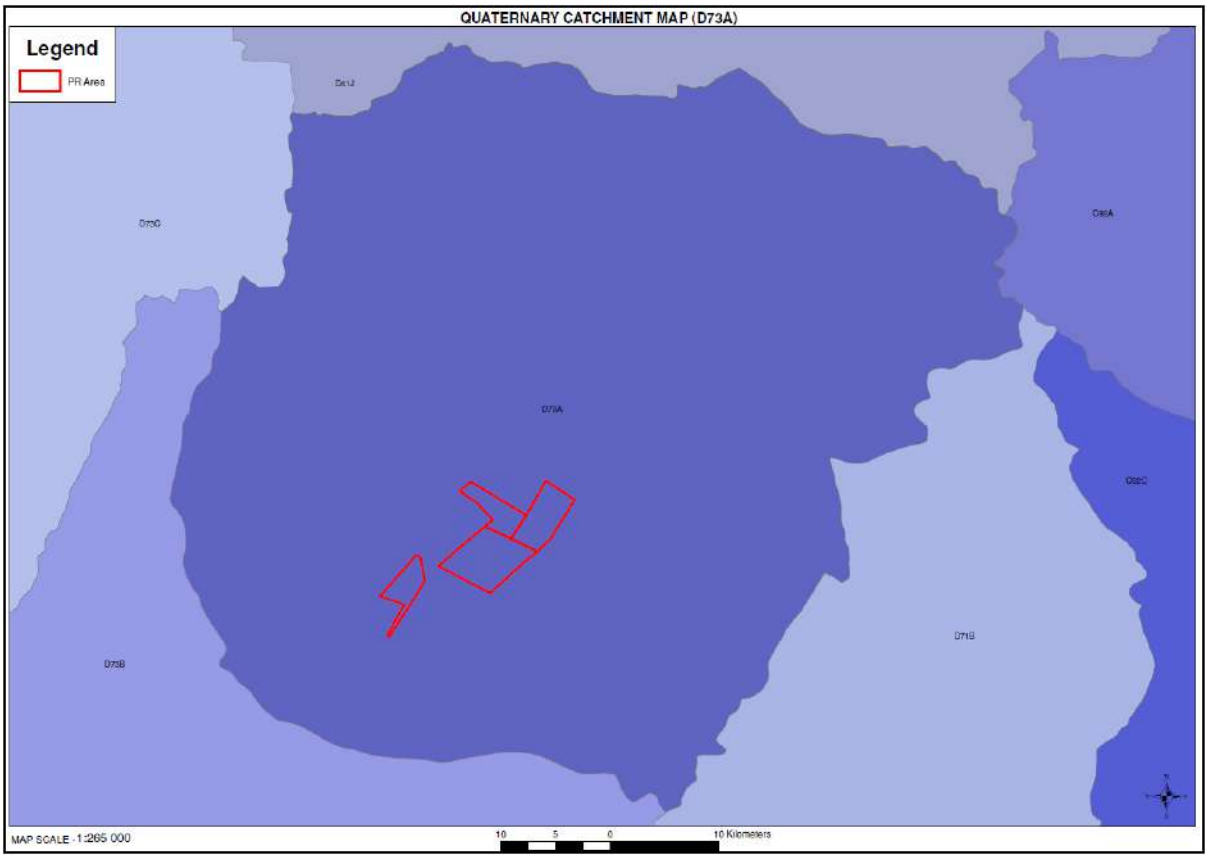



Figure 14 – Catchment map

The PR Area falls over the D73A quaternary drainage region.

This drainage region forms part of the Vaal Major Management Area (nr. 5 in terms of the National Water Act, 1998 (Act no. 36 of 1998) as published in the Government Gazette 40279, Government Notice No. 1056, 16 September 2016).

The surface owners use groundwater for livestock watering and domestic purposes. The ground water quality is expected to be reasonable.

- **Noise:**
  The only current source of noise is created from vehicles travelling on the secondary roads and the gravel (farm) roads transecting the properties and immediate surrounding area.

- **Sensitive landscapes:**
  "Sensitive environments" that have statutory protection are the following:
  - Limited development areas (section 23 of the Environment Conservation Act, 1989 (Act 73 of 1989).
  - Protected natural environments and national heritage sites.
  - National, provincial, municipal and private nature reserves.
  - Conservation areas and sites of conservation significance.
  - National monuments and gardens of remembrance.
  - Archaeological and palaeontological sites.

- Graves and burial sites
- Lake areas, offshore islands and the admiralty reserve.
- Estuaries, lagoons, wetlands and lakes.
- Streams and river channels, and their banks.
- Dunes and beaches.
- Caves and sites of geological significance.
- Battle and burial sites.
- Habitat and /or breeding sites of Red Data Book species.
- Areas or sites of outstanding natural beauty.
- Areas or sites of special scientific interest.
- Areas or sites of special social, cultural or historical interest.
- Declared national heritage sites
- Mountain catchment areas.
- Areas with eco-tourism potential

The following sensitive environments have been identified within the PR Area:

→ Archaeological and palaeontological sites:

- Archaeological: Stone tools
  A deficit of significant archaeological sites particularly those that are still well preserved and undisturbed in their primary context were observed. However, isolated scatters of Stone Age material culture of low significance were observed which were highly weathered with probably secondary context. Some of the Stone Age material culture recorded includes stone tool scrapers, flakes and cores.
- Graves/burials:
  Historical structures that include an old farmhouse and cemetery were recorded. These, however, are of low significance, and mining or prospecting activities can ovoid areas where these structures are sited.
- 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 Aeolian sands, sandstones and calcrete are typical for the country and do not contain fossil plant, insect, invertebrate and vertebrate material. No palaeo-pans or palaeo-springs that could entrap fossil are visible in the satellite imagery; therefore it is extremely unlikely that they occur in the prospecting area.

→ Streams and river channels, and their banks:
There are a number of non-perennial drainage lines and ephemeral pans within the PR Area.

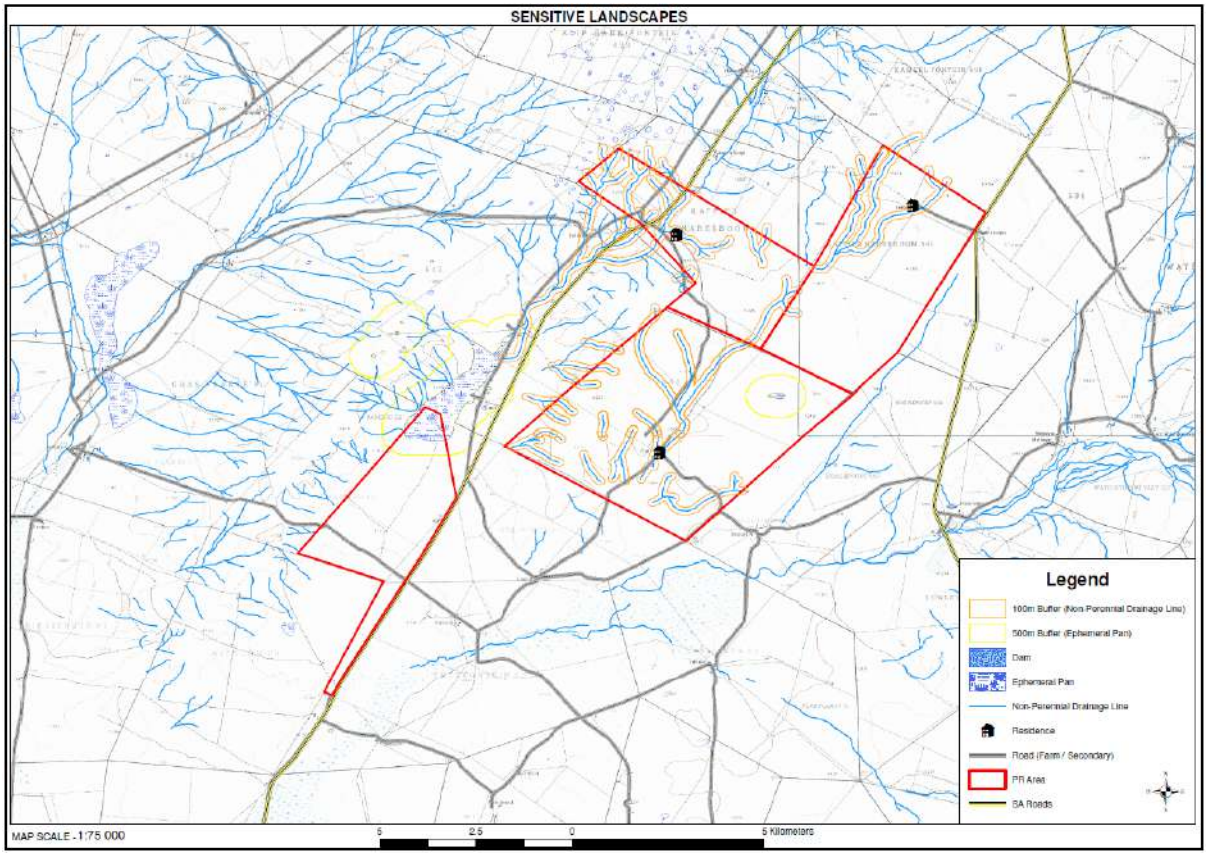



Figure 15 - Sensitive landscapes

- **Socio-Economic:**
  Censuses were held in 2001, 2011 and 2022, whilst Community Surveys were held in 2007 and 2016 respectively.

  The last census was held in 2022; however these results are not yet available. The following section was compiled using data from Census 2001 and 2011.

  The PR Area falls within the Tsantsabane Local Municipality, which falls under management of the ZF Mgcawu District Municipality. Area: 18,333km².

  Tsantsabane Local Municipality is located within the north-eastern parts of the Northern Cape Province, and falls within the boundaries of the Siyanda District Municipality. Tsantsabane was the original name given to the town by the Batswana because of the presence of many shiny stones (e.g. the hematite).

  The nearest business centre is Kimberley, which is about 200km away. The municipality's main town is Postmasburg. Three main traffic routes provide access to other cities, namely Johannesburg via Kuruman and the Kalahari and Cape Town via Kimberley. The rest of the Tsantsabane Municipality area comprises of Boichoko, Postdene, New Town, Stasie, Groen Water, Skyfontein, Jean Heaven, the new established settlement brought about by the land redistribution called Maremane, and the well-known Lohatlha Army Battle School.

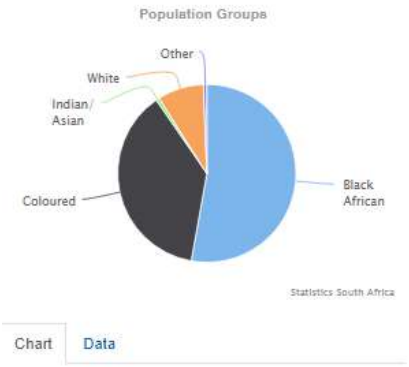
| Key Statistics | 2011 |
|---|---|
| Total population | 35,093 |
| Young (0-14) | 27,9% |
| Working Age (15-64) | 67,6% |
| Elderly (65+) | 4,4% |
| Dependency ratio | 47,8 |
| Sex ratio | 109,8 |
| Growth rate | 2,59% (2001-2011) |
| Population density | 2 persons/km2 |
| Unemployment rate | 26,1% |
| Youth unemployment rate | 32,3% |
| No schooling aged 20+ | 13,7% |
| Higher education aged 20+ | 6,3% |
| Matric aged 20+ | 25,3% |
| Number of households | 9,839 |
| Number of Agricultural households | 1,132 |
| Average household size | 3,5 |
| Female headed households | 31,3% |
| Formal dwellings | 71,8% |
| Housing owned/paying off | 44,7% |
| Flush toilet connected to sewerage | 66,7% |
| Weekly refuse removal | 57,4% |
| Piped water inside dwelling | 45,3% |
| Electricity for lighting | 83,5% |

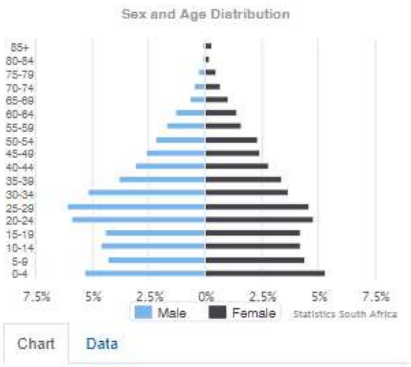
| Key Statistics | 2001 |
|---|---|
| Total population | 27,082 |
| Young (0-14) | 31,4% |
| Working Age (15-64) | 67,6% |
| Elderly (65+) | 4,7% |
| Dependency ratio | 56,4% |
| Sex ratio | 96,1 |
| Growth rate | 0,38% (2001-2011) |
| Unemployment rate | 33,9% |
| Youth unemployment rate | 43,1% |
| No schooling aged 20+ | 24,2% |
| Higher education aged 20+ | 4,1% |
| Matric aged 20+ | 16,7% |
| Number of households | 6,800 |
| Average household size | 3,9 |
| Female headed households | 33,1% |
| Formal dwellings | 81,4% |
| Housing owned/paying off | 53,9% |
| Flush toilet connected to sewerage | 61,7% |
| Weekly refuse removal | 67,5% |
| Piped water inside dwelling | 35,5% |
| Electricity for lighting | 74,4% |

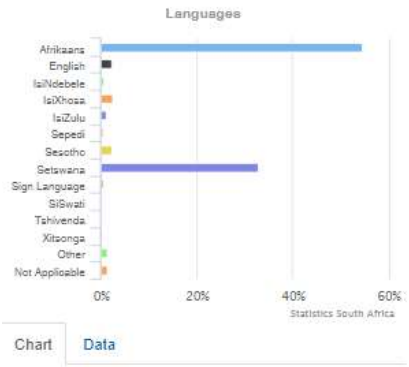
<u>People:</u>

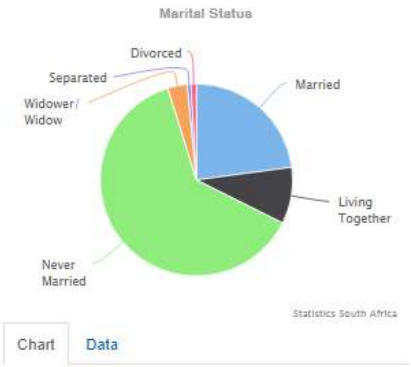
According to census 2011, there are 35 093 people in the municipality. Of these, 52,8% are African black, 37,6% are coloured, and 8,4% are white. Other population groups make up the remaining 1,2% of the population.

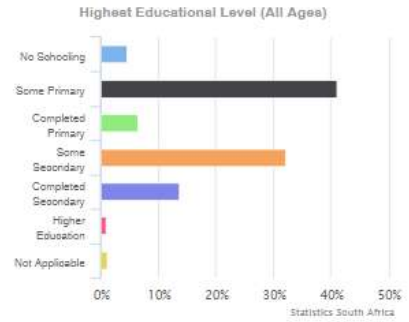
Of those aged 20 years and older, 13,9% had some primary schooling, 5,3% had completed primary, 35,4% had some secondary, and 25,4 had matric. Only 6,4% had a higher qualification, and 13,7% had no form of schooling.

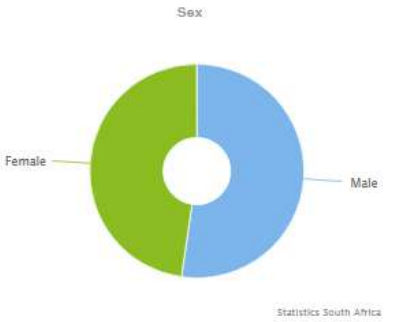


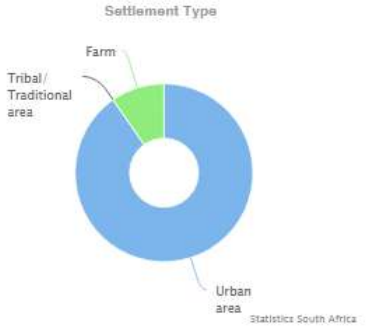



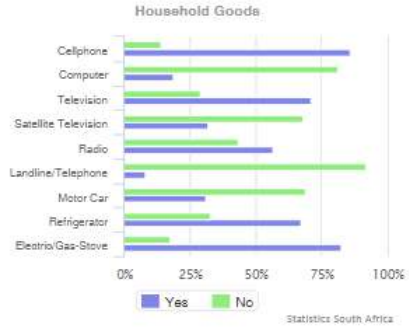



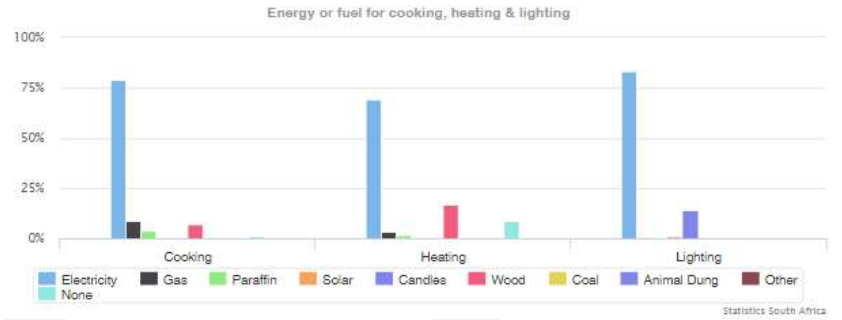

<u>Living conditions:</u>

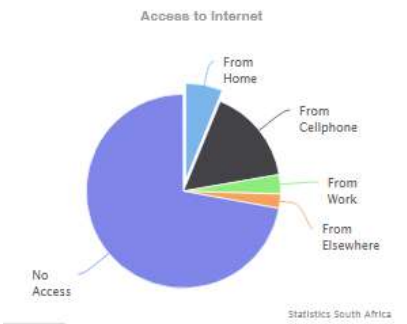
There are 9 839 households in the municipality and the population has access to the following basic services:

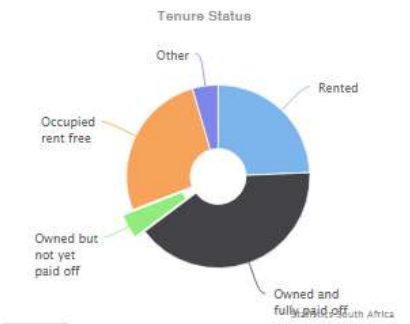
- 96,0% of the households have access to water.
- 68,9% of the population has access to flush toilet.
- 83,5% has access to internet facilities.
- 58,6% has access to refuse removal.

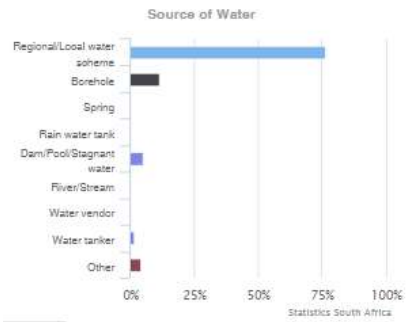


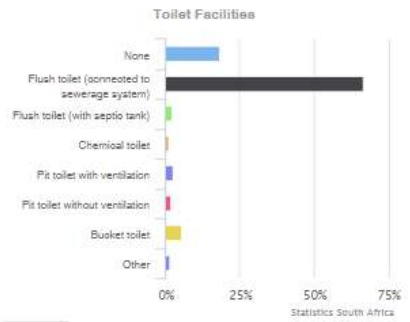



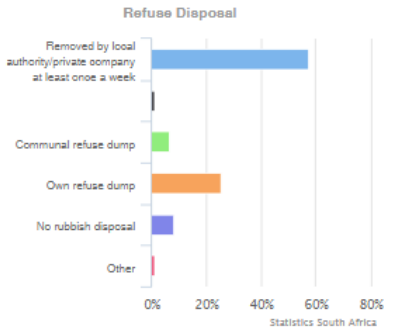


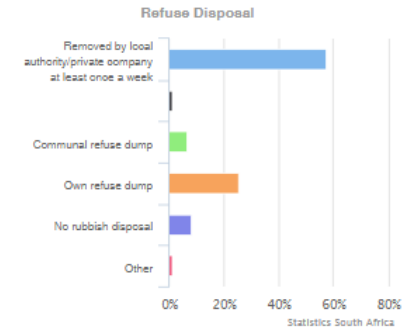



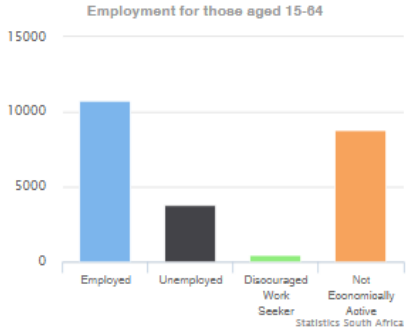

<u>Economy:</u>

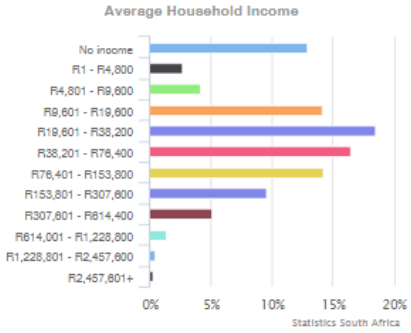
Economically Tsantsabane is known for being rich in minerals, and for its mining, agriculture, manufacturing and farming sectors. Tsantsabane has reinvented itself over the years as one of the leading investment hot spots in the Northern Cape. The construction of the Anglo American Kumba Iron Ore's Kolomela mine has brought an implosion of development to the area.

Kolomela mine is one of Anglo American's Big Four expansion projects alongside Barro Alto in Brazil (nickel), Minas Rio in Brazil (ferrous) and Los Bronces in Chile (copper). The mine is situated

in the town of Postmasburg in the Northern Cape Province, South Africa. The name Kolomela means “to dig deeper or further”, or “to persevere”, and the excellent physical strength of Kolomela mine’s lump ore will enable Kumba to continue to meet its customers’ needs.

- Kolomela is scheduled to produce 9Mtpa of direct shipping ore once it is fully operational in 2013.
- Its total mineral resource is 373Mt at 64% Fe cut-off grade and 405Mt at 55% Fe cut-off grade..
- Total investment in social and community projects in 2011 over R30,9 million.
- R8,5 billion investment in the Northern Cape.




- **Soil:**
  The soils of the PR Area are described per vegetation type:

  Northern Upper Karoo: Soils are variable from shallow to deep, red-yellow, apedal, freely drained soils to very shallow Glenrosa and Mispah forms.

  Postmasburg Thornveld: Red Aeolian sand of the Kalahari Group overlying the volcanic and sediments of the Griqualand West Supergroup that outcrop in places. Deep soils are of the Hutton form.

  Southern Kalahari Salt Pans: Extensive pan-like areas occur locally in slightly higher-lying portions of dry riverbeds (mekgacha), where they are isolated from the river course by a raised, compact calcareous sand formation – the pan-like alluvium consists of sandy loam and a fairly high content of calcium and phosphate. The pan soils consist of white (washed) sand in shallow pans, rocky soils on calcrete outcrops and most typically of clays and sandy clays very rich in Na, K, Mg and are characterised by a high pH, reaching values of 9. The pan bottoms are exposed for most of the year and carry shallow pools for a short time only after very good rains.

- **Surface water:**

  There are a number of non-perennial drainage lines and ephemeral pans within the PR Area.

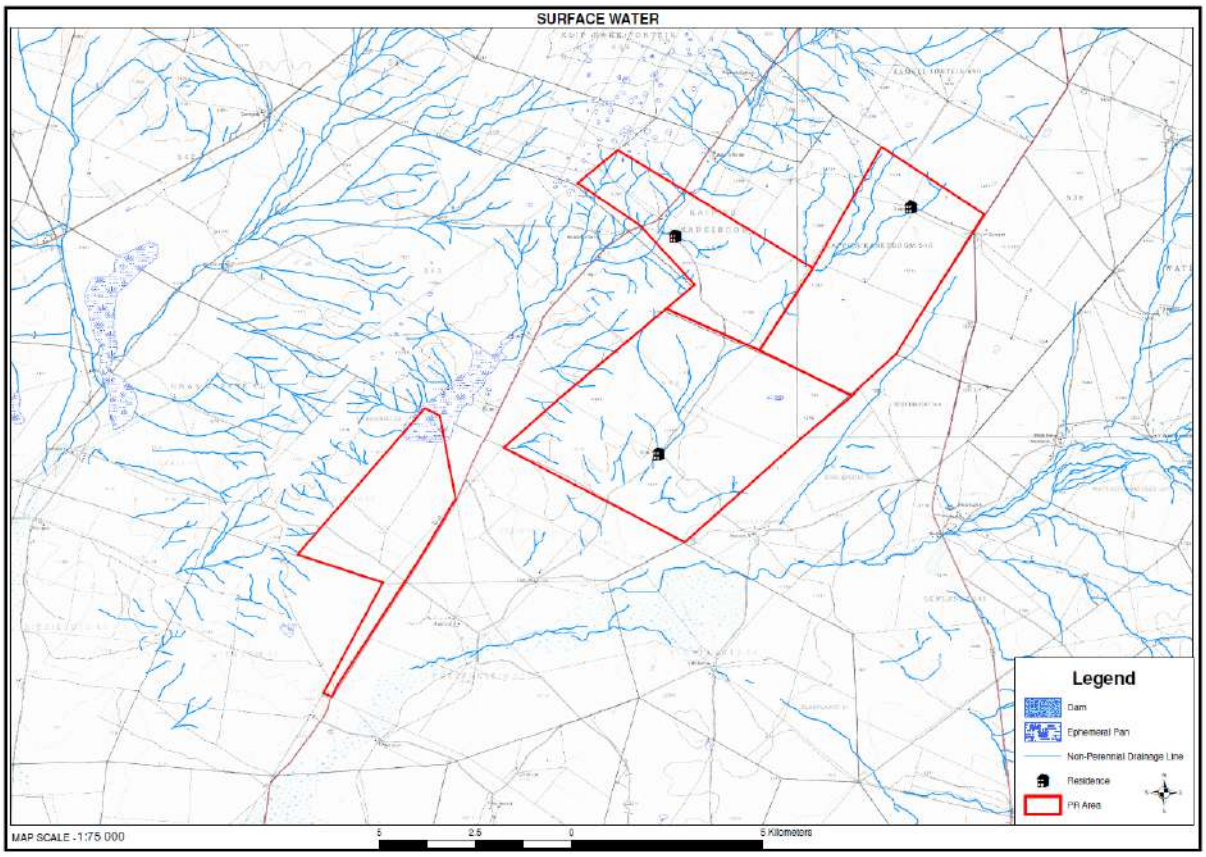



Figure 16 – Surface water map

- **Topography:**
  The application area's altitude varies between 1 152 and 1 240 meters above sea level.

**(b) Description of the current land uses.**

The surface owners currently utilize the land under application for livestock and/or game farming purposes.

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

- Infrastructure:
  - The on-site gravel (farm) roads are in a reasonable condition.
  - The secondary gravel roads accessing the farms are in a reasonable condition.
  - There are only a few windmills and relating agricultural infrastructure within the area under application.

- Environmental:
  There are a number of non-perennial drainage lines and ephemeral pans within the application area.

## (d) Environmental and current land use map:

(Show all environmental and current land use features.)

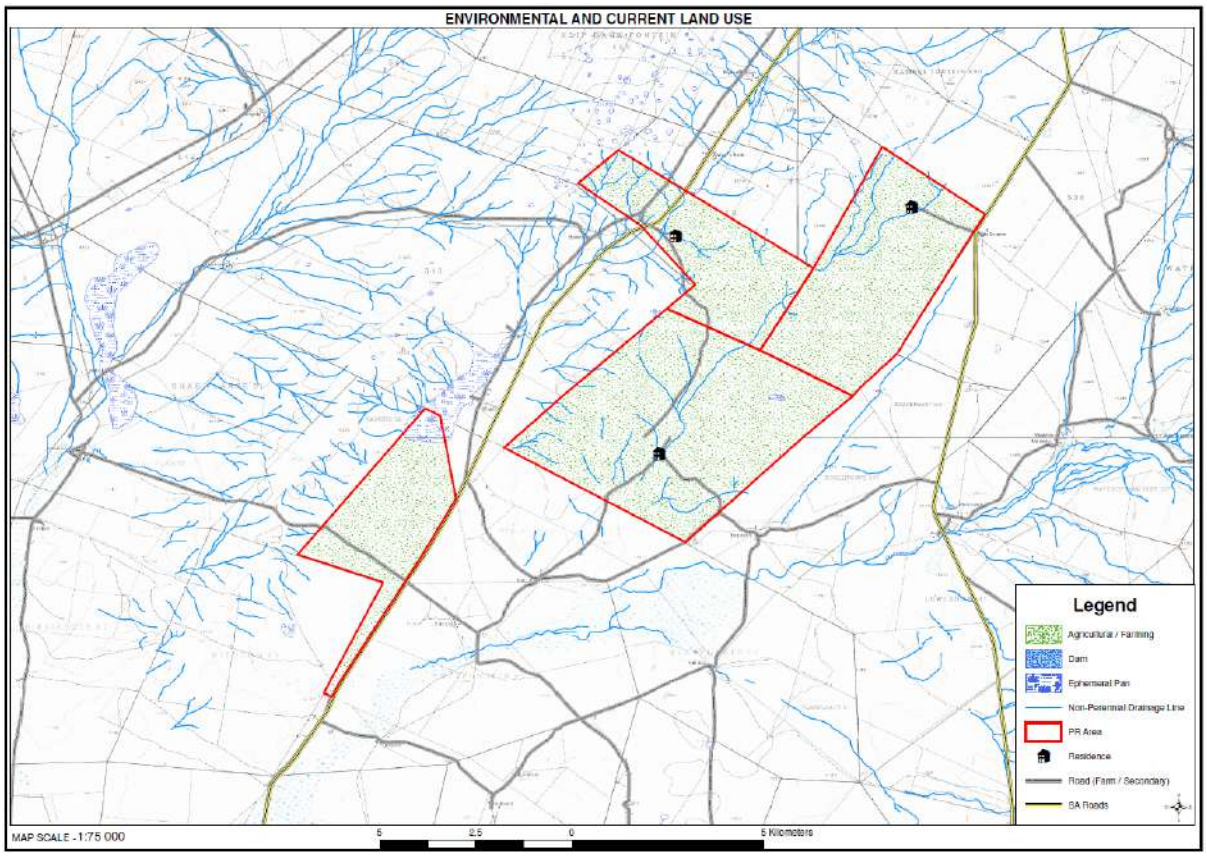



Figure 17 – Current land use and environmental map

**(v) Impacts identified:**

(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.)

Cumulative environmental impacts can be defined as changes to the environment caused by the combined impact of past, present and future human activities and/or natural processes.

Farming:

The properties under application for a Prospecting Right are currently used for grazing of livestock. The properties are divided into a number of 'camps' and the livestock are rotated between the camps. This provides rest periods for plants while others are being grazed. Impacts associated with farming activities include overgrazing, destruction of the natural vegetation cover and soil compaction through 'trampling' if the rotational grazing method is not implemented correctly by the surface owner/s and loss of groundwater if water related infrastructure; i.e. pipelines, dams and troughs, are not adequately maintained.

Prospecting:

The only invasive prospecting activity that will be conducted by Xhariep is drilling (percussion). Provision has been made for thirty boreholes.

The site clearance for drill rigs will be kept to a minimum and provision is made for a 20m x 20m surface disturbance around each borehole. Existing roads and farm tracks shall be used as far as possible. Provision is made for 500m x 3m wide two-spoor access tracks for the drilling rig.

The total anticipated surface disturbance by Xhariep calculates to 1.2ha for the proposed boreholes and 0.15ha for the anticipated two-spoor access tracks. The total extent of the application area is 6 078.5132 hectares, thus calculating to a 0.02% surface disturbance by Xhariep. The anticipated impacts associated with the proposed prospecting operation are thus negligible and it is not foreseen that the economic livelihood of the surface owner/s from the livestock farming activities will be negatively affected.

