HERITAGE IMPACT ASSESSMENT

(REQUIRED UNDER SECTION 38(8) OF THE NHRA (No. 25 OF 1999)

FOR THE PROPOSED BOOYSENDAL SOUTH, PHASE 2 EXPANSION PROJECT, STEELPOORT, LIMPOPO & MPUMALANGA PROVINCE

Type of development:

Mining development

Client:

Wood Plc

Client info:

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Project Reference:

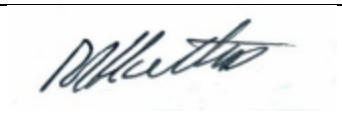
HCAC Project number 218303

Report date:

March 2018

APPROVAL PAGE

Project Name	**Booysendal South Expansion Environmental Authorisations and EMP Amendment**
Report Title	Heritage Impact Assessment **Booysendal South Expansion Environmental Authorisations and EMP Amendment**
Authority Reference Number	SAHRA Case Number 11329
Report Status	Final Report
Applicant Name	Booysendal Platinum (Pty) Ltd

	Name	Signature	Qualifications and Certifications	Date
Archaeologist	Jaco van der Walt		MA Archaeology ASAPA #159 APHP # 0114	March 2018
Archaeologist	Marko Hutten		BA Hons Archaeology	Jan 2018

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Amendments on Document

Date	Report Reference Number	Description of Amendment

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REPORT OUTLINE

Appendix 6 of the GNR 326 EIA Regulations published on 7 April 2017 provides the requirements for specialist reports undertaken as part of the environmental authorisation process. In line with this, Table 1 provides an overview of Appendix 6 together with information on how these requirements have been met.

Table 1. Specialist Report Requirements.

Requirement from Appendix 6 of GN 326 EIA Regulation 2017	Chapter
(a) Details of - (i) the specialist who prepared the report; and (ii) the expertise of that specialist to compile a specialist report including a curriculum vitae	Section a Section 12
(b) Declaration that the specialist is independent in a form as may be specified by the competent authority	*Declaration of Independence*
(c) Indication of the scope of, and the purpose for which, the report was prepared	Section 1
(cA)an indication of the quality and age of base data used for the specialist report	Section 3.4 and 7.1.
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	9
(d) Duration, Date and season of the site investigation and the relevance of the season to the outcome of the assessment	Section 3.4
(e) Description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used	Section 3
(f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	Section 8 and 9
(g) Identification of any areas to be avoided, including buffers	Section 8 and 9
(h) Map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers	Section 8
(I) Description of any assumptions made and any uncertainties or gaps in knowledge	Section 3.7
(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** or activities;	Section 9
(k) Mitigation measures for inclusion in the EMPr	Section 9
(I) Conditions for inclusion in the environmental authorisation	Section 10
(m) Monitoring requirements for inclusion in the EMPr or environmental authorisation	Section 10
(n) Reasoned opinion - (i) as to whether the proposed activity, activities or portions thereof should be authorised; (iA) regarding the acceptability of the proposed activity or activities; and (ii) if the opinion is that the proposed activity, activities 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	Section 10.2
(o) Description of any consultation process that was undertaken during the course of preparing the specialist report	Section 6
(p) A summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	Refer to EIA report
(q) Any other information requested by the competent authority	Section 10

Executive Summary

Wood PLC (Formerly Amec Foster and Wheeler Pty Ltd) was contracted by Northam Platinum to conduct Environmental permitting for the Booysendal South Expansion Project. As part of this process Pistorius (2017) conducted a heritage impact assessment for the S24G activities at the mine and for the Merensky Portals. He further assessed the BS1/2 and BS3 areas and included the study conducted by van der Walt & Celliers (2016) that incorporated sites within the project area from the Huffman & Schoeman 2001, 2002a & b reports. The BS4 (formerly known as Everest mine) area was previously assessed by Pistorius (2007). The van der Walt & Celliers (2016) and the Pistorius (20017) studies formed part of the Phase 1 and Section 24G activities for the Booysendal South Expansion Project. The Pistorius (2017) report was submitted to SAHRA (Case ID 11329) for the purposes of the phase 1 expansion and Section 24G application.

Subsequent to the preparation of the overall Booysendal South Expansion Environmental Impact Assessment (EIA) and Environmental Management Programme (EMP) for the future activities there were some changes to the project definition. HCAC was appointed to conduct a Heritage Impact Assessment (HIA) for the additional proposed expansion activities (Phase 2) to determine the presence of cultural heritage sites and the impact of the proposed development on these non-renewable resources. The study area was assessed both on desktop level and by a field survey. The field survey was conducted as a non-intrusive pedestrian survey to cover the extent of the proposed development footprint. This report represent the results of the impacts of the Phase 2 expansion and to consolidate previous work done for this project to provide a complete record of the heritage resources in the project area. In order to achieve this and for conformity the sites were renumbered numerically.

The combined studies in the project area recorded 68 heritage sites/features consisting of Iron Age Sites, ruins, cemeteries and graves as well as stone cairns and terracing. In addition to the recorded heritage features low density scatters of isolated Stone Age artefacts were noted in the study area. These artefacts are classified as Middle Stone Age (MSA) and consist of flakes and Levalois type cores usually found in vertic soils and are not *in-situ*. These background scatters of artefacts do not constitute an archaeological site and are scattered too sparsely to be of any significance apart from noting their presence, which has been done in previous reports (Huffman & Schoeman 2002a, van der Walt & Celliers 2016). Of the 68 heritage sites/features, five features will be impacted on by the Phase 2 expansion (Table 2 and illustrated in Figure 16). The five features consist of features 5 – 7 and 31 that forms part of one archaeological site as well as feature 31 and feature 66 both associated with the Iron Age occupation of the area.

The palaeontology of the Booysendal South Expansion Project was assessed by Rubidge (2017) who concluded that it is extremely unlikely that fossils will be exposed as a result of the development and that the development should continue with the implementation of a protocol for finds. During the public participation process for the project no heritage concerns were raised. The area has been subjected to various mining projects and the project will not further impact on the cultural landscape.

The impacts on identified heritage resources in the study area resulting from this project can be mitigated to an acceptable level with the correct mitigation measures and management actions. Furthermore, the socio-economic benefits derived from this project outweigh the impact on heritage resources with the correct mitigation measures in place. It is therefore recommended the project is authorised from a heritage perspective on the condition that the recommendations as made in this report (Section 10) are implemented as part of the EMPr and based on approval from South African Heritage Resources Agency (SAHRA).

Table 2 below is a summary of the recorded finds (new and previous site/feature number) and areas of impact as well as proposed mitigation measures in terms of this project. A wide range of sites have been recorded for the area and a summary of all heritage resources recorded during the current and previous studies for the Booysendal South Expansion project is attached as Annexure A (Heritage Gazetteer).

Table 2. Heritage resources impacted on by Phase 2 and recommended mitigation measures

Feature Number	Previous Number	Type Site	Source	Description	Significance Rating	Mitigation
5	350	Iron Age	Van der Walt 2016	Possible deflated midden or kraal deposit. A little bit of slag and undecorated ceramics are scattered over the area. One decorated piece was found with a cross hatching motif as decoration.	Low to Medium Significance	Test excavation.
6	351	Stone Cairn	Van der Walt 2016	Rectangular stone dressing orientated north to south. Purpose is unknown but could be a possible grave.	If confirmed as a grave it is of high social significance.	Although unlikely, the cairn could represent a grave and this will have to be confirmed. If it is confirmed to be a grave it should be relocated adhering to the relevant legislation.
7	352	Iron Age	Van der Walt 2016	Large communal grinding area on exposed bedrock with 7 grinding hollows. Possibly associated with the Iron age.	Low to Medium Significance	The area surrounding the communal grinding area could contain the subsurface remains of an Iron Age site. Mapping and test excavations are recommended.
31	600	Iron Age	Van der Walt 2016	Various stone packed terrace walls.	Low significance	Mapping.
66		Iron Age	Van der Walt 2018	Ephemeral Stone Walling	Low Significance	Mapping after which a destruction permit can be applied for. Monitoring during construction.

Declaration of Independence

Specialist Name	Jaco van der Walt
Declaration of Independence	I declare, as a specialist appointed in terms of the National Environmental Management Act (Act No 108 of 1998) and the associated 2014 Environmental Impact Assessment (EIA) Regulations, that I: • I act as the independent specialist in this application; • I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant; • I declare that there are no circumstances that may compromise my objectivity in performing such work; • I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity; • I will comply with the Act, Regulations and all other applicable legislation; • I have no, and will not engage in, conflicting interests in the undertaking of the activity; • I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority; • All the particulars furnished by me in this form are true and correct; and • I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.
Signature	
Date	09/03/2018

a) Expertise of the specialist

Jaco van der Walt has been practising as a CRM archaeologist for 15 years. He obtained an MA degree in Archaeology from the University of the Witwatersrand focussing on the Iron Age in 2012 and is a PhD candidate at the University of Johannesburg focussing on Stone Age Archaeology with specific interest in the Middle Stone Age (MSA) and Later Stone Age (LSA). Jaco is an accredited member of ASAPA (#159) and have conducted more than 500 impact assessments in Limpopo, Mpumalanga, North West, Free State, Gauteng, KZN as well as he Northern and Eastern Cape Provinces in South Africa.

Jaco has worked on various international projects in Zimbabwe, Botswana, Mozambique, Lesotho, DRC Zambia and Tanzania. Through this he has a sound understanding of the International Finance Corporation (IFC) Performance Standard requirements, with specific reference to Performance Standard 8 – Cultural Heritage.

