WATERBERG RESOURCE JV (PTY) LTD

WATERBERG-JV MINE

28 FEBRUARY 2020

Integrated Cultural & Heritage Impact Assessment

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With inputs from: Specialist studies conducted

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DEFINITIONS

Term	Definition
Cultural significance	Aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance.
Rock Art	Any form of painting, engraving or other graphic representation on a fixed rock surface or loose rock or stone, which was executed by human agency and which is older than 100 years, including any area within 10m of such representation.
Material Remains	Material remains resulting from human activity which are in a state of disuse and are in or on land and which are older than 100 years, including artefacts, human and hominid remains and artificial features and structures.
Living heritage	Means the intangible aspects of inherited culture, and may include (a) cultural tradition; (b) oral history; (c) performance; (d) ritual; (e) popular memory; (f) skills and techniques; (g) indigenous knowledge systems; and (h) the holistic approach to nature, society and social relationships.
Palaeontological	Means any fossilized remains or fossil trace of animals or plants which lived in the geological past, other than fossil fuels or fossiliferous rock intended for industrial use, and any site which contains such fossilized remains or trance.
SAHRA	Means the South African Heritage Resources Agency, established in terms of section 11 of the National Heritage Resources Act, 1999 (Act 25 of 1999).

SECTION 38(3) AND 38 (8) REQUIREMENTS

The responsible heritage resources authority must specify the information to be provided in a report required in terms of subsection (2)(a): Provided that the following must be included:

ACT REG	DESCRIPTION	REF
S38(3)(a)	The identification and mapping of all heritage resources in the area affected	Fig 8 – 17 Pgs. 16 - 51
S38(3)(b)	An assessment of the significance of such resources in terms of the heritage assessment criteria set out in section 6(2) or prescribed under section 7	Fig 1 – 3 Pgs. 20 - 40
S38(3)(c)	An assessment of the impact of the development on such heritage resources	Fig 1 – 3, 5 Pgs. 20 – 40; 56 - 65
S38(3)(d)	An evaluation of the impact of the development on heritage resources relative to the sustainable social and economic benefits to be derived from the development	Par 1.3.4 Pgs. 7
S38(3)(e)	The results of consultation with communities affected by the proposed development and other interested parties regarding the impact of the development on heritage resources;	Par 2.3 Pgs. 12
S38(3)(f)	If heritage resources will be adversely affected by the proposed development, the consideration of alternatives	Par 1.3 Pgs. 4-5
S38(3)(g)	Plans for mitigation of any adverse effects during and after the completion of the proposed development.	Table 6 Pgs. 65 - 76

1 INTRODUCTION

1.1 Backgroundof the Study

Comments received from the South African Heritage Resources Agency (SAHRA) on 7 August 2019, and the consequent meeting held with SAHRA on 12 September 2019, a request was made to compile an Integrated Cultural and Heritage Impact Assessment (IHIA). It should be noted that most of the information contained in this report was included in the Environmental Impact Assessment (EIA) and that this report provides a focus on the heritage resources and sensitive areas identified and the potential impact the Waterberg JV project may have on it.

1.2 Project Location

The Waterberg Project is located 13 km west of Senwabarwana, 74 km north-west of Polokwane and 63 km south of Alldays, within the Blouberg Local Municipality (BLM) and Capricorn District Municipality (CDM).

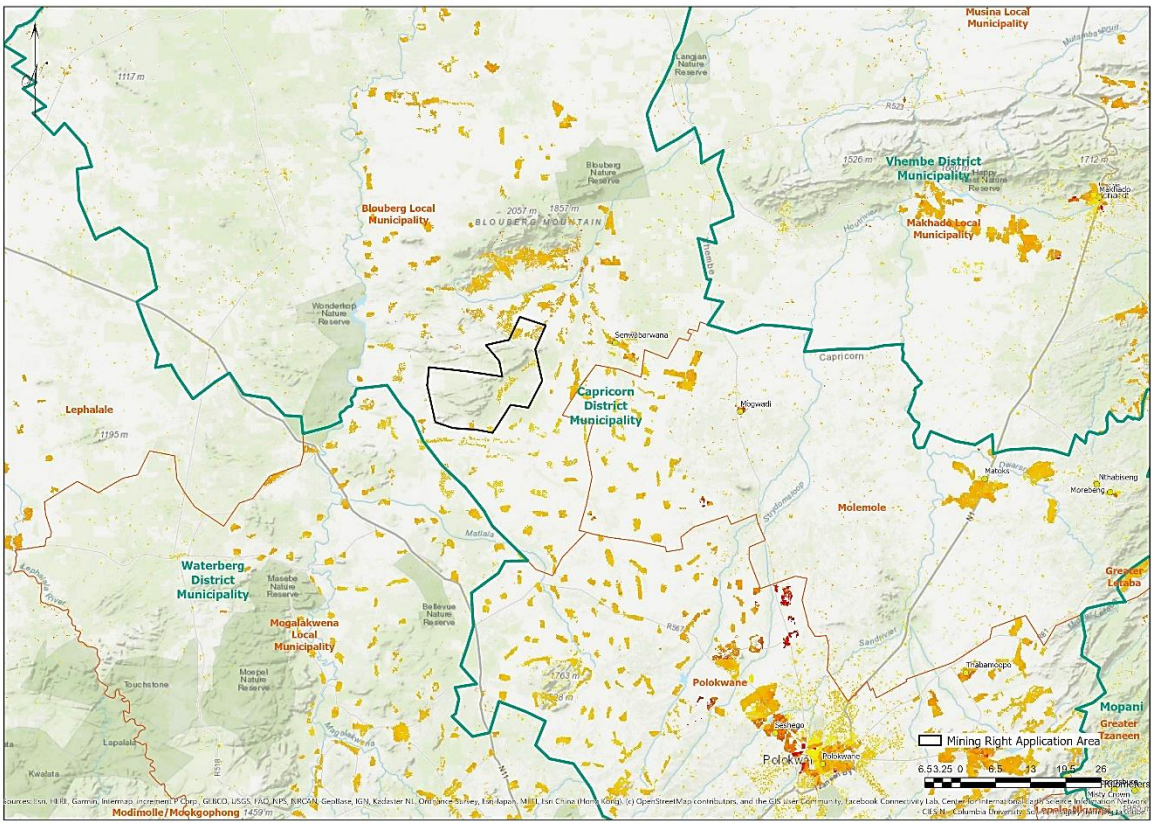

Figure 1: Locality Map

The area to be mined is situated on Rosamund 357 LR, Disseldorp 369 LR (Disseldorp), Millstream 358 LR, Ketting 368 LR (Ketting), Portion 1 of Goedetrouw 366 LR (Goedetrouw) (once registered)[1], Goedetrouw 366, Early Dawn 361 LR (Early Dawn), Old Langsine 360 LR, Langbryde 324 LR, Lomondside 323 LR, within the Northern Limb of the Bushveld Complex in the Limpopo Province. The Mining Right application (MRA) is for 20 482 hectares.

The MRA area encompasses Critical Biodiversity Area 2 (CBA2) and Ecological Support Areas (ESA) 1&2, as indicated in Figure 2. These conservation areas are mainly associated with the higher-lying areas associated with the Makgabeng Plateau. The Surface Infrastructure Area is located in the low-lying area to the south of the Makgabeng Plateau, classified as "Other Natural Areas" or "No Natural Remaining".

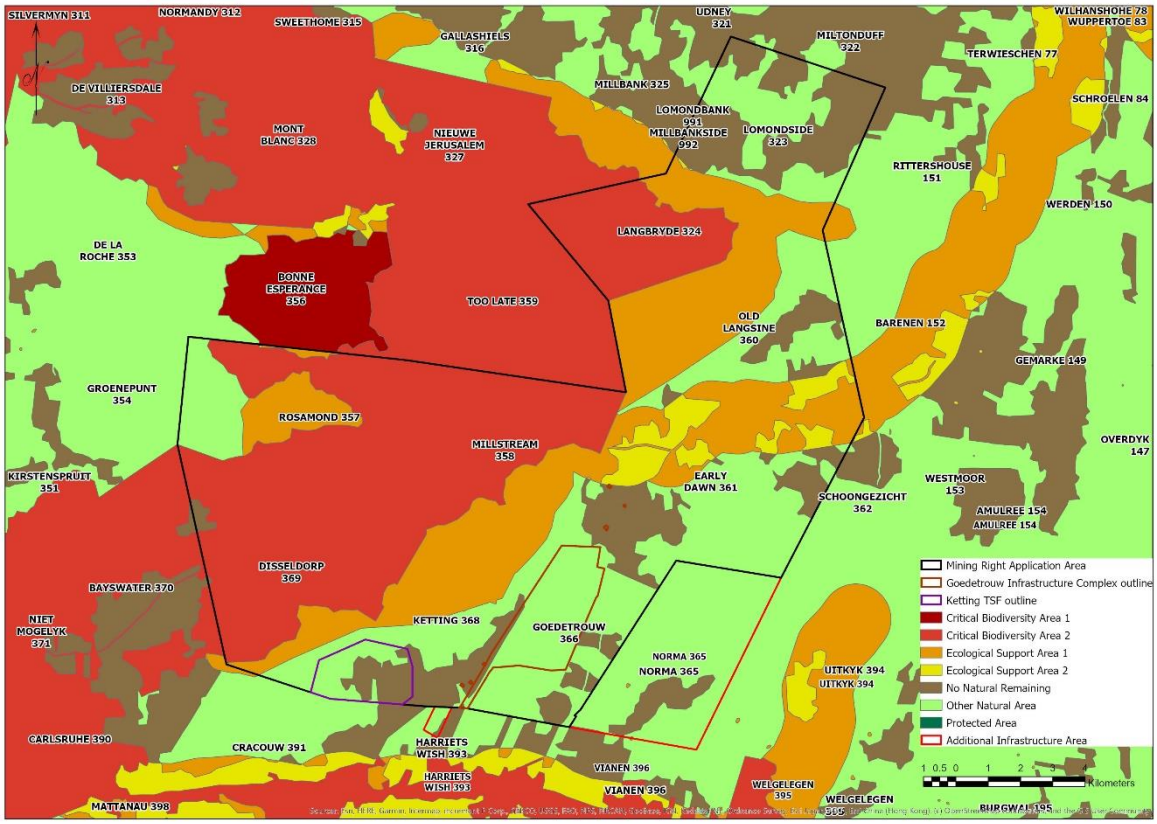

Figure 2: Limpopo Conservation Plan

The Project Area is located within the transitional zone of the Vhembe Biosphere Reserve (VBR), approximately 13 km south of the Blouberg Nature Reserve and Important Bird Area (IBA), a partially protected with the focus being the world's largest colony of Cape vultures *Gyps coprotheres* (Marnewick *et al*. 2015). Several other public and private nature reserves are present in the area (Figure 3).

[1] Although there is a registered SG diagram for Portion 1 Goedetrouw, the subdivision has been approved but not yet been registered in the Deeds Office.

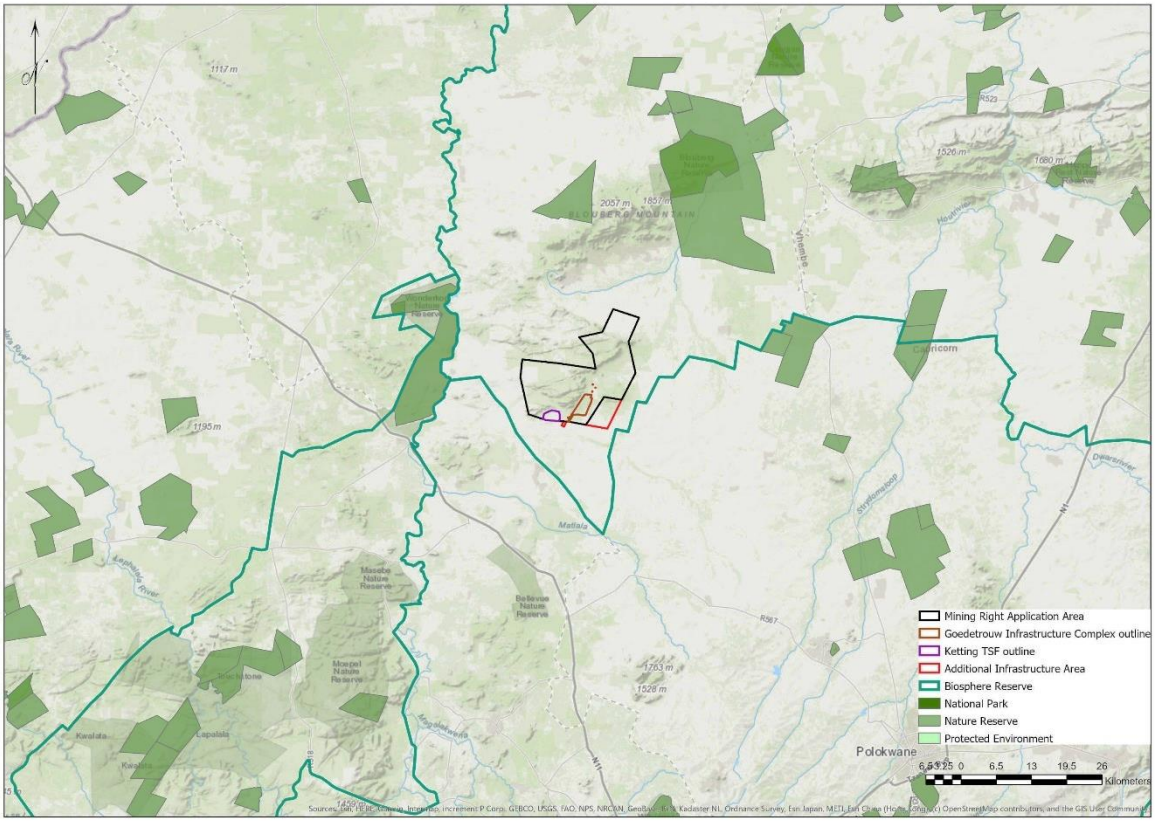

Figure 3: Protected Areas and Vhembe Biosphere Reserve

1.3 Waterberg JV Mine Project Description

The Waterberg Project represents a large-scale platinum group metal (PGM) resource with an attractive risk profile, given its shallow nature. The Project Area was considered due to the positive results obtained during the prospecting and drilling phase with regards to the underlying high-grade platinum. With the favourable results from the prospecting phase regarding platinum deposits, the Project Area locality is optimal for mining platinum.

The Waterberg Project is an underground mining development with minimal surface infrastructure. The Waterberg Project is designed to be a low cost, multi-decline, fully mechanised mining complex along an initial 13 km deposit strike length and will be mainly focused on palladium.

The top of mining zones in the current Waterberg mine plan occur at depths ranging from 170m to approximately 350m below the surface. The mine plan limits mining depth to 1 250m below surface.

The preferred mining alternative consists of two surface mining Complexes, North and South, that will serve as access to the underground mine workings up to a depth of approximately 1250m below the surface. Mining will commence at the Southern Complex, at a planned production rate of 4.8 Mtpa Run-of-Mine (RoM). Once the Southern Complex has been mined out, the mine production will

continue from the Northern Complex until depleted. This production rate indicates a Life of Mine (LOM) of 45 years.

A single 4.2 Mtpa module Process Plant will be constructed in a single phase. The phase one concentrator module and associated infrastructure will be constructed during the first three years, while the second module will be completed later. The metallurgical and backfill plants and surface infrastructure will be placed on the farm Goedetrouw, whilst the tailings storage facility (TSF) will be placed on the farms Ketting and Disseldorp. The tailings would be pumped overland to the TSF.

The Process Plant will process the ore to produce a saleable concentrate, at a 4E grade of no less than 80g/t. The concentrate is filtered and transported from the site for further processing at an existing smelter in Rustenburg and/or Polokwane.

For a detail project description of the Waterberg Project, refer to the Environmental Impact Assessment Report (EIAR).

1.3.1 Surface Layout Alternatives

Three surface layout alternatives were evaluated, namely:

- Alternative 1: Surface Infrastructure situated on Portion 1 of Goedetrouw and Goedetrouw, with the TSF situated on Ketting and Disseldorp (Figure 4).

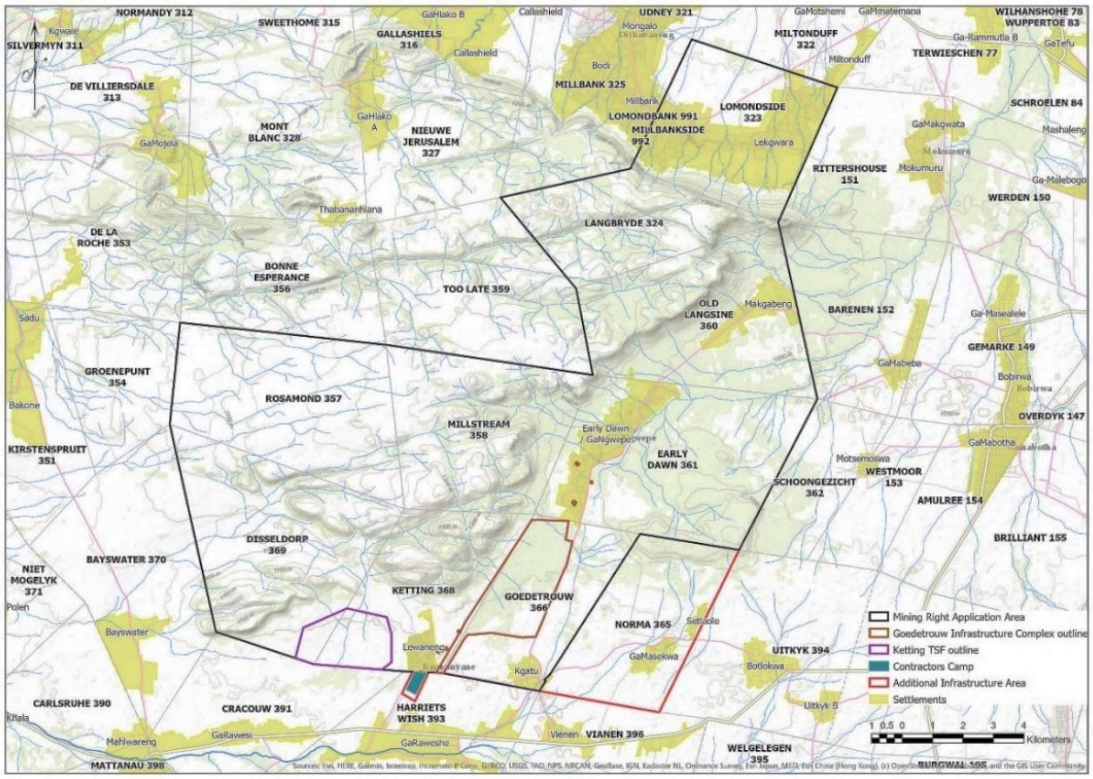

Figure 4: Surface Layout Alternative 1

- Alternative 2: Surface Infrastructure situated on Ketting, with the TSF situated on Ketting and Disseldorp (Figure 5).

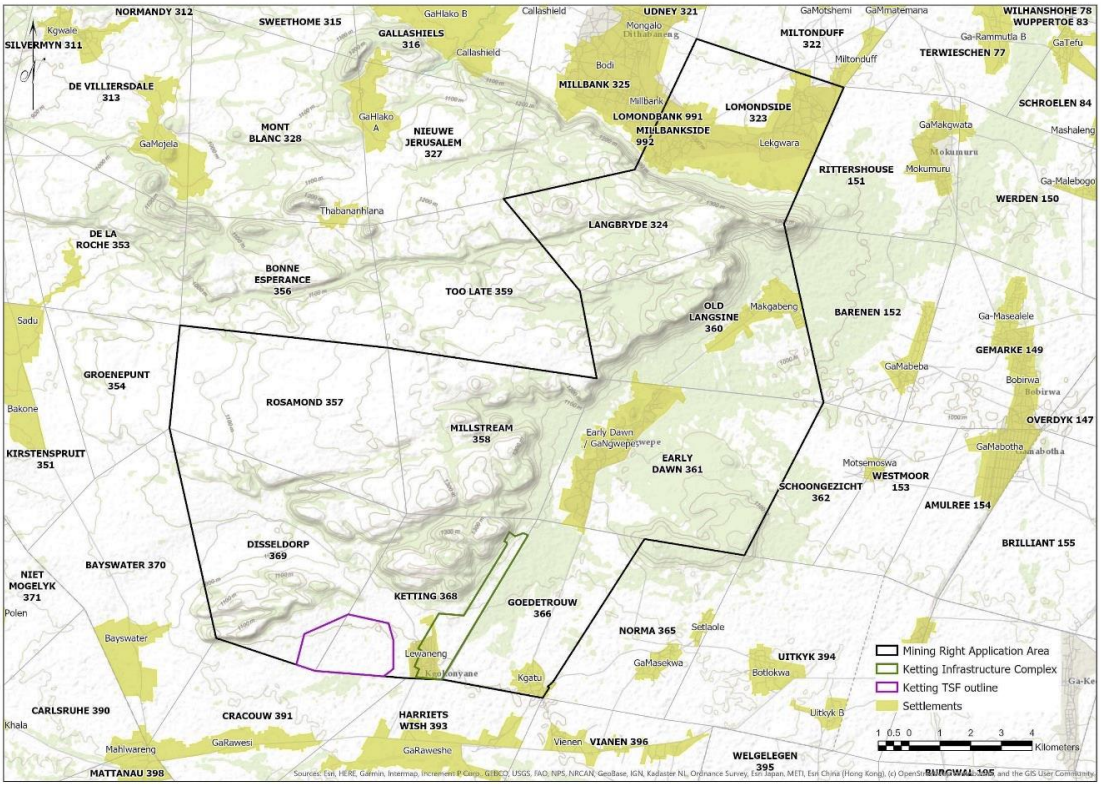

Figure 5: Surface Layout Alternative 2

- Alternative 3: Surface Infrastructure situated on Portion 1 of Goedetrouw and Goedetrouw, with the TSF situated on Portion 1 and the Remaining Extent of Norma (Figure 6).

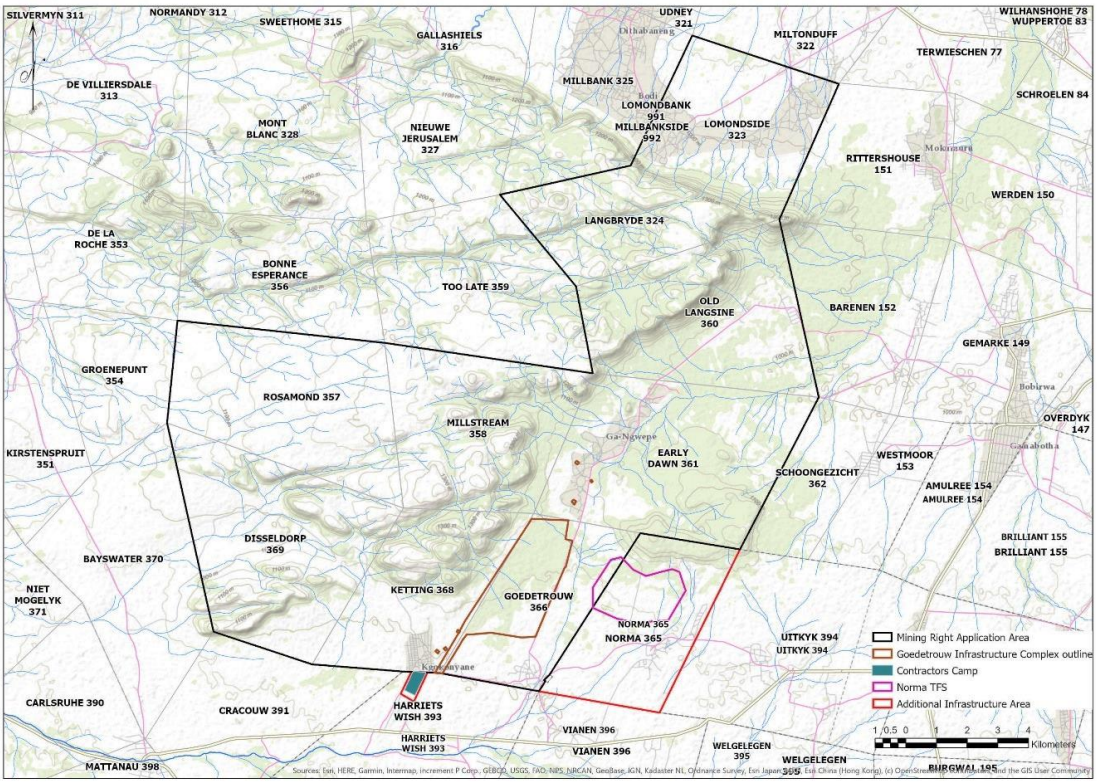

Figure 6: Surface Layout Alternative 3

Alternative 3 was discarded early in the process and was not addressed in the EIAR. Alternatives 1 and 2 were evaluated in detail during the EIA phase and within the specialist reports. The risk assessment concluded that Surface Layout Alternative 1 is the preferred option going forward in respect of all the environmental and social aspects as addressed. The IHIA (this report) only refers to the preferred alternative.

1.3.2 Surface Infrastructure

The Preferred Surface Infrastructure Area is located on Portion 1 of Goedetrouw (once registered); Goedetrouw; the south-eastern corner of Disseldorp and the south-western corner of Ketting. The existing construction camp on Portions 12 of Harriets Wish 393 LR (Harriets Wish) will be expanded onto Portions 10, 13 and 14 Harriets Wish, for use during the construction phase of the Waterberg Project (Construction Camp Area).

The Construction Camp Area, Mine Area and preferred Surface Infrastructure Area are collectively referred to as the "Project Area".

The Waterberg Surface Infrastructure is indicated in Figure 7.

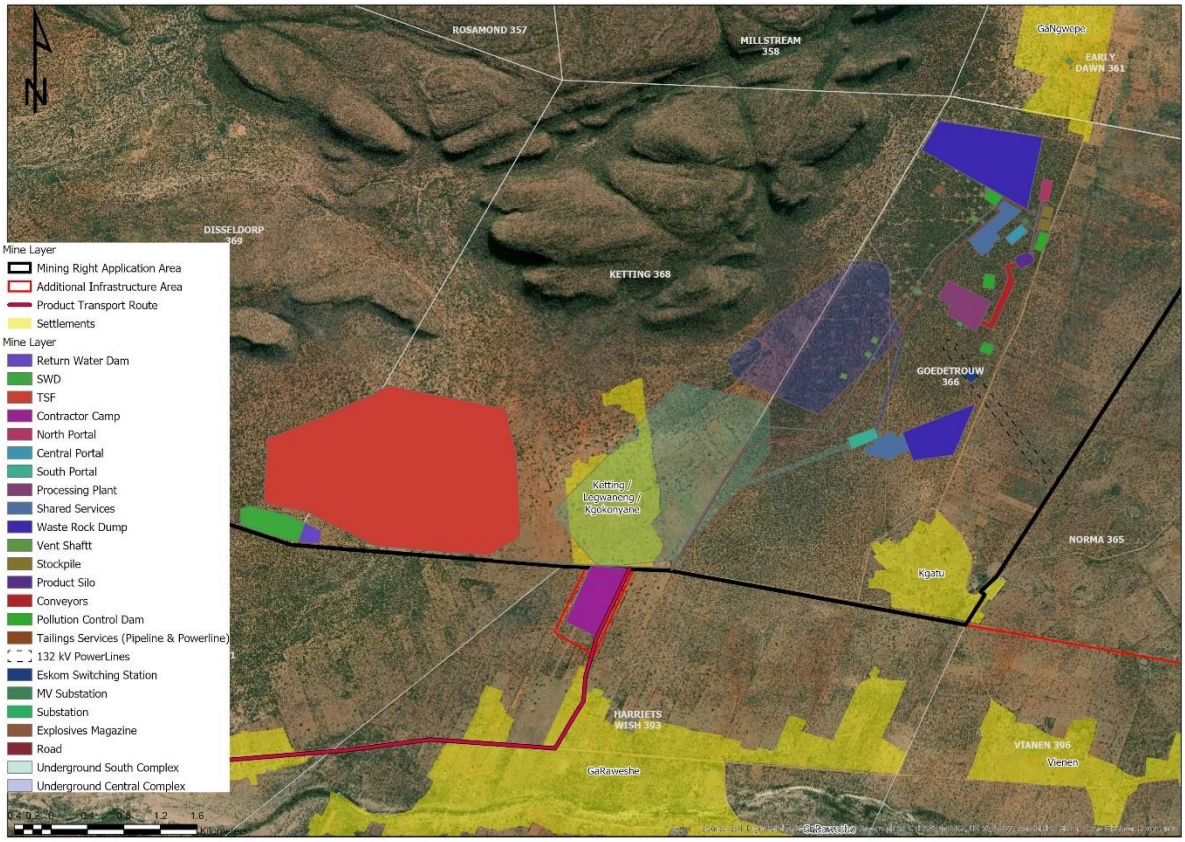

Figure 7: Surface infrastructure layout and underground mining areas

The make-up water demand for the Waterberg Project is estimated at 6.2 Ml/day. Groundwater will be extracted from various boreholes remote from the Project Area, within the CDM area. A network of pipelines will connect to a single main pipeline, which will pump water to the Process Plant. A separate authorisation process will be followed for the Water Pipeline infrastructure and is not addressed in this IHIA.

