CABANGA environmental

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**PAN AFRICAN RESOURCES PLC: BARBERTON MINES (PTY) LTD**

**FAIRVIEW MINE**

**PROPOSED FAIRVIEW TSF AND RECLAMATION OF HISTORIC DUMPS**

**REFERENCE NUMBER MP30/5/1/2/2/191MR**

14 February 2020

**South African Heritage Resources Agency**

**Attention: Nokukhanya Khumalo,** Heritage Offices

Tel: 021 462 4502

Email: nkhumalo@sahra.org.za

CaseID: **14681**

Dear Madam,

Your Letter dated 07 February 2020 pertaining to Case ID 14680 refers.

Your letter states:

"However, the geosites are heritage sites of national significance and the assessment of the impact of the development must be included in the Heritage Impact Assessment as per section 38(3) of the NHRA. The assessment is to be carried out by a suitably qualified geologist and included into the HIA report. An amended HIA report with an assessment of the aforementioned must be submitted to the case on SAHRIS."

As it is not possible for a suitably qualified geologist to amend the HIA report compiled by a suitably qualified archaeologist, a separate assessment has been undertaken by a suitably qualified geologist and is attached hereto for your consideration.

I trust this document will sufficiently address your concerns and requirements.

Kind Regards,

Lelani Claassen

Registered Environmental Assessment Practitioner 2018/153 (EAPASA)

# 1 Expertise of the Specialist

The geological heritage impact assessment was undertaken by Mr. Ken van Rooyen, whose details are provided in Table 1.

**Table 1: Details of the Specialist**

| | |
|---|---|
| Full Names | Kenneth Carl van Rooyen |
| Contact Details | e-mail ken@cabangaenvironmental.co.za<br>telephone: 011 794 7534 |
| Education | 1991: MSc (Geography, specialising in the environment and coal discard dumps)<br>1989: B.Sc. Hon. (Geography, Geomorphology and Climatology)<br>1986: BSc (Earth Science, Geology and Geography) |
| Affiliations and Registrations | Registered with the South African Council for Natural Scientists, Pr.Sci.Nat (Reg. 121/93)<br>Founding Member of the International Association for Impact Assessment, South Africa<br>Member of the Geological Society of South Africa<br>Associate Member of Environmental Earth Science Group |
| Summary | Ken started his career working as an exploration geologist and then as a senior mine geologist up until 1989. Thereafter he specialised in environmental issues and worked firstly as a consultant following which he was employed by Rand Mines, Randgold and finally Randcoal as Group Environmental Scientist.<br>After the merging of Randcoal and TransNatal to form Ingwe Coal Company in 1994, the Environmental Department broke away to form an independent environmental consulting company (Digby Wells & Associates (Pty) Ltd), where Ken filled the roles of MD, Marketing and Technical Director to the company and finally as Executive Director.<br>Ken formed Cabanga Concepts CC (trading as Cabanga Environmental) in 2006. Since then, he has been involved in a strategic and practical capacity in a variety of environmental impact assessments, rehabilitation projects and general environmental management, focussing on the coal and gold mining industries predominantly in Kwa-Zulu Natal and Mpumalanga.<br>Ken is very familiar with the geology of the Barberton area (having grown up in Barberton and subsequently completing his MSc in Geology). |

## 2 Brief description of the Proposed Project

Barberton Mines (Pty) Ltd (BML) appointed Cabanga Environmental to undertake an Environmental Impact Assessment (EIA) and apply for Environmental Authorisation of the development of the Fairview Tailings Storage Facility (TSF) and reclamation of historical dumps in Fairview Mining Rights Area. "The Project" therefore comprises two parts as follows:

- **Part A: proposed Fairview TSF**
  - Continued processing of ore at the existing Fairview Mine results in the generation of tailings. The Tailings is currently being deposited on the Barberton Tailings Retreatment Plant (BTRP) TSF. The BTRP TSF is reaching capacity and a new TSF is needed to ensure continued production is possible.
  - Therefore, BML proposes to construct the Fairview TSF, to be located on the footprint of the Old Bramber TSF (which has been reclaimed) and adjoining the BTRP TSF.
  - The Fairview TSF Return Water Dam (RWD) will be between the BTRP TSF and the BTRP Pollution Control Dam.
  - These footprints have all been disturbed by previous mining activity.
  - A Heritage Impact Assessment undertaken on the site identified no Archaeological or built environment heritage resources in the vicinity of the proposed activities (Van Vollenhoven & Viljoen, 2019).
- **Part B: proposed reclamation of material from historic dumps**
  - Mining at the Fairview Mine area started in 1886 as a number of small operations. Over the years, and before the current legislation pertaining to the planning and management of mineral waste was promulgated, several waste dumps have been created throughout the Mining Right Area (MRA).
  - After approval of the MRA, the surface rights in the area were proclaimed as part of the Barberton Nature Reserve (BNR). The historically dumped material is therefore located within the boundaries of the BNR.
  - These waste dumps comprise tailings material and waste rock and are currently affecting the aesthetic of the area and contributing pollutants to affected watercourses. Additionally, these dumps still contain viable quantities of gold that can be economically extracted. Therefore, BML proposes to reclaim this material (as part of environmental clean-up) and process the material at the existing Fairview Processing Plants (to produce gold product).
  - The dumps that are being targeted for reclamation are older than 60 years. The National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA) affords automatic protection to structure older than 60 years. The NHRA defines "structure" as "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". The HIA undertaken for the Project (Van Vollenhoven & Viljoen, 2019) concluded that, apart from their age, these dumps have no heritage significance and their reclamation does not warrant any specific heritage intervention.
  - Eight (8) other sites of varying significance were identified in close proximity to the proposed reclamation activities. It is proposed to preserve these sites in-situ. The sites should be fenced off, included in a Heritage Register and managed in accordance with a Cultural Heritage Management Plan, to be compiled by a qualified heritage specialist.

# 3 Contextual considerations

Fairview Mine is located in the Mbombela Local Municipality of the Ehlanzeni District Municipality in the Mpumalanga Province of South Africa.

The entire MRA of the Fairview Mine falls within the BNR, with infrastructure areas including the original and current TSFs situated on land owned by BML, immediately west of the BNR. This portion of the BNR was originally known as the Mountainlands Nature Reserve and was first reserved for conservation in 1985 (Mountainlands Nature Reserve, 2020). Mountainlands was identified as Phase 3 of the BNR and incorporated in the BNR Integrated Management Plan (MTPA, 2012).

The southern border of the Fairview MRA adjoins the Barberton-Makhonjwa Mountains (BMM) World Heritage Site (WHS), which was included in the World Heritage Register of the United Nations Educational, Scientific and Cultural Organization (UNESCO) in July 2018. The BMM comprises about 40% of the Barberton Greenstone Belt which is one of the oldest geological (sedimentary/lacustrine) features on earth (DEA, January 2017).

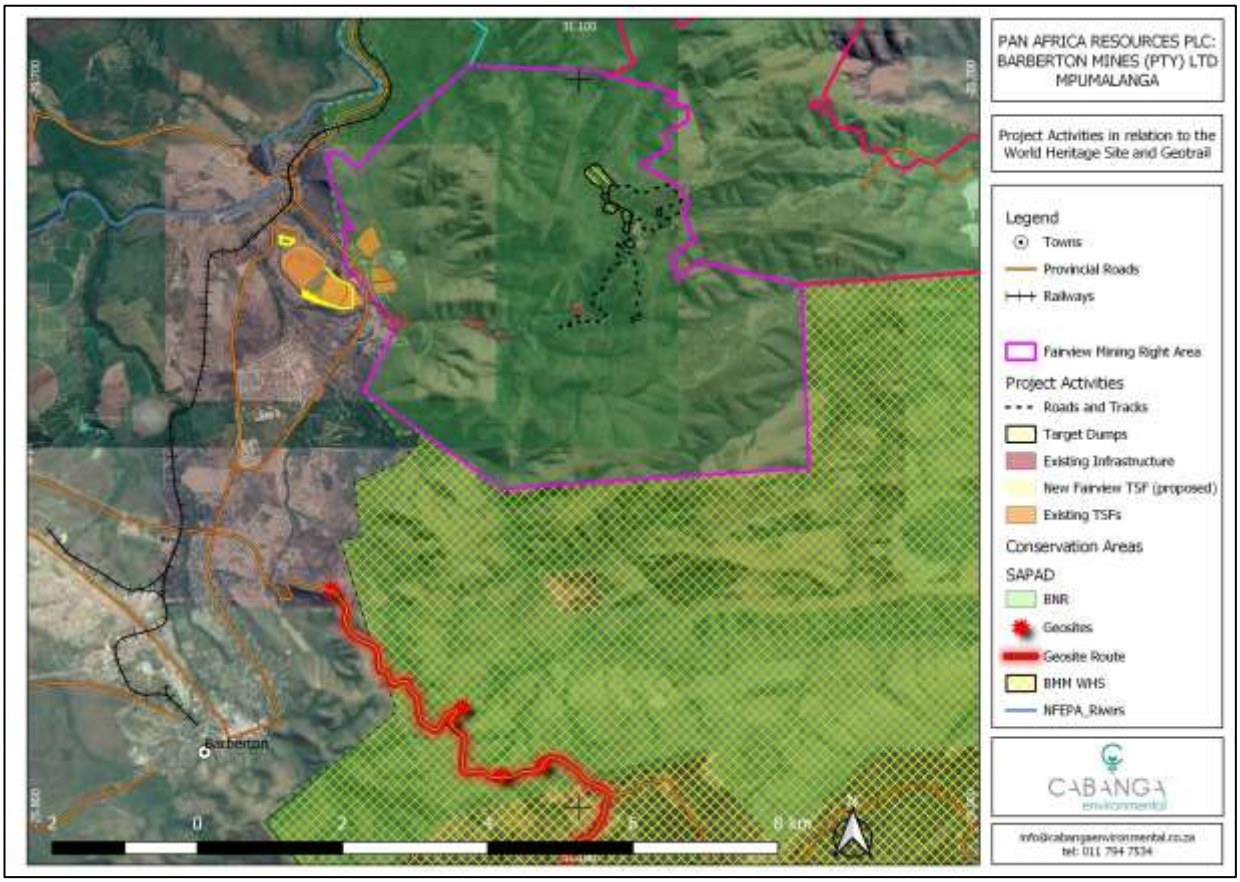
The process for including new sites as World Heritage sites is highly selective and based on underlying principles for the recognition of heritage of outstanding universal value, with a high level of site integrity/authenticity and effective site management. The criterion specifically considered in the inclusion of the BMM as a WHS relates to the area being an "*outstanding example representing major stages of earth's history, including the record of life, significant on-going geological processes in the development of land forms, [and] significant geomorphic or physiographic features*" (Dingwall, Weighell, & Badman, 2005).

## 3.1 The Geotrail and Geosites

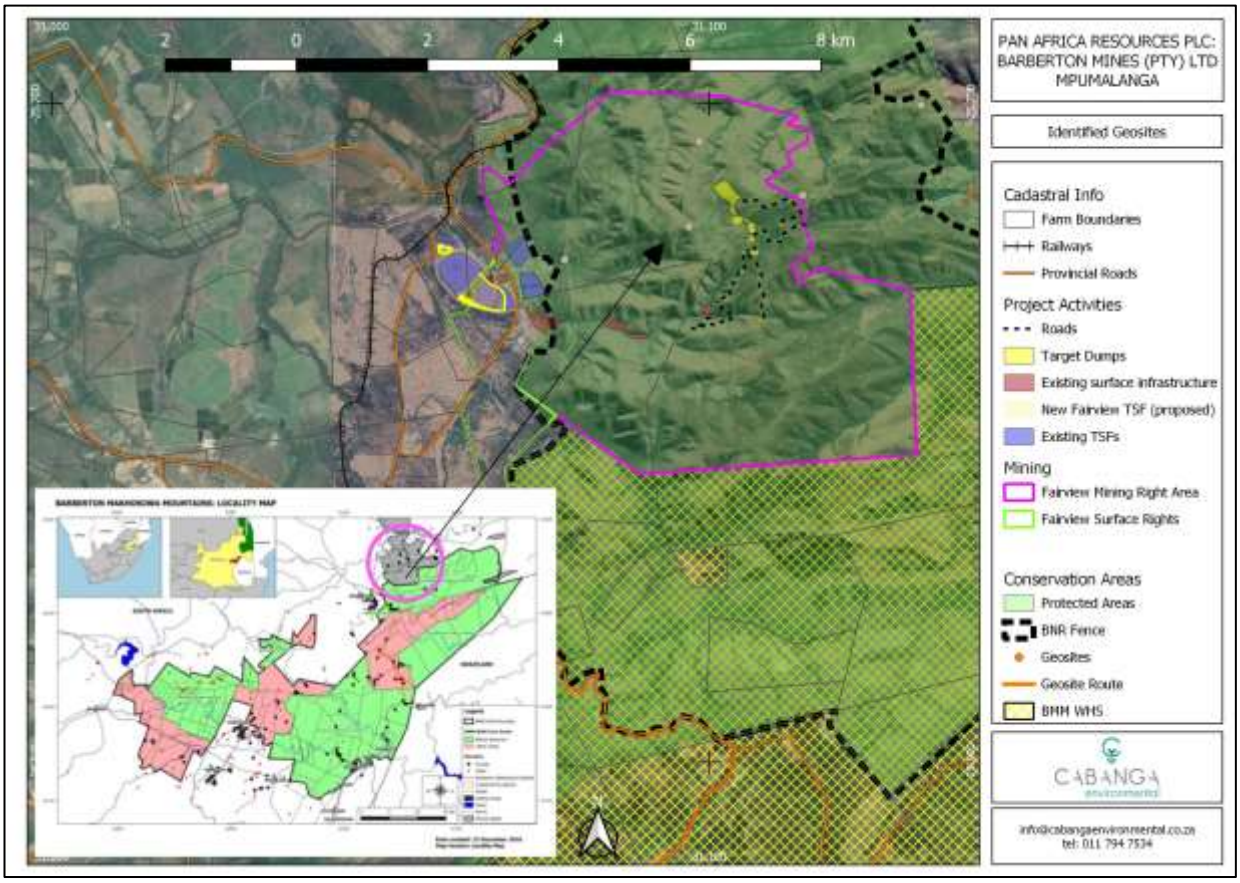
The BMM Nomination text (DEA, January 2017) states that "Geo-heritage values are identified at 300 registered geosites of which 51% (n=154) are encompassed within the Property. A 38 km motorised geotrail linking key geosites was built with illustrated information panels at lay-bys along a public road in 2014." Those geosites on the geotrail, in relation to the WHS and Project area are illustrated in Plan 1. Furthermore, "*An inventory of all significant geosites within and associated with the Barberton Greenstone Belt (BGB), has been compiled by a select group of geological scientists and researchers most familiar with the region. These data clearly show the number, distribution and variety of outcrops that have contributed so significantly to our understanding of the Archaean Eon. The project database records about 380 geosites representing the extraordinary variety of evidence available on what our planet was like three and a half billion years ago. Interpretation of most of these sites is formally recorded in more than 2 500 refereed scientific papers that have been published since the 1960s. As only about half the BGB has been thoroughly mapped by geologists, there is the potential for a similar number of new geosites to be added*."

Plan 2 illustrates the priority geosites that were identified by the aforementioned inventory in relation to the Fairview Mining Right and proposed Project Activities.

It is noted from Plan 1 and Plan 2 that the geotrail is over 6 km from the closest proposed activities (linear distance). The closest geosite included in the WHS is approximately 4.5 km linear distance from the proposed activities. The closest identified geosite to the project activities is approximately 500 m, linear distance away, and though these sites were included in the WHS Nomination dossier, this area was excluded from the WHS inscription.




**Plan 1: Project activities in relation to the WHS, Geotrail and BNR**




**Plan 2: All geosites (insert map was taken from DEA, January 2017)**

# 4 Impact Assessment

Impact Significance is calculated by the following formula:

| Impact Significance = Consequence x Likelihood |
|---|

**Likelihood** refers to the probability that an impact will occur at some time during the project.

**Consequence** is calculated by considering the **duration**, spatial **scale** and **intensity** of an impact.

The **Intensity** of an impact is calculated by considering the **severity of the impact** (how it will change the aspect, will it be destroyed completely, or altered slightly?) and the **sensitivity of the aspect** (is the aspect sensitive to change, and is the aspect important to ecosystem processes or social dynamics?).

Reclamation of historic dumps with front end loaders, transport of material to Fairview Processing Plants can potentially cause damage to or destruction of geosites. The proposed activities are located in an area with unique geological heritage resources which form part of the country's and the world heritage. Geosites located in the BMM are heritage sites of national (and international) significance and may not be impacted upon.

Geosites have been mapped in the BMM WHS and within the Fairview MRA. The Geological Heritage of the area is significant and well-studied though it is possible that additional geosites may be present (and not yet mapped). Impacts to geosites will be considered of High Severity, and Permanent Duration, though impacts will be isolated to activity areas. The resources are considered irreplaceable.

Based on the impact rating methodology implemented for the EIA, for the proposed project, the following impact significance is calculated:

**Table 2: Calculation of Impact Significance**

| Impact / Risks | Probability | | Sensitivity of the Aspect | | Severity of the Impact | | Duration | | Scale / Extent | | Significance (without Mitigation) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Potential damage to or destruction of geological heritage sites | 2 | Possible | 5 | Irreplaceable | 5 | High | 5 | Permanent | 1 | Isolated | 32 | Low |

# 5 Conclusion

It is considered unlikely that geosites will be affected by the proposed project activities at all, considering that the dumps targeted for reclamation are located on surface, predominantly in drainage lines and not on outcrops. Reclamation activities will be limited to surface activities. Underground mining in this area has already occurred in terms of the existing and approved Mining Right. Further mitigating factors include the previous identification of geosites (DEA, January 2017) which included the areas associated with the proposed reclamation activities (though it was decided to exclude the MRA from the BMM WHS).

It is recommended that the proposed reclamation activities are strictly limited to the previously disturbed footprints associated with the target dumps, and the associated access tracks. If the activity footprints are contained within these previously disturbed areas, potential impacts to sites of geological heritage value are considered negligible.