- **Air Quality:**

| Activity | Extent | Duration | Intensity | Probability | Significance without mitigation |
|---|---|---|---|---|---|
| Drilling | Site | Short Term | Low | Definite | Low |
| Vehicle emissions | Local | Short Term | Low | Probable | No significance |
| Nuisance dust – roads | Site | Short Term | Low | Probable | Low |
| Nuisance dust – vegetation clearance | Local | Long Term | Low | Definite | Low |
| Smoke – domestic fires | Site | Short Term | Low | Improbable | No significance |

| Activity | Impact summary | Significance with mitigation |
|---|---|---|
| Air Quality | *Direct impacts:*<br>• Nuisance dust created by prospecting drilling.<br>• Vehicle emissions from vehicles and equipment utilized by the prospecting operation.<br>• Vehicle emissions from vehicles utilized by farming activities.<br>• Nuisance dust from the farm roads and road network in the surrounding area. | Negative:<br>Very Low |
| | *Indirect impacts:*<br>• Nuisance dust created in areas where vegetation cover is cleared for drilling sites. | Negative:<br>Very Low |
| | *Cumulative impacts:*<br>• Nuisance dust created by prospecting drilling.<br>• Vehicle emissions from vehicles and equipment utilized by the prospecting operation.<br>• Vehicle emissions from vehicles utilized by farming activities.<br>• Nuisance dust from the farm roads and road network in the surrounding area.<br>• Nuisance dust created in areas where vegetation cover is cleared for drilling sites.<br>• Smoke from domestic open fires. | Negative<br>Very Low |

- **Fauna:**

| Activity | Extent | Duration | Intensity | Probability | Significance without mitigation |
|---|---|---|---|---|---|
| Disturbance of natural habitat – Drill sites | Local | Long Term | Medium | Probable | Medium |
| Disturbance of natural habitat - Overgrazing | Local | Long Term | Medium | Improbable | Medium |

| Activity | Impact summary | Significance with mitigation |
|---|---|---|
| Fauna | *Direct impacts:*<br>• Disturbance of natural habitat of wild animals when vegetation is cleared for drilling sites.<br>• Disturbance of natural habitat of wild animals in the instance of overgrazing. | Negative: Low |
| | *Indirect impacts:*<br>• None | N/A |
| | *Cumulative impacts:*<br>• Disturbance of natural habitat of wild animals when vegetation is cleared for drilling sites.<br>• Disturbance of natural habitat of wild animals in the instance of overgrazing. | Negative: Low |

- **Flora:**

| Activity | Extent | Duration | Intensity | Probability | Significance without mitigation |
|---|---|---|---|---|---|
| Disturbance of natural vegetation cover – Drill sites | Local | Long Term | Medium | Definite | Medium |
| Disturbance of natural vegetation cover - Overgrazing | Local | Long Term | Medium | Improbable | Medium |
| Veld fires | Regional | Medium Term | High | Probable | High |

| Activity | Impact summary | Significance with mitigation |
|---|---|---|
| Flora | *Direct impacts:*<br>• Disturbance and/or destruction of natural vegetation cover when vegetation is cleared for drilling sites.<br>• Disturbance and/or destruction of natural vegetation cover in the instance of overgrazing. | Negative: Low |
| | *Indirect impacts:*<br>• Disturbance of natural habitat of wild animals when vegetation is cleared for drilling sites.<br>• Disturbance of natural habitat of wild animals in the instance of overgrazing. | Negative: Low |
| | *Cumulative impacts:*<br>• Disturbance and/or destruction of natural vegetation cover when vegetation is cleared for drilling sites.<br>• Disturbance and/or destruction of natural vegetation cover in the instance of overgrazing.<br>• Disturbance of natural habitat of wild animals when vegetation is cleared for drilling sites.<br>• Disturbance of natural habitat of wild animals in the instance of overgrazing.<br>• Veld fires. | Negative: Low |

- **Groundwater:**

| Activity | Extent | Duration | Intensity | Probability | Significance without mitigation |
|---|---|---|---|---|---|
| Groundwater loss – Prospecting Activities | Site | Medium Term | Medium | Improbable | Low |
| Groundwater loss – Farming Activities | Site | Short Term | Medium | Improbable | Low |
| Groundwater contamination | Site | Medium Term | Low | Probable | Low |

| Activity | Impact summary | Significance with mitigation |
|---|---|---|
| Groundwater | *Direct impacts:*<br>• Utilization of groundwater for drilling could cause a drop in the groundwater table.<br>• Loss of groundwater if water related infrastructure; i.e. pipelines, dams and troughs, are not adequately maintained by the surface owner/s. | Negative: Very Low |

| | | |
|---|---|---|
| | *Indirect impacts:*<br>• Possible hydrocarbon spills from prospecting vehicles and equipment at the drilling sites, which could contaminate the groundwater. | Negative:<br>Very Low |
| | *Cumulative impacts:*<br>• Utilization of groundwater for drilling could cause a temporary drop in the groundwater table.<br>• Loss of groundwater if water related infrastructure; i.e. pipelines, dams and troughs, are not adequately maintained by the surface owner/s.<br>• Possible hydrocarbon spills from prospecting vehicles and equipment at the drilling sites, which could contaminate the groundwater.<br>• Possible chemical spills from chemical toilets utilized by the prospecting operation, which could contaminate the groundwater. | Negative:<br>Very Low |

- **Noise:**

| Activity | Extent | Duration | Intensity | Probability | Significance without mitigation |
|---|---|---|---|---|---|
| Drill rigs | Site | Short Term | Low | Definite | Low |
| Prospecting vehicles and equipment | Site | Short Term | Low | Probable | No significance |
| Farming vehicles | Site | Short Term | Low | Probable | No significance |

| Activity | Impact summary | Significance with mitigation |
|---|---|---|
| Noise | *Direct impacts:*<br>• Noise from drilling rigs.<br>• Noise from prospecting vehicles and equipment. | Negative:<br>Very Low |
| | *Indirect impacts:*<br>• None | N/A |
| | *Cumulative impacts:*<br>• Noise from drilling rigs.<br>• Noise from prospecting vehicles and equipment.<br>• Noise from farming vehicles. | Negative:<br>Very Low |

- **Soil:**

| Activity | Extent | Duration | Intensity | Probability | Significance without mitigation |
|---|---|---|---|---|---|
| Disturbance of soil structure | Local | Short Term | Low | Probable | Low |
| Hydrocarbon spills | Local | Short Term | Low | Probable | Low |
| Erosion | Site | Short Term | Low | Improbable | No significance |
| Soil compaction – Drilling | Local | Short Term | Low | Probable | Low |
| Soil compaction – Overgrazing | Local | Short Term | Low | Improbable | No significance |
| Spills from chemical toilet | Local | Short Term | Low | Improbable | No significance |

| Activity | Impact summary | Significance with mitigation |
|---|---|---|
| Soil | *Direct impacts:*<br>• Disturbance of the soil structure during drilling activities.<br>• Possible hydrocarbon spills from prospecting vehicles and equipment at the drilling sites.<br>• Erosion in areas where vegetation has been cleared at the drilling sites. | Negative:<br>Very Low |
| | *Indirect impacts:*<br>• Compaction of soil during drilling activities.<br>• Compaction of soil in the event of overgrazing. | Negative:<br>Very Low |
| | *Cumulative impacts:*<br>• Disturbance of the soil structure during drilling activities.<br>• Possible hydrocarbon spills from prospecting vehicles and equipment at the drilling sites.<br>• Potential hydrocarbon spills on the surrounding road network.<br>• Erosion in areas where vegetation has been cleared at the drilling sites.<br>• Possible chemical spills from chemical toilets utilized by the prospecting operation.<br>• Compaction of soil during drilling activities.<br>• Compaction of soil in the event of overgrazing. | Negative:<br>Very Low |

- **Surface water:**

| Activity | Extent | Duration | Intensity | Probability | Significance without mitigation |
|---|---|---|---|---|---|
| Hydrocarbon spills | Site | Short Term | Low | Improbable | No significance |

| Activity | Impact summary | Significance |
|---|---|---|
| Surface water | *Direct impacts:*<br>• None anticipated if buffer zones around ephemeral pans are adhered to. | N/A |
| | *Indirect impacts:*<br>• Hydrocarbon spills could potentially flow into ephemeral pans during rain events. | Negative:<br>Very Low |
| | *Cumulative impacts:*<br>• Hydrocarbon spills could potentially flow into ephemeral pans during rain events. | Negative:<br>Very Low |

**(vi) Methodology used in determining the significance of environmental impacts:**

(Describe how the significance, probability and duration of the aforesaid identified impacts that were identified through the consultation process were determined in order to decide the extent to which the initial site layout needs revision.)

The assessment of the impacts has been conducted according to a synthesis of criteria required by the integrated environmental management procedure.

**Nature of impact**

This is an appraisal of the type of effect the activity would have on the affected environmental component. Its description should include what is being affected, and how.

**Extent**

The physical and spatial size of the impact. This is classified as follows:

- **Local**
  The impacted area extends only as far as the activity, e.g. a footprint.
- **Site**
  The impact could affect the whole, or a measurable portion of the property.
- **Regional**
  The impact could affect the area including the neighbouring farms, transport routes and the adjoining towns.

**Duration**

The lifetime of the impact which is measured in the context of the lifetime of the proposed phase (i.e. construction or operation).

- **Short term**
  The impact will either disappear with mitigation or will be mitigated through natural process in a short time period.
- **Medium term**
  The impact will last up to the end of the mining period, where after it will be entirely negated.
- **Long term**
  The impact will continue or last for the entire operational life of the mine, but will be mitigated by direct human action or by natural processes thereafter.
- **Permanent**
  The only class of impact, which will be non-transitory. Mitigation either by man or natural process will not occur in such a way or in such a time span that the impact can be considered transient.

**Intensity**

This describes how destructive, or benign, the impact is. Does it destroy the impacted environment, alter its functioning, or slightly alter it. These are rated as:

- **Low**
  This alters the affected environment in such a way that the natural processes or functions are not affected.
- **Medium**
  The affected environment is altered, but function and process continue, albeit in a modified way.

- **High**
  Function or process of the affected environment is disturbed to the extent where it temporarily or permanently ceases.

  This will be a relative evaluation within the context of all the activities and the other impacts within the framework of the project.

**Probability**
This describes the likelihood of the impacts actually occurring. The impact may occur for any length of time during the life cycle of the activity, and not at any given time. The classes are rated as follows:

- **Improbable**
  The possibility of the impact occurring is very low, due either to the circumstances, design or experience.
- **Probable**
  There is a possibility that the impact will occur to the extent that provisions must be made therefore.
- **Highly probable**
  It is most likely that the impacts will occur at some or other stage of the development.
- **Definite**
  The impact will take place regardless of any preventative plans, and mitigation measures or contingency plans will have to be implemented to contain the impact.

**Determination of significance**
Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The classes are rated as follows:

- **No significance**
  The impact is not likely to be substantial and does not require any mitigatory action.
- **Low**
  The impact is of little importance, but may require limited mitigation.
- **Medium**
  The impact is of importance and therefore considered to have a negative impact. Mitigation is required to reduce the negative impacts to acceptable levels.
- **High**
  The impact is of great importance. Failure to mitigate, with the objective to reduce the impact to acceptable levels, could render the entire development option or entire project proposal unacceptable. Mitigation is therefore essential.

**(vii) The positive and negative impacts that the proposed activity (in terms of the initial site layout) and alternatives will have on the environment and the community that may be affected:**
(Provide a discussion in terms of advantages and disadvantages of the initial site layout compared to alternative layout options to accommodate concerns raised by affected parties.)

Infrastructure: No offices and storerooms will be established at the site as Xhariep shall make use of facilities in the town of Kimberley / Postmasburg.

Invasive prospecting: The proposed locality of the exploration boreholes has been placed on a wide grid to determine the economic potential. The final locality of the exploration holes can only be determined after the desktop studies and geological mapping have been completed.

Alternatives considered:-
Infrastructure: The only alternative considered was the establishment of offices and storerooms on the farms under application. As Xhariep aims to minimize its impact on the natural environment as much as possible this option was decided against.

Invasive prospecting: The drilling of boreholes over the entire property was considered, but taking into account that Xhariep aims to minimize its impact on the natural environment as much as possible this option was decided against.

**(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.)

| Impact | Mitigation | Risk |
|---|---|---|
| Air quality | • Speed limits;<br>• Spraying of surfaces with water // dust-a-side or similar environmentally friendly product;<br>• Avoidance of unnecessary removal of vegetation;<br>• Re-vegetation and monitoring of re-growth;<br>• Rehabilitation of disturbed areas; and<br>• Controlled drilling operations, preferably on wind-free days. | Low |
| Fauna | • Speed limits;<br>• Continuous rehabilitation of disturbed areas;<br>• No snares or traps may be set for animals and strict adherence to be communicated to all employees and contractors; and<br>• Maintenance of firebreaks. | Medium |
| Flora | • Continuous rehabilitation of disturbed areas;<br>• Avoidance of unnecessary removal of vegetation;<br>• Re-vegetation and monitoring of re-growth;<br>• Maintenance of firebreaks;<br>• No trees felled for firewood;<br>• Obtain relevant permit before removal of protected tree or plant species; and<br>• Re-seeding where necessary. | High |
| Ground water | • Immediate removal of any hydrocarbon spill;<br>• Maintenance in dedicated area;<br>• Re-fuelling in dedicated area;<br>• Drip pans;<br>• Storage of hydrocarbons in dedicated areas; and | Low |

| | | |
|---|---|---|
| | • Monitoring of groundwater quality. | |
| Noise | • Hearing protection;<br>• Working hours;<br>• Controlled drilling operations;<br>• Silencers on equipment and vehicles; and | Medium |
| Soil | • Continuous rehabilitation of disturbed areas;<br>• Ripping of compacted areas;<br>• Maintenance & refuelling in dedicated areas;<br>• Drip pans;<br>• Storage of hydrocarbons in dedicated areas; and<br>• Immediate removal of any hydrocarbon spill. | Medium |
| Surface water | • Storm water control;<br>• Control and monitoring of erosion;<br>• Immediate removal of any hydrocarbon spill;<br>• Maintenance & re-fuelling in dedicated areas;<br>• Adhering to buffer zones;<br>• Drip pans; and<br>• Storage of hydrocarbons in dedicated areas. | N/A |
| Topography | • Sloping of rehabilitated and disturbed areas. | N/A |
| Visual | • Sloping of rehabilitated and disturbed areas; | Low |

**(ix) Motivation where no alternative sites were considered:**

No offices and storerooms will be established at the site as Xhariep shall make use of facilities in the town of Kimberley / Postmasburg.

**(x) Statement motivating the preferred site:**

(Provide a statement motivating the final site layout that is proposed.)

No offices and storerooms will be established at the site as Xhariep shall make use of facilities in the town of Kimberley / Postmasburg.

**i) Full description of the process undertaken to identify, assess and rank the impacts and risks the activity will impose on the preferred site (in respect of the final site layout plan) through the life of the activity.**

(Provide a statement motivating the final site layout that is proposed.)

The methodology for the predication and assessment of impacts has been in accordance with *DEA Guideline 5: Assessment of Alternatives and Impacts*. Potential impacts have been rated in terms of the direct, indirect and cumulative impacts.

Criteria taken into account:

- Spatial extent – The size of the area that will be affected by the impact.
- Intensity –The anticipated severity of the impact.
- Duration –The timeframe during which the impact will be experienced.

Using the criteria above, the impacts have further been assessed in terms of the following:

- Probability –The probability of the impact occurring.
- Significance – Will the impact cause a notable alteration of the environment?
- Status - Whether the impact on the overall environment will be positive, negative or neutral.
- Confidence – The degree of confidence in predictions based on available information and specialist knowledge.

## (j) Assessment of each identified potentially significant impact and risk

| **NAME OF ACTIVITY**<br>(e.g. For prospecting – drill site, site camp, ablution facility, accommodation, equipment storage, sample storage, site office, access rout etc…etc…etc<br><br>e.g. For mining - 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…) | **POTENTIAL IMPACT**<br>(Including the potential impacts for cumulative impacts)<br><br>(e.g. dust, noise, drainage, surface disturbance, fly rock, surface water contamination, groundwater contamination, air pollution etc…etc…) | **ASPECTS AFFECTED** | **PHASE**<br>In which impact is anticipated.<br><br>(e.g. Construction, commissioning, operational, decommissioning, closure, post-closure) | **SIGNIFICANCE**<br>If not mitigated | **MITIGATION TYPE**<br>modify, remedy, control or stop through:<br>(e.g. noise control measures, stormwater control, dust control, rehabilitation, design measures, blasting controls, avoidance, relocation, alternative activity etc…etc…)<br>(e.g. modify through alternative method. Control through noise control. Control through management and monitoring through rehabilitation.) | **SIGNIFICANCE**<br>If mitigated |
|---|---|---|---|---|---|---|
| Access Tracks | • Dust<br>• Disturbance of the natural habitat of fauna<br>• Disturbance / destruction of natural vegetation cover<br>• Groundwater contamination from hydrocarbon spills<br>• Noise from vehicles travelling on the access tracks<br>• Compaction of soil.<br>• Erosion | Air quality<br>Fauna<br>Flora<br>Groundwater<br>Soil<br>Surface water | Phases 3, 5 & 7 Percussion Drilling | Low | • Maintenance of access tracks / roads<br>• Dust control and monitoring<br>• Groundwater quality monitoring<br>• Noise control and monitoring<br>• Speed limits<br>• Stormwater run-off control<br>• Erosion control<br>• Immediately clean | Very Low |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | • hydrocarbon spills<br>• Rip disturbed areas to allow re-growth of vegetation cover | |
| Chemical toilets | • Soil contamination<br>• Groundwater contamination | Groundwater<br>Soil | Phases 3, 5 & 7 Percussion Drilling | Very Low | • Maintenance of toilets on regular basis.<br>• Removal of toilets upon closure. | N/A |
| Drilling activities | • Nuisance dust created by drill rig<br>• Disturbance of the natural habitat of fauna<br>• Disturbance / destruction of natural vegetation cover<br>• Groundwater contamination from hydrocarbon spills<br>• Noise from drill rig<br>• Compaction and / or disturbance of soil structure<br>• Changing of natural aesthetic view of environment by drill rig | Air quality<br>Fauna<br>Flora<br>Groundwater<br>Soil<br>Surface water | Phases 3, 5 & 7 Percussion Drilling | Medium | • Avoidance of unnecessary removal of vegetation<br>• Continuous rehabilitation of disturbed areas, re-vegetation and monitoring of re-growth<br>• Controlled drilling operations, preferably on wind-free days<br>• Immediate removal of any hydrocarbon spill<br>• Maintenance and re-fuelling to take place in dedicated area<br>• Drip pans<br>• Storage of hydrocarbons in dedicated area<br>• Hearing protection<br>• Working hours<br>• Ripping of compacted areas | Low |

**(k) 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 THAT HAVE BEEN INCLUDED IN THE EIA REPORT (mark with an X where applicable) | REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED |
|---|---|---|---|
| Heritage Impact Assessment Report (Appendix '10') | The stone tools discovered in the study area require no further action, as they mostly occur in secondary contexts such as roads or tracks. The historical structure and cemetery are found on current homestead and are not directly threatened by the prospecting activities.<br><br>Without identifiable cultural material, there are therefore no heritage grounds to halt the prospecting activities. Chance findings are still possible and reporting procedures have to be followed. | X | Page 65 - 66 |
| Palaeontological Impact Assessment Report (Appendix '11') | Based on experience and the lack of any previously recorded fossils from the area, it is extremely unlikely that any fossils in the loose sands or calcretes of the Quaternary Kalahari Sands.<br><br>There is a very small chance that fossils may occur in palaeo-pans but no such feature is visible. Therefore, a Fossil Chance Find Protocol should be added to the EMPr: if fossils are found once the surveyor and/or the environmental officer walks the route and expansion areas, they should be | X | Page 68 |

| | | | |
|---|---|---|---|
| | photographed, position recorded, removed and stored. Photographs sent to the palaeontologist will enable him/her to assess the scientific importance of the fossils and act accordingly. | | |

Attach copies of Specialist Reports as appendices.

## (l) Environmental impact statement

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

- The creation of the access tracks will have a very low impact on air quality, fauna, flora, groundwater, soil and surface water after the implementation of mitigation measures.
- The chemical toilets are not expected to have an environmental impact should the mitigation measures be implemented.
- The drilling activities will have a low impact on air quality, fauna, flora, groundwater, soil and surface water after the implementation of mitigation measures.

### (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 indicating any areas that should be avoided, including buffers. Attach as Appendix.

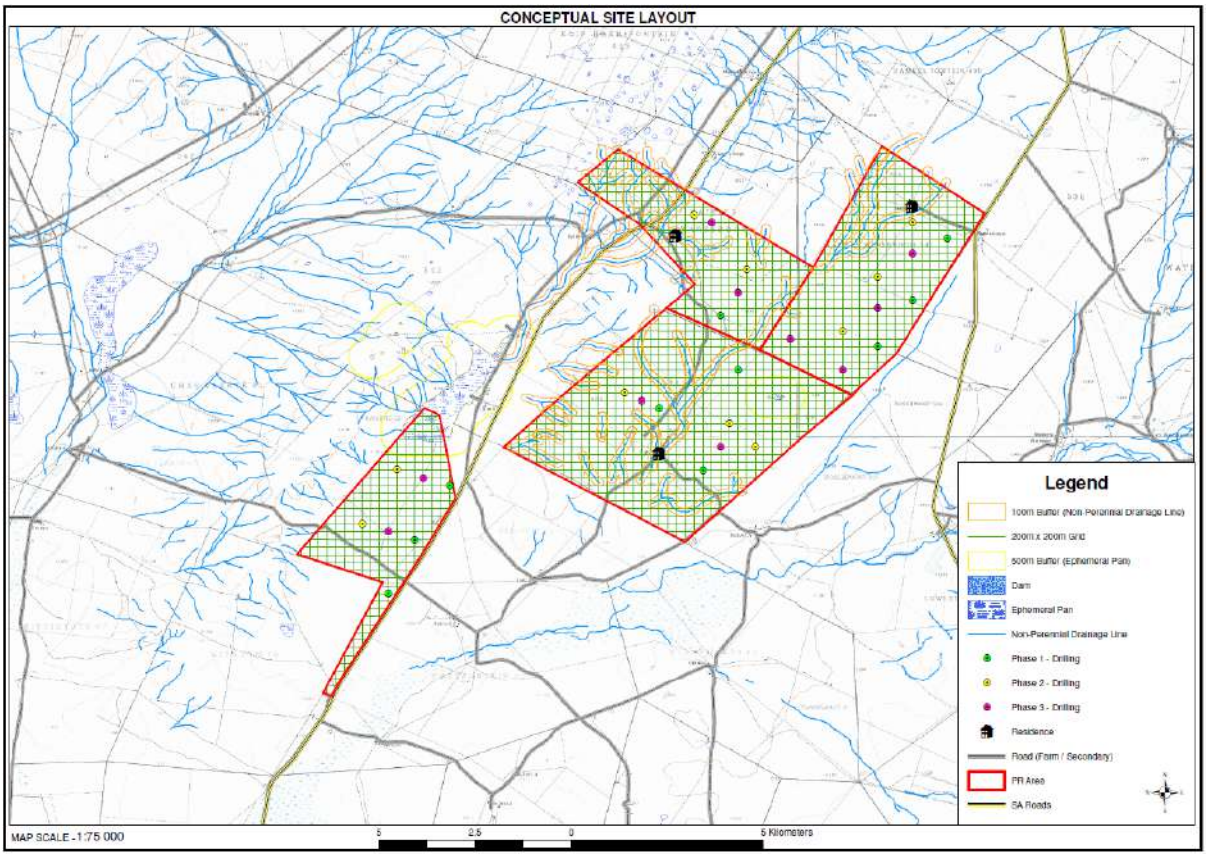



Figure 18 – Site layout with buffer zones

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

Infrastructure: No offices and storerooms will be established at the site as Xhariep shall make use of facilities in the town of Kimberley / Postmasburg.

Invasive prospecting: The proposed locality of the exploration boreholes has been placed on a wide grid to determine the economic potential. The

final locality of the exploration holes can only be determined after the desktop studies and geological mapping have been completed.

Alternatives considered:-
Infrastructure: The only alternative considered was the establishment of offices and storerooms on the farms under application. As Xhariep aims to minimize its impact on the natural environment as much as possible this option was decided against.

Invasive prospecting: The drilling of boreholes over the entire property was considered, but taking into account that Xhariep aims to minimize its impact on the natural environment as much as possible this option was decided against.

**(m) 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 for inclusion as conditions of authorisation.

- Archaeological sites (Chance Findings Procedure):
  The following monitoring and reporting procedures must be followed in the event of a chance find, to ensure compliance with heritage laws and policies for best practice. Should any archaeological materials be revealed from the subsurface, the following procedure should be followed, everyone working on the site must be properly inducted to ensure they are fully aware of the procedures regarding chance finds.
  - If during the drilling operations or closure phases of this project, any person employed by the developer, one of its subsidiaries, contractors and subcontractors, or service provider, finds any artefact of cultural significance, work must cease at the site of the find and this person must report this find to their immediate supervisor, and through their supervisor to the senior on-site manager.
  - The senior on-site Manager must then make an initial assessment of the extent of the find and confirm the extent of the work stoppage in that area before informing SAHRA/PHRA.
  - If a human grave/burial is encountered, the remains must be left as undisturbed as possible before the local police and SAHRA or PHRA are informed. If the burial is deemed to be over 60 years old and no foul play is suspected, an emergency exhumation permit may be issued by SAHRA for an archaeologist to exhume the remains.

  The following indicators of unmarked sub-surface sites could be encountered:
  - Ash deposits (unnaturally grey appearance of soil compared to the surrounding substrate);
  - Bone concentrations, either animal or human;
  - Ceramic fragments such as pottery shards either historic or pre-contact;
  - Stone concentrations of any formal nature.

The following recommendations are given should any sub-surface remains of heritage sites be identified as indicated above:

- All operators of excavation 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, all activities at the finds must be seized and the South African Police Services (SAPS) should be notified.
- Mitigation measures (such as refilling etc.) 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.
- The area should be placed under guard.
- No media statements should be released until such time as the heritage practitioner has had enough time to analyze the finds.

- Air quality:
  To limit the creation of nuisance dust the following management guidelines should be followed:
  - Speed limits of vehicles inside the application area will be strictly controlled to avoid excessive dust or the excessive deterioration of the farm roads and access tracks to be used.
  - Routine spraying of unpaved site areas and access tracks utilized by the prospecting operation with water // dust-a-side or similar environmentally friendly product;
  - Avoidance of unnecessary removal of vegetation;
  - All cleared, disturbed or exposed areas must be rehabilitated as soon as practically possible to prevent the forming of additional sources of dust.
  - Monitoring of vegetation re-growth in rehabilitated areas.
  - Drilling activities preferably to take place on wind-free days.

- Fauna
  To ensure a minimum of impact to animals the following management guidelines should be followed:
  - Speed limits of vehicles inside the application area will be strictly controlled to avoid road kills.
  - Continuous rehabilitation of disturbed areas to allow the fauna habitat to be re-established.
  - No hunting (snares) will be allowed at the application area.
  - Maintenance of the firebreak.

- Flora
  - Continuous rehabilitation of disturbed areas to allow the natural vegetation cover to be re-established.
  - Avoidance of unnecessary removal of vegetation cover.
  - Monitoring of vegetation re-growth in rehabilitated areas.
  - Maintenance of firebreak.
  - No trees or shrubs will be felled or damaged for the purpose of obtaining firewood.
  - Management will take responsibility to control declared invader or exotic species on the site. The following control methods will 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 Northern Cape Nature Conservation will be obtained before any protected plant species are removed.
    - All rehabilitated areas, where applicable and possible, will be seeded with a vegetation seed mix adapted to reflect the local indigenous flora that was present prior to prospecting activities commenced, if the natural succession of vegetation is unacceptably slow.
    - Fires will only be allowed in facilities or equipment specially constructed for this purpose.
    - The end objective of the re-vegetation program will be to achieve a stable self-sustaining habitat unit.

- Groundwater
    - Immediate removal of any hydrocarbon spill.
    - Vehicle- and equipment maintenance will only be allowed within the dedicated maintenance area.
    - Only emergency breakdowns will be allowed in other areas. The following procedure will be followed if a vehicle or piece of equipment would break down outside of the maintenance area.
        - Drip pans will be placed at all points where diesel, oil or hydraulic fluid may drip and in so doing contaminate the soil.
        - All efforts will 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 will firstly be drained of all fluid. The part will then be removed and taken to the maintenance area.
    - Equipment used as part of the proposed operation will be adequately maintained so as to ensure that oil, diesel, grease or hydraulic fluid does not leak during operation.
    - Fuel and other petrochemicals will be stored in steel receptacles that comply with SANS 10089-1:2003 (SABS 089-1:2003) standards.
    - Monitoring of groundwater quality.
    - Proper sanitation facilities will be provided for employees. No person will pollute the workings with faeces or urine, misuse the facilities provided or inappropriately foul the surrounding environment with faeces or urine. Acceptable hygienic and aesthetic practices will be adhered to.

- Noise
    - Hearing protection will be available for all employees where attenuation cannot be implemented.
    - Working hours will be kept between sunrise and sunset as far as possible.
    - As a minimum, ambient noise levels emanating from the prospecting activities will not exceed 82 dBA at the site boundary. 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.

- Xhariep will comply with the occupational noise Regulations of the Occupational Health and Safety Act, Act 85 of 1993.
- Xhariep will comply with the measures for good practice with regard to management of noise related impacts during construction and operation.
- 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 drilling area and that which may migrate outside the drilling area.
- 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 will be in good working order and vehicles will adhere to the relevant noise requirements of the Road Traffic Act.
- All vehicles in operation will be equipped with a silencer on their exhaust system.
- Safety measures, which generate noise such as reverse gear alarms on large vehicles, will be appropriately calibrated/adjusted.

- Palaeontological sites

  Chance Fossil Finds Procedure as outlined in the Specialist Report should be followed:

  Programme for Palaeontology – to commence once the expansion area and routes are surveyed by the surveyor or environmental officer. Planning/pre-construction phase

  - The following procedure is only required if fossils are seen on the surface when surveyed and any palaeo-pan or palaeo-spring feature is recognised, or if stromatolites are seen
  - If any fossiliferous material (plants, insects, bones, or stromatolites) is seen it should be put aside in a suitably protected place. This way the construction activities will not be interrupted.
  - Photographs of similar fossil plants must be provided to the developer to assist in recognizing the fossil plants in the shales and mudstones. This information will be built into the EMP's training and awareness plan and procedures.
  - Photographs of the putative fossils can be sent to the palaeontologist for a preliminary assessment.
  - If there is any scientifically important fossil material as assessed from the submitted photographs, then the qualified palaeontologist sub-contracted for this project, should visit the site to inspect the site and excavate (having obtained a SAHRA permit).
  - Stromatolites, 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.
  - Annual reports must be submitted to SAHRA as required by the relevant permits.
  - If no good fossil material is recovered then the site inspection by the palaeontologist will not be necessary.
  - If no fossils are found during the survey, then no further palaeontological impact assessment is required.

- Soil
  - In all places of development the first 300mm of loose or weathered material found will be classified as a growth medium. The topsoil will 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 will be removed and stockpiled on a dedicated area. The maximum height of stockpiles will be 2 meters.
  - The growth medium/topsoil will 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 prospecting area, it will 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 will be implemented on disturbed areas in and around the site.
  - The stored topsoil will be adequately protected from being blown away or being eroded.
  - Compacted areas will 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 will be confined to established roads and access tracks for as far as practical in order to prevent the compaction of soils.

- Surface water
  - The disposal of oil, grease and related industrial waste will be transported to the stores area in Hotazel on a daily basis where it will be stored in steel containers supplied by an oil recycling contractor. All oil and grease will be removed on a regular basis from the operation by a registered approved contractor.
  - All refuse and waste from the different sections will be handled according to NEMA Guidelines. Recycling of waste is encouraged in all the consumer sections of the operation, where recyclable materials will 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 will be removed from the site on a regular basis and disposed of at a recognized disposal facility.
  - Erosion and storm water control measures will be implemented.
  - Vehicle repairs will only take place within the maintenance area for vehicles.
  - Re-fuelling will only take place in the re-fuelling area. If this is found not be practical, drip trays will be used whenever re-fuelling takes place outside of this area.
  - During rehabilitation the applicant will 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.
  - Adhering to no-prospecting buffer zones placed around dry water courses.

- Topography
  - During rehabilitation the applicant will 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.

- Visual
  - Waste material of any description will be removed from the prospecting area upon completion of the operation and be disposed of at a recognized landfill facility.
  - The drill rigs will be removed from the site upon completion of the prospecting operation.

**(n) Aspects for inclusion as conditions of Authorisation.**
Any aspects which must be made conditions of the Environmental Authorisation.

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 Authorisation.

**(o) Descriptions of any assumptions, uncertainties and gaps in knowledge.**
(Which relate to the assessment and mitigation measures proposed.)

The abovementioned mitigatory measures are tried and tested over many years in the prospecting / mining industry. Xhariep will 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 its annexures have extensive knowledge in her field and it is hereby assumed that the above assumptions are adequate and that the information provided is in the region of 85% - 95% 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.**

Five measures of economic impacts can be used to demonstrate the potential effect of the proposed prospecting operation on the local economy:

- Employment - The extent of employment can be measured as number of jobs or in terms of full time equivalents.
- Payroll income - The gross remuneration of employees in terms of salaries and wages.
- Capital Expenditure (CAPEX) - The total amount spent on the purchasing of fixed assets and total spent on construction.
- Operating expenditure and maintenance (OPEX) - The total amount spent locally by businesses on goods and services, excluding salaries and wages as well as rents or interest.
- Revenue - The total value of sales arising from business activity at the prospecting operation.

It is recommended that the activity should be authorized for the above reasons.