Bulk electricity for the Waterberg Project will be supplied from Eskom's Borotho Main Transmission Station via one or two 132kV overhead lines. The overhead powerlines are subject to a separate EIA process and are not addressed in this IHIA.

1.3.3 Underground Mining Area – Southern Complex

Primary access to the ore body will be via a twin decline system. The decline systems will initially start from two portals (South and Central), which will be excavated to a high wall depth of ±25m.

The decline system will consist of a service decline that will be utilised for all personnel and material transportation down the underground mine workings, as well as waste rock haulage. The conveyor decline will be utilised for the conveying of ore once the conveyor tips have been commissioned.

Ore brought to the surface by the conveyors will deposit the ore on a stockpile, from where it will be conveyed into the Process Plant. Waste rock brought to the surface will be trucked to the Waste Rock Dumps.

Figure 7 indicates the two portal areas and associated decline systems in relation to the communities.

1.3.4 Social and Economic benefits to be derived from the Development

It is recognised that mining activities are an essential component of South Africa's economic development. According to the Chamber of Mines of South Africa's Integrated Annual Review (2017) the mining sector accounted for 6.8% of South Africa's GDP, contributing R312 billion to GDP. Due to higher mining production, employment is estimated to have increased by 1.6% to 464,667 during 2017. This eventually arrested the rate of job losses which stood at 30,000 jobs between 2014 and 2017. The sector contributed R80.9 billion to fixed investment in 2017, which constituted 18.2% of private-sector fixed investment and 10.8% of the country's total fixed investment for the year.

The market and prices for platinum, palladium and associated PGMs have continued to be volatile. The Waterberg JVCo relies on research from various third parties to assist in the analysis and understanding of supply and demand trends.

Autocatalysis and pollution control in the automotive sector have historically been the primary demand driver for both platinum and palladium. Based on global automotive trends, palladium and rhodium have vastly outperformed platinum since 2016. The Volkswagen emissions scandal had an extremely negative impact on the European diesel market and the perception of diesel technology globally. Platinum has historically been used in diesel autos for autocatalysis and that demand segment has been weakening. It is expected that this trend will continue. Gasoline and hybrid automotive technology has been the primary benefactor. Palladium and rhodium are used as the primary catalysts in gasoline and hybrid automobiles. The gasoline and hybrid markets are expected to continue to grow, particularly in China where stringent new emissions legislation is expected to increase palladium consumption significantly. There is a great deal of discussion concerning battery electric vehicles ("**BEV**"). Although BEV technology is currently less than 1% of the global auto market, there are projections for this market to grow. BEV technology does not require an autocatalyst and is thus considered a significant threat to PGM metals demand in general. The perceived growth of the BEV market has had a dampening effect on PGM market sentiment.

The Waterberg resource is palladium dominate, which is a unique metal balance compared with the traditional South African PGM reefs. Palladium is typically used in gasoline engines and legislative changes are already driving autocatalyst palladium loadings higher in Europe, North America and Japan, and there are expectations that new regulations in China will be brought forward, driving further demand for the metal. Automotive demand for palladium is predicted to grow by around 2% in 2018.

The predominance of palladium over platinum in the ore, positions the Waterberg Project well as a future source of PGMs, especially as the supply side pressure grows on existing marginal PGM operations elsewhere in South Africa.

The Waterberg Project will contribute to favourable economic impacts on both a local, regional and national scale. This will result in numerous job creation and skills development opportunities and provide an economic injection in the region.

Numerous platinum mines occur to the south of the Project Area near Mokopane. The Waterberg Project fits in with these developments and land uses. If the Waterberg JVCo is not to proceed with the proposed MR Application, mining of these platinum reserves will not necessarily be avoided, as another application in terms of the MPRDA can be made by another company. Unless the Government declares these areas as restricted for mining and/or the demand for platinum subsides, mining companies will continue to attempt to mine these platinum reserves.

1.4 Legal Framework

1.4.1 International Treaties, Policies and Standards

1.4.1.1 2003 UNESCO Convention for the Safeguarding of the Intangible Cultural Heritage

2003 UNESCO Convention for the Safeguarding of the Intangible Cultural Heritage, which South Africa has ratified, sees living heritage as "manifested inter alia in the following domains":

- Oral traditions and expressions, including language as a vehicle of the intangible cultural heritage
- Performing arts
- Social practices, rituals, and festive events
- Knowledge and practices concerning nature and the universe
- Traditional craftsmanship[2]

1.4.2 South African Acts, Regulations and Policies

Aspects concerning the conservation of cultural resources are dealt with, mainly in two acts. These are the National Heritage Resources Act (Act 25 of 1999) (the "NHRA") and the National Environmental Management Act (Act 107 of 1998) (the "NEMA").

1.4.2.1 The National Environmental Management Act

NEMA states that a survey and evaluation of cultural resources must be done in areas where development projects that will change the face of the environment will be undertaken. In terms of section 23 of the NEMA, the impact of the development on these resources should be determined and proposals for the mitigation thereof be made.

[2] 2003 Convention, article 2, paragraph 2

Environmental management should also take the cultural and social needs of people into account. Section 2(4)(a)(iii) of NEMA requires that any disturbance of landscapes and sites that constitute the nation's cultural heritage should be avoided as far as possible and where this is not possible the disturbance should be minimized and remedied.

1.4.2.2 The National Heritage Resources Act

In terms of Section 2(ii) archaeological includes (a) material remains resulting from human activity, older than 100 years (including artefacts, human and hominid remains and artificial features and structures) or rock art (older than 100 years) and any area within 10m of the rock art.

According to the act as mentioned above the following is protected as cultural heritage resources:

a) Archaeological artefacts, structures and sites older than 100 years
b) Ethnographic art objects (e.g. prehistoric rock art) and ethnography
c) Objects of decorative and visual arts
d) Military objects, structures and sites older than 75 years
e) Historical objects, structures and sites older than 60 years
f) Proclaimed heritage sites
g) Graveyards and graves older than 60 years
h) Meteorites and fossils
i) Objects, structures and sites of scientific or technological value.

The national estate includes the following:

a) Places, buildings, structures and equipment of cultural significance
b) Places to which oral traditions are attached or which are associated with living heritage
c) Historical settlements and townscapes
d) Landscapes and features of cultural significance
e) Geological sites of scientific or cultural importance
f) Archaeological and paleontological importance
g) Graves and burial grounds
h) Sites of significance relating to the history of slavery
i) Movable objects (e.g. archaeological, paleontological, meteorites, geological specimens, military, ethnographic, books etc.)

A Heritage Impact Assessment (HIA) is the process to be followed in order to determine whether any heritage resources are located within the area to be developed as well as the possible impact of the proposed development thereon. An Archaeological Impact Assessment only looks at archaeological resources.

An HIA must be done under the following circumstances:

a) The construction of linear development (road, wall, power line canal etc.) exceeding 300m in length
b) The construction of a bridge or similar structure exceeding 50m in length

c) Any development or other activity that will change the character of a site and exceed 5 000m^2 or involve three or more existing erven or subdivisions thereof
d) Re-zoning of a site exceeding 10 000 m^2
e) Any other category provided for in the regulations of SAHRA or a provincial heritage authority

Structures

Section 34 (1) of the NHRA states that no person may demolish any structure or part thereof, which is older than 60 years without a permit issued by the relevant provincial heritage resources authority.

A structure means any building, works, device or other facility made by people and which is fixed to land and includes any fixtures, fittings and equipment associated therewith.

Alter means any action affecting the structure, appearance or physical properties of a place or object, whether by way of structural or other works, by painting, plastering or the decoration or any other means.

Archaeology, palaeontology and meteorites

Section 35(4) of this act deals with archaeology, palaeontology and meteorites. The act states that no person may, without a permit issued by the responsible heritage resources authority (national or provincial):

a) destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or paleontological site or any meteorite;
b) destroy, damage, excavate, remove from its original position, collect or own any archaeological or paleontological material or object or any meteorite;
c) trade in, sell for private gain, export or attempt to export from the Republic any category of archaeological or paleontological material or object, or any meteorite; or
d) Bring onto or use at an archaeological or paleontological site any excavation equipment or any equipment that assists in the detection or recovery of metals or archaeological and paleontological material or objects or use such equipment for the recovery of meteorites.
e) Alter or demolish any structure or part of a structure which is older than 60 years as protected.

The above mentioned may only be disturbed or moved by an archaeologist, after receiving a permit from the South African Heritage Resources Agency (SAHRA). In order to demolish such a site or structure, a destruction permit from SAHRA will also be needed.

Human remains

Graves and burial grounds are divided into the following:

a) ancestral graves
b) royal graves and graves of traditional leaders
c) graves of victims of conflict
d) graves designated by the Minister
e) historical graves and cemeteries
f) human remains

In terms of Section 36(3) of the National Heritage Resources Act, no person may, without a permit issued by the relevant 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 or 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, or any equipment which assists in the detection or recovery of metals.

All graves older than 60 years are called heritage graves and should be handled by an archaeologist. This includes archaeological graves, which are older than 100 years. Unidentified/unknown graves are also handled as older than 60 until proven otherwise.

Human remains that are less than 60 years old are subject to provisions of the National Health Act (Act 61 of 2003) and to local regulations. Exhumation of graves must conform to the standards set out in the Ordinance on Excavations (Ordinance no. 12 of 1980) (replacing the old Transvaal Ordinance no. 7 of 1925).

Permission must also be gained from the descendants (where known), the National Department of Health, Provincial Department of Health, Premier of the Province and local police. Furthermore, permission must also be gained from the various landowners (i.e. where the graves are located and where they are to be relocated) before exhumation can take place. Only a registered undertaker can handle human remains or an institution declared under the National Health Act (Act 61 of 2003).

1.4.2.3 National Heritage Resources Act Regulations (GNR 548, June 2000)

The regulations require permit applications to SAHRA for any damage or destruction of the following:

- National heritage site, provincial heritage site, provisionally protected place or structure older than 60 years
- Archaeological or palaeontological site or meteorite
- To reproduce a national heritage site
- Heritage objects
- To export a heritage object
- Wrecks
- Burial grounds and graves

The regulations also provide procedures for the consultation regarding protected areas; regarding burial grounds and graves; and discovery of previously unknown graves.

1.4.2.4 The Tourism Act, 1993 (Act No. 72 of 1993)

The legislation that exists in the tourism context in South Africa is firstly the Tourism Act 1993 (Act No. 72 of 1993) which was updated in the form of the Tourism Amendment Act No.105 of 1996. Following this amendment, the Tourism Second Amendment Act No.70 of 2000 was passed.

The mandate of the Department of Tourism (DoT), as outlined in the Tourism Act of 2014, is to:

- promote growth and development of the tourism sector; promote quality tourism products and services;
- provide for the effective domestic and international marketing of South Africa as a tourist destination; enhance cooperation and coordination between all spheres of government in developing and managing tourism; and
- promote the practice of responsible tourism for the benefit of South Africa and for the enjoyment of all its residents and foreign visitors.

1.4.2.5 National Tourism Sector Strategy (NTSS)

The NTSS Vision is:

"*rapidly and inclusively growing tourism economy that leverages South Africa's competitive edge in nature, culture, and heritage, underpinned by Ubuntu and supported by innovation and service excellence*." - A top world responsible tourism destination.[3]

The NTSS Mission is:

"*To increase the direct contribution of tourism to the economy through partnerships, research-based collaborative planning, and the implementation of agreed priority actions*".[4]

The Guiding Principles and Values of the NTSS are:

a) Trust and Accountability: The multiple partnerships shall be built on trust; all parties should have a mutual trust that they are all aiming for the same vision and goals and all role players shall accept responsibility to deliver on the actions and objectives on which they embark;
b) Respect for our arts, culture and heritage: All tourism development and activities shall respect all aspects of South Africa's diverse arts, heritage and culture;
c) Responsible tourism: All tourism development and activities shall deliver on the triple-bottom-line, namely economic, social and environmental sustainability;
d) Service excellence: The entire tourism value chain, including the non-tourism service providers, shall continually strive for service excellence towards all tourists.
e) Upholding the values of the Constitution: Human dignity and equality shall be respected;
f) A commitment to transformation: The entire industry shall understand and unequivocally support the moral need for transformation; and
g) Collaboration and cooperation between all key stakeholders.[5]

[3] National Tourism Sector Strategy, 2016
[4] National Tourism Sector Strategy, 2016
[5] National Tourism Sector Strategy, 2016

1.4.2.6 Limpopo Growth and Development Strategy

With the main focus on Limpopo, Limpopo province is also strategically situated at the northern-most tip of South Africa. It is ideally positioned for easy access to African markets. Its proximity to Zimbabwe, Mozambique and Botswana provides the investor with a powerful platform from which to access the South African region and to contribute as well as benefit from the New Partnership for Africa's Development.

The vision of the government of the Limpopo province is:

"*A peaceful, prosperous, united, dynamic and transformed province*."[6]

To enable this vision, the government sees its mission as:

"*To stimulate, promote and sustain unity and an enabling environment conducive for economic development, social justice and improved quality of life for all its people*."[7]

[6] Limpopo Growth and Development Strategy, 2005
[7] Limpopo Growth and Development Strategy, 2005

2 METHODOLOGY

2.1 Review of existing Heritage Research

A survey of the literature was undertaken in order to obtain background information regarding the area. Sources consulted in this regard are indicated in the bibliography.

The SAHRA database, SAHRIS, was also utilised. Information obtained here is utilised further on and referenced as such.

All sites, objects, features and structures identified were documented according to the general minimum standards accepted by the archaeological profession. Co-ordinates of individual localities were determined by means of the GPS. The information was added to the description in order to facilitate the identification of each locality.

2.2 Collection and Analysis of Data

Potential impacts resulting from the proposed Waterberg Project were identified during the Scoping Phase using input from the following sectors:

- Views of Interested and Affected Parties (IAPs);
- Existing information based on literature reviews and desktop assessments (EIA and specialist inputs);
- Information in the Environmental Management Plans for the Prospecting Rights;
- Fieldwork, Field Evaluations and Assessment Visits;
- Review of related Specialist Studies;
- Heritage Resource and Sensitivity Mapping;
- Tourism baseline assessment and associated socio-economic aspects;
- Guidelines; and.
- Legislation.

2.3 Engagement with Stakeholders and Local Communities

The Public Participation Programme followed for the Environmental Authorisation Application in terms of NEMA was utilised to identify stakeholder comments and concerns regarding the potential heritage impacts. Detail of the full programme is contained in the Environmental Impact Assessment.

The following Heritage related stakeholders are registered on the IAP database:

- South African Heritage Resources Agency (SAHRA)
- Limpopo Heritage Resources Agency (LIHRA)
- Capricorn District Municipality (CDM)
- Blouberg Local Municipality (BLM)
- Bahananwa Traditional Authority

- Bokoni Ba Matlala Traditional Authority
- Community representatives, members and elders from the Ketting, Disseldorp, Goedetrouw, Norma A&B, Early Dawn, Old Langsine, and Langbryde
- University of the Witwatersrand
- Rock Art Research Institute
- National Cultural History Museum

Comments received throughout the EIA process from IAPs include the following:

- Impact on grave sites;
- Impact on rock art sites with specific reference to its protection as well as the tourism activity connected to it; and
- Co-existence of rock art conservation, heritage tourism and mining development.

2.4 Review of related Specialist Studies

The following specialist studies were reviewed for impacts on heritage or cultural resources:

- Archaeological Assessment – Archaetnos Culture & Cultural Resources Consultants (Archaetnos), 2019
- Palaeontological Assessment – Dr Heidi Fourie (Ditsong: National Museum of Natural History), 2019
- Socio-economic Assessment – ChemC Environmental (ChemC), 2019
- Air Quality Assessment – EnviroNgaka, 2019
- Noise Assessment – Acusolv, 2019
- Visual Assessment – Newtown Landscape Architects (NLA), 2019
- Biodiversity Assessment – Nyengere Solutions (Nyengere), 2019
- Blasting and Vibration Assessment – Blast Management and Consulting (BMC), 2019
- Stakeholder Engagement and Public Participation Programme – Diphororo Development

2.5 Fieldwork, Field Evaluations and Assessment Visits

A basic assessment of the area was done in 2014 and the site was visited twice during this survey, for 3 days in September and 1 day in December. This was followed by an HIA in 2016 when the site was visited for a third time. This visit was done in May and the duration thereof was 2 days. During 2018 the site was visited again, as the infrastructure layout plan had changed. This visit was done in May and took 2 days.

The surveys were conducted according to generally accepted HIA practices and was aimed at locating all possible objects, sites and features of cultural significance in the area of proposed development. One regularly looks a bit wider than the demarcated area, as the surrounding context needs to be taken into consideration. These practices are described in SAHRA's minimum standards (2007) but is based on the basic methodology for doing archaeological surveys as described in various academic textbooks, such as Joukowsky (1980), Renfrew & Bahn (1991) and Van Vollenhoven (2000).

The location/position of any site was determined by means of a Global Positioning System (GPS), while photographs were also taken where needed. The surveys were undertaken by doing a physical survey via off-road vehicle and on foot and covered as much as possible of the area to be studied. Certain factors, such as accessibility, density of vegetation, etc. may however influence the coverage. The Project Area surveyed is larger than 4000 ha.

2.6 Heritage Resource and Sensitivity Mapping

Geographical Information Systems was utilized to map all identified heritage resources which included graves, historical ruins, iron age sites.

Due to its sensitivity and because research is still ongoing, exact locations of all rock art sites could not be obtained. A Rock Art Sensitive Area was determined utilizing the following:

- Topography (rocky outcrops and the Makgabeng plateau)
- Critical Biodiversity Areas (1 & 2)
- Geological formations
- Available information on rock art locations

By utilizing this method of looking at the broader Makgabeng Cultural landscape, and not individual sites, provision is made for the identification of further sites.

2.7 Assessing Resource Significance

The evaluation of heritage sites is done by giving a field rating of each (see Appendix C of the HIA) using the following criteria:

- The unique nature of a site;
- The integrity of the archaeological deposit;
- The wider historic, archaeological and geographic context of the site;
- The location of the site in relation to other similar sites or features;
- The depth of the archaeological deposit (when it can be determined or is known);
- The preservation condition of the site;
- Uniqueness of the site; and
- Potential to answer present research questions.

2.8 Assessing Development Impact

The development impact on the heritage resources is based on the EIA conducted for the Waterberg Project, as well as the specialist studies conducted for the project. Impact mapping was conducted to determine the potential direct and indirect impacts on the identified cultural and heritage resources.

The impact rating allocated to the different development impacts are in line with the findings of the EIAR and the specialist studies reviewed as part of this integrated report.

2.9 Conditions and Assumptions

The following conditions and assumptions have a direct bearing on the HIA (Archaetnos, 2019):

1. Cultural Resources are all non-physical and physical man-made occurrences, as well as natural occurrences associated with human activity. These include all sites, structures and artefacts of importance, either individually or in groups, in the history, architecture and archaeology of human (cultural) development. Graves and cemeteries are included in this.
2. The significance of the sites, structures and artefacts is determined by means of their historical, social, aesthetic, technological and scientific value in relation to their uniqueness, condition of preservation and research potential. The various aspects are not mutually exclusive, and the evaluation of any site is done with reference to any number of these aspects.
3. Cultural significance is site-specific and relates to the content and context of the site. Sites regarded as having low cultural significance have already been recorded in full and require no further mitigation. Sites with medium cultural significance may or may not require mitigation depending on other factors such as the significance of impact on the site. Sites with a high cultural significance require further mitigation.
4. All recommendations are made with full cognizance of the relevant legislation.
5. It must be mentioned that it is almost impossible to locate all the cultural resources in a given area, as it will be very time consuming. Developers should however note that the report makes it clear how to handle any other finds that might occur.
6. In this case there were certain areas where the vegetation cover was very dense in certain areas which had a negative effect on both the horizontal and the vertical archaeological visibility.
7. All the farms were surveyed before and therefore the aim was to identify sites not yet known as well as to determine impact.

3 HERITAGE RESOURCE ENVIRONMENT

A Heritage Impact Assessment (HIA) for the Waterberg Project area was conducted by Professor AC van Vollenhoven of Archaetnos. Several surveys were conducted in the Waterberg Project area during 2018 and 2019, the results which are presented in two HIA reports attached in Appendix B.

Several heritage sites were identified during the surveys and is indicated in Figure 8 in relation to the preferred Surface Infrastructure Area. These are discussed in more detail in sections 3.2 to 3.4 below.

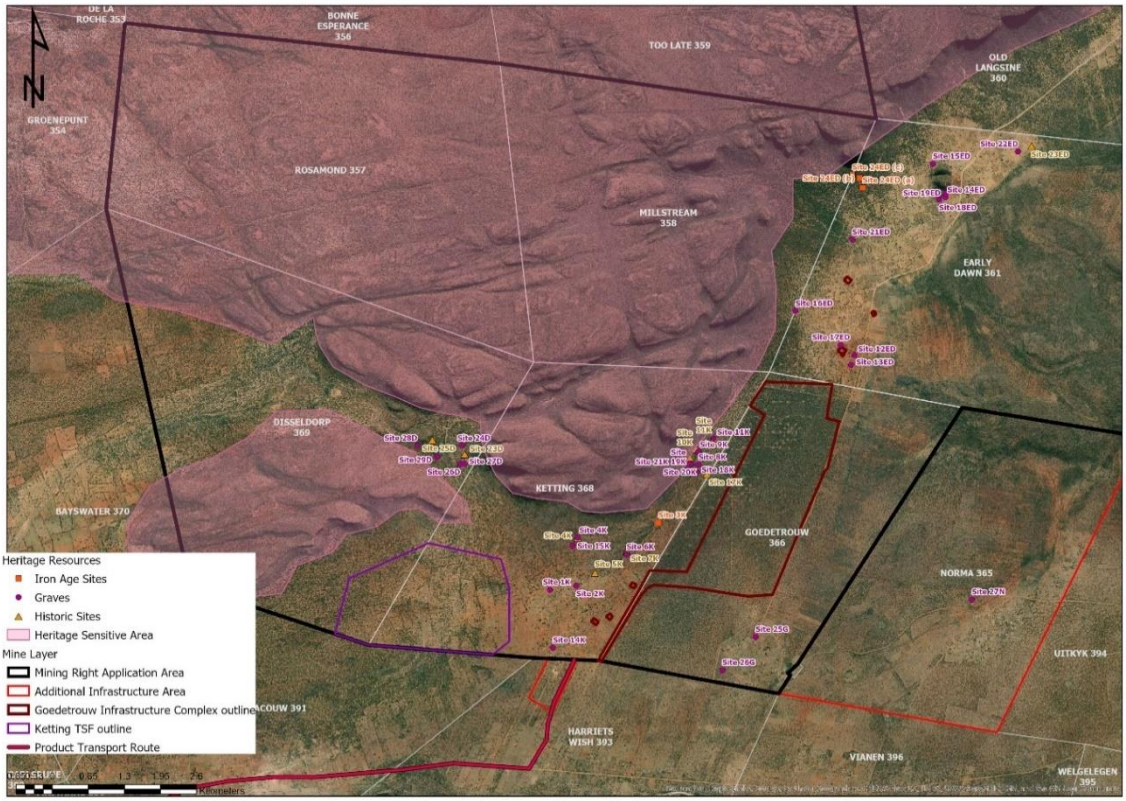

Figure 8: Heritage sites identified in the Waterberg Project area in relation to the preferred surface infrastructure area

3.1 Cultural Landscape - Makgabeng Plateau and Rock art

The Makgabeng Plateau is located about 45 km south-west of Vivo, at the western end of the Soutpansberg Mountain Range, about 22 km south-west of the Blouberg Mountain. The Makgabeng mountain is one of the three ranges in the province of Limpopo, South Africa. The other two mountain ranges are Soutpansberg and Blouberg. Makgabeng is the smallest of the three. The Makgabeng is a rugged and well-bushed plateau rising about 200m above the surrounding plains. It covers approximately 400 km^2 and lies just south of the 23rd degree parallel line.

The villages and communities which surround this mountain are collectively known as belonging to Makgabeng. These surrounding villages include: Bays Water, Disseldorp (Mothakgale), Cracow, Calsruhe (Khala), Harrietswish (Garaweshi), Ketting (Lehwaneng), Goedetrouw (Kgatu), Norma A and B, Uitkyk No. 1, 2 and 3, Schoongezicht, Early Dawn, Rosamond, Groenpunt, De La Roche, Devilliersdale, Mont Blanc, Bonne Esperance, Niewe Jerusalem, Too Late, Milbank (Ga Monyebodi), Langbryde, Old Langsyne, Lamonside (Ga-Lekgwara), Baranen, Gemarke, Rittershouse (Mokumuru), Normandy (Madibeng), Kirtenspruit (Sadu) and Non Parella.

One of the outstanding features of Makgabeng is the Khoisan and Bantu-speaking rock art paintings in the mountains. The fine paintings are evidence of traces of earliest human occupation in the area. The Makgabeng Plateau is home to over 890 San, Khoekhoe, Tswana and Northern Sotho rock art sites found hidden in sandstone outcrops and overhangs. The rock art at Makgabeng depicts the rich history of the indigenous people. It relays tales of war between the Boers on horseback and ox wagons, and Chief Malebogo.

In 2012 Rock Art Research Institute (RARI) became involved in a community-based heritage tourism project in the Makgabeng region. The BLM commissioned RARI to undertake a project focusing on the collection of ethnographic heritage, traditional folklore; the physical conservation of heritage resources; and strengthen the heritage tourism market in the region. The rich cultural background and heritage resources in the region called for the development of a heritage management and conservation report (RARI & Van Schalkwyk 2009b). The purpose of the plan was to devise strategies for the conservation of both the physical and intangible aspects of the heritage resources. The conservation plan was followed by a Tourism Management Plan that looked for ways to utilize the heritage resources for sustainable tourism purposes (RARI & Van Schalkwyk 2009a). Through an extensive survey RARI and Van Schalkwyk (2009a; 2009b) identified that the heritage resources in the MB region were under threat due to several factors including natural deterioration, neglect and unplanned development. It was therefore determined that the ideal remedy to these challenges would be the integration of economic value to the cultural resources on a sustainable basis.

The Makgabeng Plateau is seen as being a very sensitive heritage area – refer to Figure 9.

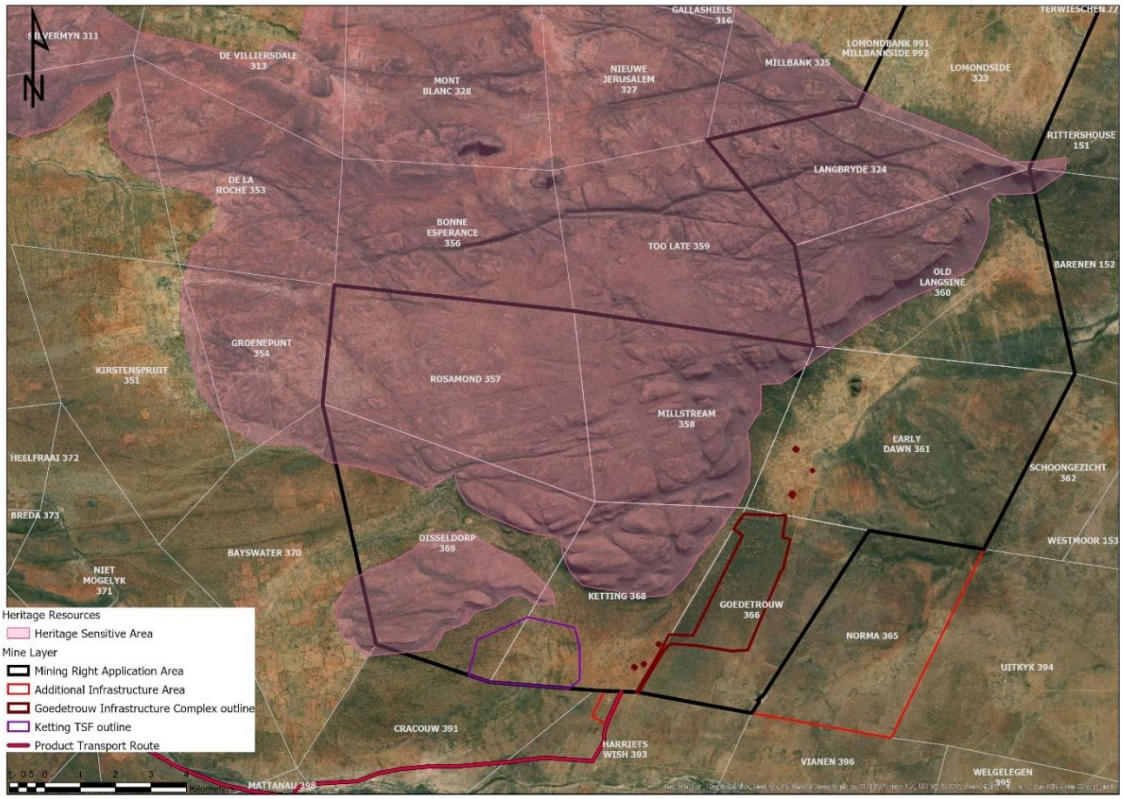

Figure 9: Heritage sensitive area associated with the Makgabeng Plateau

3.2 Historical Built Environment

The historical age started with the first recorded oral histories in the area. It includes the moving into the area of people that were able to read and write. This era is sometimes called the Colonial era or the recent past. Due to factors such as population growth and a decrease in mortality rates, more people inhabited the area during the recent historical past. Therefore, much more cultural heritage resources have been left on the landscape. It is important to note that all cultural resources older than 60 years are potentially regarded as part of the heritage and that detailed studies are needed in order to determine whether these indeed have cultural significance.