## 6 Declaration by the Specialist

I, Ken van Rooyen, herewith confirm:

- That the information provided in this report are to the best of my knowledge true and correct;
- I act as an independent specialist in this application;
- I have performed work relating to the application in an objective manner. I have no, and will not engage in, conflicting interests in the undertaking of the activity. I do not have and will not have any vested interest (either business, financial, personal or other) in the proposed activity proceeding other than remuneration for work performed in terms of the Regulations;
- there are no circumstances that may compromise my objectivity in performing such work;
- 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;
- I realise that a false declaration is an offence and is punishable by law.

14 February 2020

Signature of the Specialist: KC van Rooyen Date:

Name of company: Cabanga Concepts CC (t/a Cabanga Environmental)

## 7 References


DEA. (January 2017). *South Africa: Barberton Makhonjwa Mountains - Nomination Dossier in terms of the Convention concerning the protection of the World Cultural and Natural Heritage*. Pretoria: Department of Environmental Affairs.

Dingwall, P., Weighell, T., & Badman, T. (2005). *Geological Wordl Heritage: A Global Framework. A Contribution to the Global Theme Study of World Heritage Natural Sites.* UICN, WCPA. Retrieved February 14, 2020, from https://whc.unesco.org/document/9777

Mountainlands Nature Reserve. (2020). *Mountainlands Nature Reserve*. Retrieved from https://www.mountainlands.co.za/mountainlands-reserve-introduction/

MTPA. (2012). *Integrated Management Plan: Barberton Nature Reserve, Mpumalanga Province, South Africa.* Nelspruit: Mpumalanga Tourism and Parks Agency (MTPA).

Van Vollenhoven, A., & Viljoen, D. (2019). *A Report on Archaeological and Built Environment Heritage Impact Assessment for the proposed Fairview TSF and reclamation of historic dumps at the Fairview Mine close to Barberton, Mpumalanga Province.* Pretoria: Archaeotnos Culture & Cultural Resource Consultants.

https://whc.unesco.org/en/list/1575

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**Appendix A: Letter from SAHRA**

an agency of the
Department of Arts and Culture

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Enquiries: Nokukhanya Khumalo
Tel: 021 462 4502
Email: nkhumalo@sahra.org.za
CaseID: 14681



# Letter

**In terms of Section 38(3), 38(8) of the National Heritage Resources Act (Act 25 of 1999)**

Attention: Barberton Mines (Pty) Ltd

**Proposed construction of the Fairview TSF and reclamation of material from historic dumps in the Fairview Mining Right Area near Barberton, Mpumalanga**

Barberton Mines (Pty) Ltd appointed Cabanga Environmental to undertake an Environmental Impact Assessment (EIA) for Environmental Authorisation of the development of the Fairview Tailings Storage Facility (TSF) and reclamation of historical dumps in Fairview Mining Rights Area. The development is associated with vegetation clearance, road upgrades.

The SAHRA APM unit issued and interim comment dated 24/01/2020 which requested the that during the EIA phase, a geological heritage survey be undertaken to see if any of the geological outcrops in the project area may contribute to the NHS and WHS status of the area.

It is noted that the DEA Nomination Dossier for the Barberton Makhonjwa Mountain WHS, as per the Scoping Report, that "geosites are only threatened by direct in-situ impacts, so buffer zones protecting against external threats are redundant".

In email correspondence with Cabanga Environmental, it was brought to the attention of SAHRA that "the proposed project activities are all limited to surface activities (reclamation of mineral waste material dumped in the area before such activities were regulated, and construction (on surface) of a new Tailings Facility on the same footprint that previously housed a Tailings Facility). Furthermore the activities are over 2.5km from the border of the WHS, at the closest point and 5.5km from the nearest Geosite that I am aware of. The Fairview Mining Right Area was considered in the assessment of the area as part of the WHS nomination as well, and excluded from the WHS with reason."

However the geosites are heritage sites of national significance and the assessment of the impact of the development must be included in the Heritage Impact Assessment as per section 38(3) of the NHRA. The assessment is to be carried out by a suitably qualified geologist and included into the HIA report. An amended HIA report with an assessment of the aforementioned must be submitted to the case on SAHRIS.
Further comments will be issued when the revised report as requested above has been submitted for review.

an agency of the
Department of Arts and Culture

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Enquiries: Nokukhanya Khumalo
Tel: 021 462 4502
Email: nkhumalo@sahra.org.za
CaseID: 14681

Date: Friday February 07, 2020


Should you have any further queries, please contact the designated official using the case number quoted above in the case header.

Yours faithfully

Nokukhanya Khumalo
Heritage Officer
South African Heritage Resources Agency

Phillip Hine
Manager: Archaeology, Palaeontology and Meteorites Unit
South African Heritage Resources Agency

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**ADMIN:**
Direct URL to case: http://www.sahra.org.za/node/532282
(DMR-MP, Ref: MP/30/5/1/2/2/191MR)

Terms & Conditions:

1. This approval does not exonerate the applicant from obtaining local authority approval or any other necessary approval for proposed work.
2. If any heritage resources, including graves or human remains, are encountered they must be reported to SAHRA immediately.

an agency of the
Department of Arts and Culture

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3. SAHRA reserves the right to request additional information as required.

**Appendix B: HIA**

Archaetnos Culture & Cultural
Resource Consultants
BK 98 09854/23

# A REPORT ON AN ARCHAEOLOGICAL AND BUILT ENVIRONMENT HERITAGE IMPACT ASSESSMENT FOR THE PROPOSED FAIRVIEW TSF AND RECLAMATION OF HISTORIC DUMPS AT THE FAIRVIEW MINE CLOSE TO BARBERTON, MPUMALANGA PROVINCE

For:

***CABANGA CONCEPTS***
***E-MAIL: lelani@cabangaenvironmental.co.za***

**REPORT NO.: AE01953V**

By:

***Prof. A.C. van Vollenhoven (L.AKAD.SA.)***
***Accredited member of ASAPA* (Accreditation number: 166)**
***Accredited member of SASCH (*Accreditation number: CH001)**
**&**
**Daniël Viljoen (BA Hons)**

***4 November 2019***

Archaetnos
P.O. Box 55
GROENKLOOF
0027
Tel: 083 291 6104
Fax: 086 520 4173
E-mail: antonv@archaetnos.co.za

## SUBMISSION OF REPORT

**Please note that the South African Heritage Resources Agency (SAHRA) or one of its subsidiary bodies needs to comment on this report.**

**It is the client's responsibility to do the submission via the SAHRIS System on the SAHRA website.**

**Clients are advised not to proceed with any action before receiving the necessary comments from SAHRA.**

## DISCLAIMER

**Although all possible care is taken to identify all sites of cultural importance during the survey of study areas, the nature of archaeological and historical sites is as such that it always is possible that hidden or subterranean sites could be overlooked during the study. Archaetnos and its personnel will not be held liable for such oversights or for costs incurred as a result thereof.**

## EXECUTIVE SUMMARY

Purpose:
Archaetnos cc was requested by Cabanga Environmental to conduct an archaeological impact assessment (AIA), including a built environment impact assessment for the proposed Fairview Tailings Storage Facility (TSF) and reclamation of historic dumps. The Fairview Mine is managed by Barberton Mines (Pty) Ltd. This is close to Barberton in the Mpumalanga Province.

Project description:
The project has three components:

- Construction of a new TSF, on the footprint of the original Bramber TSF and its expansion
- Upgrading of roads and
- Reclamation of historic dumps.

Barberton Mines Limited (BML), the Holder of the Mining Right at Fairview, is also the surface rights owner of the Farm Fairview 542 JU, and Portion 1 of the Farm Bramber South 348 JU, adjoining the Mining Right Area (MRA), and others. The proposed project further relates to the proposed construction of the Fairview TSF, on the footprint of the reclaimed Bramber TSF, which is located on the Farm Fairview 542 JU.

Methodology:
The methodology for the study includes a survey of literature and a field survey. The latter was 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/ reclamation.

If required, the location/position of any site was determined by means of a Global Positioning System (GPS), while photographs were also taken where needed. The survey was 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.

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.

Public consultation:
General public consultation will be done by Cabanga. The various specialist reports will be utilized for this purpose.

Findings:
Eight 8 sites of cultural heritage significance were located during the survey of which 3 (no. 2, 3 and 5) are in the surveyed area. The other 5 sites (1, 4, 6, 7 and 8) are however very close thereto. The survey of the indicated area was completed successfully.

However, apart from sites identified outside of the project area, there are definitely more heritage sites further away, and these would ideally need to be assessed in comparison with the identified sites. This may have an effect on final evaluations.

Also the age of the mine dumps proposed for reclamation are all older than 60 years and thus are protected under the National Heritage Act (25 of 1999). As indicated above the heritage significance thereof is limited and it does not warrant any specific heritage intervention. However, specific features within it, may have a higher rating. Such features identified, are discussed below.

Thus, it should be remembered that recommendation made, will always be subject to the above-mentioned factors.

The following is recommended:

- Site no. 1 – grave yard: The site is of high significance but may be mitigated. It also should be included in the heritage register. Mitigation is subject to a permit application lodged with the relevant heritage authority.

  Two possibilities exist. The first option would be to fence the graves in and have a cultural management plan (CMP) drafted for the sustainable preservation thereof. The second option is to exhume and relocate the mortal remains.

  Since the site is not impacted on directly by the proposed development, Option 1 is recommended.

- Site no. 6 – grave yard: The site is of high significance and may not be mitigated. It should be included in the heritage register and maintained in situ with a protected buffer zone and fencing. A CMP should be written for the sustainable preservation thereof.

- Site no. 8 – grave yard: The site is of high significance but may be mitigated. It also should be included in the heritage register. Mitigation is subject to a permit application lodged with the relevant heritage authority.

  It is recommended that a CMP be drafted to ensure sustaiable preservation of the site.

- Site no. 2 – ruin of stone building - The site is of medium heritage significance and may be mitigated. Mitigation is subject to a permit application lodged with the relevant heritage authority.

Since the site falls outside of the project area, it should merely be left as it is, but the mine needs to ensure that it is not impacted on.

- Site no. 3 – old mining plant: the site is of medium significance and should thus be included in the heritage register. It may be mitigated, but mitigation is subject to a permit application lodged with the relevant heritage authority.

  The site may be demolished, but it should be documented first by mapping and photographs.

- Site no. 4 – house ruins – the site is of low significance and therefore the description in this phase 1 heritage report is seen as sufficient recording. It may be granted a destruction permit at the discretion of the relevant heritage authority without a formal permit application, subjected to the granting of Environmental Authorisation.

- Site no. 5 - small building (possible magazines room): The site is of medium cultural significance. It should be included in the heritage register and may be mitigated. The mitigation is subject to a permit application lodged with the relevant heritage authority.

  The site may thus be demolished, but it should be documented first by mapping and photographs.

- Site no. 7 – house ruins – the site is of low significance and therefore the description in this phase 1 heritage report is seen as sufficient recording. It may be granted a destruction permit at the discretion of the relevant heritage authority without a formal permit application, subjected to the granting of Environmental Authorisation.

- It should be noted that the subterranean presence of archaeological and/or historical sites, features or artifacts is always a distinct possibility. It may only become known later on, especially since the density of the vegetation probably influenced the accurate recording of sites. Therefore, operating controls and monitoring should be introduced, aimed at the possible unearthing of such features. Care should therefore be taken when development commences that if any of these are discovered, a qualified archaeologist be called in to investigate the occurrence.

It is also important to take cognizance that it is the client's responsibility to do the submission of this report via the SAHRIS System on the SAHRA website. No work on site may commence before receiving the necessary comments from SAHRA.

**CURRICULUM VITAE**
***Prof. Anton Carl van Vollenhoven***

**PERSONAL INFORMATION**

- Born: 20 January 1966, Pretoria, RSA
- Address: Archaetnos, PO Box 55, Groenkloof, 0027
- Cell phone: 083 291 6104
- Nationality: RSA
- E-mail: antonv@archaetnos.co.za

**TERTIARY EDUCATION**

- BA 1986, University of Pretoria
- BA (HONS) Archaeology 1988 (cum laude), University of Pretoria
- MA Archaeology 1992, University of Pretoria
- Post-Graduate Diploma in Museology 1993 (cum laude), University of Pretoria
- Diploma Tertiary Education 1993, University of Pretoria
- DPhil Archaeology 2001, University of Pretoria.
- MA Cultural History 1998 (cum laude), University of Stellenbosch
- Management Diploma 2007 (cum laude), Tshwane University of Technology
- DPhil History 2010, University of Stellenbosch

**EMPLOYMENT HISTORY**

- *1988-1991:* Fort Klapperkop Military Museum - Researcher
- *1991-1999:* National Cultural History Museum. Work as Archaeologist, as well as Curator/Manager of Pioneer Museum (1994-1997)
- *1999-2002:* City Council of Pretoria. Work as Curator: Fort Klapperkop Heritage Site and Acting Deputy Manager Museums and Heritage.
- *2002*-2007: City of Tshwane Metropolitan Municipality. Work as Deputy Manager Museums and Heritage.
- *August 2007* – present – Managing Director for Archaetnos Archaeologists.
- *1988-2003*: Part-time lecturer in Archaeology at the University of Pretoria and a part-time lecturer on Cultural Resources Management in the Department of History at the University of Pretoria.
- *2014-2015*: Part-time lecturer for the Honours degree in Museum Sciences in the Department of History and Heritage Studies at the University of Pretoria
- *Since 2015*: Extraordinary Professor of History at the Mahikeng campus of the Northwest University

**OTHER**

- Has published 34 peer-reviewed and 42 popular articles.
- Hs written 11 books/book contributions/conference proceedings .
- Has been the author and co-author of over 911 unpublished reports on cultural resources surveys and archaeological work.
- Has delivered more than 72 papers and lectures at national and international conferences.
- Member of SAHRA Council for 2003 – 2006.
- Member of the South African Academy for Science and Art.
- Member of Association for South African Professional Archaeologists.
- Member of the South African Society for Cultural History (Chairperson 2006-2008; 2012-2014; 2018-

2020).

- Has been editor for the SA Journal of Cultural History 2002-2004.
- Editorial member of various scientific journals.
- Member of the Provincial Heritage Resources Agency, Gauteng's Council.
- Member of Provincial Heritage Resources Agency, Gauteng's HIA adjudication committee (Chairperson 2012-2019).

A list of reports can be viewed on www.archaetnos.co.za.

**DECLARATION OF INDEPENDENCE**

I, Anton Carl van Vollenhoven from Archaetnos, hereby declare that I am an independent specialist within the field of heritage management. The report complies with the SAHRA 2007 Minimum Standards for Ar*chaeological Components of Impact Assessment Reports*.

Signed:  Date: 4 November 2019

**LIST OF ACRONYMS:**

AIA – Archaeological Impact Assessment
CMP – Cultural Management Plan
EAP – Environmental Assessment Practitioner
EIA – Environmental Impact Assessment
HIA – Heritage Impact Assessment
PIA – Palaeontological Impact Assessment
SAHRA –South African Heritage Resources Agency

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## 1. INTRODUCTION

Archaetnos cc was requested by Cabanga Environmental to conduct an archaeological impact assessment (AIA), including a built environment impact assessment for the proposed Fairview Tailings Storage Facility (TSF) and reclamation of historic dumps. The Fairview Mine is managed by Barberton Mines (Pty) Ltd. This is close to Barberton in the Mpumalanga Province (Figure 1-2).

The Fairview Mine is located in the Mbombela Local Municipality of the Ehlanzeni District Municipality in the Mpumalanga Province of South Africa. The area formed part of the Umjindi Local Municipality before Umjindi Municipality was disestablished and merged with Mbombela Local Municipality to establish the City of Mbombela Local Municipality on 3 August 2016.

The project has three components:

- Construction of a new TSF, on the footprint of the original Bramber TSF and its expansion
- Upgrading of roads and
- Reclamation of historic dumps.

The project (at the time of writing this report) is in the pre-application phase.

