

Cultural Heritage Assessment for the Amendment to the Environmental Management Programme for the Proposed Tailings Storage Facility (TSF) and Associated Infrastructure at Royal Bafokeng Platinum Styldrift Mine Complex, Rustenburg Local Municipality, Bojanala District Municipality, North West Province

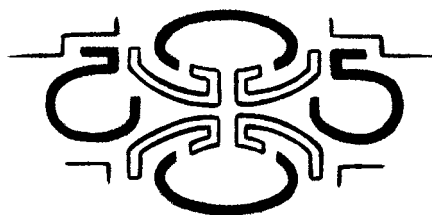


For

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Date:	February 2015
Version:	3 (Final Revised)

Executive Summary

This report contains a comprehensive heritage impact assessment investigation in accordance with the provisions of Sections 38(1) and 38(3) of the *National Heritage Resources Act* (Act No. 25 of 1999) (**NHRA**) and focuses on the survey results from a cultural heritage survey. SRK Consulting (Pty) Ltd (**SRK**) has been appointed as an independent consultant to conduct the EMPR amendment process as well as undertaking the public involvement component. The Styldrift Mine Complex (**SMC**) has an existing Environmental Management Programme (EMPR), issued in March 2008, for its Styldrift mining operation.

The Merensky reserves at the existing Royal Bafokeng Platinum Mine (**BRPM**) South and North shafts have now been depleted, with the South Shaft reducing Merensky production as from 2012 and North Shaft in 2018. The SMC will initially supplement and eventually replace production of these shafts. The existing BRPM Tailings Storage Facility (**TSF**) does not have sufficient capacity to accommodate the additional tailings produced by the modified BRPM Concentrator Plant. In order for the SMC to achieve its objective of initially supplementing, and eventually replacing, the production at BRPM, a new (or expansion to the existing) TSF is required to accommodate the additional tailings. Approval in terms of the Minerals and Petroleum Resources Development Act (**MPRDA**) was granted for the SMC to modify the existing BRPM Concentrator and to extend the existing BRPM TSF onto the Farm Uitvalgrond 105 JQ (Styldrift EIA/EMPR, 2008). However, securing surface lease agreements for the Farm Uitvalgrond 105 JQ has proved problematic and therefore alternative locations for the TSF must be investigated.

Due to the proposed TSF and RWD expansions and water pipelines the survey focussed on Portion 1 of the Farm Boschkopie 104 JQ and on the north-eastern section of the Farm Boschhoek 103 JQ.

Archaeological remains

No archaeological (Stone Age or Iron Age) structures, features, assemblages or artefacts were recorded during the survey.

Historical Structures

No historical structures or associated features were recorded.

Graveyard

No graves were recorded.

Conclusion and Recommendations

Based on the assessment, from a heritage perspective, there is no impact on cultural heritage remains and it is recommended that the proposed mining activities be allowed to continue, taking cognizance of the following aspects:

Archaeological deposits usually occur below ground level. Should archaeological artefacts or skeletal material be revealed in the area during development activities, such activities should be halted, and a university or museum notified in order for an investigation and evaluation of the find(s) to take place (*cf.* **NHRA (Act No. 25 of 1999)**, Section 36 (6)).

Definitions and abbreviations

AD:	Anno Domini (after Christ)
ASAPA:	Association of Southern African Professional Archaeologists
BRPM:	Royal Bafokeng Platinum Mine
CRM:	Cultural Resources Management
DEA:	Department of Environmental Affairs
DMR:	Department of Mineral Resources
EIA:	Environmental Impact Assessment
EMPR:	Environmental Management Plan Report
ESA:	Early Stone Age
GDARD:	Gauteng Department of Agriculture and Rural Development
HIA:	Heritage Impact Assessment
ICOMOS:	International Council on Monuments and Sites
Iron Age:	An archaeological term used to define a period associated with domesticated livestock and grains, metal working and ceramic manufacture
LIA:	Late Iron Age
LSA:	Later Stone Age
Midden:	Refuse that accumulates in a concentrated heap.
MPRDA:	Minerals and Petroleum Resources Development Act
MSA:	Middle Stone Age
NHRA:	National Heritage Resources Act (Act No. 25 of 1999)
NWA:	National Water Act (Act No. 36 of 1998)
PHRA:	Provincial Heritage Resources Authority
RWD:	Return Water Dam
Stone Age:	An archaeological term used to define a period of stone tool use and manufacture
SADC:	Southern African Development Community
SAHRA:	South African Heritage Resources Agency
SAHRIS:	South African Heritage Resources Information System
SMC:	Styldrift Mine Complex

I, Francois Coetzee, hereby confirm my independence as a cultural heritage specialist and declare that I do not have any interest, be it business, financial, personal or other, in any proposed activity, application or appeal in respect of the listed environmental processes, other than fair remuneration for work performed on this project.



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1. Introduction

SRK Consulting (Pty) Ltd (SRK) has been appointed as an independent consultant to conduct the EMPR amendment process as well as undertaking the public involvement component. The Styldrift Mine Complex (SMC) has an existing Environmental Management Programme (EMPR), issued in March 2008, for its Styldrift mining operation (Reference Number: NW30/5/1/2/3/2/1/(312) EM) under the Minerals and Petroleum Resources Development Act (Act No. 28 of 2002) (MPRDA) and an existing Water Use Licence (WUL), Licence Number: 26031507, issued under the National Water Act (Act No. 36 of 1998) (NWA). The approved MPRDA EMPR (2008) allowed for:

- A new shaft complex (known as SMC) on the Farm Styldrift 90 JQ and it is anticipated that it will produce approximately 230 000 tons per month (tpm) from reefs underlying the Farms Styldrift 90 JQ and Frischgewaagd 96 JQ;
- The ore mined from these reefs will be conveyed from the SMC to the existing BRPM Concentrator Plant;
- The existing BRPM Concentrator Plant will be modified to accommodate the additional ore produced at the SMC;
- The extension of the existing BRPM Tailings Storage Facility (TSF) located on the Farm Boschkopie 104 JQ onto the Farm Uitvalgrond 105 JQ (footprint size of approximately 330 ha) to accommodate additional tailings produced by the modified BRPM Concentrator Plant.

The Merensky reserves at the existing BRPM South and North shafts have now been depleted, with the South Shaft reducing Merensky production as from 2012 and North Shaft in 2018. The SMC will initially supplement and eventually replace production of these shafts. The existing BRPM TSF does not have sufficient capacity to accommodate the additional tailings produced by the modified BRPM Concentrator Plant. In order for the SMC to achieve its objective of initially supplementing, and eventually replacing, the production at BRPM, a new (or expansion to the existing) TSF is required to accommodate the additional tailings. Approval in terms of the MPRDA was granted for the SMC to modify the existing BRPM Concentrator and to extend the existing BRPM TSF onto the Farm Uitvalgrond 105 JQ (Styldrift EIA/EMPR, 2008). However, securing surface lease agreements for the Farm Uitvalgrond 105 JQ has proved problematic and therefore alternative locations for the TSF must be investigated.

2. Objectives

The general aim of this cultural heritage survey is to record and document cultural heritage remains consisting of both tangible and intangible archaeological and historical artefacts, structures (including graves), settlements and oral traditions of cultural significance.

As such the terms of reference of this survey are as follows:

- Identify and provide a detailed description of all artefacts, assemblages, settlements and structures of an archaeological or historical nature (cultural heritage sites) located on the study area,

- Estimate the level of significance/importance of the these remains in terms of their archaeological, historical, scientific, social, religious, aesthetic and tourism value,
- Assess any possible impact on the archaeological and historical remains within the area emanating from the proposed development activities, and
- Propose possible mitigation measures which will limit or prevent any impact provided that such action is necessitated by the development.

3. Study Area

The surface lease agreements for the extension of the existing BRPM TSF onto the Farm Uitvalgrond 105 JQ have not been successful to date. This necessitated RBPM to investigate alternative areas for the extension of the proposed TSF to accommodate the additional tailings produced by the modified BRPM Concentrator Plant.

The SMineC is located in the Rustenburg area, which forms part of the North West Province, approximately 120 km North West of Johannesburg. The Styldrift Mine Complex area is located \pm 9 km south from the Pilanesberg National Park and 4 km from the Magaliesberg Protected Environment Park on the farm Styldrift 90 JQ, within the Bojanala District Municipality, Rustenburg Local Municipality. Villages in the area include Chaneng, Robega, Mafenya and Rasimone, \pm 4 km, 3 km, 2 km and 1 km respectively, situated to the south of the SMineC. Rasimone is the closest village to the current project area.

Please note that due to the proposed TSF expansions the survey area is situated further south on Portion 1 of the Farm Boschkopie 104 JQ and a water pipeline on the north eastern section of the Farm Boschhoek 103 JQ.

In general, the survey area is dominated by the existing mining activities. The area is generally characterised by open angulating slopes with grasslands and tree clusters. The area falls within the Zeerust Thornveld (Central Bushveld Bioregion) in the larger Savanna Biome (Mucina & Rutherford 2010). Several non-perennial streams flow northwards through the survey area towards the Elands River further to the north. Generally the survey area is mostly dominated by dark cotton (turf) soils. The Surveyor General's map of the farm drawn in 1895 and earlier Google images confirm that large areas of the farm were mostly used as agricultural fields for over 100 years.

It should also be noted that the survey area has been severally disturbed and impacted on by mining activities in the last few years. Large-scale surface disturbances included gravel and tarred roads, evaporation and treatment dams, stock piling and surface clearing and levelling for infrastructure.

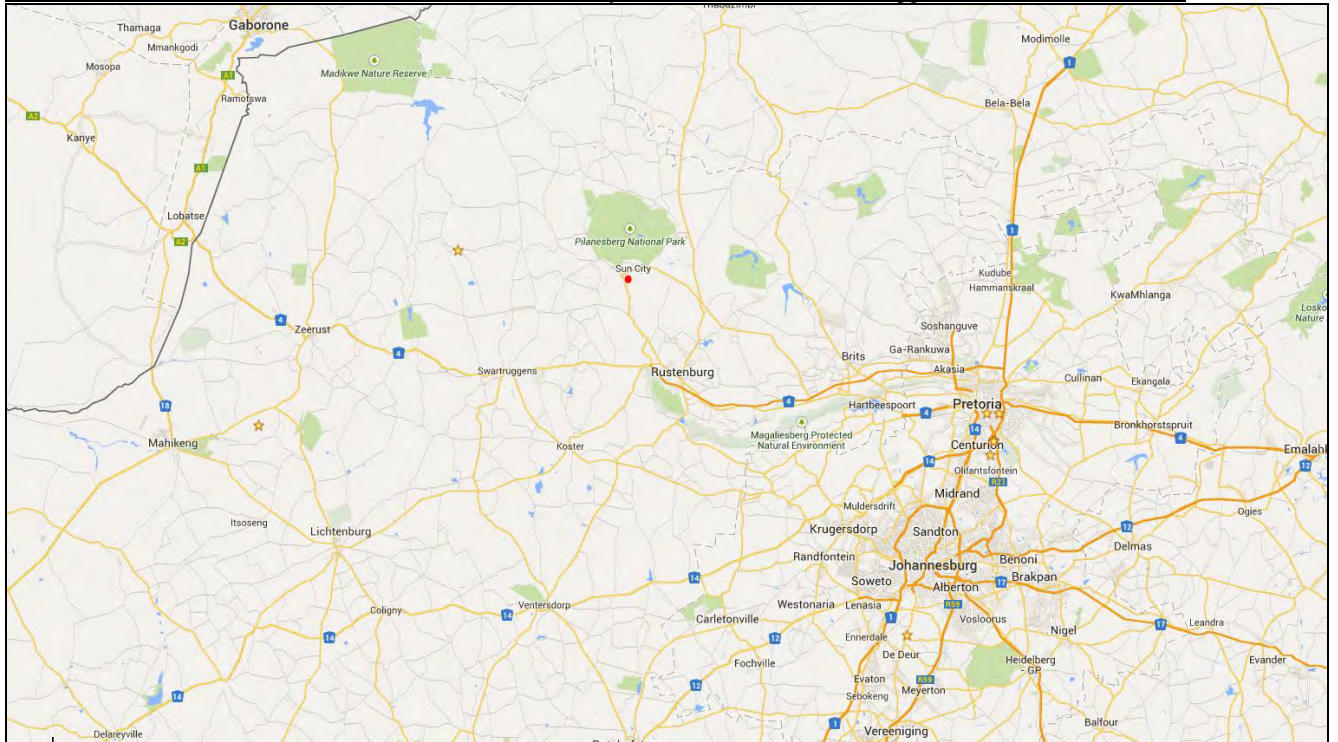


Figure 1: Regional context of the survey area (indicated by the red circle south of Pilanesberg)