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ABBREVIATIONS

AIA: Archaeological Impact Assessment
ASAPA: Association of South African Professional Archaeologists
BGG Burial Ground and Graves
BIA: Basic Impact Assessment
CFPs: Chance Find Procedures
CMP: Conservation Management Plan
CRR: Comments and Response Report
CRM: Cultural Resource Management
DEA: Department of Environmental Affairs
EA: Environmental Authorisation
EAP: Environmental Assessment Practitioner
ECO: Environmental Control Officer
EIA: Environmental Impact Assessment*
EIA: Early Iron Age*
EIA Practitioner: Environmental Impact Assessment Practitioner
EMP: Environmental Management Programme
ESA: Early Stone Age
ESIA: Environmental and Social Impact Assessment
GIS Geographical Information System
GPS: Global Positioning System
GRP Grave Relocation Plan
HIA: Heritage Impact Assessment
LIA: Late Iron Age
LSA: Late Stone Age
MEC: Member of the Executive Council
MIA: Middle Iron Age
MPRDA: Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002
MSA: Middle Stone Age
NEMA: National Environmental Management Act, 1998 (Act No. 107 of 1998)
NHRA: National Heritage Resources Act, 1999 (Act No. 25 of 1999)
NID: Notification of Intent to Develop
NoK: Next-of-Kin
PRHA: Provincial Heritage Resource Agency
SADC: Southern African Development Community
SAHRA: South African Heritage Resources Agency

**Although EIA refers to both Environmental Impact Assessment and the Early Iron Age both are internationally accepted abbreviations and must be read and interpreted in the context it is used.*

GLOSSARY

Archaeological site (remains of human activity over 100 years old)
Early Stone Age (~ 2.6 million to 250 000 years ago)
Middle Stone Age (~ 250 000 to 40-25 000 years ago)
Later Stone Age (~ 40-25 000, to recently, 100 years ago)
The Iron Age (~ AD 400 to 1840)
Historic (~ AD 1840 to 1950)
Historic building (over 60 years old)

1 Introduction and Terms of Reference:

Booysendal embarked on expanding its Booysendal Operation through the Booysendal South Expansion Project (Phase 1 & 2) with the aim to increase mining of the PGM minerals from the UG2 and Merensky Reefs. The Booysendal South Expansion Project specifically focusses on four development areas (BS1/2, two Merensky Portals, BS4 and BS4 Valley Boxcut) with linear and supporting infrastructure between the various development areas. The EA for Phase 1 of this larger expansion project has already been granted on 05 January 2018 and construction activities are ongoing. Booysendal has identified further expansion needs (Phase 2) which are applied for under the current environmental authorisation processes to allow for the amendment of the EMP and authorisation of listed activities in terms of Section 24 of the National Environmental Management Act, 107 of 1998 (NEMA) and listed activities in terms of the National Environmental Management Waste Act, 59 of 2008 (NEMWA). Pistorius conducted a heritage impact assessment for the Booysendal South Phase 1 Expansion Project in 2017 (Pistorius 2017). The Pistorius study included assessments for BS1/2 and BS3 areas which was conducted by HCAC (van der Walt & Celliers 2016) and for the BS4 (former Everest) area which was conducted by Pistorius (2007) as well as a heritage survey for the S24G activities and for the Merensky Portals which were done in 2016 (Pistorius 2017).

Heritage Contracts and Archaeological Consulting CC (**HCAC)** has been contracted by Wood PLC to conduct a heritage impact assessment of the proposed Phase 2 expansion of the Booysendal South Mine comprising the following components:

<u>Booysendal</u>

- The process and potable water pipeline between BS1/2 and BN;
- The BCM1 and BCM2 adits and infrastructure;
- The ARC from BS1/2 to BN,
- The emergency escape portal;
- The 11kVA powerline

<u>BS4</u>

- The Valley boxcut
- The backfill plant at BS4
- Three pipelines at BS4

The aim of the study is to survey the proposed development footprint to identify cultural heritage sites, document, and assess their importance within local, provincial and national context and to consolidate previous work done for this project to provide a complete record of the heritage resources in the project area. It serves to assess the impact of the proposed project on non-renewable heritage resources, and to submit appropriate recommendations with regard to the responsible cultural resources management measures that might be required to assist the developer in managing the discovered heritage resources in a responsible manner. It is also conducted to protect, preserve, and develop such resources within the framework provided by the National Heritage Resources Act of 1999 (Act No 25 of 1999). The report outlines the approach and methodology utilized before and during the survey, which includes: Phase 1, review of relevant literature; Phase 2, the physical surveying of the area on foot and by vehicle; Phase 3, reporting the outcome of the study.

A total of 68 heritage resources have been identified during the various studies of the project area. General site conditions and features on sites were recorded by means of photographs, GPS locations, and site descriptions. Possible impacts were identified and mitigation measures are proposed in the following report. SAHRA as a commenting authority under section 38(8) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) require all environmental documents, complied in

support of an Environmental Authorisation (EA) application as defined by NEMA EIA Regulations section 40 (1) and (2), to be submitted to SAHRA.

As such the Environmental Assessment report and its appendices must be submitted to the case as well as the EMPr, once it's completed by the Environmental Assessment Practitioner (EAP).

1.1 Terms of Reference

Field study

Conduct a field study to: (a) locate, identify, record, photograph and describe sites of archaeological, historical or cultural interest; b) record GPS points of sites/areas identified as significant areas; c) determine the levels of significance of the various types of heritage resources affected by the proposed development.

Reporting

Report on the identification of anticipated and cumulative impacts the operational units of the proposed project activity may have on the identified heritage resources for all 3 phases of the project; i.e., construction, operation and decommissioning phases. Consider alternatives, should any significant sites be impacted adversely by the proposed project. Ensure that all studies and results comply with the relevant legislation, SAHRA minimum standards and the code of ethics and guidelines of Association of Southern African Professional Archaeologists (ASAPA).

To assist the developer in managing the discovered heritage resources in a responsible manner, and to protect, preserve, and develop them within the framework provided by the National Heritage Resources Act of 1999 (Act No 25 of 1999).

Table 3: Project Description

Farms	The Booysendal mine is located in the Limpopo and Mpumalanga Provinces of South Africa on the following farms: Remaining Extent of Buttonshope 51 JT, Booysendal 43JT, the farm Sterkfontein 749JT as well as Portions (Remaining extent of Portions 4 and 15 and Portions 8, 17 and 27) of the farm De Kafferskraal 53JT. The closest towns are Steelpoort and Mashishing (Lydenburg). Additional properties applicable to Phase 1 include: Remaining Extent of Portion 4 and Portions 1 and 5 of the farm Sterkfontein 52JT and Portion 19 of the Farm De Kafferskraal 53JT
Magisterial District	Greater Tubatse Local Municipality and the Thaba Chweu Local Municipality
1: 50 000 map sheet number	1:50 000 topographical map 2530 AA
Central co-ordinate of the development	25° 9'12.26"S 30° 9'21.95"E

Table 4: Infrastructure and project activities

Type of development	Mining development
Project Components	This report is specifically related to the Phase 2 expansions comprising the Booysendal Mining Right (MR) and the Booysendal South MR. The following components are included: <u>Booysendal MR:</u> • Development of surface infrastructure at BCM 1 and BCM2; • Development of an Emergency Escape Portal to serve BCM1, BCM2 and the BS1/2 underground complex; • A 11kVA powerline from BN to BS1/2; • Process and clean water pipelines between BS1/2 and BN; • Access roads to the BCM1 and BCM2 Adits and ARC; and • An Arial Rope Conveyor (ARC) system from BS1/2 to BN. <u>Booysendal South Mining Right</u> (Ex-Everest Mining Right) • Backfill plant; • Slurry pipelines from the process plant to the backfill plant and the underground workings; • Three emergency ponds along the slurry line; • Process water lines between the backfill and process plant and the return water dam (RWD). • Valley Boxcut.

	The life of mine of the Booysendal South Expansion Project is approximately 40 years. The total BS reserve is estimated at 105.88Mt.