**ii) Conditions that must be included in the authorisation**

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 Authorisation.

**(q) Period for which the Environmental Authorisation is required.**

Five years

**(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.

Xhariep's undertaking to meet the requirements of the Basic Assessment Report and Environmental Management Programme Report is attached at the end of the EMPr and is applicable to both documents.

**(s) Financial Provision**

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

R323 812.16

**(i) Explain how the aforesaid amount was derived.**

The Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA) requires a holder of a right to provide to the Department of Mineral Resources and Energy (DMRE) sufficient financial provision for environmental rehabilitation and closure requirements of mining operations. Regulation 54 of the MPRDA, '*Quantum of financial provision*', as well as the '*Guideline document for evaluation of the quantum of closure-related financial provision provided by a mine*' has been used to calculate the required financial provision for the Xhariep Project.

Furthermore, the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) requires a Right Holder to make financial provision for rehabilitation and remediation; decommissioning and closure activities as well as remediation and management of latent or residual environmental impacts. The '*Regulations pertaining to the financial provision for prospecting, exploration, mining or production operations*' as published on 20 November 2015 under Government Notice R. 1147 of Government Gazette 39425 has also been used to guide the calculations in this report.

<u>Calculation criteria:</u>

1. Master Rates:
   In terms of the guideline document 'the Master Rates in Section B will be updated on an annual basis, based on CPIX or similar approved method. The first of these updates will take place during 2005.'

The 2004 Master Rates were updated annually in terms of the published STATS SA CPI rates:
(http://www.statssa.gov.za/publications/P0141/CPIHistory.pdf).

| Year | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Aver |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2005 | 3,0 | 2,6 | 3,0 | 3,4 | 3,3 | 2,8 | 3,4 | 3,9 | 4,4 | 4,0 | 3,4 | 3,6 | 3,4 |
| 2006 | 4,0 | 3,9 | 3,4 | 3,3 | 3,9 | 4,9 | 5,0 | 5,4 | 5,3 | 5,4 | 5,4 | 5,8 | 4,7 |
| 2007 | 6,0 | 5,7 | 6,1 | 7,0 | 6,9 | 7,0 | 7,0 | 6,7 | 7,2 | 7,9 | 8,4 | 9,0 | 7,1 |
| 2008 | 9,3 | 9,8 | 10,6 | 11,1 | 11,7 | 12,2 | 13,4 | 13,7 | 13,1 | 12,1 | 11,8 | 9,5 | 11,5 |
| 2009 | 8,1 | 8,6 | 8,5 | 8,4 | 8,0 | 6,9 | 6,7 | 6,4 | 6,1 | 5,9 | 5,8 | 6,3 | 7,1 |
| 2010 | 6,2 | 5,7 | 5,1 | 4,8 | 4,6 | 4,1 | 3,7 | 3,5 | 3,2 | 3,4 | 3,6 | 3,5 | 4,3 |
| 2011 | 3,7 | 3,7 | 4,1 | 4,2 | 4,6 | 5,0 | 5,3 | 5,3 | 5,7 | 6,0 | 6,1 | 6,1 | 5,0 |
| 2012 | 6,3 | 6,1 | 6,0 | 6,1 | 5,7 | 5,5 | 4,9 | 5,0 | 5,5 | 5,6 | 5,6 | 5,7 | 5,6 |
| 2013 | 5,4 | 5,9 | 5,9 | 5,9 | 5,6 | 5,5 | 6,3 | 6,4 | 6,0 | 5,5 | 5,3 | 5,4 | 5,7 |
| 2014 | 5,8 | 5,9 | 6,0 | 6,1 | 6,6 | 6,6 | 6,3 | 6,4 | 5,9 | 5,9 | 5,8 | 5,3 | 6,1 |
| 2015 | 4,4 | 3,9 | 4,0 | 4,5 | 4,6 | 4,7 | 5,0 | 4,6 | 4,6 | 4,7 | 4,8 | 5,2 | 4,6 |
| 2016 | 6,2 | 7,0 | 6,3 | 6,2 | 6,1 | 6,3 | 6,0 | 5,9 | 6,1 | 6,4 | 6,6 | 6,8 | 6,4 |
| 2017 | 6,6 | 6,3 | 6,1 | 5,3 | 5,4 | 5,1 | 4,6 | 4,8 | 5,1 | 4,8 | 4,6 | 4,7 | 5,3 |
| 2018 | 4,4 | 4,0 | 3,8 | 4,5 | 4,4 | 4,6 | 5,1 | 4,9 | 4,9 | 5,1 | 5,2 | 4,5 | 4,7 |
| 2019 | 4,0 | 4,1 | 4,5 | 4,4 | 4,5 | 4,5 | 4,0 | 4,3 | 4,1 | 3,7 | 3,6 | 4,0 | 4,1 |
| 2020 | 4,5 | 4,6 | 4,1 | 3,0 | 2,1 | 2,2 | 3,2 | 3,1 | 3,0 | 3,3 | 3,2 | 3,1 | 3,3 |
| 2021 | 3,2 | 2,9 | 3,2 | 4,4 | 5,2 | 4,9 | 4,6 | 4,9 | 5,0 | 5,0 | 5,5 | 5,9 | 4,5 |
| 2022 | 5,7 | 5,7 | 5,9 | 5,9 | 6,5 | 7,4 | 7,8 | 7,6 | 7,5 | 7,6 | 7,4 | 7,2 | 6,9 |
| 2023 | 6,9 | 7,0 | 7,1 | | | | | | | | | | |

2. Procedure to determine the quantum for financial provision:

2.1. Step 1 – Determine mineral mined and saleable by-products:

In terms of Tables B.12 and B.13 of the Guideline Document the activities to be conducted under the Prospecting Right has been classified as a Small Mine under the category 'Mine, mine waste'. Xhariep will not establish a processing plant at the site. The primary risk class for the type of mineral mined / processed are as follows:

| Mineral | Table | Primary Risk Class |
|---|---|---|
| Iron Ore | B.12 | Risk Class C (Low) |
| Manganese Ore | B.13 | N/A |

2.2. Step 2A – Determine primary risk class:

The primary risk class in terms of the information contained in Tables B.12 and B.13 the primary risk class for the project is Class B (Medium Risk).

2.3. Step 2B – Revise primary risk class (if applicable) based on saleable by-products:

Not applicable – No by-products have been identified.

2.4. Step 3 – Determine environmental sensitivity of mine area:

The site the sensitivity of the PR area, in terms of Table B.4 of the Guideline Document, has been determined as follows:

| Sensitivity | Sensitivity criteria | | |
|---|---|---|---|
| | Biophysical | Social | Economic |
| Low | | X | X |
| Medium | | | |
| High | X | | |

2.5. Step 4 – For Class A or B mining operations:

2.5.1. Step 4.1 – Determine level of information available:
The level of information available for the operation is classified as 'extensive':

- An BAR/EMPr that is in the process of being approved;
- Closure Plan (included in the BAR/EMPr)
- Detailed breakdown of the costs (included in the BAR/EMPr).

2.5.2. Step 4.2 – Identify closure components:
The operation has been classified as an open-cast activity, which triggers all components, with the exception of Component No. 7 – Sealing of shafts, adits and inclines, as listed in Table B.5 of the Guideline Document.

2.5.3. Step 4.3 – Identify unit rates for closure components:
In terms of Table B.6 of the Guideline Document the unit rates for the closure components were determined as follows:

| Component | Risk Class | Sensitivity | Multiplication Factor | Unit | Master Rate (2004) | Master Rate (2023) |
|---|---|---|---|---|---|---|
| 1 | A | Medium | 1.00 | $m^3$ | 6.82 | 18.68 |
| 2(A) | A | Medium | 1.00 | $m^2$ | 95.00 | 260.21 |
| 2(B) | A | Medium | 1.00 | $m^2$ | 140.00 | 383.47 |
| 3 | A | Medium | 1.00 | $m^2$ | 17.00 | 46.56 |
| 4(A) | A | Medium | 1.00 | m | 165.00 | 451.95 |
| 4(B) | A | Medium | 1.00 | m | 90.00 | 246.52 |
| 5 | A | Medium | 1.00 | $m^2$ | 190.00 | 520.43 |
| 6 | A | Medium | 0.52 | Ha | 96,700.00 | 264 869.56 |
| 7 | N/A | N/A | N/A | N/A | N/A | N/A |
| 8(A) | A | Medium | 1.00 | Ha | 66,400.00 | 176 397.10 |
| 8(B) | A | Medium | 1.00 | Ha | 82,700.00 | 226 522.36 |
| 8(C) | A | Medium | 0.80 | Ha | 240,200.00 | 657 928.32 |
| 9 | A | Medium | 1.00 | Ha | 55,600.00 | 152 293.15 |
| 10 | A | Medium | 1.00 | Ha | 52,600.00 | 144 075.89 |
| 11 | A | Medium | 1.00 | Ha | 52,600.00 | 144 075.89 |
| 12 | A | Medium | 1.00 | m | 60.00 | 164.35 |
| 13 | A | Medium | 0.67 | Ha | 20,000.00 | 54 781.71 |
| 14 | A | Medium | 1.00 | Ha | 7,000.00 | 19 173.60 |

2.5.4. Step 4.4 – Identify and apply weighting factors:
In terms of Tables B.7 and B.8 of the Guideline Document the weighting factors were determined as follows:

- Weighting Factor 1:
  The nature of the terrain is flat, thus a weighting factor of 1.00 is used.

- Weighting Factor 2:
  The site is situated within 150km of a developed urban area, thus a weighting factor of 1.05 is used (Peri-urban).

### 2.5.5. Step 4.5 – Identify areas of disturbance:

| No | Description | Quantity |
|---|---|---|
| 1 | Dismantling of processing plant and related structures (including overland conveyors and powerlines)<br><br>Not applicable – Xhariep will not establish any processing plants at the site. | 0m³ |
| 2(A) | Demolition of steel buildings and structures<br><br>Not applicable – Xhariep will not establish any steel buildings or structures at the site. | 0m² |
| 2(B) | Demolition of reinforced concrete buildings and structures<br><br>Not applicable – Xhariep will not establish any reinforced concrete buildings and structures at the site. | 0m² |
| 3 | Rehabilitation of access roads<br><br>Provision is made for 500m x 3m wide two-spoor access tracks. | 1 500m² |
| 4(A) | Demolition and rehabilitation of electrified railway lines<br><br>There are no electrified railway lines on the site. | 0m |
| 4(B) | Demolition and rehabilitation of non-electrified railway lines<br><br>There are no non-electrified railway lines on the site. | 0m |
| 5 | Demolition of housing and/or administration facilities<br><br>Not applicable – Xhariep will not establish any housing and/or administration facilities at the site. | 0m² |
| 6 | Opencast rehabilitation including final voids and ramps<br><br>Not applicable – Xhariep's Prospecting Right does not make provision for bulk sampling. | 0Ha |
| 7 | Sealing of shafts adits and inclines<br><br>Not applicable – Xhariep's activities has been classified as 'open-cast'. | 0m³ |
| 8(A) | Rehabilitation of overburden and spoils<br><br>Not applicable – Xhariep's Prospecting Right does not make provision for bulk sampling. | 0Ha |
| 8(B) | Rehabilitation of processing waste deposits and evaporation ponds (non-polluting potential)<br><br>Not applicable – Xhariep's Prospecting Right does not make provision for bulk sampling. | 0Ha |
| 8(C) | Rehabilitation of processing waste deposits and evaporation ponds (polluting potential)<br><br>Not applicable – Xhariep's Prospecting Right does not make provision for bulk sampling. | 0Ha |
| 9 | Rehabilitation of subsided areas<br><br>Not applicable – There are no subsided areas at the site. | 0Ha |

| | | |
|---|---|---|
| 10 | General surface rehabilitation<br><br>Provision is made for 30 boreholes with a 20m x 20m surface disturbance each. | 1.2Ha |
| 11 | River diversions<br><br>There are no rivers at the site. | 0Ha |
| 12 | Fencing<br><br>Not applicable – Xhariep will not establish any fences at the site. | 0m |
| 13 | Water management<br><br>Not applicable – Xhariep will not establish any water related infrastructure at the site. | 0Ha |
| 14 | 2 to 3 years maintenance and aftercare<br><br>Not application at this early stage of the application process. | 0Ha |
| 15 (A) & 15(B) | Specialist study<br><br>Refer to Step 4.6 below | |

2.5.6. Step 4.6 – Identify closure costs from specialist studies:
In terms of Table B.9 of the Guideline Document provision must be made for a Screening Level Risk Assessment.

Provision is thus made for an estimated cost of such a specialist report.

2.5.7. Step 4.7 – Calculate closure costs:
In terms of Table B.10 of the Guideline Document 6% of Subtotal 1 must be added under ‘Preliminary and General’ if Subtotal 1 is less than R100,000,000.00 and 10% of Subtotal 1 must be added under ‘Contingencies’.

**CALCULATION OF THE QUANTUM**

Applicant: **XHARIEP PLANT AND MINING (PTY) LTD** **Ref No:** **NC 13478 PR**
**Date:** **MAY 2023**

| No. | Description | Unit | A Quantity | B Master Rate | C Multiplication factor | D Weighting factor 1 | E=A*B*C*D Amount (Rands) |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
| 1 | Dismantling of processing plant and related structures (including overland conveyors and pow erlines) | m3 | 0.00 | 18.68 | 1 | 1 | 0.00 |
| 2 (A) | Demolition of steel buildings and structures | m2 | 0.00 | 260.21 | 1 | 1 | 0.00 |
| 2(B) | Demolition of reinforced concrete buildings and structures | m2 | 0.00 | 383.47 | 1 | 1 | 0.00 |
| 3 | Rehabilitation of access roads | m2 | 1 500.00 | 46.56 | 1 | 1 | 69 846.68 |
| 4 (A) | Demolition and rehabilitation of electrified railw ay lines | m | 0.00 | 451.95 | 1 | 1 | 0.00 |
| 4 (B) | Demolition and rehabilitation of non-electrified railw ay lines | m | 0.00 | 246.52 | 1 | 1 | 0.00 |
| 5 | Demolition of housing and/or administration facilities | m2 | 0.00 | 520.43 | 1 | 1 | 0.00 |
| 6 | Opencast rehabilitation including final voids and ramps | ha | 0.000 | 264 869.56 | 1 | 1 | 0.00 |
| 7 | Sealing of shafts adits and inclines | m3 | 0.00 | 139.69 | 1 | 1 | 0.00 |
| 8 (A) | Rehabilitation of overburden and spoils | ha | 0.000 | 176 397.10 | 1 | 1 | 0.00 |
| 8 (B) | Rehabilitation of processing w aste deposits and evaporation ponds (non-polluting potential) | ha | 0.00 | 226 522.36 | 1 | 1 | 0.00 |
| 8 ( C ) | Rehabilitation of processing w aste deposits and evaporation ponds (polluting potential) | ha | 0.00 | 657 928.32 | 1 | 1 | 0.00 |
| 9 | Rehabilitation of subsided areas | ha | 0.00 | 152 293.15 | 1 | 1 | 0.00 |
| 10 | General surface rehabilitation | ha | 1.20 | 144 075.89 | 1 | 1 | 172 891.07 |
| 11 | River diversions | ha | 0.00 | 144 075.89 | 1 | 1 | 0.00 |
| 12 | Fencing | m | 0.00 | 164.35 | 1 | 1 | 0.00 |
| 13 | Water management | ha | 0.00 | 54 781.71 | 1 | 1 | 0.00 |
| 14 | 2 to 3 years of maintenance and aftercare | ha | 0.00 | 19 173.60 | 1 | 1 | 0.00 |
| 15 (A) | Specialist study | Sum | 0.00 | 25 000.00 | 1 | 1 | 0.00 |
| 15 (B) | Specialist study | Sum | 0.00 | 25 000.00 | 1 | 1 | 0.00 |
| | | | | | **Total of 1 - 15 above** | | **242 737.75** |

| weighting factor 2 |
|---|
| 1 |

| | |
|---|---|
| **Subtotal 1** | **242 737.75** |

| | | | |
|---|---|---|---|
| 1 | Preliminary and General (6% of Sub Total 1) | 14 564.27 | 14 564.27 |
| 2 | Contingencies (10% of Sub Total 1) | 24 273.78 | 24 273.78 |
| | | **Subtotal 2** | **281 575.79** |
| | | VAT (15%) | 42 236.37 |
| | | **Grand Total** | **323 812.16** |

**(ii) Confirm that this amount can be provided for 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.)

Provision has been made in table 9.1 of the Prospecting Work Programme for rehabilitation.

## (t) Specific information required by the competent Authority

**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 parson.**

(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 an Appendix.)

- Impact on landowner:
  Positive: Compensation of land lost to prospecting.
  Negative: Temporary loss of grazing land.
- Impact on other I&AP:
  - Employment - The extent of employment can be measured as number of jobs or in terms of full time equivalents.

- Payroll income - The gross remuneration of employees in terms of salaries and wages.
- Capital Expenditure (CAPEX) - The total amount spent on the purchasing of fixed assets and total spent on construction.
- Operating expenditure and maintenance (OPEX) - The total amount spent locally by businesses on goods and services, excluding salaries and wages as well as rents or interest.
- Revenue - The total value of sales arising from business activity at the prospecting operation.

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

The Heritage Impact Assessment Report and Palaeontological Heritage Report should list a number of recommendations relating to any archaeological or palaeontological finds.

Should these recommendations, and any condition set by SAHRA, be adhered to by Xhariep, no impact on any national estate in terms of Section 3(2) of the National Heritage Resources Act is foreseen.

**(u) 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.)

No viable alternatives were found.

# PART B
# ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

## 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.)

Refer to Part A, page 4 of this document for the details of M and S Consulting (Pty) Ltd.

## 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.)

Xhariep's prospecting activities for Iron Ore and Manganese Ore shall be conducted in nine phases over a period of five years.

| Phase | Activity<br>(what are the activities that are planned to achieve optimal prospecting) | Skill(s) required<br>(refers to the competent personnel that will be employed to achieve the required results) | Timeframe<br>(in months) for the activity) | Outcome<br>(What is the expected deliverable, e.g. Geological report, analytical results, feasibility study, etc.) | Timeframe for outcome<br>(deadline for the expected outcome to be delivered) | What technical expert will sign off on the outcome?<br>(e.g. geologist, mining engineer, surveyor, economist, etc) |
|---|---|---|---|---|---|---|
| 1 | **Non-invasive Prospecting**<br>Reconnaissance visit | Geologist | Month 1 | Memorandum to address any problems | Month 2 | Geologist |
| 2 | **Non-invasive Prospecting**<br>Review of historical activities; Desktop study; and Geological Mapping | Geologist | Month 2 - 12 | Map & Report | Month 13 | Geologist |
| 3 | **Invasive Prospecting**<br>Phase 1 Percussion drilling | Geologist & Drilling contractor | Month 13 - 24 | Drill logs | Month 24 | Geologist |
| 4 | **Non-invasive Prospecting**<br>Analysis of drill samples | Laboratory | Month 13 – 24 (Concurrent with drilling) | • Analyses sheets<br>• Laboratory report<br>• Map<br>• Report | Month 24 | Laboratory & Geologist |
| 5 | **Invasive Prospecting**<br>Phase 2 Percussion drilling | Geologist & Drilling contractor | Month 25 – 36 | Drill logs | Month 36 | Geologist |
| 6 | **Non-invasive Prospecting**<br>Analysis of drill samples | Laboratory | Month 25 – 36 (Concurrent with drilling) | • Analyses sheets<br>• Laboratory report<br>• Map<br>• Report | Month 36 | Laboratory & Geologist |
| 7 | **Invasive Prospecting**<br>Phase 3 Percussion drilling | Geologist & Drilling contractor | Month 37 - 48 | Drill logs | Month 48 | Geologist |
| 8 | **Non-invasive Prospecting**<br>Analysis of drill samples | Laboratory | Month 37 - 48 (Concurrent with drilling) | • Analyses sheets<br>• Laboratory report<br>• Map<br>• Report | Month 48 | Laboratory & Geologist |
| 9 | **Non-invasive Prospecting**<br>Consolidation and interpretation of results / data | Geologist | Month 49 - 60 | Feasibility Report | Month 60 | Geologist & CEO |

## 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 on the preferred site, indicating any areas that should be avoided, including buffers.)

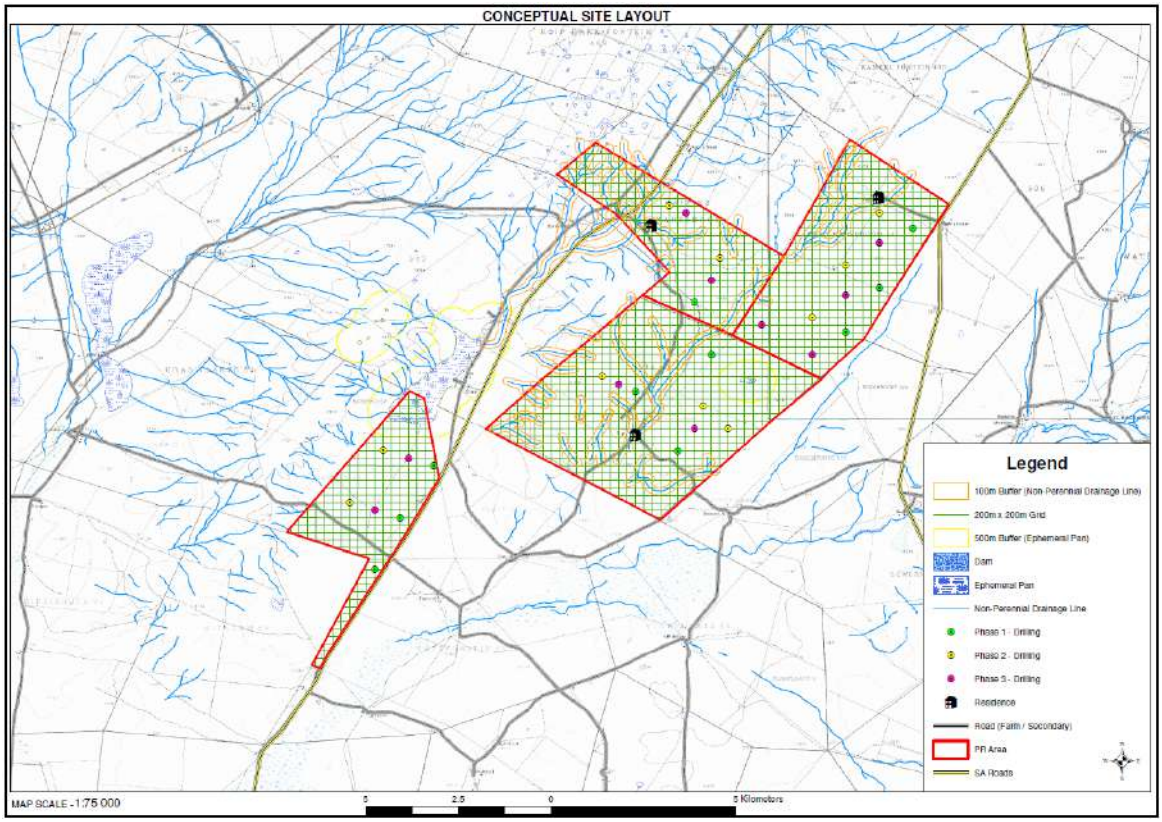



Figure 19 – Conceptual site layout (See Appendix '4')

## 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.)

- The main closure objective of Xhariep's planned prospecting operation is to restore the site to its current land capability in a sustainable matter.
- To prevent the sterilization of any ore 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 prospecting activities.
- To safeguard the safety and health of humans and animals on the site.
- To close the prospecting operation efficiently, cost effectively and in accordance with Government Policy.

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

The only water use at the site will be for domestic use (drinking water). The drilling team, consisting of five people, will be on the site during Phases 3, 5 and 7 of the prospecting operation (percussion drilling). Provision for 50 litres of water per day is made for drinking water.

Xhariep plans to make use of a percussion drill rig. Should an alternative type of drill be utilized, i.e. reverse circulation, water for the drill rig will be needed.

**(iii) Has a water use license been applied for?**

Xhariep considers the following water use alternatives:

- Municipal water: Xhariep obtains municipal water from a nearby town. The municipal water will be transported to the site.
- Groundwater: Xhariep makes use of groundwater for the drinking water and for the drilling rigs, should a drilling method other than percussion drilling be used.

The Acting Director-General of Water and Sanitation has, in terms of Section 39 of the National Water Act, published the revised General Authorisation (GNR 538 of 02 September 2016) pertaining to the taking and storing of water, water uses in terms of Section 21(a) and 21(b) of the National Water Act respectively.

The General Authorisation came into effect on 1 March 2017 and replaced the General Authorisation for the taking and storing of water contained in GNR399 of 26 March 2004. In terms of clause 7.2 of the Schedule to the 2017 General Authorisations, registration of a water use is only required if more than 10m³ of water is taken from a groundwater resource per day on average over a year on a property.

As stated in paragraph d(ii) above, Xhariep's water use shall not exceed 10 000 litres (10m³) per day. Accordingly, Xhariep is not required to apply for a water use license or register its water use after 3 March 2017 with the responsible authority by virtue of clause 7 of the 2017 General Authorisations.

Xhariep shall obtain relevant authorisation, where necessary, for its intended water use/s before invasive prospecting activities commence. The water use alternative decided upon, once invasive prospecting commences, shall be set out in the surface use agreement/s with the surface owners.

**(iv) Impacts to be mitigated in their respective phases**
**Measures to rehabilitate the environment affected by the undertaking of any listed activity.**

| **ACTIVITY**<br>(e.g. For prospecting – drill site, site camp, ablution facility, accommodation, equipment storage, sample storage, site office, access rout etc…etc…etc<br><br>e.g. For mining - 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**<br>Of operation in which activity will take place<br><br>State: Planning and design, pre-construction, construction, operational, rehabilitation, closure, post-closure | **SIZE AND SCALE of disturbances**<br>Volumes, tonnages and hectares or $m^2$) | **MITIGATION MEASURES**<br>(describe how each of the recommendations herein will remedy the cause of pollution or degradation and migration of pollutants.) | **COMPLIANCE WITH STANDARDS**<br>(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**<br>Describe the time period when the measures in the environmental management programme must be implemented. Measures must be implemented when required.<br><br>With regard to rehabilitation specifically this must take place at the earliest opportunity. With regard to rehabilitation, therefore state either:<br>- Upon cessation of the individual activity, or<br>- Upon cessation of the mining, bulk sampling or alluvial diamond prospecting as the case may be. |
|---|---|---|---|---|---|
| Two-Spoor Access Tracks | Operational<br>Rehabilitation<br>Closure | 1 500$m^2$ | • Maintenance of roads / access tracks.<br>• Dust control and monitoring.<br>• Groundwater quality monitoring<br>• Noise control and monitoring.<br>• Speed limits.<br>• Stormwater run-off control<br>• Erosion control<br>• Immediately clean hydrocarbon spills | The following must be placed at the site and is applicable to all activities:<br>○ Relevant Legislation;<br>○ Acts;<br>○ Regulations;<br>○ COP's; and<br>○ SOP's<br>Management and staff must be trained to understand the contents of these documents, and | Ripping of access tracks upon closure of prospecting right. |

| | | | | | |
|---|---|---|---|---|---|
| | | | • Ripping of access tracks / roads upon closure. | to adhere to thereto.<br>• Environmental Awareness Training must be provided to employees.<br>• 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 to thereto.<br><br>Bi-annually Performance Assessment Reports and Quantum Calculations must be done to ensure that the operation adheres to the contents of the BAR & EMPr documents. | |
| Chemical toilets | Operational<br>Closure | 6m² each | • Maintenance of the toilets.<br>• Removal of toilets upon closure. | | Removal of toilets upon closure of prospecting right. |
| Drilling activities | Operational<br>Rehabilitation<br>Closure | 2 Ha | • Avoidance of unnecessary removal of vegetation.<br>• Continuous rehabilitation of disturbed areas, re-vegetation and monitoring of re-growth<br>• Controlled drilling operations, preferably on wind-free days<br>• Immediate removal of any hydrocarbon spills<br>• Maintenance and re-fuelling to take place in dedicated area<br>• Drip pans<br>• Storage of hydrocarbons in dedicated area<br>• Hearing protection<br>• Working hours kept between sun-up and sun-down<br>• Ripping of compacted / disturbed areas | | Ripping of disturbed areas upon closure of prospecting 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**<br>(whether listed or not listed)<br><br>(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…) | **POTENTIAL IMPACT**<br>(Including the potential impacts for cumulative impacts)<br><br>(e.g. dust, noise, drainage, surface disturbance, fly rock, surface water contamination, groundwater contamination, air pollution etc…etc…) | **ASPECTS AFFECTED** | **PHASE**<br>In which impact is anticipated.<br><br>(e.g. Construction, commissioning, operational, decommissioning, closure, post-closure) | **MITIGATION TYPE**<br>modify, remedy, control or stop through:<br>(e.g. noise control measures, stormwater control, dust control, rehabilitation, design measures, blasting controls, avoidance, relocation, alternative activity etc…etc…)<br>(e.g. modify through alternative method. Control through noise control. Control through management and monitoring through rehabilitation.) | **STANDARD TO BE ACHIEVED**<br>(Impact avoided, noise levels, dust levels, rehabilitation standards, end use objectives etc.) |
|---|---|---|---|---|---|
| Access tracks | • Dust<br>• Disturbance of the natural habitat of fauna<br>• Disturbance / destruction of natural vegetation cover<br>• Groundwater contamination from hydrocarbon spills<br>• Noise from vehicles travelling on the access tracks<br>• Compaction of soil.<br>• Erosion | Air quality<br>Fauna<br>Flora<br>Groundwater<br>Soil<br>Surface water | Operational<br>Rehabilitation<br>Closure | • Maintenance of access tracks<br>• Dust control and monitoring<br>• Groundwater quality monitoring<br>• Noise control and monitoring<br>• Speed limits<br>• Stormwater run-off control.<br>• Erosion control<br>• Immediately clean hydrocarbon spills<br>• Rip disturbed areas to allow re-growth of vegetation cover | • Safety ensured.<br>• Dust levels minimized.<br>• Minimize potential for hydrocarbon spills to infiltrate into groundwater.<br>• Noise levels minimized.<br>• Rehabilitation standards and closure objectives met.<br>• Erosion potential minimized. |

| | | | | | |
|---|---|---|---|---|---|
| Chemical toilets | • Soil contamination<br>• Groundwater contamination | Groundwater<br>Soil | Operational<br>Closure | • Maintenance of toilets on regular basis.<br>• Removal of toilets upon closure. | • Minimize the potential for a chemical spill on soil, which could infiltrate to groundwater. |
| Drilling activities | • Nuisance dust created by drill rig<br>• Disturbance of the natural habitat of fauna<br>• Disturbance / destruction of natural vegetation cover<br>• Groundwater contamination from hydrocarbon spills<br>• Noise from drill rig<br>• Compaction and / or disturbance of soil structure<br>• Changing of natural aesthetic view of environment by drill rig | Air quality<br>Fauna<br>Flora<br>Groundwater<br>Soil<br>Surface water | Operational<br>Rehabilitation<br>Closure | • Avoidance of unnecessary removal of vegetation<br>• Continuous rehabilitation of disturbed areas, re-vegetation and monitoring of re-growth<br>• Controlled drilling operations, preferably on wind-free days<br>• Immediate removal of any hydrocarbon spill<br>• Maintenance and re-fuelling to take place in dedicated area<br>• Drip pans<br>• Storage of hydrocarbons in dedicated area<br>• Hearing protection<br>• Working hours<br>• Ripping of compacted areas | • Dust levels minimized.<br>• Rehabilitation standards and closure objectives met.<br>• Minimize potential for hydrocarbon spills to infiltrate into groundwater.<br>• Erosion potential minimized.<br>• Noise levels minimized. |

## f) Impact Management Actions

(A description of impact management actions, identifying the manner in which the impact management objectives and outcomes contemplated in paragraphs © and (d) will be achieved.)

| **ACTIVITY**<br>(whether listed or not listed)<br><br>(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…) | **POTENTIAL IMPACT**<br>(Including the potential impacts for cumulative impacts)<br><br>(e.g. dust, noise, drainage, surface disturbance, fly rock, surface water contamination, groundwater contamination, air pollution etc…etc…) | **MITIGATION MEASURES**<br>(describe how each of the recommendations herein will remedy the cause of pollution or degradation and migration of pollutants.) | **TIME PERIOD FOR IMPLEMENTATION**<br>Describe the time period when the measures in the environmental management programme must be implemented. Measures must be implemented when required.<br><br>With regard to rehabilitation specifically this must take place at the earliest opportunity. With regard to rehabilitation, therefore state either:<br>- Upon cessation of the individual activity, or<br>- Upon cessation of the mining, bulk sampling or alluvial diamond prospecting as the case may be. | **COMPLIANCE WITH STANDARDS**<br>(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 management standards or practices that have been identified by Competent Authorities.) |
|---|---|---|---|---|
| Access tracks | • Dust<br>• Disturbance of the natural habitat of fauna<br>• Disturbance / destruction of natural vegetation cover<br>• Groundwater contamination from hydrocarbon spills<br>• Noise from vehicles travelling on the access tracks<br>• Compaction of soil.<br>• Erosion | • Maintenance of access tracks / roads<br>• Dust control and monitoring<br>• Groundwater quality monitoring<br>• Noise control and monitoring<br>• Speed limits<br>• Stormwater run-off control.<br>• Erosion control<br>• Immediately clean hydrocarbon spills<br>• Rip disturbed areas to allow re-growth of vegetation cover | Ripping of access tracks upon closure of prospecting right. | The following must be placed at the site and is applicable to all activities:<br>○ Relevant Legislation;<br>○ Acts;<br>○ Regulations;<br>○ COP's; and<br>○ SOP's<br><br>Management and staff must be trained to understand the contents of these documents, and to adhere to thereto. |
| Chemical toilets | • Soil contamination<br>• Groundwater | • Maintenance of toilets on regular basis. | Removal of toilets upon closure of prospecting right. | The following must be placed at the site and is |

| | | | | |
|---|---|---|---|---|
| | contamination | • Removal of toilets upon closure. | | applicable to all activities:<br>○ Relevant Legislation;<br>○ Acts;<br>○ Regulations;<br>○ COP's; and<br>○ SOP's<br><br>Management and staff must be trained to understand the contents of these documents, and to adhere to thereto. |
| Drilling activities | • Nuisance dust created by drill rig<br>• Disturbance of the natural habitat of fauna<br>• Disturbance / destruction of natural vegetation cover<br>• Groundwater contamination from hydrocarbon spills<br>• Noise from drill rig<br>• Compaction and / or disturbance of soil structure<br>• Changing of natural aesthetic view of environment by drill rig | • Avoidance of unnecessary removal of vegetation<br>• Continuous rehabilitation of disturbed areas, re-vegetation and monitoring of re-growth<br>• Controlled drilling operations, preferably on wind-free days<br>• Immediate removal of any hydrocarbon spill<br>• Maintenance and re-fuelling to take place in dedicated area<br>• Drip pans<br>• Storage of hydrocarbons in dedicated area<br>• Hearing protection<br>• Working hours<br>• Ripping of compacted areas | Ripping of drilling sites upon closure of prospecting right. | The following must be placed at the site and is applicable to all activities:<br>○ Relevant Legislation;<br>○ Acts;<br>○ Regulations;<br>○ COP's; and<br>○ SOP's<br><br>Management and staff must be trained to understand the contents of these documents, and to adhere to thereto. |

**g) Financial Provision**

**(1) Determination of the amount of Financial Provision.**

**a. Describe the closure objectives and the extent to which they have been aligned to the baseline environment described under the Regulation.**

- The main closure objective of Xhariep's planned prospecting operation is to restore the site to its current land capability in a sustainable matter.
- To prevent the sterilization of any ore 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 prospecting activities.
- To safeguard the safety and health of humans and animals on the site.
- To close the prospecting operation efficiently, cost effectively and in accordance with Government Policy.