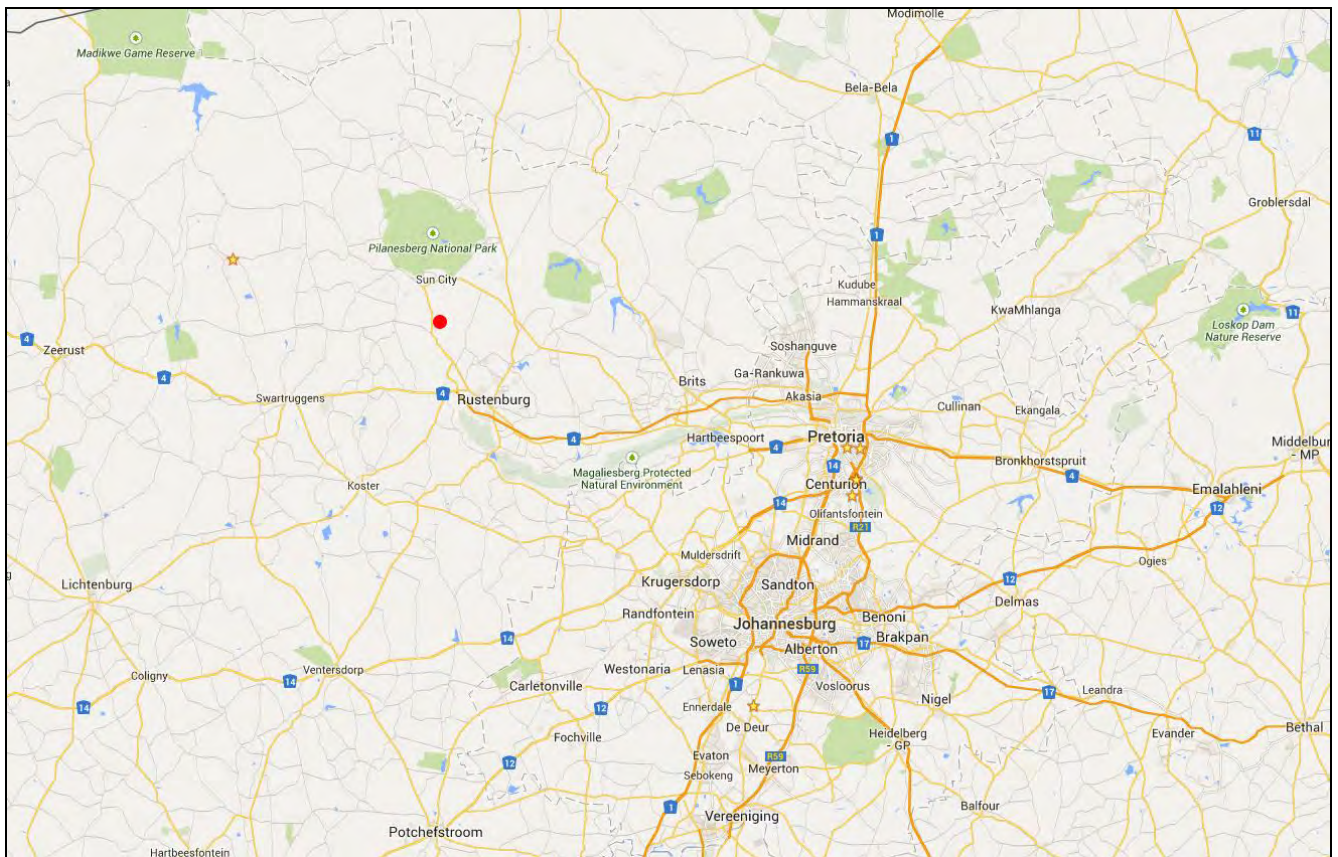


Figure 2: Local context of the survey area (north of Rustenburg)

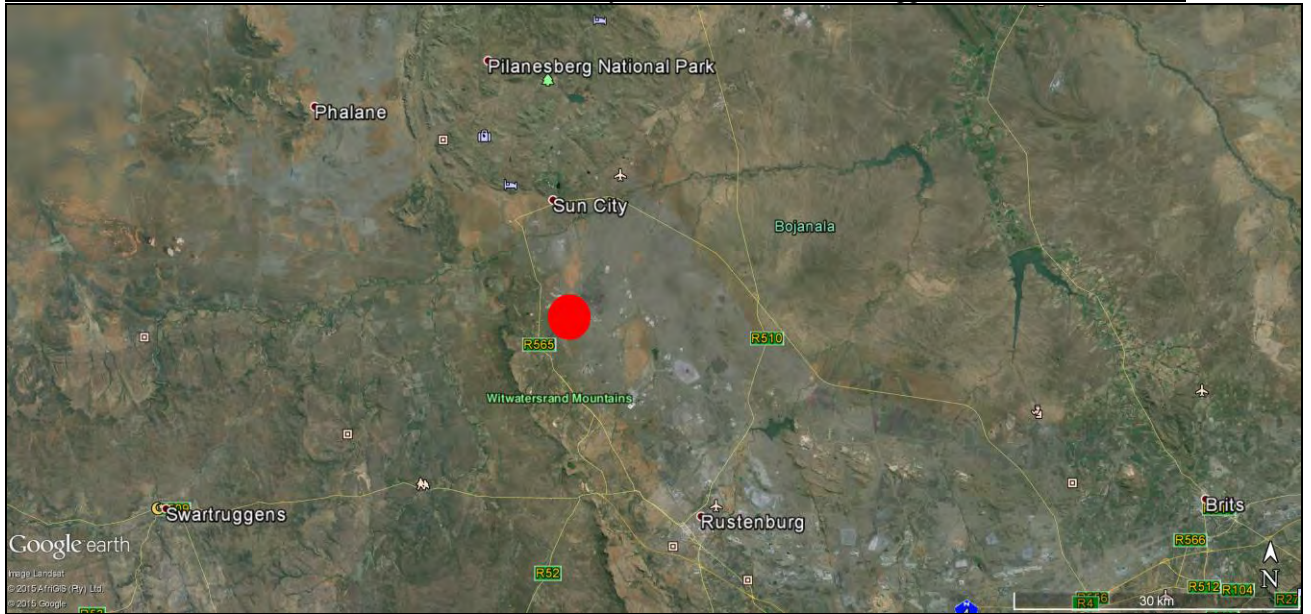


Figure 3: Detail location of the survey area south of the Pilanesberg (Google Earth 2015)

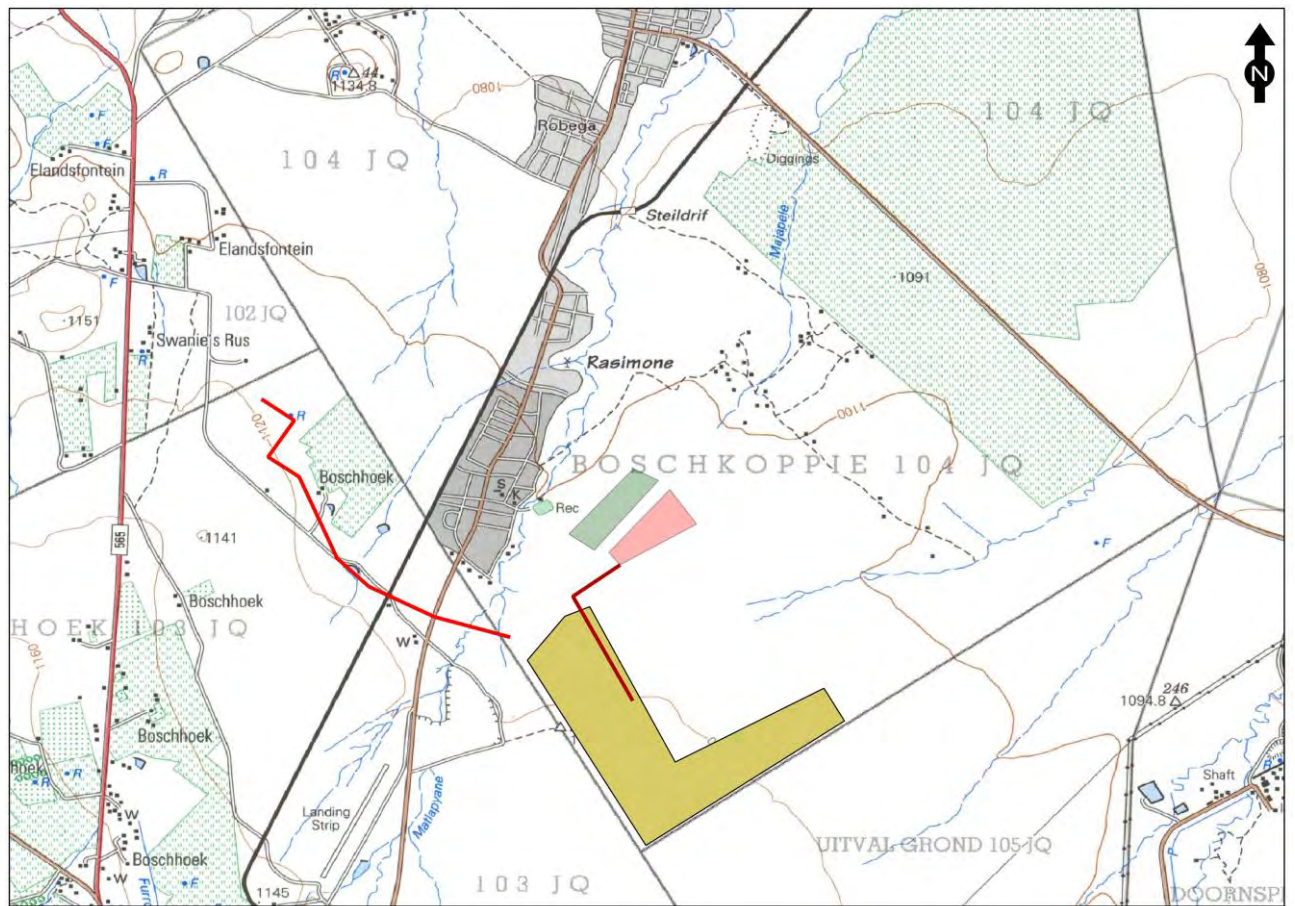


Figure 4: Detail view of the survey areas as indicated on the 1:50 000 topographic map 2527AC



Figure 5: The detail of the survey area as indicated on Google Earth (2015)



Figure 6: The proposed water pipeline will follow existing infrastructure



Figure 7: General view of the survey area with existing infrastructure (proposed TSE Alternative)



Figure 8: Existing water management systems in the adjacent mining area



Figure 9: Existing slimes/evaporation dam



Figure 10: General view of the area indicated for the proposed Soil Stockpile



Figure 11: General view of the area indicated for the proposed Return Water Dam (RWD) North

4. Proposed Project Activities

It is therefore proposed that the existing BRPM TSF be extended within Portion 1 of the Farm Boschkopie 104 JQ. The following infrastructure is proposed to be constructed and operated:

- Extension of the existing TSF covering an additional area of approximately 150 ha;
- Return Water Dam (RWD) associated with the extended TSF covering an area of approximately 35 ha;
- Overland pipelines (approximately 3 km in length) for the transportation of tailings-containing water from the modified BRPM Concentrator Plant to the extended TSF;
- Overland pipelines for the transportation of return water between the extended TSF and the RWD;
- Overland pipelines (approximately 3 km in length) for the transportation of return water between the RWD and the modified BRPM Concentrator Plant;
- Booster pump stations;
- Water management infrastructure and systems associated with this project;
- Service roads will be built along all pipelines and around the extended TSF in order for the mine to be able to service and maintain the proposed infrastructure;
- Relocation of a power line to accommodate the extended TSF (a separate Basic Assessment application has been submitted to National Department of Environmental Affairs (DEA) (DEA reference number 14/12/16/3/3/2/648);
- Development of a topsoil stockpile with a footprint area of approximately 12 ha;
- River crossings associated with pipelines.

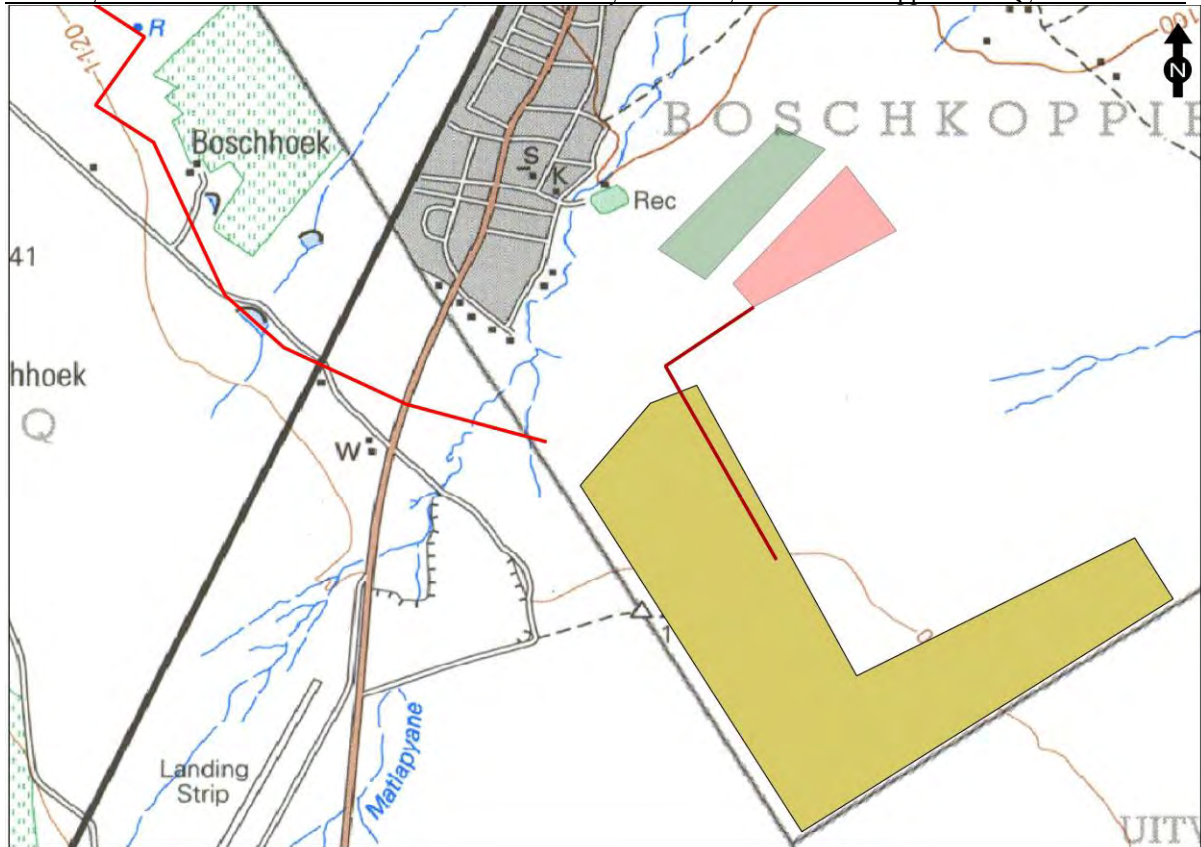


Figure 12: Topographic map indicating the detailed aspects of the proposed mining activities

5. Legal Framework

- Archaeological remains can be defined as human-made objects, which reflect past ways of life, deposited on or in the ground.
- Heritage resources have lasting value in their own right and provide evidence of the origins of South African society and they are valuable, finite, non-renewable and irreplaceable.
- All archaeological remains, features, structures and artefacts older than 100 years and historic structures older than 60 years are protected by the relevant legislation, in this case the **National Heritage Resources Act (Act No. 25 of 1999) (NHRA), Section 34 and 35**. The Act makes an archaeological impact assessment as part of an EIA and EMPR mandatory (see **Section 38**). No archaeological artefact, assemblage or settlement (site) may be moved or destroyed without the necessary approval from the **South African Heritage Resources Agency (SAHRA)** or **Provincial Heritage Resources Authority (PHRA)**, where applicable. Full cognisance is taken of this Act in making recommendations in this report.
- Cognisance will also be taken of the **Mineral and Petroleum Resources Development Act (Act No 28 of 2002) (MPRDA)** and the **National Environmental Management Act (Act No 107 of 1998) (NEMA)** when making any recommendations.