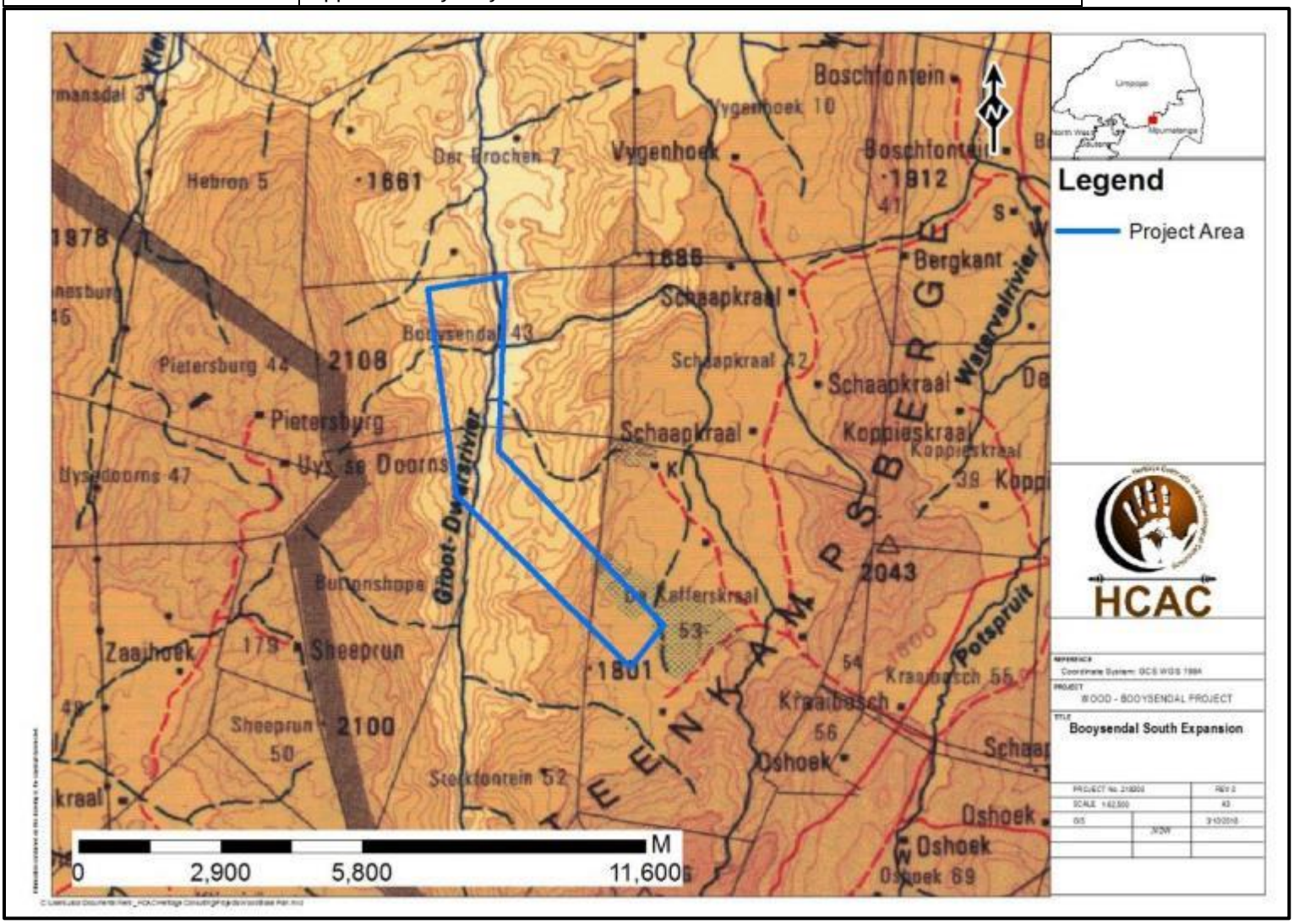

Figure 1. Provincial locality map (1: 250 000 topographical map).

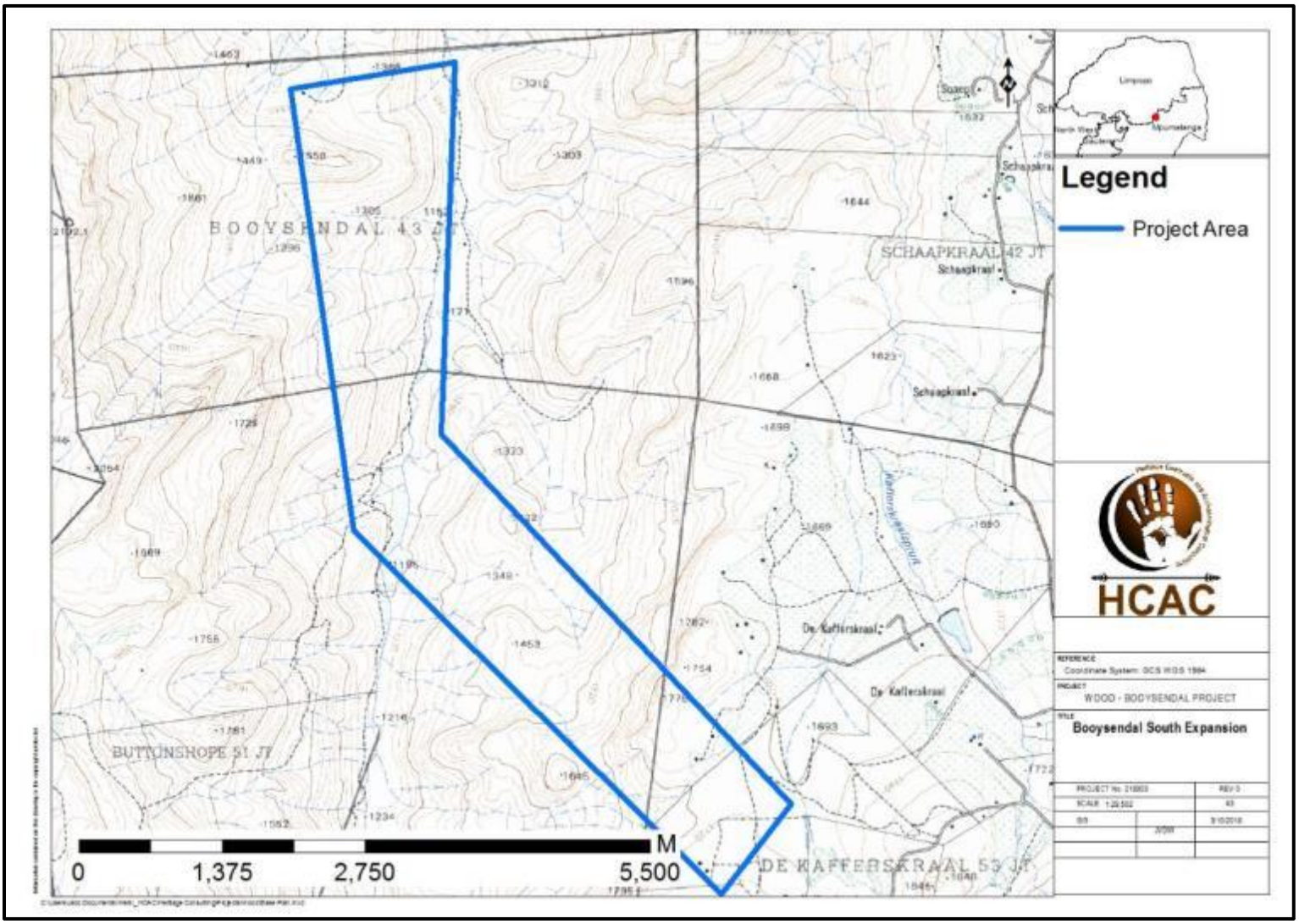

Figure 2. Regional locality map (1:50 000 topographical map).

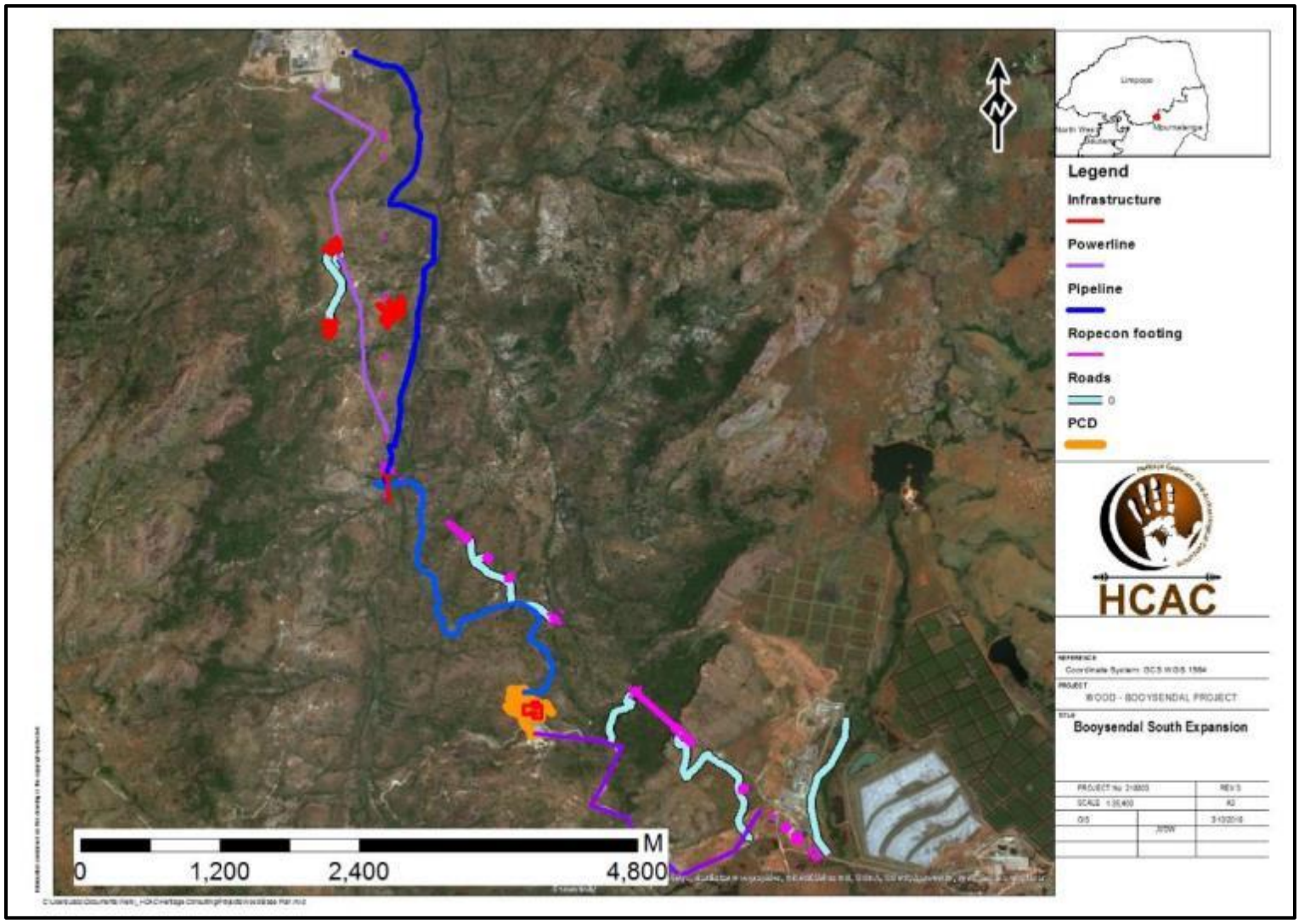

Figure 3: Satellite image indicating the development footprint (Google Earth 2017).