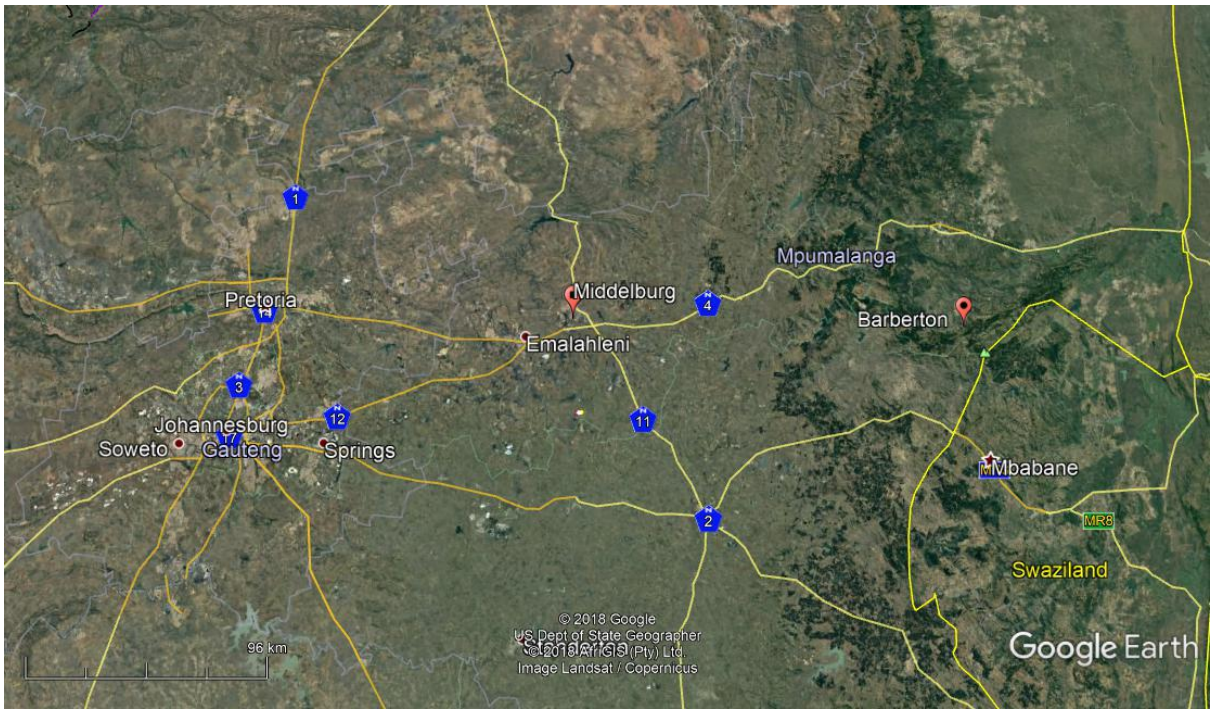


**Figure 1: Location of Barberton in the Mpumalanga Province.**

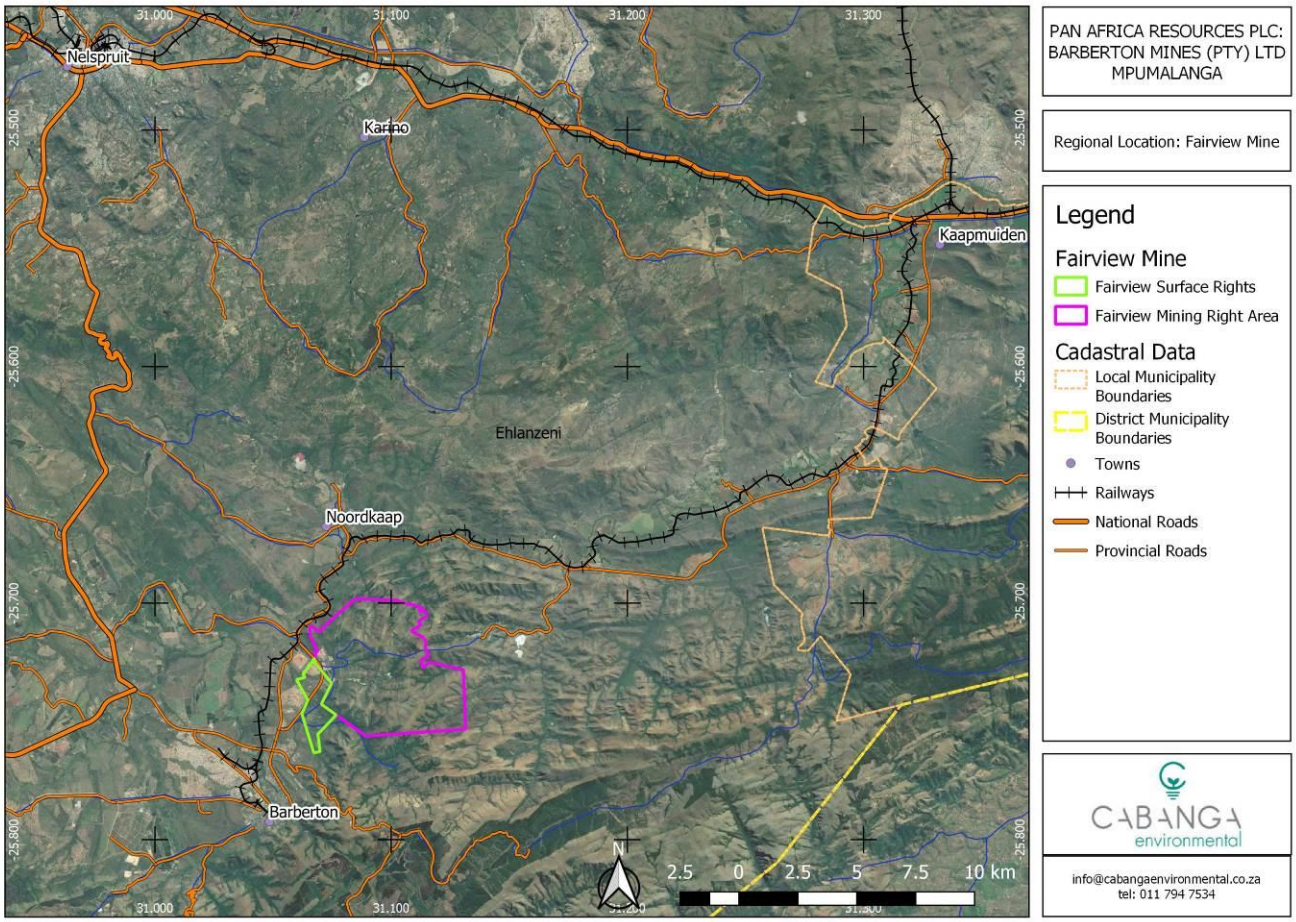


**Figure 2: Regional site location (Cabanga Environmental).**

The Fairview Mining Right Area (MRA) comprises the following properties (according to the converted Mining Right MP30/5/1/2/2/191MR) subject to Regulation 17 of the Mine Health and Safety Act, and thus excluding any area within 100m of any public road, railway, cemetery, residential area or public area:

- Lots 119, 120, 123, 124, 126, 136, 137, 138, 140, 141, 142, 143 and 144 of Section A Kaap Block
- The Farm Worral 352 JU,
- The Farm Bickenhall 346 JU,
- The Farm Bramber Est 314 JU, and
- The Farm Hayward 310 JU,

These farms have been renamed in the meantime and there are discrepancies between databases. The reclamation activities are (from the latest property description received from the Mine) on the Farm Sheba 940 JU).

Barberton Mines Limited (BML), the Holder of the Mining Right at Fairview, is also the surface rights owner of the Farm Fairview 542 JU, and Portion 1 of the Farm Bramber South 348 JU, adjoining the MRA, and others. The proposed project further

relates to the proposed construction of the Fairview TSF, on the footprint of the reclaimed Bramber TSF, which is located on the Farm Fairview 542 JU (Figure 3-4).

The 1:50 000 map for the project is map sheet number 2531CA and a central co-ordinate of the development is:

- Proposed new TSF: 25°43'44.37"S; 31° 4'1.60"E
- Reclamation activities: 25°43'5.62"S; 31° 6'20.50"E

The client indicated the area to be surveyed. The field survey, which was done via foot and off-road vehicle, was confined to this area.

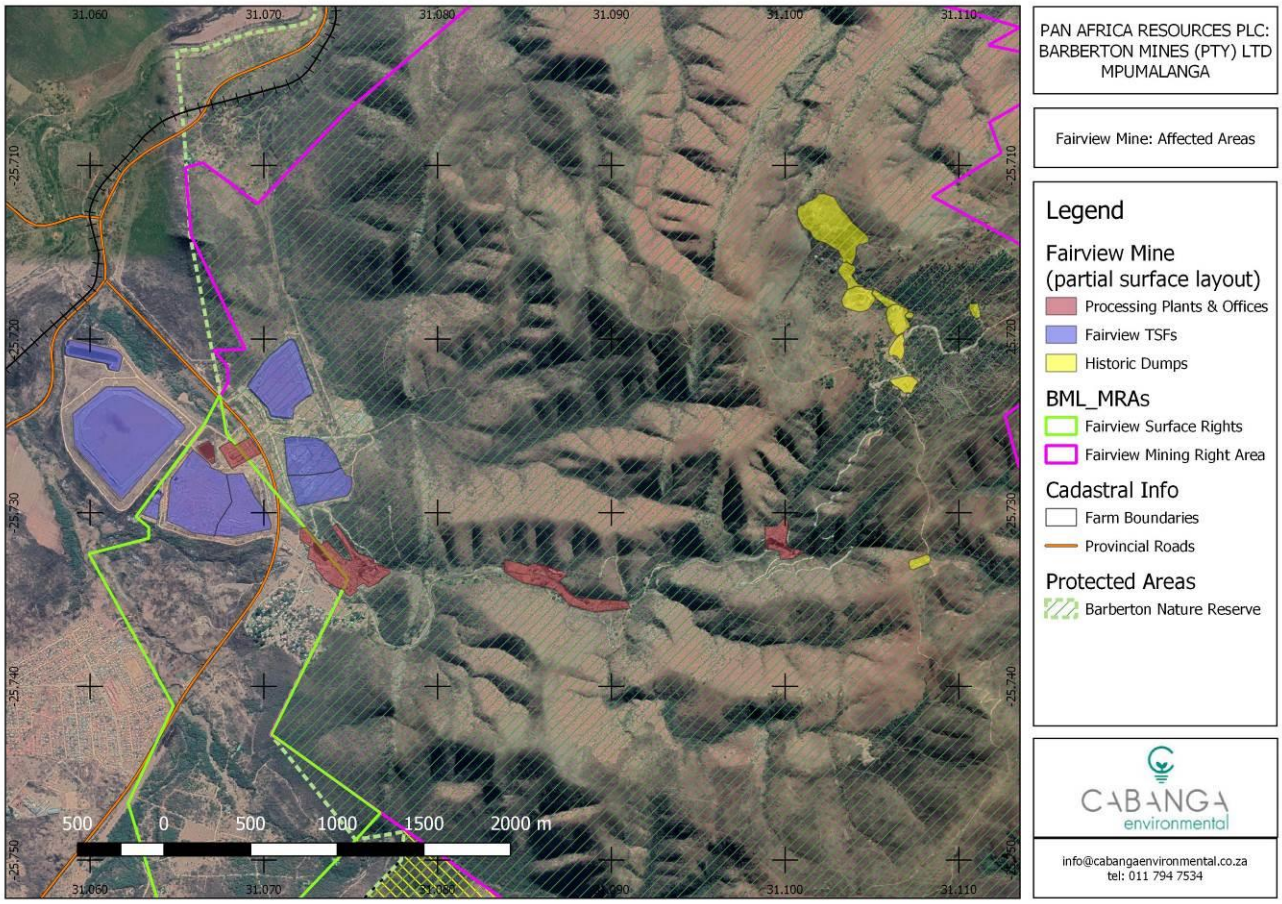


**Figure 3: Affected area (Cabanga Environmental).**

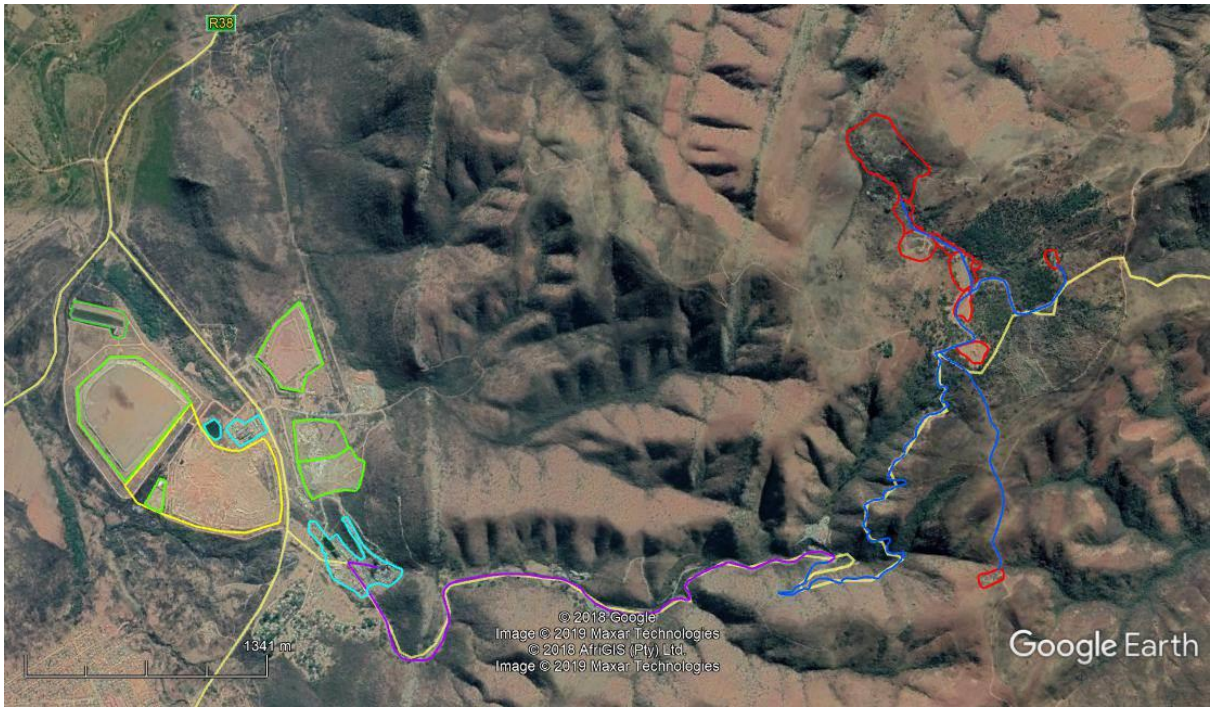


**Figure 4: Google Earth image indicating the affected areas including the roads (blue lines) that will be upgraded.**

## 2. TERMS OF REFERENCE

The Terms of Reference for the survey were to:

1. Identify objects, sites, occurrences and structures of an archaeological or historical nature (cultural heritage sites) located on the property (see Appendix A).

2. Study background information on the area to be affected by the Project.

3. Assess the significance of the cultural resources in terms of their archaeological, historical, scientific, social, religious, aesthetic and tourism value (see Appendix B).

4. Describe the possible impact of the proposed Project on these cultural remains, according to a standard set of conventions.

5. Recommend suitable mitigation measures to minimize possible negative impacts on the cultural resources by the proposed Project.

6. Review applicable legislative requirements.

## 3. CONDITIONS & ASSUMPTIONS

The following conditions and assumptions have a direct bearing on the survey and the resulting report:

1. Cultural Resources are all non-physical and physical man-made occurrences, as well as natural occurrences associated with human activity (Appendix A). These include all sites, structure and artifacts 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 artifacts 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 (see Appendix C).

4. The latitude and longitude of any archaeological or historical site or feature, is to be treated as sensitive information by the developer and should not be disclosed to members of the public[1].

5. All recommendations are made with full cognizance of the relevant legislation.

6. It has to 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 should make it clear how to handle any other finds that might occur. In this case there were certain areas where the vegetation cover was reasonably dense which had a negative effect on archaeological visibility.

## 4. LEGISLATIVE REQUIREMENTS

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) and the National Environmental Management Act (Act 107 of 1998).

[1] It is noted that this report will be made available for public review as part of the public participation process prescribed by the National Environmental Management Act, 1998 (Act No. 107 of 1998) and the Environmental Impact Assessment (EIA) Regulations, 2014 (as amended). The sites identified in this report are within the proclaimed boundaries of the Barberton Nature Reserve (BNR). The Mpumalanga Tourism and Parks Agency (MTPA) is responsible for the surface rights in this area while BML holds the Mining Rights in this area and it is recommended that these parties reach an agreement on the management of and access control to sites.

### 4.1 The National Heritage Resources Act

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

a. Archaeological artifacts, 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. Grave yards and graves older than 60 years
h. Meteorites and fossils
i. Objects, structures and sites of scientific or technological value.

The national estate (see Appendix D) 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 affected by a project as well as the possible impact of the proposed project/development thereon. An Archaeological Impact Assessment only looks at archaeological resources. The different phases during the HIA process are described in Appendix E. An HIA must be done under the following circumstances:

a. The construction of a 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 mentioned act 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;
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.

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.

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

### 4.2 The National Environmental Management Act

This act (Act 107 of 1998) states that a survey and evaluation of cultural resources must be done in areas where projects, that will change the face of the environment, will be undertaken. The impact of the project on these resources should be determined and proposals for the mitigation thereof made.

Environmental management should also take the cultural and social needs of people into account. 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.

## 5. THE INTERNATIONAL FINANCE CORPORATIONS' PERFORMANCE STANDARD FOR CULTURAL HERITAGE

This standard recognizes the importance of cultural heritage for current and future generations. It aims to ensure that developers protect cultural heritage in the course of their project activities.

This is done by developers abiding to the law and having heritage surveys done in order to identify and protect cultural heritage resources via field studies and the documentation of such resources. These need to be done by competent professionals (e.g. archaeologists and cultural historians). Possible chance finds, encountered during the project development, also needs to be managed by not disturbing it and by having it assessed by professionals.

Impacts on the cultural heritage should be minimized. This include the possible maintenance of such sites in situ, or when impossible, the restoration of the functionality of the cultural heritage in a different location. When cultural historical and archaeological artifacts and structures need to be removed this should be done by professionals and by abiding to the applicable legislation. The removal of cultural heritage resources may however only be considered if there are no technically or financially feasible alternatives. In considering the removal of cultural resources, it should be outweighed by the benefits of the overall project to the effected communities. Again, professionals should carry out the work and adhere to the best available techniques.

Consultation with affected communities should be engaged in. This entails that access to such communities should be granted to their cultural heritage if this is applicable. Compensation for the loss of cultural heritage should only be given in extra-ordinary circumstances.

Critical cultural heritage may not be impacted on. Professionals should be used to advise on the assessment and protection thereof. Utilization of cultural heritage resources should always be done in consultation with the affected communities in order to be consistent with their customs and traditions and to come to agreements with relation to possible equitable sharing of benefits from commercialization.

## 6. METHODOLOGY

### 6.1 Survey of literature

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

### 6.2 Reference to other specialist studies

A Palaeontological Impact Assessment and soil study have been commissioned. The information from these are not available yet.

On the existing SAHRA Database (SAHRIS) various heritage reports done in the wider Barberton area was noted. Four of these are specific to the Fairview Mine. Archaetnos has also done some work in Barberton (Archaetnos' database). Heritage features were identified in these reports and will be referred to below. One of the sites identified is directly linked to the current study area.

### 6.3 Public consultation and stakeholder engagement

General public consultation will be done by Cabanga Environmental. The various specialist reports will be utilized for this purpose.

### 6.4 Field survey

The survey was conducted according to generally accepted HIA practices and was aimed at locating all possible objects, sites and features of cultural significance in the area that may be affected by the proposed projects. One regularly looks a bit wider than the demarcated area, as the surrounding context needs to be taken into consideration.