It is known that some of the early trade routes went past the Project Area, to the east thereof (Bergh 1999: 9). At the beginning of the 19th century different indigenous groups resided here. To the north it was the Hananwa who entered circa 1820/30 and to the south the Koni of Matlala, the Moletse/Kwena and the Langa Ndebele (Bergh 1999: 10). The Hananwa are the present occupiers of the area (Bradfield et.al.2009: 179).

The only early white traveller who visited this area was Coenraad de Buys in 1821 and 1825. In fact, he settled here (Bergh 1999: 12-13). The Voortrekkers under leadership of Louis Trichardt also moved through this area in 1836 (Bergh 199: 14).

White farmers settled in the Soutpansberg area during the 1840's and established the town of Schoemansdal (Bergh 1999: 14). They never settled further to the west in the project area. The white farmers were followed by the Berlin Missionaries and later other missionaries (Nel et.al. 2013: 21; Bergh 1999: 57).

In 1894 a war broke out between the Boers and the Hananwa in the Blouberg area. This was known as the Maleboch War. During the War several fortifications were erected of which some are still to be seen today (Van Schalkwyk & Moifatswane 1991: 1-17; Smith & Van Schalkwyk 2002: 237; Nel et.al. 2013: 21-22; Bergh 1999: 36). This lies just to the north of the surveyed area. Late Iron Age/ Historical stone walled sites, linked to this period, have also been identified close to the project area (Nel et.al. 2013:31-34, 41-43). The Historical/ Late Iron Age sites identified on Ketting may also date from this period in time.

It seems as if many of the farms surveyed were only used for grazing by white farmers. By 1904 the area was however allocated to different indigenous groups (Bergh 1999: 41). It later on became part of the so-called Lebowa State (Bergh 1999: 43).

It therefore is clear that one would rather expect recent historical structures in the area than older or even prehistoric features. According to legislation everything older than 60 years can potentially be deemed as of heritage value, although one has to also consider other factors, such as uniqueness and state of the site. It would be impossible to list every heritage site older than 60 years. Sites, features and structures that are known from nearby the surveyed area are nevertheless listed below:

Schoemansdal Voortrekker town and graveyard (Stoffberg 1988);

- ZAR fortifications at Blouberg;
- Mission stations, including Phatametsane, Khalatlolu, Bethesda, Malokong, Blauberg, Medingen, Mp'hôme, Kranspoort, Georgenholtz, Ha Schewasse, Tshakoma and Valdezia;
- Battlefields from the Anglo-Boer War (1899-1902) including Fort Edward close to Louis Trichardt, Fort Klipdam and Pietersburg to the north of Polokwane and Houtboschberg to the east of Polokwane;
- The place where Louis Trichardt met Portuguese Askari's and site of the State Artillery in Louis Trichardt (Oberholster 1972; Bergh 1999).

Declared national heritage sites include the following:

- Fort Hendrina in Louis Trichardt;
- The first ore stamper for gold on the farm Eersteling close to Polokwane;
- The Louis Trichardt monument north of Polokwane;
- Schoemansdal, mentioned earlier;
- Stonehenge, a residential farmhouse on the farm Bergvliet close to the Soutpansberg;
- The trek route of Louis Trichardt (Oberholster 1972; Bergh 1999);
- Fort Klipdam north of Polokwane, mentioned above (Oberholster 1972; SAHRA database; Bergh 1999).

One may therefore expect to find buildings and structures of a similar age (i.e. mid-19th century) on the farms within the Project Area. This is likely to coincide with the missionaries or structures built by farmers. It however seems as if these farms were scarcely inhabited by white farmers and rather used as grazing land.

Sites found will undoubtedly include graves. In fact, grave sites have been identified on adjacent farms during previous survey (Net et.al. 2013: 26, 29-30, 34-35, 41; Van Vollenhoven & Collins 2014; Van Vollenhoven 2015a; Van Vollenhoven 2016). Other historical sites were also identified during the latter surveys (Van Vollenhoven 2015a; Van Vollenhoven 2016).

The historical sites identified in the Waterberg Project area is shown in Figure 10 and listed in Table 1.

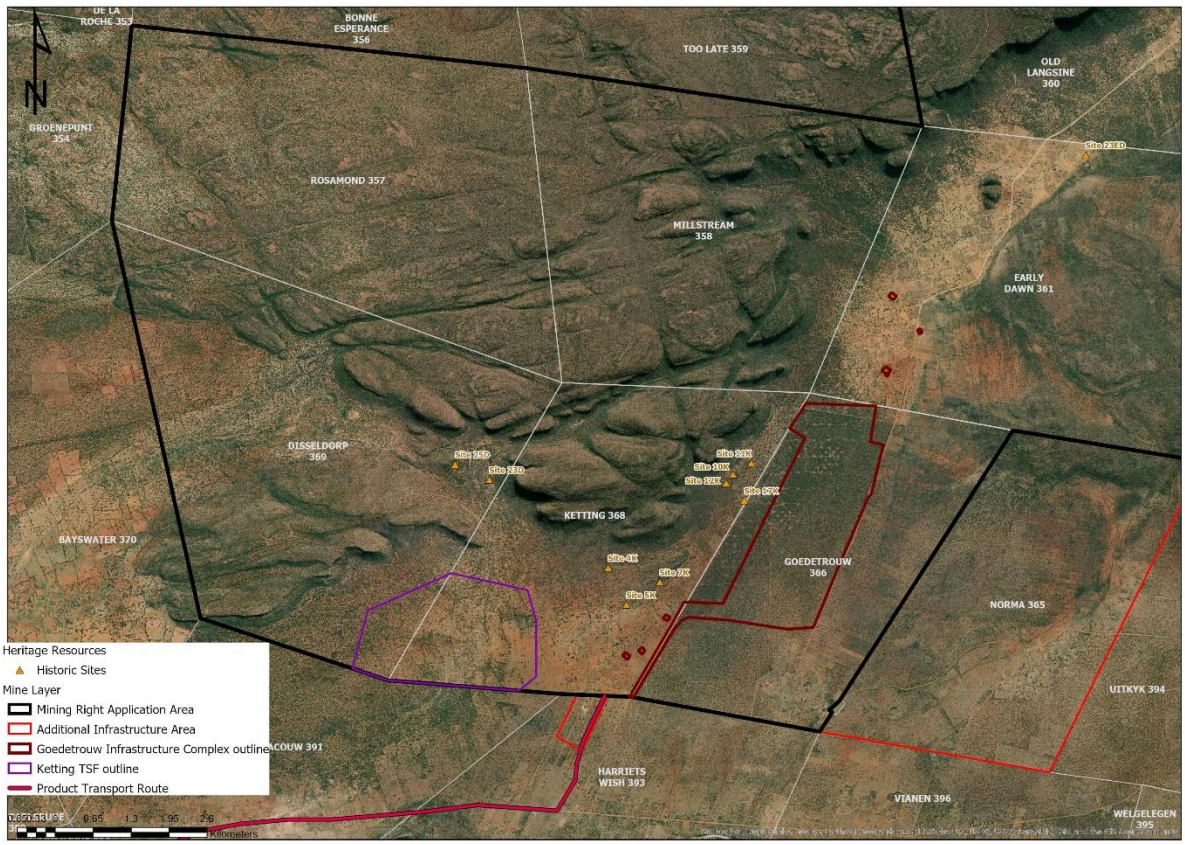

Figure 10: Historical sites identified in the Waterberg Project area

Table 1: Historical sites identified during the HIA (Archaetnos, 2019)

Site ID	Description	Farm	GPS Reference	Sensitivity	Potential impact	Photograph
Site 4K	***Historical residential site*** This is a residential site containing various rectangular and circular remains, most likely dating to the early to mid-20th century. The historical remains are built from cement and stone. It is not very old or unique and in a very bad state of decay. A single grave is situated at the site – refer to Table 2.	Ketting	23°22'48.1''S; 28°52'42.3''E	Low	The site will not be impacted on by the project and the residential site may be left as it is. The field rating for the site is General protection C (IV C). This report is seen as sufficient recording and it may be demolished, if required.	
Site 5K	***Historical residential site*** The site consists of rectangular, circular and square remains of buildings. These were originally built from stone and cement. The remains most likely date to the early to mid-20th century. It is not very old or unique.	Ketting	23°23'06.9"S; 28°52' 52.4" E	Low	Although the site is close to the development footprint, no direct impact is expected. The field rating for the site therefore is Local Grade IIIB: The site should be included in the heritage register and may be mitigated (high/ medium significance). Mitigation is subject to a permit application lodged with the relevant heritage authority.	
Site 7K	***Circular stone wall*** The site consists of at least two circular stone-built kraals. These are likely historical livestock enclosures and may be linked to any of the residential sites identified. There is a slight possibility that it may be dating back to the very last phase of the Late Iron Age. It is also most likely associated with Site 6K (graves). The site therefore most likely dates to between 1900 and 1950.	Ketting	23°22'55.4"S; 28°53'10.9" E	Medium	Although the site lies close to the development footprint, it will not be impacted on by the development. It may therefore be left as it is. The field rating for the site therefore is Local Grade IIIB: The site should be included in the heritage register and may be mitigated (high/ medium significance). Mitigation is subject to a permit application	

Site ID	Description	Farm	GPS Reference	Sensitivity	Potential impact	Photograph
					lodged with the relevant heritage authority.	
Site 10K	***Historical residential site*** The site consists of rectangular remains of buildings. These were originally built from stone and cement. Some glass shards were also seen lying around.	Ketting	23°22'00.7"S; 28°53'51.6" E	Low	Although the site is close to the development footprint, no direct impact is expected. The field rating for the site therefore is Local Grade IIIB: The site should be included in the heritage register and may be mitigated (high/ medium significance). Mitigation is subject to a permit application lodged with the relevant heritage authority.	
Site 11K	***Historical residential site*** This is a residential site containing various rectangular and circular remains, most likely dating to the early to mid-20th century. The historical remains are built from cement and stone. A refuse midden may also be present with glass and ceramic shards lying around. The site is not very old or unique and in a very bad state of decay. A graveyard is situated at the site – refer to Table 2.	Ketting	23°21'54.9''S; 28°54'01.6''E	Low	The site is close to the development footprint and there will be an indirect impact. The residential site may be left as it is. The field rating for the site is General protection C (IV C). This report is seen as sufficient recording and it may be demolished, if required.	
Site 12K	***Historical residential site*** The site consists of rectangular remains of buildings. These are mainly stone built.	Ketting	23°22'05.12"S; 28°53'47.69" E	Low	Although the site is close to the development footprint no direct impact is expected. The field rating for the site therefore is Local Grade IIIB: The site should be included in the heritage register and may be mitigated (high/ medium significance). Mitigation is subject to a permit application lodged with the relevant heritage authority.	

Site ID	Description	Farm	GPS Reference	Sensitivity	Potential impact	Photograph
Site 17K	***Historical residential site*** The site consists of rectangular and circular remains of buildings and walls. These are manly stone built.	Ketting	23°22'13.92"S; 28°53'57.67" E	Low	The site will be impacted on by the development footprint. The field rating for the site therefore is Local Grade IIIB: The site should be included in the heritage register and may be mitigated (high/ medium significance). Mitigation is subject to a permit application lodged with the relevant heritage authority.	
Site 25D	***Historical residential site*** The site consists of rectangular remains of buildings and walls. These are mainly stone built.	Disseldorp	23°21'55.61"S; 28°51'17.55" E	Low	The site is far from the development footprint and therefore no direct impact is expected. The filed rating for the site therefore is Local Grade IIIB: The site should be included in the heritage register and may be mitigated (high/ medium significance). Mitigation is subject to a permit application lodged with the relevant heritage authority.	
Site 23D	***Historical residential site*** The site consists of rectangular and circular remains of buildings and walls. These are mainly stone built.	Disseldorp	23°22'03.34"S; 28°51'36.49" E	Low	The site is far from the development footprint and thus no direct impact is expected. The field rating for the site therefore is Local Grade IIIB: The site should be included in the heritage register and may be mitigated (high/ medium significance). Mitigation is subject to a permit application lodged with the relevant heritage authority.	

Site ID	Description	Farm	GPS Reference	Sensitivity	Potential impact	Photograph
Site 23ED (S10/2016)	***Historical residential site*** The site consists of various rectangular remains of structures. These were originally built from stone and cement. The remains most likely date to the early to mid-20th century. It is not very old or unique.	Early Dawn	23°19'18.3"S; 28°57'06.9" E	Medium	The site will not be impacted by the development and it may therefore be left as it is. The field rating for the site therefore is Local Grade IIIB: The site should be included in the heritage register and may be mitigated (high/ medium significance). Mitigation is subject to a permit application lodged with the relevant heritage authority.	

3.3 Burial Grounds and Graves

Graves are always regarded as having a high cultural significance. The field rating thereof is Local Grade III B. It should be included in the heritage register but may be mitigated.

Two possibilities exist. The first option would be to fence the graves in and have a management plan drafted for the sustainable preservation thereof ("Option 1"). This should be written by a heritage expert. This usually is done when the graves are in no danger of being damaged, but where there will be a secondary impact due to the activities of the mine.

The second option is to exhume the mortal remains and then to have it relocated ("Option 2"). This usually is done when the graves are in the area to be directly affected by the mining activities. For this a specific procedure should be followed which includes social consultation. For graves younger than 60 years, only an undertaker is needed. For those older than 60 years and unknown graves an undertaker and archaeologist is needed. Permits should be obtained from the Burial Grounds and Graves unit of SAHRA. This procedure is quite lengthy and involves social consultation.

Several burial grounds and grave sites have been identified in the Waterberg Project area as indicated in Figure 11 and listed in Table 2.

The field rating for these sites are Local Grade IIIB: The sites should be included in the heritage register and may be mitigated (high/medium significance). Mitigation is subject to a permit application lodged with the relevant heritage authority.

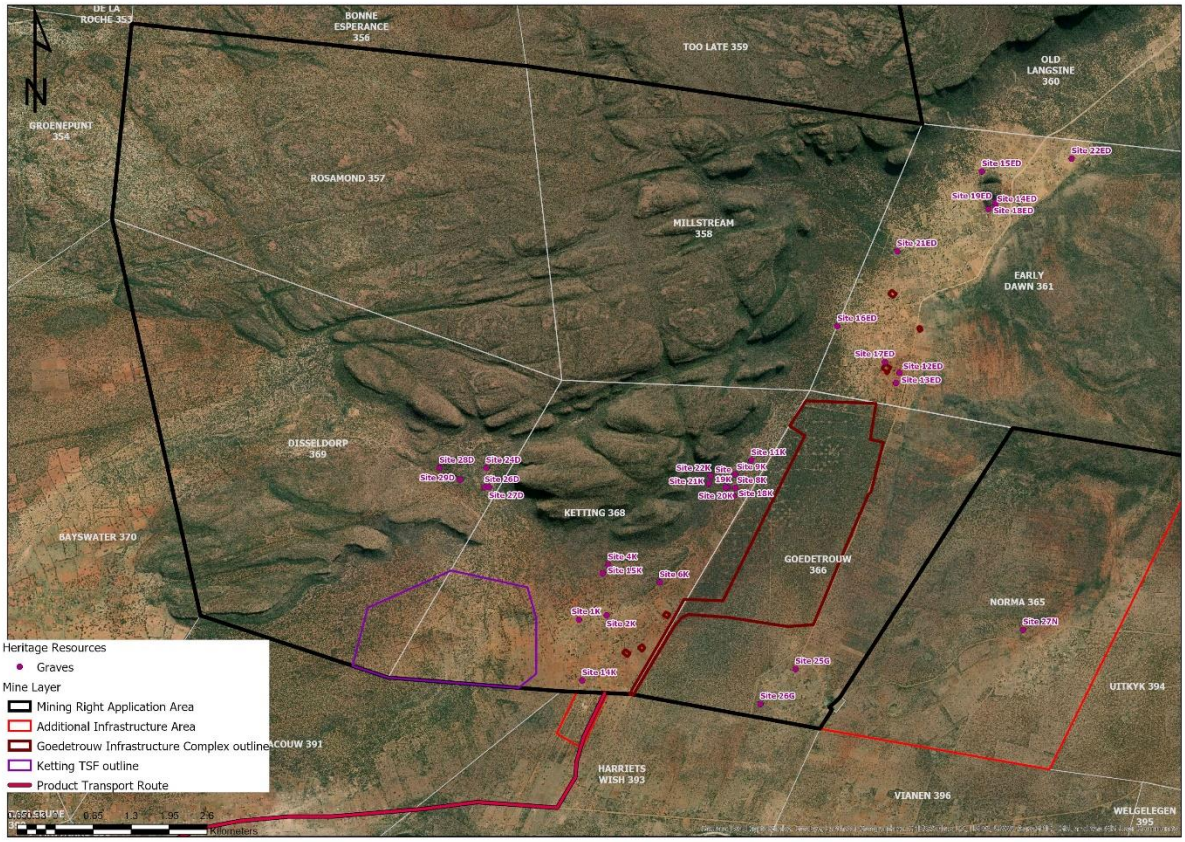

Figure 11: Grave sites and burial grounds identified in the Waterberg Project area

Table 2: Burial grounds and grave sites identified during the HIA (Archaetnos, 2019)

Site ID	Description	Farm	GPS Reference	Sensitivity	Potential impact	Photograph
Site 1K	***Graveyard*** This is a site containing at least 14 graves. Most of the graves are stone packed, with or without headstones, but some also have granite headstones and borders. Surnames identified include Ramokgaba and Mantla. The oldest date of death identified is 1947 and the youngest 1993. Graves from all three of the categories of graves were identified, being those older than 60 years (heritage graves), those without a date of death (unknown graves) and those younger than 60 years.	Ketting	23°23'16.0''S; 28°52'26.1''E	High	Although close to the development area, these graves will not be impacted on directly by the development. Therefore Option 1 is recommended.	
Site 2K	***Graveyard*** This is a site containing at least 91 graves. Most of the graves are stone packed, with or without headstones, but some also have granite headstones and borders. Surnames identified include Ngoepe and Senosha. Graves from all three of the categories of graves were identified.	Ketting	23°23'13.9''S; 28°52'41.5''E	High	Although close to the development area, these graves will not be impacted on directly. Therefore Option 1 is recommended.	
Site 4K	***Single grave at historical residential site*** The surname of the person buried here is Rapheaga and the date of death 1930. It has a granite headstone and grave dressing. It therefore is older than 60 years and is regarded to be a heritage grave.	Ketting	23°22'48.1''S; 28°52'42.3''E	High	The site will not be impacted on by the development. Therefore Option 1 is recommended.	

Site ID	Description	Farm	GPS Reference	Sensitivity	Potential impact	Photograph
Site 6K	***Graveyard*** This is a site containing at least 15 graves. Most of the graves are stone packed, with or without headstones, but some also have granite or cement headstones and borders. Surnames identified include Mmakwena and Phukubje. The oldest date identified is 1966 and the youngest 1995. Nine of the graves have an unknown date of death. Graves from two of the three of the categories of graves were identified – unknown graves and those younger than 60 years.	Ketting	23°22'57.1''S; 28°53'10.9''E	High	The site is close to the development footprint and there will be an indirect impact. Option 1 is recommended.	
Site 8K	***Graveyard*** This is a site containing at least 5 graves. All have granite headstones and borders. Only one surname was identified being Phukubje. The oldest date identified is 1904 and the youngest 1983. Graves from two of the three of the categories of graves were identified, one heritage grave and the rest younger than 60 years.	Ketting	23°22'09.0''S; 28°53'52.8''E	High	This site is close to the development, but no direct impact is foreseen. Option 1 is recommended.	
Site 9K	***Graveyard*** This is a site containing at least 11 graves. Most of the graves have granite or headstones and borders, with 2 having cement borders. Only one surname could be identified, being Phukubje. The oldest date identified is 1966 and the youngest 1982. The graves are all younger than 60 years.	Ketting	23°22'02.2''S; 28°53'52.6''E	High	Although close to the development area, these graves will not be impacted on directly by the development. Option 1 is therefore recommended.	

Site ID	Description	Farm	GPS Reference	Sensitivity	Potential impact	Photograph
Site 11K	***Graveyard at historical residential site*** At least 9 graves are present. No surnames or dates of death could be identified, but informants indicated that the grave are those of the Kgomo and Moremi families. The graves are all stone packed. The graves are therefore unknown and should be handled as heritage graves.	Ketting	23°21'54.9''S; 28°54'01.6''E	High	The site is close to the development footprint and there will be an indirect impact. Therefore Option 1 is recommended.	
Site 14K	***Graveyard*** This is a site containing 4 graves. They all have granite dressing. The graves are also fenced in. The only surname available is Baloyi. The oldest date of death noted is 1954 and the youngest 1975. Graves from two of the three of the categories of graves were identified, heritage graves and graves younger than 60 years.	Ketting	23°23'46.99''S; 28°52'27.94''E	High	There will be no direct impact on the site and therefore Option 1 is recommended.	
Site 15K	***Graveyard*** This is a site containing at least 5 graves. All of the graves are dressed with granite with accompanying headstones. Only one surnames was identified, being Mokwatedi. The dates of death vary between 1956 and 1983. One grave is older than 60 years and two younger. The remaining two have unknown dates of death. Thus, graves from all three of the categories of graves were identified.	Ketting	23°22'52.48''S; 28°52'39.24''E	High	There will be no direct impact on this site and therefore Option 1 is recommended.	

Site ID	Description	Farm	GPS Reference	Sensitivity	Potential impact	Photograph
Site 18K	***Graveyard*** This is a site containing 2 graves. Both have granite headstones and borders and date to 1972. The only surname identified is Phukubje. Both graves fall within the category of those younger than 60 years.	Ketting	23°22'13.25''S; 28°53'51.78''E	High	There will be no direct impact on the site and thus Option 1 is recommended.	
Site 19K	***Single grave*** This is a site containing only one grave. It has a granite headstone and border. The surname on the headstone is Phukubje. The date on the grave is 1956. It thus is regarded as being a heritage grave.	Ketting	23°22'08.82'S; 28°53'48.35''E	High	Although close to the development area, these graves will not be impacted on directly by the development. Option 1 is therefore recommended.	
Site 20K	***Graveyard*** This is a site containing at least 10 graves. Five of the graves are stone packed, with or without headstones, and five have granite headstones and borders. Only one surname was identified, namely Phukubje. Those with dates range between 1982 and 2009. Graves from two of the categories of graves were identified, being unknown graves and graves younger than 60 years.	Ketting	23°22'08.82''S; 28°53'47.47''E	High	Although close to the development area, these graves will not be impacted on directly by the development. Option 1 is therefore recommended.	

Site ID	Description	Farm	GPS Reference	Sensitivity	Potential impact	Photograph
Site 21K	***Graveyard*** This is a site containing at least 46 graves. Most of the graves are stone packed, with or without headstones, but some also have granite headstones and borders. The only surname identified is Phukubje. The site seems to consist of two sections as some of the graves are a few metres away from the others. This may have no significance. The dates of death range between 1918 and 1986. Graves from all three of the categories of graves were identified.	Ketting	23°22'06.70''S; 28°53'38.09'E	High	Although close to the development area, these graves will not be impacted on directly by the development. Option 1 is therefore recommended.	
Site 22K	***Graveyard*** This is a site containing at least 15 graves. One has a granite headstone and grave dressing whereas the rest are stone packed. The surname on the headstone is Phukubje. The date of death on the grave is 1929. The grave therefore is older than 60 years and therefore is a heritage grave.	Ketting	23°22'02.94''S; 28°53'39.05''E	High	No direct impact is foreseen on the site. Therefore Option 1 is recommended.	
Site 25G (S1/2016)	***Graveyard*** This is a site containing at least 34 graves. Two of these are stone packed and one has a granite dressing. The graves are also fenced in. The only surname available is Sepufa and this person died in 1951. The other two graves have no information. Graves from two of the three of the categories of graves were identified, heritage and unknown graves.	Goedetrouw	23°23'41.2''S; 28°54'26.1''E	High	There will be no direct impact on the site if any of two alternatives are implemented. Therefore Option 1 is recommended.	

Site ID	Description	Farm	GPS Reference	Sensitivity	Potential impact	Photograph
Site 26G (S2/2016)	***Graveyard*** This is a very large site containing at least 60 graves. All of the graves are either dressed with cement or granite with accompanying headstones. The graves are also fenced in. Surnames identified include Masehela, Laka, Boshomane, Monkoe and Makgoka. Graves from two of the three of the categories of graves were identified, heritage graves and graves younger than 60 years.	Goedetrouw	23°23'56.8''S; 28°54'07.4''E	High	Again, for both alternative development plans, there will be no direct impact on site. Therefore Option 1 is recommended.	
Site 14ED (S1/2016)	***Graveyard*** This is a site containing at least 60 graves. Most of the graves are stone packed, with or without headstones, but some also have granite headstones and borders. One of the surnames identified is Malebana. Graves from all three of the categories of graves were identified.	Early Dawn	23°19'45.9''S; 28°56'16.8''E	High	There will be no direct impact on the site for both development alternatives. Thus Option 1 is recommended.	
Site 15ED (S2/2016)	***Graveyard*** This is a site containing at least 50 graves. Most of the graves are stone packed, with or without headstones, but some also have granite headstones and borders. One of the surnames identified is Phuti. Graves from all three of the categories of graves were identified.	Early Dawn	23°19'28.0''S; 28°56'09.4''E	High	Again, for both development alternatives, no impact is foreseen on this site. Therefore Option 1 is recommended.	

Site ID	Description	Farm	GPS Reference	Sensitivity	Potential impact	Photograph
Site 16ED (S3/2016)	***Graveyard*** This is a site containing at least 44 graves. Most of the graves are stone packed, with or without headstones, but some also have granite headstones and borders. Some of the surnames identified are Sekgala and Ngoepe. Graves from all three of the categories of graves were identified.	Early Dawn	23°20'46.8''S; 28°54'49.3''E	High	For development Alternative 1, no impact is foreseen on this site. Option 1 is therefore recommended. However, for development Alternative 2, direct impact is foreseen. Should Alternative 2 be chosen, Option 2 is recommended.	
Site 17ED (S4/2016)	***Graveyard*** This is a site containing at least 70 graves. Most of the graves are stone packed, with or without headstones, but some also have granite headstones and borders. Surnames identified include Ramoroka and Mojela. Graves from all three of the categories of graves were identified.	Early Dawn	23°21'05.0''S; 28°55'15.6''E	High	For both development alternatives no direct impact is foreseen on the site. Thus Option 1 is recommended.	
Site 18ED (S5/2016)	***Single grave*** This is a single grave with a granite headstone and dressing. The surname on the headstone is Ngoepe. The date of death on the grave is 1940. The grave therefore is older than 60 years and therefore is a heritage grave.	Early Dawn	23°19'47.3''S; 28°56'13.1''E	High	For both development alternatives, no direct impact is foreseen on the site. Therefore Option 1 is recommended.	