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

A meeting was held on the 8th of August 2023 with the surface owners and other interested and/or affected parties. The attendees of this meeting were provided with a copy of the draft BAR/EMPr document. The closure objectives of Xhariep, as contained in the BAR/EMPr, were discussed during this meeting.

**c. Provide a rehabilitation plan that describes and shows the scale and aerial extent of the main prospecting activities, including the anticipated prospecting area at the time of closure.**

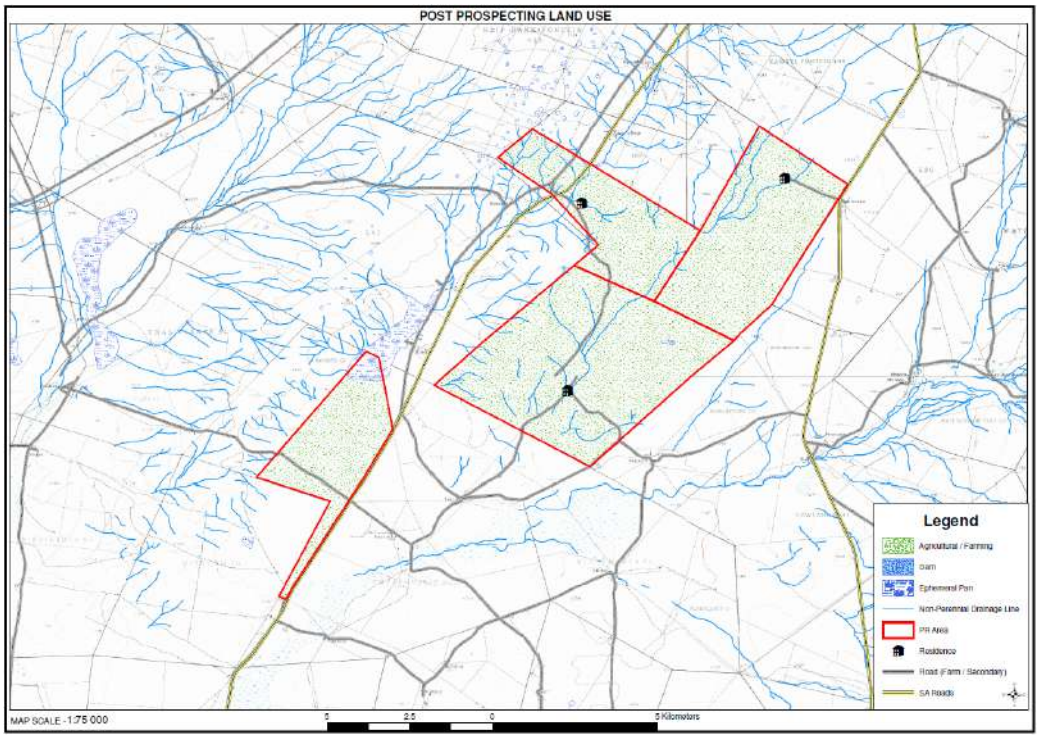



Figure 20 – Post prospecting land use map

Rehabilitation Plan:

- Rehabilitation of boreholes
  - All shallow boreholes (i.e. <10m) will be backfilled and levelled.
  - All boreholes deeper than 10m will be covered with a metal plate and 1000mm of previously stored topsoil.

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

- Submission of information
  Reports on rehabilitation and monitoring will be submitted biennially to the Department of Mineral Resources and Energy - Kimberley, as described in Regulation 55.

- Maintenance (Aftercare)
  Maintenance after closure will mainly concern the regular inspection and monitoring and/or completion of the re-vegetation programme for a period of at least two rainy seasons.

  The aim of this Environmental Management Plan is for rehabilitation to be stable and self-sufficient, so that the least possible aftercare is required.

  The aim with the closure of the prospecting operation will be to create an acceptable post-prospecting environment and land-use. Therefore all agreed commitments will be implemented by Prospecting Management.

- After-effects following closure
  - Acid drainage
    No potential for bad quality leach ate or acid drainage development exists.

  - Long term impact on ground water and / or surface water.
    No after effect on the groundwater yield or quality or surface water quality is expected.

  - Long-term stability of rehabilitated land
    One of the main aims of any rehabilitated ground will be to obtain a self-sustaining and stable end result. Xhariep's prospecting activities will not include bulk sampling which could impact on the stability of the land.

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

The main closure objective of Xhariep's planned prospecting operation is to restore the site to its current land capability in a sustainable matter. The rehabilitation activities proposed in the above rehabilitation plan will ensure that the land reverts back to grazing land upon closure of the prospecting right.

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

**CALCULATION OF THE QUANTUM**

Applicant: **XHARIEP PLANT AND MINING (PTY) LTD** **Ref No:** **NC 13478 PR**
**Date:** **MAY 2023**

| No. | Description | Unit | A Quantity | B Master Rate | C Multiplication factor | D Weighting factor 1 | E=A*B*C*D Amount (Rands) |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
| 1 | Dismantling of processing plant and related structures (including overland conveyors and powerlines) | m3 | 0.00 | 18.68 | 1 | 1 | 0.00 |
| 2 (A) | Demolition of steel buildings and structures | m2 | 0.00 | 260.21 | 1 | 1 | 0.00 |
| 2(B) | Demolition of reinforced concrete buildings and structures | m2 | 0.00 | 383.47 | 1 | 1 | 0.00 |
| 3 | Rehabilitation of access roads | m2 | 1 500.00 | 46.56 | 1 | 1 | 69 846.68 |
| 4 (A) | Demolition and rehabilitation of electrified railway lines | m | 0.00 | 451.95 | 1 | 1 | 0.00 |
| 4 (B) | Demolition and rehabilitation of non-electrified railway lines | m | 0.00 | 246.52 | 1 | 1 | 0.00 |
| 5 | Demolition of housing and/or administration facilities | m2 | 0.00 | 520.43 | 1 | 1 | 0.00 |
| 6 | Opencast rehabilitation including final voids and ramps | ha | 0.000 | 264 869.56 | 1 | 1 | 0.00 |
| 7 | Sealing of shafts adits and inclines | m3 | 0.00 | 139.69 | 1 | 1 | 0.00 |
| 8 (A) | Rehabilitation of overburden and spoils | ha | 0.000 | 176 397.10 | 1 | 1 | 0.00 |
| 8 (B) | Rehabilitation of processing waste deposits and evaporation ponds (non-polluting potential) | ha | 0.00 | 226 522.36 | 1 | 1 | 0.00 |
| 8 ( C ) | Rehabilitation of processing waste deposits and evaporation ponds (polluting potential) | ha | 0.00 | 657 928.32 | 1 | 1 | 0.00 |
| 9 | Rehabilitation of subsided areas | ha | 0.00 | 152 293.15 | 1 | 1 | 0.00 |
| 10 | General surface rehabilitation | ha | 1.20 | 144 075.89 | 1 | 1 | 172 891.07 |
| 11 | River diversions | ha | 0.00 | 144 075.89 | 1 | 1 | 0.00 |
| 12 | Fencing | m | 0.00 | 164.35 | 1 | 1 | 0.00 |
| 13 | Water management | ha | 0.00 | 54 781.71 | 1 | 1 | 0.00 |
| 14 | 2 to 3 years of maintenance and aftercare | ha | 0.00 | 19 173.60 | 1 | 1 | 0.00 |
| 15 (A) | Specialist study | Sum | 0.00 | 25 000.00 | 1 | 1 | 0.00 |
| 15 (B) | Specialist study | Sum | 0.00 | 25 000.00 | 1 | 1 | 0.00 |
| | | | | | **Total of 1 - 15 above** | | **242 737.75** |

| weighting factor 2 |
|---|
| 1 |

| | | | |
|---|---|---|---|
| | | **Subtotal 1** | **242 737.75** |
| 1 | Preliminary and General (6% of Sub Total 1) | 14 564.27 | 14 564.27 |
| 2 | Contingencies (10% of Sub Total 1) | 24 273.78 | 24 273.78 |
| | | **Subtotal 2** | **281 575.79** |
| | | VAT (15%) | 42 236.37 |
| | | **Grand Total** | **323 812.16** |

## f. Confirm that the financial provision will be provided as determined.

Xhariep shall submit to the DMRE a financial guarantee upon request therefore.

**h) Mechanisms for monitoring compliance with and performance assessment against the environmental management programme and reporting thereon, including:**

**a. Monitoring of Impact Management Actions**
**b. Monitoring and reporting frequency**
**c. Responsible persons**
**d. Time period for implementing impact management actions**
**e. Mechanism 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 |
|---|---|---|---|---|
| - Access tracks<br>- Drilling activities | Air quality | A single bucket monitoring system must be placed on the site during the drilling phase to measure the air quality levels and to ensure that Xhariep's operation adheres to the Management Standards as set out in the Atmospheric Pollution Prevention Act (45 of 1965), the Regulations of the MPRDA (28 of 2002) and the Mine, Health and Safety Act (29 of 1996). | Project manager<br>Environmentalist | Monthly fall-out dust sampling and quarterly reporting to DMRE during phases 3, 5 and 7. |
| - Access tracks<br>- Drilling activities | Flora | A registered mine surveyor must conduct measurements of disturbed and rehabilitated areas on a quarterly basis. The measurements must be plotted on plans and kept for life of operation. | Project manager<br>Environmentalist | Annual surveys and included with performance assessment reports submitted to the DMRE biennially. |
| - Access tracks<br>- Drilling activities | Groundwater | Water samples must be taken and analysed to ensure that they comply with the SANS 241-1:2011 drinking water quality. Water levels must be measured. | Project manager<br>Environmentalist | Biennial analysis and included with performance assessment reports and submitted to the DMRE biennially. |

| | | | | |
|---|---|---|---|---|
| - Access tracks<br>- Drilling activities | Noise | Noise readings must be taken at pre-determined noise monitoring points with sufficient, calibrated sound level meter during drilling activities. | Project manager<br>Environmentalist | Monthly analysis and included with performance assessment reports and submitted to the DMRE biennially. |

**i) Indicate the frequency of the submission of the performance assessment / environmental audit report.**

An Audit Report will be conducted biennially in line with Regulation 26(e) of the Environmental Impact Assessment Regulations, 2014 of the National Environmental Management Act, 1998 (Act no 107 of 1998) (NEMA) and per Regulation 55(2) of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA).

**j) Environmental Awareness Plan**

**(1) Manner in which the applicant intends to inform his or her employees of any environmental risk which may result from their work.**

Xhariep shall provide and discuss the Environmental Awareness Plan with each employee during pre-employment induction. Monthly Environmental Awareness training shall be provided during life of operation.

**(2) Manner in which risks will be dealt with in order to avoid pollution or the degradation of the environment.**

Xhariep shall ensure that there is an Emergency Response Plan on site, clearly indicating the different procedures to potential incidents.

**k) Specific information required by the Competent Authority**
(Amongst others, confirm that the financial provision will be reviewed annually.)

The financial quantum will be conducted annually as is prescribed by Regulation 54 of the MPRDA and Regulations pertaining to the financial provision for prospecting, exploration, mining or production operations of the NEMA.

Xhariep shall provide the DMRE with a progress and results report annually.

**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; ☒

Signature of the Environmental Assessment Practitioner:

M & S CONSULTING
PO BOX 2473
KIMBERLEY
8300
CELL 0844444474
TEL 0538611765
FAX 0866360731
VAT 4060244284

M AND S CONSULTING (PTY) LTD
Name of company:

3 OCTOBER 2023
Date:

# Appendix 1

EAP Qualifications

# Environmental Assessment Practitioners Association of South Africa

Registration No. 2019/1983

## *Herewith certifies that*

Tanja Jooste

## *is registered as an*

Environmental Assessment Practitioner

***Registered in accordance with the prescribed criteria of Regulation 15. (1) of the Section 24H Registration Authority Regulations (Regulation No. 849, Gazette No. 40154 of 22 July 2016, of the National Environmental Management Act (NEMA), Act No. 107 of 1998, as amended).***

Effective: 01 March 2023

Expires: 29 February 2024

*Chairperson*

*Registrar*

SAQA

UNISA

UNIVERSITY OF SOUTH AFRICA

*We certify that*

**TANJA JOOSTE**

*having complied with the requirements of the Higher Education Act and the Institutional Statute, was admitted to the degree of*

# BACHELOR OF ARTS

*in Environmental Management*

*at a congregation of the University on 9 May 2020*

Vice Chancellor

Executive Dean

University Registrar

2080556072992QC05662

*A5754871NU*

# Appendix 2

EAP CV

M&S CONSULTING
REG NR: 2015/159433/07

36 WILLIAM STREET
KESTELLHOF
8301
TEL: +2753 861 1765
CELL: +2784 444 4474
E-MAIL: ms.consulting@vodamail.co.za

P.O. BOX 2473
KIMBERLEY
8300
FAX: +2786 636 0731
VAT REG NR: 4060244284

# COMPANY PROFILE OF M and S CONSULTING (PTY) LTD

M and S Consulting (Pty) Ltd (M&S) was founded in January 2008.

M&S specializes in the following commodities:

- Manganese Ore
- Iron Ore
- Diamonds (General, Kimberlite and Alluvial)
- Tiger's Eye
- Zinc Ore
- Lead Ore
- Aggregate
- Sand

Major projects that have been conducted by M&S include:

1. Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA):
   - The compilation of Mining Permit applications in terms of the MPRDA requirements.
   - The compilation of Prospecting Right applications in terms of the MPRDA requirements. The compilation of these Prospecting Right applications included the following:
     - Prospecting Work Programme
     - Regulation 2(2) Map
     - Environmental Management Plan
   - The compilation of Prospecting Right applications in terms of the MPRDA and the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) requirements. The compilation of these Prospecting Right applications included the following:
     - Prospecting Work Programme
     - Regulation 2(2) Map
     - Application for Environmental Authorisation
     - Notification and consultation with Interested and Affected Parties
     - Basic Assessment Report and Environmental Management Programme
   - The compilation of Mining Right applications in terms of the MPRDA requirements. The compilation of these Mining Right applications included the following:
     - Mining Work Programme
     - Social & Labour Plan
     - Regulation 2(2) Map
     - Notification and consultation with Interested and Affected Parties

    - Scoping Report
    - Environmental Impact Assessment and Environmental Management Programme
- The compilation of Mining Right application in terms of the MPRDA and NEMA requirements. The compilation of this Mining Right application included the following:
    - Mining Work Programme
    - Social & Labour Plan
    - Regulation 2(2) Map
    - Application for Environmental Authorisation
    - Notification and consultation with Interested and Affected Parties
    - Scoping Report
    - Environmental Impact Assessment and Environmental Management Programme
- The compilation of Mining Right Conversion applications according to the MPRDA requirements. The compilation of these conversion applications included the following:
    - Revised Mining Work Programme
    - Revised Social & Labour Plan
    - Revised Environmental Impact Assessment and Environmental Management Programme Report
- The compilation of closure applications in terms of the MPRDA requirements. The compilation of these closure applications included the following:
    - Final Performance Assessment Report to measure degree of compliance of closure objectives as stipulated in EMP/EMPR.

2. National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA):
    - The application for Environmental Authorization according to NEMA requirements, with Millennium Geoconsulting.
        - Christian Revival Church – for the establishment of a church site, Kimberley.
        - Small Enterprise Development Agency – for the establishment of an Agave Plantation, Carnarvon.

3. National Water Act, 1998 (Act No. 36 of 1998) (NWA):
    - The application for Integrated Water Use Licenses according to NWA requirements. The compilation of these applications included:
        - Completion of application forms
        - GIS services for compilation of mapping
        - Integrated Water and Waste Management Plan
        - Water balance
        - Public participation
        - Motivation in terms of Section 27 of the NWA
        - Rehabilitation plan
        - Liaison with specialists, i.e. Geohydrologist, Engineer, Wetland, etc., to obtain site specific specialist reports for inclusion in the IWUL application.

4. Additional specialist services M&S Consulting provide include the following:
    - GIS Services including high resolution satellite images, mapping, plotting, digitizing etc.

- Section 11 applications
- Section 102 applications
- Section 20 applications
- Liability assessments
- Environmental Audit Report
- Financial Quantum
- Renewal applications
- Third party consultation processes, including public meetings, advertisements, notice boards etc.
- Field work, including, but not limited to, surveying, mapping and field plotting of drilling lines for exploration programmes.
- Managing of exploration programmes

**REFERENCES**

- Millennium Geoconsulting
  Hano Hamman
  Cell: 082 418 9929

- SJ de Wet Consulting Services
  Sarel de Wet
  Cell: 082 524 9152

- Roelien Oosthuizen
  Cell: 084 208 9088

# Appendix 3

Locality Map

# LOCALITY OF PR AREA IN RELATION TO POSTMASBURG, NORTHERN CAPE PROVINCE

POSTMASBURG

R385

R325

R309

Legend

PR Area

SA Roads

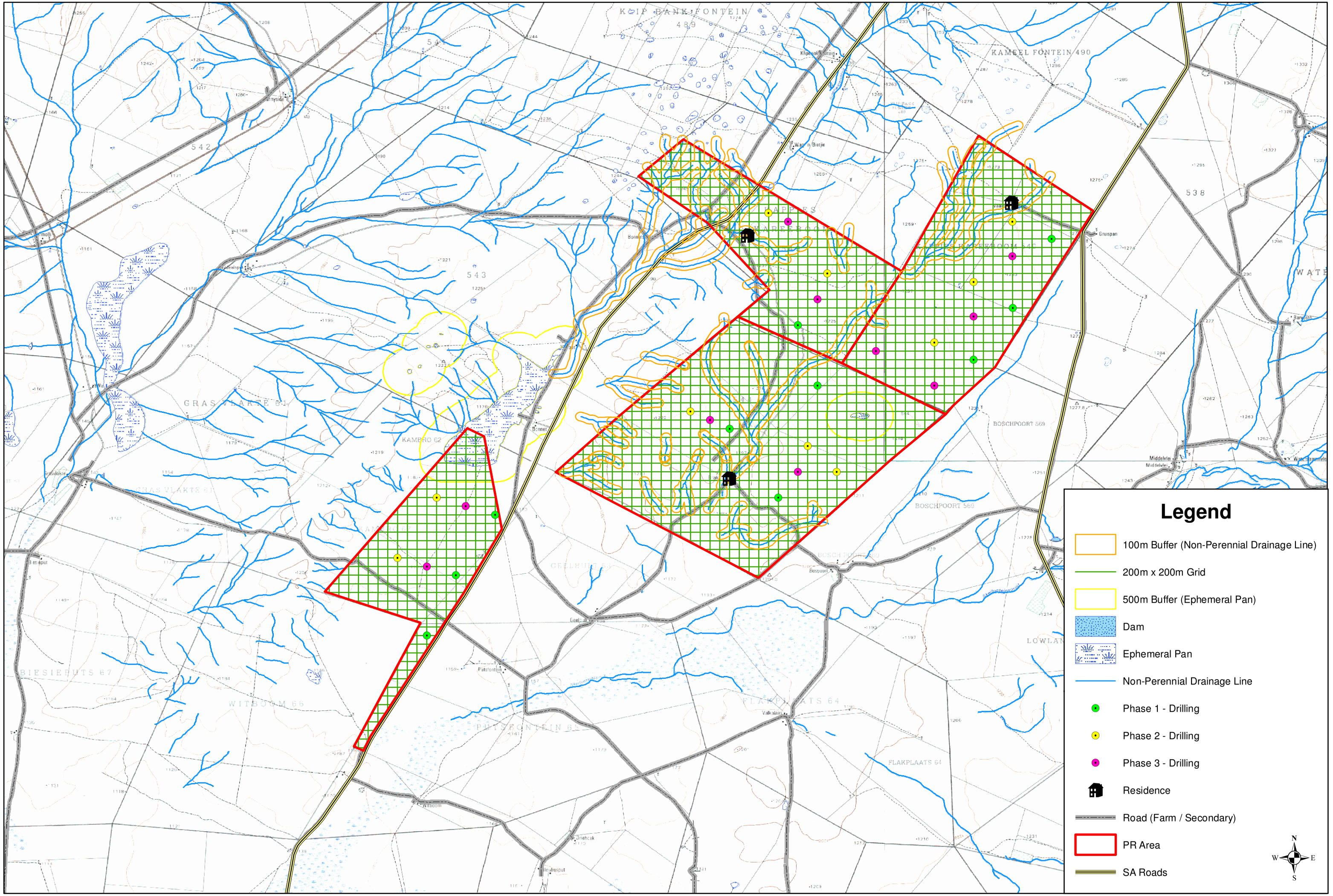
MAP SCALE - 1:150 000

7 3.5 0 7 Kilometers

# Appendix 4

Conceptual Site Plan

# CONCEPTUAL SITE LAYOUT




MAP SCALE - 1:75 000

5 2.5 0 5 Kilometers

# Appendix 5

Notification

## APPENDIX 5

The Protection of Personal Information Act ('POPI') sets out the minimum standards regarding accessing and 'processing' of any personal information belonging to another. The Act defines 'processing' as collecting, receiving, recording, organizing, retrieving, or the use, distribution or sharing of any such information.

Personal information is any information that may identify a person such as a name, surname, identity number, contact number, email address, religion, medical history, education, financial or any other information that is unique to an individual.

It is our responsibility to ensure that all personal information of interested and / or affected parties is stored safely and not accessible to individuals that may misuse or share that information for any onerous intent.

The Notification Letters are not included to ensure M and S Consulting (Pty) Ltd adheres to the POPI Act.

# Appendix 6

Responses received

## APPENDIX 6

The Protection of Personal Information Act ('POPI') sets out the minimum standards regarding accessing and 'processing' of any personal information belonging to another. The Act defines 'processing' as collecting, receiving, recording, organizing, retrieving, or the use, distribution or sharing of any such information.

Personal information is any information that may identify a person such as a name, surname, identity number, contact number, email address, religion, medical history, education, financial or any other information that is unique to an individual.

It is our responsibility to ensure that all personal information of interested and / or affected parties is stored safely and not accessible to individuals that may misuse or share that information for any onerous intent.

The responses received are not included to ensure M and S Consulting (Pty) Ltd adheres to the POPI Act.

# Appendix 7

Minutes of Meeting

**APPENDIX 7**

The Protection of Personal Information Act ('POPI') sets out the minimum standards regarding accessing and 'processing' of any personal information belonging to another. The Act defines 'processing' as collecting, receiving, recording, organizing, retrieving, or the use, distribution or sharing of any such information.

Personal information is any information that may identify a person such as a name, surname, identity number, contact number, email address, religion, medical history, education, financial or any other information that is unique to an individual.

It is our responsibility to ensure that all personal information of interested and / or affected parties is stored safely and not accessible to individuals that may misuse or share that information for any onerous intent.

The minutes of the meeting and attendance register are not included to ensure M and S Consulting (Pty) Ltd adheres to the POPI Act. These have been distributed to all attendees.

# Appendix 8

Objection

**APPENDIX 7**

The Protection of Personal Information Act ('POPI') sets out the minimum standards regarding accessing and 'processing' of any personal information belonging to another. The Act defines 'processing' as collecting, receiving, recording, organizing, retrieving, or the use, distribution or sharing of any such information.

Personal information is any information that may identify a person such as a name, surname, identity number, contact number, email address, religion, medical history, education, financial or any other information that is unique to an individual.

It is our responsibility to ensure that all personal information of interested and / or affected parties is stored safely and not accessible to individuals that may misuse or share that information for any onerous intent.

The objection is not included to ensure M and S Consulting (Pty) Ltd adheres to the POPI Act.

# Appendix 9

BAR Re-Circulate

## APPENDIX 9

The Protection of Personal Information Act ('POPI') sets out the minimum standards regarding accessing and 'processing' of any personal information belonging to another. The Act defines 'processing' as collecting, receiving, recording, organizing, retrieving, or the use, distribution or sharing of any such information.

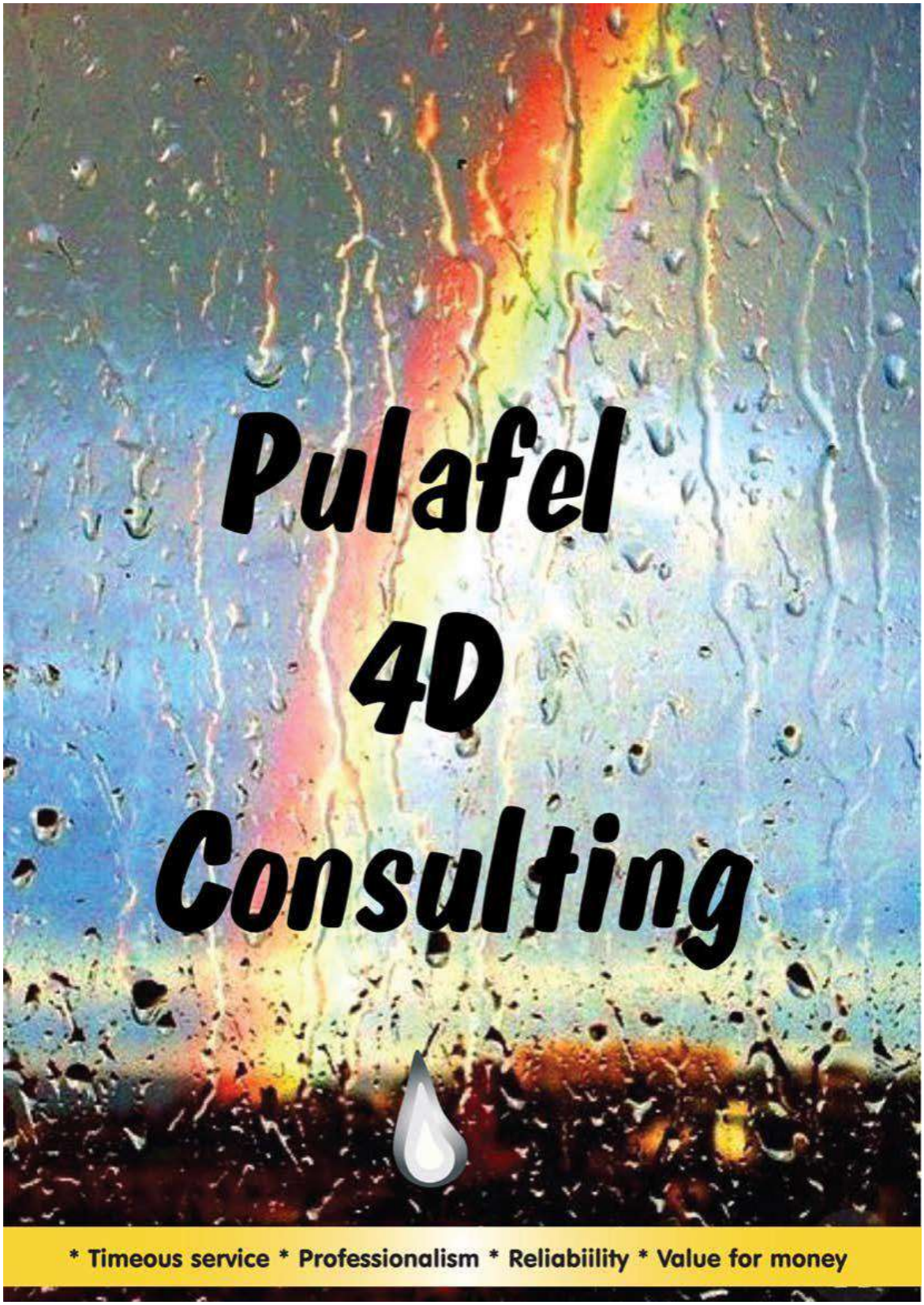
Personal information is any information that may identify a person such as a name, surname, identity number, contact number, email address, religion, medical history, education, financial or any other information that is unique to an individual.

It is our responsibility to ensure that all personal information of interested and / or affected parties is stored safely and not accessible to individuals that may misuse or share that information for any onerous intent.

The e-mail re-circulating the BAR/EMPr is not included to ensure M and S Consulting (Pty) Ltd adheres to the POPI Act.

# Appendix 10

HIA


Pulafel
4D
Consulting
* Timeous service * Professionalism * Reliabiility * Value for money

# Heritage Impact Assessment for the proposed Prospecting Right application over the Remaining Extent of Consolidated Farm Kappies Kareeboom 540, Portion 1 of Consolidated Farm Kappies Kareeboom 540, Remaining Extent of the Farm 544 and Portion 1 of the Farm 616, Hay District, Northern Cape Province

Prepared by Pulafel 4D Consulting (Pty) Ltd

Report prepared for Xhariep Plant and Mining (Pty) Ltd

**3 October 2023**


**Author**

Dr Joseph Chikumbirike Ph.D. (Wits). Professional Archaeologist and Heritage Management Specialist (ASAPA member)

**Internal reviewer**

Prof Jesmael Mataga Ph.D. (UCT), Associate Professor of Heritage Studies and Heritage Management Specialist

## Executive Summary

Table 1: Project summary

| Item | Description |
|---|---|
| **Proposed development and location** | Prospecting Right application over the Remaining Extent of Consolidated Farm Kappies Kareeboom 540, Portion 1 of Consolidated Farm Kappies Kareeboom 540, Remaining Extent of the Farm 544 and Portion 1 of the Farm 616, Hay District, Northern Cape Province |
| **Purpose of study** | To carry out a field-based Heritage Impact Assessment to determine the presence/absence of cultural heritage sites and the impact of the proposed project on heritage resources within the areas demarcated for the proposed prospecting. |
| **Municipalities** | Hay District |
| **Predominant land use of surrounding area** | Commercial mining and agriculture |
| **Developer** | Xhariep Plant and Mining (Pty) Ltd |
| **Contact Details** | Tanja Jooste |
| **Heritage Consultant** | Pulafel 4D Consultants (Pty) Ltd |
| **Date of Report** | 3 October 2023 |

Pulafel 4D Consulting (Pty) Ltd. was commissioned by M & S Consulting to do a field based HIA for Prospecting Right application over the Remaining Extent of Consolidated Farm Kappies Kareeboom 540, Portion 1 of Consolidated Farm Kappies Kareeboom 540, Remaining Extent of the Farm 544 and Portion 1 of the Farm 616, Hay District, Northern Cape Province. The area is characterised by Ongeluk Formation that is probably more than 1 000m thick and is a monotonous succession of greyish-green andesitic lava, locally amygdaloidal, with lenses of tuff and agglomerate up to 15m thick. The study area also is characterised by Tertiary to Quaternary Deposits: Surface limestone covers large tracts of the area, especially on the Ghaap Plateau where it attains an appreciable thickness. Landscape surface visibility was relatively good at the time of the visit in terms of observing surface archaeological traces despite dense vegetation cover in some areas.