If required, the location/position of any site was determined by means of a Global Positioning System (GPS)[2], while photographs were also taken where needed. The survey was 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 (Figure 5).

Certain factors, such as accessibility, density of vegetation, etc. may however influence the coverage. The size of the area that will be impacted is as follows: TSF – approximately 35 Ha; Road – approximately 5 km; Mine dumps – approximately 15 Ha. The survey took twelve hours to complete.

### 6.5 Documentation

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.

### 6.6 Evaluation of Heritage sites

The evaluation of heritage sites is done by giving a field rating of each (see Appendix C) 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

[2] A Garmin Oregon 550 with an accuracy factor of a few meters.

• 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.

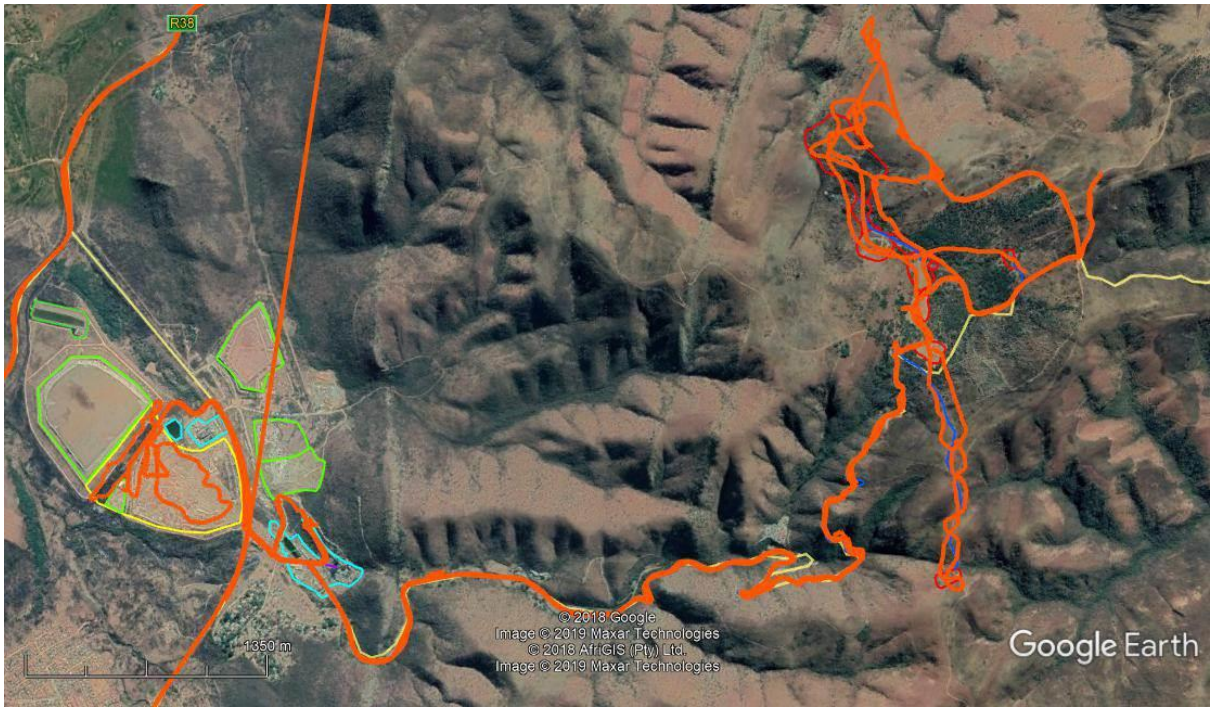


**Figure 5: GPS track of the surveyed area. North reference is to the top.**

## 7. DESCRIPTION OF NATURAL ENVIRONMENT

The surveyed area can be divided into three. Firstly, there is the proposed tailings dam area, which is entirely disturbed. It consists of an existing TSF, which is being reclaimed (Figure 6) and a small stretch with natural vegetation where disturbance is also visible. In this section the vegetation is reasonably dense in certain sections, but with open patches in between (Figure 7). The topography here is reasonably flat.

The second area is the road leading up to the third. This is an existing road, which will merely be upgraded. It runs along the very steep sides of the mountain and is entirely disturbed, since it is an existing road (Figure 8-9). The topography here is steep.

The third is the different areas that will be reclaimed for mining purposes. These are either within the valleys or against the very steep slopes of the mountains (Figure 10) As these are were formerly mined it also is disturbed areas. Vegetation cover is low against the slopes (Figure 11), but denser within the valleys. Disturbance mainly consist of roads, former mining excavations (Figure 12) and building ruins. The topography of the area is steep, falling rapidly towards the valleys where water courses are located.

**Figure 6: General view of TSF being reclaimed.**

**Figure 7: General view at the area where the TSF is proposed.**

**Figure 8: Section of road that will be upgraded.**

**Figure 9: Another section of the road to be upgraded.**

**Figure 10: General view of the environment with high mountains.**

**Figure 11: View of vegetation in the mountainous area.**

**Figure 12: View of old mining excavation in the surveyed area.**

## 8. HISTORICAL CONTEXT

Eight sites of cultural heritage significance were located, three of which were inside of the surveyed area and the others very close thereto. In order to enable the reader to better understand the historical landscape, it is necessary to give a background regarding the different phases of human history. The larger environment has a long history which needs to be understood.

It also needs to be indicated that there are many declared heritage sites in the town of Barberton, all of these being historical buildings. No sites within the area of the Fairview Mine have been declared.

The Barberton Makhonjwa Mountain Land is however formally recognized as a World Heritage Site (WHS) and the specific land areas include all formally proclaimed Protected Areas within the general Barberton Mountain Land region, which includes four major nature reserves and several other minor ones, including the Barberton Provincial Nature Reserve (Figure 13). The impact on the WHS will however be minimal, if any, since the development is in already disturbed areas, the physical manifestation of the development is low key and there are a number of hills between the WHS and the locations of impact.

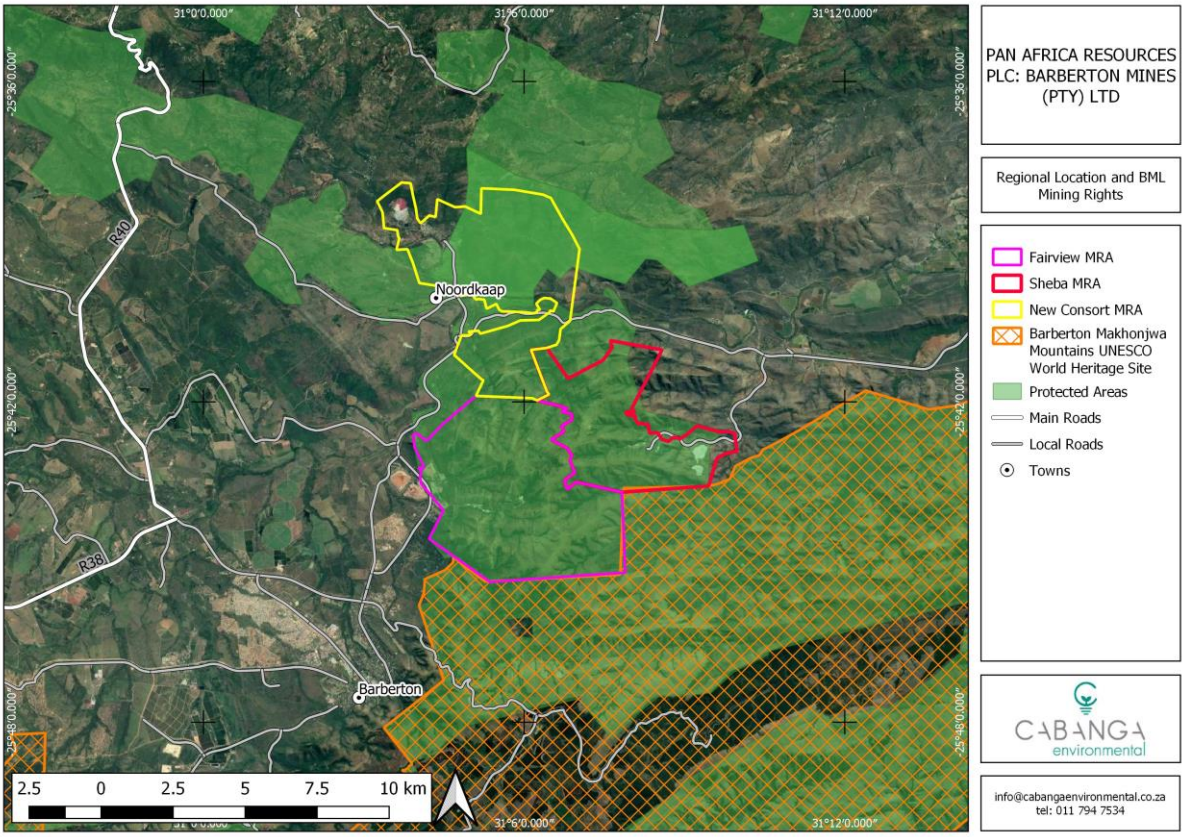


**Figure 13: Location of the mine in relation to the WHS.**

### 8.1 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: 93-94) 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.

The closest known Early and Middle Stone Age site to the project area is one called Border Cave in Swaziland (Mitchell 2002: 61, 73). This however is not in close vicinity. Another Middle Stone Age site is that of Lion Cavern to the south-west of the surveyed area (Mitchell 2002: 73). Late Stone Age sites were found very close to Barberton. These are called Bornmansdrif, Sweet Home and Kearnsney Estates (Bergh 1999: 4). Others were also found at Siphiso and Caimane in Swaziland (Mitchell 2002: 127, 162). Middle and Late Stone Age tools have been identified in Rimers Creek, Barberton during a heritage survey (Van Vollenhoven 2015:23-24).

Many rock art sites are known from around Barberton and Swaziland (Bergh 1999: 5; Mitchell 2002: 193). Smith & Zubieta (2007: 36) indicates no rock art sites in the Komati River Valley. No natural shelters were seen during the survey, but such shelters are most likely to be found in the surrounding area.

The relative few indications of Stone Age occurrences in the wider Barberton environment, probably only indicates a lack of research in the area as well as the fact that there is no comprehensive data base on the prehistory of southern Africa. From the above mentioned it is however clear that the surveyed area definitely is suitable for human occupation. The close vicinity of water sources and ample grazing would have made it a prime spot for hunting and obtaining water during the past. Therefore one may assume that Stone Age people probably would have lived in and utilized the area.

### 8.2 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 now seem to be 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.

The closest Early Iron Age site to the surveyed area is one at Plaston to the north of Nelspruit. This is more than 60 km from the surveyed site (Bergh 1999: 6). Another site has been excavated close to Nelspruit (Esterhuysen & Smith 2007: 12). One however needs to take note that not many Early Iron Age sites have been identified thus far in South Africa.

Bergh (1999: 7) also indicates that many Late Iron Age sites were identified around Badplaas to the west of Barberton. It is also indicated that during the Iron Age iron was worked to the south and east of the surveyed area (Bergh 1999: 8).

One of the early trade routes passed through Barberton from Maputo. A few others went through Sabie Poort and one through the Komati Poort, both to the north-east of where the survey was done (Bergh 1999: 9).

No Iron Age material was identified during the survey. The steepness of the valley most likely made it a difficult area to inhabit, but homesteads may have been located higher or lower down the mountains. The good grazing and access to water in the area would have provided a good environment for Iron Age people. The lack of

knowledge about the Iron Age in the vicinity of Barberton may only indicate a lack of research in the area. In fact, Van Schalkwyk (2011) did identify a LIA site where the TSF is currently located. This site was mitigated by Pelser (2012) and subsequently destroyed.

### 8.3 Historical Age

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 area sometimes is also called the recent historical past. Therefore and because less time has passed, much more cultural heritage resources from this era 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. Factors to be considered include aesthetic, scientific, cultural and religious value of such resources.

At the beginning of the 19th century the area to the north of current day Swaziland and Barberton was also inhabited by the Swazi (Eloff et.al. 2007: 63; Bergh 1999: 10; Bornman 1994: 2-6). During the Difaquane (1823-1837) the Swazi moved further inland as a result of land becoming available (Bergh 1999: 11). This indicates that historical Iron Age people probably utilized this environment in the past.

A historical report on Fairview was written for Archaetnos by Past Matters in 2012. According to this source, in 1905, the British authorities in South Africa commissioned a book from its War Office, in which information on the black tribes in Transvaal would be recorded for military purposes. In the book, tribes were grouped according to the administrative divisions in which they were found. The bulk of the Swazi people found lived in the district of Barberton, where they are said to have settled in about the year 1865. This settlement took place after the “wholesale killingoff” which took place on the death of the Swazi chief Umswazi. Apparently the British had found the area practically uninhabited, as the Swazis under chief Sobhuza, had exterminated the Basuto tribe that used to live in the area some years before (Massie 1905: 14, 85).

As the area is a malaria stricken one, during the nineteenth and early twentieth century, pastoralists would have preferred to avoid the moist low-lying valleys and thickly wooded regions where these insects preferred to congregate (Shillington 1995: 32). It is thus unlikely that populations would be dense in these areas. It was only after the Rinderpest broke out in 1897, that pastoralists could move into the area (Myburgh 1956: 7).

The first early travelers never reached the Barberton area and neither did the Voortrekkers (Bergh 1999: 12-14). White farmers only settled here after 1845, but this was to the north of the Crocodile River (Bergh 1999: 16, 130). This area was traded from the Swazi in 1846 but excluded modern day Barberton (Bergh 1999:16-17). The Komati River then was the border between the Swazi’s and the South African Republic (ZAR). The land between the Crocodile and Komati Rivers however

stayed government land. The permanent settlement of white people here soon followed.

Gold was discovered in the De Kaap valley in 1874. This resulted in many prospectors coming to the area. The first white settlement here was at Jamestown in 1883, at the Noordkaap River. Gold was only discovered in Barberton in 1884 (Bornman 1994: 11-14) and the town of Barberton was proclaimed roundabout 1885. The area became a district in 1902 (Bergh 1999: 20, 22, 144). Rimer's Creek is closely associated with the discovery of gold in Barberton. The lower section, which today forms part of the town, hosts many historical buildings as well as the first stamp battery called the Central Mill, which was an ore crusher (Küsel 2009: 6).

In 1885 the so-called Golden Quarry was discovered by Edward Bray. This was the start of the Royal Sheba Mine (Bornman 1994: 16-17). Gold Mines in the area have flourished ever since and four operational Gold Mines remain in the Barberton area today, that have been operational for over 100 years (including Sheba, the oldest mine, New Consort, Fairview and Agnes Gold Mines) (Anhaeusser 1969: 5-13).

Due to the remoteness of the area it was difficult to transport ore and thus it was decided to build a railway between Sheba and the Kaap River. Construction started in January 1889 and the locomotive was running between the Oriental Battery and Charlestown by 18 June of that year. It was finally completed on 29 January 1899.[3] In 1897 the rail was electrified. It was decommissioned in 1912. The Sheba mine was closed for a period of ten years between 1927 and 1937 during which time the railway was also not in use and the railway stock sold (Jux & Middleton 2013: 2-7).

The first newspaper in the vicinity, the Barberton Herald saw the light in 1886. The first post office was also opened, and Eureka City was established in the Barberton region. Eureka City is the historical site of various components, including a butchery, hotel, three shops, a chemist and a racecourse. It was originally established by J Sherwood to serve the miners near Sheba Mine (Bornman 1994: 18). Only the ruin of the hotel remains on the site today. The Sheba Gold Mining Company, who worked the Golden Quarry ore-body, was also established in 1886 (Anhaeusser 1969: 5-13).

The first mill in the Sheba Hills was on Fever Creek. This was a 10-stamp stream battery and was capable of crushing 12 to 14 tons per day. A 20-stamp mill was later established. However, water supply was insufficient, and thus the majority of milling was undertaken along the Fig Tree Creek at Charlestown. This was situated between the Royal Sheba Mine and the old Sheba Cemetery. When the water supply at Charlestown eventually dried up, milling was moved to the De Kaap River at Avoca (Anhaeusser 1969: 5-13).

Mining at the Fairview Mine area started in 1886 as a number of small operations. All the viable gold mines in the Sheba Valley were eventually acquired by Eastern Transvaal Consolidated Mines Limited in 1937. By 1953 the company had also taken over the Golden Quarry. The New Consort area consisted of several small workings

[3] It is believed this date should be 29 January 1890 as sub-sections added to the track were done before 1899.

which were eventually consolidated into what was to become known as New Consort Mine. This mine was acquired by Eastern Transvaal Consolidated Mines Limited (ETC) in 1933, and in 1948 ETC became a member of the Anglovaal Group (https://lowvelder.co.za/feat/barberton-mines/).

The mining at Fairview continued intermittently until 1955 when they were consolidated under Federale Mynbou. In 1988 ETC acquired the Fairview Mine. In 2003 the ETC operations consisting of Fairview, New Consort and Sheba was bought by Metorex (Pty) Ltd and Millennium Consolidated Investments. Barberton Mines now owns and operates these mines. Barberton Mines was owned and operated by Pan African Resources (PAR) and Shanduka since 2009 (https://lowvelder.co.za/feat/barberton-mines/) and is presently held by PAR.

Barberton also saw action during the Anglo-Boer War (1899-1902). The Boers had a large camp here at the start of the War. Here Boer women and children were housed, but the town was invaded by the British in September 1900. They changed the burger camp to a large concentration camp (Bornman 1994: 27; Bergh 1999: 51, 54).

Five blockhouses were erected by the British around Barberton (Bornman 1994: 28). This was to safeguard the town from Boer attacks. Only one of these survived and can be seen close to Rimer's Creek. During a survey of blockhouses it was regarded as being one of the unique examples from this time period, therefore increasing its heritage significance (Van Vollenhoven & Van den Bos 1997). The remains of a blockhouse on East Hill has also been identified recently (Van Vollenhoven & Morris 2017: 17).