- Human remains older than 60 years are protected by the **NHRA**, with reference to **Section 36**. Human remains that are less than 60 years old are protected by the Regulations Relating to the Management of Human Remains (Government Notice R363 of 22 May 2013) made in terms of the National Health Act No. 61 of 2003 as well as local Ordinances and regulations.

Mitigation guidelines (The significance of the site):

Rating the significance of the impact on a historical or archaeological site is linked to the significance of the site itself. If the significance of the site is rated high, the significance of the impact will also result in a high rating. The same rule applies if the significance rating of the site is low (also see Table 1).

Significance Rating	Action
Not protected	1. None
Low	2a. Recording and documentation (Phase 1) of site adequate; no further action required
	2b. Controlled sampling (shovel test pits, auguring), mapping and documentation (Phase 2 investigation); permit required for sampling and destruction
Medium	3. Excavation of representative sample, C ¹⁴ dating, mapping and documentation (Phase 2 investigation); permit required for sampling and destruction [including 2a & 2b]
High	4a. Nomination for listing on Heritage Register (National, Provincial or Local) (Phase 2 & 3 investigation); site management plan; permit required if utilised for education or tourism 4b. Graves: Locate demonstrable descendants through social consulting; obtain permits from applicable legislation, ordinances and regional by-laws; exhumation and reinterment [including 2a, 2b & 3]

Table 1: Rating the significance of sites

- With reference to the evaluation of sites, the certainty of prediction is definite, unless stated otherwise.
- The guidelines as provided by Section 3 of the **NHRA (Act No. 25 of 1999)**, with special reference to subsection 3, and the Australian ICOMOS (International Council on Monuments and Sites) Charter (also known as the Burra Charter) are used when determining the cultural significance or other special value of archaeological or historical sites.
- It should be kept in mind that archaeological deposits usually occur below ground level. Should archaeological artefacts or skeletal material be revealed in the area during development activities, such activities should be halted, and a university or museum notified in order for an investigation and evaluation of the find(s) to take place (*cf.* **NHRA (Act No. 25 of 1999)**, Section 36 (6)).

- **Architectural significance:**
 - Does the site contain any important examples of a building type?
 - Are any of the buildings important examples of a style or period?
 - Do any of the buildings contain fine details and or reflect fine workmanship?
 - Are any of the buildings the work of a major architect or builder?
 - Are the buildings important examples of an industrial, technological or engineering development?
 - What is the integrity of the buildings?
 - Are the buildings still utilised?
 - Has the buildings been altered and are these alterations sympathetic to the original intent of the design?

- **Spatial significance of architecture:**
 - Is the site or any of the buildings a landmark in the city or town?
 - Does the plant contribute to the character of the neighbourhood/region?
 - Do the buildings contribute to the character of the street or square?
 - Is the place or building part of an important group of buildings?

- **Architecture: Levels of significance are:**
 - Protect
 - Highly significant
 - Possible significance
 - Least significance
 - No significance

- **Architecture: Levels of protection are:**

Retain and protect	Considered to be of high significance. The building or structure can be used as part of the development but must be suitably protected. Should not include major structural alterations. If the building is older than 60 years a modification permit is required from SAHRA.
Retain and re-use	Considered to be of moderate significance. The building or structure can be altered to be accommodated within the development plans. Structural alterations can be included. If the building is older than 60 years a modification permit is required from SAHRA.
Alter and re-use	Considered to be of low significance. The building or structure can be structurally altered or destruction can be considered following further documentation. If the building is older than 60 years a modification/destruction permit is required from SAHRA.
Can be demolished	Considered to be of negligible significance and can be demolished. If the building is older than 60 years a destruction permit is required from SAHRA.

Table 2: Level of protection of buildings/structures

- A copy of this report will be lodged with the **SAHRA** as stipulated by the National Heritage Resources Act (NHRA) (Act No. 25 of 1999), Section 38 (especially subsection 4) and the relevant PHRA.
- Note that the final decision for the approval of permits, or the removal or destruction of sites, structures and artefacts identified in this report, rests with the SAHRA (or relevant PHRA).

6. Study Approach/Methods

Regional maps and other geographical information (ESRI shapefiles) were supplied by SRK. In addition Google images and topographic maps were used to indicate the survey area. The survey area was localised on the 1:50 000 topographic map 2527AC. Please note that all maps are orientated with north facing upwards (unless stated otherwise).

The survey area was preliminary surveyed and selected areas were investigated on foot using both systematic and intuitive pedestrian survey techniques. Local residents were also consulted during ad hoc interviews to determine the location of any known heritage sites, especially graves.

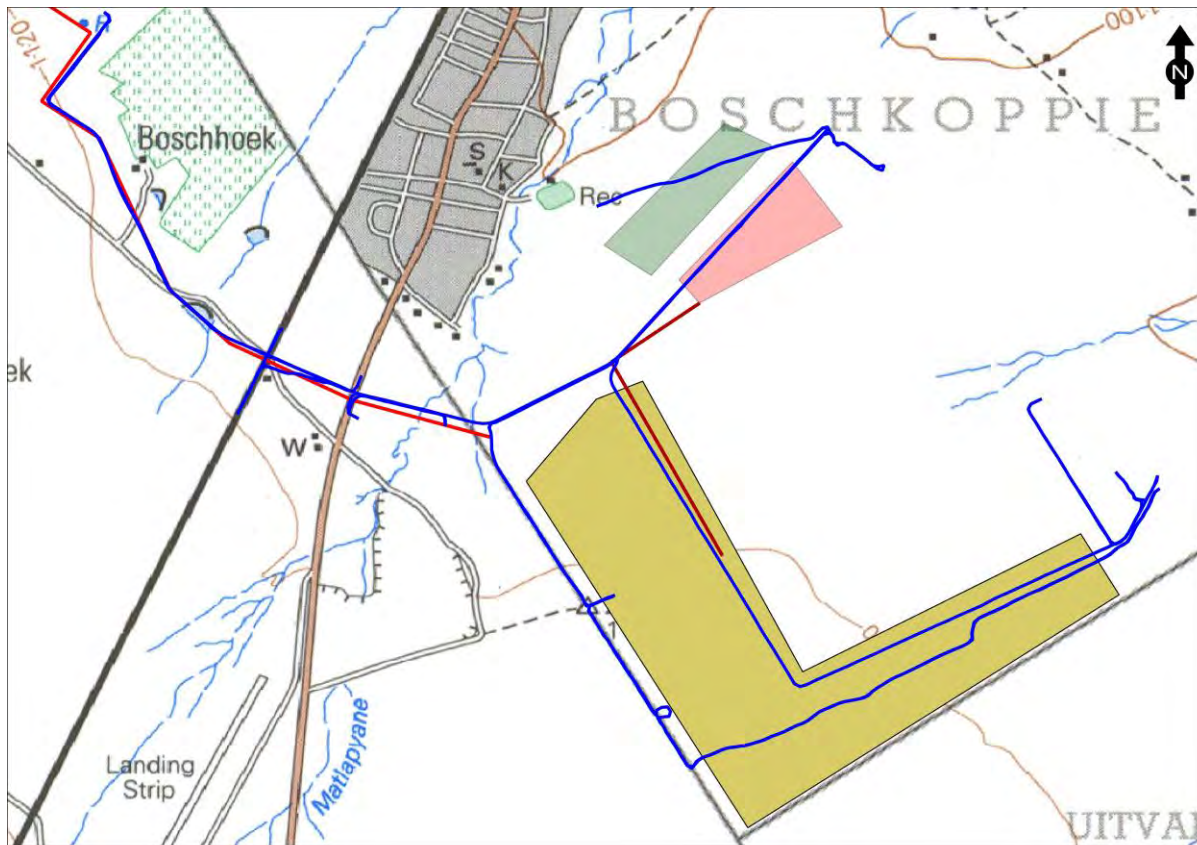


Figure 13: Recorded survey tracks for the project



Figure 14: Aerial view of existing mining activities in the survey areas (TSF area)



Figure 15: Location of the proposed water pipeline (along existing infrastructure)

6.1 Review of existing information/data

Additional information on the cultural heritage of the area was sourced from the following records:

- National Mapping Project by SAHRA (which lists heritage impact assessment reports submitted for South Africa)
- Online South African Heritage Resources Information System (SAHRIS) database
- Maps and information documents supplied by the client
- Published material on the area
- Previous heritage survey completed in the area (Coetzee 2010 & 2012, Mathoho 2012, Pistorius 2001 and Van der Walt 2007)

The Surveyor General's database shows that the Farm Boschkoppie 104 JQ was first surveyed in 1894 (see Addendum 2), and the Farm Boschhoek 103 JQ in 1879. As no early 20th historical structures were recorded in the survey area the farm was probably used for additional farming activities (agricultural fields and pastures) and no farm house complex was built. The 1980s topographic map seems to confirm that the area was mostly used as agricultural fields and was probably extensively farmed for several decades. However, all the records and other studies confirmed that several known historically and archaeologically significant structures or settlements have been recorded in the immediate region.

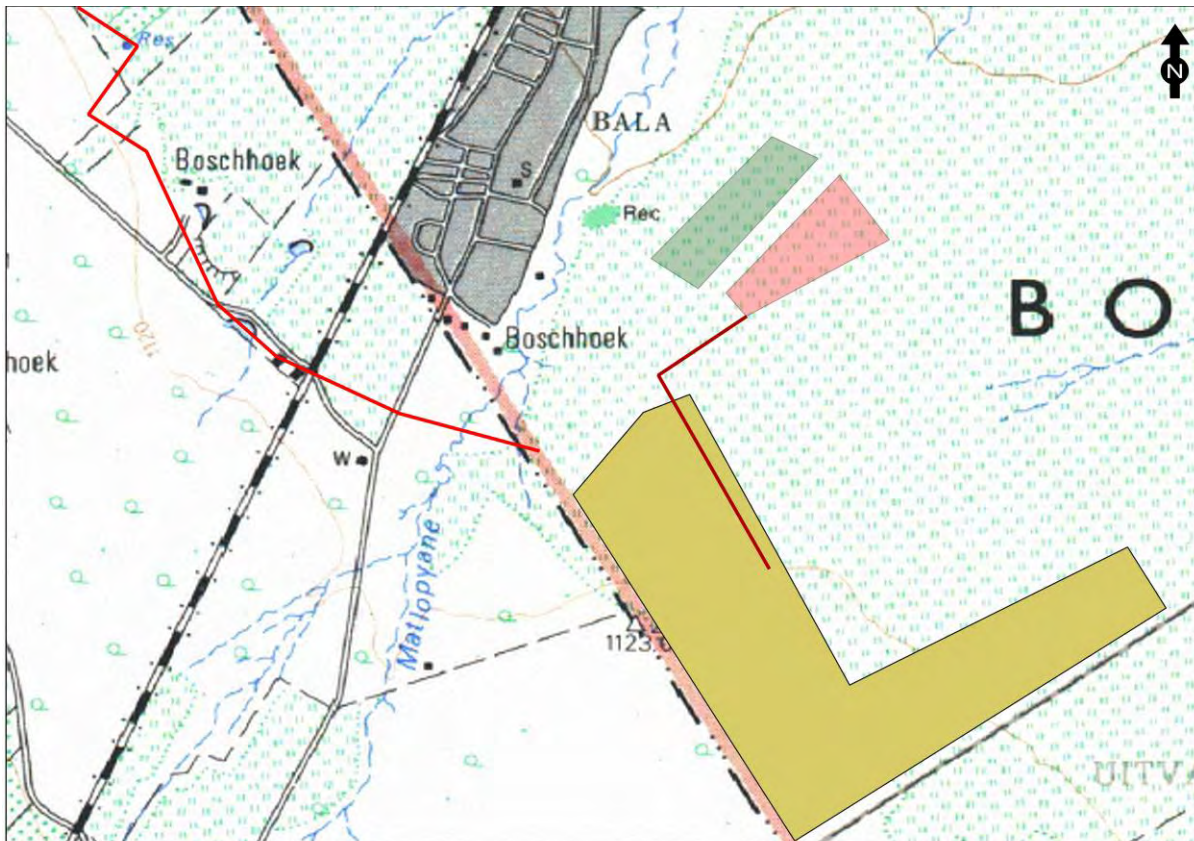


Figure 16: The Topographic Map 2527AC of the 1980s clearly indicate agricultural fields for most of the survey areas

6.2 Site visit

The site investigation took place on 23 February 2015.