2 Legislative Requirements

The HIA, as a specialist sub-section of the EIA, is required under the following legislation:

- National Heritage Resources Act (NHRA), Act No. 25 of 1999)
- National Environmental Management Act (NEMA), Act No. 107 of 1998 - Section 23(2)(b)
- Mineral and Petroleum Resources Development Act (MPRDA), Act No. 28 of 2002 - Section 39(3)(b)(iii)

A Phase 1 HIA is a pre-requisite for development in South Africa as prescribed by SAHRA and stipulated by legislation. The overall purpose of heritage specialist input is to:

- Identify any heritage resources, which may be affected;
- Assess the nature and degree of significance of such resources;
- Establish heritage informants/constraints to guide the development process through establishing thresholds of impact significance;
- Assess the negative and positive impact of the development on these resources; and
- Make recommendations for the appropriate heritage management of these impacts.

The HIA should be submitted, as part of the impact assessment report or EMPr, to the Provincial Heritage Resources Agency (PHRA) if established in the province or to SAHRA. SAHRA will ultimately be responsible for the professional evaluation of Phase 1 HIA reports upon which review comments will be issued. 'Best practice' requires Phase 1 AIA reports and additional development information, as per the impact assessment report and/or EMPr, to be submitted in duplicate to SAHRA after completion of the study. SAHRA accepts Phase 1 AIA reports authored by professional archaeologists, accredited with ASAPA or with a proven ability to do archaeological work.

Minimum accreditation requirements include an Honours degree in archaeology or related discipline and 3 years post-university Cultural Resource Management (CRM) experience (field supervisor level). Minimum standards for reports, site documentation and descriptions are set by ASAPA in collaboration with SAHRA. ASAPA is based in South Africa, representing professional archaeology in the SADC region. ASAPA is primarily involved in the overseeing of ethical practice and standards regarding the archaeological profession. Membership is based on proposal and secondment by other professional members.

Phase 1 AIA's are primarily concerned with the location and identification of heritage sites situated within a proposed development area. Identified sites should be assessed according to their significance. Relevant conservation or Phase 2 mitigation recommendations should be made. Recommendations are subject to evaluation by SAHRA.

Conservation or Phase 2 mitigation recommendations, as approved by SAHRA, are to be used as guidelines in the developer's decision-making process.

Phase 2 archaeological projects are primarily based on salvage/mitigation excavations preceding development destruction or impact on a site. Phase 2 excavations can only be conducted with a permit, issued by SAHRA to the appointed archaeologist. Permit conditions are prescribed by SAHRA and includes (as minimum requirements) reporting back strategies to SAHRA and deposition of excavated material at an accredited repository.

In the event of a site conservation option being preferred by the developer, a site management plan, prepared by a professional archaeologist and approved by SAHRA, will suffice as minimum requirement.

After mitigation of a site, a destruction permit must be applied for with SAHRA by the applicant before development may proceed.

Human remains older than 60 years are protected by the National Heritage Resources Act, with reference to Section 36. Graves older than 60 years, but younger than 100 years fall under Section 36 of Act 25 of 1999 (National Heritage Resources Act), as well as the Human Tissues Act (Act 65 of 1983) and the jurisdiction of SAHRA. The procedure for Consultation Regarding Burial Grounds and Graves (Section 36[5]) of Act 25 of 1999) is applicable to graves older than 60 years that are situated outside a formal cemetery administrated by a local authority. Graves in this age category, located inside a formal cemetery administrated by a local authority, require the same authorisation as set out for graves younger than 60 years, in addition to SAHRA authorisation. If the grave is not situated inside a formal cemetery, but is to be relocated to one, permission from the local authority is required and all regulations, laws and by-laws, set by the cemetery authority, must be adhered to.

Human remains that are less than 60 years old are protected under Section 2(1) of the Removal of Graves and Dead Bodies Ordinance (Ordinance No. 7 of 1925), as well as the Human Tissues Act (Act 65 of 1983), and are the jurisdiction of the National Department of Health and the relevant Provincial Department of Health and must be submitted for final approval to the office of the relevant Provincial Premier. This function is usually delegated to the Provincial MEC for Local Government and Planning; or in some cases, the MEC for Housing and Welfare. Authorisation for exhumation and reinternment must also be obtained from the relevant local or regional council where the grave is situated, as well as the relevant local or regional council to where the grave is being relocated. All local and regional provisions, laws and by-laws must also be adhered to. To handle and transport human remains, the institution conducting the relocation should be authorised under Section 24 of Act 65 of 1983 (Human Tissues Act).

3 METHODOLOGY

3.1 Literature Review

A brief survey of available literature was conducted to extract data and information on the area in question to provide general heritage context into which the development would be set. This literature search included published material, unpublished commercial reports and online material, including reports sourced from the South African Heritage Resources Information System (SAHRIS).

3.2 Genealogical Society and Google Earth Monuments

Google Earth and 1:50 000 maps of the area were utilised to identify possible places where sites of heritage significance might be located; these locations were marked and visited during the field work phase. The database of the Genealogical Society was consulted to collect data on any known graves in the area.

3.3 Public Consultation and Stakeholder Engagement:

Stakeholder engagement is a key component of any EIA process, it involves stakeholders interested in, or affected by the proposed development. Stakeholders are provided with an opportunity to raise issues of concern (for the purposes of this report only heritage related issues will be included). The aim of the public consultation process was to capture and address any issues raised by community members and other stakeholders during key stakeholder and public meetings. The process involved:

- Placement of advertisements and site notices;
- Stakeholder notification (through the dissemination of information and meeting invitations);
- Stakeholder meetings undertaken with I&APs;
- Authority Consultation; and
- The compilation of the Scoping and eventually an Environmental Impact Assessment Report

Please refer to section 6 for more detail.

3.4 Site Investigation

A field survey was conducted to: a) systematically survey the proposed project area to locate, identify, record, photograph and describe sites of archaeological, historical or cultural interest; b) record GPS points of sites/areas identified as significant areas; c) determine the levels of significance of the various types of heritage resources recorded in the project area.

Table 5: Site Investigation Details

	Site Investigation
Date	29 – 31 January 2018
Season	Summer. Vegetation is high however the development footprint was adequately surveyed to record the presence of heritage sites (Figure 4)

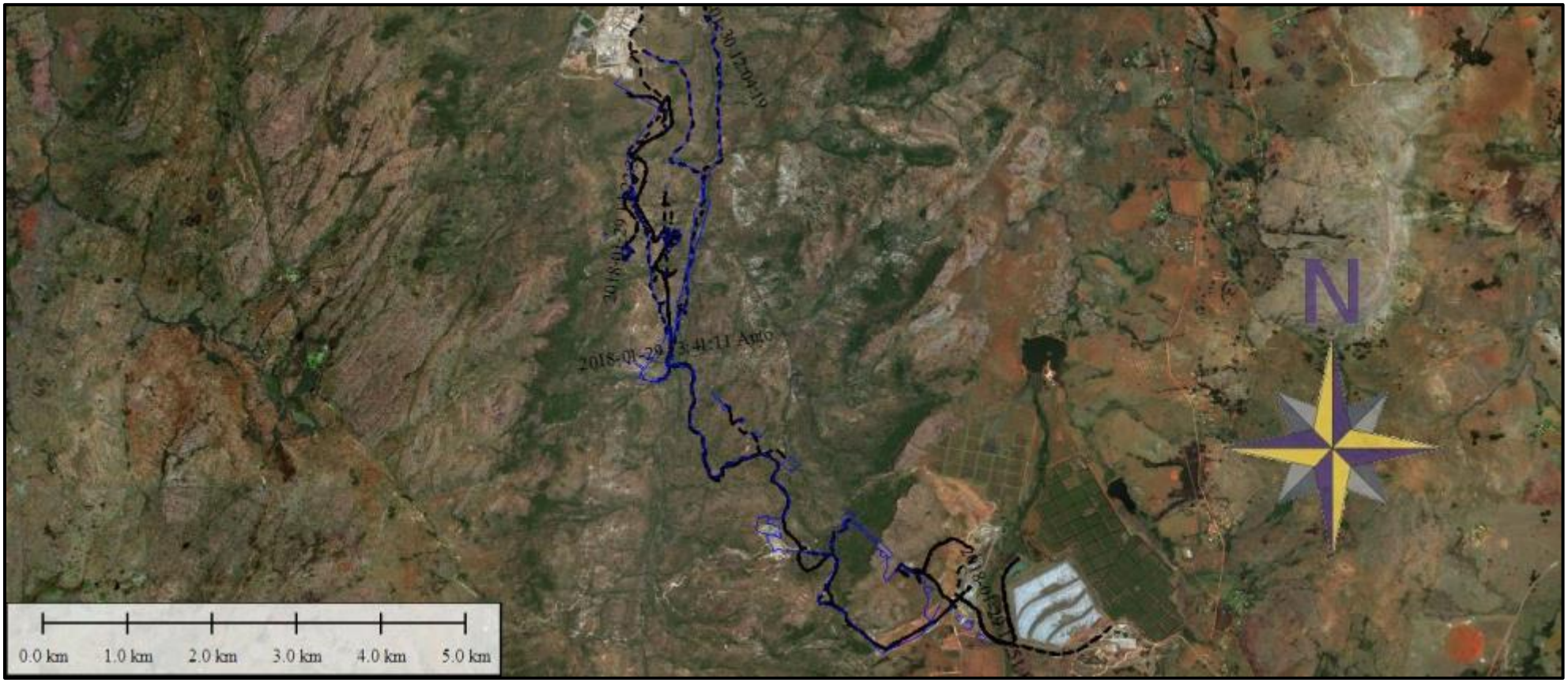

Figure 4: Track logs of survey paths in black with impact areas indicated in blue.