Other known historical buildings in Barberton are Fernlea House, the Cockney Liz Hotel, old Cinema House, the De Kaap Stock Exchange (the first Gold Exchange built in South Africa, opened in 1877), Belhaven House, Masonic Temple, Lewis and Marks Building, Phoenix Hotel and Stopforth House (Küsel 2009: 10-12; Miller 2010: 4-20). Many of these were mentioned in heritage reports found in the SAHRIS database of SAHRA.

One may therefore expect to find farm and mining buildings, structures and objects from this period in time in the area. Graves may also be found isolated in the veldt, but it is known that the Fairview Mine had specific cemeteries for white and black people. This is similar to the Sheba Mine, where during a recent heritage survey Pelser and Rowe (2018: 12) did find such features. One should therefore be on the lookout for indications of such features during construction activities.

## 9. DISCUSSION OF SITES FOUND DURING THE SURVEY

Eight sites of cultural heritage importance were identified (Figure 14-15). These all date to the Historical Age. As indicated above, three of these are inside of the project area, with five very close thereto.

It needs to be mentioned that the mine dumps proposed for reclamation are all older than 60 years and thus are protected under the National Heritage Act (25 of 1999). However, apart from its age it has no heritage significance and will therefore merely receive a field rating of low heritage significance. The dumps by itself therefore does not warrant any specific heritage intervention. Although the dumps may have limited heritage significance, specific features within it, may have a higher rating. Such features identified, are discussed below.

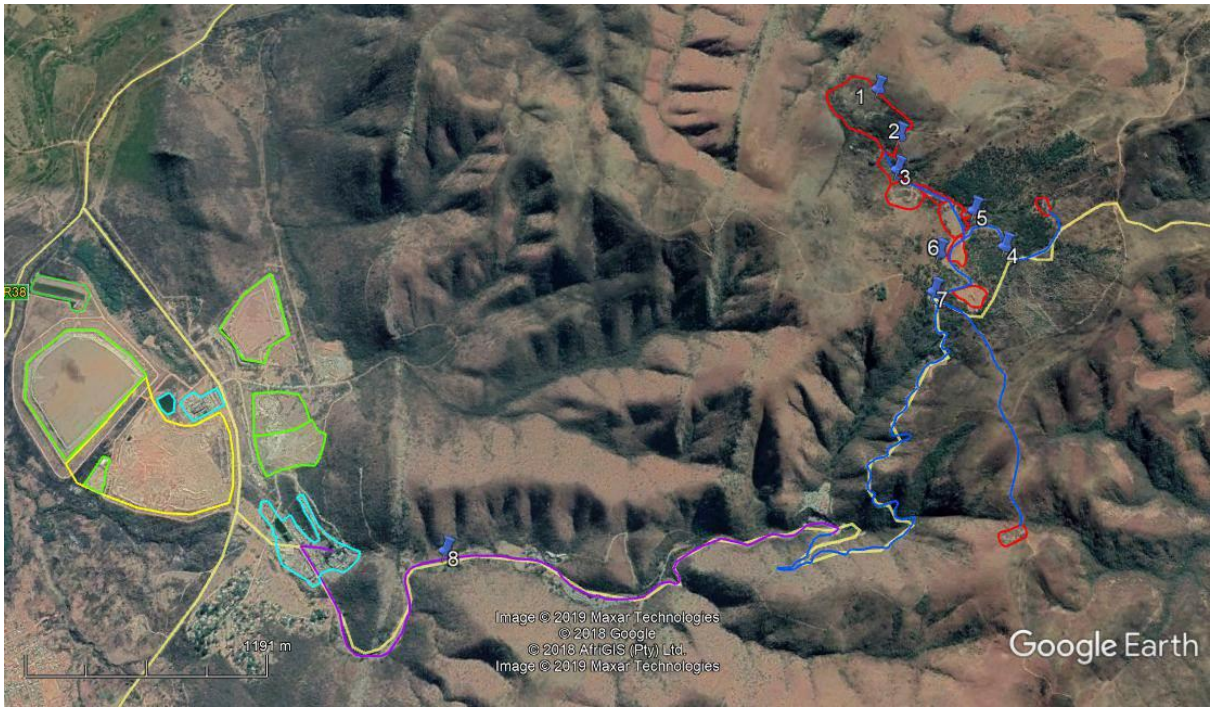


**Figure 14: Location of all the sites identified in relation to the entire project area.**


**Figure 15: Zoomed-in image showing the sites identified.**

### 9.1 Site no. 1 – grave yard

This is a site containing at least 17 graves (Figure 16). These are all stone packed without any information although they all have stone headstones. It probably is the graves of mine workers.

Therefore only one of the three categories of graves are present, being unknown (meaning without a date of death) graves. These are handled similarly to those older than 60 years (heritage graves).

GPS: 25°42’44.94”S
31°06’12.09”E – this lies approximately 10 m from one of the proposed reclamation mining areas.

**Figure 16: The graves at site no. 1.**

**Cultural significance Table:**

| **A place is considered to be part of the national estate if it has cultural significance because of -** | **Applicable or not** | **Rating:**<br>**1 - Negligible/ 2 -Low/**<br>**3 - Low-Medium/ 4 - Medium/ 5 - Medium-High/ 6 - High/ 7 - Very High** |
|---|---|---|
| Its importance in the community or pattern of South Africa's history | Y | H |
| Its possession of uncommon, rare, or endangered aspects of South Africa's natural or cultural history | Y | H |
| Its potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage | Y | M |
| Its importance in demonstrating the principal characteristics of a particular class of South Africa's natural or cultural places or objects | Y | H |
| Its importance in exhibiting particular aesthetic characteristics valued by a community cultural group | N | - |
| Its importance in demonstrating a high degree of creative or technical achievement at a | N | - |

| | | |
|---|---|---|
| particular period | | |
| Its strong or special association with a particular community or cultural group for social, cultural or spiritual reasons | Y | H |
| Its strong or special association with the life or work of a person, group or organization of importance in the history of South Africa | N | - |
| Sites of significance relating to the history of slavery in South Africa | N | - |
| **Reasoned assessment of significance using appropriate indicators outlined above:** | | 5,6 – High |

**Integrity scale:**
1 – Bad state of preservation, but no contextual information
2 – Bad state of preservation and includes contextual information
3 – Reasonable state of preservation, but no contextual information
4 – Reasonable state of preservation and includes contextual information
5 – Good state of preservation, but no contextual information
6 - Good state of preservation and includes contextual information
7 – Excellent state of preservation, but no contextual information
8 – Excellent state of preservation and includes contextual information

**Field-rating = Cultural significance x Integrity**
= 5,6 (High) x 5
= 28

The site receives a field rating of Local Grade IIIB. It 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.

Two possibilities exist. The first option would be to fence the graves in and have a management plan drafted for the sustainable preservation thereof. 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 and relocate the mortal remains. 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 are needed. Permits should be obtained from the Burial Grounds and Graves unit of SAHRA. This procedure is quite lengthy.

**It is recommended that Option 1 be implemented since there will be indirect impact only.**

### 9.2 Site no. 6 – grave yard

This is a site containing at least 18 graves (Figure 17). Some graves are stone packed, and some have cement dressing. The graves mostly have headstones, but in some cases the information is illegible. Headstones are made of stone, granite, marble and slate. One of the headstones is a commemorative stone in memory of three people who died when the Drummond Castle sank in 1896.

The graves are all either unknown, or older than 60 years (the oldest date identified is 1884). Thus two of the three categories of graves are present, being unknown (meaning without a date of death) graves and heritage graves. Unknown graves are handled similarly to those older than 60 years (heritage graves). Some of the surnames identified are Sherwood, Rae, Master and Bruce.

GPS: 25°43’20.87”S
31°06’18.73”E – this lies next to the road to be upgraded.

**Figure 17: The graves at site no. 6.**

**Cultural significance Table:**

| **A place is considered to be part of the national estate if it has cultural significance because of -** | **Applicable or not** | **Rating:**<br>**1 - Negligible/ 2 -Low/**<br>**3 - Low-Medium/ 4 - Medium/ 5 - Medium-High/ 6 - High/ 7 - Very High** |
|---|---|---|
| Its importance in the community or pattern of South Africa's history | Y | H |
| Its possession of uncommon, rare, or endangered aspects of South Africa's natural or cultural history | Y | H |
| Its potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage | Y | M |
| Its importance in demonstrating the principal characteristics of a particular class of South Africa's natural or cultural places or objects | Y | H |
| Its importance in exhibiting particular aesthetic characteristics valued by a community cultural group | N | - |
| Its importance in demonstrating a high degree of creative or technical achievement at a particular period | N | - |
| Its strong or special association with a particular community or cultural group for social, cultural or spiritual reasons | Y | H |
| Its strong or special association with the life or work of a person, group or organization of importance in the history of South Africa | N | - |
| Sites of significance relating to the history of slavery in South Africa | N | - |
| **Reasoned assessment of significance using appropriate indicators outlined above:** | | 5,6 – High |

**Integrity scale:**

1 – Bad state of preservation, but no contextual information
2 – Bad state of preservation and includes contextual information
3 – Reasonable state of preservation, but no contextual information

4 – Reasonable state of preservation and includes contextual information
5 – Good state of preservation, but no contextual information
6 - Good state of preservation and includes contextual information
7 – Excellent state of preservation, but no contextual information
8 – Excellent state of preservation and includes contextual information

**Field-rating = Cultural significance x Integrity**
= 5,6 (High) x 6
= 33,6

The site receives a field rating of Local Grade IIIA. The site should be included in the heritage register and not be mitigated (high significance), should be maintained in situ with a protected buffer zone and a Cultural Management Plan (CMP) must be recommended.

Thus, option 1 regarding graves is recommended. This is to fence the graves in and have a management plan drafted for the sustainable preservation thereof. This should be written by a heritage expert.

**It is recommended that Option 1 be implemented as there will be secondary impact on the graves.**

### 9.3 Site no. 8 – large grave yard

This is a site containing at least 186 graves (Figure 18-19). These are mostly stone packed without any information although many have stone headstones. A few have cement or granite dressings and slate, cement or granite headstones. It probably is the graves of mine workers.

Only one grave has legible information. It shows the surname Mseko and the date of death as 1976. Therefore, two of the three categories of graves are present, being those younger than 60 years and unknown graves (meaning without a date of death) graves. The latter are handled similarly to those older than 60 years (heritage graves).

GPS: 25°43’59.85”S
31°04’53.54”E – it lies right next to the tarred section of road, which will therefore not be upgraded.

**Figure 18: The graves at site no. 8.**


**Figure 19: The only marked grave at site no. 8.**

**Cultural significance Table:**

| **A place is considered to be part of the national estate if it has cultural significance because of -** | **Applicable or not** | **Rating:**<br>**1 - Negligible/ 2 -Low/**<br>**3 - Low-Medium/ 4 - Medium/ 5 - Medium-High/ 6 - High/ 7 - Very High** |
|---|---|---|
| Its importance in the community or pattern of South Africa's history | Y | H |
| Its possession of uncommon, rare, or endangered aspects of South Africa's natural or cultural history | Y | H |
| Its potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage | Y | M |
| Its importance in demonstrating the principal characteristics of a particular class of South Africa's natural or cultural places or objects | Y | H |
| Its importance in exhibiting particular aesthetic characteristics valued by a community cultural group | N | - |
| Its importance in demonstrating a high degree of creative or technical achievement at a particular period | N | - |
| Its strong or special association with a particular community or cultural group for social, cultural or spiritual reasons | Y | H |
| Its strong or special association with the life or work of a person, group or organization of importance in the history of South Africa | N | - |
| Sites of significance relating to the history of slavery in South Africa | N | - |
| **Reasoned assessment of significance using appropriate indicators outlined above:** | | 5,6 – High |

**Integrity scale:**

1 – Bad state of preservation, but no contextual information
2 – Bad state of preservation and includes contextual information
3 – Reasonable state of preservation, but no contextual information

4 – Reasonable state of preservation and includes contextual information
5 – Good state of preservation, but no contextual information
6 - Good state of preservation and includes contextual information
7 – Excellent state of preservation, but no contextual information
8 – Excellent state of preservation and includes contextual information

**Field-rating = Cultural significance x Integrity**
= 5,6 (High) x 5
= 28

The site receives a field rating of Local Grade IIIB. It 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.

Two possibilities exist. The first option would be to fence the graves in and have a management plan drafted for the sustainable preservation thereof. 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 in close proximity to the heritage resource.

The second option is to exhume and relocate the mortal remains. This usually is done when the graves are in the area to be directly affected by the mine's 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 are needed. Permits should be obtained from the Burial Grounds and Graves unit of SAHRA. This procedure is quite lengthy.

**It is recommended that Option 1 be implemented to ensure sustaiable preservation of the site.**

### 9.4 Site no. 2 – ruin of stone building

This is the ruin of a rectangular stone building with walls of 4 m long and approximately 1 m high (Figure 20). It has an entrance on the western side. It could be an old house used by a miner during the very first mining era on site.

GPS: 25°42'53.55"S
31°06'15.30"E – this is about 20 m outside of one of the reclamation mining areas.

**Figure 20: Ruin of stone building.**

**Cultural significance Table:**

| **A place is considered to be part of the national estate if it has cultural significance because of -** | **Applicable or not** | **Rating:**<br>**1 - Negligible/ 2 -Low/**<br>**3 - Low-Medium/ 4 - Medium/**<br>**5 - Medium-High/ 6 - High/**<br>**7 - Very High** |
|---|---|---|
| Its importance in the community or pattern of South Africa's history | Y | MH |
| Its possession of uncommon, rare, or endangered aspects of South Africa's natural or cultural history | Y | L |
| Its potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage | Y | MH |
| Its importance in demonstrating the principal characteristics of a particular class of South Africa's natural or cultural places or objects | Y | M |
| Its importance in exhibiting particular aesthetic characteristics valued by a community cultural group | N | - |
| Its importance in demonstrating a high degree of creative or | N | - |

| | | |
|---|---|---|
| technical achievement at a particular period | | |
| Its strong or special association with a particular community or cultural group for social, cultural or spiritual reasons | N | - |
| Its strong or special association with the life or work of a person, group or organization of importance in the history of South Africa | Y | M |
| Sites of significance relating to the history of slavery in South Africa | N | - |
| **Reasoned assessment of significance using appropriate indicators outlined above:** | | 4 – Medium |

**Integrity scale:**
1 – Bad state of preservation, but no contextual information
2 – Bad state of preservation and includes contextual information
3 – Reasonable state of preservation, but no contextual information
4 – Reasonable state of preservation and includes contextual information
5 – Good state of preservation, but no contextual information
6 - Good state of preservation and includes contextual information
7 – Excellent state of preservation, but no contextual information
8 – Excellent state of preservation and includes contextual information

**Field-rating = Cultural significance x Integrity**
= 4 (Medium) x 3
= 12

The field rating for the site 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.

**Since the site falls outside of the project area, it should merely be left as it is, but the mine needs to ensure that it is not impacted on.**

### 9.5 Site no. 3 – old mining plant

This is the remains of an old mine shaft and probably related to the earlier mining at Fairview during the 1950's-1970s (Figure 21). It consists of the ruins of various buildings, but the vegetation in the area is very dense making further identification difficult.

GPS: 25°42'59.40"S
31°06'14.63"E

**Figure 21: Some of the buildings and structures at site no. 3.**

**Cultural significance Table:**

| **A place is considered to be part of the national estate if it has cultural significance because of -** | **Applicable or not** | **Rating:**<br>**1 - Negligible/ 2 -Low/**<br>**3 - Low-Medium/ 4 - Medium/**<br>**5 - Medium-High/ 6 - High/**<br>**7 - Very High** |
|---|---|---|
| Its importance in the community or pattern of South Africa's history | Y | M-H |
| Its possession of uncommon, rare, or endangered aspects of South Africa's natural or cultural history | Y | M |
| Its potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage | Y | L-M |
| Its importance in demonstrating the principal characteristics of a particular class of South Africa's natural or cultural places or objects | Y | L |
| Its importance in exhibiting particular aesthetic characteristics valued by a community cultural group | N | - |
| Its importance in demonstrating a high degree of creative or | Y | M-H |

| | | |
|---|---|---|
| technical achievement at a particular period | | |
| Its strong or special association with a particular community or cultural group for social, cultural or spiritual reasons | N | - |
| Its strong or special association with the life or work of a person, group or organization of importance in the history of South Africa | Y | L-M |
| Sites of significance relating to the history of slavery in South Africa | N | - |
| **Reasoned assessment of significance using appropriate indicators outlined above:** | | 3,66 – Medium |

**Integrity scale:**
1 – Bad state of preservation, but no contextual information
2 – Bad state of preservation and includes contextual information
3 – Reasonable state of preservation, but no contextual information
4 – Reasonable state of preservation and includes contextual information
5 – Good state of preservation, but no contextual information
6 - Good state of preservation and includes contextual information
7 – Excellent state of preservation, but no contextual information
8 – Excellent state of preservation and includes contextual information

**Field-rating = Cultural significance x Integrity**
= 3,66 (Medium) x 2
= 7,33

The field rating for the site is Local Grade IIIB. It 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.

**The site may thus be demolished, but it should be documented first by mapping and photographs.**

### 9.6 Site no. 4 – house ruin

This is the ruin of a house with sides of approximately 12 x 12 m and at least five rooms (Figure 22). It is built from brick and concrete. It probably was used as accommodation during the mining period of the 1950's -1970's.

GPS: 25°43'13.19"S
31°06'32.06"E – it is next to the road that will be upgraded.