6.3 Impact assessment

The criteria used to describe heritage resources and to provide a significance rating of recorded sites are listed in the NHRA specifically Section 7(7) and Section 38. SAHRA also published various regulations including: Minimum standards: Archaeological and palaeontological components of impact assessment reports in 2006 and updated requirements in 2012.

6.4 Assumptions, restrictions and gaps in knowledge

No severe physical restrictions were encountered as access to the mining area was granted by RBPlat. However, please note that due to the subterranean nature of cultural remains this report should not be construed as a record of all archaeological and historic sites in the area.

7. Description and Evaluation of Cultural Heritage Sites

The survey revealed no Historical, Iron Age or Stone Age settlements, features, structures or assemblages (artefact scatters) were recorded.

8. Recommendations and Conclusions

Archaeological remains

No archaeological (Stone Age or Iron Age) structures, features, assemblages or artefacts were recorded during the survey.

Historical Structures

No historical structures or associated features were recorded.

Graveyard

No graves were recorded.

Conclusion and Recommendations

Based on the assessment, from a heritage perspective, there is no impact on cultural heritage remains and it is recommended that the proposed mining activities be allowed to continue, taking cognizance of the following aspects:

Archaeological deposits usually occur below ground level. Should archaeological artefacts or skeletal material be revealed in the area during development activities, such activities should be halted, and a university or museum notified in order for an investigation and evaluation of the find(s) to take place (*cf.* NHRA (Act No. 25 of 1999), Section 36 (6)).

9. References

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Addendum 1: Archaeological and Historical Sequence

The table provides a general overview of the chronological sequence of the archaeological periods in South Africa.

PERIOD	APPROXIMATE DATE
Early Stone Age	More than c. 2 million years ago - c. 250 000 years ago
Middle Stone Age	c. 250 000 years ago – c. 25 000 years ago
Later Stone Age (Includes San Rock Art)	c. 25 000 years ago - c. AD 200 (up to historic times in certain areas)
Early Iron Age	c. AD 400 - c. AD 1025
Late Iron Age (Stonewalled sites)	c. AD 1025 - c. AD 1830 (c. AD 1640 - c. AD 1830)

Archaeological Context

Stone Age Sequence

Concentrations of Early Stone Age (ESA) sites are usually present on the flood-plains of perennial rivers and may date to over 2 million years ago. These ESA open sites may contain scatters of stone tools and manufacturing debris and secondly, large concentrated deposits ranging from pebble tool choppers to core tools such as handaxes and cleavers. The earliest hominins who made these stone tools, probably not always actively hunted, instead relying on the opportunistic scavenging of meat from carnivore kill sites.

Middle Stone Age (MSA) sites also occur on flood plains, but are also associated with caves and rock shelters (overhangs). Sites usually consist of large concentrations of knapped stone flakes such as scrapers, points and blades and associated manufacturing debris. Tools may have been hafted but organic materials, such as those used in hafting, seldom preserve. Limited drive-hunting activities are also associated with this period.

Sites dating to the Later Stone Age (LSA) are better preserved in rock shelters, although open sites with scatters of mainly stone tools can occur. Well-protected deposits in shelters allow for stable conditions that result in the preservation of organic materials such as wood, bone, hearths, ostrich eggshell beads and even bedding material. By using San (Bushman) ethnographic data a better understanding of this period is possible. South African rock art is also associated with the LSA.

Iron Age Sequence

In the northern regions of South Africa at least three settlement phases have been distinguished for early prehistoric agropastoralist settlements during the **Early Iron Age** (EIA). Diagnostic pottery assemblages can be used to infer group identities and to trace movements across the landscape. The first phase of the Early Iron Age, known as **Happy**

Rest (named after the site where the ceramics were first identified), is representative of the Western Stream of migrations, and dates to AD 400 - AD 600. The second phase of **Diamant** is dated to AD 600 - AD 900 and was first recognized at the eponymous site of Diamant in the western Waterberg. The third phase, characterised by herringbone-decorated pottery of the **Eiland** tradition, is regarded as the final expression of the Early Iron Age (EIA) and occurs over large parts of the North West Province, Northern Province, Gauteng and Mpumalanga. This phase has been dated to about AD 900 - AD 1200. These sites are usually located on low-lying spurs close to water.

The **Late Iron Age** (LIA) settlements are characterised by stone-walled enclosures situated on defensive hilltops c. AD 1640 - AD 1830). This occupation phase has been linked to the arrival of ancestral Northern Sotho, Tswana and Ndebele (Nguni-speakers) in the northern regions of South Africa with associated sites dating between the sixteenth and seventeenth centuries AD. The terminal LIA is represented by late 18th/early 19th century settlements with multichrome Moloko pottery commonly attributed to the Sotho-Tswana. These settlements can in many instances be correlated with oral traditions on population movements during which African farming communities sought refuge in mountainous regions during the processes of disruption in the northern interior of South Africa, resulting from the so-called *difaqane* (or *mfecane*).

Ethno-historical Context

Pilanesberg is an eroded circular volcanic intrusion into the low-lying Bushveld Complex. The result is a mountainous region which stands in stark contrast to the surrounding open plains, creating a unique enclave for occupation and utilisation. Rivers flowing from the centre to the periphery of Pilanesberg exacerbated by extensive surface movement caused by dykes and faults have resulted in valleys which provide accessible pathways into the centre of the structure. Access to Pilanesberg was controlled by positioning extensive settlements at the periphery of Pilanesberg near the entrance to these pathway-like valleys.

According to oral tradition the Bakgatla бага Kgafela separated from the Moseitlha at Momusweng near the Hammanskraal district (north-east of Pretoria) around AD 1700. As one of five Bakgatla groups, this separation heralded in a period of independence and extensive sojourn for the Kgafela people. The Kgafela settled at various locales on their north-western journey towards the Crocodile (Odi) River and eventually arrived in the Pilanesberg area between AD 1700 and AD 1750. Chief Pilane, ruler of the Kgafela people (after whom the Pilanesberg Mountains was named) reigned between AD 1825 and 1859.

However, on their arrival in the region the Batlhako were already settled in the area and ruled the territory between the Crocodile River and Pilanesberg. Oral history links several stone-walled settlements, at Pilwe mountain south-east of Pilanesberg, with earlier Batlhako occupation. Further to the south the Bafokeng ruled over the region north of Rustenburg with the northern border demarcated by the Elands River (south of the Pilanesberg).

Another group that settled in the area is the Batlokwa, who lived more towards the south west of Pilanesberg Mountains. The Batlokwa are, according to their own tradition, yet another offshoot of the Bakgatla (Legassick 1978:104; Schapera 1952:10). As discussed above Tabane and Mathulare had five sons, namely: Diale (or Liale), Khetsi (Kgetsi), Matsibolo, Khoali (Khoadi or Kgwadi) and Mosia. Of relevance to this discussion is Kgwadi (the fourth

son) who separated from the main group, then ruled by Matlaisane (who became the Bakgatla baga Motšha) with his followers (in *circa* AD 1570) who eventually constituted the Batlokwa (See 2.1.1). Moreover, David-Frederic Ellenberger relates that the Batlokwa also eventually split into two separate sections. Kgwadi remained in the north but Molatodi (Molatudi), the son of Molefe (reigned five generations after Kgwadi), seceded in *circa* AD 1690 and moved to the south (Wakkerstroom). Molatodi's southern Batlokwa split again during his grandson, Tsotetsi's reign as a group under Motonosi (great grandson of Molefe) seceded in *circa* AD 1735. *Kgosi* Tsotetsi's *morafe* became known as the Batlokwa Bamokgalong (senior in status) and *kgosi* Motonosi's *morafe* as the Batlokwa Bamokotleng (Bamokgotlong; junior in status, they became the Mantatise of Sekonyela). A third independent division was known as the Malakeng (Makalakeng) (Breutz 1989:380; Ellenberger 1912:40). Although D.F. Ellenberger dealt exclusively with the southern Batlokwa, an account of the northern section under Kgwadi was later recorded by his son Vivien Ellenberger (1939) and subsequently also by Paul-Lenert Breutz (1989). This account is of direct relevance to the settlement sequence of the Pilanesberg District.

As stated, Molefe reigned five generations after Kgwadi in *circa* AD 1670. Although not supported by Ellenberger (1939:199 (Genealogical Table)), Breutz (1989:377-380) lists Morare as Molefe's father who settled at Ramoriana (Nkgagolwe, on the farm Waterval 267) near the Dwarsberg Mountains. This is significant as the area will remain under Batlokwa influence until today. The Batlokwa then moved to the Matlapeng (Matlapynsberg) Mountains where Morare was buried at Moreteletse (on the farm Syferfontein) west of Pilanesberg. Molefe succeeded and moved first to Mabodi Masweu (White) Mountains and then to Tlôkwe (Thete, Ditsopotla, also Potchefstroom) on the Mooi River, where he died. Initiated by the secession of various sections, as discussed above, the Batlokwa started to disperse first in a northern and southern division and secondly, into various smaller groups. Ultimately it seems that Tswana (Tswana, son of Sebedi (Sebili) son of Molefe) emerged as leader (*circa* AD 1720) of the northern Batlokwa who remained in North West Province (Ellenberger 1939:166, 170; Breutz 1989:383).

According to Ellenberger (1939:170) Tswana was succeeded by Marakadu (ruled from *circa* AD 1730), although Breutz (1989:383) inserts another two rulers between Tswana and Marakadu, namely Kgwadi and Molefe (who probably settled at Nkwe). It is during Marakadu's reign that the antbear (*thakadu*) was accepted as the new totem of the northern Batlokwa. After Marakadu's death, his son Mosima Tsele (ruled from *circa* AD 1740) trekked north of the Magaliesberg Mountains, probably along the Crocodile River and settled at Bôte (near Houwater, Pilanesberg District) near Phokeng (Rustenburg District) where he died.

Interestingly, Breutz (1989:383) presents Mosima Tsele as two individuals, namely Mosima (who settled at Dite) and Tsele (Tsela) who ruled at Mankwe (cited as being situated on the farm Zwaarverdiend 234JP adjoining Selons Location to the east which is on the farm Grootwagendrift 233JP, south of Pilwe Mountain). An alternative version has it that *kgosi* Mosima Tsele settled on the farm Houwater (in Pilanesberg) and later at Bopitiko on the farm Doornhoek 910JQ, near the Elands (Kgetleng) River. Monageng (ruled from *circa* AD 1750) and Matlhabane (Matlabane) (ruled from *circa* AD 1760) reigned successively at Mankwe. During Matlhabane's reign a dispute arose with the Bafokeng (of Patsa) which prompted Matlhabane to cross the Elands River and settle on its western bank at Itlholanôga (possibly located on the western bank of the Leitholenoga River on the farm Doornhoek 910JQ) in

circa AD 1770, in the southern periphery of Pilanesberg, where he died. He was succeeded by Mokgwa a Matlhabane (ruled from *circa* AD 1770), who also died there. His son Taukobong (Taukubong) started his rule at Mankwe River (a tributary of the Elands River where the Bakgatla бага Kgafêla presently reside) sometime during AD 1780, and later moved his capital further south-west to Maruping at Pilwe Mountain (on the farms Zwartkoppies 212JP and Zwaarverdiend 234JP, eleven kilometres from Mankwe River), south-west of Pilanesberg. Taukubong also fought and defeated the Batlhako ba Leêma near Pilwe Mountain (Breutz 1953:198,201; Ellenberger 1939:166,170).

Taukubong had four sons, namely Makaba, Molefe, Thekiso and Mokgatle. Makaba was betrothed to Nkae, a Bahurutshe royal, but died before the marriage could be effected. Molefe fathered heirs in the name of Makaba, called Bogatsu, Phiri and Semêla. After Taukubong's death a succession dispute arose, sometime after AD 1800, between Thekiso and Mokgatle, which prompted Molefe to break away and act as regent until Bogatsu came of age. This section later became known as the Batlokwa ba Bogatsu. Bogatsu ruled from *circa* AD 1810 and settled west of Pilwe ('Piloë') mountain at Marothodi (on the farm Vlakfontein 207JP), where he died in *circa* AD 1815 (alternatively between *circa* AD 1815 to AD 1820). During his reign the Batlokwa, with the aid of the Kgafêla, fought and defeated the Bafokeng under Moseletsane (Moseletsana). The Batlokwa ba Bogatsu later split into the Batlokwa ba Gaborone, Batlokwa ba Sedumedi and Batlokwa ba Kgosi. Bogatsu's brother Phiri settled south of Pilwe Mountain after a dispute with Molefe. His other brother Semêla later took his people to live among the Bakgatla at Odi I. Kgosi settled at Tshwene-Tshwene and later at Ga-Molatedi. Note that when Bogatsu succeeded Molefe he retained his own *morafe* and after his bout with Phiri moved to Kolontwane (further east along the Elands River, on the farm Grootfontein) (Breutz 1953:199,202,363; 1989:384,385; Ellenberger 1939:166,172,173; Schapera 1952:20; TNAD 1968:40).