3.5 Site Significance and Field Rating

Section 3 of the NHRA distinguishes nine criteria for places and objects to qualify as 'part of the national estate' if they have cultural significance or other special value. These criteria are:

- Its importance in/to the community, or pattern of South Africa's history;
- Its possession of uncommon, rare or endangered aspects of South Africa's natural or cultural heritage;
- Its potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage;
- Its importance in demonstrating the principal characteristics of a particular class of South Africa's natural or cultural places or objects;
- Its importance in exhibiting particular aesthetic characteristics valued by a community or cultural group;
- Its importance in demonstrating a high degree of creative or technical achievement at a particular period;
- Its strong or special association with a particular community or cultural group for social, cultural or spiritual reasons;
- Its strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa; and
- Sites of significance relating to the history of slavery in South Africa.

The presence and distribution of heritage resources define a 'heritage landscape'. In this landscape, every site is relevant. In addition, because heritage resources are non-renewable, heritage surveys need to investigate an entire project area, or a representative sample, depending on the nature of the project. In the case of the proposed project the local extent of its impact necessitates a representative sample and only the footprint of the areas demarcated for development were surveyed. In all initial investigations, however, the specialists are responsible only for the identification of resources visible on the surface. This section describes the evaluation criteria used for determining the significance of archaeological and heritage sites. The following criteria were used to establish site significance with cognisance of Section 3 of the NHRA:

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

In addition to this criteria field ratings prescribed by SAHRA (2006) and acknowledged by ASAPA for the South African Development Community (SADC) region, were used for the purpose of this report. The recommendations for each site should be read in conjunction with section 10 of this report.

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

3.6 Impact Assessment Methodology

The criteria below are used to establish the impact rating on sites:

- The **nature**, which shall include a description of what causes the effect, what will be affected and how it will be affected.
- The **extent**, wherein it will be indicated whether the impact will be local (limited to the immediate area or site of development) or regional, and a value between 1 and 5 will be assigned as appropriate (with 1 being low and 5 being high):
- The **duration**, wherein it will be indicated whether:
  - the lifetime of the impact will be of a very short duration (0-1 years), assigned a score of 1;
  - the lifetime of the impact will be of a short duration (2-5 years), assigned a score of 2;
  - medium-term (5-15 years), assigned a score of 3;
  - long term (> 15 years), assigned a score of 4; or
  - permanent, assigned a score of 5;
  - The **magnitude**, quantified on a scale from 0-10 where; 0 is small and will have no effect on the environment, 2 is minor and will not result in an impact on processes, 4 is low and will cause a slight impact on processes, 6 is moderate and will result in processes continuing but in a modified way, 8 is high (processes are altered to the extent that they temporarily cease), and 10 is very high and results in complete destruction of patterns and permanent cessation of processes.
  - The **probability of occurrence**, which shall describe the likelihood of the impact actually occurring. Probability will be estimated on a scale of 1-5 where; 1 is very improbable (probably will not happen), 2 is improbable (some possibility, but low likelihood), 3 is probable (distinct possibility), 4 is highly probable (most likely) and 5 is definite (impact will occur regardless of any prevention measures).
  - The **significance**, which shall be determined through a synthesis of the characteristics described above and can be assessed as low, medium or high; and
  - the **status**, which will be described as either positive, negative or neutral.
  - the degree to which the impact can be reversed.
  - the degree to which the impact may cause irreplaceable loss of resources.
  - the *degree* to which the impact can be mitigated.

The **significance** is calculated by combining the criteria in the following formula:
S=(E+D+M)P
S = Significance weighting
E = Extent
D = Duration
M = Magnitude
P = Probability

The **significance weightings** for each potential impact are as follows:

- < 30 points: Low (i.e., where this impact would not have a direct influence on the decision to develop in the area),
- 30-60 points: Medium (i.e., where the impact could influence the decision to develop in the area unless it is effectively mitigated),
- 60 points: High (i.e., where the impact must have an influence on the decision process to develop in the area).

3.7 Limitations and Constraints of the study

The authors acknowledge that the brief literature review is not exhaustive on the literature of the area. Due to the subsurface nature of archaeological artefacts and high vegetation cover, the possibility exists that some features or artefacts may not have been discovered/recorded during the survey and the possible occurrence of unmarked graves and other cultural material cannot be excluded. Similarly, the depth of the deposit of heritage sites cannot be accurately determined due its subsurface nature. This report only deals with the footprint area of the proposed development and consisted of non-intrusive surface surveys. This study did not assess the impact on medicinal plants and intangible heritage as it is assumed that these components would have been highlighted through the public consultation process if relevant. It is possible that new information could come to light in future, which might change the results of this Impact Assessment.

4 Description of Socio Economic Environmental

According to Stats SA the following applies to the Thubatse Municipality: "*The population size is 335 676. The population in the municipality is constituted by 97,8% black African, 1,6% white people, with other population groups making up the remaining 0,7. The sex ratio in the municipality is 88, meaning that for every 100 women there are 88 men. Languages spoken in the municipality include Sepedi (78,6%), Tsonga (6,9%), isiNdebele (3,8%), isiZulu (2,1%) and other languages make up 8,6%. Of those aged 20 years and older, 22,6% have completed matric and 6,6% have some form of higher education. The municipality has a weak economic base and high poverty levels. The Burgersfort town in the municipality has been identified as a growth point in the province because of its mining activities. A potential to grow the economic base in the municipality, through tourism, has been brought by the availability of natural resources. Poverty alleviation projects implemented by the municipality have improved the socio-economic conditions."*

According to the IDP (2017 – 2022) the following applies to the Thaba Chweu Local Municipality*: "According to the Census results of Statss SA the population size in 1996 was at 65909, 2001 it stood at 81681 and in 2011 it was 98387 as at 2016 we sitting at 101895 and it is projected that by 2030 we will be around 113920. According to these statistics there has been an increase in population size from 1996 to 2016.*

In terms of unemployment the IDP states the following*: "In 2011 TCLM sat at an overall percentage of 20,49 which is not that bad compared to the figure in 2001. In general unemployment remains high in TCLM and in order to combat this, the LED strategy must be strengthened. The general unemployment of TCLM population comprises of classified persons i.e People with disabilities, Women and Youth."*

5 Description of the Physical Environment

The Booysendal operations are located approximately 33km west of Mashashing (Lydenburg), 40km south-southwest of Steelpoort, 32km north of Dullstroom and 21km northeast from Roossenekal. The operations straddle sections of the Limpopo and Mpumalanga provinces and as a result fall in the Greater Tubatse Local Municipality of the Sekhukhune District Municipality (Limpopo Province), as well as the Thaba Chweu Local Municipality of the Ehlanzeni District Municipality (Mpumalanga Province). The operations are described as Booysendal North (BN) and Booysendal South [BS1/2 BCM1, BCM2, Emergency Escape Portal and BS4 (previously Everest Mine)].

The area is rich in minerals and the Bushveld Igneous Complex (BIC) is mined for several valuable minerals by various mining companies. The larger area occupied by the Booysendal Operation is largely undeveloped where mining has not yet impacted (Figure 5 to 8). The topography of the Booysendal Operations area comprises rugged mountains and steep sided river valleys The main drainage via the Groot Dwars River northwards to the Der Brochen Dam (2 km north of BN) and then onto the Steelpoort River, which is a main tributary to the Olifants River. The Booysendal Operations that characterise the study area are located on higher land in the north of the site (BN), within the valley (BS1/2, BCM1, BCM2 and the Emergency Escape Portal with associated infrastructure) and on a terrace to the south east of BN (BS4 and the Valley Boxcut). The study area is characterized by existing mining infrastructure and associated roads and powerlines. From west to east, the steep valley ranges in altitude. To the south and east of the site the Steenkampsberge form a prominent feature stretching north to south (Booysendal South Expansion EMP).

The Booysendal area falls within three vegetation types, namely the Sekhukhune Mountain Bushveld, Lydenburg Montane Grassland and Sekhukhune Montane Grassland, with an ecological corridor running along the Groot Dwars River.

Figure 5. General Site Conditions

Figure 6. General Site conditions

Figure 7. Existing Mining infrastructure.

Figure 8. Existing site conditions

6 Results of Public Consultation and Stakeholder Engagement:

6.1.1 Stakeholder Identification

Adjacent landowners and the public at large were informed of the proposed activity as part of the EIA process. Site notices and advertisements notifying interested and affected parties were placed at strategic points and in local newspapers as part of the process.

7 Literature / Background Study

7.1 Literature Review

In anticipation of other mining activities in the greater study area, archaeologists have completed numerous heritage surveys including Huffman & Schoeman 2001, 2002 a and b; van Schalkwyk 2005; Roodt 2003a, 2003b, 2003c, 2005, 2008a, 2008b; Van der Walt & Fourie 2006; Van der Walt & Celliers 2009; Van der Walt 2009; 2016 and Pistorius 2007, 2010, 2011 for various Environmental Impact Assessment Reports (EIAs) and Environmental Management Programmes (EMPs). These studies provide a good understanding of the archaeology of the area and use of the wider landscape. Since 2001, heritage surveys have recorded more than 240 sites in the greater study area, ranging from the Middle Stone Age to the recent households of farm labourers and tenants.

Booysendal South (BS1/BS2 and BS3) was subjected to a heritage survey by Van Der Walt & Celliers in 2016 and a total of 49 sites are on record (please refer to Section 8.2 Table 6 for more detail on these sites) for the study area including 17 sites that are on record from previous surveys that covered sections of the study area. The Pistorius (2017) assessment identified 16 previously unknown sites within the BS4 and Merensky Portals study area (Figure 9).