**Figure 22: House ruin – site no. 4.**

**Cultural significance Table:**

| **A place is considered to be part of the national estate if it has cultural significance because of -** | **Applicable or not** | **Rating:**<br>**1 - Negligible/ 2 -Low/**<br>**3 - Low-Medium/ 4 - Medium/**<br>**5 - Medium-High/ 6 - High/**<br>**7 - Very High** |
|---|---|---|
| Its importance in the community or pattern of South Africa's history | Y | L |
| Its possession of uncommon, rare, or endangered aspects of South Africa's natural or cultural history | N | - |
| Its potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage | N | - |
| Its importance in demonstrating the principal characteristics of a particular class of South Africa's natural or cultural places or objects | Y | L |
| Its importance in exhibiting particular aesthetic characteristics valued by a community cultural group | N | - |
| Its importance in demonstrating a high degree of creative or | N | - |

| | | |
|---|---|---|
| technical achievement at a particular period | | |
| Its strong or special association with a particular community or cultural group for social, cultural or spiritual reasons | N | - |
| Its strong or special association with the life or work of a person, group or organization of importance in the history of South Africa | Y | L |
| Sites of significance relating to the history of slavery in South Africa | N | - |
| **Reasoned assessment of significance using appropriate indicators outlined above:** | | 2 – Low |

**Integrity scale:**
1 – Bad state of preservation, but no contextual information
2 – Bad state of preservation and includes contextual information
3 – Reasonable state of preservation, but no contextual information
4 – Reasonable state of preservation and includes contextual information
5 – Good state of preservation, but no contextual information
6 - Good state of preservation and includes contextual information
7 – Excellent state of preservation, but no contextual information
8 – Excellent state of preservation and includes contextual information

**Field-rating = Cultural significance x Integrity**
= 2 (Low) x 1
= 2

The field rating for the site is Local Grade IIIC. The description in this phase 1 heritage report is seen as sufficient recording (low significance) 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.

**The site may thus be demolished after obtaining permission form the heritage authority.**

### 9.7 Site no. 5 – small building (possible magazines room)

The site consists of a small building of about 3 x 2 m with concrete build walls and a corrugated iron roof (Figure 23). It also is likely associated with site no. 3 and may have been the magazines room for the mine/ one of the past mining operations.

GPS: 25°43’06.80”S
31°06’27.53”E

**Figure 23: Possible magazines room.**

**Cultural significance Table:**

| **A place is considered to be part of the national estate if it has cultural significance because of -** | **Applicable or not** | **Rating:**<br>**1 - Negligible/ 2 -Low/**<br>**3 - Low-Medium/ 4 - Medium/**<br>**5 - Medium-High/ 6 - High/**<br>**7 - Very High** |
|---|---|---|
| Its importance in the community or pattern of South Africa's history | Y | M-H |
| Its possession of uncommon, rare, or endangered aspects of South Africa's natural or cultural history | Y | M |
| Its potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage | Y | L-M |
| Its importance in demonstrating the principal characteristics of a particular class of South Africa's natural or cultural places or objects | Y | L |
| Its importance in exhibiting particular aesthetic characteristics valued by a community cultural group | N | - |
| Its importance in demonstrating a high degree of creative or | Y | M-H |

| | | |
|---|---|---|
| technical achievement at a particular period | | |
| Its strong or special association with a particular community or cultural group for social, cultural or spiritual reasons | N | - |
| Its strong or special association with the life or work of a person, group or organization of importance in the history of South Africa | Y | L-M |
| Sites of significance relating to the history of slavery in South Africa | N | - |
| **Reasoned assessment of significance using appropriate indicators outlined above:** | | 3,66 – Medium |

**Integrity scale:**
1 – Bad state of preservation, but no contextual information
2 – Bad state of preservation and includes contextual information
3 – Reasonable state of preservation, but no contextual information
4 – Reasonable state of preservation and includes contextual information
5 – Good state of preservation, but no contextual information
6 - Good state of preservation and includes contextual information
7 – Excellent state of preservation, but no contextual information
8 – Excellent state of preservation and includes contextual information

**Field-rating = Cultural significance x Integrity**
= 3,66 (Medium) x 2
= 7,33

The field rating for the site is Local Grade IIIB. It 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.

**The site may thus be demolished, but it should be documented first by mapping and photographs.**

### 9.8 Site no. 7 – house ruin

This is the ruin of a house with sides of approximately 10 x 6 m and at least two rooms (Figure 24). It is built from brick and concrete. It probably was used as accommodation during the mining period of the 1950's -1970's.

GPS: 25°43'14.29"S
31°06'20.27"E – it is next to the road that will be upgraded.

**Figure 24: House ruin – site no. 6.**

**Cultural significance Table:**

| **A place is considered to be part of the national estate if it has cultural significance because of -** | **Applicable or not** | **Rating:**<br>**1 - Negligible/ 2 -Low/**<br>**3 - Low-Medium/ 4 - Medium/**<br>**5 - Medium-High/ 6 - High/**<br>**7 - Very High** |
|---|---|---|
| Its importance in the community or pattern of South Africa's history | Y | L |
| Its possession of uncommon, rare, or endangered aspects of South Africa's natural or cultural history | N | - |
| Its potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage | N | - |
| Its importance in demonstrating the principal characteristics of a particular class of South Africa's natural or cultural places or objects | Y | L |
| Its importance in exhibiting particular aesthetic characteristics valued by a community cultural group | N | - |
| Its importance in demonstrating a high degree of creative or | N | - |

| | | |
|---|---|---|
| technical achievement at a particular period | | |
| Its strong or special association with a particular community or cultural group for social, cultural or spiritual reasons | N | - |
| Its strong or special association with the life or work of a person, group or organization of importance in the history of South Africa | Y | L |
| Sites of significance relating to the history of slavery in South Africa | N | - |
| **Reasoned assessment of significance using appropriate indicators outlined above:** | | 2 – Low |

**Integrity scale:**
1 – Bad state of preservation, but no contextual information
2 – Bad state of preservation and includes contextual information
3 – Reasonable state of preservation, but no contextual information
4 – Reasonable state of preservation and includes contextual information
5 – Good state of preservation, but no contextual information
6 - Good state of preservation and includes contextual information
7 – Excellent state of preservation, but no contextual information
8 – Excellent state of preservation and includes contextual information

**Field-rating = Cultural significance x Integrity**
= 2 (Low) x 1
= 2

The field rating for the site is Local Grade IIIC. The description in this phase 1 heritage report is seen as sufficient recording (low significance) 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.

**The site may thus be demolished after obtaining permission form the heritage authority.**

## 10. CONCLUSION & RECOMMENDATIONS

As indicated, 8 sites of cultural heritage significance were located during the survey of which 3 (no. 2, 3 and 5) are in the surveyed area. The other 5 sites (1, 4, 6, 7 and 8) are however very close thereto. The survey of the indicated area was completed successfully.

However, apart from sites identified outside of the project area, there are definitely more heritage sites further away, and these would ideally need to be assessed in comparison with the identified sites. This may have an effect on final evaluations.

Also the age of the mine dumps proposed for reclamation are all older than 60 years and thus are protected under the National Heritage Act (25 of 1999). As indicated above the heritage significance thereof is limited and it does not warrant any specific heritage intervention. However, specific features within it, may have a higher rating. Such features identified, are discussed below.

Thus, it should be remembered that recommendations made, will always be subject to the above-mentioned factors.

The following is recommended:

- Site no. 1 – grave yard: The site is of high significance but may be mitigated. It also should be included in the heritage register. Mitigation is subject to a permit application lodged with the relevant heritage authority.

  Two possibilities exist. The first option would be to fence the graves in and have a management plan drafted for the sustainable preservation thereof. The second option is to exhume and relocate the mortal remains.

  Since the site is not impacted on directly by the proposed project, Option 1 is recommended.

- Site no. 6 – grave yard: The site is of high significance and may not be mitigated. It should be included in the heritage register and maintained in situ with a protected buffer zone and fencing. A CMP should be written for the sustainable preservation thereof.

- Site no. 8 – grave yard: The site is of high significance but may be mitigated. It also should be included in the heritage register. Mitigation is subject to a permit application lodged with the relevant heritage authority.

  It is recommended that a CMP be drafted to ensure sustaiable preservation of the site.

- Site no. 2 – ruin of stone building - The site is of medium heritage significance and may be mitigated. Mitigation is subject to a permit application lodged with the relevant heritage authority.

  Since the site falls outside of the project area, it should merely be left as it is, but the mine needs to ensure that it is not impacted on.

- Site no. 3 – old mining plant: the site is of medium significance and should thus be included in the heritage register. It may be mitigated, but mitigation is subject to a permit application lodged with the relevant heritage authority.

The site may be demolished, but it should be documented first by mapping and photographs.

- Site no. 4 – house ruins – the site is of low significance and therefore the description in this phase 1 heritage report is seen as sufficient recording. It may be granted a destruction permit at the discretion of the relevant heritage authority without a formal permit application, subjected to the granting of Environmental Authorisation.

- Site no. 5 - small building (possible magazines room): The site is of medium cultural significance. It should be included in the heritage register and may be mitigated. The mitigation is subject to a permit application lodged with the relevant heritage authority.

  The site may thus be demolished, but it should be documented first by mapping and photographs.

- Site no. 7 – house ruins – the site is of low significance and therefore the description in this phase 1 heritage report is seen as sufficient recording. It may be granted a destruction permit at the discretion of the relevant heritage authority without a formal permit application, subjected to the granting of Environmental Authorisation.

- It should be noted that the subterranean presence of archaeological and/or historical sites, features or artifacts is always a distinct possibility. It may only become known later on, especially since the density of the vegetation probably influenced the accurate recording of sites. Therefore, operating controls and monitoring should be introduced, aimed at the possible unearthing of such features. Care should therefore be taken when the Project commences that if any of these are discovered, a qualified archaeologist be called in to investigate the occurrence.

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## APPENDIX A

## DEFINITION OF TERMS:

Site: A large place with extensive structures and related cultural objects. It can also be a large assemblage of cultural artifacts, found on a single location.

Structure: A permanent building found in isolation or which forms a site in conjunction with other structures.

Feature: A coincidental find of movable cultural objects.

Object: Artifact (cultural object).

(Also see Knudson 1978: 20).

## APPENDIX B

## DEFINITION/ STATEMENT OF HERITAGE SIGNIFICANCE:

| | |
|---|---|
| Historic value: | Important in the community or pattern of history or has an association with the life or work of a person, group or organization of importance in history. |
| Aestetic value: | Important in exhibiting particular aesthetic characteristics valued by a community or cultural group. |
| Scientific value: | Potential to yield information that will contribute to an understanding of natural or cultural history or is important in demonstrating a high degree of creative or technical achievement of a particular period |
| Social value: | Have a strong or special association with a particular community or cultural group for social, cultural or spiritual reasons. |
| Rarity: | Does it possess uncommon, rare or endangered aspects of natural or cultural heritage. |
| Representivity: | Important in demonstrating the principal characteristics of a particular class of natural or cultural places or object or a range of landscapes or environments characteristic of its class or of human activities (including way of life, philosophy, custom, process, land-use, function, design or technique) in the environment of the nation, province region or locality. |

## APPENDIX C

## SIGNIFICANCE AND FIELD RATING:

**Cultural significance:**

- Negligible – The site has no heritage significance, although it may be older than 60 years.

- Low - A cultural object being found out of context, not being part of a site or without any related feature/structure in its surroundings. A site with minimal importance which is decreased by its bad state of decay.

- Low-Medium - A site of lesser importance, which is increased by a good state of preservation and contextual importance (e.g. a specific community).

- Medium - Any site, structure or feature being regarded less important due to a number of factors, such as date and frequency. Also, any important object found out of context.

- Medium-High - A site that has high importance due to its age or uniqueness, but which decreases due to its bad state of decay.

- High - Any site, structure or feature regarded as important because of its age or uniqueness. Also, any important object found within a specific context.

- Very High - A site of exceptional importance due to its age, uniqueness and good state of preservation.

**Heritage significance:**

- Grade I Heritage resources with exceptional qualities to the extent that they are of national significance

- Grade II Heritage resources with qualities giving it provincial or regional importance although it may form part of the national estate

- Grade III Other heritage resources of local importance and therefore worthy of conservation

**Field ratings:**

National Grade I significance: The site should be managed as part of the national estate, should be nominated as Grade I site, should be maintained in situ with a protected buffer zone and a CMP must be recommended. Score above 50.

Provincial Grade II significance: The site should be managed as part of the provincial estate, should be nominated as Grade II site, should be maintained in situ with a protected buffer zone and a CMP must be recommended. Score between 41 and 50.

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Local Grade IIIA: The site should be included in the heritage register and not be mitigated (high significance), should be maintained in situ with a protected buffer zone and a CMP must be recommended. Score between 31 and 40.

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. Score between 6 and 30.

Local Grade IIIC: The description in the phase 1 heritage report is seen as sufficient recording (low significance) 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. Score below 5.

**APPENDIX D**

**PROTECTION OF HERITAGE RESOURCES:**

**Formal protection:**

National heritage sites and Provincial heritage sites – grade I and II
Protected areas - an area surrounding a heritage site
Provisional protection – for a maximum period of two years
Heritage registers – listing grades II and III
Heritage areas – areas with more than one heritage site included
Heritage objects – e.g. archaeological, palaeontological, meteorites, geological specimens, visual art, military, numismatic, books, etc.

**General protection:**

Objects protected by the laws of foreign states
Structures – older than 60 years
Archaeology, palaeontology and meteorites
Burial grounds and graves
Public monuments and memorials

## APPENDIX E

## HERITAGE IMPACT ASSESSMENT PHASES

1. Pre-assessment or scoping phase – establishment of the scope of the project and terms of reference.
2. Baseline assessment – establishment of a broad framework of the potential heritage of an area.
3. Phase I impact assessment – identifying sites, assess their significance, make comments on the impact of the development and makes recommendations for mitigation or conservation.
4. Letter of recommendation for exemption – if there is no likelihood that any sites will be impacted.
5. Phase II mitigation or rescue – planning for the protection of significant sites or sampling through excavation or collection (after receiving a permit) of sites that may be lost.
6. Phase III management plan – for rare cases where sites are so important that development cannot be allowed.

**Appendix C: PIA**

# Palaeontological Impact Assessment for the proposed development of the Fairview TSF and reclamation of historical dumps on Fairview Mining Rights Area, Mpumalanga Province

**Desktop Study**

**For**

**Cabanga Environmental**

**21 October 2019**

**Prof Marion Bamford**
Palaeobotanist
P Bag 652, WITS 2050
Johannesburg, South Africa
Marion.bamford@wits.ac.za

# Expertise of Specialist

The Palaeontologist Consultant is: Prof Marion Bamford
Qualifications: PhD (Wits Univ, 1990); FRSSAf, ASSAf
Experience: 30 years research; 22 years PIA studies

# Declaration of Independence

This report has been compiled by Professor Marion Bamford, of the University of the Witwatersrand, sub-contracted by Cabanga Environmental, Johannesburg, South Africa. The views expressed in this report are entirely those of the author and no other interest was displayed during the decision making process for the Project.

Specialist: Prof Marion Bamford

Signature: 

## Executive Summary

A desktop Palaeontological Impact Assessment has been completed for Barberton Mines (Pan Africa Resources) who propose to undertake certain development activities within their Fairview Mining Right Area. They intend to reclaim a number of waste deposits resulting from past mining activities (commencing in the 1880's), and to construct a new Tailings Storage Facility at the site of the Bramber TSF which they have recently reclaimed.

The Fairview Mining Right Area lies on the greywacke of the Moodies and Fig Tree Groups, Barberton Greenstone Belt, Swaziland Supergroup. These are some of the oldest rocks on the earth's surface, ca 3550-3250 million years old so predate all forms of multicellular life. Based on the age of the sediments and extremely rare occurrence of fossils in this formation, and the fact that no fossils have been recorded from this area, there is almost no chance that fossils would be preserved in the rocks. In particular, the mine dumps have already been disturbed and no fossils, even if present, would have survived. No further palaeontological assessment is required. It is recommended that if stromatolites are excavated then a hand sample should be sent to the University of Johannesburg, Department of Geology, for their records and possible further research. As far as the palaeontological heritage is concerned, the proposed reclamation and construction of a TSF can proceed.

# Table of Contents

# 1. Background

A desktop Palaeontological Impact Assessment (PIA) has been completed for the proposed reclamation of a number of waste deposits resulting from past mining activities (commencing in the 1880's), and the construction of a new Tailings Storage Facility at the site of the Bramber TSF which Barberton Mines have recently reclaimed.

The applicant is Barberton Mines (Pty) Ltd: Fairview Gold Mine (Pan Africa Resources). The area is the existing Fairview Mine (Figures 1, 2).

The National Heritage Resources Act (Act 25 of 1999) and the National Environmental Management Act (Act 107 of 1998) requires that the proposed development must be preceded by the relevant impact assessment, in this case for palaeontology.

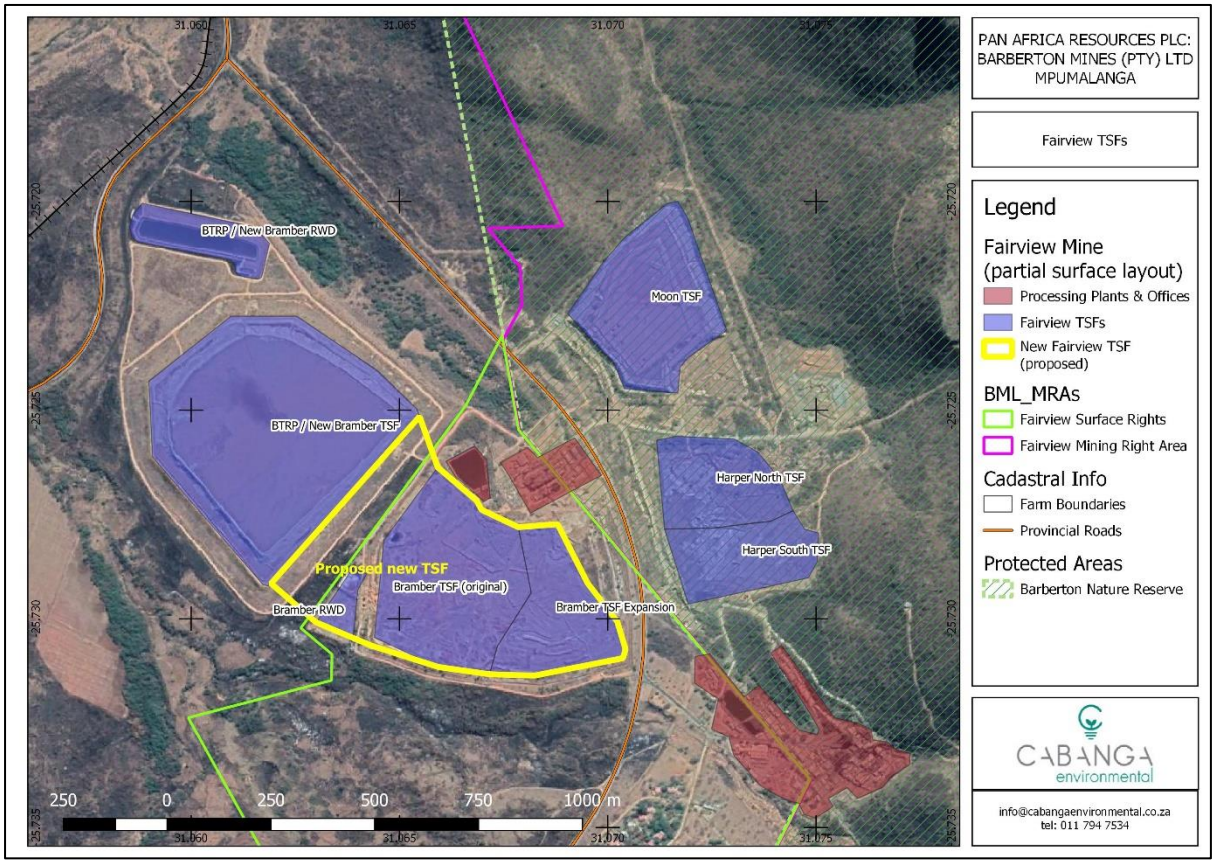


Figure 1: Detailed map from Google Earth of the proposed area for the proposed new Tailings Storage Facility (TSF) (within the yellow outline) at the Fairview Mine. Map supplied by Cabanga Environmental.