During the reign of Bogatsu's son Kgosi (ruled from *circa* AD 1820) the Batlokwa, while still living at Marothodi, were attacked and defeated by the Bakwena Modimosana Bammatau. Kgosi was killed during the battle in *circa* AD 1823, which resulted in a succession dispute between his four sons. Leshage (Kgosi's son from a junior house) seceded in *circa* AD 1823 with a following, but as a result of fights with Sebestwane of the Bafokeng, were chased as far north as Serowe in Botswana where they stole cattle from the Bamangwato, who retaliated by defeating them and recapturing their cattle. The remaining division under Bashe (Bashwe; another of Kgosi's son from a junior house) (acting ruler from *circa* AD 1825) first re-occupied Marothodi but later relocated to Letlhakeng (on the farm Putsfontein, west of Mabieskraal and north of Matlapeng (Matlapynsberg) Mountains) where he was killed by Mzilikazi in AD 1835. Matlapeng (the rightful successor of Kgosi) came of age and moved from Letlhakeng to rule at Motlhatseng (on the farm Rietfontein on the western periphery of the Matlapeng Mountains), where his sons Gaborone and Sedumendi (from the first house), were born (Breutz 1989:385; Ellenberger 1939:166,174,176,178,179). It is significant that the Matlapeng Mountains feature prominently in Batlokwa oral traditions as *kgosi* Morare (an earlier ruler) was buried at Moreteletse, an erstwhile Batlokwa capital, south of the Matlapeng Mountains.

The above discussion clearly highlights the movement and role of various Batlokwa *merafe* in the southern, south-western and western reaches of the Pilanesberg. However, their close association through kinship and social interconnectedness with the Bakgatla бага Kgafêla seems only to surface during periods of conflict. This thread of association continued

throughout the 19th century as the Batlokwa, during the reign of Matlapeng, assisted the Kgafêla during their war with the Bakwena in *circa* AD 1875 (Schapera 1942:12).

The areas to the southwest of Pilanesberg, such as Pilwe and the Matlapeng Mountains, were not only extensively occupied by the Batlokwa, but were also inhabited by two Batlhako *merafe* (as stated above) who settled and controlled the area before the arrival of both the Bakgatla and Batlokwa.

South African War (1899 – 1902)

A battle, which turned into a siege, was fought on the farm Brakfontein during the South African War. The battlefield is located just north of the Eland River, but probably situated further east of the survey area.

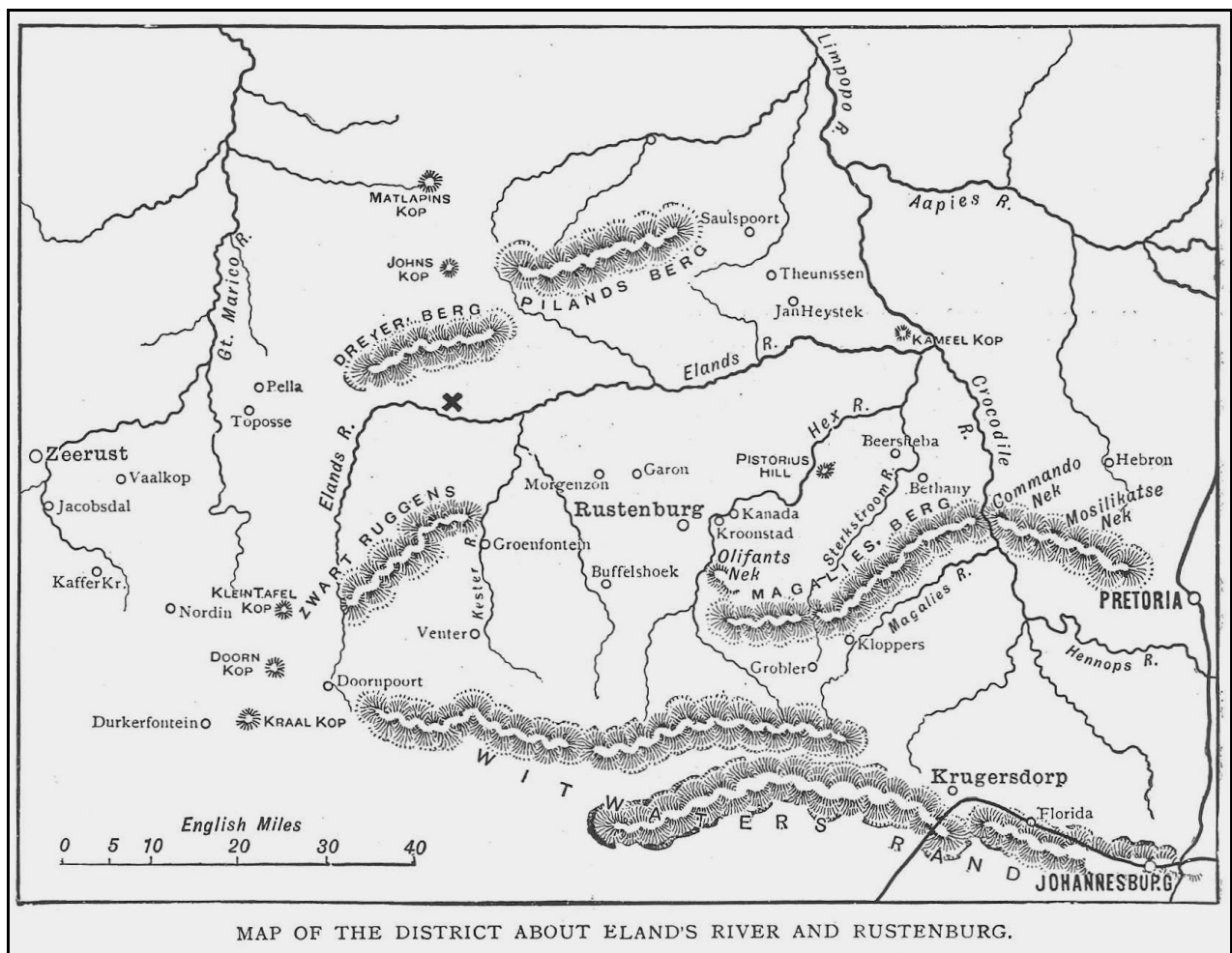


Figure 17: Location of the Battle of Eland River

Roughly 550 Australian and Rhodesian colonials fought courageously for 10 days in August 1900 against a superior Boer force under General JH de la Rey and General HL Lemmer on the Elands River. The Boer commando's had them pinned down and they were eventually saved by Lord Kitchener (Coulthard-Clark 1998:83-84).

The battle indicates the possibility of other such skirmish sites associated with the Second Anglo-Boer (South African) War in the survey area.

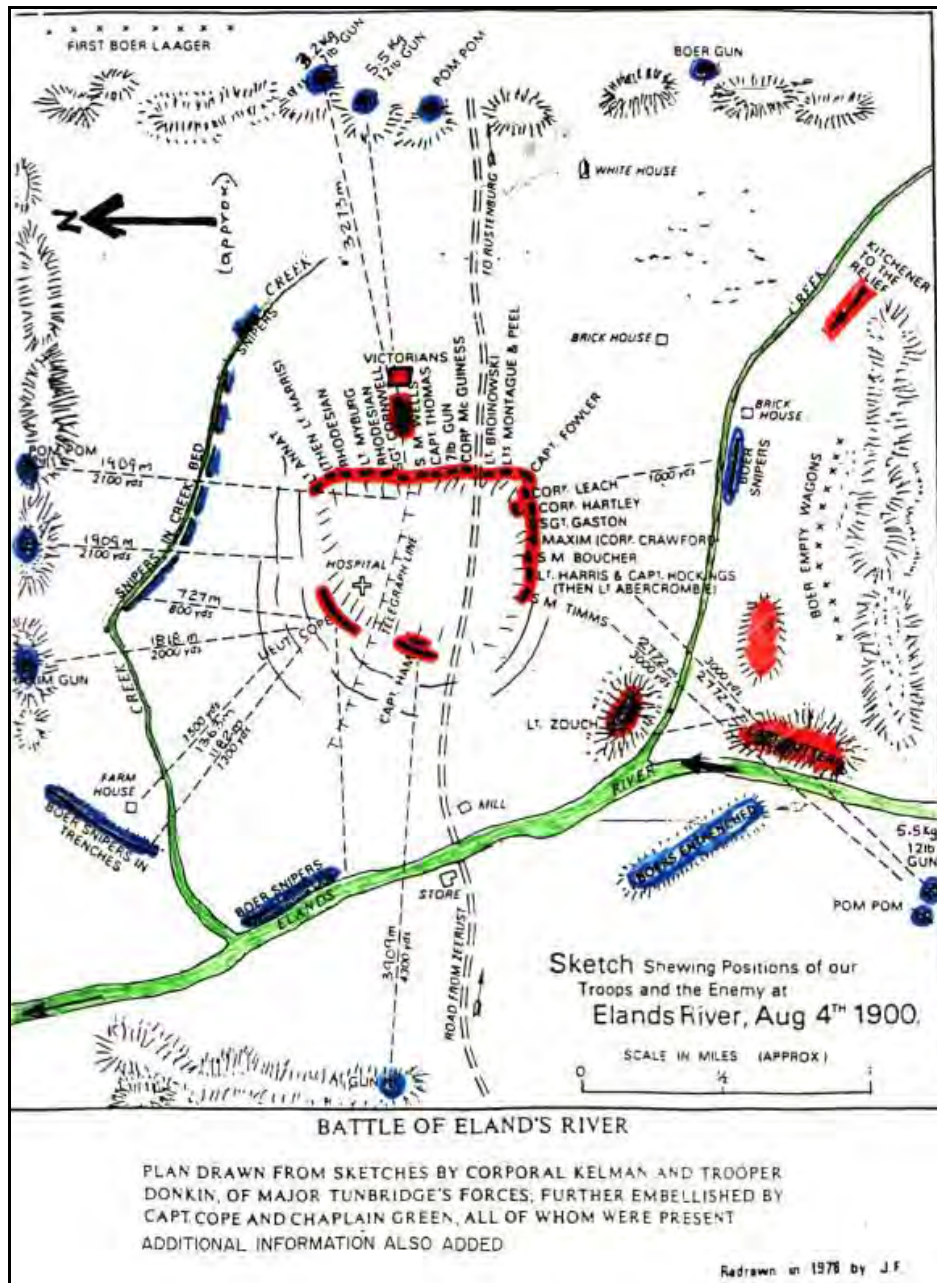


Figure 18: Location and sequence of events at the Battle of Eland River

Addendum 2: Surveyor General Farm Diagrams

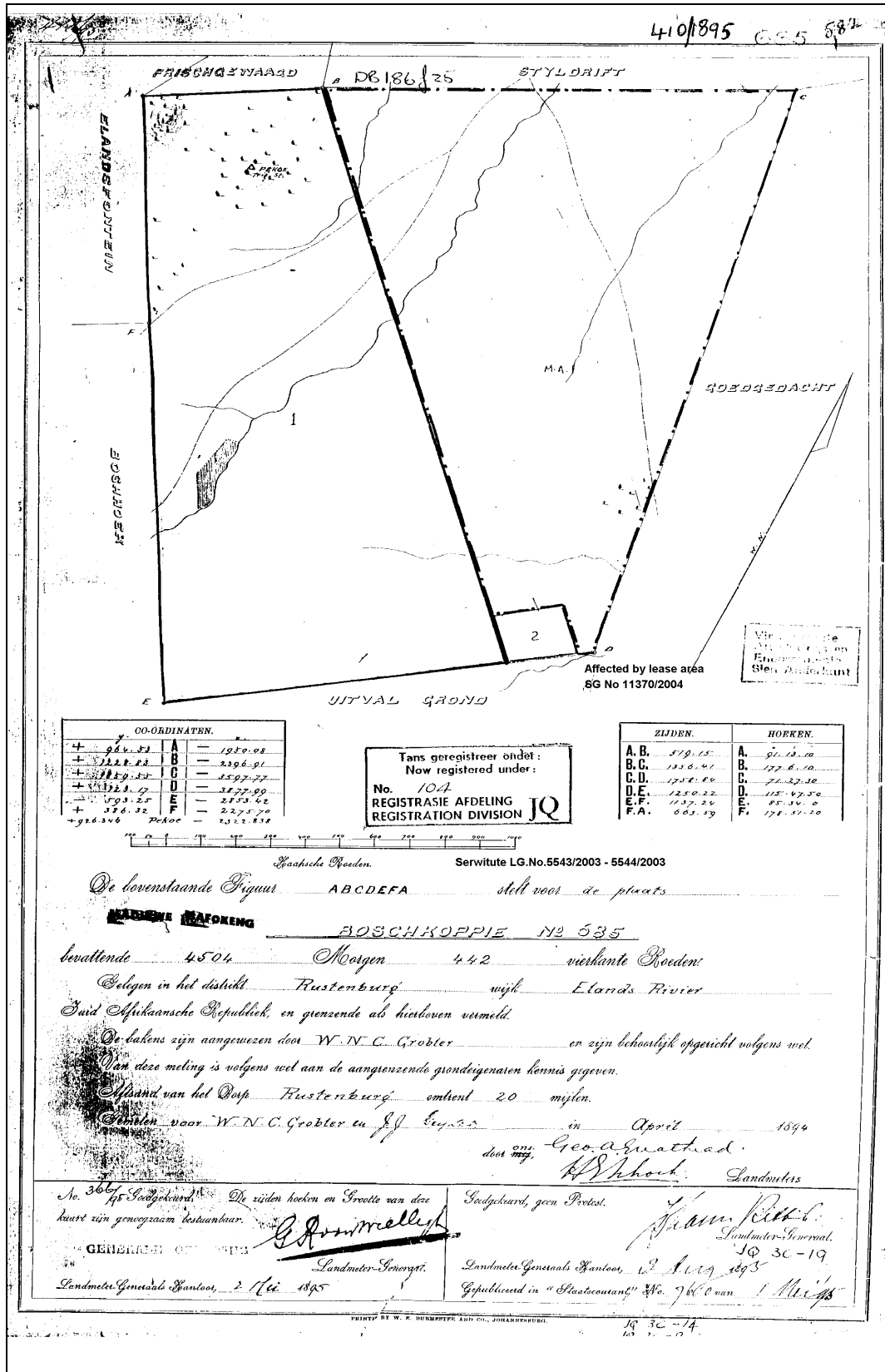


Figure 19: Surveyor General's map of the farm Boschkoppie 104 JQ first surveyed in 1894