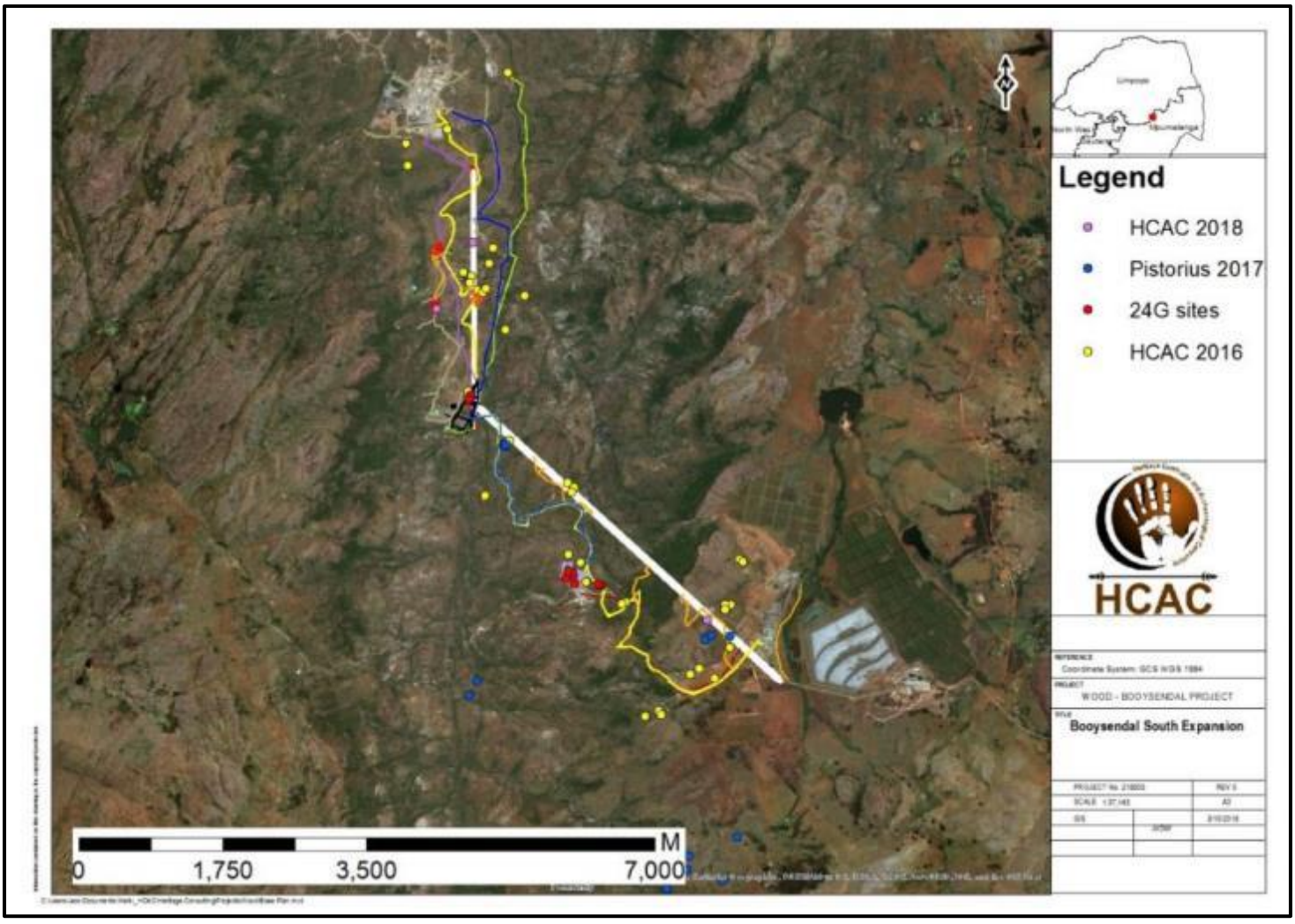

Figure 9. Site distribution map indicating recorded heritage resources in the project area.

The distribution of the sites on the landscape show different land use patterns. Many agriculturally-orientated societies (making Eiland, Leolo and Marateng pottery) built their villages in the valleys near cultivatable alluvium. Others (probably Ndebele) built terraced-settlements on basal slopes of the valley edge, while farm labourers usually lived in the valleys as well.

During the 19th Century, farmers lived around the edge of high meadows as a measure of protection. A few Middle Iron Age Eiland sites were also cited in this plateau environment. Grave sites can be expected anywhere on the landscape.

7.1.1 Genealogical Society and Google Earth Monuments

No known grave sites are indicated in the study area.

7.2 Background Information

7.2.1 Archaeology of the area

The archaeological record for the greater study area consists of the Stone Age and Iron Age.

7.2.1.1 Stone Age

South Africa has a long and complex Stone Age sequence of more than 2 million years. The broad sequence includes the Later Stone Age, the Middle Stone Age and the Earlier Stone Age. Each of these phases contains sub-phases or industrial complexes, and within these we can expect regional variation regarding characteristics and time ranges. For CRM purposes it is often only expected/ possible to identify the presence of the three main phases.

Yet sometimes the recognition of cultural groups, affinities or trends in technology and/or subsistence practices, as represented by the sub-phases or industrial complexes, is achievable (Lombard 2012). The three main phases can be divided as follows:

- Later Stone Age: associated with Khoi and San societies and their immediate predecessors. Recently to ~30 thousand years ago
- Middle Stone Age: associated with Homo sapiens and archaic modern humans. 30-300 thousand years ago.
- Earlier Stone Age: associated with early Homo groups such as Homo habilis and Homo erectus. 400 000-> 2 million years ago.

Middle Stone Age isolated artefacts are found scattered over the landscape. Finds typically include radial cores, triangular points and flakes. These artefacts are scattered too sparsely to be of any significance (Van der Walt 2016).

7.2.1.2 The Iron Age

The Iron Age as a whole represents the spread of Bantu speaking people and includes both the pre-Historic and Historic periods. It can be divided into three distinct periods:

- The Early Iron Age: Most of the first millennium AD.
- The Middle Iron Age: 10th to 13th centuries AD
- The Late Iron Age: 14th century to colonial period.

The Iron Age is characterised by the ability of these early people to manipulate and work Iron ore into implements that assisted them in creating a favourable environment to make a better living. Most of the decorated pottery found in the Dwars River Valley belongs to the stylistic facies known as *Eiland*. This style dates to between 1550 AD and 1750 AD and was made by Sotho-Tswana people (Huffman 2007: 186-189). These Middle Iron Age Sites do not have any stone walling associated with them and is found close to cultivatable soil. Some stylistic *Marateng* pottery were also recorded presumably in association with Late Iron Age stone walled settlements. *Marateng* pottery dates to between 1650 AD and 1840 AD (Huffman 2007: 207).

7.3 Historical Information

European occupation began in 1845 when trekkers established Ohrigstad and then Lydenburg a few years later. Originally, the trekkers were interested in ivory, but they also needed land and labour for agriculture. Tensions with African communities over these needs rose to such a point that the Trekkers attacked the Pedi capital in 1852. They failed, however, to destroy Pedi authority. Somewhat later, they negotiated a peace with Sekwati and traded cattle for land. Boers then started to establish farms in the region. GS Maree, for example, settled on Mareesburg in 1871. Tensions over land and labour increased again until the ZAR attacked the Pedi capital in 1876: this battle also failed to break Pedi resistance.

Some ephemeral stone walls were recorded in the study area. These walls are inconspicuous and not associated with any particular period. They were mostly built on or near rocky outcrops and are in some instances barely visible as they are covered with grass and vegetation. Several ruins occur in the study area marked by rectangular and linear walls, presumably these sites date to the historical to recent occupation of the study area.

7.3.1 Anglo-Boer War

The Anglo-Boer War was the greatest conflict that had taken place in South Africa up to date. No sites relating to the war are known to occur in the study area.

7.3.2 Cultural Landscape

The Dwarsrivier Valley is home to a rich and varied cultural landscape that ranges from the Stone and Iron Age to a recent Industrial Mining legacy. Through the various CRM projects in the Valley, landscape use and settlement patterns through time and space could be studied. It should be noted that the greater area has historically been occupied and disturbed by cultivation activities and in the recent past the area has been extensively mined and developed for this purpose. Currently the cultural landscape of the project area and its surrounds is characterized by numerous mining developments and associated electrical and access infrastructure.

8 Baseline Heritage Resources

The various studies conducted within the Booysendal South Expansion project area (Huffman & Schoeman 2001, 2002a & b, Pistorius 2007 & 2017, van der Walt & Celliers 2016) recorded a total of 68 heritage features (Annexure A & Figure 10). These studies provide a good understanding of the heritage of the area and use of the wider landscape. The heritage resources which were recorded by the various authors are similar in types and ranges. These heritage resources comprise the following:

- Stone walled sites which date from the Late Iron Age and/or the Historical Period. These settlements are mostly characterised by stone walls; the presence of mostly undiagnostic potsherds and lower grinding stones. In some instances stone walls are ephemeral and difficult to identify and some ephemeral walls demarcate terraces.
- Stone and mud brick ruins which date from the Historical Period into the recent past. These vernacular buildings are characterised by elongated or square ground plans.
- Graveyards.
- Stone cairns dating from an unknown period.
- Engravings on a dolerite boulder consisting of a circular motif which may represent the layout (ground plan) of a stone walled settlement.