Site ID	Description	Farm	GPS Reference	Sensitivity	Potential impact	Photograph
Site 19ED (S6/2016)	***Graveyard*** This is a site containing at least 8 graves. Four of the graves have brick borders and four granite borders and headstones. One surname was identified being Motlokwane. The oldest date of death is 1994 and the youngest 2000. This means that all the graves are younger than 60 years.	Early Dawn	23°19'43.8''S; 28°56'16.9''E	High	For both development alternatives, no direct impact is foreseen. Option 1 is therefore recommended.	
Site 20ED (S7/2016)	***Graveyard*** This is a site containing at least 50 graves. The graves mostly have granite headstones and borders, but some have cement dressing or are just stone packed. Surnames identified include Ngoepe and Ngwepe. The oldest date of death is 1993 and the youngest 2009. Some have no information. This means that two of the three categories of graves are present being those with an unknown date of death and those younger than 60 years.	Early Dawn	23°20'23.5''S; 28°55'102.6''E	High	For both development alternatives, no direct impact is foreseen. Option 1 is therefore recommended.	
Site 21ED (S8/2016)	***Graveyard*** This is a large site containing at least 30 graves. The graves mostly have granite headstones and borders, but some have cement or brick dressing. A few are new graves only indicated by a heap of soil. Surnames identified include Ramoroka, Thou, Sekwadi and Setumu. All the graves are fairly recent meaning they are all younger than 60 years.	Early Dawn	23°20'08.6''S; 28°55'22.5''E	High	For both development alternatives, no direct impact is foreseen on this site. Thus Option 1 is recommended.	

Site ID	Description	Farm	GPS Reference	Sensitivity	Potential impact	Photograph
Site 22ED (S9/2016)	***Graveyard*** This is a site containing at least 30 graves. Four of the graves have granite headstones and borders and one have cement dressing. The remainder are all stone packed. Only one surname was identified namely Mosina. The oldest date of death is 1978 and the youngest 2008. Some have no information. This means that two of the three categories of graves are present being those with an unknown date of death and those younger than 60 years.	Early Dawn	23°19'21.5''S; 28°56'59.1''E	High	For this site no direct impact is foreseen by any of the development alternatives. Therefore Option 1 is recommended.	
Site 12ED	***Graveyard*** This is a site containing 2 graves. Both have granite headstones and borders. Only one surname was identified namely Mpebe. The oldest date of death is 1963. This means that only one of the three categories of graves are present being those younger than 60 years.	Early Dawn	23°21'10.5''S; 28°55'23.8''E	High	For this site no direct impact is foreseen for any of the development alternatives. Therefore Option 1 is recommended.	
Site 13ED	***Graveyard*** This site was identified by a community member. Only two stones are present, apparently indicating two graves. No other information is available. This means that one of the three categories of graves are present being those with an unknown date of death.	Early Dawn	23°21'15.6''S; 28°55'21.9''E	High	For this site no direct impact is foreseen for any of the development alternatives. Therefore Option 1 is recommended.	

Site ID	Description	Farm	GPS Reference	Sensitivity	Potential impact	Photograph
Site 27N	***Graveyard*** (site 36.19 from the Nel et.al, 2013 report) This is a site containing at least 140 graves. Most of the graves have granite headstones and borders. Some of the surnames identified is Ramaroka, Ngoepe, Mojela, Setumu and Masekoa. The oldest date of death identified is 1940. Unfortunately, Nel et.al. (2013) does not provide more information. For now it is assumed that it is likely that graves from all three of the categories of graves are present	Norma	23°23'21.2''S; 28°56'32.2''E	High	There will be no direct impact from any of the two development alternatives on the site. Thus option 1 is recommended.	
Site 24D	***Graveyard*** This is a site containing at least 40 graves. Most of the graves have granite headstones and dressing, but some are merely stone packed. Surnames that were identified include Ngwepe and Mautla. The dates of death range between 1918 and 1986. Graves from all three of the categories of graves were identified.	Disseldorp	23°21'58.86''S; 28°51'34.78''E	High	No direct impact is foreseen. Option 1 is therefore recommended.	
Site 26D	***Graveyard*** This is a site apparently containing 40 graves. It could however not be located, but information was provided by informant. Surnames of people buried here include Mautla, Phukubje, Ngoepe and Moloto.	Disseldorp	23°22'08.7''S; 28°51'33.9''E (inaccurate, could be the same as Site 24)	High	No direct impact is foreseen. Option 1 is therefore recommended.	Not available.
Site 27D	***Single grave*** This site was indicated on a list provided by the mine from information obtained from informants. The site could however not be located. It is indicated that it a single grave. The surname of the person buried here is Mautla.	Disseldorp	23°22'08.6''S; 28°51'36.3''E (inaccurate)	High	No direct impact is foreseen. Option 1 is therefore recommended.	Not available.

Site ID	Description	Farm	GPS Reference	Sensitivity	Potential impact	Photograph
Site 28D	***Graveyard*** This site was indicated on a list provided by the mine from information obtained from informants. The site could however not be located. It is indicated that the site contains 22 graves. Surnames provided are Rapheega, Mojela, Maarala, Ngoepe and Phukubje.	Disseldorp	23°21'58.9''S; 28°51'08.9''E (inaccurate)	High	No direct impact is foreseen. Option 1 is therefore recommended.	Not available.
Site 29D	***Graveyard*** This site was indicated on a list provided by the mine from information obtained from informants. The site could however not be located. It is indicated that the site contains 11 graves. The only surnames provided is Ngoepe.	Disseldorp	23°22'04.9''S; 28°51'20.2''E (inaccurate)	High	No direct impact is foreseen. Option 1 is therefore recommended.	Not available.

3.4 Archaeology

3.4.1 Stone Age

The Stone Age is the period in human history when lithic material was mainly used to produce tools (Coertze & Coertze 1996: 293). In South Africa the Stone Age can be divided in three periods. It is however important to note that dates are relative and only provide a broad framework for interpretation. The division for the Stone Age according to Korsman & Meyer (1999) is as follows:

- Early Stone Age (ESA) 2 million – 150 000 years ago
- Middle Stone Age (MSA) 150 000 – 30 000 years ago
- Late Stone Age (LSA) 40 000 years ago – 1850 - A.D.

Many Stone Age sites have been identified previously in the Limpopo Province. Sites dated to the Early Stone Age were identified at Blaauwbank close to Rooiberg, at the Cave of hearths and Schoonheid close to Mokopane, at Olieboompoort to the north of Thabazimbi and at Kalkbank to the south of Schoemansdal (Bergh 1999: 4).

Middle Stone Age sites are known at Tuinplaats to the east of Bela-Bela, at Olieboompoort to the north of Thabazimbi, at the Cave of Hearths and Rufus Cave close to Mokopane, at Grace Dieu and Mwulu Cave close to Polokwane, at Kalkbank to the south of Schoemansdal and at Noord-Brabant and Goergap to the east of Lephalale (Bergh 1999: 4). One Middle Stone Age site is known from the farm Mont Blanc, close to the surveyed area (Sadr 2005).

Late Stone Age sites have been identified at Wellington Estates to the east of Settlers, at Modimolle, at Olieboompoort to the north of Thabazimbi, at the Cave of Hearths close to Mokopane, at Noord-Brabant close to Lephalale, at Kalkbank to the south of Schoemansdal and in the Greefswald area. Closer to the surveyed area only one Late Stone Age site is known. It is called the Makgabeng site close to Blouberg (Bergh 1999: 4).

Rock art is also associated with the Late Stone Age. Such sites were found in abundance in the Limpopo Province. Rock paintings are located along the Limpopo River, the Soutpansberg, Waterberg, Strydpoortberg and the areas in between these. Rock engravings were found along the Mogalakwena and Limpopo Rivers, and between the Olifants and Steelpoort Rivers (Bergh 1999: 4). This includes the Project Area.

It is clear that the mentioned sites were identified in rural areas and therefore there is a good chance of finding Stone Age sites in this environment, especially close to rivers and mountains. These natural features create an environment suitable for human habitation.

At least one Middle Stone Age site was identified in close proximity to the project area (Nel et.al 2013: 43-44). Nel et.al. (2013: 20-27) also indicates the Late Stone Age existence in the more immediate vicinity of the project area. They mention that more than 460 rock art sites have been documented in this region. However, Eastwood and Tlouamma (2006:9) indicates that they documented more than 670 sites in the region. This includes San rock art as well as finger paintings associated with the Khoi.

Rock paintings were also noted by Van Essen (2018), who conducted a biodiversity study on the plateau.

Late Stone Age sites on the Makgabeng Plateau was also researched and described by Bradfield et.al. (2009: 176-183). They indicate that research has been done in the past here by Roberts (1916), Mason (1962) and Sampson (1974). Bradfield excavated a specific shelter called Mphekwane.

Although no such sites were identified during the survey, it is clear from the above mentioned that Stone Age people did utilize and settled in the broader geographical area. There however are some hiatuses due to certain farms not having been researched before. One will therefore have to be careful during mining that sites are not disturbed. These are however expected to occur against and on top of the Makgabeng Plateau which is adjacent to the area of impact.

Things to be on the lookout for would be caves, rock shelters, rock outcrops and areas with scattered stone tools in the open, especially close to rivers. This environment is found on the western sections of the farms Early Dawn and Ketting. Stone tools can be recognized by it showing definite sharp edges as well as cut and hammering marks, which would distinguish it from ordinary stones. Rock paintings may also be found in caves and rock shelters whereas large stones in the open may contain rock engravings.

3.4.2 Iron Age

The Iron Age is the name given to the period of human history when metal was mainly used to produce metal artifacts (Coertze & Coertze 1996:346). In South Africa it can be divided in two separate phases according to Van der Ryst & Meyer (1999: 96-98), namely:

- Early Iron Age (EIA) 200 – 1000 A.D.
- Late Iron Age (LIA) 1000 – 1850 A.D.

Huffman (2007: xiii) however indicates that a Middle Iron Age should be included. His dates, which are now widely accepted in archaeological circles, are:

- Early Iron Age (EIA) 250 – 900 A.D.
- Middle Iron Age (MIA) 900 – 1300 A.D.
- Late Iron Age (LIA) 1300 – 1840 A.D.

Very few Early Iron Age sites have been identified. In Limpopo Province these include sites at Kommando Kop, Pont Drift, Mapungubwe and Schroda in the Limpopo Valley. Other sites are Happy Rest/ Matakoma close to Schoemansdal, Klein Afrika to the north of Louis Trichardt, the Eiland site along the upper Letaba River, Silver Leaves close to Tzaneen, at Harmonie to the south of Leydsdorp and at Diamant to the north of Thabazimbi (Bergh 1999: 6). Sites were also identified close to Burgersfort and Hoedspruit (Archaetnos database). No Early Iron Age sites are indicated in a historical atlas (Bergh 1999) close to the surveyed area.

Middle Iron Age sites include the World Heritage site at Mapungubwe as well as K2, Kommandokop and Schroda in the Limpopo Valley (Bergh 1999: 7). No Middle Iron Age sites are indicated in a historical atlas (Bergh 1999) close to the surveyed area.

Late Iron Age sites are found in abundance throughout the Limpopo Province. Pelser (2011: 11) indicate that many such sites exist close to Alldays but does not provide any details. Known sites include those along the Sand and Levuvhu Rivers, various sites in the Kruger National Park (including Thulamela, Makahane and others), at least 58 sites near the town of Phalaborwa, 200 sites along the Lephalala River, 35 sites to the south of Polokwane, 42 sites to the east of Mokopane, 13 smelting sites in the Strydpoort Mountains and 63 sites between Thabazimbi and Rooiberg (Bergh 1999: 7). None of these are in the surveyed area.

Specific sites relating to archaeo-metallurgy were also identified. Sites where copper smelting were identified include some to the west and south of Musina, to the north and west of Phalaborwa (including Lolwe), sites to the south of Leydsdorp, between Tzaneen and Polokwane, along the Hout River and close to Modimolle. Sites where iron were worked include those at Tshimbupfe to the east of Louis Trichardt, sites around Phalaborwa, sites between Polokwane and Tzaneen, to the north and east of Modimolle and to the east of Thabazimbi. Signs of gold working were only found at four sites namely Mapungubwe, Machemma, Makahane and Thulamela. Tin workings were identified at Blaauwbank and Rooiberg in the south-west of the province (Bergh 1999: 8). More sites known are sites on the farm Icon, Matoks, Manavela, Tavhatshena and the farm Stayt (Archaetnos database). Van Schalkwyk also indicated that iron was worked at a site on the farm Millbank (Bradfield et.al. 2009: 180).

The lack of known sites in the Project Area is merely an indication that these have not been surveyed in the recent past. Therefore, chances are good that Iron Age material and sites will be identified on some of these farms. Early Iron Age sites are usually found close to rivers. During a very recent survey such sites were indeed identified on the southern side of Blouberg and the northern side of the Makgabeng Plateau. Mention is made of several Early Iron Age sites on farms in and close to the project area (Nel et.al. 2013: 20-23).

During the mentioned recent survey, in close proximity to the project area, Nel et.al. (2013: 20-29, 35-40, 44-46) did identify Late Iron Age sites. They also mention rock art sites, known as finger paintings, associated with Northern Sotho speaking farming communities of the Late Iron Age. These were studied by Smith & Van Schalkwyk 2002: 235-254) who indicated that a specific painting of a camel can be dated to the early 20th century.

Van Schalkwyk indicated that Iron Age farmers moved into the area during the 13th century. He also did some excavations on the farm Millbank on a 16th and 17th century LIA village (Bradfield et.al. 2009: 176).

Late Iron Age sites are normally found on the foot or against slopes of hills. These sites can be identified by extensive stone walled complexes that served as homesteads and cattle kraals.

Sometimes these sites can be identified by only a few potsherds. The lack of known sites closer to the project area may only indicate that no research has been done in this area. During the mentioned recent survey near the project area, Nel et.al. (2013: 20-29, 35-40, 44-46) did identify Late Iron Age sites. They also mention rock art sites, known as finger paintings, associated with Sotho speaking farming communities of the Late Iron Age.

One such site was identified during the current survey, but since the environment is definitely suitable, one should be cautious. Caution should especially be taken when working in the areas close to mountains (against slopes, in saddles or on top) and rivers. On Goedetrouw some Iron Age remains were also noted (Van Vollenhoven 2015b).

On the farm Ketting a few sites have been identified by one of the project geologists. It includes seven Late Iron Age sites and one cave with pottery and other remains. The biodiversity specialist made mention of similar sites. These sites are important but are far away from the proposed infrastructure development on site.

The strategic position of some of these sites indicates that the sites were utilized during times of turmoil, e.g. the Difaquane or the wars against the former Boer republic of the ZAR. This would place it within the historical era, but the characteristics of the sites are similar to that of Late Iron Age sites.

The Iron Age sites identified during the HIA for the Waterberg Project area are indicated in Figure 12 and listed in Table 3.

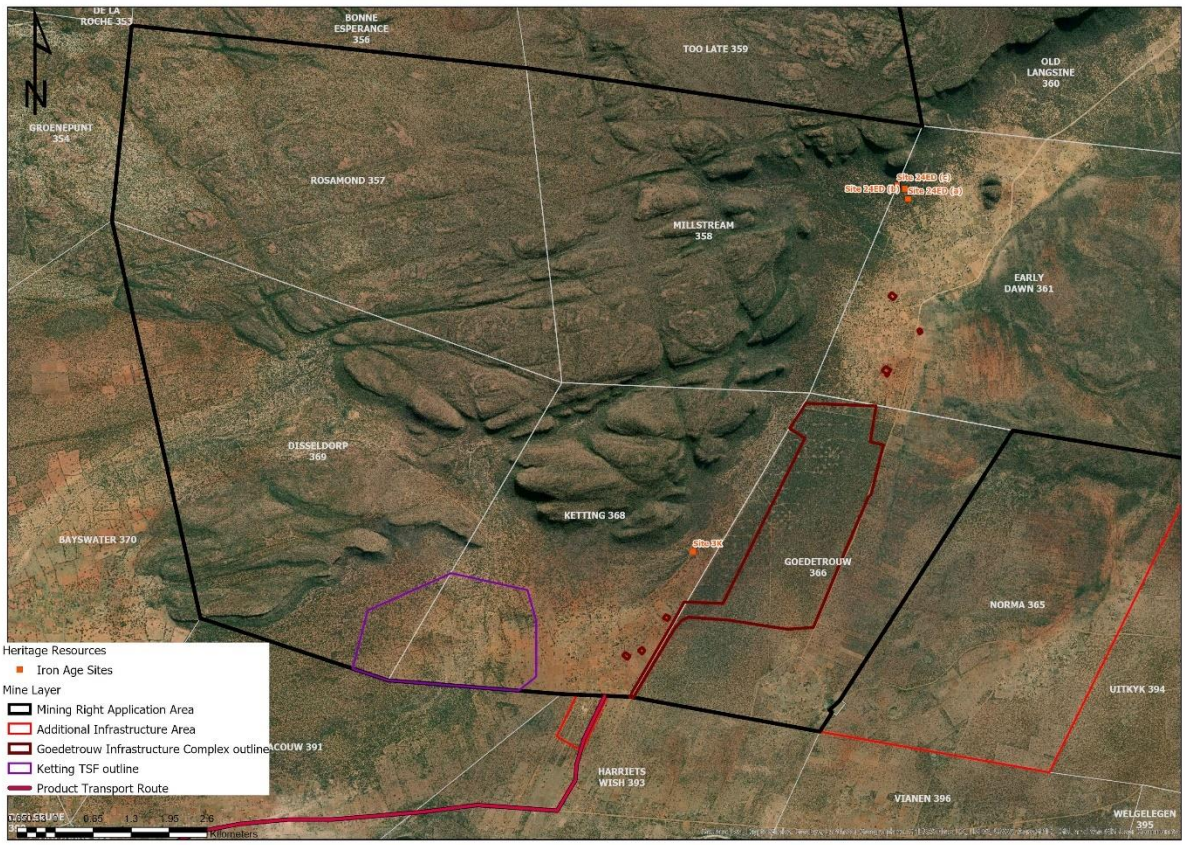

Figure 12: Iron Age sites identified in the Waterberg Project area

Table 3: Iron Age sites identified during the HIA (Archaetnos, 2019)

Site ID	Description	Farm	GPS Reference	Sensitivity	Potential impact	Photograph
Site 3K	***Iron Age lower grinding stones*** This site consists of nothing more than a few broken lower grinding stones.	Ketting	23°22' 40.1"S; 28°53' 29.5" E	Negligible	The site lies within the development area but will likely not be impacted on by any of the alternatives. The site therefore has low cultural significance and receives a field rating of Local Grade IIIC: The description in the phase 1 heritage report is seen as sufficient recording and it may be granted destruction at the discretion of the relevant heritage authority without a formal permit application, subjected to the granting of Environmental Authorisation.	
Site 24ED (S11/2016)	***Iron Age pottery*** This site consists of isolated pottery; only one decorated potshard was identified. One cannot really base a pottery analyses on only one potshard. This one however does look similar to Icon pottery, which forms part of the Moloko branch of the Urewe ceramic tradition. If so, it would relatively date to between 1300 and 1500 AD (Huffman 2007: 183-185).	Early Dawn	23°19'40.9"S; 28°55' 28.5" E 23°19'35.7"S; 28°55' 26.7" E 23°19'34.0"S; 28°55' 22.5" E	Negligible	The site lies within the development area but will likely not be impacted on by any of the two alternatives. It therefore has low cultural significance and receives a field rating of Local Grade IIIC: The description in the phase 1 heritage report is seen as sufficient recording and it may be granted destruction at the discretion of the relevant heritage authority without a formal permit application, subjected to the granting of Environmental Authorisation.	

3.5 Palaeontology

According to SAHRIS the Waterberg Project MRA area is classified as moderate, for which a desk-top Palaeontological Impact Assessment (PIA) is required (Figure 13).

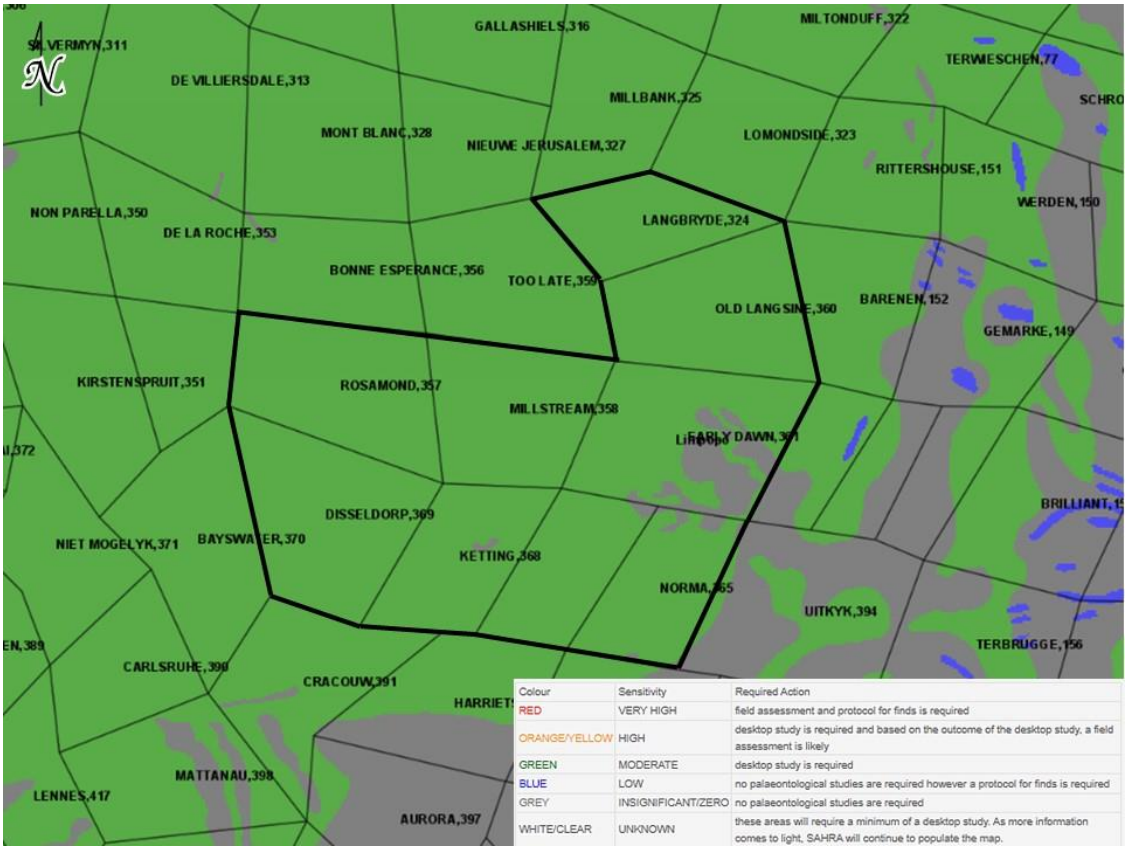

Figure 13: Palaeontological categorization according to SAHRIS

A desk-top PIA was conducted by Dr Heidi Fourie in July 2019. Below a summary of the findings of the study; the desk-top PIA is attached as Appendix C.

The geology was obtained from map 1:100 000, Geology of the RSA and 1:250 000, 2328 Pietersburg.

The Waterberg Group of rocks today occurs in several separate regions: in the Limpopo and Mpumalanga Provinces, an area spanning 20 000 km^2. These separate patches probably originally formed a single sheet of sedimentary rocks that since became fragmented as a result of erosion. A deep red iron oxide is responsible for the colouration. As the rocks are chemically resistant and very hard, they produce spectacular cliffs and mountainous topography.The Waterberg Group is known for its reddish sandstone with conglomerates present between Pretoria and Middelburg, older than the coal and younger than the Magaliesberg Quartzite Formation. In the Cullinan-Middelburg base only one formation has been recognised, the unconformable Wilgerivier Formation. A threefold subdivision is recognised in the main basin, the Nylstroom, Matlabas and Kransberg Subgroups. It overlies the Loskop Formation. The Wilgerivier Formation overlies the Pretoria Group of the Transvaal Supergroup, the Selonsrivier Formation and the Loskop Formation. It is often covered with Karoo sediments.

Sandstone, grit, conglomerate and shale are present. It is 2000 m in thickness. The conglomerate layer is often at the base. Trace fossils are found in the Waterberg Group.

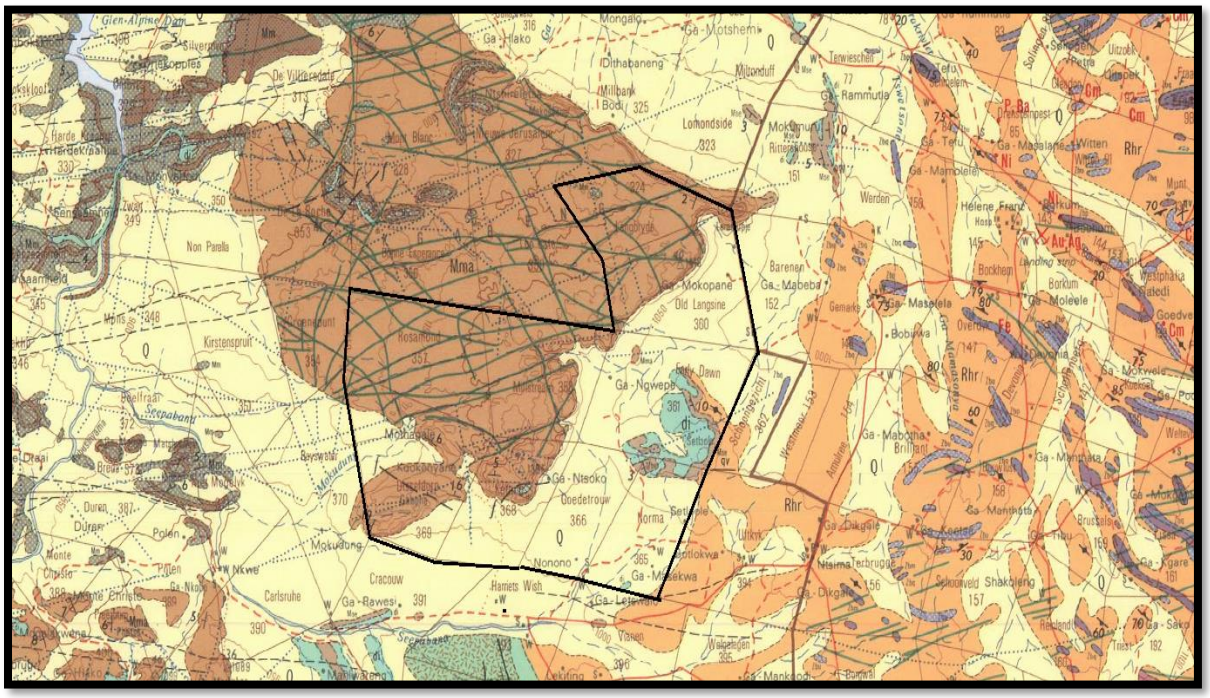

Figure 14: The geology of the development area (Fourie, 2019)

Legend to map and short explanation:
Q – Soil, sand, alluvium, calcrete, scree (yellow). Quaternary.
di – Diabase (green). Vaalian.
Mma – Medium-grained, yellowish, laminated sandstone (brown). Makgabeng Formation, Waterberg Group. Mokolian.
Rhr – Hout River Gneiss. Randian.
□ – Proposed Mining (in black on figure).

The Swaershoek and Alma Formations are in the Nylstroom Subgroup; Skilpadkop, Aasvoëlkop, Setlaole, and Makgabeng Formations in the Matlabas Subgroup; and Sandriviersberg, Mogalakwena, Cleremont and Vaalwater Formations in the Kransberg Subgroup. The Makgabeng Formation forms part of the Makgabeng Plateau with a thickness of 300 – 600 m up to 1000 m. Also part of the Waterberg Group are the Koedoesrand Formation and the Blouberg Formation.

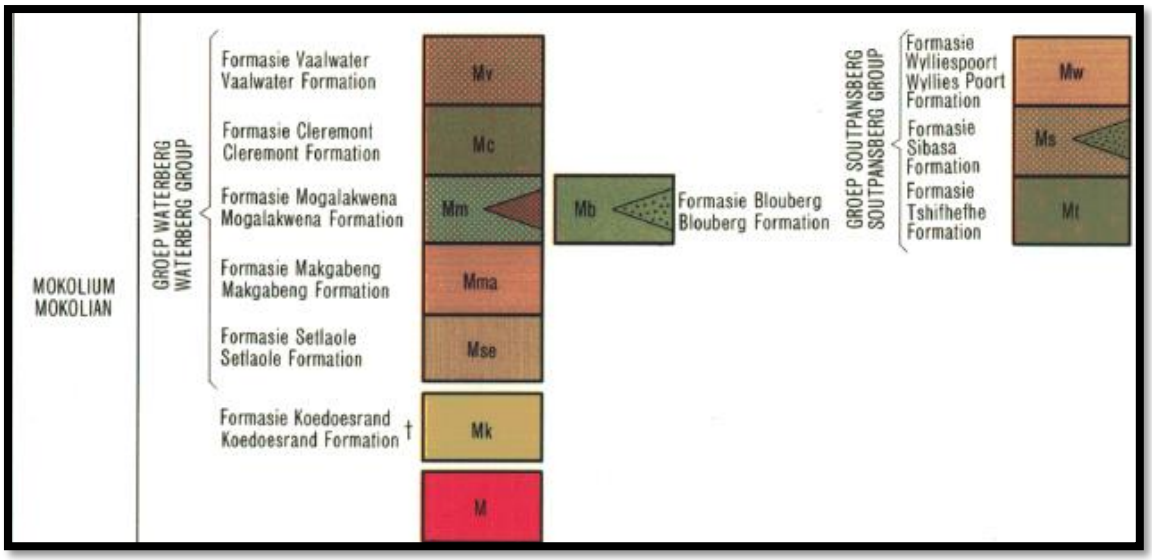

Figure 15: Lithostratigraphy (Fourie, 2019)

The mine infrastructure will be located on the farms with Quaternary sediments.