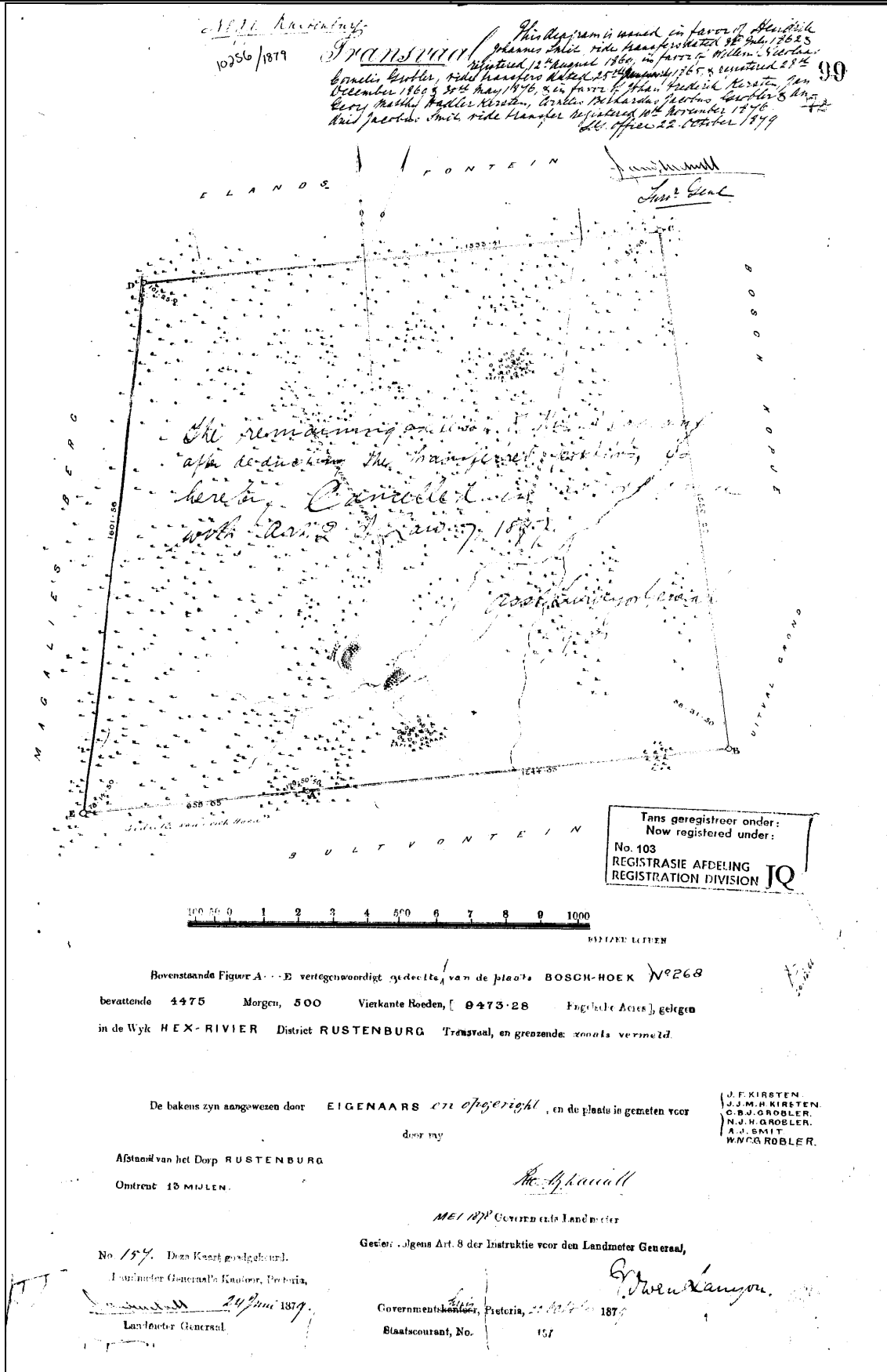
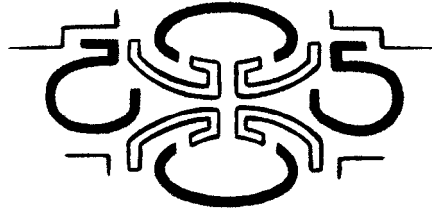


Figure 20: Surveyor General's map of the farm Boschhoek 103 JQ first surveyed in 1879

FRANCOIS P COETZEE



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Nationality: South African

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Researcher and Curator: Museum of Anthropology and Archaeology, UNISA

QUALIFICATIONS

- BA (Hons): Archaeology (cum laude) (University of Pretoria)
- MA Candidate: Archaeology (UNISA) :The precolonial history of the Tswana people of Pilanesberg, North West Province.
- Principles of Environmental Management Course (Environmental Evaluation Unit: University of Cape Town)

PROFESSIONAL ASSOCIATIONS

- Association of Southern African Professional Archaeologists (ASAPA) (Council Member 2004-2008)
- Registered member of the Cultural Resource Management Section of ASAPA
- Pan African Association of Archaeologists and Related Studies
- Anthropology Southern Africa

Registered archaeologists with the South African Heritage Resources Agency (SAHRA)

Registered archaeologists with the AMAFA (Heritage Agency in KwaZulu-Natal)

RESEARCH INTERESTS AND MAJOR PROJECTS

Iron Age archaeology
Archaeological Impact Assessments
GIS
Museology

- An investigation with the Pilanesberg National Park, North West Province, as the locale of this project, has as its main aim to locate, document, classify and establish a chronology of Iron Age settlements, structures and artefacts
- Iron Age farming societies of the Waterberg: exploring the roots of black South Africans

- The archaeology of Melora Hill and Melora Saddle, two Iron Age farmer sites in Lapalala Wilderness, Limpopo. This project is undertaken in partnership with the Waterberg Biosphere, which was officially approved and proclaimed by UNESCO and the South African government in 2001. In view of the renewed interest in the educational use and tourism potential of archaeological sites, investigations are under way that will ensure that the research will, directly or indirectly, benefit local communities in the respective areas

PUBLICATIONS

- Coetzee, FP 1995. History: humans and nature pp 38-41 in *The magic of Pilanesberg: a complete guide to the Park*. Jacana Publishing
- Coetzee, FP 1997. *Our heritage at Pilanesberg*, Sediba newsletter
- Coetzee, FP & Prinsloo, HP 2001. Stayt: A 13th Century Iron Age Site, Soutpansberg District, Northern Province, South Africa, *SA Journal of Ethnology* 24(3)
- Coetzee, FP. 2004. *Review: Archaeology of Southern Africa, by Peter Mitchell*. Klieo
- Coetzee, F.P., Boeyens, J.C.A., Van der Ryst, M.M., Parsons, I. & Lombard M. 2005. Cultural heritage management plan for Melora Hilltop and Saddle sites, Lapalala Wilderness, Limpopo Province. *Occasional paper* 1: 1-24. Tswane: Unisa.
- Coetzee, F.P., L'Abbé, N. & Loots, M. 2008. A description of Iron Age skeletons from the Pilanesberg National Park. *South African Archaeological Bulletin*. 169 (58)
- Hall, S., Anderson, M., Boeyens, J. & Coetzee, P. 2008. Towards an outline of the Oral Geography, Historical Identity and Political Economy of the Late Precolonial Tswana in the Rustenburg region. *Researches of the last 500 Years*. Wits University Press.
- Boeyens, J.C.A., Van der Ryst, M., Coetzee, F.P., Steyn, M. & Loots, M. 2009. An infant pot burial from Melora Saddle, a nineteenth-century Sotho-Tswana site on the Waterberg Plateau, Limpopo Province. *Journal of the Humanities*.

HERITAGE IMPACT ASSESSMENTS AND REPORTS

I have over 15 years experience in the field heritage management, especially:

- Archaeological/heritage impact assessment
- heritage audits
- conservation management plans
- analysis of archaeological material
- curation of archaeological material

Reports

Some recent examples. I'm involved with about 20 – 25 projects a year and a complete list can be supplied on request.

Coetzee, F. P. 2009. Cultural Heritage Survey of the Proposed Mogwase Substation & Associated Turn-Ins Project, North West Province for PBA International (SA). Unpublished report. Pretoria

Coetzee, F. P. 2009. Cultural Heritage Survey of the Rosslyn Norite Quarry, on Portions 34, 35 72 & 73 of the Farm Klipfontein 268JR, Rosslyn, Tshwane Municipality for Umhlaba Environmental Consulting cc. Unpublished report. Pretoria

Coetzee, F. P. 2009. Cultural Heritage Survey of the Farm Bezuidenhoutshoek 274JS, Magisterial District of Middelburg, Mpumalanga For Bezuidenhoutshoek Farm (Pty) Ltd. Unpublished report. Pretoria

Coetzee, F. P. 2009. Cultural Heritage Survey of the Proposed Low Cost Housing on Portion 51 of the Farm Houtkoppen 193 IQ, Kya Sands, Johannesburg (Gdace ref no: gaut 002/08-09/n0335) For MSA Environmental, Legal and Mining Services. Unpublished report. Pretoria.



the DEDECT

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DETAILS OF SPECIALIST AND DECLARATION OF INTEREST

Table with 2 columns: Labels (File Reference Number, NEAS Reference Number, Date Received) and a shaded header (For official use only) with three empty rows.

Application for authorisation in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2010

PROJECT TITLE

Integrated Environmental Authorisation Process for the Proposed Extension of the Existing Bafokeng Rasimone Platinum Mine (BRPM) Tailings Storage Facility and Associated Infrastructure, North West Province

Table with 4 columns: Labels (Specialist, Contact person, Postal address, Postal code, Telephone, E-mail, Professional affiliation(s) (if any)) and contact details for Cultural Heritage (FP Coetzee).

Table with 4 columns: Labels (Project Consultant, Contact person, Postal address, Postal code, Telephone, E-mail) and contact details for SRK Consulting (SA)(Pty)Ltd.

Report for Royal Bafokeng Styldrift Mining Complex – Environmental Authorisation to include the proposed Styldrift Tailings Storage Facility, Return Water Dam, Topsoil Stockpile, and other Associated Infrastructure

Rustenburg Local Municipality, North-West Province

Farm: Styldrift 90JQ, Boschkopie 104JQ

Fourie, H. Dr heidicindy@yahoo.com

Palaeontological Desktop Impact Assessment

Commissioned by: SRK Consulting

P.O. Box 35290, Menlopark, Pretoria, 0102

012 361 9821

2015/03/10

Ref: NWP/EIA/



B. Executive summary

Outline of the development project: SRK Consulting (SA) (Pty) Ltd (SRK) appointed Dr H. Fourie, a palaeontologist, to undertake a Desktop Paleontological Impact Assessment (PIA) of the suitability of-

The applicant Bafokeng Rasimone Platinum Mine (BRPM) proposes to develop the Styldrift Tailings Storage Facility, Return Water Dam, Topsoil Stockpile, and other associated infrastructure on the Farm Styldrift 90JQ, located approximately 7 km from the existing BRPM Concentrator Plant and 6 km south of Sun City along the R565 in the North West Province. The mine is situated 40 km north-west of Rustenburg.

This project includes two Alternatives for the additional extension (see Locality Map). See Outline of development and Satellite Image (Figure 2).

The **National Heritage Resources Act (Act No. 25 of 1999) (NHRA)** requires that all heritage resources, that is, all places or objects of aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance are protected. The Republic of South Africa (RSA) has a remarkably rich fossil record that stretches back in time for some 3.5 billion years and must be protected for its scientific value. Fossil heritage of national and international significance is found within all provinces of the RSA. South Africa's unique and non-renewable palaeontological heritage is protected in terms of the National Heritage Resources Act. According to this act, palaeontological resources may not be excavated, damaged, destroyed or otherwise impacted by any development without prior assessment and without a permit from the relevant heritage resources authority.

The main aim of the assessment process is to document resources in the development area and identify both the negative and positive impacts that the development brings to the receiving environment. The PIA therefore identifies palaeontological resources in the area to be developed and makes recommendations for protection or mitigation of these resources.

For this study, resources such as geological maps, scientific literature, institutional fossil collections, satellite images, aerial maps and topographical maps were used. It provides an assessment of the observed or inferred palaeontological heritage within the study area, with recommendations (if any) for further specialist palaeontological input where this is considered necessary.

A Palaeontological Impact Assessment is generally warranted where rock units of **LOW to VERY HIGH** palaeontological sensitivity are concerned, levels of bedrock exposure within the study area are adequate; large scale projects with high potential heritage impact are planned; and where the distribution and nature of fossil remains in the proposed area is unknown. The specialist will inform whether further monitoring and mitigation are necessary.