As part of the current scope of work HCAC was appointed to consolidate previous work done for this project to provide a complete record of the heritage resources in the project area. Authors of previous reports assigned unique numbers to site and features, however, in order to present a uniform and consistent record of recorded heritage resources, sequential, numerical numbers were assigned to each recorded heritage resource. It should be noted that the new numbers are not site numbers but rather features numbers as in some instances several features were recorded that are all related to a single site. For example, feature numbers 5, 6, 7 and 31 that relate to a larger archaeological site.

Implemented S24G activities have destroyed the Historical ruins (Feature 9, 10 and 54) and the Iron Age features (Feature 41,42,43,44, 46, 47, 48 and 49) as indicated in Figure 10. These impacts have been addressed under the Pistorius (2017) report and were submitted to SAHRA for comment.

Known sites in the Booysendal South Expansion area are indicated in the Site Distribution Map (Figure 10) and described in Table 6. For a full site description please refer to the original report referenced in the table.

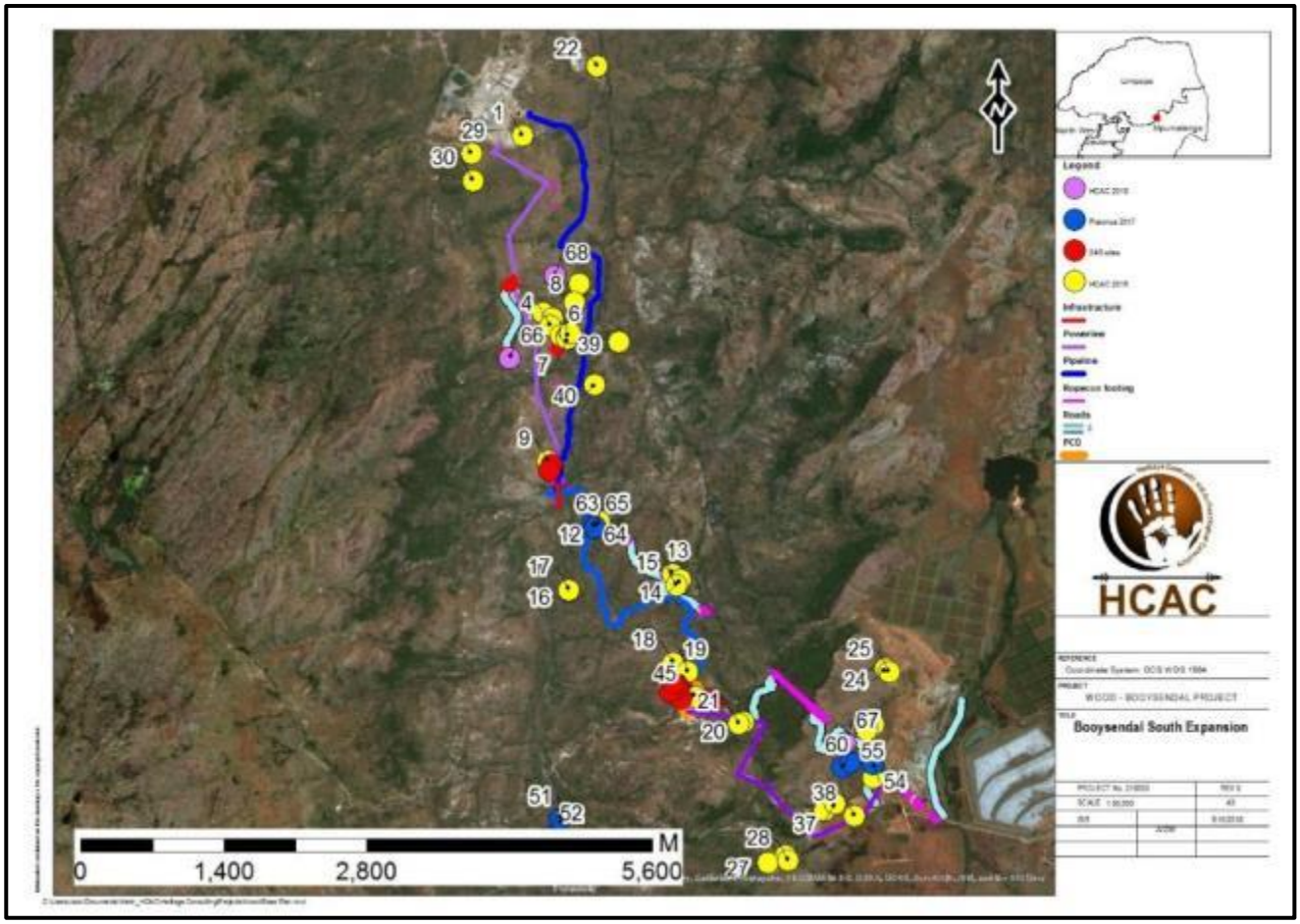

Figure 10. Site distribution Map

8.1 Heritage resources applicable to this study

An extended archaeological site and its associated features will be impacted on by the Booysendal Emergency Escape Portal. The site consists **of Feature 5, 6,7 and 31** located in an area measuring approximately 65 X 60 meters and is briefly described below:

- Feature 5 located at Longitude 30° 07' 07.7520" E and Latitude 25° 06' 57.3659" S consists of a possible deflated midden or kraal deposit (Figure 12). Finds included a small amount of slag and undecorated ceramics (Figure 11). One decorated piece was found with a cross hatching motif as decoration.
- Feature 6 located at Longitude 30° 07' 09.8977" E and Latitude 25° 06' 57.6288" S consist of a rectangular stone dressed feature (Figure 13) orientated north to south. The purpose of the stone cairn is unknown.
- Feature 7 located at Longitude 30° 07' 09.7031" E and Latitude 25° 06' 58.3201" S comprises a large communal grinding area on exposed bedrock with 7 grinding hollows (Figure 14).
- Feature 31 located at Longitude 30° 07' 10.7868" E and Latitude 25° 06' 56.5956" S and comprises various stone packed terrace walls.

Figure 11. Ceramics and slag from Feature 5.

Figure 12. Possible midden/ kraal deposit at Feature 5.

Figure 13. Feature 6

Figure 14: Communal grinding area at Feature 7

Feature 66 will also be impacted on by the proposed project and is located at Longitude 30° 06' 51.5915" E and Latitude 25° 07' 04.5192" S. The feature comprises ephemeral stone packed walls forming an enclosure. The site is highly overgrown and no other features were noted in this area. The enclosure is relatively small measuring approximately 10 meters in diameter.

Figure 15. Ephemeral stone walls at Feature 66

8.2 Heritage resources recorded in the greater project area

Table 6. Heritage baseline resources excluding features described under Section 8.1 of the report.

Feature Number	Previous Number	Type Site	TYPE SITE-Description	LONGITUDE	LATITUDE	SOURCE	DESCRIPTION	SIGNIFICANCE RATING
1	344	Historical	Historical Ruin	30° 06' 55.5553" E	25° 05' 53.9016" S	Van der Walt 2016	Site is fenced in by green palisade fence (fenced by mine). The site consists of several circular enclosures and least two rectangular enclosures.	Low to Medium Significance
2	345	Historical	Historical Ruin	30° 07' 01.9849" E	25° 06' 50.1949" S	Van der Walt 2016	Consists of the foundations of a mud dwelling (circular enclosure) as well as a rectangular foundation of a house with at least three rooms. Additional stone circle built up against natural rocks. Cultural material consists of cans and undecorated pottery, lower grinders and a possible deflated midden.	Low to Medium Significance
3	346	Historical	Historical Ruin	30° 07' 05.0483" E	25° 06' 51.8832" S	Van der Walt 2016	Consists of mud and stone foundations of the ruins of several large rectangular features. Lower grinders and undecorated pottery together with the ruins of approximately 6 houses. Burnt daga fragments.	Low to Medium Significance
4	347	Burial Site	Cemetery	30° 07' 04.3609" E	25° 06' 54.3563" S	Van der Walt 2016	Three graves with headstones. Oldest visible date is 1962.	High Significance
8	353	Historical	Historical Ruin	30° 07' 13.6201" E	25° 06' 40.8419" S	Van der Walt 2016	Rectangular stone wall structure incorporated into natural rock. Entrance is orientated to the North. Possible filled in entrance to the South. Several ephemeral terraces surround the feature. Cultural material consists of undecorated ceramics. Linear walls are located to the East and West of this feature.	Low to Medium Significance
9	354	Historical	Historical Ruin	30° 07' 03.7236" E	25° 07' 37.1279" S	Van der Walt 2016	Rectangular stone walled structure measuring 5 x 4 meters.	Low to Medium Significance
10	355	Historical	Historical Ruin	30° 07' 04.7927" E	25° 07' 38.4493" S	Van der Walt 2016	Linear stone wall, most likely associated with Feature 354. Cultural material consists of fragments of an iron 3 legged cooking pot.	Low to Medium Significance
11	356	Historical	Historical Ruin	30° 07' 04.1771" E	25° 07' 40.1231" S	Van der Walt 2016	Rectangular stone walled ruin. Entrance orientated east. Could be a goat kraal. Cultural material consists of a old plough.	Low significance
12	357	Historical	Historical Ruin	30° 07' 20.0280" E	25° 07' 56.5068" S	Van der Walt 2016	Stone walls that form a funnel towards a rectangular stone walled structure (8 x 8 meters). Fragments of undecorated pottery noted. The possibility exists that more structures might be present as the area is highly overgrown.	Low to Medium Significance