Fossils in South Africa mainly occur in rocks of sedimentary nature and not in rocks from igneous or metamorphic nature. The Quaternary Formation associated with the Waterberg Project may contain fossils. A wide range of possible fossil remains, though these are often sparse, such as: mammalian bones and teeth, tortoise remains, ostrich eggshells, non-marine mollusc shells, ostracods, diatoms, and other micro fossil groups, trace fossils (e.g. calcretised termitaria, rhizoliths, burrows, vertebrate tracks), freshwater stromatolites, plant material such as peats, foliage, wood, pollens, within calc tufa. Stromatolite structures range from a centimetre to several tens of metres in size. They are the result of algal growth in shallow water, indicating a very rich growth that would have caused an enrichment in the amount of oxygen in the atmosphere. Stromatolites may also be present in the Makgabeng Formation.

According to the PIA, the Waterberg Project area is categorized as moderate for the Quaternary age rocks, and low for the Makgabeng Formation (Fourie, 2019).

Rock Unit	Significance/vulnerability	Recommended Action
Q	Moderate	Desktop study is required.
Mma	Low	No palaeontological studies are required, however a protocol for finds is required.

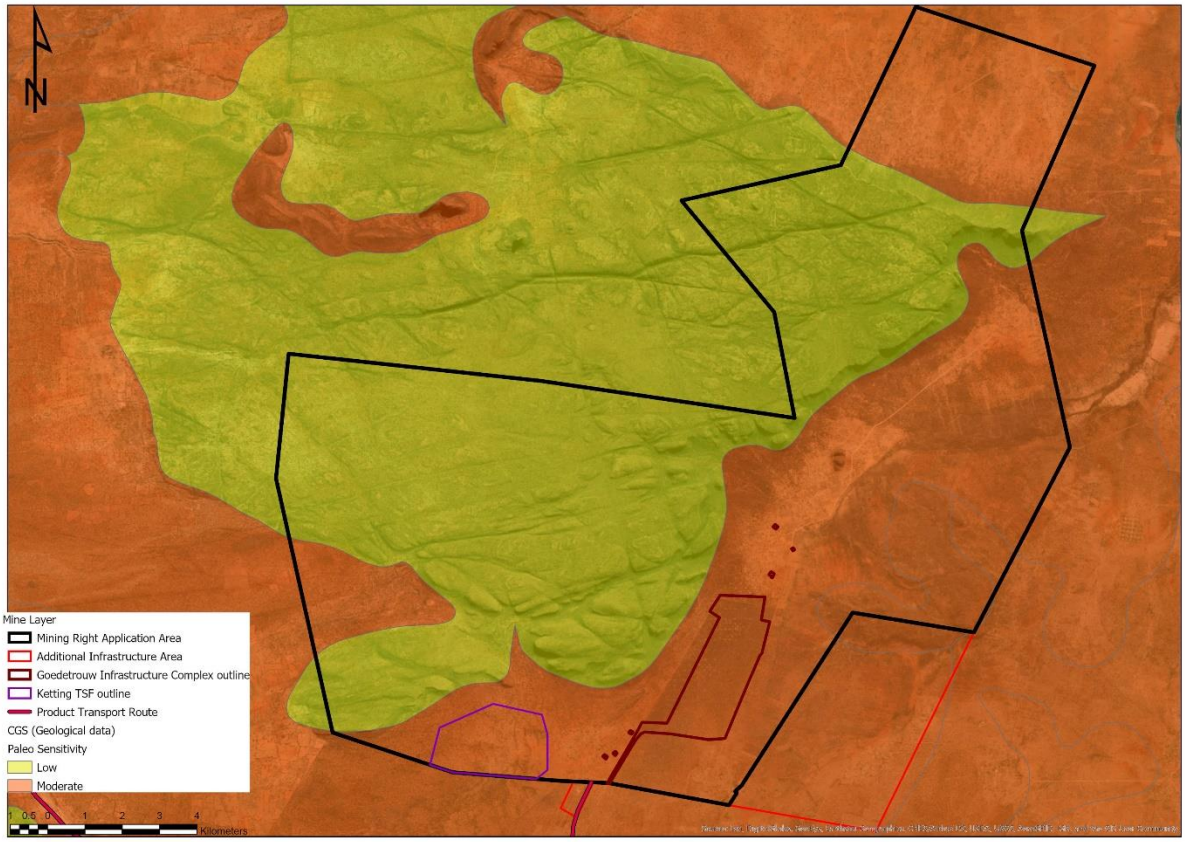

Figure 16: Palaeontological categorization according to Fourie (2019)

3.6 Indigenous Knowledge Systems

Currently local communities could possibly make use of a wealth of natural resources, or ecosystem services, that are freely and readily available in the Project Area. The primary ecosystem services include livestock grazing, subsistence farming, collecting wood for cooking, collecting water for drinking and gathering traditional herbs and medicine for household consumption and commercial use. These natural resources provide households with valuable sources of food, fuel, income and various other uses (ChemC, 2019).

The plant species with medicinal and/or commercial properties that were recorded within the Project Area (Nyengere, 2019) are listed in Table 4.

Table 4: List of species with medicinal and/or commercial properties

Botanical name	Common name(s)	Uses (SANBI website)
Vachellia (Acacia) karroo	Sweet thorn	The sweet thorn gets its common name from the gum which is exuded from wounds in the bark. This pleasant tasting gum is eaten by people and animals, including the Lesser Bushbaby which feeds exclusively on insects and gum from trees, particularly vachellia and sengalia trees. It also had commercial value in the past when the gum was exported as "Cape Gum" for making confectionary. This is apparently like gum arabic which is used as a water-soluble glue.

Botanical name	Common name(s)	Uses (SANBI website)
		It is a particularly good fodder tree, stock and game feed on the leaves, flowers and pods. Seed dispersal takes place this way. There is no danger of hydrocyanic poisoning which is a self-protection mechanism used by many trees. The bark contains tannin which is used to tan leather to a reddish colour. (This unfortunately gives the leather an unpleasant odour). The heartwood is heavy and hard but susceptible to attack from borer. This apparently may be prevented by seasoning the wood in water for six months before use. The "Dune Forest" form found along the coast of Kwazulu-Natal northwards of the Tugela river has soft wood so would not be suitable for woodworking. A strong rope can be made from the inner bark which is pliable enough for ropemaking when it is wet. The flowers produce lots of nectar and pollen for bee-farming and the honey has a pleasant flavour. The sweet thorn has many medicinal uses ranging from wound poultices to eye treatments and cold remedies. The bark, leaves and gum are usually used. It is also used to treat cattle which have tulp poisoning (*Homeria* /*Moraea* spp) - bulbous plants which are poisonous to stock.
Dombeya rotundifolia	Wild pear (Drolpeer)	*Dombeya rotundifolia* has many traditional uses. Strong rope fibre is made from the bark, and the plant is used medicinally for various purposes, including a love potion made from the flowers. It is a useful tree on farms and nature reserves, as game and stock browse from it. The wood is termite-resistant and often used as fence posts. Bee farmers also appreciate the tree for the large amounts of nectar and pollen which it produces.
Euclea undulata	Small-leaved guarri, common guarri	Almost all parts of *Euclea undulata* are used by people or animals in one way or the other. It yields excellent firewood that produces long lasting coals. The leaves are useful as fodder for stock, antelope and small herbivorous mammals while the fruits are eaten by birds, antelope and humans although not very tasty. The hard, brown heartwood is heavy and close-grained which make it durable and strong and a suitable species for making fencing posts. The bark contains suitable quantities of tannin and is used to ease headaches, while the roots provide a remedy for toothache and heart-related ailments. Alternatively, the roots, when used as a powder, can be a drastic purgative. In the Western Cape leaf preparations are taken orally to treat diarrhoea and disorders of the stomach, and as a gargle to relieve throat ailments such as tonsillitis.
Ptaeroxylon obliquum	Sneezewood	Sneezewood is extremely hard and durable and highly valued as a timber for fence posts and buildings. In the past, it was also used extensively for railway sleepers. Little furniture was ever made of it, but with some effort and preparation beautiful pieces can be made and these are prized today. Highly irritant, aromatic peppery oils, containing *nieshoutol* are produced by the wood, causing violent sneezing by woodworkers after sawing or sanding. When used as machine bearings sneezewood often wears longer than brass or iron. In Mozambique it is the preferred wood for the manufacture of xylophone keys. The tree is used traditionally both for medicine and ritual purposes. Bark is used as a snuff to relieve headaches. Pieces of wood can be placed in cupboards to repel moths. The resin from the heated wood has been applied to warts and powdered bark added to a wash to kill cattle ticks. The wood is reported to "burn like paraffin"- giving a bright, hot fire. It was also used as tinder to make fire by friction. Great quantities were felled for fuel and other uses in the past, making it scarce today. Palmer & Pitman (1973) in *Trees of Southern Africa* report that sneezewood was used to fuel five lime kilns at Bathurst and for the steam tugs at the Kowie (Port Alfred).
Schotia brachypetala	Weeping boer-bean	Not only is *Schotia brachypetala* an exceptional ornamental tree, it also has several other uses: A decoction of the bark is taken to treat heartburn and hangovers. Bark and root mixtures are used to strengthen the body and purify the blood, to treat nervous heart conditions and diarrhoea, as

Botanical name	Common name(s)	Uses (SANBI website)
		well as for facial saunas. The seeds are edible after roasting, and although low in fat and protein they have a high carbohydrate content. Both the Bantu-speaking people and the early European settlers and farmers are said to have roasted the mature pods and eaten the seeds, a practice which they learned from the Khoikhoi. The bark can be used for dyeing, giving a red-brown or red colour. The timber is of good quality, suitable for furniture making. The sapwood is pinkish-grey and not durable unless treated. The heartwood is a dark walnut, almost black, hard, fairly heavy and termite resistant with a dense fine texture and has been much used for furniture and flooring blocks. It is also said to be excellent for all kinds of wagon wood and was chiefly in demand for wagon beams.
Terminalia sericea	Silver cluster-leaf or silver terminalia (Vaalboom)	*Terminalia sericea* is important in traditional medicine. The leaves and roots are boiled in water and the infusion is taken orally for the treatment of coughs, diarrhoea and stomach ache. The leaves can be used as an antibiotic for wounds. In the case of bleeding, a paste can be made by cooking the leaves in water and placing them on the wounds. The wood is used as a source of energy for cooking and boiling water, for constructing huts, for fencing material and for solid structures.
Ziziphus mucronata	Buffalo thorn (Blinkblaar-wag-'n-bietjie)	A decoction of the glutinous roots is commonly administered as a painkiller for all sorts of pains as well as dysentery. A concoction of the bark and the leaves is used for respiratory ailments and other septic swellings of the skin. Pastes of the root and leaves can be applied to treat boils, swollen glands, wounds and sores. Steam baths from the bark are used to purify and improve the complexion. In East Africa, roots are used for treating snake bites. All the above can be attributed to the peptide alkaloids and antifungal properties isolated from the bark and leaves. The berries are edible and were used by residents in the former Transvaal in making porridge or as a coffee substitute. The fruit can also make a beer if fermented properly. During the Anglo-Boer war, the seeds were ground and used as a coffee substitute. Africans have many beliefs and superstitions attached to this tree. Zulus and Swazis use the buffalo thorn in connection with burial rites. It was once customary that when a Zulu chief died, the tree was planted on his grave as a reminder or symbol of where the chief lies. Hence the name *umLahlankosi*- that which buries the chief. A twig from the tree was and is still used to attract and carry the spirit of the deceased from the place of death to the new resting place. When a stock owner died, and was buried according to custom, within the cattle or goat kraal, some branches were placed on the grave so that the animals nibbled on leaves and twigs, and so understood that their master had died. In other parts, Africans drag a branch around the village to protect it from evil spirits, as it is believed to keep evil spirits away. In Botswana as well as most parts of South Africa, the residents believed the buffalo thorn to be immune against lightning, anyone standing under one in a storm would be safe. It is also believed that if it is felled in summer, a drought, hail or lightning will certainly follow. Wood from this tree is used for timber, wagon making and fence posts as it yields a yellow, fine-grained, heavy wood which contains 12.2-15.7% tanning matter. The elasticity of the shoots makes it suitable for bows and whip sticks. Some African tribes use the thorny branches to make kraals or hedges. This protects their livestock from lions and other predators.
Croton gratissimus	Lavender fever berry (Berg boegoe)	The young branches of lavender croton are pleasantly aromatic; and it is recorded that Bushman girls dried these and then powder them to make perfume. The charred and powdered bark is used to treat bleeding gums. Although the plant is believed to be toxic, it is an important stock food in Namibia. It is also a beautiful ornamental plant with pale bark and attractive foliage.
Heteropyxis natalensis	Lavender Tree (Laventelboom)	This tree has several economic uses. Bark and leaves are browsed by black rhino. Leaves are also used in herbal tea and potpourri. The wood is hard,

Botanical name	Common name(s)	Uses (SANBI website)
		very fine grained and is pale pinkish brown in colour. It is suitable for use as fencing posts and charcoal. The leaves and roots of this plant are used medicinally and to treat worms in stock. African healers prescribe inhaling the steam from a decoction of the roots to heal a bleeding nose. The roots are also used in the treatment of mental disorders and fresh leaves are used during weaning. The leaves are also used to scent tobacco.
Lippia javanica	Fever tea, lemon bush (Koorsbossie)	This plant is well known medicinally to many African people and to many avid herbalists and herb gardeners. Different parts (the leaves, twigs and occasionally the roots) of the plant are used for different reasons. The Xhosa people are known to drink it in a weak infusion as a tea substitute and in a stronger infusion for the treatment of coughs, colds and bronchial problems in general. They use the leaves and stem and drink it with milk or water. In addition, the Xhosa people also use *Lippia javanica* for the disinfection of meat that has been infected with anthrax. This herb is also said to be affective against fever, especially in cases of malaria, influenza, measles, and as a prophylactic against lung infections. In these cases *Lippia javanica* is often mixed with another herb *Artemisia afra*. The smoke from the herb has proven to be affective, if inhaled, against asthma, chronic coughs and pleurisy. The leaves and stems are burned. Skin disorders, such as heat rash and other rashes, as well as scratches, stings and bites can also be treated. Here the tea is usually cooled and then applied like a lotion. Even lice and scabies can be treated with it. Apart from its medicinal uses *Lippia javanica* is also used ritually in a cleansing ceremony when someone has been in contact with a corpse and apparently for protection against dogs, crocodiles and lightning. The Masai make a red ointment from it, which is used to decorate their bodies. For those gardeners who are potpourri lovers and are looking for a good cupboard freshener, then Lemon bush is the perfect addition to your bouquet. Some people even use it to make perfume. There may be a commercial purpose for a volatile oil that is produced by *Lippia javanica*. Apparently, it repels and controls Bark Beetles from the genus *Ips* who can become a plant pest.
Myrothamnus flabellifolius	Resurrection plant (Opstandingsplant)	*Myrothamnus flabellifolius* is unique, being the only woody resurrection plant. It is an important plant in southern Africa because of its widespread occurrence and usage in African medicine and traditional culture. The leaves contain essential oils, mainly camphor and eucalyptol and have been used as a medicinal tea. The leaves and stems of the resurrection plant are added to tea to flavour it and are also used as a spice. Smoke from burning plants is inhaled or young leaves are smoked in pipes for asthma and pains in the chest by the Pedi people. Smoke from the leaves is directed into the vagina for pain in the uterus. The vhaVenda use the whole plant for colds, respiratory ailments, nosebleeds and fainting. In Tanzania, the fruit is used for chest complaints and the leaves are used to make aromatic lotions. The plant is used as a tonic and for breast diseases in central Africa and for a variety of complaints in Zimbabwe.
Olea europaea	Wild olive (Olienhout)	A tea can be made from the leaves. The hard, heavy and beautiful golden-brown wood is used for furniture, ornaments, spoons and durable fence posts. An ink is made from the juice of the fruit. Traditional remedies prepared from this plant serve as eye lotions and tonics, lower blood pressure, improve kidney function and deal with sore throats. The early Cape settlers used the fruits to treat diarrhoea.
Pellaea calomelanos	Hard fern	Burnt leaves are smoked for headaches, chest colds, asthma and head colds. Decoctions of rhizomes are traditionally used to treat boils, mouth or nasal ulcers and intestinal parasites. Boiled roots and rhizomes are used as poultices for abscesses, while milk decoctions of rhizomes are administered to frightened children at night and for internal sores. Tea made from this species was an early Cape remedy for colds and chest ailments.

Botanical name	Common name(s)	Uses (SANBI website)
Syzygium cordatum	Water berry (Waterbessieboom)	This tree is known for its many uses. The fleshy fruit is edible, slightly acid in flavour, and is eaten by children, monkeys, bush-babies and birds. The berries are also used to sometimes make an alcoholic drink. The powdered bark is used as a fish poison. In central Africa the tree is known as a remedy for stomach ache and diarrhoea. It is also used to treat respiratory ailments and tuberculosis.
Tarchonanthus camphoratus	Camphor bush (Wildekanferbos)	The camphor bush is used for medicinal purposes. Problems such as blocked sinuses and headache can be healed by inhaling the smoke from the burning green leaves. Drinking boiled mixture of leaves and water can help to treat coughing, toothache, abdominal pain and bronchitis. Leaves can also be used for massaging body stiffness and as a perfume. The cotton wool-like seed heads were used to stuff cushions.
Tetradenia riparia	Misty plume bush, ginger bush (Gemmerbos, watersalie)	The Zulu people have many uses for the plant including the relief of chest complaints, stomach ache and malaria. Inhaling the scent of the crushed leaves apparently also relieves headaches.
Zanthoxylum capense	Small knobwood (Kleinperdepram)	Early records show that traditional medicine from the small knobwood was widely used, mainly for flatulent colic, stomach ache, fever, snake bites, toothache and as a mouthwash. It is an old remedy for epilepsy and numerous other ailments. The Zulu people use the leaves to heal sores. Infusions or decoctions of the fruits or leaves are used as a carminative medicine (taken to relieve flatulence) and to treat fever. One teaspoon of fruits or crushed leaves can be taken in one cup of water. Root or bark decoctions are used as mouthwashes.
Boscia albitrunca	Shepherd's tree (Witgat)	The root is pounded to make porridge. It is commonly used as a substitute for coffee or chicory. The root is also used to make a beer and to treat haemorrhoids. The leaves are nutritious and are often browsed by cattle, although the milk is then said to be tainted. An infusion of the leaves is used to treat eye infections in cattle. The fruits are used in traditional dishes and the flower buds as caper substitutes in pickles. It is said that if the fruits wither before the millet crop is ripe, the harvest will be a failure. Household utensils are made from the wood. If the wood is burnt, it is believed that cows will produce only bull calves.
Vachellia (Acacia) erioloba	Camel thorn (Kameeldoring)	The pods are useful fodder for cattle and are favoured by wild animals in Africa, especially elephants who chew the pods and disperse the seed in their dung. The timber is strong and is highly prized for firewood. Dry powdered pods can be used to treat ear infections. The gum can be used for the treatment of gonorrhoea and the pulverized, burned bark can be used to treat headaches. The root can be used to treat toothache. To treat tuberculosis, the root is boiled for a few minutes and the infusion is swirled around in the mouth and spat out. It is believed that lightning will strike at the *Vachellia erioloba* more readily than other trees. The seeds can be roasted and used as a substitute for coffee; the gum is also eaten by humans as well as animals. The root bark is used by the Bushmen to make quivers. Many wild animals love to eat the pods and will rest in the dense shade, in the heat of the African sun.
Combretum imberbe	Leadwood (Hardekool)	Parts of this tree are used by various tribes in several ways: smoke that comes from the burning leaves has been used to relieve coughs, colds and chest complaints. The flowers can also be used as a cough mixture. The leaves are believed to have magical powers. For treatment of diarrhoea and stomach pains, root decoctions are used. A combination of roots and leaves are taken against bilharzia. Root bark that is boiled in water is used for tanning leather. The gum that exudes from damaged areas on the stem is edible and forms part of the diet of the Bushmen. Leadwood ash is used as a toothpaste. The wood is very hard and tough and burns very slowly with intense heat. Africans used this wood to make hoes before metal was discovered. The trunk was used to build an enclosure (kraal*)* and grain stamping mortars and these days it is used for furniture and sculptures.

Botanical name	Common name(s)	Uses (SANBI website)
		The tree has special cultural and religious importance to the Ovambo people of Namibia. The leaves and fruits are used in white magic.
Sclerocarya birrea subsp. caffra	Marula	The powdered bark is used to treat pregnant women to determine the gender of an unborn baby. If a pregnant woman wishes to have a girl, she will take a preparation from the female plant and for a boy she will use the male plant. Traditional healers use the hard nut in their divining dice. A decoction of the bark treats dysentery, diarrhoea, rheumatism and has a prophylactic effect against malaria. The bark is an excellent remedy for haemorrhoids. Roots and bark are also used as laxatives. A drink made from marula leaves is used for the treatment of gonorrhoea. Sometimes one finds a tree with a wound, probably caused by a traditional healer or someone who collected material for medicinal use. In the former homeland of Venda, it was a criminal offence to cut down a living tree of this species. The wood is used for furniture, panelling, flooring, carvings and household utensils like spoons. The inner layer of bark makes a strong rope. Drums and yokes for certain animals are made from the wood of this tree. In Namibia some people use the wood for sledges. Boats are also made from the trunk. Red-brown dye can be produced from the fresh skin of the bark. The gum, which is rich in tannin, is mixed with soot and used as ink. The fruit is edible, eaten either fresh or made into a delicious jelly. It also makes alcoholic beer known as Mukumbi by the vhaVenda people. A marula liqueur is available commercially. The white nut is highly nutritious and is eaten as it is or mixed with vegetables. Fruit-farming communities prefer planting a couple of these trees to attract pollinators to their farm in early spring.
Securidaca longepedunculata	Violet tree, fibre tree	The violet tree is the most popular of all the traditional medicinal plants in South Africa and is used for almost every conceivable ailment. The roots are extremely poisonous, smell like wintergreen oil and contain methyl salicylate which may partly indicate why they have a wide diversity of uses, such as arrow poison in some parts of Africa including West Africa. The roots and bark are taken orally either powdered or as infusions for treating chest complaints, headache, inflammation, abortion, ritual suicide, tuberculosis, infertility problems, venereal diseases and for constipation. Toothache can also be relieved by chewing the roots. Mixed roots of the violet tree and dwarf custard apple are used to treat gonorrhoea. Powdered roots or wood scrapings are used to treat headache by rubbing them on the forehead, while infusions from the roots are used to wash tropical ulcers. In Limpopo, the vhaVenda people use roots for mental disorders and as protection against children's illness during breastfeeding. It is also believed that many African people use the powdered violet tree roots as a sexual boost for men. The vhaVenda people mix the powdered root with mageu *(*maize or sorghum beverage) and it is given to a man to drink if he is sexually weak. The bark is used to make soap, fibre for fishing nets, baskets and strong threads that are used to sew bark cloth. In Zimbabwe, the roots are used to treat people who are believed to be possessed by evil spirits, for snakebite as well as for coughs when pounded with water and salt.
Combretum collinum	Weeping Bushwillow	The wood is reasonably hard, but not very durable and is sensitive to borer attack. It is difficult to distinguish between the whitish-brown sapwood from the light brown heartwood. The wood is used for wagon building, canoes, tool handles and hut frames, fences. The wood is used for fuel and makes a very good charcoal. Cattle browse the leaves. The bark yields an edible gum. It is used to cure toothache or to plug a carious tooth. The leaves are used as a purgative. The roots are boiled and the decoction drunk warm as a treatment for dysentery and snakebites. Research at Makerere University in Kampala, Uganda has found that an extract from shoot bark of this tree can produce larvicidal activity against

Botanical name	Common name(s)	Uses (SANBI website)
		the yellow fever mosquito (*Aedes aegypti*). This mosquito can also spread dengue fever (a mosquito borne disease caused by the dengue virus).
Spirostachys africana	Tamboti	The wood is used to manufacture good furniture and the poisonous latex is traditionally used to stupefy fish, making them easier to catch. The sawdust from the wood is harmful to the eyes and can even cause blindness. The wood is so strong that you can also make gunstocks or arrows from it. It is not suitable as firewood because the smoke is toxic and will cause diarrhoea if meat roasted on the coals is eaten. The tree is classified as a precious timber in Mozambique. The wood is still used traditionally for fencing, hut rafters, walking sticks and necklaces. The scented wood is beautifully figured with creamy white sapwood and dark brown heartwood. Although the latex is very toxic to humans it does have traditional medicinal uses, for example, a drop of the fresh latex is applied to a painful tooth as painkiller. The bark is used to treat stomach pains, but large dosages will cause damage to the internal organs.

3.7 Visual Environment and Sense of Place

According to Lynch (1992), sense of place "is the extent to which a person can recognize or recall a place as being distinct from other places - as having a vivid, or unique, or at least particular, character of its own".

The landscape character of the Project Area is defined by its topography and consists of slightly undulating plains, criss-crossed by a network of drainage lines, and the prominent mountainous area in the west and central area (Makgabeng Plateau). This natural feature forms part of the larger Blouberg mountain range, located further to the north. There are two associated clusters of small koppies. One is located on the farms Early Dawn and Norma, to the east of the mountainous area, and the second located on the farm Disseldorp to the south-west of the mountainous area. The various non-perennial drainage lines and surface water drain into the Seepabana River, running east-west approximately 2 km south of the Surface Infrastructure Area. The Seepabana River in turn joins the Mogalakwena River, which feeds the Glen Alpine Dam (located within the Wonderkop Nature Reserve), approximately 25 km to the north-west. The various communities are scattered on the plains and along the Seepabana River.

Figure 17 indicates the sensitivity of the landscape. It also rates the relative scenic quality of each type and its landscape sensitivity (NLA, 2019). The highest value is assigned to the mountainous area and the clusters of koppies. The Seepabana River, agricultural fields and communities were assigned with a moderate rating and the local roads with a low rating.

Other than the Makgabeng Plateau, the Project Area does not contain rich or prominent landscape features that are distinct from the sub-region. However, the Project Area can still be regarded as having a *moderate* to *high* value, due to the absence of mining and industrial developments and the presence of these natural features (NLA, 2019).

The combination of the mountainous area, clusters of koppies, drainage lines, Seepabana River, agricultural activities and the communities define the Project Area as being pleasant, rural with pastoral sense of place. At night-time, the dark rural sky will be lit with clusters of tiny lights from the community households which are scattered throughout the Project Area, mostly on the plains.