Types and ranges of heritage resources as outlined in Section 3 of the National Heritage Resources Act (Act No. 25 of 1999):

(i) objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens.

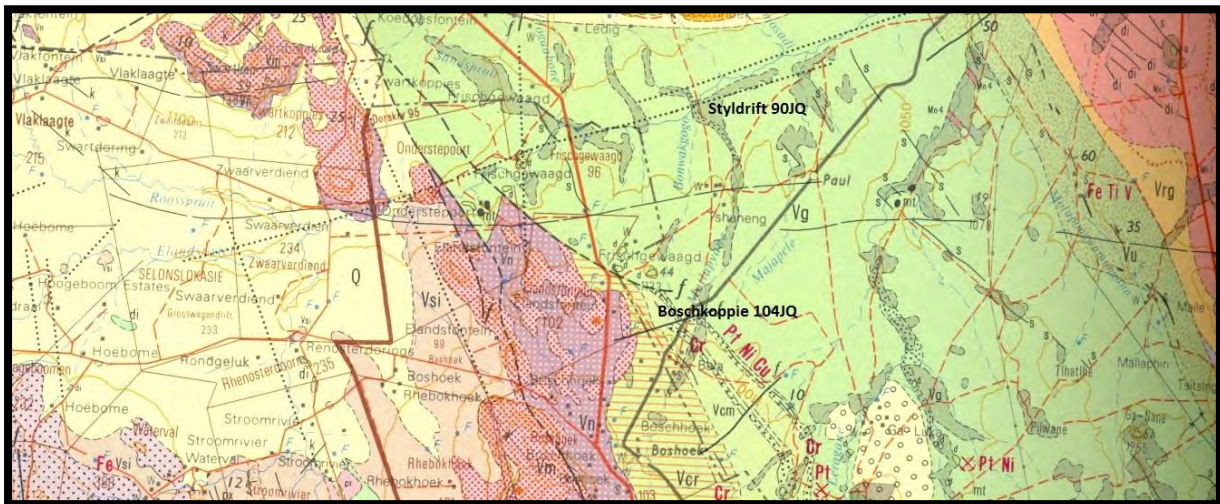
This report adheres to the guidelines of Section 38 (1) of the National Heritage Resources Act (Act No. 25 of 1999) (NHRA). Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorised as (a) the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length; (b) the construction of a bridge or similar structure exceeding 50m in length; (c) any development or other activity which will change the character of a site (see Section 38); (d) the re-zoning of a site exceeding 10 000 m² in extent; (e) or any other category of development provided for in regulations by SAHRA or a PHRA authority.

This reports aim to provide comment and recommendations on the potential impacts that the proposed development could have on the fossil heritage of the area and to state if any mitigations or conservation measures are necessary.

Outline of the geology and the palaeontology:

The geology was obtained from the Geological Map of the Republic of South Africa, 1:100 000 (Visser, 1984) and 2526 Rustenburg, 1:250 000 (Walraven, 1981).

Figure 1: The geology of the development area.



Legend to Map and short explanation

- Vg – Gabbro, norite, anorthosite, (green), Pyramid Gabbro-norite Formation, Rustenburg Layered Suite, Bushveld Complex.
- Vcm – Norite, anorthosite (Khaki), Mathlagame Norite-anorthosite Formation, Rustenburg Layered Suite, Bushveld Complex.
- Vcr – Pyroxenite (striped green), Ruighoek Pyroxenite Formation, Rustenburg Layered Suite, Bushveld Complex.
- Vn – Norite, hybrid rocks, diabase, epidiorite (purple), Kolobeng Norite Formation, Rustenburg Layered Suite, Bushveld Complex.
- Vm – Quartzite (lilac), Magaliesberg Quartzite Formation, Pretoria Group, Transvaal Supergroup.
- f-- - Fault

Mining activities:

- Cr – Chrome
- Ni - Nickel
- Cu - Copper
- Pt - Platinum group metals

Summary of findings: The Desktop PIA was undertaken during March 2015, it was Summer, and the following is reported: As this is a desktop study the date and season have no influence on the outcome. The formations present are mainly the Rustenburg Layered Suite (Vg,Vcm, Vn, Vcr) of the Bushveld Complex.

The proposed development and associated structures are largely situated on the Pyramid Gabbro-norite Formation (Vg) of the Rustenburg Layered Suite (Vg, Vcm, Vn, Vcr) of the Bushveld Complex. It is Vaalian in age (2,100 – 1,920 Ma) and consists of an igneous intrusion with anorthosite, hybrid gabbro, gabbro, diabase, epidiorite, pyroxenite, and norite rocks. The Bushveld Complex is a massive body of igneous origin and it is intrusive in the Transvaal Supergroup. Both mafic and ultramafic rocks are present in the Rustenburg Layered Suite. The site is covered in 'Bushveld' vegetation. The weathering product is known as 'black turf'.

The Kolobeng Norite Formation (Vn) contains, apart from orthopyroxenite and plagioclase, abundant clinopyroxenite. Quartz is an important constituent and biotite and magnetite are present in minor quantities. This formation forms the lowermost part of the Rustenburg Layered Suite. The Pyramid-Gabbro-Norite Formation (Vg) consists of gabbro and norite with interlayered anorthosite. Cumulus clinopyroxenite and plagioclase are the major constituents. The Ruighoek Pyroxenite Formation (Vcr) consists of feldspathic pyroxenite in which several chromitite layers may be developed. Norite, anorthosite, pyroxenite and chromitite are characteristic in the Mathlagame Norite-anorthosite Formation (Vcm). It contains the Merensky Reef (Kent, 1980; Visser, 1989). There is a presence of mining past and present.

Fossils in South Africa mainly occur in rocks of sedimentary nature and not in rocks from igneous or metamorphic nature. Therefore, if there is the presence of Karoo Supergroup strata the palaeontological sensitivity is generally LOW to VERY HIGH, but here locally INSIGNIFICANT or ZERO for the Rustenburg Layered Suite (SG 2.2 SAHRA APMHOB, 2012).

Recommendation: The impact of the development on fossil heritage is **INSIGNIFICANT or ZERO** and therefore mitigation or conservation measures are not necessary for this development. A Phase 1 Palaeontological Assessment is not recommended. The topsoil, subsoil, overburden, inter-burden and bedrock do not have to be surveyed for fossiliferous outcrops.

This project includes two Alternatives for the additional extension (see Locality Map).
See Outline of development and Satellite Image (Figure 2).

The property is suitable for development and there is no objection to the development, all the options are possible.

Concerns/threats:

1. Threats are earth moving equipment / machinery (front end loaders, excavators, graders, dozers) during construction, the sealing-in or destruction of the fossils by development, vehicle traffic and human disturbance.
2. No consultation with parties was necessary.

Stakeholders:

Developer – Royal Bafokeng Platinum (Pty) Ltd., Royal Bafokeng Holdings, 1 Monte Casino boulevard Block c, Floor 4, Fourways. Tel: 010 590 4515.

Environmental – SRK, P.O. Box 35290, Menlopark, Pretoria, 0102. Tel. 012 361 9821.

Landowner – Royal Bafokeng Nation (RBN).

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D. Background information on the project

Report This report is part of the environmental impact assessment process under the National Environmental Management Act, as amended (Act No. 107 of 1998) (NEMA) and include Appendix 6 (GN R38282 of 4 December 2014) of the Environmental Impact Assessment Regulations contained in GN R982 of 04 December 2010.

Outline of development

This report discusses and aims to provide the developer with information regarding the location of palaeontological material that will be impacted by the development. In the pre-construction phase, if the palaeontological sensitivity is **VERY HIGH** or **LOW**, it may be necessary for the developer to apply for the relevant permit from the South African Heritage Resources Agency (SAHRA) and follow protocol.

It is proposed that the existing BRPM TSF be extended within Portion 1 of the Farm Boschkoppe 104JQ. The following infrastructure is proposed to be constructed and operated (TSF Scoping Report):

1. Extension of the existing TSF covering an area of approximately 150 ha. Two alternatives are proposed (see Satellite Image, Figure 2);
2. One Return Water Dam (RWD) associated with the extended TSF covering an area of approximately 12.7 ha;
3. Overland pipelines (approximately 3 km in length) for the transportation of tailings-containing water from the modified BRPM Concentrator Plant to the extended TSF;
4. Overland pipelines for the transportation of return water between the extended TSF and the RWD;
5. Overland pipelines (approximately 3 km in length) for the transportation of return water between the RWDs and the modified BRPM Concentrator plant;
6. Booster pump stations;
7. Water management infrastructure and systems associated with this project;
8. Service roads will be built along all pipelines and around the extended TSF in order for the mine to be able to service and maintain the proposed infrastructure;
9. Relocation of a power line to accommodate the extended TSF (a separate Basic Assessment application has been submitted);
10. Development of a topsoil stockpile with a footprint area of approximately 12 ha;
11. River crossings associated with pipelines.

This project includes two Alternatives for the additional extension (see Locality Map).
See Outline of development and Satellite Image (Figure 2).

Rezoning/ and or subdivision of land: None.

Name of developer and consultant: Royal Bafokeng Platinum Holdings (Pty) Ltd and SRK.

Terms of reference: Dr H. Fourie is a palaeontologist commissioned to do a Desktop PIA to ascertain if any palaeontological sensitive material is present in the development area. This study will advise on the impact on fossil heritage mitigation or conservation necessary, if any.

Dr Fourie obtained a Ph.D from the Bernard Price Institute for Palaeontological Research, University of the Witwatersrand. Her undergraduate degree is in Geology and Zoology. She specialises in vertebrate morphology and function concentrating on the Therapsid Therocephalia. For the past nine years she carried out field work in the Eastern Cape Province and Mpumalanga Province. Dr Fourie has been employed at the Ditsong: National Museum of Natural History in Pretoria (formerly Transvaal Museum) for 20 years.

Legislative requirements: SAHRA / Provincial Heritage Resources Agency (PHRA) for issue of permits if necessary. The National Heritage Resources Act (NHRA). An electronic copy of this report must be supplied to SAHRA/PHRA.

E. Description of property or affected environment

Location and depth:

The Farm Styldrift 90JQ has a common boundary with the Farm Boschkoppe 104JQ to the south and is adjacent to the Farm Frischgewaagd 96 JQ to the west. The major natural feature on the northern boundary is the Pilansberg complex. The Farm Styldrift 90 JQ is situated on land held in trust by the State on behalf of the Royal Bafokeng Nation (RBN). The closest neighbouring communities and villages are Shaneng, Rasimore, Mafenya and Robega (Scoping Report 470328).

Figure 2: Satellite Images of the Proposed Development (Google.earth 2012) (SRK Consulting).
Tailings Alternative 2.



Tailings Alternative 1 and Return Water Dam.



F. Description of the Geological Setting

Description of the rock units:

The development is taking place in an area covered by mostly the Rustenburg Layered suite sediments of the Bushveld Complex (Appendix 1).

The Bushveld Complex is a massive body of igneous origin and it is intrusive in the Transvaal Supergroup (Kent, 1980). It covers an area of 65 000 km² and is chrome and platinum rich (Visser, 1989). The age is Vaalian in age (2,100 – 1,920 Ma). The Rustenburg Layered Suite is so termed as it is intrusive in origin and the term is to be equivalent to a 'group'. It consists of mafic and ultramafic rocks and is rich in platinum, chrome and vanadium. The layered rocks of the Bushveld Complex are generally believed to be the result of crystals settling out of magma during slow cooling. This region is covered by the

'Bushveld' vegetation. The magmatic events petrogenetically related to and generally considered part of the whole magmatic evolution of the Complex are, the diabase sills and the Rooiberg Group. The Complex consists of three main units or suites of which the Rustenburg Layered Suite is one (Kent, 1980), the other two are the Rashedoep and Lebowa Granite (Visser, 1989).

The Rustenburg Layered Suite has three outcrops intrusive in the Transvaal Supergroup. It is characterised by four lobes with a central granitic area in between. A total thickness of 8200 to 8700m has been measured. The different layers consist of peridot, pyroxene, gabbro, norite, anorthosite, troctolite, and diorite. The main problem is the product of weathering which forms black turf unsuitable for road construction. Rocks are used in road construction, building construction and for commercial purposes (Snyman, 1996).

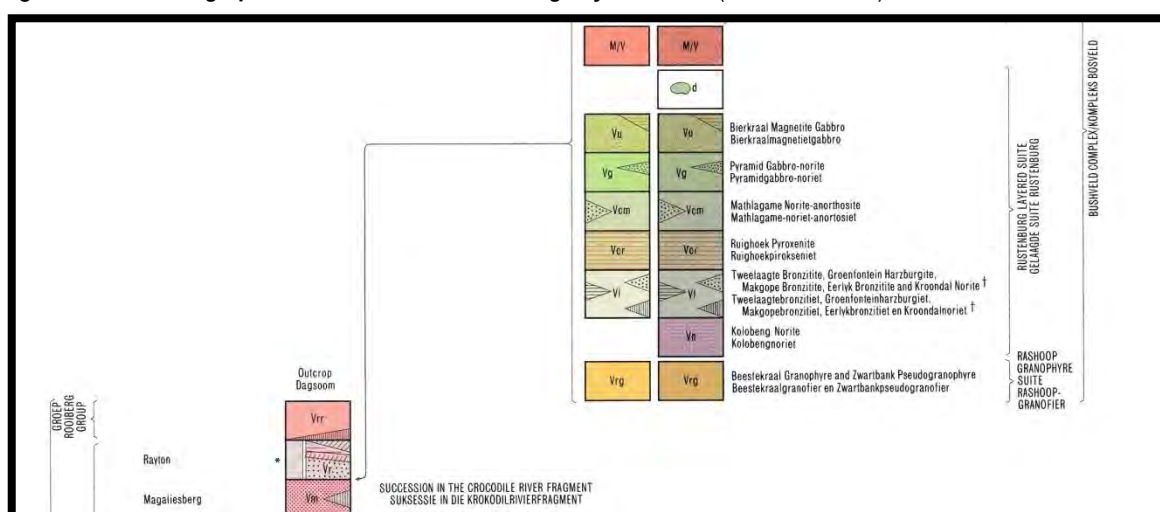
The Bushveld Complex rocks are classified mafic and ultramafic because of the iron and magnesium (and/or calcium) rich content, such as norite, gabbro and pyroxenite. The heaviest minerals, such as olivine and pyroxene, and any sulphide minerals (like magnetite and chromite) concentrate towards the base of each layer. Lighter minerals, such as feldspar and quartz, tend to form at the top (Norman and Whitfield, 2006).