The study methods used a combination of drive-through and field walking was conducted in the Farms. In all the surveyed areas, the precolonial archaeology is represented by a mixture of MSA and LSA lithic scatters. Even so, the lithics are of **LOW** impact (negligible) rating because of their isolated context. Various historical structures also occur within the current footprint, but these are not threatened at all by the proposed development. It is considered unlikely that prospecting by way of core drilling, trenching and pitting will have a detrimental effect on the Stone Age archaeological component, and it is assigned a site rating of Generally Protected C (GP.C). There is a low to moderate chance that trenching and pitting into the sandy overburden especially within the vicinity of natural drainage areas may impact on intact Stone Age archaeological remains and should be

avoided where possible, whereas prospecting by way of core drilling is considered least likely to have a detrimental effect on potentially capped archaeological heritage resources. In this case, potential prospecting areas that are capped by well-developed wind-blown sand deposits are assigned a site rating of Generally Protected B (GP.B) and will require archaeological monitoring if trenching and pitting activities are to be conducted. Therefore, from a heritage perspective, the proposed development by Xhariep Plant and Mining (Pty) Ltd is supported, with full cognizance that buried archaeological remains may still occur and chance findings report procedures must be followed when encountered.

## Table of Contents

## ABREVIATIONS

| | |
|---|---|
| AIA: | Archaeological Impact Assessment |
| ASAPA: | Association of South African Professional Archaeologists |
| EIA: | Environmental Impact Assessment |
| EIA: | Early Iron Age (EIA refers to both Environmental Impact Assessment and the Early Iron Age but in both cases the acronym is internationally accepted. This means that it must be read and interpreted within the context in which it is used.) |
| EIAR: | Environmental Impact Assessment Report |
| ESA: | Early Stone Age GPS Global Positioning System |
| HIA: | Heritage Impact Assessment |
| ICOMOS: | International Council of Monuments and Sites |
| LIA: | Late Iron Age |
| LFC: | Late Farming Community |
| LSA: | Late Stone Age |
| MAA: | Mineral Amendment Act, No 103 of 1993 |
| MIA: | Middle Iron Age |
| MPRDA: | Mineral and Petroleum Resources Development Act 28 of 2002 |
| MSA: | Middle Stone Age |
| NEMA: | National Environmental Management Act 107 of 1998 NHRA National Heritage Resources Act 25 of 1999 |
| NID: | Notice of Intention to Develop |
| PHRA: | Provincial Heritage Resource Agency |
| SAHRA: | South African Heritage Resources Agency |
| TOR: | Terms of Reference |

## DOCUMENT INFORMATION

### Periodisation

Archaeologists divide the different cultural epochs according to the dominant material finds for the different time periods. This periodization is usually region-specific, such that the same label can have different dates for different areas. This makes it important to clarify and declare the periodization of the area one is studying. These periods are nothing a little more than convenient time brackets because their terminal and commencement are not absolute and there are several instances of overlap. In the present study, relevant archaeological periods are given below (Table 2):

Table 2: The periodization of the archaeology of southern Africa

| | |
|---|---|
| Early Stone Age | (~ 2.6 million to 250 000 years ago) |
| Middle Stone Age | (~ 250 000 to 40-25 000 years ago) |
| Later Stone Age | (~ 40-25 000, to recently, 100 years ago) |
| Early Iron Age | (~ AD 200 to 1000) |
| Late Iron Age | (~ AD1100-1840) |
| Historic | (~ AD 1840 to 1950, but a Historic building is classified as over 60 years old) |

### Definitions

Just like periodisation, it is also critical to define key terms employed in this study. Most of these terms derive from South African heritage legislation and its ancillary laws, as well as international regulations and norms of best-practice. The following aspects have a direct bearing on the investigation and the resulting report:

*Cultural (heritage)* resources are all non-physical and physical human-made occurrences, and natural features that are associated with human activity. These can be singular or in groups and include significant sites, structures, features, ecofacts and artefacts of importance associated with the history, architecture, or archaeology of human development.

*Cultural significance* is determined means of aesthetic, historic, scientific, social or spiritual values for past, present or future generations.

*Value* is related to concepts such as worth, merit, attraction or appeal, concepts that are associated with the (current) usefulness and condition of a place or an object. Although significance and value are not mutually exclusive, in some cases the place may have a high level of significance but a lower level of value. Often, the evaluation of any feature is based on a combination or balance between the two.

*Isolated finds* are occurrences of artefacts or other remains that are not in-situ or are located apart from archaeological sites. Although these are noted and recorded, but do not usually constitute the core of an impact assessment, unless if they have intrinsic cultural significance and value.

*In-situ* refers to material culture and surrounding deposits in their original location and context, for example an archaeological site that has not been disturbed by farming.

*Archaeological site/materials* are remains or traces of human activity that are in a state of disuse and are in, or on, land and which are older than 100 years, including artifacts, human and hominid remains, and artificial features and structures. According to the National Heritage Resources Act (NHRA) (Act No. 25 of 1999), no archaeological artefact, assemblage, or settlement (site) and no historical building or structure older than 60 years may be altered, moved or destroyed without the necessary authorization from the South African Heritage Resources Agency (SAHRA) or a provincial heritage resources authority.

*Historic material* are remains resulting from human activities, which are younger than 100 years, but no longer in use, including artefacts, human remains and artificial features and structures.

*Chance finds* means archaeological artefacts, features, structures or historical remains accidentally found during development.

*A grave is* a place of interment (variably referred to as burial) and includes the contents, headstone, or other marker of such a place, and any other structure on or associated with such place. A grave may occur in isolation or in association with others where upon it is referred to as being situated in a cemetery (contemporary) or burial ground (historic).

*A site* is a distinct spatial cluster of artefacts, structures, organic and environmental remains, as residues of past human activity.

*Heritage Impact Assessment (HIA)* refers to the process of identifying, predicting, and assessing the potential positive and negative cultural, social, economic and biophysical impacts of any proposed project which requires authorization of permission by law, and which may significantly affect the cultural and natural heritage resources. Accordingly, a HIA must include recommendations for appropriate mitigation measures for minimizing or circumventing negative impacts, measures enhancing the positive aspects of the proposal and heritage management and monitoring measures.

*Impact* is the positive or negative effects on human well-being and / or on the environment.

*Mitigation* is the implementation of practical measures to reduce and circumvent adverse impacts or enhance beneficial impacts of an action.

*Mining heritage sites* refer to old, abandoned mining activities, underground or on the surface, which may date from the prehistorical, historical or the relatively recent past.

*Study area or 'project area'* refers to the area where the developer wants to focus its development activities (refer to plan).

*Phase I* studies refer to surveys using various sources of data and limited field walking to establish the presence of all possible types of heritage resources in any given area.

## Assumptions and disclaimer

The investigation has been influenced by the unpredictability of buried archaeological remains (absence of evidence does not mean evidence of absence) and the difficulty in

establishing intangible heritage values. It should be noted that human burials can occur in unpredictable locations. It should be remembered that archaeological deposits (including graves and paleontological remains) usually occur below the ground level. Should this material be revealed during construction, such activities should be halted immediately, and a competent heritage practitioner and SAHRA must be notified in order for an investigation and evaluation of the find(s) to take place [cf. NHRA (Act No. 25 of 1999), Section 36 (6)]. Recommendations contained in this document do not exempt the developer from complying with any national, provincial, and municipal legislation or other regulatory requirements, including any protection or management or general provision in terms of the NHRA. Pulafel 4D Consulting assumes no responsibility for compliance with conditions that may be required by the PHRA or SAHRA in terms of this report.

**Terms of Reference (TOR)**

Pulafel 4D Consulting Pty Ltd was engaged to do a field-based Heritage Impact Assessment. The objectives for doing a HIA are to:

- Review applicable legislative requirements, identify all objects, sites, occurrences, and structures if an archaeological or historical nature (cultural heritage sites) located on the property,
- Assess the significance of the cultural resources in terms of their archaeological, historical scientific, social religious, aesthetic, and tourism,
- Describe the possible impact of the proposed development on these cultural remains, according to standard set conventions,
- Where there is a need, recommend suitable mitigation measures and

## INTRODUCTION AND BACKGROUND TO THE PROJECT

Pulafel 4D Consulting (Pty) Ltd was appointed by M & S Consulting to do a field based HIA for Prospecting Right application over the Remaining Extent of Consolidated Farm Kappies Kareeboom 540, Portion 1 of Consolidated Farm Kappies Kareeboom 540, Remaining Extent of the Farm 544 and Portion 1 of the Farm 616, Hay District, Northern Cape Province (Figure 1).

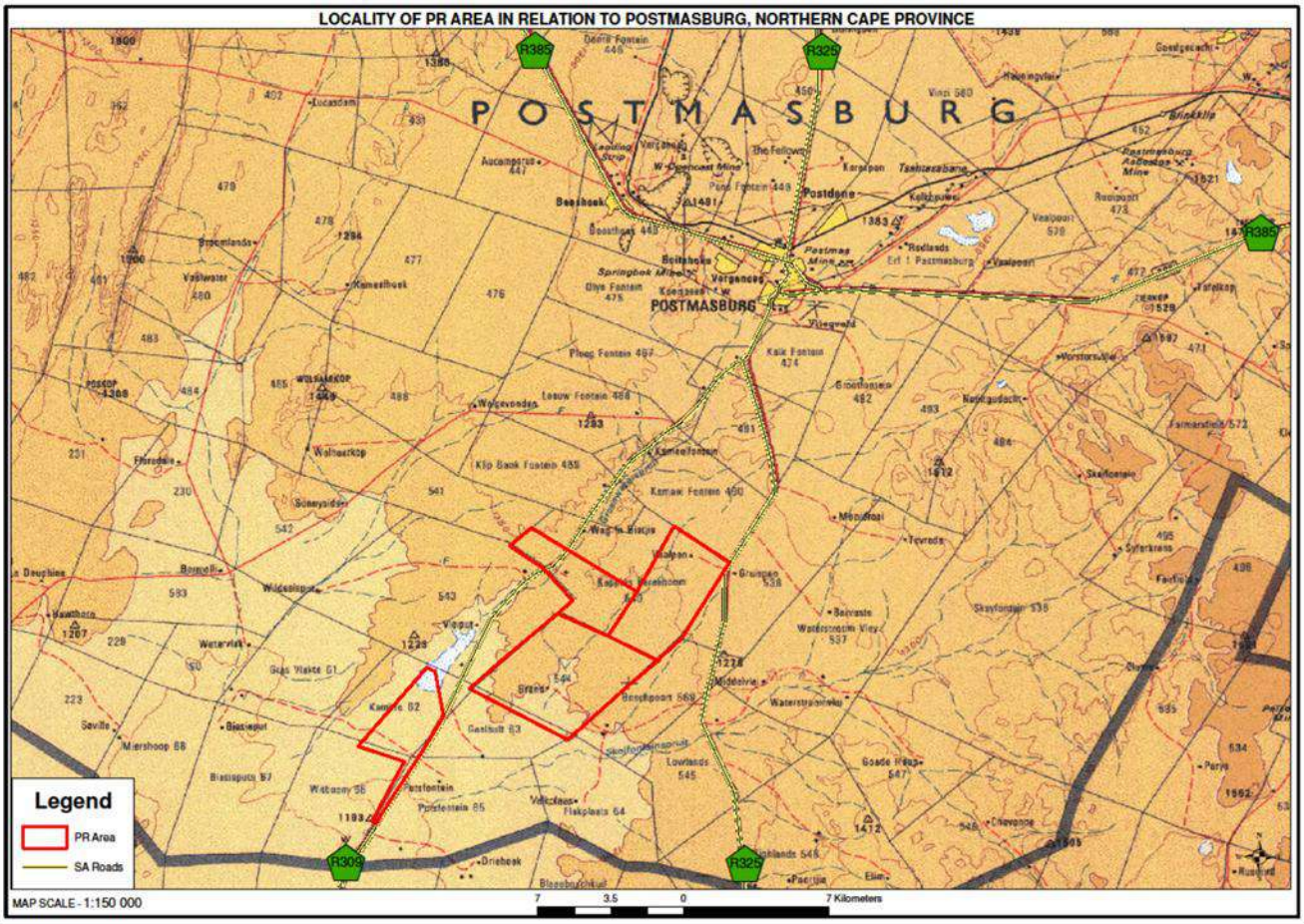



**Fig.1. Extract from the 1:250 000 map: 2822 Postmasburg showing the approximate location of the mining rights study area on the Remaining Extent of Consolidated Farm Kappies Kareeboom 540, Portion 1 of Consolidated Farm Kappies Kareeboom 540, Remaining Extent of the Farm 544 and portion 1 of the Farm 616, located approximately 2km south-west of the town of Postmasburg in the Northern Cape Province.**

Figure 1: Prospecting area (Topographic map)

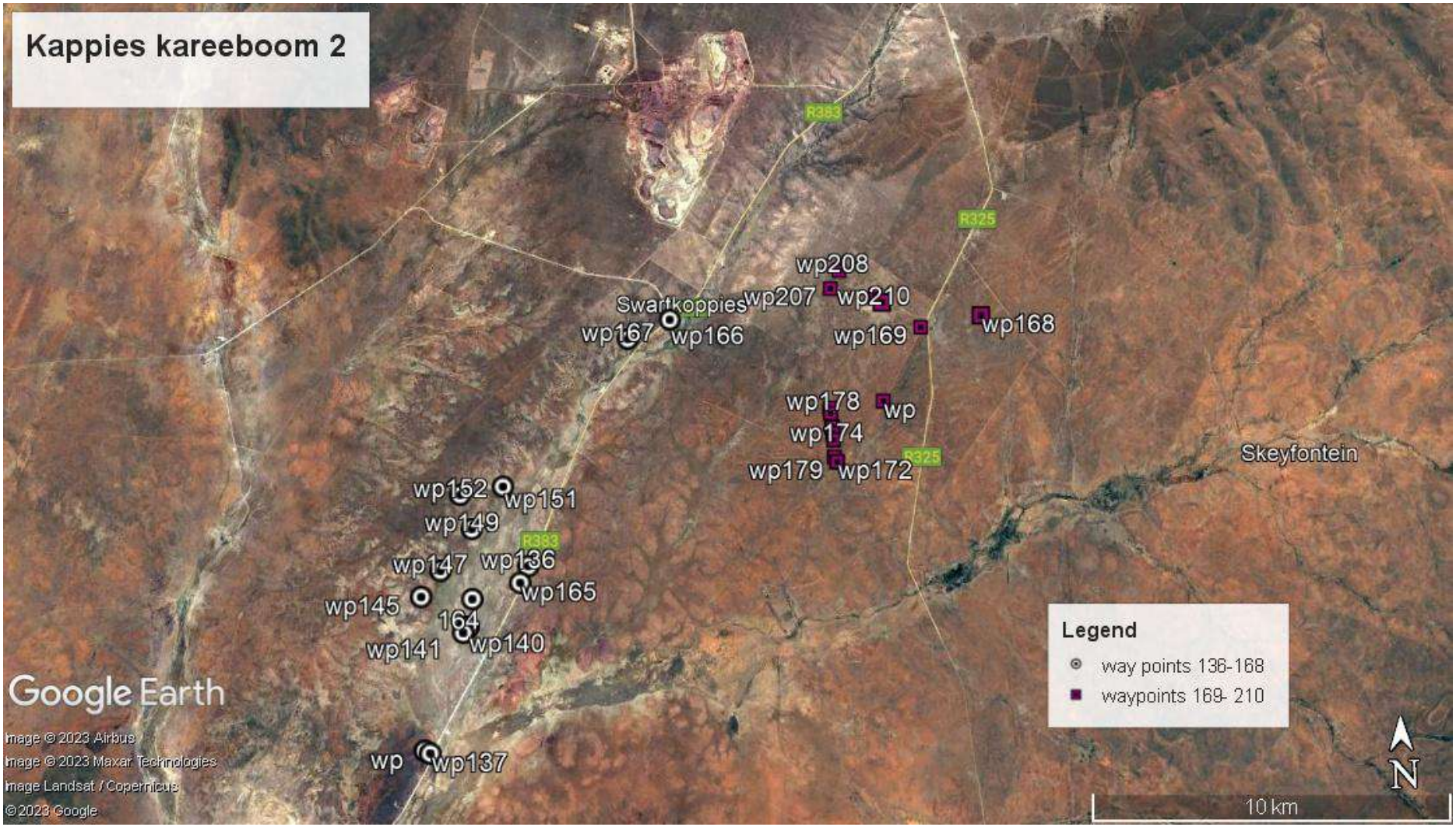



Figure 2: Garmin GPS Map 64s8 track for study area

## LEGISLATIVE REQUIREMENTS

Archaeological patrimony is finite as it is non-renewable and hence it needs to be sustainably utilized. This ensured by putting in place protective legislations. Numerous Acts are incorporated into legislation to provide for the protection of archaeological and heritage resources in South Africa. Overarching these is the Constitution of South Africa Act No 108 of 1996. The National Heritage Resources Act (NHRA), Act 25 of 1999, the Mineral and Petroleum Resources Development Act 28 of 2002 (MPRDA), the National Environmental Management Act (NEMA) 107 of 1998 section 39 (3) (b) (iii) the National Environment Management Protected Areas Act No 57 of 2003 (NEMPAA), and the Human Tissues Act (HTA) 65 of 1983 as amended. The Environment Management Biodiversity Act of 2004, Act No 10 of 2004, is one of the pieces of legislation that help in the protection of the various forms of the South African heritage. The National Heritage Resources Act (NHRA) no 25 of 1999 is the most relevant of these as it provides for the protection of the following resources:

a) palaeontological and archaeological deposits, objects and sites,

b) built structures older than 60 years,

c) burial grounds and graves which include graves younger than 60 years; graves older than 60 years; graves of victims of conflict and or graves of individuals of royal descent, as well as

d) cultural landscapes.

The NHRA (No. 25 of 1999) is a piece of legislation that defines heritage resources of cultural significance or other special value for the present community and for the posterity that are considered part of the national estate such as “places, buildings, structures and equipment of cultural significance; places that are associated with oral traditions are attached, historical settlements, and townships landscapes and natural features of cultural significance; geological sites of scientific or cultural importance; archaeological and palaeontological sites; or graves and burial grounds, including ancestral graves; royal graves and graves of traditional leaders; graves of victims of conflict; graves of individuals designated by the Minister by notice in the Gazette; historical graves and cemeteries; and other human remains which are not covered in terms of the Human Tissue Act,1983 (Act No. 65 of 1983); sites of significance relating to the history of slavery in South Africa; movable objects, including objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens; objects to which oral traditions are attached or which are associated with living heritage; ethnographic art and objects”

According to NHRA Act 1999, developments which alter the character of a site, and, which exceed prescribed limitations require specialist assessment. These activities trigger the need for Heritage Impact Assessments (HIA) and are listed in sections 34, 35 and 38. The limitations are listed below:

Section 34(1) No person may alter or demolish any structure or part of a structure which is more than 60 years old without permission by the relevant provincial heritage resources authority.

Section 35(4) No person may, without a permit issued by the responsible heritage resources authority, destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site.

Section 36(3) No person may, without a permit issued by SAHRA or the responsible provincial heritage resources authority, destroy, damage, alter exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority; or bring onto or use at a burial ground or grave any excavation equipment or any equipment which assists in detection or recovery of metals.

Section 38 (1) of the National Heritage Resources Act, 1999: Requirements of heritage impact assessment nature, to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorised as – (a) the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length; (b) the construction of a bridge or similar structure exceeding 50m in length; (c) any development or other activity which will change the character of a site (i) exceeding 5 000 m 2 extent; or (ii) involving three or more existing erven or subdivisions thereof; or (iii) involving three or more erven or divisions thereof which have been consolidated within the past five years; or (iv) the cost of which exceed a sum set in terms of regulations b SAHRA or a provincial heritage resources agency; (d) the re-zoning of a site exceeding 10 000 m 2 in extent; or (e) any other category of development provided for in regulations by SAHRA or a provincial heritage resources agency, must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development."

## Details and Relevance of the proposed development

The proposed prospecting at the Remaining Extent of Consolidated Farm Kappies Kareeboom 540, Portion 1 of Consolidated Farm Kappies Kareeboom 540, Remaining Extent of the Farm 544 and Portion 1 of the Farm 616, Hay District, Northern Cape Province has an impact on the archaeology, cultural heritage, and natural heritage of the area, therefore the need for an Archaeological and Heritage Impact Study. The proposed project has phases that include preliminary exploration work, exploratory drilling, based on the results of the geophysics and loam sampling. Currently a number of existing roads and tracks traverse the proposed project area and where practicable, these roads will be used. It is envisaged that more temporary access roads will be established for repeated access to the drilling sites if the identified drill sites cannot be access via existing roads and tracks. Thirty boreholes, approximately 50m deep each are planned. All drilling will be short term and undertaken by a contractor using truck-mounted equipment.

Table 3: Evaluation of the proposed development as guided by the criteria in NHRA, MPRDA and NEMA.

| ACT | Stipulations of development | Requirement details |
|---|---|---|
| NHRA Section 38 | Construction of road, wall, power line, pipeline, canal or other linear form of development or barrier exceeding 300m in length | No |
| | Construction of bridge or similar structure exceeding 50m in length | No |

| | | |
|---|---|---|
| | Development exceeding 5000 sq. m | Yes |
| | Development involving three or more existing erven or subdivisions | No |
| | Development involving three or more erven or divisions that have been consolidated within past five years | No |
| | Rezoning of site exceeding 10 000 sq. m | No |
| | Any other development category, public open space, squares, parks, recreation ground | No |
| NHRA Section 34 | Impacts on buildings and structures older than 60 years | No |
| NHRA Section 35 | Impacts on archaeological and paleontological heritage resources | Subject to identification during the Phase 1 |
| NHRA Section 36 | Impacts on graves | No |
| NHRA Section 37 | Impacts on public monuments | No |
| Chapter 5 (21/04/2006) NEMA | HIA is required as part of an EIA | Yes |
| Section 39(3)(b)(iii) of the MPRDA | AIA/HIA is required as part of an EIA | Yes |

# METHODOLOGY

## Desktop Assessment

The HIA study for the proposed project area was implemented through the various methods. Firstly a desktop study was conducted to gain access to the following literature sources: academic literature, South African Heritage Resources Authority (SAHRA) impact assessment reports on the region, South African Heritage Resources Information System (SAHRIS) map, Genealogical society database, South African archives database, McGregor, Africana libraries, digital collections, as well as previous HIA reports in the Northern Cape and specifically in the Postmasburg area in the Hay District. The second method involved a field survey.

## Field Survey

The field study was undertaken on 02-03 September 2023. The field study entailed a combination of foot survey and by drive through by a car. Environmental parameters such as geology, soils, and types of vegetation, river valleys and hills / mountains were taken into consideration when deciding the areas to investigate for archaeological and heritage sites. On the day of the survey, the weather was bright and sunny, with clear visibility. Relative to desktop predictions it was found that the area had no potentially significant archaeological exposure. Artefact assemblages consisting of mostly cores and flakes were in sporadic and isolated occurrences, most occurring at the surface exposures. The hilly areas were bereft of any artefacts meaning that the scatters are isolated to the area below the hills. The rock outcrops and exposures yielded no traces of engravings or past inhabitation. Overall, it was found that the prospecting area has a generally low surface density of isolated Stone Age artefacts ranging from Pleistocene but mainly Holocene. The artefact scatters are of low archaeological integrity and therefore have limited significance.

## The Built Environment, Cultural and Historical Landscapes

Within the project area, though the existence of such important historical and cultural sites, the likely impacts in and adjacent to the development area can be managed by avoidance, and /or possibly preservation. These remnant sites related to human, historical and symbolic attachments within, or adjacent to the proposed development area are highlighted in the following narrative. Generally, the identified properties are protected by section 34 of *the National Heritage Resources Act* (NHRA) which states that ‘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’.

1. **Built Environment**

Limited remnants of old buildings were recorded within the proposed project footprint. These included loosely broken concreate blocks from building structures that had been completely dilapidated. An intact farmhouse was recorded by Mr du Plooy’s farm. The farmhouse is more than 60 years old and is protected by law.

2. **Graves**

A modern cemetery (Figure 3) located in Mr JP du Plooy Farm 540/Vaalport was recorded. contemporary section, where burials re still done.

Figure 3: Cemetery at (Farm 540/Vaalport).

## 3. Contemporary Human Activity

The major contemporary human activities are related to the agricultural activities, mainly animal husbandry within the 3 portions. Most infrastructure related to this include farmsteads and water provisions infrastructure such as boreholes. The current land use in the project footprint is cattle, sheep, goats and game farming.

## 4. Impacts

The ‘‘cultural significance’’ of the identified structures in and adjacent to the project area are Built Environment, Historical sites and burial grounds and graves.

### Burial grounds and graves

The SAHRA Act also offer general protection to sites such as this- declared or not thus as per 34. (1) covering all structures/grave older than 60 years without a permit issued by the

relevant provincial heritage resources authority. As per the SAHACT 3.2.1 (e) The range Burial grounds and graves include—

(i) ancestral graves;
(ii) royal graves and graves of traditional leaders;
(iii) graves of victims of conflict;
(iv) graves of individuals designated by the Minister by notice in the *Gazette*;
(v) historical graves and cemeteries; and
(vi) other human remains which are not covered in terms of the Human Tissue Act, 1983 (Act No. 65 of 1983);

Given the history of settlement in the area, there is a possibility of discovering more burials in or adjacent to the project area, and in this case as per made a concerted effort to contact and consult communities and individuals. In such cases and as for the identified gravesite, and as per SAHRA 36.5A, who by tradition have an interest in such grave or burial ground; and

(b) reached agreements with such communities and individuals regarding the future of such grave or burial ground.
(6) Subject to the provision of any other law, any person who in the course of development or any other activity discovers the location of a grave, the existence of which was previously unknown, must immediately cease such activity and report the discovery to the responsible heritage resources authority …

### 4.1. Built Environment

- The farmstead contains a mixture of old and modern structures, with a possibility of a few of them being older than 60years.
- No other protected historic buildings or related structures were discovered within the project area.

## HERITAGE ASSESSMENT AND REPORT COMPILATION

### Assessing significance

The assessment of the heritage significance is the measure of value that the heritage carries to various stake holders. It is based on the importance that people attach to a physical object, or abstract concept attached to an event, landscape, or people. The heritage significance is its worthiness to different stake holders. The intrinsic worth of cultural, or natural patrimony (sites and object) is linked to various sectors of the local, national, and global population. The types of significances or values below are in accordance with SAHRA which is the national heritage authority in South Africa (Table 4)

Table 4: Type of Significance and definition

| | |
|---|---|
| *Aesthetic*: | the site or object are significant in exhibiting particular aesthetic characteristics valued by a community or cultural group. |
| *Historical* | Is its importance in the community, or pattern of history. It also reflects a strong or special association with the life or work of a person, group or organisation of importance in history. According to SAHRA heritage may demonstrate significances relating to the history of slavery |
| *Rarity*: | is when heritage possess uncommon, rare, or endangered aspects of natural or cultural heritage |
| *Representivity*: | shows the principal characteristics of a particular class of natural or cultural places or objects, whether they indicate a range of landscapes or environments, the attributes of which identify it as being characteristic of its class. The other factor is that is whether it shows principal characteristics of human activities that include the way of life, philosophy, custom, process, land-use, function, design, or technique in the environment of the nation, province, region, or locality. |
| *Scientific/Technical*: | is the potential to yield information that will contribute to an understanding of natural or cultural heritage. It shows a high level of creative or technical achievement at a particular time period. |
| *Social*: | this when the heritage has a strong or special association with a particular community or cultural group for social, cultural, or spiritual purposes |
| *Tourism*: | this when the site or object carries a commercial value that is associated with tourism, thus the heritage does possess the potential to be used for education/economic benefits. Site Grading Assessment for heritage significances paves way for site grading. |

### Site Grading

Assessment for heritage significances paves way for site grading. Site grading or weighting is contingent on the geographical extent (local/provincial/national) and the importance

(low/medium/high) of the value. Based on these two elements, possible recommendations on future action on the sites are prescribed. These recommendations may include no further action, mitigation measures or destruction of a site. It is important to note that SAHRA is the one that approves to developers or any other interested and or affected parties the destruction of any heritage site. This may only take place upon SAHRA issuing a permit. The permit may also be issued by a provincial heritage resources authority (PHRA).

Table 5: Recommended grading as well as associated recommendation measures. In all the scenarios approval will be required from SAHRA.

| South African Legislation (National Heritage Resources Act) Ranking | Sites within the study area | Sites immediately outside study area |
|---|---|---|
| National Heritage Sites (Grade 1) | None | None |
| National Heritage Sites (Grade 1), Grade 2 (Provincial Heritage Sites), burials | None | None |
| Grade 3a | None | None |
| Grade 3b | None | None |
| Grade 3c | None | None |

## Report compilation

The desktop analysis and physical surveys were employed identity and locate possible heritage sites and their associated significance and impacts.

# BACKGROUND TO THE ARCHAEOLOGICAL AND HERITAGE HISTORY OF THE STUDY AREA.

The South African pre-history follows a complex sequence of stratigraphic deposition, which is preserved in the deep layers underground. There are three progressive phases, namely the Palaeontological phase, the Archaeological phase and the Colonial/historical periods. The present study deals with the last two.

## Stone Age

The Northern Cape is endowed with rich archaeological resources that relate to the Stone Age (Morris 2006). The archaeological signature in the project footprint area includes Stone Age, Iron Age and Historical periods. The archaeological landscape contains such sites such as Wonderwerck Cave, Gamo Hana, Kathu Pan and Dithakong. The Wonderwerk Cave located in the Kuruman Hills-Asbestos Mountains (Curnoe et al. 2006; Herries et al. 2007, Chazan and Horwitz 2009). Chazan and Horwitz (2009) state that Wonderwerk Cave serves as a unique and extensive diachronic record of milestones in the development of symbolic behaviour. According to Chazan and Horwitz (ibid), local communities associate the cave with a snake spirit, and the rock art executed on the cave walls provide the evidence on how special the cave was during the Later Stone Age. In addition, manuports with sensory properties were introduced into the back of the cave during the terminal Acheulean (over 180,000 years ago) (Chazan and Horwitz 2009).

Beaumont and Vogel (1989) dated rock art sites in the Northern Cape Province, particularly in the landscape within which the project area is located. Some the sites that were dated are Melkboom which is pecked and dated to 330 +/-45, Batlharos dated to 210+/-30, Meidekop finder paintings dated to 180+/-, Nchwaneng percked and dated to 190+/-40 (Beaumont and Vogel 1989). Within the same project area just close to Postmasburg is located an ancient mine. The ancient mine was excavated by Beaumont and Boshier (1974). According to the description by Beaumont and Boshier (1974), the ancient working site is located on an elevated rise on the farm Doornfontein M82, roughly 12 km north-north-west of Postmasburg. Excavated materials from Strata 1 and 2 produced similar amorphous 'Pre- Iron Age' aggregates (Beaumont & Vogel 1972). They also yielded abundance of stone mining tools Iron Age and modern objects Beaumont and Boshier 1974). Another important site within the archaeolohgical landscape in which the project is locate is Kathu Pan. It is located north of the actual project area. Kathu Pan forms a complex with other sites known as Kathu Complex. Walker et al. (2014) argue that the Kathu Complex includes Kathu Pan1 (KP1) and Bestwood 1 (BW 1). Kathu Complex is one of the richest early prehistoric archaeological sites in South Africa. Excavations conducted at Kathu archaeological site have produced tens of thousands of Earlier Stone Age artifacts. They assemblage consists of hand axes and other tools. With an estimated date between 700,000 and one million years old. Kathu Pan presents evidence of early hominin occupation in multiple locations within the pan; however, ESA deposits have only been excavated at KP 1 (Walker et al. 2014).