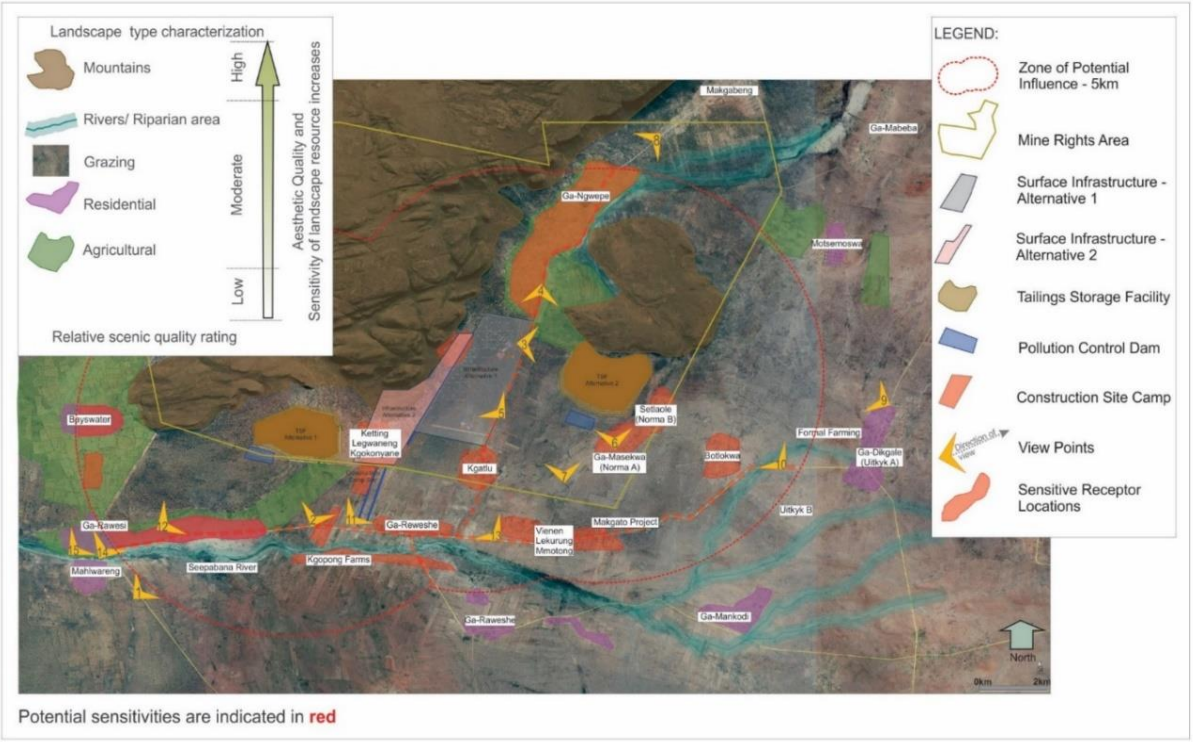

Figure 17: Landscape types and sensitivities (NLA, 2019)

3.8 Heritage Tourism

Tourism can be considered as joint elements and relationships or coalitions that manifest due to communication between people travelling, companies, ethnic structures and ethnic groups of people, in connection with enticing peoples to visit and enjoy respective locations.[8] Within this context, it is important to define a tourist, which can be explained as "a visitor travelling to a place other than that of his or her usual environment for less than 12 consecutive months and whose purpose in taking the trip is not to receive remuneration for activities undertaken at the place visited".[9]

According to the Department of Tourism they are committed to meaningfully contributing to the government's objectives of inclusive economic growth, sustainable job creation, and redistribution and transformation of the industry through:

- Increasing the number of tourists who visit our country
- Increasing the geographic spread, length of stay and spend of all visitors
- Improving seasonal arrival patterns

[8] R.W. McIntosh; C.R. Goeldner and J.R. Brent Ritchie, *Tourism: Principles, Practices and Philosophies,* p. 10.

[9] Lubbe, B. A. *Tourism Management in Southern Africa*., p. 51.

- Working to transform the industry so that historically disadvantaged South Africans may benefit from the sector.[10]

According to StatsSA, Limpopo (15.6%) and KwaZulu-Natal (14.9%) were the most visited destinations during overnight trips in Quarter 1 of 2018. A similar trend was observed in Quarter 2, where most tourists also visited Limpopo (18.4%) and Gauteng (15.4%). Northern Cape was the least popular destination in both Quarters 1 and 2. The main destination for day trips in Quarter 1 of 2018 was Gauteng (20.8%), followed by Limpopo (18.6%) and then Western Cape (12.0%). At 4.4%, Northern Cape had the least number of day trips in Quarter 1. In Quarter 2, the results indicate that Gauteng (24.0%) and Limpopo (20.0%) were the provinces most visited by day travellers.

3.8.1 Tourism in Limpopo

Polokwane provides access to various nature and wildlife viewing opportunities for ecotourists. The Polokwane Bird and Reptile Park is home to over 280 species of birds. The Polokwane Game Reserve houses various South African species of wildlife, birdlife, and plants in an unspoiled bushveld environment. The Moletzie Bird Sanctuary protects rare birds like the Cape vulture. The Modjadji Rainforest near Duiwelskloof holds the largest concentration of indigenous cycads in the world, and Cheune Crocodile Farm provides a place to learn about the life of crocodiles.

An extensive art collection is preserved in Polokwane's art gallery, open to the public. The city has more public sculptures per capita in its parks than elsewhere in South Africa. Polokwane was also the first to unveil a bust of the ex-president Nelson Mandela in its City Square (Civic Gardens), and it was authorised by Nelson Mandela personally.

The city is considered the premier hunting destination in South Africa.

Near Modjadjiskloof, at Sunland Baobab farms, there is a large Baobab tree which has been fashioned into a rather spacious pub.

The Limpopo Department of Economic Development, Environment and Tourism (LEDET) has targeted the province as a preferred eco-tourism destination. Its Environment and Tourism Programme encompasses tourism, protected areas and community environment development to achieve sustainable economic growth.

While Limpopo is one of South Africa's poorest provinces, it is rich in wildlife and heritage, which gives it an edge in attracting tourists. Both the private and public sectors are investing in tourism development.

[10] South African Tourism Website, accessed 2019

3.8.2 Tourism in Capricorn District

The Capricorn District Municipality, with its air of myth, legend and prehistoric civilization, is a popular ecotourism destination in Limpopo, with no shortage of natural, historical and cultural attractions (Capricorn District Municipality, 2019). The district takes its name from the Tropic of Capricorn, one of the five major circles of latitude that mark maps of the Earth and which runs directly through this diverse landscape. The region's position makes it a perfect stopover between Gauteng and the northern areas of the province and between the country's north-western areas and the world-renowned Kruger National Park. It is also in close proximity to the neighbouring countries of Botswana, Zimbabwe, Mozambique and Swaziland.

The region is dominated by mountains and forests but also includes the provincial capital of Polokwane (formerly Pietersburg), which is a popular stopover on route to the Kruger National Park. The city has a certain charm to it, whether it be from the wide, jacaranda-lined avenues or the architecture of times gone by that is so evident. Here visitors have plenty of cultural attractions to choose from such as the Bakone Malapa Northern Sotho Museum (015 295 2432), described as an open-air 'living' museum, where you can interactively learn about Sotho culture and explore a traditional Sotho tribal village as it existed 250 years ago.

CDM has identified tourism as a sector with high potential. Key interventions in the areas include marketing, developing identified tourist attractions, packaging and promoting tourist destinations. A need has also been identified to improve tourism research through different efforts such as coordinating and engaging industry players, promoting trade relations and supporting the development of community and local tourism. CDM is currently updating their tourism strategy to identify specific projects to invest in.

3.8.3 Tourism in the Blouberg Local Municipal area

BLMs name originates from the mountain range sporting the same name. This mountain range is located to the west of the well-known Soutpansberg Mountain Range. The word "Blouberg", which directly translates to "Blue Mountain", derives from the Afrikaans language.

This local municipality is situated in the northern reaches of the Limpopo Province, within the CDM. It borders two SADC (Southern African Development Community) countries, namely Zimbabwe and Botswana. Blouberg is also the largest of the four local municipalities in the Capricorn District and covers an approximate area of 9 248 km^2. The area is easily accessible via the R521, from the direction of the provincial economic hub, Polokwane.

The prevalence of game farms has stimulated the area's tourism industry by attracting large numbers of hunters. The area's attractiveness as a tourist destination is also partly due to its rich cultural and heritage background, which includes rock art paintings at the Makgabeng Mountains, the Malebogo\Boer battlefields that have been declared a Provincial Heritage Site, the footprints of the

missionaries at areas such as Leipzig and Milbank, and the presence of two nature reserves (Malebogo and Blouberg). The area's potential as a tourism development node is further reinforced by its geographical location between the Waterberg wetlands and the Dongola Trans-frontier Park (which encompasses the UNESCO accredited Mapungubwe World Heritage Site). Senwabarwana, also previously known as "Bochum", is the economic hub of the BLM. It is approximately 85 km from Polokwane. The name Senwabarwana means "Where the bushmen drink", signifying this region's close ties with its rich and colourful heritage. The local inhabitants of the area are mostly comprised out of the Bahananwa and Batlokwa people, with a small cluster of Vha-Venda, Afrikaans and English-speaking residents living in the rural areas.

The Blouberg Local Municipality views tourism as one of the economic pillars due to its strategic location and tourism potential. It is focusing more efforts and resources into tourism to harness its potential to reduce the triple challenges of unemployment, poverty and inequality within the municipal area. The following programmes have been included in their Growth and Development Strategy, Vision 2040:

- Development of interpretation centres;
- Training of tour guides;
- Collection of oral heritage to traditional authorities;
- Development of community camp sites (including 1 at the Makgabeng Rock Art);
- Development of tourism booklets;
- Development of Tourism routes; and
- Tourism and heritage campaigns – e.g. road shows.

3.8.3.1 Tourism Routes

The concept of route tourism a relatively new concept in tourism and therefore has been borrowed and adapted to cover a broad spectrum of tourism product types. Each destination along the route complies with a consistent theme, and the destinations have developed somewhat organically over a long period. The routes generally cover very large geographical spaces. This kind of route tourism is usually used as a mechanism to attract tourists to an area and to link several attractions that would independently not have the potential to entice visitors to spend time and money. Using a synergy effect promises to have greater pulling power and dispenses visitors' money among a larger number of recipients. The local definition commonly used in South Africa interprets the term, 'route tourism', as combining the tourism resources of several smaller centres and collectively marketing them as a single tourism destination region.

Within the Blouberg region there are many tourism routes connection tourism destinations and shared with neighbouring regions and countries. These include:

- African Ivory Route: The route was named by hunters who tracked game across the Limpopo Province, Botswana, and Zimbabwe, including the northern expanse of the Kruger National Park. The route encapsulates 54 nature reserves, spanning over various terrains, including mountains, sandveld plains, and the Mapungubwe Cultural Landscape World Heritage Site. This route links

Blouberg in the west with the Great Limpopo Transfrontier Project, with a vision to connect nature reserves to enable wildlife to once again travel along the old migratory routes across the borders separating South Africa, Zimbabwe and Mozambique. The route has organized tours or self-drive packages

- Greater Limpopo Birding Routes: The Greater Limpopo Birding Routes are some of the most prolific regions in the country for bird watching. It is an expansion of the initial Soutpansberg/Limpopo Birding Route. The route incorporates a series of mountain ranges, floodplains (where thousands of birds gather every year), as well as lowland forests and bushy savannahs.
- Greater Mapungubwe Heritage Route: The Greater Mapungubwe Heritage Route celebrates the incredibly rich history of the northern part of the Limpopo Province of South Africa. The route links numerous cultural (and natural) heritage sites via a circular route centred around key sites such as: the Mapungubwe World Heritage Site, the Thulamela Archaeological Site and the cluster of heritage sites surrounding the sacred Lake Fundudzi and royal Dzata Museum.
- Seraki Blouberg Route: The Seraki Blouberg Route is located at the foothills of the Blouberg Mountain. The route's path intertwines through a few local villages, fascinating community projects, natural attractions and an amazing diverse range of cultural heritage and natural treasures. The boundaries of the route are constituted by the Blouberg Mountain, Makgabeng Mountain and Malebogo (Maleboch) Nature Reserve on the one side, and the Blouberg Nature Reserve on the other side. The route also incorporates attractions found at the summit of this majestic mountain and is deeply entrenched in the history of its people.

3.8.3.2 Blouberg Tourism destinations and facilities

Within the Blouberg Local Municipal area, tourism destinations and facilities are made up of nature-based, heritage and adventure-based destinations. These include:

- Blouberg Nature Reserve;
- Maleboch Nature Reserve;
- Wonderkop Nature Reserve;
- Makgabeng Plateau and Rock art;
- Culture and art shops within the local villages and Senwabarwana; and
- Lodges and safari camps in the surrounding area.

Some of the activities provided by the local tourism industry include:

- Hiking in the mountainous areas;
- Birdwatching;
- Visiting rock art and other heritage sites;
- Shopping for local goods;
- Game watching; and
- Hunting.

Figure 18 provides an overview of the tourism destinations and facilities in relation to the Waterberg Project mine development.

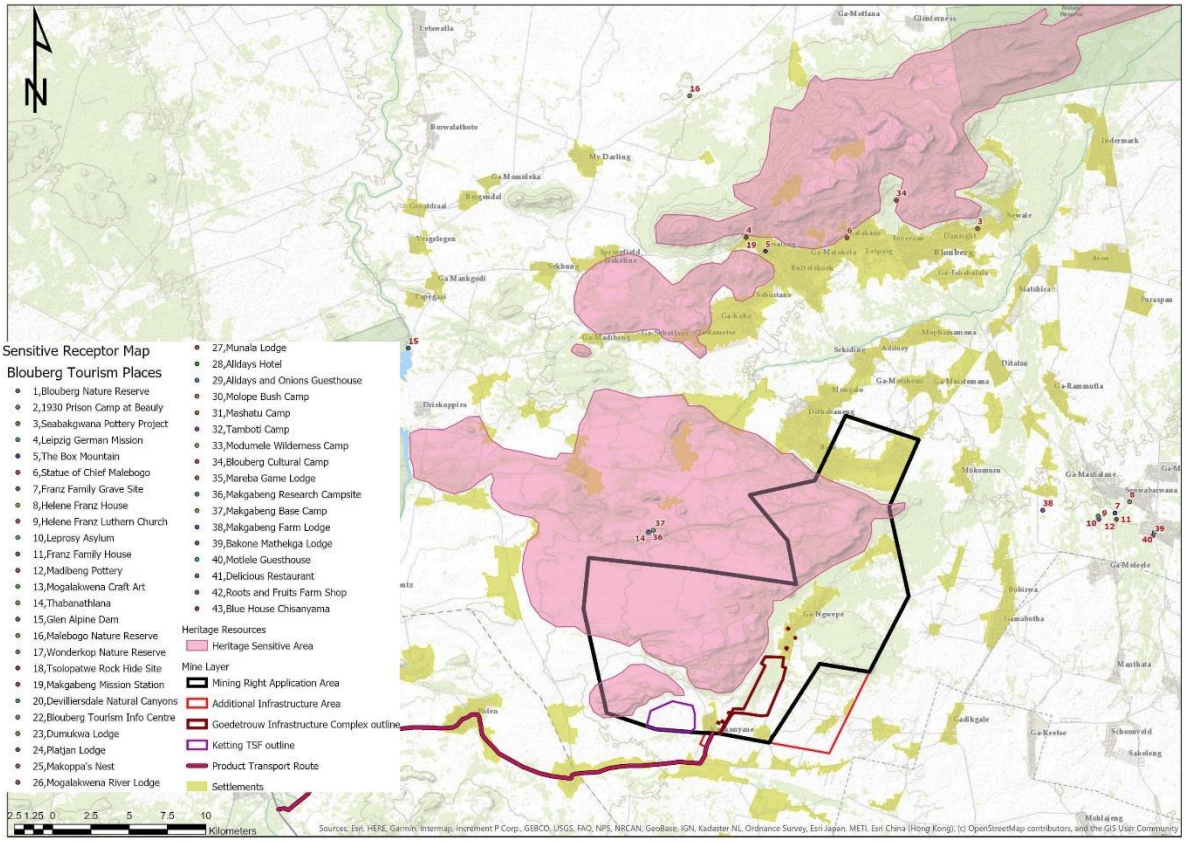

Figure 18: Main tourism facilities and destinations

4 IMPACT ASSESSMENT

Table 5: Impact Assessment

Potential Impact	Impact Rating	Description
Makgabeng Cultural Sensitive Area and Landscape		
Direct Impacts due to Infrastructure Placement	Low	The mining and infrastructure impact are limited to the plains east of the plateau and no direct impact on the Makgabeng Plateau is envisaged. However, threats to other resources such as rock art, Stone Age and Late Iron Age sites and the natural environment may undermine the authenticity of the cultural landscape, the sense of place, and the interaction of human values within which the Makgabeng Plateau developed and should therefore also be identified and managed.
Secondary Impacts caused by Air Quality	Low	The major pollutant associated with development activities would be PM_{10} and $PM_{2.5}$ generated by surface disturbance and traffic activities. Excessive dust outfall will have an impact on the sense of place of the Makgabeng Plateau and present potential indirect impacts to the rock art. Figure 19 and Figure 20 indicate the PM_{10} and $PM_{2.5}$ dispersion modelling results for the Waterberg Project. The predicted PM values within and adjacent to the Makgabeng Plateau are well below the ambient air quality standard and the impact is envisaged to be negligible. Sulphur dioxide is the primary pollutant involved in stone decay. Sulphur dioxide, when combined with moisture in the air, forms sulphuric acid and precipitates as acid rain or fog which is globally known to have severe effects on stone buildings, rocks and rock art. Figure 21 indicates the predicted SO_2 values associated with the Waterberg Project. The SO_2 emissions are restricted to the Surface Infrastructure Area, and well below the ambient air quality standard. No impact is therefore envisaged on the Makgabeng Plateau and the rock art sites. Additional NO and CO pollutants would be emitted from vehicle and equipment exhaust. Figure 22 and Figure 23 indicate the predicted NO_2 and CO emissions associated with the Waterberg Project. Again, the emissions are well below the ambient air quality standard and the impact should therefore be negligible.
Secondary Impacts caused by Blasting & Vibration Impacts	Low	Vibration, resulting from increased traffic, construction activities and blasting may have effects on rock art and other associated sites (e.g. sites with standing architecture). The major concern with vibration is the potential for collapsed cliff faces, or portions thereof, containing rock art panels or the collapse of standing architecture. Vibration resulting from increased traffic and product transport will be limited and no impact on the Makgabeng Plateau and associated rock art sites is envisaged. Figure 24 and Figure 25 indicate the blasting zone of influence for the construction and operational phases of the Waterberg Project. It is clear that the ground vibration within and adjacent to the Makgabeng Plateau is minimal and no impact on the rock art sites are therefore expected.
Secondary Impacts caused by Noise and Visual Impacts	Low	The ambient noise levels could potentially increase between 5 and 10 dB in the vicinity of the Makgabeng Plateau (Figure 26). This impact is however restricted to the south-eastern edge of the plateau, the remainder of the plateau should experience a limited increase in ambient noise levels. The viewshed analysis (Figure 27) indicates some visual impacts on the Makgabeng Plateau within a radius of 5 km from the Surface

Potential Impact	Impact Rating	Description
		Infrastructure Area, on the southern and south-eastern edge of the plateau. It is noted that the viewshed analysis doesn't consider the visual screening of natural vegetation and therefore presents a worst-case scenario. There will further be visual impacts from night-time lighting on the Makgabeng Plateau, impacting on the sense of place.
Historical Built Environment Impacts		
Direct Impacts due to Infrastructure Placement	None	No direct impact on any of the identified historical sites – refer to Figure 10.
Secondary Impacts caused by Air Quality	Low	Figure 19 and Figure 20 indicate the PM_{10} and $PM_{2.5}$ dispersion modelling results for the Waterberg Project. The historical sites identified on Ketting fall within the air quality zone of influence. It is however noted that the air quality at the sites adheres to the ambient air quality standards and the impact is therefore low.
Secondary Impacts caused by Blasting & Vibration Impacts	Low	No impact is expected due to construction blasting, as indicated in Figure 24. The addendum to the blasting specialist report (Appendix D) indicates that underground blasting could have a vibration impact on surface for mining depths shallower than 370m. The following historical sites fall within the underground blasting zone of influence (Figure 25): Central – Site 17K; South – Site 5K and Site 7K. These sites may potentially be impacted if the underground vibration levels are not controlled.
Secondary Impacts caused by Noise and Visual Impacts	Low	The ambient noise levels could potentially increase between 5 and 10 dB at historical sites situated on Ketting (Figure 26). The viewshed analysis (Figure 27) indicates some visual impacts on all sites within a radius of 5 km from the Surface Infrastructure Area. It is noted that the viewshed analysis doesn't consider the visual screening of natural vegetation and therefore presents a worst-case scenario.
Burial Grounds and Grave sites		
Direct Impacts due to Infrastructure Placement	Unknown	No direct impact on any of the identified burial grounds and grave sites – refer to Figure 11. Unknown/subsurface grave sites may be unearthed during construction. Direct impacts to cultural resources without surface indications, often referred to as buried sites, are difficult to estimate.
Secondary Impacts caused by Air Quality	Low	Figure 19 and Figure 20 indicate the PM_{10} and $PM_{2.5}$ dispersion modelling results for the Waterberg Project. The burial grounds and grave sites identified on Ketting, Goedetrouw and the southern portion of Early Dawn fall within the air quality zone of influence. It is however noted that the air quality at the sites adheres to the ambient air quality standards and the impact is therefore low.
Secondary Impacts caused by Blasting & Vibration Impacts	Low	No impact is expected due to construction blasting, as indicated in Figure 24. The addendum to the blasting specialist report (Appendix D) indicates that underground blasting could have a vibration impact on surface for mining depths shallower than 370m. The following graveyards fall within the underground blasting zone of influence (Figure 25): South – Site 2K, Site 6K and Site 14K. These sites may potentially be impacted if the underground vibration levels are not controlled.
Secondary Impacts caused by Noise and Visual Impacts	Low	The ambient noise levels could potentially increase between 5 and 10 dB at grave sites situated on Ketting and the southern portion of Early Dawn (Figure 26). The viewshed analysis (Figure 27) indicates some visual impacts on all sites within a radius of 5 km from the Surface Infrastructure Area. It is

Potential Impact	Impact Rating	Description
		noted that the viewshed analysis doesn't consider the visual screening of natural vegetation and therefore presents a worst-case scenario.
Archaeological Impacts		
Direct Impacts due to Infrastructure Placement	Unknown	No direct impact on any of the identified Iron Age sites – refer to Figure 12. Unknown/subsurface heritage resources may be unearthed during construction. Direct impacts to cultural resources without surface indications, often referred to as buried sites, are difficult to estimate.
Secondary Impacts caused by Air Quality	Low	Figure 19 and Figure 20 indicate the PM_{10} and $PM_{2.5}$ dispersion modelling results for the Waterberg Project. Iron Age Site 3K falls within the air quality zone of influence. It is however noted that the air quality at the sites adheres to the ambient air quality standards and the impact is therefore low.
Secondary Impacts caused by Blasting & Vibration Impacts	None	Blasting creates noise and vibrations which may affect rock art sites and Stone Age and Iron Age sites on hills. No impact is expected due to construction blasting, as indicated in Figure 24. The addendum to the blasting specialist report (Appendix D) indicates that underground blasting could have a vibration impact on surface for mining depths shallower than 370m. The following Iron Age site falls within the underground blasting zone of influence (Figure 25): Central – Site 3K. This site consists of a few broken lower grinding stones, and no impact is expected due to vibration.
Secondary Impacts caused by Noise and Visual Impacts	Low	The ambient noise levels could potentially increase between 5 and 10 dB at Site 3K situated on Ketting (Figure 26). The viewshed analysis (Figure 27) indicates some visual impacts on all sites within a radius of 5 km from the Surface Infrastructure Area. It is noted that the viewshed analysis doesn't consider the visual screening of natural vegetation and therefore presents a worst-case scenario.
Paleaontological Impacts		
Direct Impacts due to Infrastructure Placement	Unknown	Details of the location and distribution of significant fossil sites or key fossiliferous rock units are often difficult to be determined due to thick topsoil, subsoil, overburden and alluvium. Direct impacts to paleontological resources include surface disturbance during construction, the sealing-in or destruction of fossils by underground mining, vehicle traffic and human disturbance. At present, the entire Waterberg Surface Infrastructure Area and underground mine workings have a potential for paleontological resources and paleontological monitoring must be implemented.
Secondary Impacts caused by Air Quality	None	Air quality will not impact on the palaeontological resources in the Waterberg Project area.
Secondary Impacts caused by Blasting & Vibration Impacts	Low to Moderate	Blasting will destroy fossils and other palaeontological resources, however the chances of exposing such resources are low to moderate.
Secondary Impacts caused by Noise and Visual Impacts	None	Noise and visual impacts are not relevant to the palaeontological resources.
Tourism Impacts		
Direct Impacts due to Infrastructure Placement	None	There is no direct impact on any tourism facility, route or trail.
Secondary Impacts caused by Air Quality	Low	The secondary tourism impacts relating to air quality has been identified as dust caused by external parties approaching the mine development from the north. The main transport route to and from the mine for product and deliveries are in a southern direction towards the N11 and

Potential Impact	Impact Rating	Description
		Mogalakwena, however it is envisaged that some staff and other smaller local contractors may utilize the D3340 road and the D3440 road to the north. Both these roads are unpaved roads and travelling on them may cause additional dust. The tourism facilities, routes and hiking trails are located further north of the mine development. The nearest tourism facility/route from these potentially affected roads are more than 10 km away, and it is therefore expected that the impact on tourism will be low.
Secondary Impacts caused by Blasting & Vibration Impacts	None	Blasting vibrations are mostly noticeable in the immediate vicinity of blasting. There are currently no tourism facilities in this region of the Makgabeng, but due to the presence of the rock art there is a potential to development tourism facilities in this region. It is expected that blasting will have a very low impact on tourism based on current development. From current activities, route development and available facilities it would seem that future tourism development is more likely to take place between Makgabeng and Blouberg than to the south and east of the Makgabeng Plateau.
Secondary Impacts caused by Noise and Visual Impacts	Low	The tourism facilities, routes and hiking trails are located further north of the mine development. The nearest tourism facility/route are more than 12 km away from the Surface Infrastructure Area, and no increase in the ambient noise levels are expected at these facilities. Due to the distance from the Surface Infrastructure Area, a negligible visual impact is envisaged, especially if considering the vegetation screening on the Makgabeng Plateau.
Indigenous Knowledge System		
Direct Impacts due to Infrastructure Placement	Medium	Approximately 950 ha will be disturbed during construction. It is envisaged that several protected species and medicinal plants will be impacted by the surface clearance.
Secondary Impacts caused by Air Quality	Low	Dust settling on trees could affect the breeding “fitness” of adult individuals (e.g. during host plant selection) and faunal survival where these are dependent on this resource (Nyegere, 2019).
Secondary Impacts caused by Blasting & Vibration Impacts	None	Blasting will not impact on the indigenous knowledge system.
Secondary Impacts caused by Noise and Visual Impacts	None	Noise and visual impacts are not relevant to the indigenous knowledge system.