It is believed that the Bushveld Complex looked like the Yellowstone National Park in the States of Wyoming, Idaho and Montana, United States of America, when it formed. The Rustenburg Layered Suite formed first. Erosion caused the Bushveld Complex to shrink in size. The Complex crops out at surface in three very long arcs, from Thabazimbi to Pretoria in the west, from Mokopane to Middelburg in the east, and north of Mokopane (McCarthy and Rubidge, 2005).

The Kolobeng Norite Formation (Vn) contains, apart from orthopyroxenite and plagioclase, abundant clinopyroxenite. Quartz is an important constituent and biotite and magnetite are present in minor quantities. This formation forms the lowermost part of the Rustenburg Layered Suite. The Pyramid-Gabbro-Norite Formation (Vg) consists of gabbro and norite with interlayered anorthosite. Cumulus clinopyroxenite and plagioclase are the major constituents. The Ruighoek Pyroxenite Formation (Vcr) consists of feldspathic pyroxenite in which several chromitite layers may be developed. Norite, anorthosite, pyroxenite and chromitite are characteristic in the Mathlagame Norite-anorthosite Formation (Vcm). It contains the Merensky Reef (Kent, 1980; Visser, 1989).

The Bushveld Complex is economically very important. By far the most important metal mined from the Rustenburg Layered Suite is platinum. Gold is also present, other minerals are nickel, copper, chrome, vanadium, tin, fluorspar, and cobalt. Quarries provide dimension stone and granite (Visser, 1989).

Figure 3: Lithostratigraphic column of the Rustenburg Layered Suite (Walraven, 1981).



This project includes two Alternatives for the additional extension (see Location Map). See Outline of development and Satellite Image (Figure 2).

G. Background to Palaeontology of the area

Summary: When rock units of moderate to high palaeontological sensitivity are present within the development footprint, a desktop and or field scoping (survey) study by a professional palaeontologist is usually warranted. The main purpose of a field scoping (survey) study would be to identify any areas within the development footprint where specialist palaeontological mitigation during the construction phase may be required (SG 2.2 SAHRA AMPHOB, 2012).

The site itself is situated on the Rustenburg Layered Suite of the Bushveld Complex with zero fossiliferous outcrops.

Criteria used (Fossil Heritage Layer Browser/SAHRA):

Rock unit	Significance/vulnerability	Recommended action
Rustenburg Layered Suite	Insignificant or zero	No palaeontological studies are required.
Bushveld Complex	Insignificant or zero	No palaeontological studies are required.

Databases and collections: Ditsong: National Museum of Natural History.

Impact: INSIGNIFICANT or ZERO. There are zero fossil resources that may be impacted by the development.

H. Description of the Methodology

The Desktop PIA was undertaken during March 2015.

Assumptions and Limitations:-

The accuracy and reliability of the report may be limited by the following constraints:

1. Most development areas have never been surveyed by a palaeontologist or geophysicist.
2. Variable accuracy of geological maps and associated information.
3. Poor locality information on sheet explanations for geological maps.
4. Lack of published data.
5. Lack of rocky outcrops.
6. A site visit was not conducted.
7. Insufficient data from developer and exact lay-out plan for all structures.

I. Description of significant fossil occurrences (Heritage value)

All Karoo Supergroup geological formations are ranked **LOW** to **VERY HIGH**, but here the impact is potentially **INSIGNIFICANT** or **ZERO**, there will therefore not be any fossiliferous outcrops.

J. Recommendation

- a. There is no objection to the development, and it is not necessary to request a Phase 1 PIA to determine whether the development will affect fossiliferous outcrops as the palaeontological sensitivity is **INSIGNIFICANT** or **ZERO**. A Phase 2 Palaeontological Mitigation will only be required if the Phase 1 Palaeontological Assessment finds fossiliferous outcrops.
- b. This project will benefit the economy, the growth of the community and social development in general.
- c. Preferred choice: Points 1-11 as the palaeontological sensitivity is INSIGNIFICANT or ZERO.
- d. The following should be conserved: if any palaeontological material is exposed during digging, excavating, drilling, or blasting SAHRA/PRHA must be notified. All construction activities must be stopped and a palaeontologist should be called in to determine proper mitigation measures.

Sampling and collecting:

Wherefore a permit may be needed from the SAHRA/PHRA.

- a. Objections: None.
- b. Conditions of development: See Recommendation.
- c. Areas that may need a permit: None.
- d. Permits for mitigation - needed from SAHRA / PHRA: None.

K. Conclusions

- a. All the land involved in the development was assessed and none of the property is unsuitable for development.
- b. All information needed for the Desktop PIA scope was provided by SRK.
- c. Areas that would involve mitigation and may need a permit from the South African Heritage Resources Agency are discussed.
- d. The following should be conserved: if any palaeontological material is exposed during digging, excavating, drilling or blasting, SAHRA/PHRA must be notified. All development activities must be stopped and a palaeontologist should be called in to determine proper mitigation measures. Especially shallow caves.
- e. Condition in which development may proceed: It is further suggested that Occupational, Health and Safety Act is adhered to for safety and security reasons.

L. Bibliography

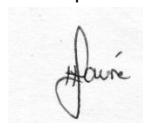
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Declaration

I, Heidi Fourie, declare that I am an independent consultant and have no business, financial, personal or other interest in the proposed development project for which I was appointed to do a palaeontological scope. There are no circumstances that compromise the objectivity of me performing such work.

Heidi Fourie accepts no liability, and the client, by receiving this document, indemnifies Heidi Fourie against all actions, claims, demands, losses, liabilities, costs, damages and expenses arising from or in connection with services rendered, directly or indirectly by the use of the information contained in this document.

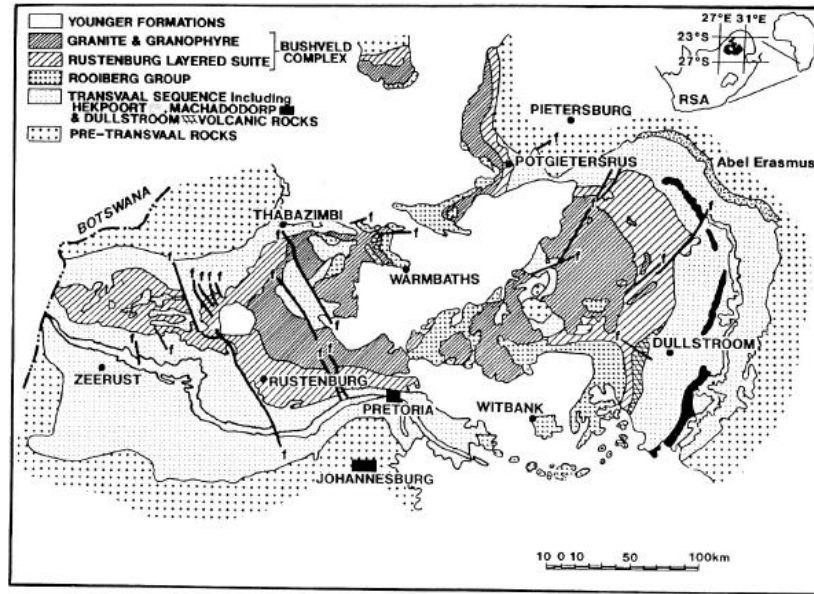
This report may not be altered in any way and any parts drawn from this report must make reference to this report.



Heidi Fourie 2015/03/10

Appendix 1:

Map 1: Bushveld Complex (Visser, 1989).



The Bushveld Complex

Appendix 2:

Table 1: Listing points in Appendix 6 of the Act and position in Report.

Section in report	Point in Act	Heading
B	1(c)	Outline of development project
	1(d)	Summary of findings
	1(g)	Concerns/threats:
	1(n)i	"
	1(n)ii	"
	1(o)	"
	1(p)	"
D	1(h)	Figures
	1(a)i	Terms of reference
H	1(e)	Description of Methodology
	1(i)	Assumptions and Limitations
I	1(f)	Heritage value
J	1(j)	Recommendation
	1(l)	"
	1(m)	Sampling and collecting
	1(k)	"
	1(q)	"
Declaration	1(b)	Declaration
Appendix 2	1(k)	Protocol for finds
	1(m)	"
	1(q)	"

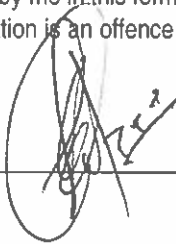
4.2 The specialist appointed in terms of the Regulations_

I, FP Coetzee declare that --

General declaration:

- I act as the independent specialist in this application
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of Section 24F of the Act.

Signature of the specialist:



Name of company (if applicable):

17/8/2015.

Date:



Signature of the Commissioner of Oaths:

18-08-2015

Date:

Menlyn Roadworthy

Designation:

Official stamp (below)

THE UNDERSIGNED DO HEREBY CERTIFY THAT THE ORIGINAL DOCUMENT WAS EXHIBITED TO ME AND THAT THIS IS A TRUE COPY OF THE ORIGINAL

18-08-2015

ELSIE BOPHA GOETZER
COMMISSIONER OF OATHS

REF: 8/1/8/2 PTA

MENLYN ROADWORTHY CENTRE

Curriculum vitae

Heidi Fourie

Title: Dr

Surname: Fourie

Name: Heidi

Citizenship: South African

Email: heidicindy@yahoo.com

Identity number: 6502020080080

Disability: High-frequency neural sensory deafness.

Contact: 012 993 3110 (h) 012 0000040 (w)

Employment: Curator of Karoo Collections. Active in research on the skeletal morphology of the Therocephalia (mammal-like reptiles) of the Karoo.

Highest qualification: Ph.D Karoo Palaeontology (B.Sc in Geology and Zoology).

Member of: Palaeontological Society of South Africa. International Congress of Vertebrate Morphologists.

Terms of reference: Involved in Palaeontological Impact Assessments since 2012. Have done over thirty to date. Did the field studies for the Dorper Wind Energy Project, Greenside Colliery, Ngululu Opencast mine and Benicon Park Phase 1 Palaeontological Impact Assessments. Active in Assessments in Gauteng, Limpopo, North West and Mpumalanga.

Publications:

Fourie, H 1993. A detailed description of the cranial morphology of *Emydops* (Therapsida: Dicynodontia). *Palaeontologia Africana*, **30**: 1-5.

Fourie, H. 2007. The postcranial skeletal anatomy of the therocephalian *Regisaurus* (Therapsida: Regisauridae) and its utilisation for biostratigraphic correlation. *Palaeontologia Africana*, **42**: 1-16.

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Fourie, H. 2009. The postcranial skeleton of the basal therocephalian *Glanosuchus macrops* (Scylacosauridae) and comparison of morphological and phylogenetic trends amongst the Theriodontia. *Palaeontologia Africana*, **44**: 27-39.

Fourie, H. 2013. The postcranial description of *Ictidosuchooides* (Therapsida: Therocephalia: Baurioidea). *Annals of the Ditsong National Museum of Natural History*, **3**: 1-10.

Methodology:

The type of scope is determined by the geological formation and its palaeontological sensitivity ranking determined through the Fossil Heritage Layer Browser (SAHRA).

Palaeontological Exemption Letter: Sensitivity of Insignificant to Zero and Low.

Desktop Study: Moderate and High Sensitivity.

Field Assessment: Very High Sensitivity.

Most fossil containing geological formations will be ranked as High to Very High.

The Environmental Assessment Practitioner must map the location of the proposed development on SAHRIS, once mapped, they will be able to switch on the palaeontological sensitivity layer to determine whether or not a PIA is necessary.



the DEDECT

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Smukhola@nwpg.gov.za

DETAILS OF SPECIALIST AND DECLARATION OF INTEREST

Table with 2 columns: Labels (File Reference Number, NEAS Reference Number, Date Received) and a shaded header (For official use only) with three empty rows.

Application for authorisation in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2010

PROJECT TITLE

Integrated Environmental Authorisation Process for the Proposed Extension of the Existing Bafokeng Rasimone Platinum Mine (BRPM) Tailings Storage Facility and Associated Infrastructure, North West Province

Table with 2 columns: Labels (Specialist, Contact person, Postal address, Postal code, Telephone, E-mail, Professional affiliation(s) (if any)) and contact details for Dr H. Fourie.

Table with 2 columns: Labels (Project Consultant, Contact person, Postal address, Postal code, Telephone, E-mail) and contact details for SRK Consulting (SA)(Pty)Ltd.

4.2 The specialist appointed in terms of the Regulations_

I, Hala Fourie declare that --

General declaration:

- I act as the independent specialist in this application
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of Section 24F of the Act.

Hala
Signature of the specialist:

N/A
Name of company (if applicable):

2015-08-18
Date:

Signature of the Commissioner of Oaths:

Date:

Designation:

Official stamp (below)