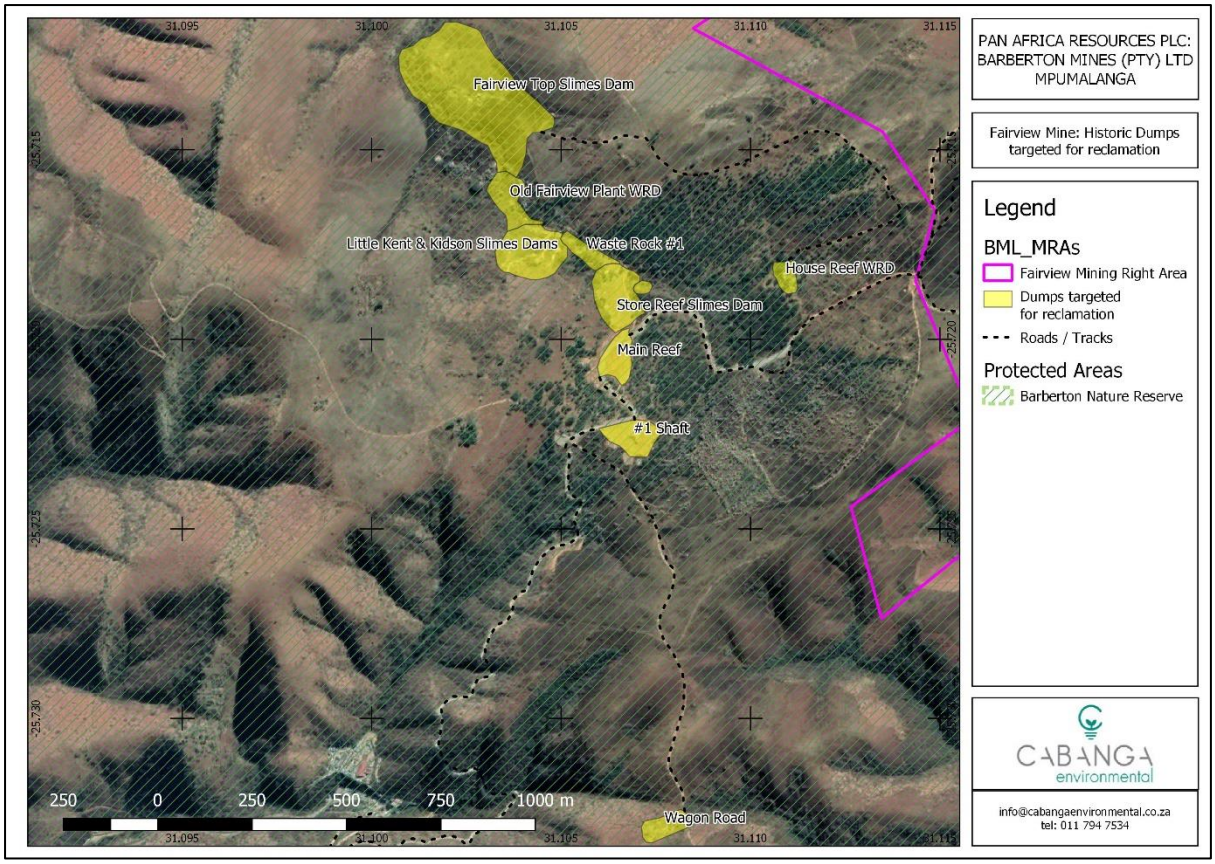


Figure 2: Google Earth map of the Fairview Mine historical dumps that are the target for reclamation (yellow).

This report is the palaeontological impact assessment for the project.

Table 1: Specialist report requirements in terms of Appendix 6 of the EIA Regulations (2014, as amended)

| | **A specialist report prepared in terms of the Environmental Impact Regulations of 2017 must contain:** | **Relevant section in report** |
|---|---|---|
| ai | Details of the specialist who prepared the report | Appendix B |
| aii | The expertise of that person to compile a specialist report including a curriculum vitae | Appendix B |
| b | A declaration that the person is independent in a form as may be specified by the competent authority | Page 1 |
| c | An indication of the scope of, and the purpose for which, the report was prepared | Section 1 |
| ci | An indication of the quality and age of the base data used for the specialist report: SAHRIS palaeosensitivity map accessed – date of this report | Yes |
| cii | A description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change | Section 5 |

| | | |
|---|---|---|
| d | The date and season of the site investigation and the relevance of the season to the outcome of the assessment | N/A – desktop only |
| e | A description of the methodology adopted in preparing the report or carrying out the specialised process | Section 2 |
| f | The specific identified sensitivity of the site related to the activity and its associated structures and infrastructure | Section 4 |
| g | An identification of any areas to be avoided, including buffers | N/A (none) |
| h | A map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers; | See palaeosensitivity map |
| i | A description of any assumptions made and any uncertainties or gaps in knowledge; | Section 5 |
| j | A description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives, on the environment | Section 4 |
| k | Any mitigation measures for inclusion in the EMPr | Appendix A |
| l | Any conditions for inclusion in the environmental authorisation | N/A (None) |
| m | Any monitoring requirements for inclusion in the EMPr or environmental authorisation | Section 8 |
| ni | A reasoned opinion as to whether the proposed activity or portions thereof should be authorised | See Executive Summary |
| nii | If the opinion is that the proposed activity or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan | N/A (none except as included in Appendix A) |
| o | A description of any consultation process that was undertaken during the course of carrying out the study | N/A – consultation will be undertaken by the EAP |
| p | A summary and copies if any comments that were received during any consultation process | N/A (none) |
| q | Any other information requested by the competent authority. | N/A (none) |

# 2. Methods and Terms of Reference

The Terms of Reference (ToR) for this study were to undertake a PIA and provide feasible management measures to comply with the requirements of the South African Heritage Resource Agency (SAHRA).

The methods employed to address the ToR included:

1. Consultation of geological maps, literature, palaeontological databases, published and unpublished records to determine the likelihood of fossils occurring in the affected

areas. Sources included records housed at the Evolutionary Studies Institute at the University of the Witwatersrand and SAHRA databases;

2. Where necessary, site visits by a qualified palaeontologist to locate any fossils and assess their importance (*not applicable to this assessment*);
3. Where appropriate, collection of unique or rare fossils with the necessary permits for storage and curation at an appropriate facility (*not applicable to this assessment*); and
4. Determination of fossils representivity or scientific importance to decide if the fossils can be destroyed or a representative sample collected.

# 3. Geology and Palaeontology

## i. Project location and geological context

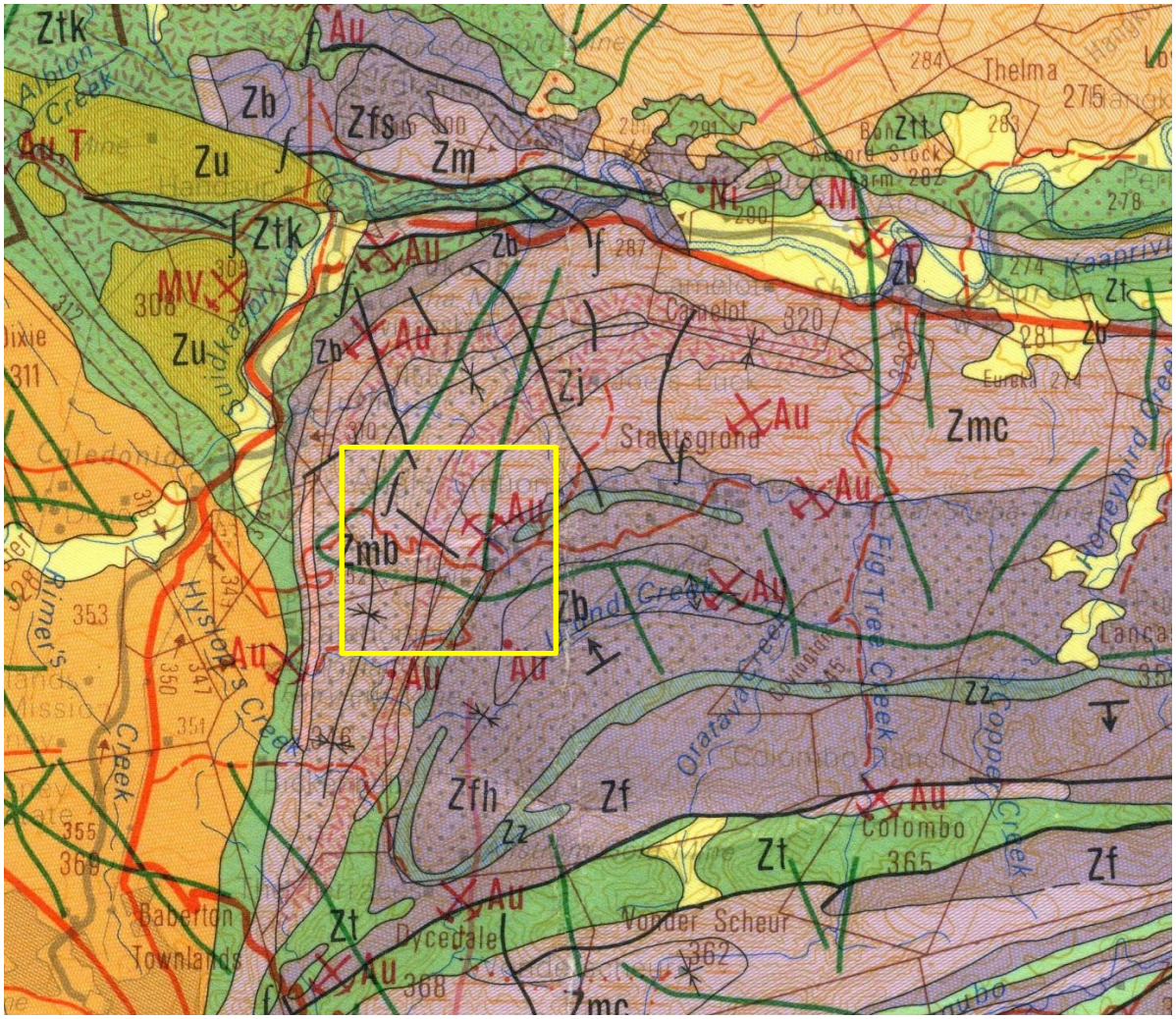


Figure 3: Geological map of the area to the northeast of Barberton, Mpumalanga Province, where the Fairview Mining Right area (yellow rectangle) and Sheba Mine (arrow) are located. Abbreviations of the rock types are explained in Table 2. Map enlarged from the Geological Survey 1: 250 000 map Barberton 2530.

Table 2: Explanation of symbols for the geological map and approximate ages (Brandl et al., 2006; Cornell et al., 2006; Duncan and Marsh, 2006; Erikssen et al., 2006. Johnson et al., 2006). SG = Supergroup; Fm = Formation.

| Symbol | Group/Formation | Lithology | Approximate Age |
|---|---|---|---|
| Rmp | Mpuluzi Granite | Quartz monzonite | <3105 Ma |
| Zu | Kaap Valley Granite | Serpeninised dunite, gabbro, anorthosite | 3411 – 3230 Ma |
| Zmb | Baviaanskop Fm, Moodies Group, Barberton SG | Sandstone, grit, conglomerate, shale, greywacke | Ca 3255 – 3215 Ma |
| Zj | Joe's Luck Fm, Moodies Group, Barberton SG | Shale, subgreywacke, quartzite, phyllite, basaltic lava | |
| Zmc | Clutha Fm, Moodies Group, Barberton SG | Shale, quartzite, conglomerate, jaspilite | |
| Zfs | Schoongezicht Fm, Figtree Group, Barberton GS | Trachytic tuff, agglomerate, lava, tuffaceous greywacke | Ca 3250 Ma |
| Zb | Belvue Road Fm, Figtree Group, Barberton SG | Siltstone, shale, greywacke | |
| Zfh | Sheba Fm, Figtree Group, Barberton SG | | |
| Zz | Zwartkoppies Mb, Geluk Fm, Onverwacht Group, Barberton SG | Mafic and felsic lava | Ca 3550 - 3250 Ma |
| Zt | Tarkastad Mb, Onverwacht, Group, Barberton SG | | Ca 3600 Ma |

The proposed site lies on several outcrops of the oldest rocks in South Africa, those of the Barberton Greenstone Belt (BGB), which is mid Archean in age (3600- 3100 Ma; Brandl et al., 2006) and in particular on the Onverwacht, Figtree and Moodies Groups. There are also a number of plutons and batholiths in the area that range in age from 3509 to 3104 Ma. The Barberton Greenstone Belt is one of the best studied granite-greenstone terranes in the world (Brandl et al., 2006) because it is one of the oldest known, it is composed of a unique sequence of the best-preserved, first-formed lithologies on the planet, and geologists have used it as a model to interpret other greenstone belts (ibid).

The Barberton Supergroup comprises three major lithostratigraphic units (Figure 3), with the Onverwacht Group at the base, the Figtree Group in the middle and the Moodies Group at the top. It is thought that these sediments formed in an oceanic setting, followed by island arc development as a consequence of some primitive form of Archaean plate tectonic processes (ibid).

Most research has been done on the southern part of the BGB and little on the northern part, where Fairview Mine is situated. Currently the basal Onverwacht Group is divided into seven

formations, from the bottom, the Sandspruit, Theespruit, Komati, Hooggenoeg, Kromberg, Mendon and Weltevreden Formations. The Figtree Group is divided into three formations in the northern part as follows (basal to top): Sheba Formation, Belvue Road Formation and Schoongezicht Formation. They comprise various combinations of deepwater facies such as turbiditic lithic greywacke, shale, turbiditic siltstone and locally coarse volcaniclastic rocks (Brandl et al., 2006). The overlying Moodies Group is divided into three formations, from the base upwards, the Clutha Formation, Joe's Luck Formation and the Baviaanskop Formation. These formations each represent an upward-fining cycle comprising a coarse basal unit of conglomeratic quartzose sandstone, siltstone and shale (Brandl et al., 2006).

The Fairview Mine is positioned mainly in the Moodies Group, with the Fig Tree Group where there are extensive gold reserves, exposed to the southeast (Ward and Wilson, 1998) (Figure 4).

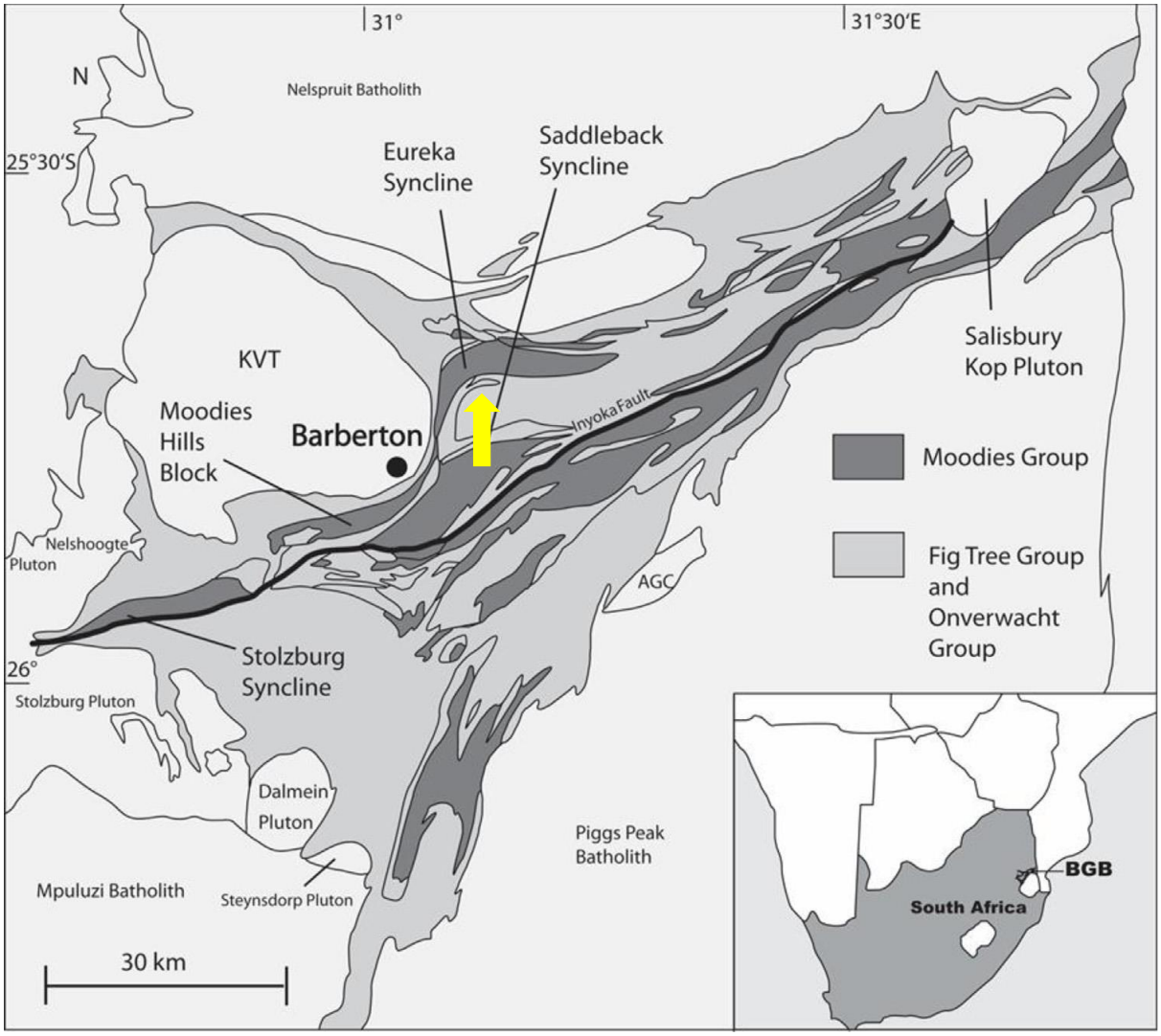


Figure 4: Map showing the updated geological groups in the Barberton Greenstone Belt (from Noffke et al., 2006, Brandl et al., 2006, figure 1, page 120) with a focus on the three main stratigraphic divisions and the volcanic rock types. Fairview Mine, arrow, is in the northeast part.