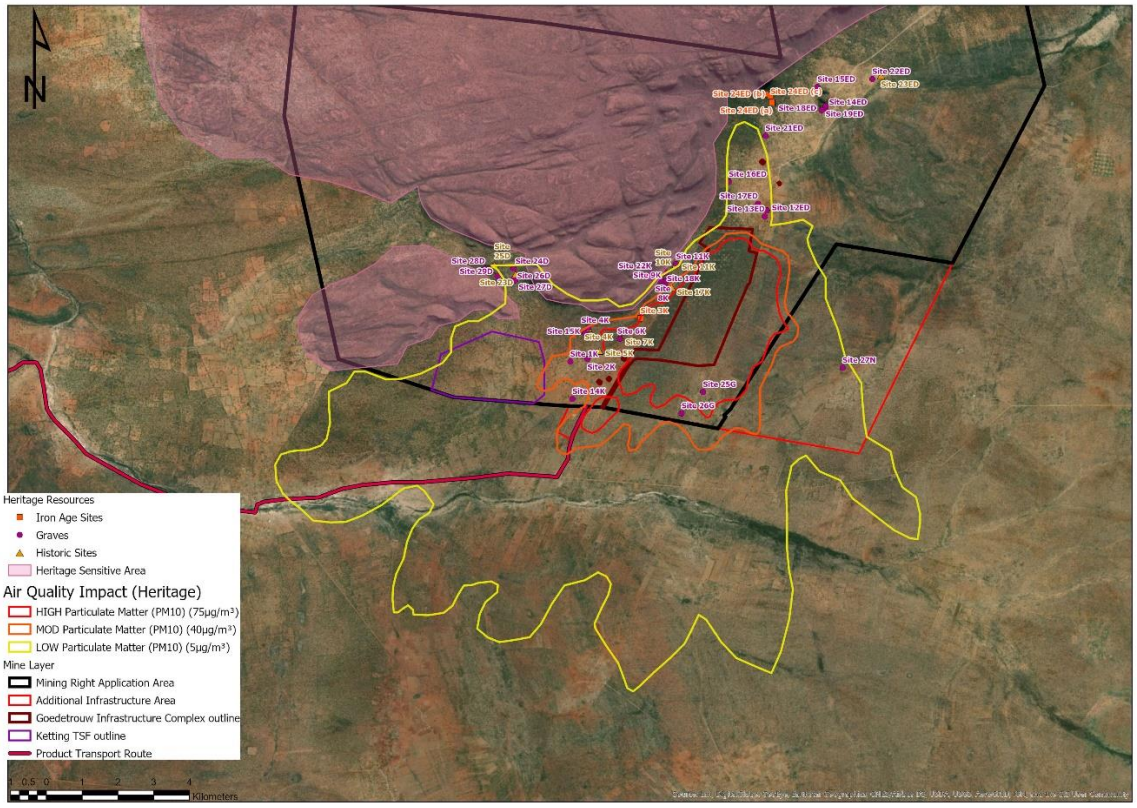

Figure 19: Particular matter (PM_{10}) – all sources (24 hour, 99th percentile, ambient air quality standard 75 µg/m^3)

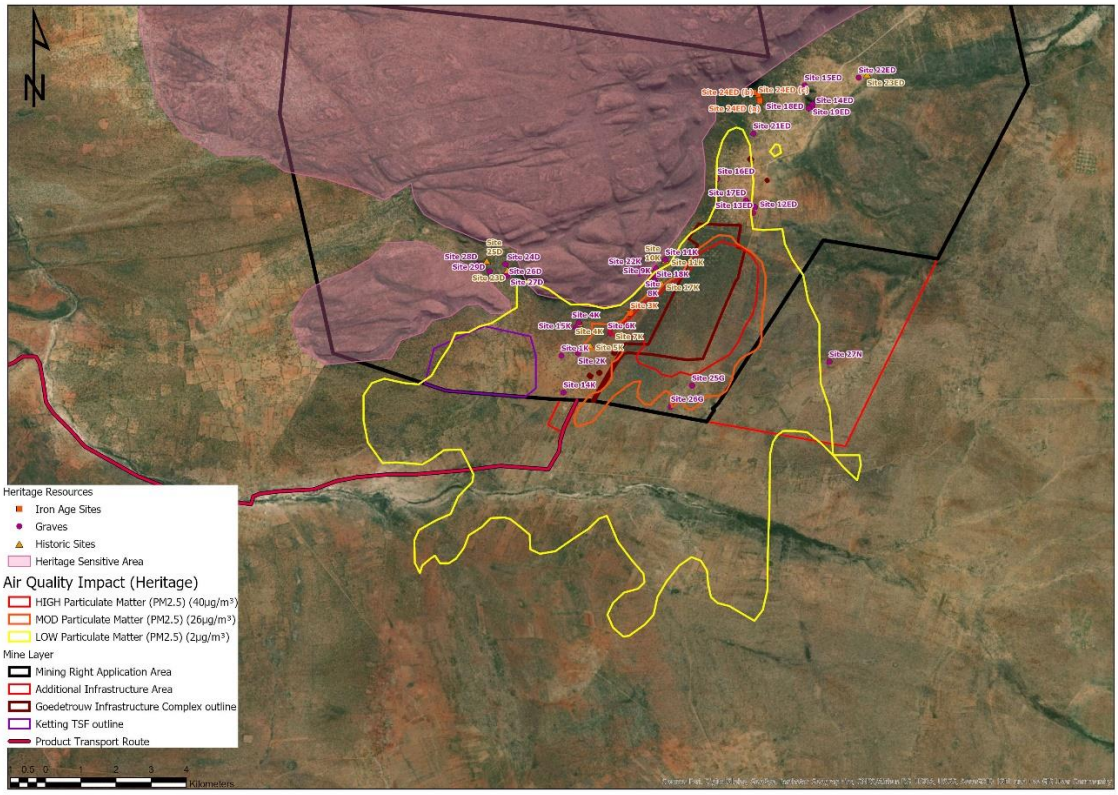

Figure 20: Particular matter ($PM_{2.5}$) – all sources (24 hour, 99th percentile, ambient air quality standard 40 µg/m^3)

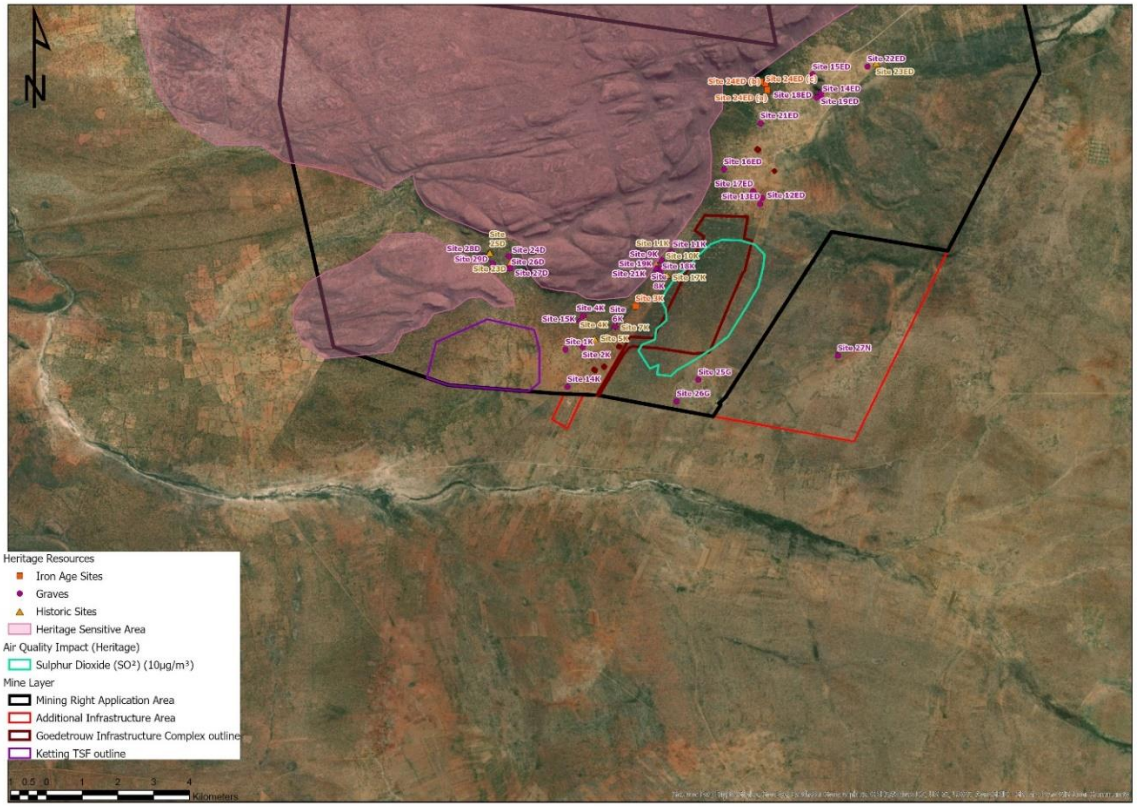

Figure 21: Sulphur dioxide (SO_2) – all sources (24 hour, 99th percentile, ambient air quality standard 125 µg/m^3)

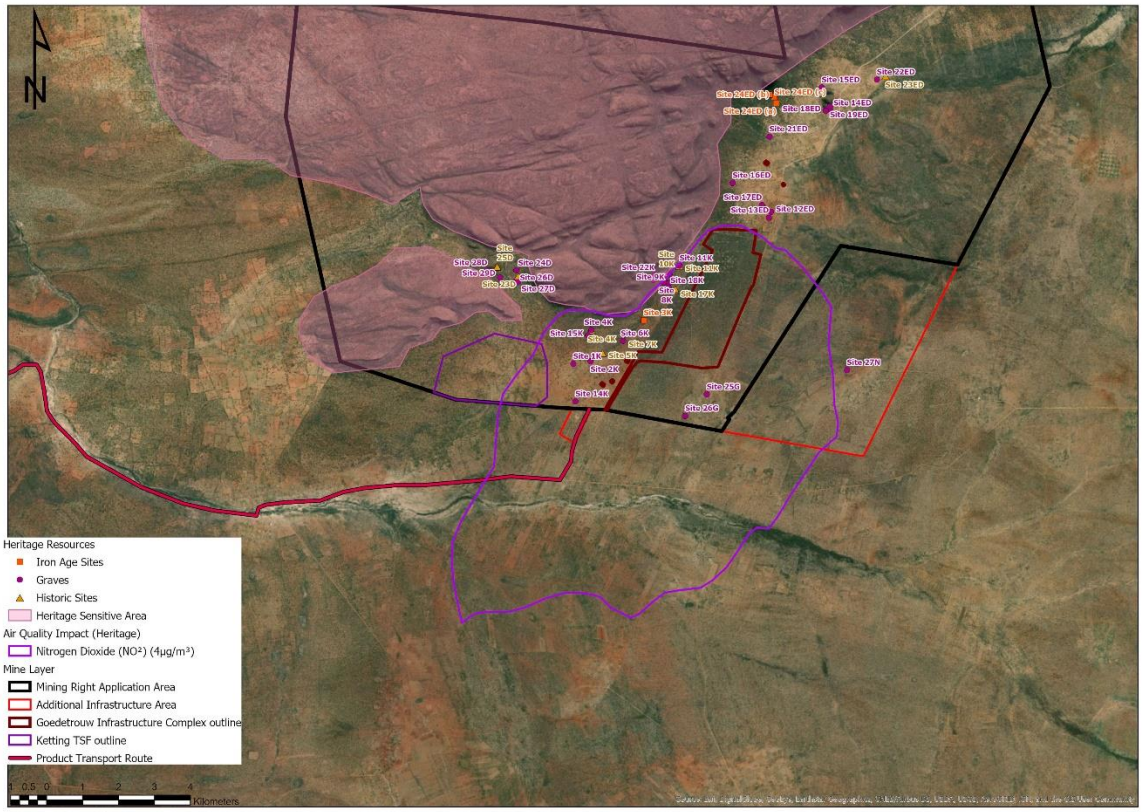

Figure 22: Nitrogen dioxide (NO_2) – all sources (annual average, ambient air quality standard 40 µg/m^3)

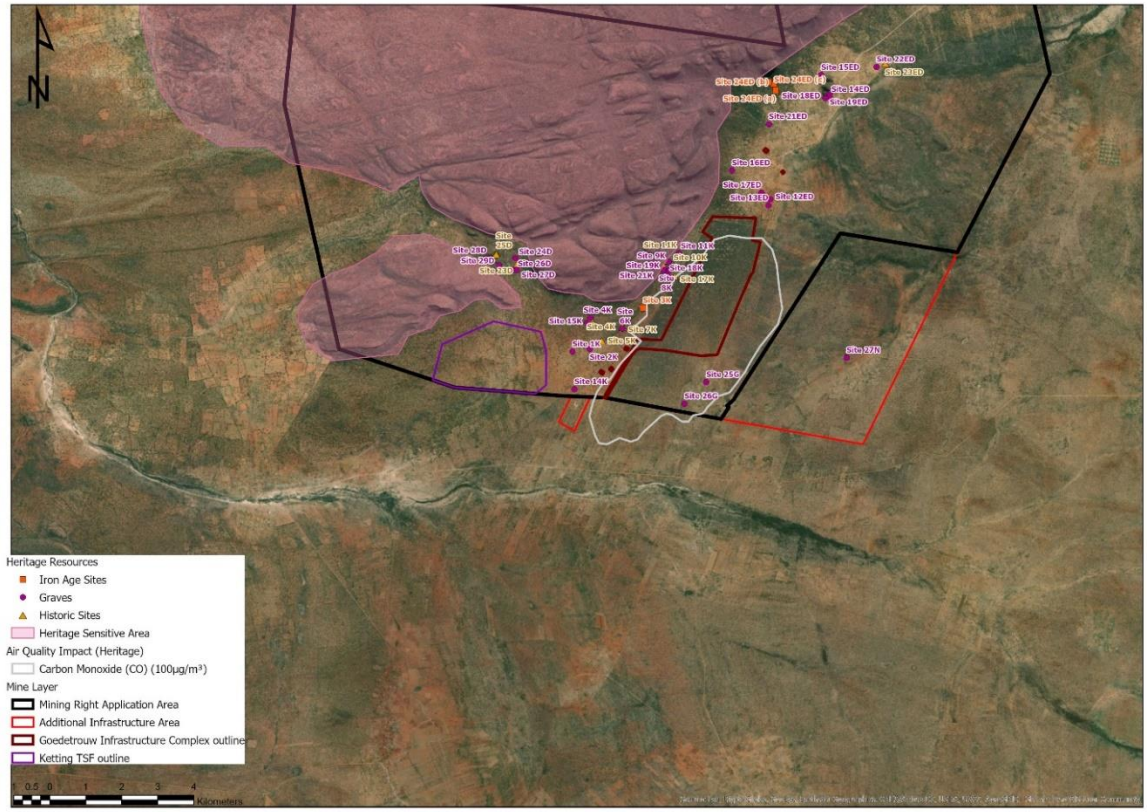

Figure 23: Carbon monoxide (CO) – all sources (8 hour, 99th percentile, ambient air quality standard 10,000 µg/m3)

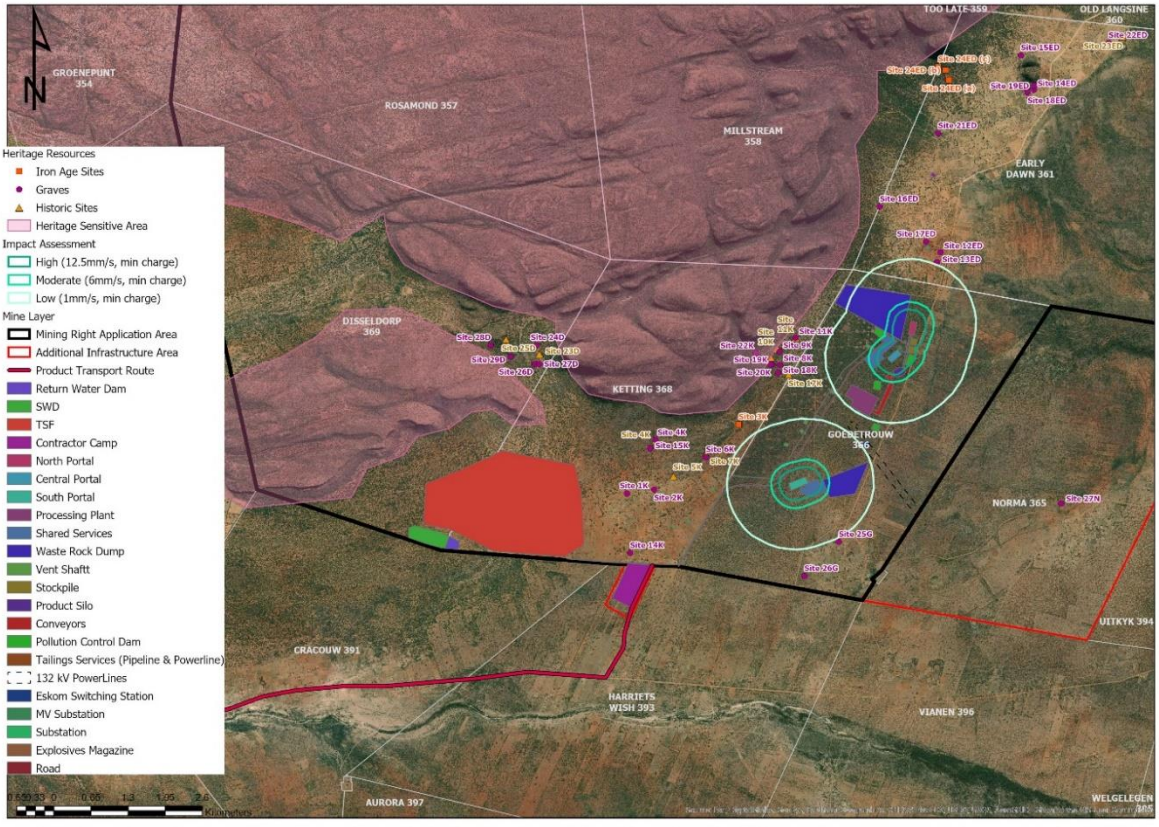

Figure 24: Blasting & vibration impact – Construction Phase

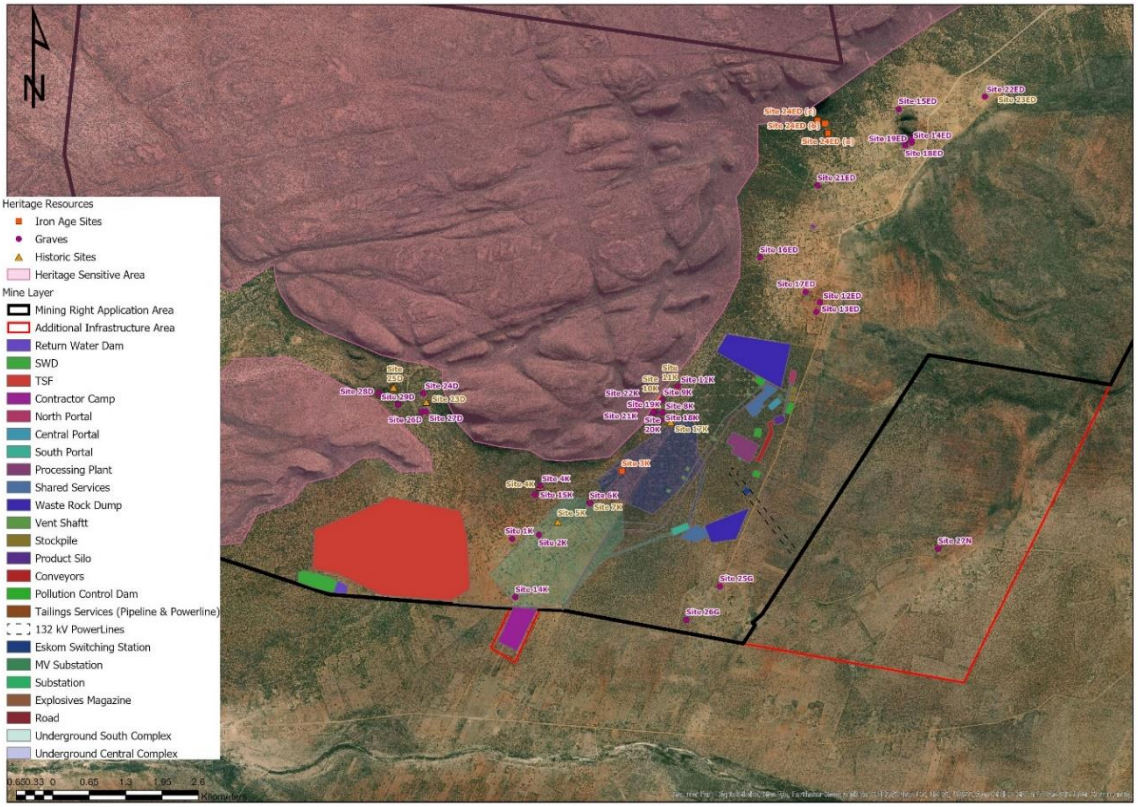

Figure 25: Blasting & vibration impact – Operational Phase (underground mining)

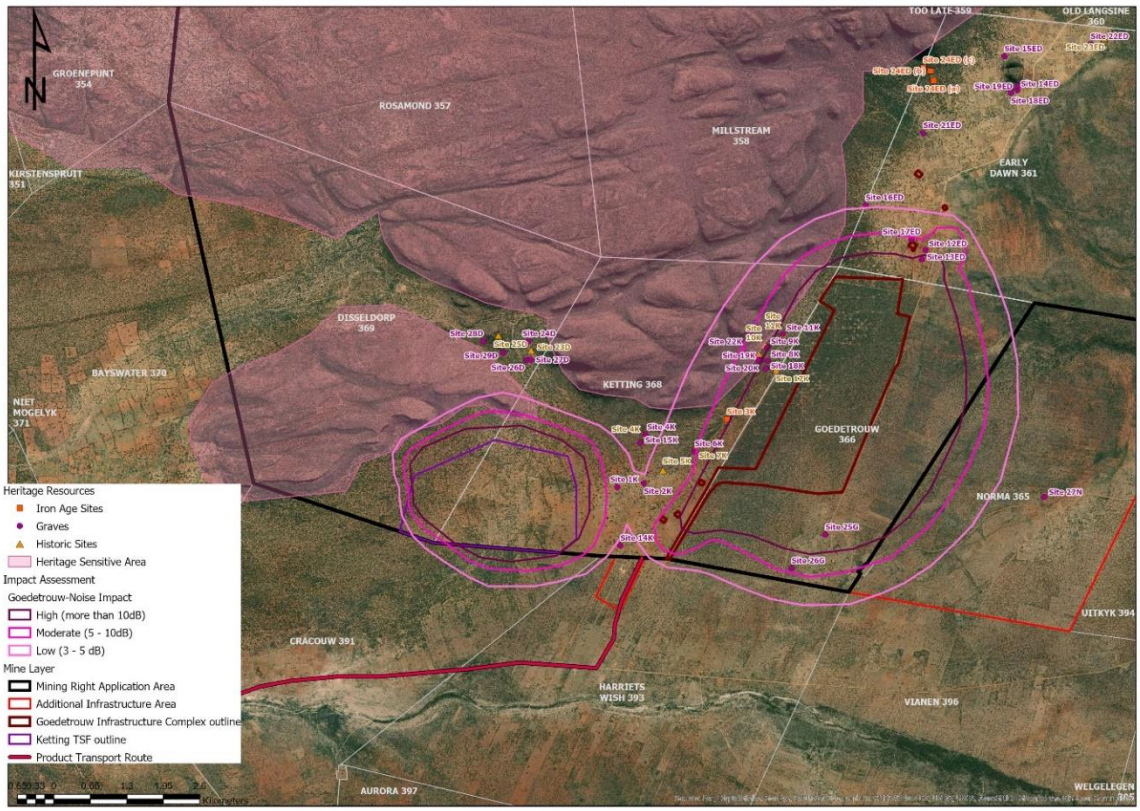

Figure 26: Ambient noise increase as a result of the Waterberg Project activities

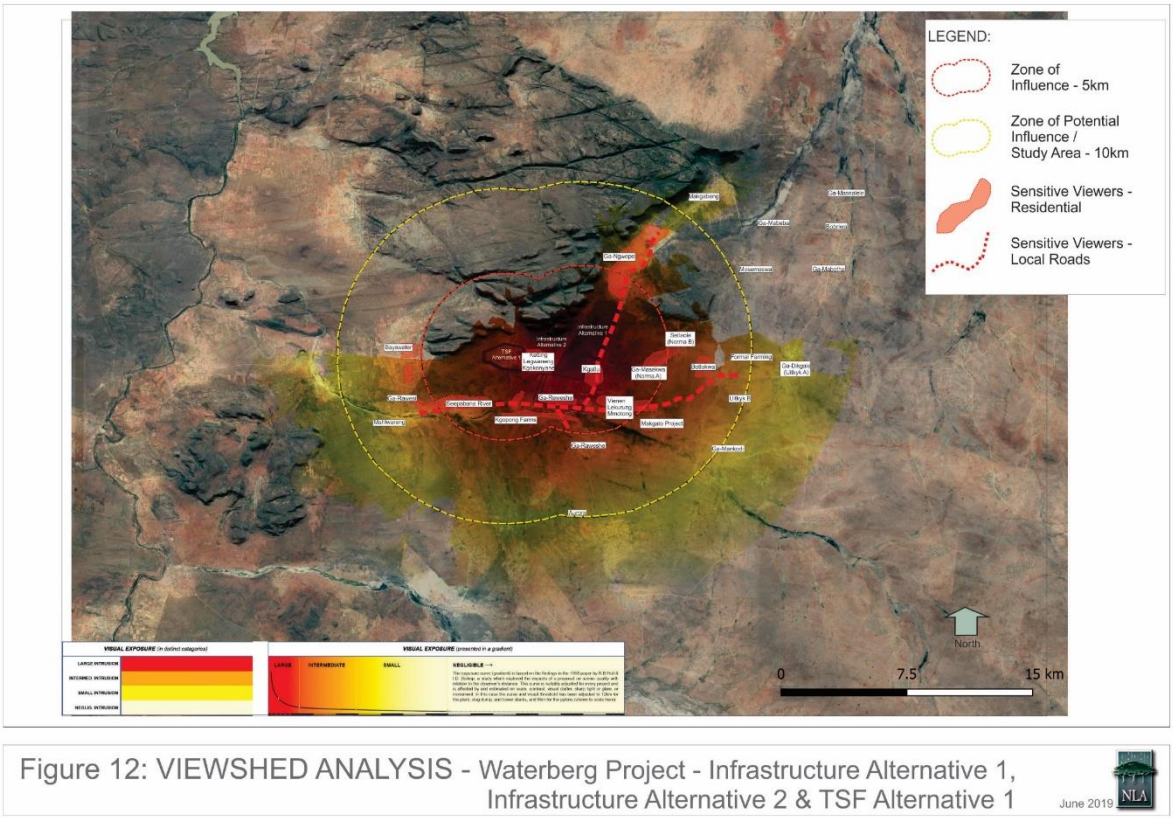

Figure 27: Viewshed analysis for the Waterberg Project (NLA, 2019)

5 MITIGATION, MANAGEMENT AND MONITORING

5.1 Mitigation Measures

Table 6: Mitigation Measures

Impact	Mitigation Measures
Impact on the sensitive Makgabeng Plateau environment	• All personnel on site must be informed of the conservation significance of the natural habitat and fauna of the Makgabeng Plateau and its foot slopes. • Regular (weekly or monthly depending on the level of awareness of the staff) education and awareness meetings must be held to inform staff. Officials from the nature conservation services must be invited to some meetings.
Impact on rock art sites	• Rock art monitoring must be implemented in conjunction with a specialist in the field of rock art. • Ongoing air quality (dust fallout) monitoring must be conducted to determine the impact of dust on the sites.
Impact on archaeological and historical sites	• All identified sites within the development footprint should be clearly demarcated (fenced in) and declared as a no-go area. • Buffer zones around any of these sites should be at least 20m. Depending on individual circumstances, e.g. blasting and dust pollution, such a buffer may have to be increased. • Monthly Monitoring of heritage sites to determine any damage resulting from blasting or other mining related activities. • Immediate rectification of damage to any heritage sites.
Impact on burial grounds and grave sites	• All identified sites within the development footprint should be clearly demarcated (fenced in) and declared as a no-go area. • Buffer zones around any of these sites should be at least 20m. Depending on individual circumstances, e.g. blasting and dust pollution, such a buffer may have to be increased. • Monthly Monitoring of grave sites to determine any damage resulting from blasting or other mining related activities. • Immediate rectification of damage to any grave sites.
Recovery of sub-surface archaeological sites during construction	• A qualified archaeologist must monitor excavation activities. • Any discovery of artefacts, graves or other remains of archaeological interest should be reported to SAHRA. • Activities must cease immediately upon any discovery of cultural or heritage resources and a qualified archaeologist informed to do further assessment and reporting. • Identified sites of cultural and heritage significance must be demarcated until such time that an instruction to resume work is provided to the contractor, following consultation with the regulating authorities. • Implementation of Chance Find Procedure.
Exposure of paleontological material or fossils	• Implementation of Chance Find Procedure. • If discovered, a qualified palaeontologist must be appointed to confirm the presence of palaeontological material and/or fossils.
Impact on protected and medicinal species	• Minimize area cleared for construction activities and retain indigenous vegetation where possible. • Site impact must be restricted to a radius of 20 m, preferably delineated and with a barrier erected. • Protected and medicinal plant species must be retained/protected where possible.

Impact	Mitigation Measures

	• Individuals of these species must be identified and translocated before natural vegetation is cleared during the construction phase.
	• Do a count of the number of Marula trees to be affected by construction activities and document the traditional herbs to be affected. Negotiate workable solutions with the community, e.g.:
	  ○ Plant/replace fruit trees and other plants that are being used by community members at suitable localities;
	  ○ Where possible fruit trees and other medicinal plants should not be removed, and access granted at harvesting times;
	  ○ Where trees are removed, community members be given permission to use and/or sell the wood.

Impact on sense of place	• Large trees surrounding the infrastructure footprint areas should remain intact as far as possible. • General housekeeping should receive priority to ensure operational areas are always neat and orderly. • Visually intrusive activities must be screened off or make use of local screening opportunities as far as is considered feasible. • Where screening opportunities from topography and vegetation are absent, natural-looking constructed landforms and vegetative or architectural screening may be used to minimise visual impacts. • Minimize use of earthmoving equipment, generators and any other equipment that results in noise and/or dust. • Vegetation growth on dumps and stockpiles should be encouraged, and if required facilitated through seeding with a locally indigenous seed mixture. • Disturbed areas and bare soils should be revegetated as soon as possible during the operational phase. • Vehicles should be restricted to existing roads and the speed of hauling and other vehicles should be limited to minimise dust generation. • Access roads must be suitably maintained to limit and prevent erosion and dust. • Off-site visual mitigation measure that should be considered could include reclaiming unnecessary roads, removing unnecessary fencing, signage and buildings that will not be repurposed, and rehabilitating and revegetating existing erosion or disturbed areas. • If required, additional screening vegetation may be planted at receptor sites from where a clear view towards mining infrastructure of increased height exists. • Continuous consultation with neighbouring landowners to ensure co-existence and collaboration on mitigation measures for impacts on noise and dust. • Implement a consultation programme with local stakeholders in the development of a closure plan and rehabilitation programme. • Determine the regional needs and characteristics to ensure post mining land use enhances the regional characteristics. • Monitoring the impact on neighbouring properties. • Establish a complaint and grievance procedure.
Visual impacts from night-time lighting	• Existing vegetation will assist in screening surrounding receptors from night-time lighting at ground level, and therefore as much existing vegetation as possible surrounding the proposed infrastructure should be retained and development footprints should remain as small as possible. • A lighting engineer should be consulted to assist in the planning and placement of light fixtures for the plant and all ancillary infrastructure in order to reduce visual impacts associated with glare and light trespass. • Placement of lighting outside of the project area should be avoided or strictly limited.