## DESCRIPTION OF THE AFFECTED ENVIRONMENT

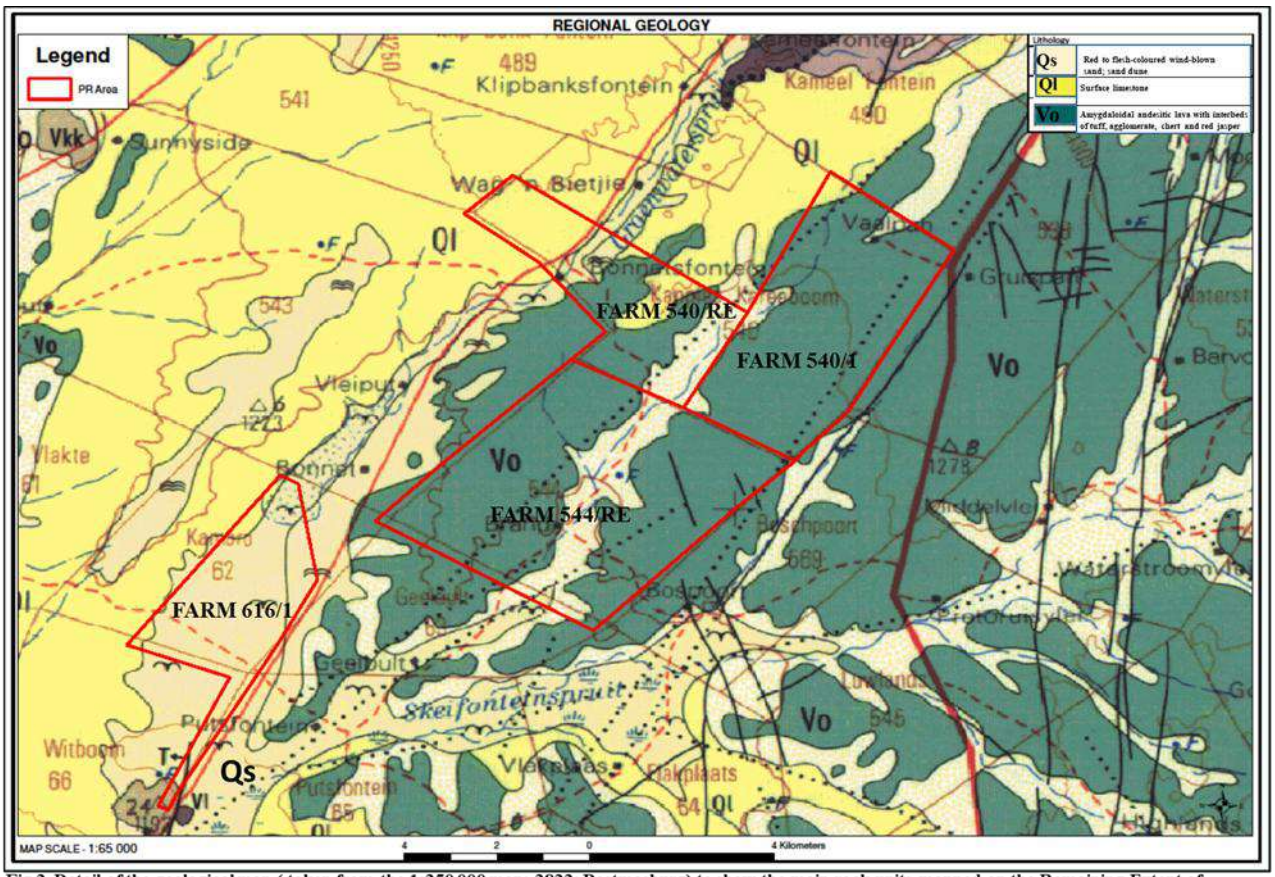



**Fig.2. Detail of the geological map ( taken from the 1:250 000 map: 2822; Postmasburg) to show the main rock units mapped on the Remaining Extent of Consolidated Farm Kappies Kareeboom 540, Portion 1 of Consolidated Farm Kappies Kareeboom 540, Remaining Extent of the Farm 544 and portion 1 of the Farm 616.Main rock units: Vo (dark green) = Ongeluk Formation (Amygdaloidal andesitic lava with interbeds of tuff, agglomerate, chert and red jasper); Ql ( bright yellow) = surface limestone; Qs (pale yellow) = reddish brown wind blown sand.**

Figure 2: Geology of the project footprint area

The Ongeluk Formation is one of the geological formations found in the project area. The Ongeluk Formation a thick and is a monotonous succession of greyish-green andesitic lava, locally amygdaloidal, with lenses of tuff and agglomerate up to 15m thick. The Tertiary to Quaternary Deposits is also found in the project area. These consist of surface limestone that stretch for into the Ghaap Cliff limestone is found along the escarpment, while diatomaceous limestone and kieselguhr occur in depressions in the central and western portions of the area. Reddish-brown wind-blown sand is found mainly in the west where it builds seif dunes striking north-northwest. Iron ore (hematite) is mined at Beeshoek and Manganore from ferruginous subsidence breccia (blinkklip breccia) which caps some of the hills north of Postmasburg, as well as an eluvial detrital ore from scree on the hillsides. The basal shale of the Gamagara Formation is locally ferruginised where it overlies banded ironstone, and is also mined at Beeshoek and Manganore, while the banded ironstone itself has in places also been enriched to high-grade ore. Manganese ore is recovered from the basal shale of the Gamagara Formation where it overlies dolomite. The most important mines are at Glosam, Lohatlha and Beeshoek. Manganiferous chert breccia, also known as the ‘silica breccia’ or ‘manganese marker’, found at the top of the Ghaapplato dolomite, is exploited on a small scale at Manganore.

Figure 4: Landscape of study area (bare rock and highly weathered)

Figure 5: Calcrete formations

Figure 6: General landscape view

## Vegetation

Vegetation in the project area is influenced by the semi-arid \climatic conditions. The climate in the project area supports a continuous scrub cover, largely vaalbos (*Tarchonanthus camphoratus*), interspersed with sparse, mainly thorn-bearing bush which varies locally and includes swarthaak (*Acacia detinens*), kameeldoring (*Acacia giraffae*), soetdoring (*Acacia karroo*), witgat- boom (*Boshcia albitrunca*), and kareeboom *(Rhus lancea*) (Nel 1929: 15-16). Sparsely distributed clusters of *Z. mucronata* and *A. karroo* were observed.

Figure 7: Low bushes mixed with grass

Figure 8: Accacia Mellifera bushes on the foot of the hill


Figure 9: *Z. mucronate* bushes

## THE FINDS

### Archaeological : Stone tools

A deficit of significant archaeological sites particularly those that are still well preserved and undisturbed in their primary contexts was observed. However, isolated scatters of Stone Age material culture of **LOW** significance were observed which were highly weathered with probably secondary context. Some of the Stone Age material culture recorded include stone tool scrapers, flakes and cores. Historical structures that include an old farmhouse and cemetery were recorded. These, however, are of **LOW s**ignificance, and mining or prospecting activities can avoid areas where these structures are sited. It is recommended that development goes ahead. The notable observations made are tabulated below.

Table 4: plotted observations made.

| **Site** | **Latitude (S)** | **Longitude (E)** | **Comment** | **Significance** |
|---|---|---|---|---|
| 1 | 28 $^{o}$ 33, 663’ | 022 $^{o}$ 53, 430’ | flakes are scattered | LOW |
| 2 | 28 $^{o}$ 30, 268’ | 022 $^{o}$ 54, 183’ | Scatter concentration on the boundary/ track | LOW |
| 3 | 28 $^{o}$ 26.880’ | 023 $^{o}$ 01.665’ | Modern cemetery | HIGH |

| | | | | |
|---|---|---|---|---|
| 4 | 28° 26,880’ | 023° 01, 665’ | Old structure farmhouse 60 years old | MODERATE |


Figure 10: MSA flake (observation at Site 1)

Figure 11: Lithic scatter (observation at Site 2 )

Figure 12: Stone Age lithic materials (observation at Site 3 )

Figure 13: Stone Age lithic materials (observation at Site 3)

**Graves/ burials**

Historical structures that include an old farmhouse and cemetery (Farm 540/Vaalport), were recorded.

Of note is the recorded contemporary family cemetery. The cemetery is located adjacent to the farmhouse (Figure 14), with 7 graves. The cemetery, with family members of the current farm owners has oldest burial being in/about 1963.

As indicated in the preceding sections, these are of **LOW s**ignificance, and mining or prospecting activities can avoid areas where these structures are sited.


Figure 14: Family Cemetery at Farm/Portion 540/Vaalport

## SITE SIGNIFICANCE

### GRADING

The significance rating for the historical buildings is HIGH, however, they are not going to be directly affected by the project development. Due to this no mitigation is required.

## RECOMMENDATIONS

The stone tools discovered in the study area require no further action, as they mostly occur in secondary contexts such as roads or tracks. The historical structure and cemetery are found on current homestead and are not directly threatened by the prospecting activities.

Therefore, based on the study presented in this assessment, the proposed prospecting is supported.

## CHANCE FINDINGS PROCEDURE

It has already been highlighted that sub-surface materials may still be lying hidden from surface surveys. Therefore, absence (during surface survey) is not evidence of absence all together. The following monitoring and reporting procedures must be followed in the event of a chance find, in order to ensure compliance with heritage laws and policies for best practice. This procedure applies to the developer's permanent employees, its subsidiaries, contractors and subcontractors, and service providers. Accordingly, all construction crews must be properly inducted to ensure they are fully aware of the procedures regarding chance finds.

- If during the drilling operations or closure phases of this project, any person employed by the developer, one of its subsidiaries, contractors and subcontractors, or service provider, finds any artefact of cultural significance, work must cease at the site of the find and this person must report this find to their immediate supervisor, and through their supervisor to the senior on-site manager.
- The senior on-site Manager must then make an initial assessment of the extent of the find and confirm the extent of the work stoppage in that area before informing SAHRA/PHRA (Natasha Higgins).
- If a human grave/burial is encountered, the remains must be left as undisturbed as possible before the local police and SAHRA or PHRA are informed. If the burial is deemed to be over 60 years old and no foul play is suspected, an emergency exhumation permit may be issued by SAHRA for an archaeologist to exhume the remains.

## CONCLUSIONS

Pulafel 4D Consulting Pty Ltd was commissioned to undertake a field-based Heritage Impact assessment on Remaining Extent of Consolidated Farm Kappies Kareeboom 540, Portion 1 of Consolidated Farm Kappies Kareeboom 540, Remaining Extent of the Farm 544 and Portion 1 of the Farm 616, Hay District, Northern Cape Province. No significant cultural material was found on the development footprint, except for historical structures that lie outside the prospecting activities. Without identifiable cultural material, there is therefore, no heritage grounds to halt the prospecting activities. Chance findings are still possible and reporting procedures have been outlined to the developer.

## ACKNOWLEDGEMENTS

Pulafel 4D Consulting Pty Ltd would like to thank Ms. Ms Tanja Jooste for our appointment as the specialist in the project and for all the logistical arrangements related to the field work. Pulafel 4D Consulting also acknowledges the assistance provided by Mr JP du Ploy and Mr Viljoen the surface landowners in the project area. His patience and hospitality are greatly appreciated.

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# Appendix 11

PIA

# Desktop Palaeontological Impact Assessment of Application for a Prospecting Right for Iron and Manganese ore on the Remaining Extent of Consolidated Farm Kappies Kareeboom 540, Portion 1 of Consolidated Farm Kappies Kareeboom 540, Remaining Extent of the Farm 544 and Portion 1 of the Farm 616, Postmasburg, Northern Cape Province.

**3 October 2023**

**Report prepared for: M and S Consulting (Pty) Ltd**

**By: Pulafel 4 D Consulting**

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DECLARATION OF INDEPENDENCE

We, Joseph Chikumbirike & Sifelani Jirah, declare that we act as independent specialist consultants. We do not have or will not have any financial interest in the undertaking of the activity other than remuneration for work as stipulated in the terms of reference. We have no interest in secondary or downstream developments as a result of the authorization of this project.

3 October 2023

## EXECUTIVE SUMMARY

At the request of M and S Consulting (Pty) Ltd, a Desktop Heritage Impact Assessment was carried out on the Remaining Extent of Consolidated Farm Kappies Kareeboom 540, Portion 1 of Consolidated Farm Kappies Kareeboom 540, Remaining Extent of the Farm 544 and Portion 1 of the Farm 616, Postmasburg, Northern Cape Province**,** where Xhariep Plant and Mining (Pty) Ltd has applied for a prospecting right to prospect for Iron and Manganese ore. It is expected that the proposed prospecting activities could impact on early Proterozoic sedimentary strata which are not considered to be paleontologically sensitive. Given the scope of the proposed activities, the likelihood of palaeontological impact on early Proterozoic carbonate rocks is considered **LOW**, especially if prospecting by way of core drilling is considered. However, because of the thick sandy overburden in most of the portions of the farm (which are not considered to be palaeontologically significant in this case) it is recommended that in the event of impact on fresh carbonate rocks that may result from trenching and pitting, new exposures should require brief monitoring by a palaeontologist.

## Table of Contents

## INTRODUCTION

At the request of M and S Consulting (Pty) Ltd, a Desktop Heritage Impact Assessment was carried out on the Remaining Extent of Consolidated Farm Kappies Kareeboom 540, Portion 1 of Consolidated Farm Kappies Kareeboom 540, Remaining Extent of the Farm 544 and Portion 1 of the Farm 616, Postmasburg, Northern Cape Province**,** where Xhariep Plant and Mining (Pty) Ltd has applied for a prospecting right to prospect for Iron and Manganese ore. The region's unique and non-renewable archaeological and palaeontological heritage sites are 'Generally' protected in terms of the National Heritage Resources Act (Act No 25 of 1999, section 35) and may not be disturbed at all without a permit from the relevant heritage resources authority.

A Palaeontological Impact Assessment was requested for the mining right application. To comply with 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 project and is reported herein.

Table 1: Specialist report requirements in terms of Appendix 6 of the EIA Regulations (amended 2017)

## Legislative Framework

The primary legal trigger for identifying when heritage specialist involvement is required in the Environmental Impact Assessment process is the National Heritage Resources (NHR) Act (Act No 25 of 1999). The NHR Act requires that all heritage resources, that is, all places or objects of aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance are protected. Thus any assessment should make provision for the protection of all these heritage components, including archaeology, shipwrecks, battlefields, graves, and structures over 60 years of age, living heritage and the collection of oral histories, historical settlements, landscapes, geological sites, palaeontological sites and objects.

The Act identifies what is defined as a heritage resource, the criteria for establishing its significance and lists specific activities for which a heritage specialist study may be required. In this regard, categories of development relevant to this study are listed in Section 34 (1), Section 35 (4), Section 36 (3) and Section 38 (1) of the NHR Act as follows:

**34. (1)** 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.

**35 (4)** No person may, without a permit issued by the responsible heritage resources authority—

- destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite;

- *b)* destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or object or any meteorite;

**36 36 (3)** No person may, without a permit issued by SAHRA or a provincial heritage resources authority—

- (a) destroy, damage, alter, exhume or remove from its original position or otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves;
- (b) destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority; or
- (c) bring onto or use at a burial ground or grave referred to in paragraph *(a)* or *(b)* any excavation equipment, or any equipment which assists in the detection or recovery of metals.

**38 (1)** Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorised as—

- The construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;
- The construction of a bridge or similar structure exceeding 50m in length; • Any development or other activity which will change the character of the site

a) exceeding 5000 m² in extent; or

b) involving three or more existing erven or subdivisions thereof; or

c) involving three or more subdivisions thereof which have been consolidated within the past five years;

- The rezoning of a site exceeding 10 000 m²; or
- Any other category of development provided for in regulations by the South African Heritage Resources Agency (SAHRA).

A range of contexts can be identified which typically have high or potential cultural significance and which would require some form of heritage specialist involvement (**Table 1**).

**Table 1**: Relationship between different heritage contexts, heritage resources likely to occur within these contexts, and likely sources of heritage impacts in the central interior of South Africa.

| Heritage Context | Heritage Resources | Impact |
|---|---|---|
| **Palaeontology** | Precambrian shallow marine and lacustrine stromatolites, organic-walled microfossils, Ghaap Plateau (Transvaal Supergroup)<br>Palaeozoic and Mesozoic fossil remains, e.g. Karoo Supergroup<br>Neogene regolith | Road cuttings<br>Quarry excavation<br>Bridge and pipeline construction (Quaternary alluvial deposits) |
| **Archaeology**<br>Early Stone Age<br>Middle Stone Age<br>LSA - Herder<br>Historical | Types of sites that could occur in the Free State include Localized Stone Age sites containing lithic artifacts, animal and human remains found near *inter alia* the following:<br>River courses/springs<br>Stone tool making sites.<br>Cave sites and rock shelters<br>Freshwater shell middens<br>Ancient, kraals and stonewalled complexes<br>Abandoned areas of past human settlement<br>Burials over 100 years old<br>Historical middens<br>Structural remains<br>Objects including industrial machinery and aircraft. | Subsurface excavations including ground levelling, landscaping, foundation preparation, road building, bridge building, pipeline construction, construction of electrical infrastructure and alternative energy facilities, township development. |
| **History** | Historical townscapes, e.g., Kimberley<br>Historical structures, i.e., older than 60 years<br>Historical burial sites<br>Places associated with social identity/displacement, e.g., Witsieshoek Cave, Oppermansgronde<br>Historical mission settlements, e.g., Bethulie, Beersheba, Moffat Mission | Demolition or alteration work.<br>New development. |
| **Natural Landscapes** | Formally proclaimed nature reserves Evidence of pre-colonial occupation<br>Scenic resources, e.g., view corridors, viewing sites,<br>Historical structures/settlements older than 60 years<br>Geological sites of cultural significance. | Demolition or alteration work.<br>New development. |

| | | |
|---|---|---|
| **Relic Landscape Context** | Battle and military sites, e.g., Magersfontein<br>Precolonial settlement and burial sites<br>Historical graves (marked or unmarked, known, or unknown)<br>Human remains (older than 100 years)<br>Associated burial goods (older than 100 years) Burial architecture (older than 60 years) | Demolition or alteration work.<br>New development. |

This may include formally protected heritage sites or unprotected, but potentially significant sites or landscapes (**Table 2**).

**Table 2**. Examples of heritage resources located in the central interior of South Africa.

| **Historically, archaeologically, and palaeontologically significant heritage sites & landscapes** | **Examples** |
|---|---|
| Landscapes with unique geological or palaeontological history | Karoo Basin<br>Beaufort Group sedimentary strata<br>Glacial striations on Ventersdorp andesites<br>Vredefort Dome World Heritage Site.<br>Taung World Heritage Site |
| Landscapes characterised by certain geomorphological attributes where a range of archaeological and palaeontological sites could be located. | Vaal, Modder, and Riet River valleys Pans, pandunes and natural springs of the Free State panveld.<br>Ghaap Plateau |
| Relic landscapes with evidence of past, now discontinued human activities | Wonderwerk Cave Stone Age deposits<br>Cave sites and rock shelters in the Maluti Drakensberg region (rock art)<br>Southern Highveld pre-colonial settlement complexes.<br>Dithakong settlement complexes<br>Rock engravings on Ventersdorp andesites |
| Landscapes containing concentrations of historical structures. | Concentration camps & cemeteries from the South African War. |
| Historical towns, historically significant farmsteads, settlements & routes | Batho historical township area in Mangaung (Bloemfontein).<br>Kimberley |

| | |
|---|---|
| Battlefield Sites, burial grounds and grave sites older than 60 years. | Sannaspos<br>Magersfontein |

The involvement of the heritage specialist in such a process is usually necessary when a proposed development may affect a heritage resource, whether it is formally protected or unprotected, known or unknown. In many cases, the nature and degree of heritage significance is largely unknown pending further investigation (e.g. capped sites, assemblages or subsurface fossil remains). On the other hand, it is also possible that a site may contain heritage resources (e.g., structures older than 60 years), with little or no conservation value.

## Scope of work

This is a Desktop Palaeontological Assessment to determine the potential impacts on heritage resources within the study area.

The following are the required to perform the assessment:

• A desk-top investigation of the area;

• Identify possible palaeontological sites within the proposed development area through analysis of known information;

• Evaluate the potential of impacts occurring due to construction and operation of the proposed development on palaeontological resources; and

• Recommend mitigation measures in terms of detailed studies to determine and ameliorate any negative impacts on areas of palaeontological importance.

The study is based on archival, and document combined with terrain evaluation. No fieldwork was performed.

## Methodology

Archaeological and Palaeonontological significance was evaluated through a desktop study and carried out on the basis of existing field data, database information and published literature.

Terms of reference:

- Identify and map possible heritage sites and occurrences using available resources.
- Determine and assess the potential impacts of the proposed development on potential heritage resources;
- Recommend mitigation measures to minimize potential impacts associated with the proposed development.

The study area is rated according to field rating categories as prescribed by SAHRA (**Table 3**).

## DESCRIPTION OF THE AFFECTED AREA

### Locality data

1: 250 000 scale topographic map 2822 Postmasburg (Council for Geoscience, Pretoria) (**Fig.1**)

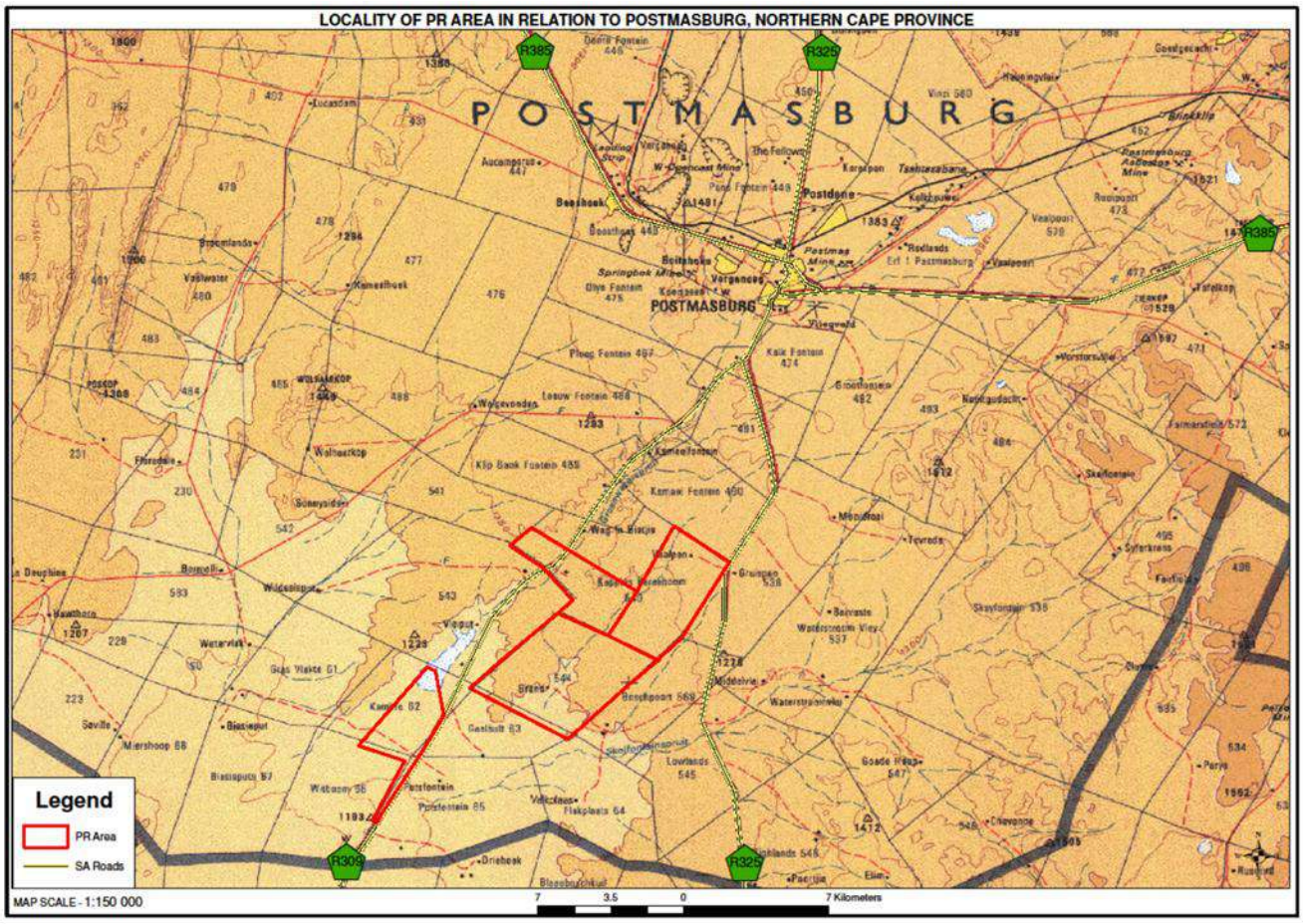


**Fig.1. Extract from the 1:250 000 map: 2822 Postmasburg showing the approximate location of the mining rights study area on the Remaining Extent of Consolidated Farm Kappies Kareeboom 540, Portion 1 of Consolidated Farm Kappies Kareeboom 540, Remaining Extent of the Farm 544 and portion 1 of the Farm 616, located approximately 2km south-west of the town of Postmasburg in the Northern Cape Province.**

**Property details:**

| Property description | District | Title Deed | Extent (Ha) |
|---|---|---|---|
| Remaining Extent of Consolidated Farm Kappies Kareeboom 540 | Hay | T3007/2002 | 1 119.0181 |
| Portion 1 of Consolidated Farm Kappies Kareeboom 540 | Hay | T949/1966 | 1 609.7901 |
| Remaining Extent of the Farm 544 | Hay | T739/2019 | 2 412.3253 |
| Portion 1 of the Farm 616 | Hay | T5263/2004 | 937.3797 |

## Palaeosensitivity rating

As per the Palaeosensitivity map for the Remaining Extent of Consolidated Farm Kappies Kareeboom 540, Portion 1 of Consolidated Farm Kappies Kareeboom 540, Remaining Extent of the Farm 544 and Portion 1 of the Farm 616 **(Fig. 3)**, there is a low to moderate palaeosensitivity rating on the pro

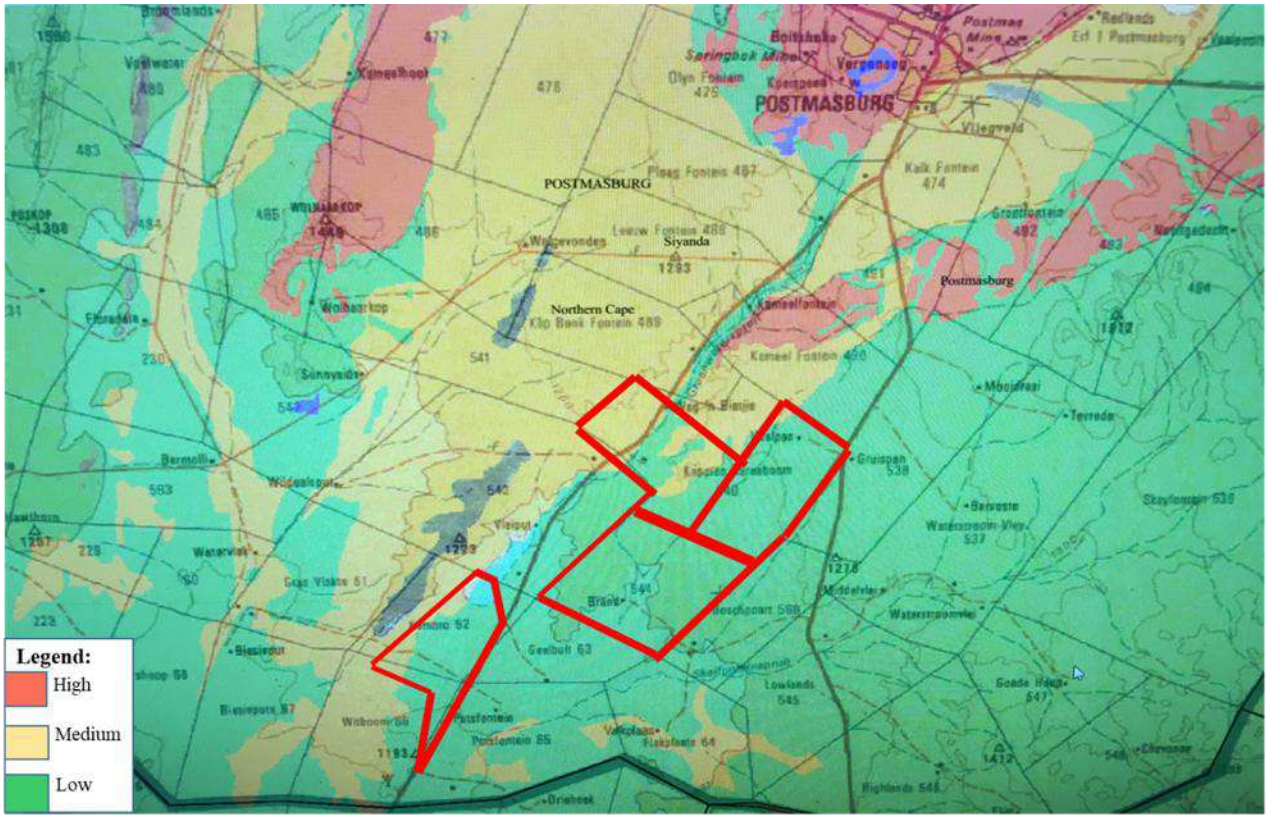


**Fig. 3. Palaeosensitivity map for the prospecting area (area bordered by red lines) showing a low to moderate rating.**
**Source:** https://sahris.sahra.org.za/map/palaeo

specting area. (Source: **https://sahris.sahra.org.za/map/palaeo).**

## Geology

The proposed mining development, located north-west of Postmasburg in the Northern Cape, is depicted on the 1: 250 000 Postmasburg 2822 Geological Map (Council for Geosciences, Pretoria) (Figure 2). According to this map, the proposed development is mostly underlain by the following units represented in **Fig. 2**.

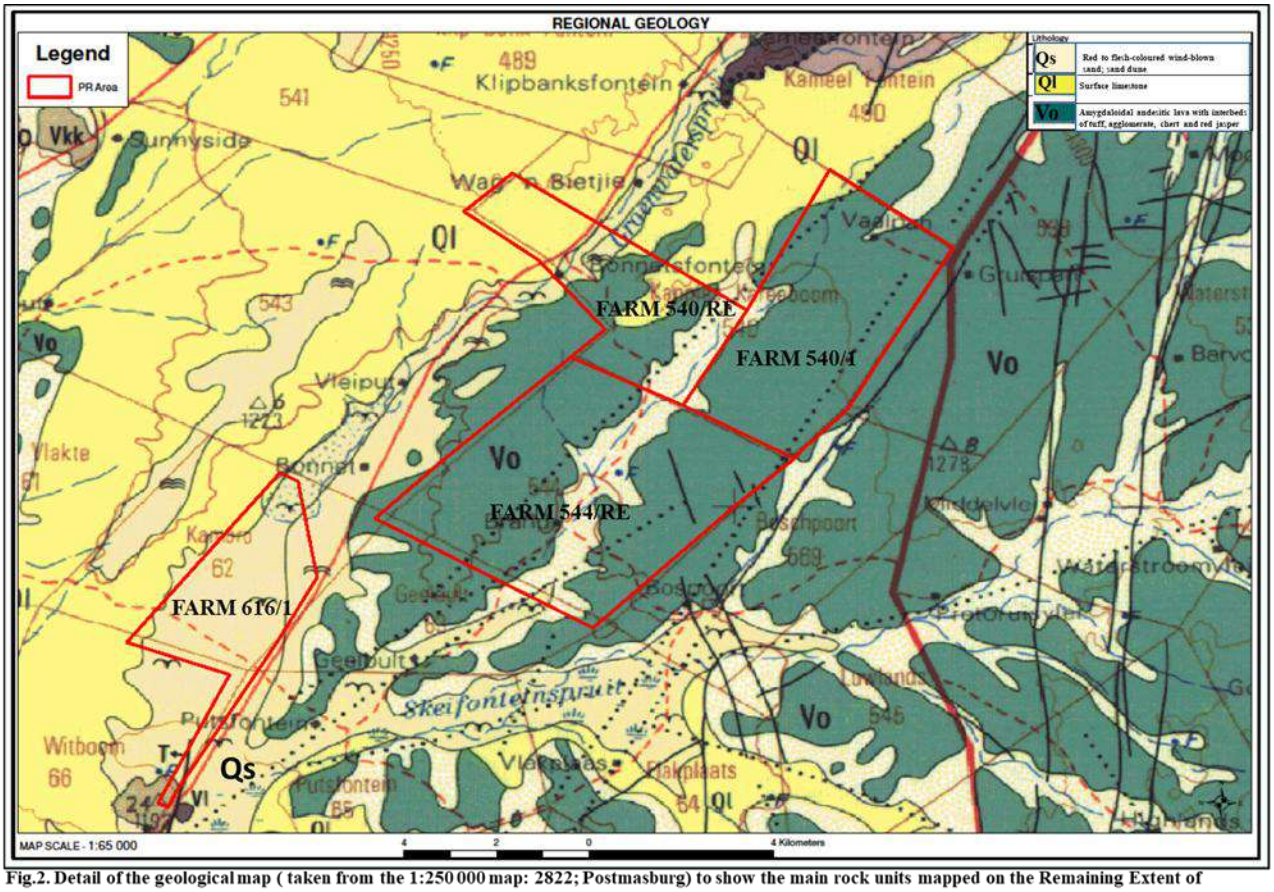


**Fig.2. Detail of the geological map ( taken from the 1:250 000 map: 2822; Postmasburg) to show the main rock units mapped on the Remaining Extent of Consolidated Farm Kappies Kareeboom 540, Portion 1 of Consolidated Farm Kappies Kareeboom 540, Remaining Extent of the Farm 544 and portion 1 of the Farm 616.Main rock units: Vo (dark green) = Ongeluk Formation (Amygdaloidal andesitic lava with interbeds of tuff, agglomerate, chert and red jasper); Ql ( bright yellow) = surface limestone; Qs (pale yellow) = reddish brown wind blown sand.**

Figure 2: 1: 250 000 scale geological map 2822 Postmasburg (Council for Geoscience, Pretoria) (Fig. 2)

### Ongeluk Formation: (Vo)

The Ongeluk Formation is probably more than 1 000m thick and is a monotonous succession of greyish-green andesitic lava, locally amygdaloidal, with lenses of tuff and agglomerate up to 15m thick.