## ii. Palaeontological context

The Onverwacht Group is predominantly volcanic in origin and the seven formations within this group represent volcanic rocks, basalts, komatiites, etc., and different degrees of metamorphism. According to Altermann et al. (2006) there are stromatolites in the Onverwacht Group. Stromatolites are trace fossils because they are the accumulations of layers of minerals laid down by colonies of primitive algae (bluegreen algae or cyanobacteria) in warm shallow seas. Very rarely the microscopic algae are preserved within the stromatolites. Recently Kremer and Kazmierzak (2017) reported the presence of microscopic algae in rocks of the Kromberg Formation, Onverwacht Group, along the Komati River, Songimvelo Nature Reserve.

The Figtree Group depositional environment was a deep-water one and about 3461-3225 million years ago (Brandl et al., 2006), and comprises sales and banded ironstone. According to Altermann et al (2006) there are stromatolites in this Group.

The Moodies Group is slightly younger at about 3225 to 3126 Ma and represents a foreland basin with braided alluvial plains, deltas, shallow water coastal systems and shelf facies (Brandl et al., 2006). Although no stromatolites have been reported from this Group other trace fossils have been. Microbially induced sedimentary structures, another form of trace fossils, have been reported from the Dycedale and Saddleback Synclines, Moodies Group, close to Barberton (Noffke et al., 2006; Altermann et al., 2006; Nabham et al., 2016). Homan et al. (2016) mapped in detail along the Saddleback Syncline and noted microbial mats in four of the five facies.

The Kaap Valley Tonalite and ultrabasic rocks do not preserve fossils because they are volcanic in origin. They also predate the origin of body fossils.

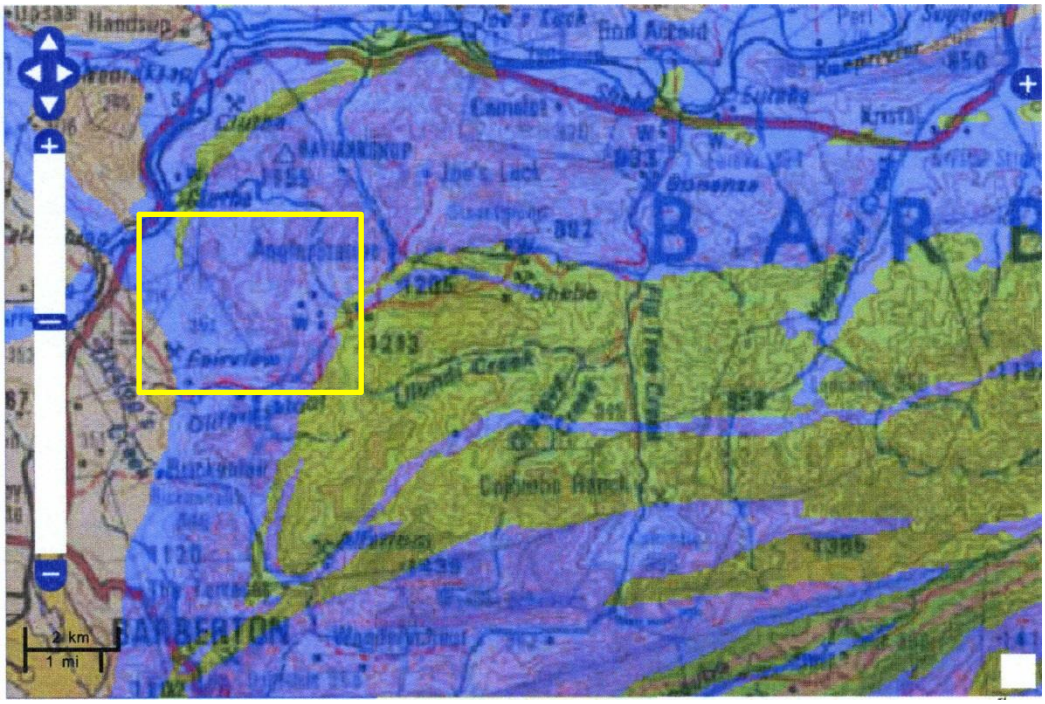


Figure 5: SAHRIS palaeosensitivity map of the region around Fairview Mining area (yellow rectangle) and Sheba Gold Mine (arrowed). The project site is in in the blue area with sections on the east (unaffected by the proposed Project) in the green area. Colours indicate the following degrees of sensitivity: red = very highly sensitive; orange/yellow = high; green = moderate; blue = low; grey = insignificant/zero.

# 4. Impact assessment

An assessment of the potential impacts to possible palaeontological resources considers the criteria encapsulated in Table 3:

**TABLE 3A: CRITERIA FOR ASSESSING IMPACTS**

| **PART A: DEFINITION AND CRITERIA** | | |
|---|---|---|
| **Criteria for ranking of the SEVERITY/NATURE of environmental impacts** | **H** | Substantial deterioration (death, illness or injury). Recommended level will often be violated. Vigorous community action. |
| | **M** | Moderate/ measurable deterioration (discomfort). Recommended level will occasionally be violated. Widespread complaints. |
| | **L** | Minor deterioration (nuisance or minor deterioration). Change not measurable/ will remain in the current range. Recommended level will never be violated. Sporadic complaints. |
| | **L+** | Minor improvement. Change not measurable/ will remain in the current range. Recommended level will never be violated. Sporadic complaints. |
| | **M+** | Moderate improvement. Will be within or better than the recommended level. No observed reaction. |
| | **H+** | Substantial improvement. Will be within or better than the recommended level. Favourable publicity. |

| | | |
|---|---|---|
| **Criteria for ranking the DURATION of impacts** | **L** | Quickly reversible. Less than the project life. Short term |
| | **M** | Reversible over time. Life of the project. Medium term |
| | **H** | Permanent. Beyond closure. Long term. |
| **Criteria for ranking the SPATIAL SCALE of impacts** | **L** | Localised - Within the site boundary. |
| | **M** | Fairly widespread – Beyond the site boundary. Local |
| | **H** | Widespread – Far beyond site boundary. Regional/ national |
| **PROBABILITY (of exposure to impacts)** | **H** | Definite/ Continuous |
| | **M** | Possible/ frequent |
| | **L** | Unlikely/ seldom |

**TABLE 3B: IMPACT ASSESSMENT**

| **PART B: ASSESSMENT** | | |
|---|---|---|
| **SEVERITY/NATURE** | **H** | - |
| | **M** | - |
| | **L** | There is none to a very small chance of fossils being found here |
| | **L+** | - |
| | **M+** | |
| | **H+** | - |
| **DURATION** | **L** | - |
| | **M** | - |
| | **H** | Where manifest, the impact will be permanent. |
| **SPATIAL SCALE** | **L** | The spatial scale is extremely small. |
| | **M** | - |
| | **H** | - |
| **PROBABILITY** | **H** | **-** |
| | **M** | |
| | **L** | There is no chance to a very small chance of finding fossils in the stromatolites (trace fossils) and microbial mats as they are microscopic and would NOT be visible to the naked eye. Furthermore, the dumps represent already disturbed and crushed sediments. |

Based on the nature of the project, the granites, tonalities, greywackes and volcanic rocks would not preserve fossils. There is a small chance that stromatolites of the Fig Tree Group could occur in the site to be developed but there is a much smaller chance that there could be microscopic algal cells preserved in the stromatolitic layers. Microbial mats are also trace fossils and do not preserve any fossils. Only if any stromatolites are noted and are going to be disturbed, should they be sampled (GPS coordinates and hand specimens of rock taken) and posted to a research facility (university or museum – for example the University of Johannesburg geologists work on rocks of this age). There is no chance of finding fossils BEFORE excavations commence so a phase 2 or site visit is NOT recommended at this stage. Taking account of the defined criteria, the potential impact to fossil heritage resources is very low. The mining dumps to be reclaimed are already highly disturbed and no fossils, even if originally present, would have survived the excavation, crushing and processing for the extraction of gold.

## 5. Assumptions and uncertainties

Based on the geology of the area and the palaeontological record as we know it, it can be assumed that the formation and layout of the gneisses, schists, granites, greywackes and basalts are typical for the country and do not contain any fossil plant, insect, invertebrate and vertebrate material. There is a very small chance that the stromatolites of the Fig Tree Group may contain microfossils of early unicellular bluegreen algae but these are not visible to the naked eye. No fossils, however, have been reported from this region.

## 6. Recommendation

Based on the age of the sediments and extremely rare occurrence of fossils in this formation, and the fact that no fossils have been recorded from this area, there is almost no chance that fossils would be preserved in the rocks. In particular, the dump sediments are already highly disturbed. No further palaeontological assessment is required. It is recommended that if stromatolites are excavated then a hand sample should be sent to the University of Johannesburg, Department of Geology, for their records and possible further research. As far as the palaeontological heritage is concerned the proposed TSF construction and reclamation of dumps can proceed.

## 7. References

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# 8. Monitoring Programme for Palaeontology – to commence once the excavations begin.

1. The following procedure is only required if fossils are seen on the surface and when excavations commence.
2. When excavations begin the rocks and sediments must be given a cursory inspection by the environmental officer or designated person. Any fossiliferous material (plants, insects, bone, coal) should be put aside in a suitably protected place. This way the construction activities will not be interrupted. Small samples of stromatolites can be taken and sent to an interested party – the algae are microscopic so will not be seen under the naked eye.
3. Photographs of similar fossil plants must be provided to the developer to assist in recognizing the fossil plants in the shales and mudstones (for example see Figure 5). This information will be built into the EMP's training and awareness plan and procedures.
4. Photographs of the putative fossils can be sent to the palaeontologist for a preliminary assessment.
5. As required and to be agreed upon by the developer and the qualified palaeontologist sub-contracted for this part of the project and appointed only if required, the palaeontologist should visit the site to inspect the selected material and check the samples where feasible. The frequency of inspections should be determined by the finding of interesting material. However, if the onsite designated person is diligent and extracts the fossil material then inspections can be less frequent.
6. Fossil plants or vertebrates that are considered to be of good quality or scientific interest by the palaeontologist (if any are identified) must be removed, catalogued and housed in a suitable institution where they can be made available for further study. Before the fossils are removed from the site a SAHRA permit must be obtained. Annual reports must be submitted to SAHRA as required by the relevant permits.
7. If no good fossil material is recovered then the site inspections by the palaeontologist can be reduced to annual events until construction has ceased. Annual reports by the palaeontologist must be sent to SAHRA.
8. If no fossils are found and the excavations have finished then no further monitoring is required.

## Appendix A – examples of stromatolites


Figure 4: Examples of stromatolites as seen in the field; A and C are vertical cuts and B is the surface view.

## Appendix B – Details of specialist

# Curriculum vitae (short) - Marion Bamford PhD
# September 2019

### I) Personal details


| | | |
|---|---|---|
| Surname | : | **Bamford** |
| First names | : | **Marion Kathleen** |
| Present employment | : | Professor; Director of the Evolutionary Studies Institute. Member Management Committee of the NRF/DST Centre of Excellence Palaeosciences, University of the Witwatersrand, Johannesburg, South Africa- |
| Telephone | : | +27 11 717 6690 |
| Fax | : | +27 11 717 6694 |
| Cell | : | 082 555 6937 |
| E-mail | : | marion.bamford@wits.ac.za ; marionbamford12@gmail.com |


### ii) Academic qualifications

Tertiary Education: All at the University of the Witwatersrand:
1980-1982: BSc, majors in Botany and Microbiology. Graduated April 1983.
1983: BSc Honours, Botany and Palaeobotany. Graduated April 1984.
1984-1986: MSc in Palaeobotany. Graduated with Distinction, November 1986.
1986-1989: PhD in Palaeobotany. Graduated in June 1990.

### iii) Professional qualifications

*Wood Anatomy Training (overseas as nothing was available in South Africa)*:
1994 - Service d'Anatomie des Bois, Musée Royal de l'Afrique Centrale, Tervuren, Belgium, by Roger Dechamps
1997 - Université Pierre et Marie Curie, Paris, France, by Dr Jean-Claude Koeniguer
1997 - Université Claude Bernard, Lyon, France by Prof Georges Barale, Dr Jean-Pierre Gros, and Dr Marc Philippe

### iv) Membership of professional bodies/associations

Palaeontological Society of Southern Africa
Royal Society of Southern Africa - Fellow: 2006 onwards
Academy of Sciences of South Africa - Member: Oct 2014 onwards

International Association of Wood Anatomists - First enrolled: January 1991
International Organization of Palaeobotany – 1993+
Botanical Society of South Africa
South African Committee on Stratigraphy – Biostratigraphy - 1997 - 2016
SASQUA (South African Society for Quaternary Research) – 1997+
PAGES - 2008 –onwards: South African representative
ROCEEH / WAVE – 2008+
INQUA – PALCOMM – 2011+onwards

**vii) Supervision of Higher Degrees**

All at Wits University

| Degree | Graduated/completed | Current |
|---|---|---|
| Honours | 7 | 0 |
| Masters | 10 | 4 |
| PhD | 12 | 5 |
| Postdoctoral fellows | 10 | 3 |

**viii) Undergraduate teaching**
Geology II – Palaeobotany GEOL2008 – average 65 students per year
Biology III – Palaeobotany APES3029 – average 25 students per year
Honours – Evolution of Terrestrial Ecosystems; African Plio-Pleistocene Palaeoecology; Micropalaeontology – average 2-8 students per year.

**ix) Editing and reviewing**
Editor: Palaeontologia africana: 2003 to 2013; 2014 – Assistant editor
Guest Editor: Quaternary International: 2005 volume
Member of Board of Review: Review of Palaeobotany and Palynology: 2010 –
Cretaceous Research: 2014 -

Review of manuscripts for ISI-listed journals: 25 local and international journals

# x) Palaeontological Impact Assessments

Selected – list not complete:

- Thukela Biosphere Conservancy 1996; 2002 for DWAF
- Vioolsdrift 2007 for Xibula Exploration
- Rietfontein 2009 for Zitholele Consulting
- Bloeddrift-Baken 2010 for TransHex
- New Kleinfontein Gold Mine 2012 for Prime Resources (Pty) Ltd.
- Thabazimbi Iron Cave 2012 for Professional Grave Solutions (Pty) Ltd
- Delmas 2013 for Jones and Wagener
- Klipfontein 2013 for Jones and Wagener
- Platinum mine 2013 for Lonmin
- Syferfontein 2014 for Digby Wells

- Canyon Springs 2014 for Prime Resources
- Kimberley Eskom 2014 for Landscape Dynamics
- Yzermyne 2014 for Digby Wells
- Matimba 2015 for Royal HaskoningDV
- Commissiekraal 2015 for SLR
- Harmony PV 2015 for Savannah Environmental
- Glencore-Tweefontein 2015 for Digby Wells
- Umkomazi 2015 for JLB Consulting
- Ixia coal 2016 for Digby Wells
- Lambda Eskom for Digby Wells
- Alexander Scoping for SLR
- Perseus-Kronos-Aries Eskom 2016 for NGT
- Mala Mala 2017 for Henwood
- Modimolle 2017 for Green Vision
- Klipoortjie and Finaalspan 2017 for Delta BEC
- Ledjadja borrow pits 2018 for Digby Wells
- Lungile poultry farm 2018 for CTS
- Olienhout Dam 2018 for JP Celliers
- Isondlo and Kwasobabili 2018 for GCS
- Kanakies Gypsum 2018 for Cabanga
- Nababeep Copper mine 2018
- Glencore-Mbali pipeline 2018 for Digby Wells
- Remhoogte PR 2019 for A&HAS
- Bospoort Agriculture 2019 for Kudzala
- Overlooked Quarry 2019 for Cabanga
- Richards Bay Powerline 2019 for NGT
- Eilandia dam 2019 for ACO

## xi) Research Output

Publications by M K Bamford up to June 2018 peer-reviewed journals or scholarly books: over 140 articles published; 5 submitted/in press; 8 book chapters.
Scopus h index = 27; Google scholar h index = 32;
Conferences: numerous presentations at local and international conferences.

## xii) NRF Rating

NRF Rating: B-2 (2016-2020)
NRF Rating: B-3 (2010-2015)
NRF Rating: B-3 (2005-2009)
NRF Rating: C-2 (1999-2004)