Impact	Mitigation Measures
	• All outdoor lighting must be strictly controlled, and lighting shields installed where required. • The use of high light masts should be avoided to reduce sky glow. • Up-lighting of structures must be avoided, with lighting installed at downward angles that provide precisely directed illumination. • Localised and portable lighting should be used where and when the operations or maintenance work is occurring. Vehicle-mounted lights or portable light towers are preferred over permanently mounted lighting for night-time maintenance activities. • Censored and motion/movement-activated lighting should be installed for security purposes at offices and workshops to prevent use of lights when not needed. • Minimum wattage light fixtures should be used, with the minimum intensity necessary to accomplish the light's purpose. • The use of low-pressure sodium lamps, yellow Light Emitting Diode (LED) lighting, or an equivalent reduces skyglow and wildlife impacts. Bluish-white lighting is more likely to cause glare. • Off-site hauling of product should be limited to daylight hours.
Excessive quantity of noxious vehicle exhaust fumes	• Manage vehicle fleet and movement of vehicles on site and limit the use of vehicles in poorly ventilated areas. • Where possible/practical, plan vehicle travel routes in such a manner as to allow for exhaust fumes to disperse sufficiently and not to affect air quality to the extent whereby exceedance of standards could occur. • Consider alternative options to vehicles with combustion engines.
Increased Fugitive dust	• Manage site access and control movement on site. • Set the speed limit for hauling vehicles and vehicles in general to as low a speed possible and enforce the speed limits specified. • Include speedbumps to control the speed limits where appropriate. • Include a program of wet suppression of the unpaved roads with major vehicle activity. The wet suppression can typically be grey water from the mine, or the water can contain a chemical that will increase the dust trapping capability once sprayed over a surface. • Material should be kept damp during crushing and screening. • Dust suppression should be installed along all conveyors and at conveyor transfer stations. • General traffic around the TSF areas must be limited. • Limit the load size of the vehicles to ensure the wind in transit does not pick up more dust than need be. • Vegetation growth on dumps and stockpiles should be encouraged, and if required facilitated through seeding with a locally indigenous seed mixture. • Disturbed areas and bare soils should be revegetated as soon as possible during the operational phase. • Windshields (barriers) can be implemented on the slopes and surface of the stockpile, these barriers are typically large trees with good foliage. The substitute of a wind barrier is a wind shield made from a prose material. • Establishment of a Complaint and Grievance Procedure. • Ongoing air quality (dust fallout) monitoring.
Secondary Tourism Impacts caused by Air Quality	• Discourage staff, contractors and suppliers on utilizing the D3340 and D3440 roads to provide goods and services to the mine. • Engage Roads Agency Limpopo, CDM and BLM to explore possibilities of a) regular maintenance of the roads; and b) upgrading these roads to an improved status.
Increased ambient noise levels	• Dump (waste rock, TSF) shaping to create a noise berm around the perimeter on top of the dump, acting as a noise screen.

Impact	Mitigation Measures
	• Restriction of dump operations to daytime hours (6:00 to 22:00). • Fitment of trucks and earth-moving equipment with buzzer type reverse alarms producing a "hissing" sound, rather than the tonal beeping of conventional alarms. • Ensure that equipment is well maintained and fitted with the correct and appropriate noise abatement measures. Engine bay covers over heavy equipment could be pre-fitted with sound absorbing material. Heavy equipment that fully encloses the engine bay should be considered, ensuring that the seam gap between the hood and vehicle body is minimised. • Establishment of a Complaint and Grievance Procedure. • Ongoing noise monitoring.
Blasting impacts	• Implementation of minimum charge during portal access. • During underground mining specific blast design is to be done with shorter, smaller diameter blast holes, using electronic initiation instead of shock tube systems to obtain single hole firing. • Ongoing blast monitoring.

5.2 Monitoring Programme

5.2.1 Noise monitoring

The initial plan is to monitor noise at locations in village areas on a monthly basis. This plan must be revised prior to and after each survey to optimise the selection of locations where noise should be monitored. Revision will be based on factors such as changes in mining operations, responses or complaints from residents in the area and the outcomes of previous surveys.

If noise levels are found to be within acceptable limits, monitoring may be relaxed to an annual routine. If operations take place during the night, the surveys should be conducted over 24-hour periods, with the focus on night-time conditions.

The proposed noise monitoring points are indicated in Figure 28. Additional monitoring points to cover the sensitive Makgabeng Plateau should be identified prior to implementation of the monitoring programme.

5.2.2 Air quality monitoring

Dust fallout monitoring will be implemented prior to the commencement of the Waterberg Project. Sampling of fallout should be undertaken within the neighbouring areas and on-site to assess the level of nuisance dust associated with both mining and process related operations.

The proposed air quality (dust fallout) monitoring points are indicated in Figure 29. Additional monitoring points to cover the sensitive Makgabeng Plateau should be identified prior to implementation of the monitoring programme.

Particulate matter must be monitored on an annual basis. Should this monitoring indicate levels above that of the ambient air quality standards, the frequency of monitoring should be increased to monthly until the standards are met.

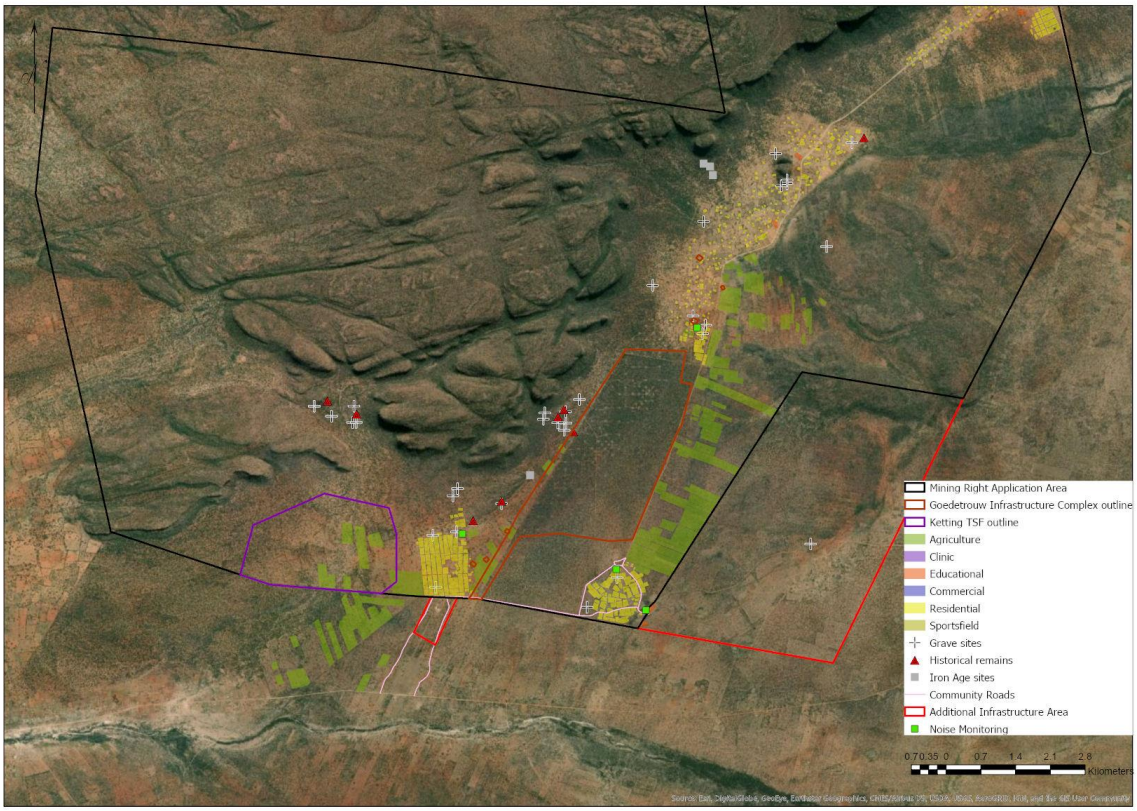

Figure 28: Noise monitoring points

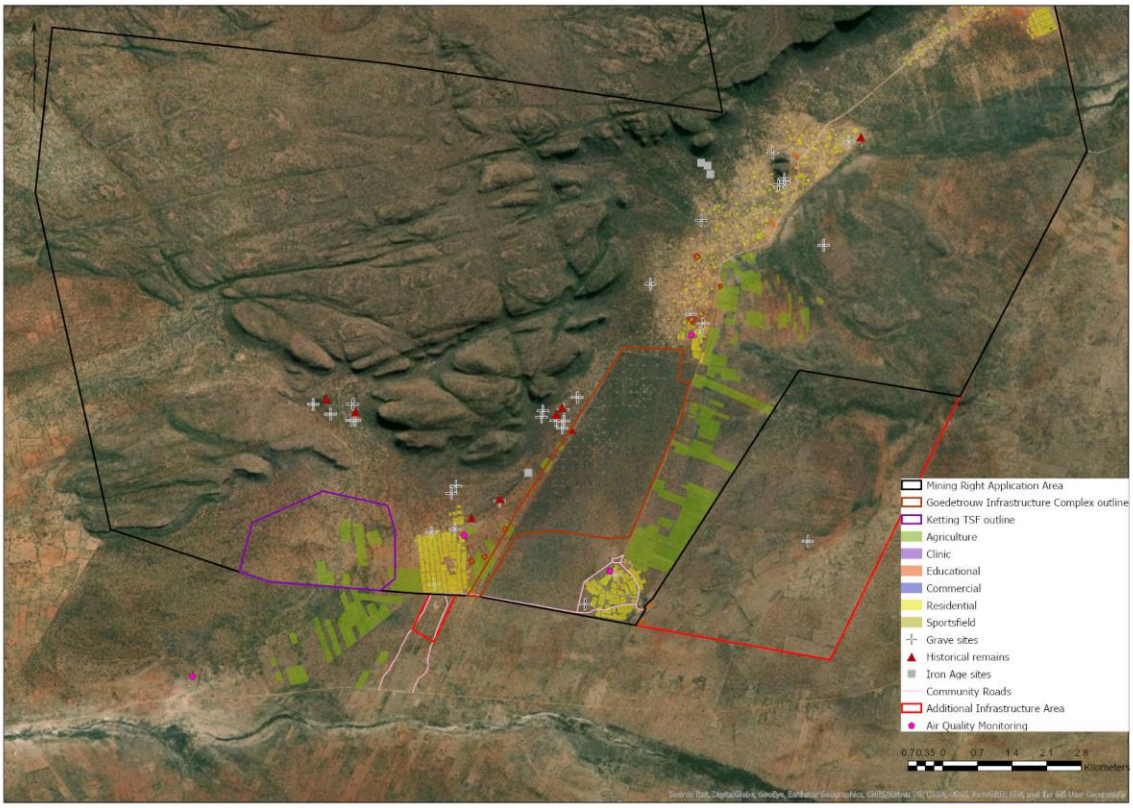

Figure 29: Air Quality Monitoring points

5.2.3 Blast monitoring

The following elements will be monitored in respect of blasting activities:

- Ground vibration and air blast results;
- Blast Information summary;
- Meteorological information at time of the blast;
- Video Recording of the blast;
- Fly rock observations.

Most of the above aspects do not require specific locations of monitoring. Ground vibration and air blast monitoring requires identified locations for monitoring. Monitoring of ground vibration and air blast is done to ensure that the generated levels of ground vibration and air blast comply with recommendations. Proposed positions were selected to indicate the nearest points of interest at which levels of ground vibration and air blast should be within the accepted norms and standards as proposed in this report. The monitoring of ground vibration will also qualify the expected ground vibration and air blast levels and assist in mitigating these aspects properly. This will also contribute to proper relationships with the neighbours.

The proposed monitoring positions are indicated in Figure 30. These points will need to be re-defined after the first blasts are done and the blasting procedure is defined.

A once-off pre-blast photographic survey will be conducted in a 2 km radius around the portal development areas on all existing infrastructure prior to the portal development.

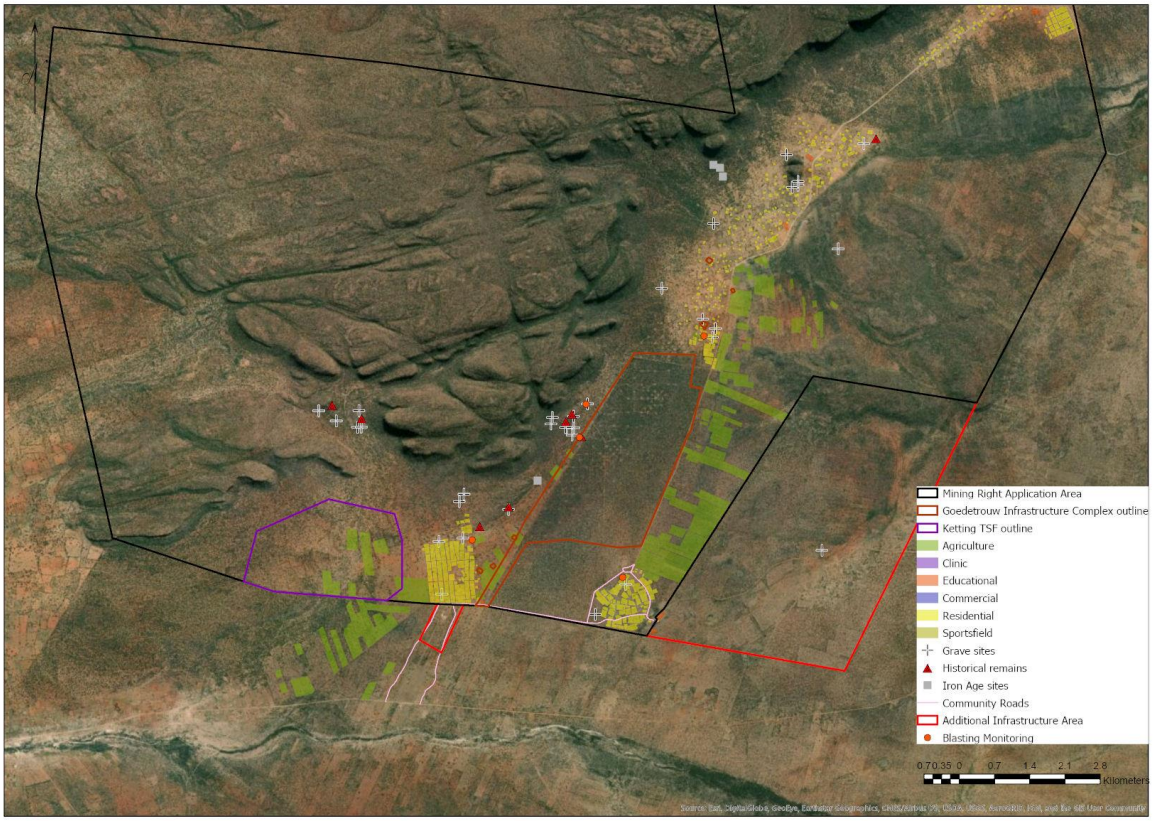

Figure 30: Blast monitoring points

5.2.4 Cultural and heritage resources monitoring

The identified cultural and heritage resources must be fenced to protect from construction activities and movement of machinery on site. A visual inspection of these sites must be conducted on a monthly basis to determine the integrity of the fencing, any damage to the sites and any fly-rock (during construction of the portal areas).

In addition, while there is no rock art that has been identified within the Surface Infrastructure Area, it would be necessary for a monitoring programme to be set up for rock art sites in the surrounding areas. A detailed monitoring programme should be developed in conjunction with a specialist in the field of rock art.

5.3 Heritage Management Plan

5.3.1 Legal requirements

According to the National Heritage Resources Act (NHRA), 1999 (Act No. 25 of 1999) the following is protected as cultural heritage resources:

a. Archaeological artefacts, structures and sites older than 100 years
b. Ethnographic art objects (e.g. prehistoric rock art) and ethnography
c. Objects of decorative and visual arts
d. Military objects, structures and sites older than 75 years
e. Historical objects, structures and sites older than 60 years
f. Proclaimed heritage sites
g. Graveyards and graves older than 60 years
h. Meteorites and fossils
i. Objects, structures and sites of scientific or technological value

The national estate includes the following:

a. Places, buildings, structures and equipment of cultural significance
b. Places to which oral traditions are attached or which are associated with living heritage
c. Historical settlements and townscapes
d. Landscapes and features of cultural significance
e. Geological sites of scientific or cultural importance
f. Archaeological and paleontological importance
g. Graves and burial grounds
h. Sites of significance relating to the history of slavery
i. Movable objects (e.g. archaeological, paleontological, meteorites, geological specimens, military, ethnographic, books etc.)

5.3.1.1 Structures

Section 34 (1) of the NHRA states that no person may demolish any structure or part thereof which is older than 60 years without a permit issued by the relevant provincial heritage resources authority.

A structure means any building, works, device or other facility made by people and which is fixed to land, and includes any fixtures, fittings and equipment associated therewith.

Alter means any action affecting the structure, appearance or physical properties of a place or object, whether by way of structural or other works, by painting, plastering or the decoration or any other means.

5.3.1.2 Archaeology, palaeontology and meteorites

Section 35(4) of the NHRA deals with archaeology, palaeontology and meteorites. The act states that no person may, without a permit issued by the responsible heritage resources authority (national or provincial):

a. destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or paleontological site or any meteorite;
b. destroy, damage, excavate, remove from its original position, collect or own any archaeological or paleontological material or object or any meteorite;

c. trade in, sell for private gain, export or attempt to export from the Republic any category of archaeological or paleontological material or object, or any meteorite;
d. bring onto or use at an archaeological or paleontological site any excavation equipment or any equipment that assists in the detection or recovery of metals or archaeological and paleontological material or objects, or use such equipment for the recovery of meteorites; or
e. alter or demolish any structure or part of a structure which is older than 60 years as protected.

Where a Heritage Impact Assessment ("HIA") has not been undertaken or where discovered after an HIA process, the above mentioned may only be disturbed or moved by an archaeologist, after receiving a permit from the South African Heritage Resources Agency (SAHRA). In order to demolish such a site or structure, a destruction permit from SAHRA will also be needed.

5.3.1.3 Human remains

Graves and burial grounds are divided into the following:

a. ancestral graves
b. royal graves and graves of traditional leaders
c. graves of victims of conflict
d. graves designated by the Minister
e. historical graves and cemeteries
f. human remains

In terms of Section 36(3) of the NHRA no person may, without a permit issued by the relevant heritage resources authority:

a. destroy, damage, alter, exhume or remove from its original position of 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 or 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, or any equipment which assists in the detection or recovery of metals.

All graves older than 60 years are called heritage graves and should be handled by an archaeologist. This includes archaeological graves, which are older than 100 years. Unidentified/unknown graves (which refers to date of death) are also handled as older than 60 until proven otherwise.

Human remains that are less than 60 years old are subject to provisions of the National Health Act, 2003 (Act 61 of 2003) and to local regulations.

Exhumation of graves must conform to the standards set out in the Ordinance on Excavations (Ordinance No. 12 of 1980) (replacing the old Transvaal Ordinance No. 7 of 1925). Permission must also be gained from the descendants (where known), the National Department of Health, Provincial Department of Health, Premier of the Province and local police. Furthermore, permission must also be gained from the various landowners (i.e. where the graves are located and where they are to be relocated) before exhumation can take place.

Human remains can only be handled by a registered undertaker or an institution declared under the National Health Act, 2003 (Act 61 of 2003).

5.3.2 Management and mitigation of identified heritage sites

The following management measures should be implemented prior to construction:

- All identified sites within the development footprint should be clearly demarcated (fenced in) and declared as a no-go area.
- Buffer zones around any of these sites should be at least 20m. Depending on individual circumstances, e.g. blasting and dust pollution, such a buffer may have to be increased.
- Monitoring of heritage sites to determine any damage resulting from blasting or other mining related activities.
- Immediate rectification of damage to any heritage sites.
- A qualified archaeologist shall monitor construction activities until completion thereof.
- Construction activities shall cease immediately upon any further discovery of cultural and heritage resources and the required assessment and reporting instituted – refer to Chance Find Procedures below.

5.3.3 Chance Find Procedures

Most archaeological and paleontological remains are subterranean and there is always a chance that archaeological material (including burial sites) may be exposed during earthworks. The Chance Find Procedures below indicates the procedure that need to be followed in such an event.

5.3.3.1 Archaeological or historical material

If any unidentified archaeological or historical material are identified and/or exposed during any of the developmental phases of the project, the following steps must be implemented subsequent to those outlined above:

- All work at the affected area must cease and reported to the immediate supervisor and through their supervisor to the senior on-site manager.
- The area should be demarcated to prevent any further work there until an investigation has been completed.
- An archaeologist should be contacted immediately to provide advice on the matter.
- The archaeologist will decide on future action. Depending on the nature of the find, it may include a site visit.
- If needed, the necessary permit will be applied for with SAHRA. This will be done in conjunction with the appointed archaeologist.
- The appropriate action will be determined by the nature of the find and the possibilities given the restriction placed upon it by mining activities.
- Work on site will only continue after the archaeologist/ SAHRA has agreed to such a matter.

5.3.3.2 Human remains

If unidentified burial grounds, graves or human remains are identified and/or exposed during any of the developmental phases of the project, the following steps must be implemented subsequent to those outlined above:

- All work at the affected area must cease and reported to the immediate supervisor and through their supervisor to the senior on-site manager.
- The area should be demarcated to prevent any further work there until an investigation has been completed.
- An archaeologist should be contacted immediately to provide advice on the matter.
- The archaeologist must confirm the presence of burial grounds, graves or human remains.
- If this is the case, the archaeologist must inform the local South African Police Services (SAPS) and traditional authority (if applicable). SAHRA's BGG Unit should also be notified in the case of human remains.
- The archaeologist, in conjunction with the SAPS and traditional authority, will inspect the possible graves and make an informed decision whether the remains are of forensic, recent, cultural-historical or archaeological significance.
- Should it be concluded that the find is of heritage significance and therefore protected in terms of heritage legislation, the archaeologist will notify the relevant authorities and institute the grave relocation procedure.

5.3.3.3 Palaeontology

If any paleontological material or fossils are exposed during any of the developmental phases of the project, the following steps must be implemented subsequent to those outlined above:

- All work at the affected area must cease and reported to the immediate supervisor and through their supervisor to the senior on-site manager.
- The area must be fenced-off with a 30 m barrier and the area declared as a no-go area.
- A palaeontologist should be contacted immediately to confirm the presence of palaeontological material and/or fossils.
- If this is the case, SAHRA must be contacted for further investigation and mitigation.
- Three types of permits are available: Mitigation, Destruction and Interpretation. The specialist will apply for the necessary permit at the beginning of the process.

5.3.4 Grave Relocation Procedure

5.3.4.1 Graves older than 60 years

- Application for a permit from SAHRA in terms of Section 36 of the NHRA for graves older than 60 years or that of a victim of conflict.
- Known graves: Proof of thorough consultative process:
    - Locate next of kin and obtain letter of consent from next of kin.
    - Obtain a letter of consent or statement of no objection from the local traditional authority if in a rural area.
    - Determine a place for the re-burial of each grave in consultation with next of kin. In addition, also determine the arrangement of reburial, i.e. by the next of kin/community or a funeral undertaker.
    - Submit documentation of the above with the permit application to SAHRA.
    - Inform the SAPS of intent to relocate the grave/s and submit a copy of the permit to SAPS.
    - The graves are to be exhumed by a funeral undertaker under the supervision of an archaeologist. Undertaker would also arrange all the formalities for the reburial.
    - The specific requirements regarding ritual and ceremonial practices from next of kin and/or community for both the exhumation and reburial activity must be determined beforehand and facilitated by the developer.
- Unknown graves: Proof of thorough consultative process:
    - Place advertisement in a local and national newspaper with description and location of graves and full contact detail of consultant and developer. A waiting period of 60 days applies.
    - If no reaction to advertisement follows, then apply for permit from SAHRA after waiting period of 60 days with proof of advertisement and any other consultative process.
    - If in rural area obtain a letter of consent or statement of no objection from local traditional authority and submit with permit application.
    - If advertisement leads to a claim from next of kin or from a community who by tradition has an interest, then written consent from relevant party must be obtained.
    - Determine a place for the reburial of each grave.
    - Submit documentation of the above with the permit application to SAHRA.
    - Inform SAPS of intent and process of reburial and submit a copy of the permit to SAPS.
    - The graves are to be exhumed by a funeral undertaker under the supervision of an archaeologist. Undertaker would also arrange all the formalities for the reburial.
    - The specific requirements regarding ritual and ceremonial practices from next of kin and/or community for both the exhumation and reburial activity must be determined beforehand and facilitated by the developer.

5.3.4.2 Graves less than 60 years old

- Locate the next of kin of the buried persons and obtain consent from the next of kin for the relocation of the graves.
- Determine a place for the reburial of each grave.

- Obtain a letter of consent or statement of no objection from the local traditional authority if in a rural area.
- Submit above documentation to the Department of Health and obtain permission for the relocation of the graves, which process would most probably be regulated by the District Municipality.
- Inform the SAPS and provide above-mentioned documentation.
- The graves are to be exhumed by a funeral undertaker under the supervision of an archaeologist or acceptable exhumation specialist. The undertaker would also arrange all the formalities for the reburial.
- The specific requirements regarding ritual and ceremonial practices from next of kin and/or community for both the exhumation and reburial activity must be determined beforehand and facilitated by the developer.

5.3.4.3 Exhumation and relocation methodology

Normally, after detailed documentation, each grave is opened by the undertakers up to the level of the burial, or when the first skeletal material or coffin remnants are encountered. The archaeologist then opens the remains carefully using required excavation equipment, before detailed documentation commences. After documentation, the remains are removed and placed in new coffins supplied by the funeral undertaker and taken to a new cemetery to be re-interred.

The documentation normally comprises the following:

- Photographic Records - Photos of each site prior to excavation and exhumation, as well as of each grave is taken. Each burial, with its contents in situ is also photographically documented.
- GPS Data - A GPS reading for each site is taken in order to locate it on a map of the area.
- Burial Recording Forms - These forms are used to record all relevant details of each grave and burial, such as dimensions, position, contents, preservation of remains, cultural material found and all other observations regarding the skeletal remains.

6 CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

The mining and infrastructure impact are limited to the plains east of the plateau and there will be no direct impact on the Makgabeng Cultural Sensitive Area and Landscape. However, threats to other resources such as rock art, Stone Age and Late Iron Age sites and the natural environment may undermine the authenticity of the cultural landscape, the sense of place, and the interaction of human values within which the Makgabeng Plateau developed and should therefore also be identified and managed. Limited indirect impacts on the Makgabeng Plateau is envisaged, this should however be verified through monitoring.

The impact mapping indicates that there will be no direct impact on any of the archaeological and historical resources (including grave sites). However, there will be indirect impacts on the identified sites as a result of noise, air quality, blasting (vibration) and visual impacts. With the implementation of appropriate controls and mitigation measures, these impacts are rated as low.

Approximately 950 ha will be disturbed during construction and several protected species and medicinal plants will be impacted by the surface clearance. Protected and medicinal plant species must be retained/protected where possible, and where not possible, individuals of these species must be identified and translocated before natural vegetation is cleared during the construction phase.

A limited impact on heritage tourism is envisaged as most of the tourism facilities, routes and hiking trails are located further north of the mine development. The nearest tourism facility/route are more than 12 km away from the Waterberg Project area. From current activities, route development and available facilities it would seem that future tourism development is more likely to take place between Makgabeng and Blouberg than to the south and east of the Makgabeng Plateau.

The recovery of (unidentified) sub-surface archaeological sites during construction and the exposure of palaeontological material or fossils remain a risk (moderate to low) associated with the project. Chance Find Procedures have been developed for this purpose and will be implemented as part of the Heritage Management Plan.

6.2 Recommendations

The following recommendations are made:

1. The Heritage Management Plan must be implemented and reviewed on a regular basis as mining progresses.
2. The Environmental Monitoring Programme (noise, air quality and blasting) must be reviewed to include monitoring points to cover the potential impacts on the Makgabeng Plateau.
3. A monitoring programme must be developed for rock art sites in the surrounding areas, in consultation with a rock art specialist.

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8 APPENDICES

- Appendix A: Maps
- Appendix B: Declaration of Independence of Involved Specialists
- Appendix C: Archaeological Impact Assessment
- Appendix D: Paleontological Assessment
- Appendix E: Addendum to Blasting Impact Assessment – Underground Blasting
- Appendix F: Comments and Response from IAPs relating to Heritage