### Tertiary to Quaternary Deposits:

Surface limestone (**Ql**) covers large tracts of the area, especially on the Ghaap Plateau where it attains an appreciable thickness. Cliff limestone is found along the escarpment, while diatomaceous limestone and kieselguhr occur in depressions in the central and western portions of the area.

Reddish-brown wind-blown sand (**Qs**) is found mainly in the west where it builds seif dunes striking north-northwest.

Rocks of the Late Archaean ( ~ 2600) to Palaeo-proterozoic ( ~ 2100 Ma) Transvaal and Griqualand West Sequences form extensive outcrops on the Kaapvaal Craton in southern Botswana and South Africa. The Griqualand West Sequence (SACS, 1980) comprises mainly chemogenic sediments with clastic sedimentary units and magmatic intercalations, deposited in Palaeoproterozoic times on the structurally stable Kaapvaal Craton. The sequence is almost undeformed and hardly metamorphosed, with igneous minerals still preserved at most localities. The Ongeluk Formation is a thick succession of lavas which crops out over a large portion of the region. The Ongeluk lavas which occur near the top of the sequence are stratigraphically equivalent to the Hekpoort Basalt Formation of the Transvaal (SACS, 1980). The simplified stratigraphic column for the Griqualand West Sequence is shown in **Table 4**.

**Table 4:** Simplified stratigraphic column for the Griqualand West Sequence (modified after Beukes and Smit, 1987)

| SEQUENCE | GROUP | SUBGROUP | FORMATION | LITHOLOGY | THICKNESS (m) |
|---|---|---|---|---|---|
| **TRANSVAAL (GRIQUALAND WEST)** | Postmasburg | Voëlwater | Mooidraai | dolomite, chert, banded jasper & lava | ~ 200- 250 |
| | | | Hotazel | banded jasper, dolomite, banded iron and Mn formation | |
| | | | Ongeluk | basaltic andesite massive lava, pillow lava, hyaloclastite | 300-900 |
| | | | Makganyane | diamictite, minor banded jasper | 50-150 |
| | Ghaap | Koegas | 6 Formations | iron-formation, shale, quartz wacke, riebeckitic slate | 640? |
| | | Asbestos Hill | Griquatown | clastic-textured iron formation | 200-300 |
| | | | Kuruman | banded iron-formation | 150-750 |
| | | Campbellrand | 8 Formations | dolomite, subordinate limestone and shale | 1500-1700 |
| | | Schmidtsdrif | 3 Formations | quartzite, subordinate shale, dolomite, limestone, lava | 10-250 |

The Ongeluk Formation comprises essentially three volcanic rock types: massive lava, hyaloclastite and pillow lava. Dark-green fine-grained massive lava flows which often show a prominent polygonal joint pattern are the most prominent rock type. The lava flows can be distinguished on aerial photographs, forming prominent scarps separated by less resistant pillow lava and hyaloclastite (Cornell et al., 1996). The basal portion of each two- to three-metre-thick flow tends to be free of amygdales which become more abundant towards the top. Flow breccias are often found near the top of the flow. Pillow lava is common throughout the Ongeluk Formation, although easily recognized only in fresh outcrop. Pillows have very dark-green rims, cooling cracks, and rounded three-dimensional forms, with either vesicular or massive cores. Chert commonly fills tricuspate interstices between pillows and its occurrence is the only good criterion for pillow lava in weathered outcrop, where onion-skin weathering is commonly developed in massive lavas (Cornell et al., 1996).

Hyaloclastite consists of fragments of massive lava in a matrix of angular glass shards. No graded bedding is observed. Alteration of hyaloclastite is evidenced by the development of brown palagonite and epidote or piedmontite along shard boundaries, while the matrix now consists largely of zeolites and chlorite. The glassy fragments probably originated during quenching and shattering of the outer parts of pillows, the matrix representing aquagene tuff (Cornell et al., 1996).

In the greater Kathu region, the Postmasburg Group is represented by the unfossiliferous volcanic Ongeluk Formation as well as the Makganyene Formation. The basaltic to andesitic lavas/magma of the Ongeluk Formation (dated to 2.2 Ga) crops out in the proposed development. The Makganyene Formation near Postmasburg, comprise of diamictites that is about 500m thick.

Various authors are of the opinion that these diamictites indicate a 250-million-year glacial episode (Palaeoproterozoic age) (Evans et al. 1997; Polteau et al. 2006). This event was most probably triggered by oxygenic cyanobacterial photosynthesis (Kopp et al. 2005; Coetzee et al. 2006). The Makganyene Formation includes sandstones, shales, large coarsely bedded diamictites, BIF and manganese-rich carbonates with stromatolitic reefs. However, Almond (2017) did not uncover fossil reefs from the shallow platform facies of the Makganyene Formation in the Griqualand Basin (Ghaap Plateau Sub-basin).

Pleistocene Kalahari sands (Gordonia Formation) has been described to mantle thick calcretes and downwasted surface gravels (Almond 2013). He described a range of calcrete types namely gravelly, brecciated, silicified, honeycomb and karstified facies, the latter with an associated sand-or gravel-infilled solution hollows.

Quaternary fossil assemblages are generally rare and low in diversity and occur over a wide-ranging geographic area. These fossil assemblages resemble modern animals and may comprise of mammalian teeth, bones and horn corns, reptile skeletons and fragments of ostrich eggs.

Microfossils, non-marine mollusc shells are also known from Quaternary deposits. Plant material

such as foliage, wood, pollens, and peats are recovered as well as trace fossils like vertebrate tracks, burrows, termitaria (termite heaps/ mounds) and rhizoliths (root casts).

The proposed development is however mantled by reddish-brown windblown sands (Qs) and the chance of finding fossils is these sands is low.

### Economic Geology:

Iron ore (hematite) is mined at Beeshoek and Manganore from ferruginous subsidence breccia (blinkklip breccia) which caps some of the hills north of Postmasburg, as well as an eluvial detrital ore from scree on the hillsides. The basal shale of the Gamagara Formation is locally ferruginised where it overlies banded ironstone, and is also mined at Beeshoek and Manganore, while the banded ironstone itself has in places also been enriched to high-grade ore.

Manganese ore is recovered from the basal shale of the Gamagara Formation where it overlies dolomite. The most important mines are at Glosam, Lohatlha and Beeshoek. Manganiferous chert breccia, also known as the 'silica breccia' or 'manganese marker', found at the top of the Ghaapplato dolomite, is exploited on a small scale at Manganore.

### Information sources for this study

The information used in this desktop palaeontological heritage study was based on the following:

1. A review of the relevant scientific literature, including published geological maps and accompanying sheet explanations, as well as previous palaeontological assessment reports for the broader Postmasburg region

2. The authors' database on the geological formations concerned and their palaeontological heritage.

Xhariep's prospecting activities for Iron and Manganese ore shall be conducted in nine phases over a period of five years.

- **Non-invasive prospecting:**

### Phase 1:

A site investigation of the application area will be undertaken to identify infrastructure and determine any potential problems that may need to be addressed.

### Phase 2:

In order to direct the exploration programme in an efficient manner, there will be a review of all available information and data. A desktop study will be undertaken of the metal potential of the area.

Any anomalous features identified will be mapped in detail. The various rock types and their contacts will also be mapped.

### Phases 4, 6 and 8:

Drill samples will be collected in one-meter intervals and logging will be done by a qualified geologist who will record the lithology, mineralogy, degree of mineralization and structural features. Mineralized samples will be analyzed at an internationally recognized (ISO certified) laboratory. Basic Assessment Report and Environmental Management Programme Report Xhariep Plant and Mining (Pty) Ltd.

### Phase 9:

All the drill sampling data will then be modeled to obtain a final interpretation of the potential of the deposit. A detailed feasibility report will be compiled after drilling operations have been completed to evaluate the economic viability of the project.

- **Invasive prospecting:**

### Phases 3, 5 and 7: Percussion drilling

Percussion drilling will be used to identify the position of a suspected base metal deposit. The position of the boreholes is dependent on the results of the review of historical activities, geological mapping, desktop study and reconnaissance visit.

Fifty boreholes, approximately 50m deep each (can be more or less depending on results), are planned for each phase (3, 5 and 7). The collar position of all boreholes will be surveyed. All drilling will be short term and undertaken by a contractor using truck-mounted equipment.

Angled percussion holes are planned to locate and intersect the mineralization. A traverse line or grid drilling is used to identify and define the extent of any mineralization. The sizes of the boreholes drilled will be determined by such factors as cost, proposed sampling, availability of drilling machines and the volume of sample required, among others.

Each drill site will be rehabilitated. The boreholes will be filled with drill chips and covered with topsoil.

## Assumptions & limitations

The accuracy and reliability of palaeontological specialist studies as components of heritage impact assessments are generally limited by the following constraints:

1. Inadequate database for fossil heritage for much of the RSA, given the large size of the country and the small number of professional palaeontologists carrying out fieldwork here. Most development study areas have never been surveyed by a palaeontologist.

2. Variable accuracy of geological maps which underpin these desktop studies. For large areas of terrain these maps are largely based on aerial photographs alone, without groundtruthing. The maps generally depict only significant ("mappable") bedrock units as well as major areas of superficial "drift" deposits (alluvium, colluvium) but for most regions give little or no idea of the level of bedrock outcrop, depth of superficial cover (soil *etc.*), degree of bedrock weathering or levels of small-scale tectonic deformation, such as cleavage. All these factors may have a major influence on the impact significance of a given development on fossil heritage and can only be reliably assessed in the field.

3. Inadequate sheet explanations for geological maps, with little or no attention paid to palaeontological issues in many cases, including poor locality information.

4. The extensive relevant palaeontological "grey literature" - in the form of unpublished university theses, impact studies and other reports (*e.g.*, of commercial mining companies) - that is not readily available for desktop studies.

5. Absence of a comprehensive computerized database of fossil collections in major RSA institutions which can be consulted for impact studies. A Karoo fossil vertebrate database is now accessible for impact study work.

In the case of palaeontological desktop studies without supporting Phase 1 field assessments these limitations may variously lead to either:

(a) *underestimation* of the palaeontological significance of a given study area due to ignorance of significant recorded or unrecorded fossils preserved there, or

(b) *overestimation* of the palaeontological sensitivity of a study area, for example when originally rich fossil assemblages inferred from geological maps have in fact been destroyed by tectonism or weathering, or are buried beneath a thick mantle of unfossiliferous "drift" (soil, alluvium *etc*).

Since most areas of the RSA have not been studied palaeontologically, a palaeontological desktop study usually entails *inferring* the presence of buried fossil heritage within the study area from relevant fossil data collected from similar or the same rock units elsewhere, sometimes at localities far away. Where substantial exposures of bedrocks or potentially fossiliferous superficial sediments are present in the study area, the reliability of a palaeontological impact assessment may be significantly enhanced through field assessment by a professional palaeontologist.

To the authors' knowledge (*cf* SAHRIS website), there have been very few field-based specialist palaeontological field studies in this part of the Southern Kalahari region. Bedrock exposure levels in some parts of the prospecting area are low due to pervasive cover by Late Caenozoic superficial deposits (*e.g.* Kalahari Group sands, calcretes as well as colluvium, alluvium and downwasted surface gravels). Confidence levels for the palaeontological assessment on the prospecting area are therefore only **MODERATE**.

## Palaeontological context

In the case of the Remaining Extent of Consolidated Farm Kappies Kareeboom 540, Portion 1 of Consolidated Farm Kappies Kareeboom 540, Remaining Extent of the Farm 544 and Portion 1 of the Farm 616 Mining Right application study area, the main potentially fossiliferous rock units present include:

- Kalahari Group sands, calcretes.

The approach to this palaeontological heritage study is briefly as follows. Fossil bearing rock units occurring within the broader study area are determined from geological maps and satellite images.

Known fossil heritage in each rock unit is inventoried from scientific literature, previous assessments of the broader study region, and the author's field experience and palaeontological

database. Based on this data as well as field examination of representative exposures of all major

sedimentary rock units present, the impact significance of the proposed development is assessed with recommendations for any further studies or mitigation.

In preparing a palaeontological desktop study the potentially fossiliferous rock units (groups, formations etc.) represented within the study area are determined from geological maps and satellite images. The known fossil heritage within each rock unit is inventoried from the published scientific literature, previous palaeontological impact studies in the same region. Consultation with professional colleagues as well as examination of institutional fossil collections may play a role here during the compilation of the final report. This data is then used to assess the palaeontological sensitivity of each rock unit to development.

The likely impact of the proposed development on local fossil heritage is then determined based on:

(1) the palaeontological sensitivity of the rock units concerned and

(2) the nature and scale of the development itself, most significantly the extent of fresh bedrock excavation envisaged.

When rock units of moderate to high palaeontological sensitivity are present within the development footprint, a Phase 1 field assessment study by a professional palaeontologist is usually warranted to identify any palaeontological hotspots and make specific recommendations for any monitoring or mitigation required before or during the construction phase of the development.

Based on the desktop and Phase 1 field assessment studies, the likely impact of the proposed development on local fossil heritage and any need for specialist mitigation are determined. Adverse palaeontological impacts normally occur during the construction rather than the operational or decommissioning phase. Phase 2 mitigation by a professional palaeontologist normally involving the recording and sampling of fossil material and associated geological-information (e.g., sedimentological data) may be required:

(a) in the pre-construction phase where important fossils are already exposed at or near the land surface and / or

(b) during the construction phase when fresh fossiliferous bedrock has been exposed by excavations.

To carry out mitigation, the palaeontologist involved will need to apply for palaeontological collection permits from the relevant heritage management authorities, i.e. the South African Heritage Resources Agency, SAHRA (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Phone: +27 (0)21 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za). It should be emphasized that, providing appropriate mitigation is carried out, the majority of developments involving bedrock excavation can make a positive contribution to our understanding of local palaeontological heritage.

The palaeontological sensitivity of the area under consideration is indicated as LOW (green) to moderately sensitive (Yellow). Kalahari Group sands of Quaternary age are windblown and weathered so they do not preserve fossils. Only such features as palaeo-pans or palaeo-springs might entrap bones or robust plant material in the Later Tertiary and Quaternary settings (Goudie & Wells, 1995; Holmes et al., 2017; Walker et al., 2014).

## Impact assessment

There will be no impact for the operational and closure (decommissioning) phases.

No monitoring is required if there are no fossils or if the fossils have been rescued already.

The status of the impact during the planning phase and before mitigation (removal of fossils)

will be negative; it becomes positive if fossils are absent or have been removed.

- The extent of the impact is low to moderate because only fossils (chance finds) in the expansion area or along the prospecting routes could be affected.
- The duration of the impact would be permanent if fossils are not removed but is low if they are removed.
- The probability of any fossils occurring in the expansion footprint that is already highly disturbed from prior mining activities, or along the route, is very low because there are no palaeo-pans or palaeo-springs visible on the satellite imagery.
- The intensity of the impact is only local.

- Significance of the impact is low to medium. The palaeosensitivity rating is Generally Protected B (GP.B) to Generally Protected C (GP.C) (**Table 3**).

**Table 3.** Field rating categories as prescribed by SAHRA.

| Field Rating | Grade | Significance | Mitigation |
|---|---|---|---|
| National Significance (NS) | Grade 1 | - | Conservation; national site nomination |
| Provincial Significance (PS) | Grade 2 | - | Conservation; provincial site nomination |
| Local Significance (LS) | Grade 3A | High significance | Conservation: mitigation not advised |
| Local Significance (LS) | Grade 3B | High significance | Mitigation (part of site should be retained) |
| Generally Protected A (GP.A) | - | High/medium significance | Mitigation before destruction |
| Generally Protected B (GP.B) | - | Medium significance | Recording before destruction |
| Generally Protected C (GP.C) | - | Low significance | Destruction |

## 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 aeolian sands, sandstones and calcrete are typical for the country and do not contain fossil plant, insect, invertebrate and vertebrate material. No palaeo-pans or palaeo-springs that could entrap fossil, are visible in the satellite imagery, therefore it is extremely unlikely that they occur in the prospecting area.

## Recommendation

Based on experience and the lack of any previously recorded fossils from the area, it is extremely unlikely that any fossils in the loose sands or calcretes of the Quaternary Kalahari Sands.

There is a very small chance that fossils may occur in palaeo-pans BUT no such feature is visible. Therefore, a Fossil Chance Find Protocol should be added to the EMPr: if fossils are found once the surveyor and/or the environmental officer walks the route and expansion areas, they should be photographed, position recorded, removed and stored. Photographs sent to the palaeontologist will enable him/her to assess the scientific importance of the fossils and act accordingly.

## Fossil Chance Find Protocol

Programme for Palaeontology – to commence once the expansion area and routes are surveyed by the surveyor or environmental officer. Planning/pre-construction phase 1. The following procedure is only required if fossils are seen on the surface when surveyed and any palaeo-pan or palaeo-spring feature is recognised, or if stromatolites are seen 2. If any fossiliferous material (plants, insects, bones, or stromatolites) is seen it should be put aside in a suitably protected place. This way the construction activities will not be interrupted.

3. Photographs of similar fossil plants must be provided to the developer to assist in recognizing the fossil plants 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 scientifically important fossil material as assessed from the submitted photographs, then the qualified palaeontologist sub-contracted for this project, should visit the site to inspect the site and excavate (having obtained a SAHRA permit).

6. Stromatolites, 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.

7. Annual reports must be submitted to SAHRA as required by the relevant permits.

8. If no good fossil material is recovered then the site inspection by the palaeontologist will not be necessary.

9. If no fossils are found during the survey, then no further palaeontological impact assessment is required.

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# Appendix 12

Screening Report

# SCREENING REPORT FOR AN ENVIRONMENTAL AUTHORIZATION AS REQUIRED BY THE 2014 EIA REGULATIONS – PROPOSED SITE ENVIRONMENTAL SENSITIVITY

**EIA Reference number:** NC 13478 PR

**Project name:** Prospecting Right

**Project title:** Kappies Kareeboom

**Date screening report generated:** 25/05/2023 08:55:31

**Applicant:** Xhariep Plant and Mining (Pty) Ltd

**Compiler:** M and S Consulting (Pty) Ltd

**Compiler signature:**

.....

**Application Category:** Mining|Prospecting rights

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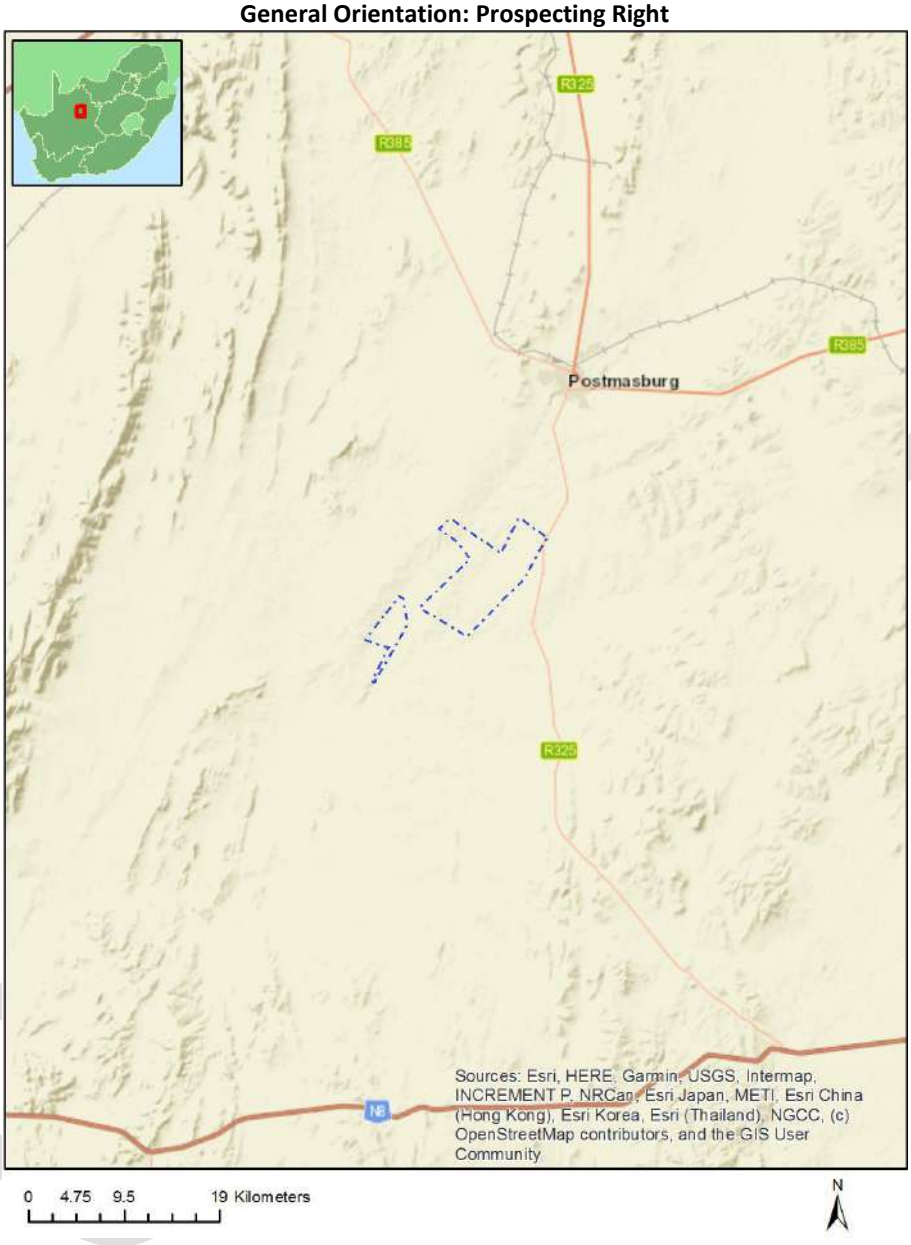
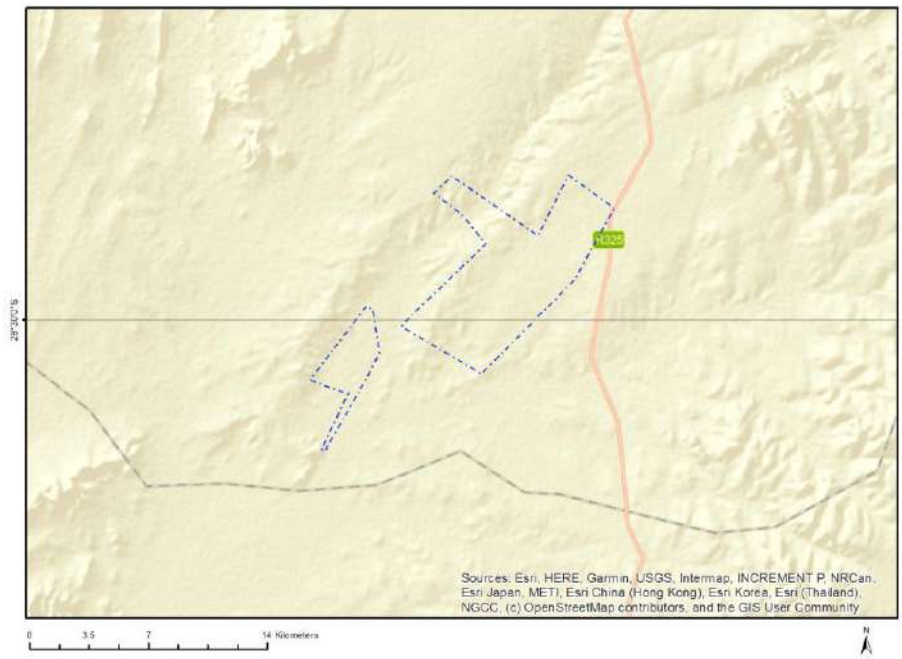
# Proposed Project Location

## Orientation map 1: General location

**General Orientation: Prospecting Right**



# Map of proposed site and relevant area(s)




## Cadastral details of the proposed site

Property details:

| No | Farm Name | Farm/ Erf No | Portion | Latitude | Longitude | Property Type |
|---|---|---|---|---|---|---|
| 1 | PUTSFONTEIN | 616 | 0 | 28°32'27.46S | 22°54'45.76E | Farm |
| 2 | KAPPIES KAREEBOOM | 540 | 0 | 28°27'37.6S | 23°0'5.38E | Farm |
| 3 | | 544 | 0 | 28°29'49.85S | 22°58'16.74E | Farm |
| 4 | KAPPIES KAREEBOOM | 540 | 0 | 28°27'25.62S | 22°58'40.75E | Farm Portion |
| 5 | KAPPIES KAREEBOOM | 540 | 1 | 28°27'45.68S | 23°1'2.4E | Farm Portion |
| 6 | | 544 | 0 | 28°29'49.85S | 22°58'16.74E | Farm Portion |
| 7 | PUTSFONTEIN | 616 | 1 | 28°31'12.68S | 22°54'13.65E | Farm Portion |

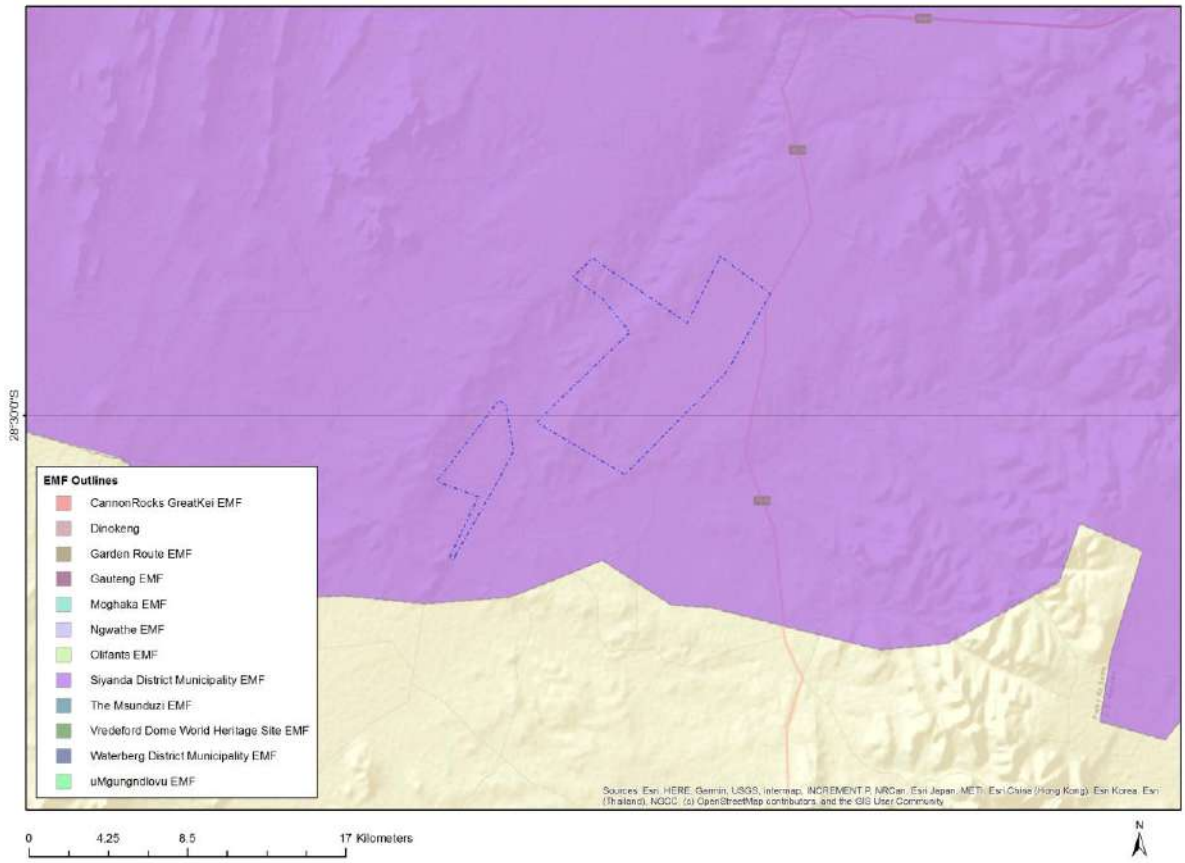
Development footprint[1] vertices:
No development footprint(s) specified.

## Wind and Solar developments with an approved Environmental Authorisation or applications under consideration within 30 km of the proposed area

[1] "development footprint", means the area within the site on which the development will take place and incudes all ancillary developments for example roads, power lines, boundary walls, paving etc. which require vegetation clearance or which will be disturbed and for which the application has been submitted.

| No | EIA Reference No | Classification | Status of application | Distance from proposed area (km) |
|---|---|---|---|---|
| 1 | 14/12/16/3/3/2/923 | Solar CSP | Approved | 29.9 |
| 2 | 12/12/20/2252/2 | Solar CSP | Approved | 29.9 |

## Environmental Management Frameworks relevant to the application




| Environmental Management Framework | LINK |
|---|---|
| Siyanda District Municipality EMF | https://screening.environment.gov.za/ScreeningDownloads/EMF/SIYANDA_EMF_REPORT_2008.doc |

# Environmental screening results and assessment outcomes

The following sections contain a summary of any development incentives, restrictions, exclusions or prohibitions that apply to the proposed development site as well as the most environmental sensitive features on the site based on the site sensitivity screening results for the application classification that was selected. The application classification selected for this report is: **Mining|Prospecting rights**.

## Relevant development incentives, restrictions, exclusions or prohibitions

The following development incentives, restrictions, exclusions or prohibitions and their implications that apply to this site are indicated below.

| Incentive, restriction or prohibition | Implication |
|---|---|
| Strategic Transmission Corridor-Northern corridor | https://screening.environment.gov.za/ScreeningDownloads/DevelopmentZones/Combined_EGI.pdf |

## Proposed Development Area Environmental Sensitivity

The following summary of the development site environmental sensitivities is identified. Only the highest environmental sensitivity is indicated. The footprint environmental sensitivities for the proposed development footprint as identified, are indicative only and must be verified on site by a suitably qualified person before the specialist assessments identified below can be confirmed.

| Theme | Very High sensitivity | High sensitivity | Medium sensitivity | Low sensitivity |
|---|---|---|---|---|
| Agriculture Theme | | | X | |
| Animal Species Theme | | X | | |
| Aquatic Biodiversity Theme | X | | | |
| Archaeological and Cultural Heritage Theme | | X | | |
| Civil Aviation Theme | | | X | |
| Defence Theme | | | | X |
| Paleontology Theme | | X | | |
| Plant Species Theme | | | | X |
| Terrestrial Biodiversity Theme | X | | | |

## Specialist assessments identified

Based on the selected classification, and the known impacts associated with the proposed development, the following list of specialist assessments have been identified for inclusion in the assessment report. It is the responsibility of the EAP to confirm this list and to motivate in the assessment report, the reason for not including any of the identified specialist study including the provision of photographic evidence of the site situation.

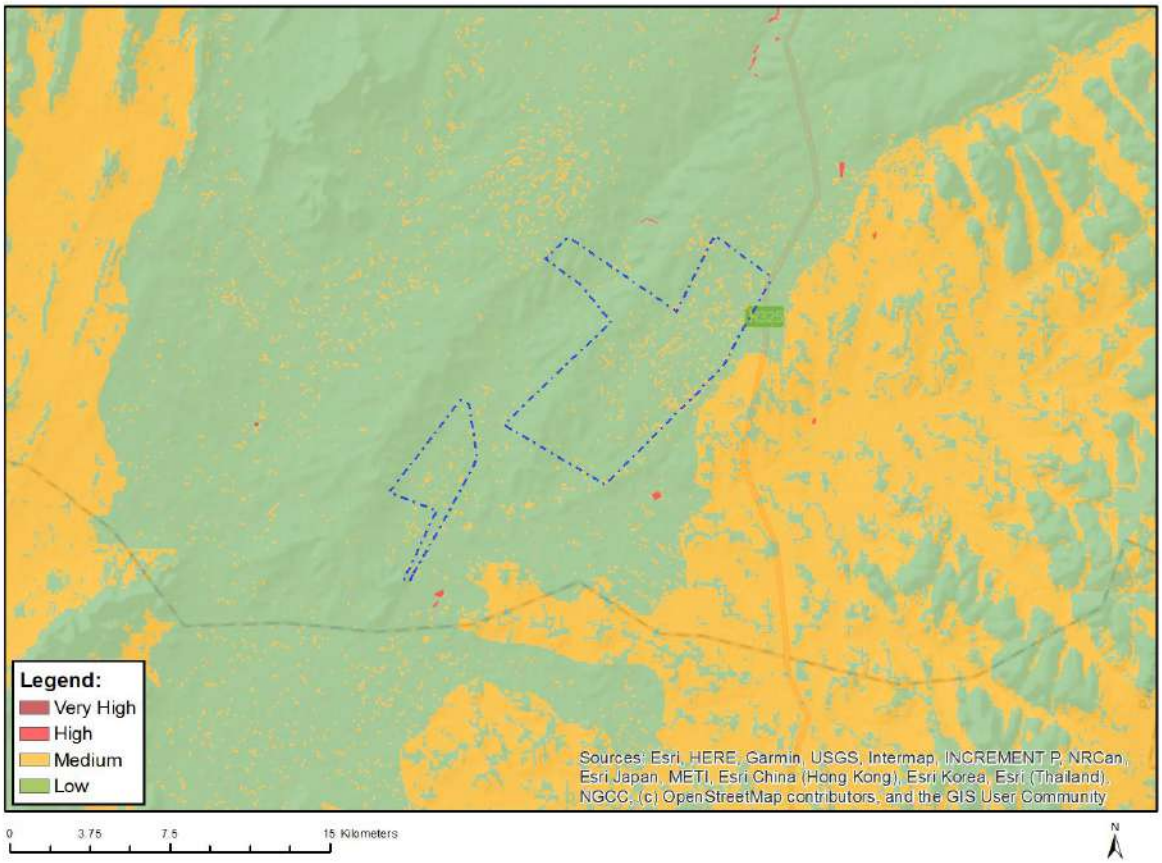
| No | Specialist assessment | Assessment Protocol |
|---|---|---|
| 1 | Agricultural Impact Assessment | https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Agriculture_Assessment_Protocols.pdf |
| 2 | Archaeological and Cultural Heritage Impact Assessment | https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf |
| 3 | Palaeontology Impact Assessment | https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf |
| 4 | Terrestrial Biodiversity Impact Assessment | https://screening.environment.gov.za/ScreeningDownloads/Asse |

| | | |
|---|---|---|
| | | ssmentProtocols/Gazetted_Terrestrial_Biodiversity_Assessment_Protocols.pdf |
| 5 | Aquatic Biodiversity Impact Assessment | https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Aquatic_Biodiversity_Assessment_Protocols.pdf |
| 6 | Noise Impact Assessment | https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Noise_Impacts_Assessment_Protocol.pdf |
| 7 | Radioactivity Impact Assessment | https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf |
| 8 | Plant Species Assessment | https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Plant_Species_Assessment_Protocols.pdf |
| 9 | Animal Species Assessment | https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Animal_Species_Assessment_Protocols.pdf |

# Results of the environmental sensitivity of the proposed area.

The following section represents the results of the screening for environmental sensitivity of the proposed site for relevant environmental themes associated with the project classification. It is the duty of the EAP to ensure that the environmental themes provided by the screening tool are comprehensive and complete for the project. Refer to the disclaimer.

## MAP OF RELATIVE AGRICULTURE THEME SENSITIVITY

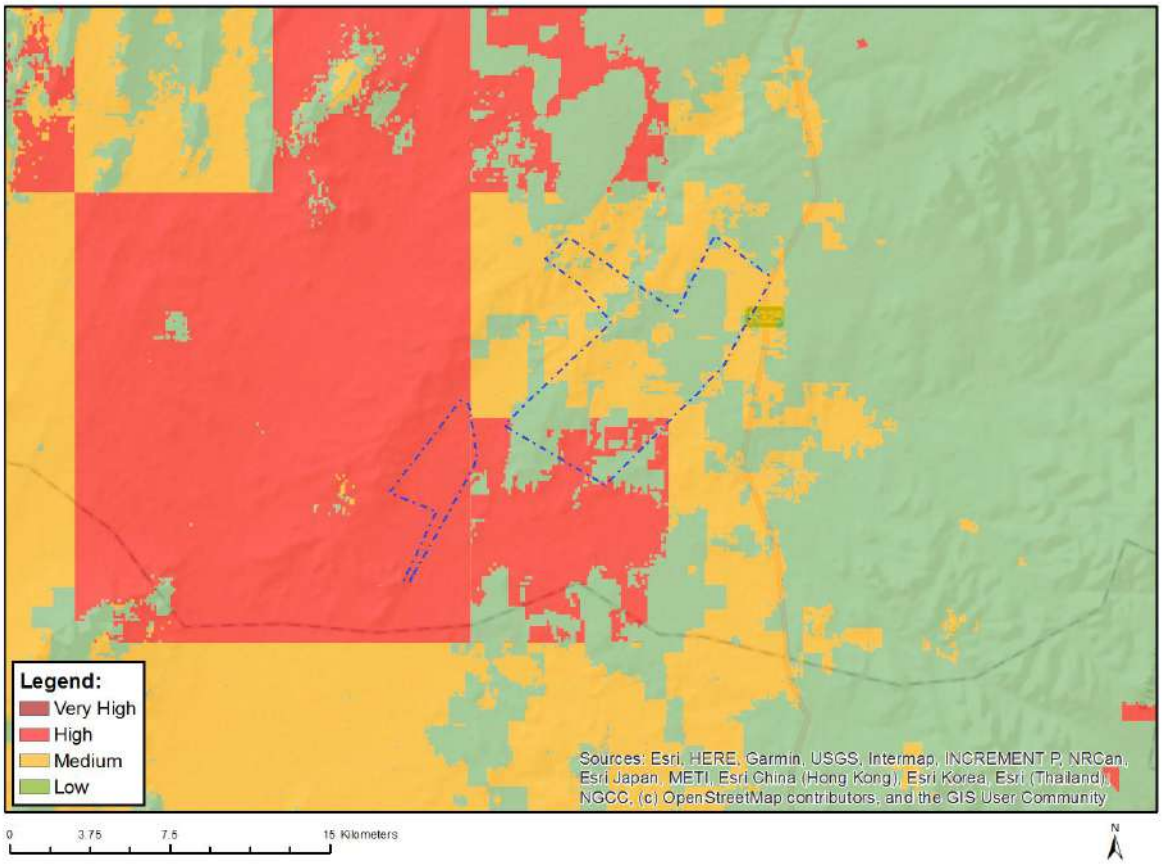



| Very High sensitivity | High sensitivity | Medium sensitivity | Low sensitivity |
|---|---|---|---|
| | | X | |

**Sensitivity Features:**

| Sensitivity | Feature(s) |
|---|---|
| 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 |

## MAP OF RELATIVE ANIMAL SPECIES THEME SENSITIVITY



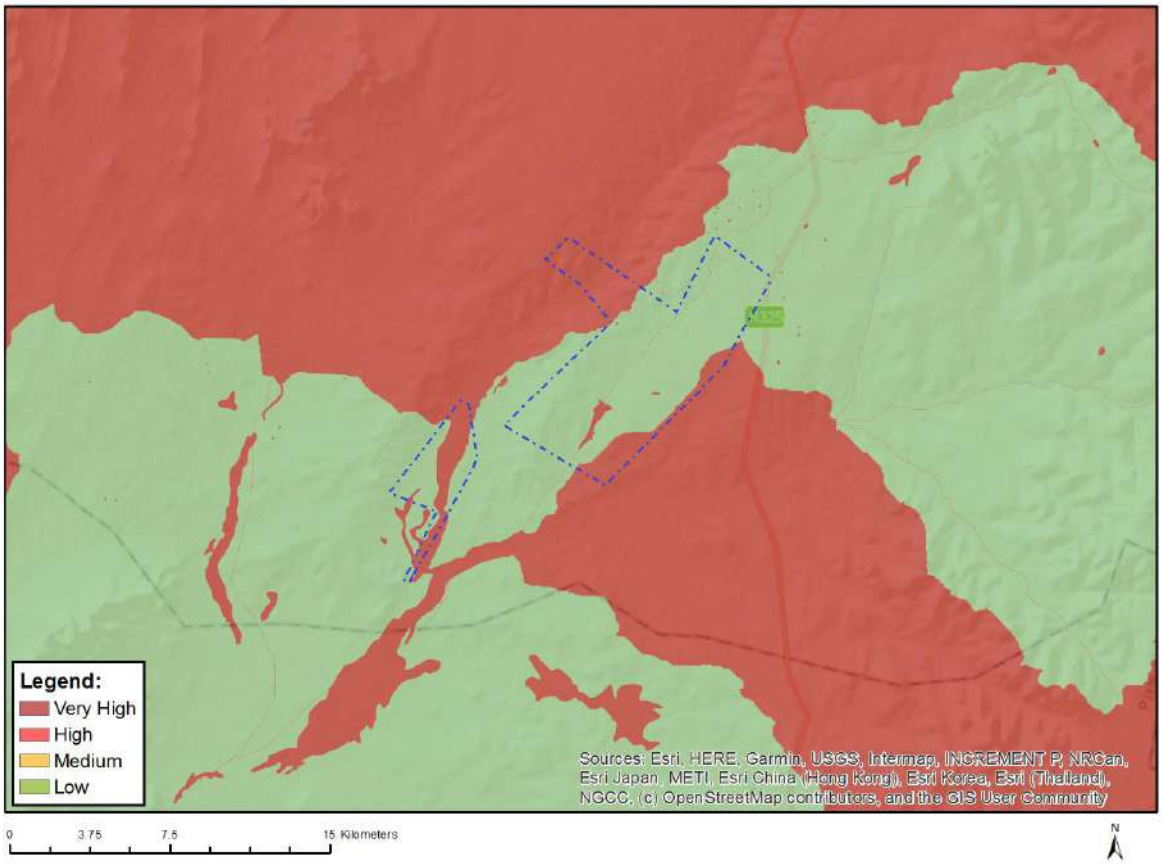

Where only a sensitive plant unique number or sensitive animal unique number is provided in the screening report and an assessment is required, the environmental assessment practitioner (EAP) or specialist is required to email SANBI at eiadatarequests@sanbi.org.za listing all sensitive species with their unique identifiers for which information is required. The name has been withheld as the species may be prone to illegal harvesting and must be protected. SANBI will release the actual species name after the details of the EAP or specialist have been documented.

| Very High sensitivity | High sensitivity | Medium sensitivity | Low sensitivity |
|---|---|---|---|
| | X | | |

**Sensitivity Features:**

| Sensitivity | Feature(s) |
|---|---|
| High | Aves-Neotis ludwigii |
| High | Aves-Falco biarmicus |
| High | Aves-Torgos tracheliotos |
| High | Aves-Aquila rapax |
| Low | Subject to confirmation |
| Medium | Aves-Neotis ludwigii |
| Medium | Aves-Sagittarius serpentarius |

## MAP OF RELATIVE AQUATIC BIODIVERSITY THEME SENSITIVITY

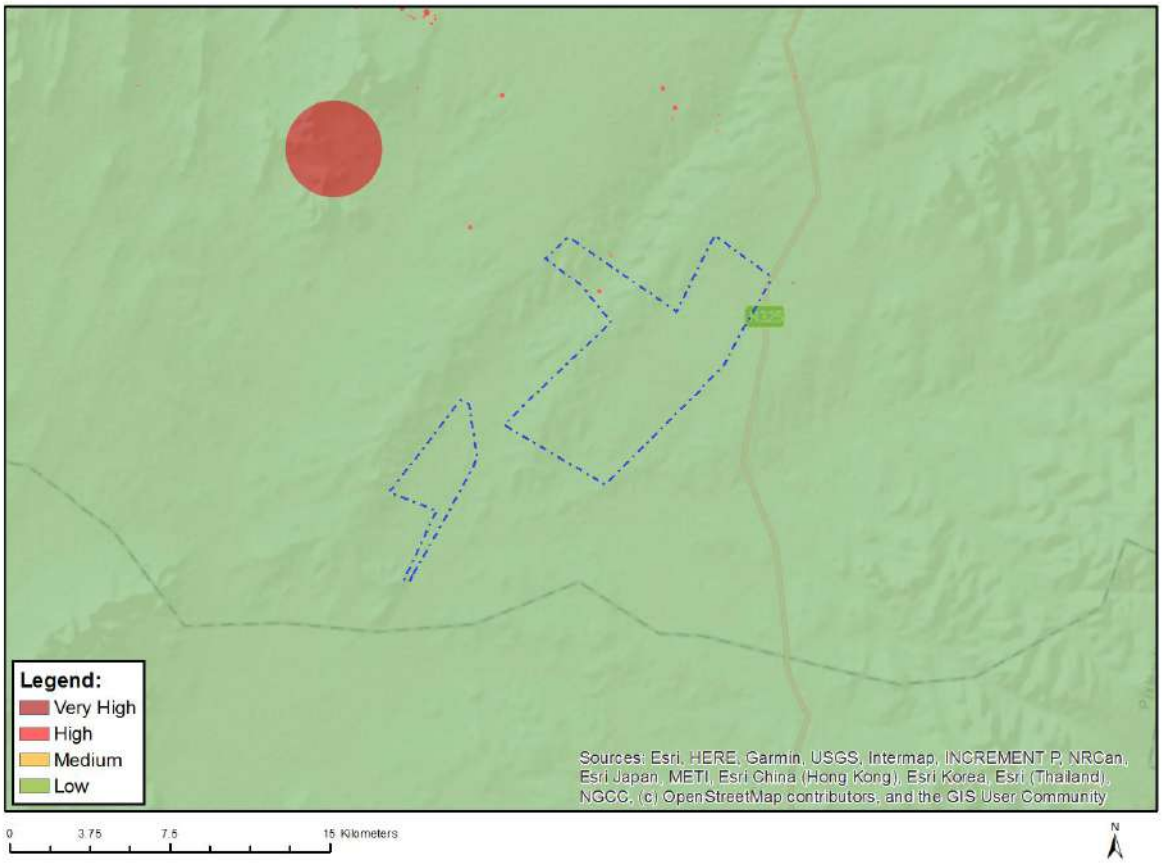



| Very High sensitivity | High sensitivity | Medium sensitivity | Low sensitivity |
|---|---|---|---|
| X | | | |

**Sensitivity Features:**

| Sensitivity | Feature(s) |
|---|---|
| Low | Low sensitivity |
| Very High | FEPA Subcatchment |
| Very High | Rivers_AB |
| Very High | Wetlands_(River) |
| Very High | Wetlands_Eastern Kalahari Bushveld Bioregion (Depression) |
| Very High | Wetlands_Upper Karoo Bioregion (Seep) |

## MAP OF RELATIVE ARCHAEOLOGICAL AND CULTURAL HERITAGE THEME SENSITIVITY

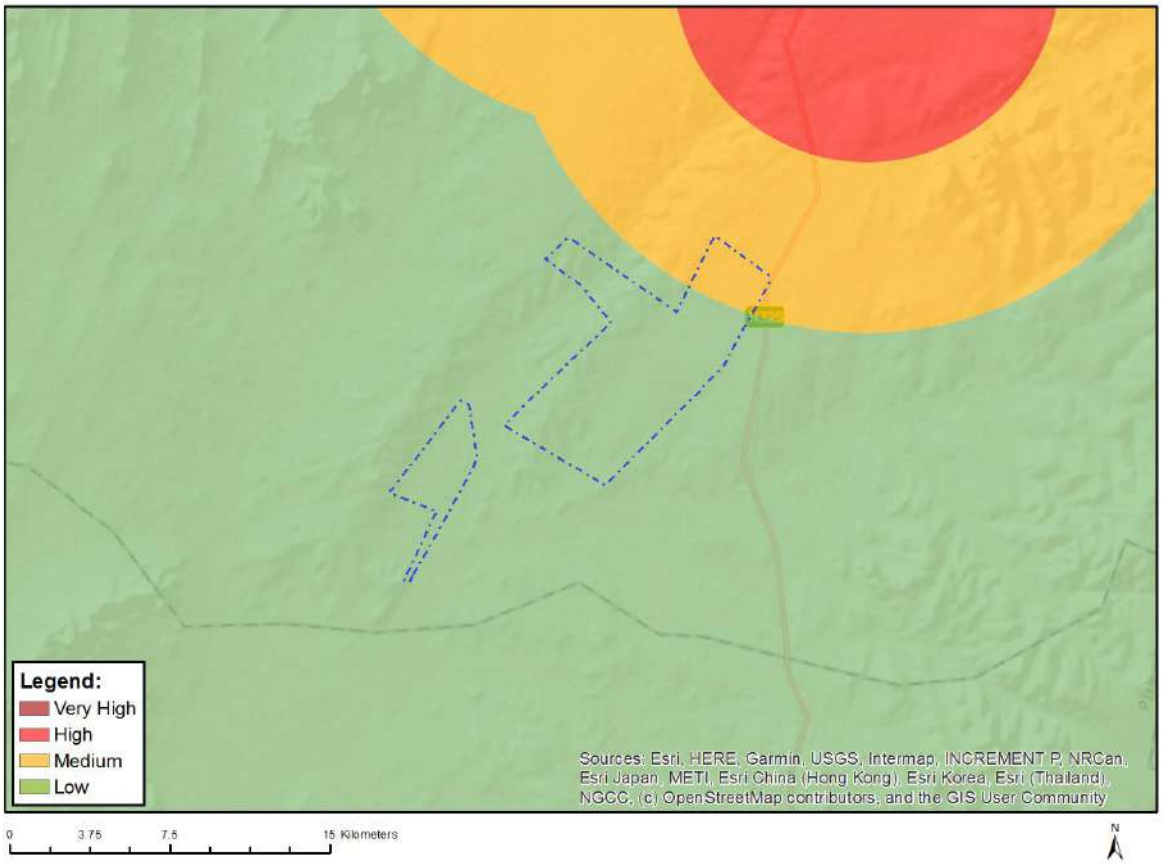



| Very High sensitivity | High sensitivity | Medium sensitivity | Low sensitivity |
|---|---|---|---|
| | X | | |

**Sensitivity Features:**

| Sensitivity | Feature(s) |
|---|---|
| High | Within 100m of a Grade IIIb Heritage site |
| Low | Low sensitivity |

## MAP OF RELATIVE CIVIL AVIATION THEME SENSITIVITY

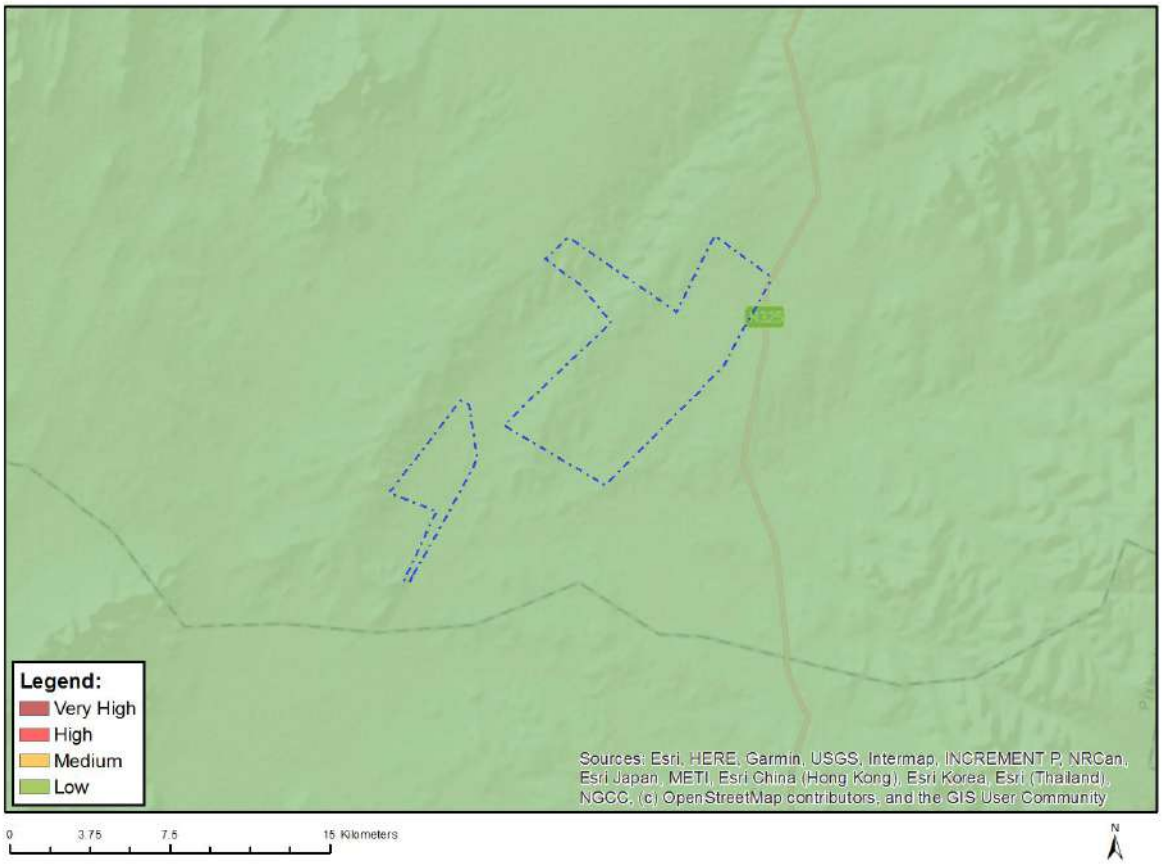



| Very High sensitivity | High sensitivity | Medium sensitivity | Low sensitivity |
|---|---|---|---|
| | | X | |

**Sensitivity Features:**

| Sensitivity | Feature(s) |
|---|---|
| Low | Low sensitivity |
| Medium | Between 8 and 15 km of other civil aviation aerodrome |

## MAP OF RELATIVE DEFENCE THEME SENSITIVITY

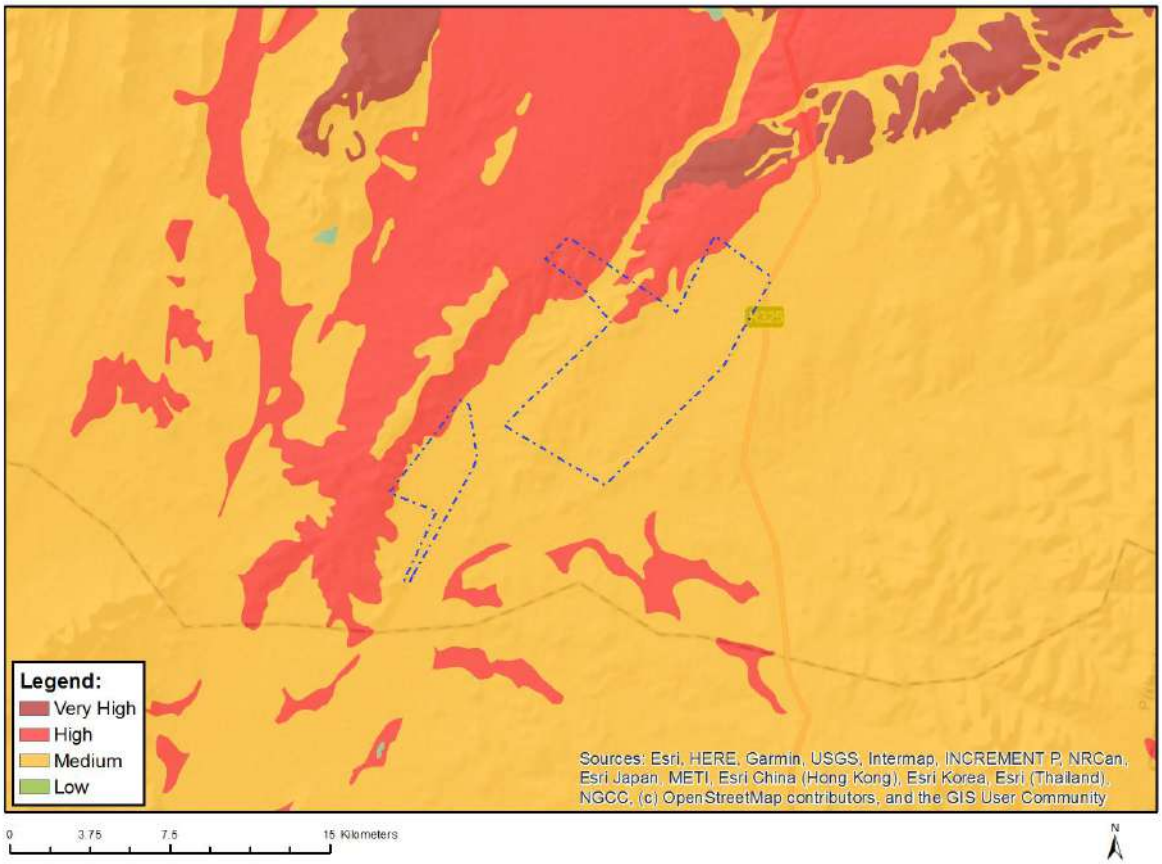



| Very High sensitivity | High sensitivity | Medium sensitivity | Low sensitivity |
|---|---|---|---|
| | | | X |

**Sensitivity Features:**

| Sensitivity | Feature(s) |
|---|---|
| Low | Low Sensitivity |

## MAP OF RELATIVE PALEONTOLOGY THEME SENSITIVITY

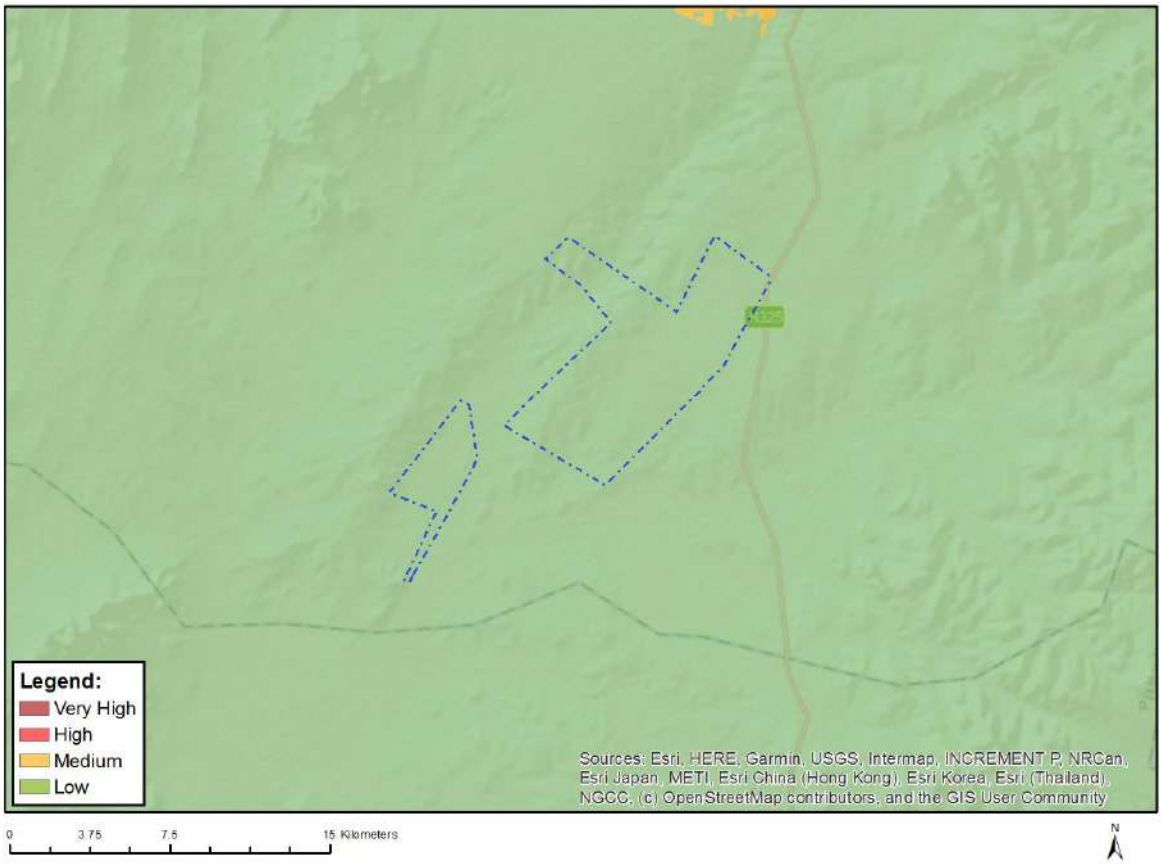



| Very High sensitivity | High sensitivity | Medium sensitivity | Low sensitivity |
|---|---|---|---|
| | X | | |

**Sensitivity Features:**

| Sensitivity | Feature(s) |
|---|---|
| High | Features with a High paleontological sensitivity |
| Medium | Features with a Medium paleontological sensitivity |

## MAP OF RELATIVE PLANT SPECIES THEME SENSITIVITY

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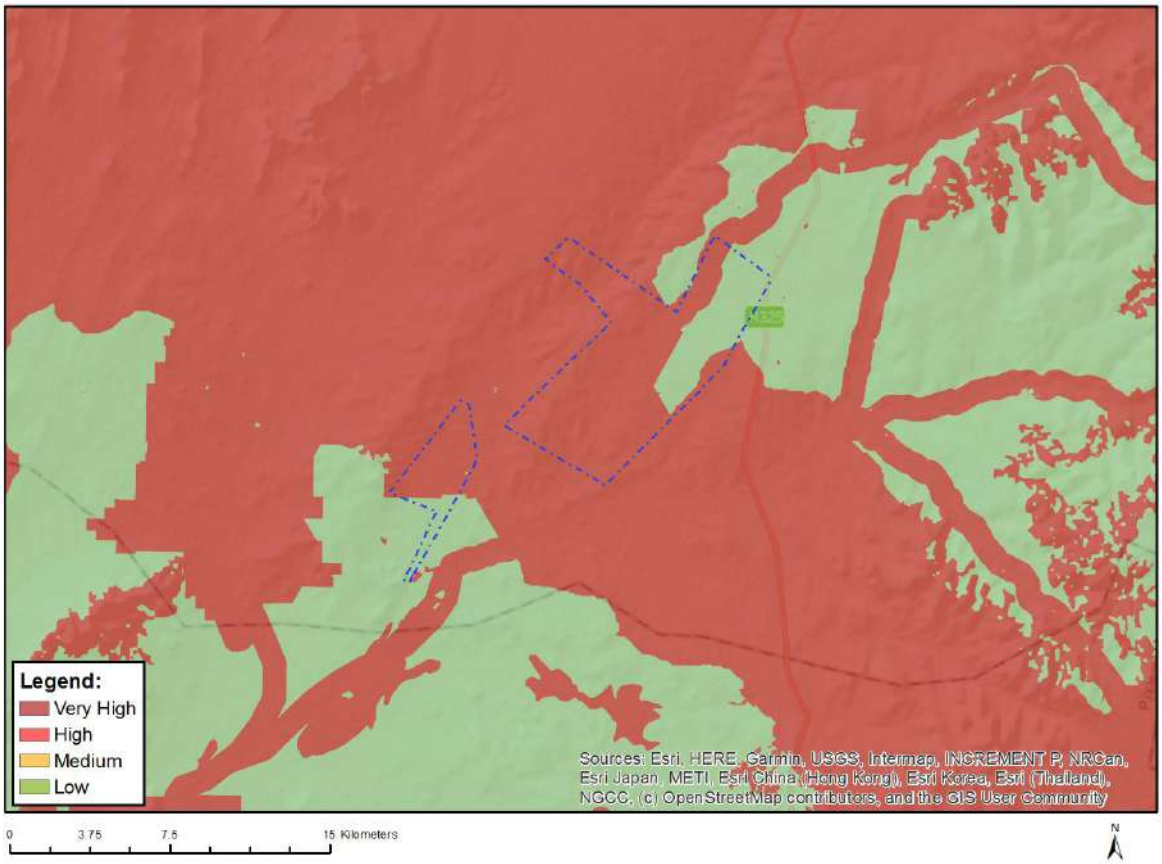
| Very High sensitivity | High sensitivity | Medium sensitivity | Low sensitivity |
|---|---|---|---|
| | | | X |

**Sensitivity Features:**

| Sensitivity | Feature(s) |
|---|---|
| Low | Low Sensitivity |

## MAP OF RELATIVE TERRESTRIAL BIODIVERSITY THEME SENSITIVITY




| Very High sensitivity | High sensitivity | Medium sensitivity | Low sensitivity |
|---|---|---|---|
| X | | | |

**Sensitivity Features:**

| Sensitivity | Feature(s) |
|---|---|
| Low | Low sensitivity |
| Very High | Critical biodiveristy area 1 |
| Very High | Critical biodiveristy area 2 |
| Very High | Ecological support area |
| Very High | FEPA Subcatchments |