13	358	Iron Age	Terracing	30° 07' 43.1401" E	25° 08' 13.0885" S	Van der Walt 2016	Possible terrace wall measuring approximately 12 meters in length. Various other ephemeral walls are visible between rock outcrops. The site is overgrown and visibility is poor due to the vegetation.	Low significance
14	359	Stone Cairn	Stone Cairn	30° 07' 45.6851" E	25° 08' 14.9603" S	Van der Walt 2016	Two stone cairns of unknown purpose. One is rectangular in shape and the other circular. Measuring 1.2 meters in diameter.	If confirmed as graves it is of high social significance.
15	360	Iron Age	Terracing	30° 07' 44.4757" E	25° 08' 16.7065" S	Van der Walt 2016	Ephemeral terrace walls, surrounding a koppie with undecorated ceramics present on site.	Low to Medium Significance
16	362	Historical	Historical Ruin	30° 07' 10.3331" E	25° 08' 18.5640" S	Van der Walt 2016	Consists of the mud foundations of a possible residential dwelling. The ruin measures 12 by 8 meters.	Low to Medium Significance
17	363	Burial Site	Possible Graves	30° 07' 10.3835" E	25° 08' 18.1609" S	Van der Walt 2016	Stone standing upright, possibly a grave marker. Cultural material consists of a 20-c piece dating to 1989. Glass and metal fragments. Several lower grinders.	If confirmed as a grave it is of high social significance.
18	365	Stone Cairn	Stone Cairn	30° 07' 43.4497" E	25° 08' 41.3449" S	Van der Walt 2016	4 Stone cairns of unknown purpose. Could be linked with initiation. Although unlikely, it could also be possible graves. Measure between 0.5 to 1.5 / 2 meters. Cultural material includes broken lower and upper grinders, pottery - decoration indicate possible Marateng pottery (Pedi). Possible Iron Age site with terracing.	If confirmed as graves it is of high social significance.
19	366	Iron Age	Terracing	30° 07' 48.1513" E	25° 08' 44.3364" S	Van der Walt 2016	Ephemeral terrace walls. Fragments of daga with pole impressions and undecorated ceramic scatter occur on site.	Low to Medium Significance
20	367	Iron Age	Terracing	30° 08' 05.8560" E	25° 09' 00.1260" S	Van der Walt 2016	Ephemeral terrace walls with undecorated ceramics. Sheet erosion is washing ceramics downhill.	Low significance
21	368	Iron Age	Terracing	30° 08' 04.3404" E	25° 09' 00.7093" S	Van der Walt 2016	Ephemeral terrace walls with undecorated ceramics. Sheet erosion is washing ceramics downhill.	Low significance
22	369	Iron Age	Rock Engraving	30° 07' 19.4088" E	25° 05' 31.7004" S	Van der Walt 2016	Rock engravings. Circular motifs. Possibly resembling later Iron Age lay outs.	Medium significance
23	370	Iron Age	Iron Age	30° 08' 46.8169" E	25° 09' 17.9029" S	Van der Walt 2016	Disturbed area due to bulldozing activities. Several undecorated ceramics scattered over the area. The site is extensively disturbed.	Low significance
24	372	Historical	Linear Stone Wall	30° 08' 50.9171" E	25° 08' 43.1629" S	Van der Walt 2016	Linear stone wall, probably associated with the exploration road and is approximately 5 meters wide.	Low significance

25	373	Historical	Historical Ruin	30° 08' 51.9901" E	25° 08' 44.2607" S	Van der Walt 2016	Rectangular structure with a North facing entrance. Walls are well preserved. Structure measures 18 x 15 meters. Several other foundations of mud dwellings are also visible. Cultural material consists of modern iron and glass artefacts together with undecorated ceramics. the site also includes the remains of two rectangular stone packed kraals measuring 12 x 18 meters (approximately).	Low to Medium Significance
26	374	Burial Site	Cemetery	30° 08' 19.0859" E	25° 09' 42.5808" S	Van der Walt 2016	Site is highly overgrown and the number of graves could not be determined. The graves are located within a kraal wall and belongs to the Mokala family.	High Significance
27	375	Stone Cairn	Stone Cairn	30° 08' 13.5241" E	25° 09' 44.8777" S	Van der Walt 2016	Orientated north to south and measures 2.5 x 1.5 m. The cairn is of unknown purpose but could represent a grave.	If confirmed as a grave it is of high social significance.
28	376	Historical	Linear Stone Wall	30° 08' 19.9969" E	25° 09' 44.1683" S	Van der Walt 2016	Long stone packed wall close to exploration road. Measures 12 meters in length. The wall is of unknown purpose and no cultural material is present.	Low significance
29	378	Iron Age	Terracing	30° 06' 39.4199" E	25° 05' 59.6185" S	Van der Walt 2016	Terrace walls located at the foot of the mountain. Undecorated ceramics are present on site. Possible agricultural terraces leading up to Iron Age site higher up on the mountain.	Low to Medium Significance
30	379	Iron Age	Iron Age	30° 6'39.87"E	25° 6'8.13"S	Van der Walt 2016	Extensive Iron Age stone walled settlement in the saddle on top of a hill. Various enclosures with middens and archaeological deposit present. High frequency of undecorated ceramics.	Medium to high significance
32	601	Iron Age	Terracing	30° 07' 11.9820" E	25° 06' 46.8144" S	Van der Walt 2016	Terrace wall next to erosion gulley or drainage line. Measure 7 meters in a North South direction and is about half a meter high.	Low significance
33	602	Burial Site	Grave	30° 08' 47.2000" E	25° 09' 01.0000" S	Huffman and Schoeman 2002A	African grave with headstone. Located next to stone foundations of a rectangular house.	High Significance
34	603	Iron Age	Historic Pedi Complex	30° 08' 45.0000" E	25° 09' 01.0000" S	Huffman and Schoeman 2002A	Substantial Pedi Complex centres around a rock dome. The site is characterised by low stone lapa walls and burnt daga.	Low to Medium Significance
35	604	Stone Age	MSA	30° 08' 45.0000" E	25° 09' 02.8000" S	Huffman and Schoeman 2002	Middle stone Age scatter.	Low significance
36	605	Historical	Stone Kraal 2	30° 08' 31.4000" E	25° 09' 28.2000" S	Huffman and Schoeman 2002	Historic stone kraal.	Low significance
37	606	Historical	Stone Kraal	30° 08' 34.8000" E	25° 09' 26.0000" S	Huffman and Schoe	Historic stone kraal.	Low significance

						man 2002		
38	607	Burial Site	Graves	30° 08' 41" E	25° 09' 30" S	Huffman and Schoeman 2001	Graveyard Complex inside an old homestead	High Significance
39	608	Iron Age	Iron Age	30° 07' 26.2000" E	25° 06' 59.3001" S	Huffman and Schoeman 2002 B	Middle Iron age Eiland villages with burnt daga	Medium significance
40	609	Iron Age	Iron Age	30° 07' 18.6001" E	25° 07' 12.9000" S	Huffman and Schoeman 2002B	Middle Iron age Eiland villages with burnt daga	Medium significance
41	610	Iron Age	Iron Age	30° 07' 56.3401" E	25° 08' 53.6399" S	Pistorius 2007	Rudimentary Terrace walls against slope of low protrusion.	Medium significance
42	611	Iron Age	Iron Age	30° 07' 45.9600" E	25° 08' 52.6800" S	Pistorius 2007	Interrupted circular stone wall on low protrusion.	Medium significance
43	612a	Iron Age	Iron Age	30° 07' 55.2601" E	25° 08' 53.2799" S	Pistorius 2007	Rudimentary Terrace walls against slope of low protrusion.	Medium significance
44	612b	Iron Age	Iron Age	30° 07' 54.9599" E	25° 08' 52.9199" S	Pistorius 2007	Rudimentary Terrace walls against slope of low protrusion.	Medium significance
45	613	Iron Age	Iron Age	30° 07' 50.3401" E	25° 08' 52.1399" S	Pistorius 2007	Rudimentary Terrace walls against slope of low protrusion.	Medium significance
46	614	Iron Age	Iron Age	30° 07' 45.3601" E	25° 08' 49.4999" S	Pistorius 2007	Stacks of stone on flat surface. Possible boundary walls for homestead.	Medium significance
47	615	Iron Age	Iron Age	30° 07' 44.7599" E	25° 08' 48.4200" S	Pistorius 2007	Stacks of stone on flat surface. Possible boundary walls for homestead.	Medium significance
48	616	Iron Age	Iron Age	30° 07' 43.4401" E	25° 08' 47.8801" S	Pistorius 2007	Clay with pole impression marking.	Medium significance
49	617	Iron Age	Iron Age	30° 07' 42.4799" E	25° 08' 50.3400" S	Pistorius 2007	Interrupted circular stone wall on low protrusion.	Medium significance
50	H01	Historical	Historical Village	30° 08' 30.6601" E	25° 10' 40.0201" S	Pistorius 2017	Historical House Coetzee family	Medium to high significance
51	H02	Historical	Historical Village	30° 07' 07.4399" E	25° 09' 31.0199" S	Pistorius 2017	1st Hamlet in Groot Dwars River Valley	Medium to high significance
52	H03	Historical	Historical Village	30° 07' 04.0199" E	25° 09' 36.6001" S	Pistorius 2017	2nd Hamlet in Groot Dwars River Valley	Medium to high significance
53	V01	Historical	Historical Village	30° 07' 52.2599" E	25° 11' 05.9400" S	Pistorius 2017	Village against the slope of a hill	Medium to high significance
54	V02	Historical	Historical Village	30° 08' 46.9201" E	25° 09' 13.4400" S	Pistorius 2017	Village situated between and next to boulders	Medium to high significance
55	V03	Historical	Historical Village	30° 08' 39.7201" E	25° 09' 12.9600" S	Pistorius 2017	Close to GY05 dates from more recent past	Medium to high significance
56	GY01	Burial Site	Cemetery	30° 07' 07.4399" E	25° 09' 31.0199" S	Pistorius 2017	Three graves on bottom of Groot Dwars River Valley	High Significance
57	GY02	Burial Site	Cemetery	30° 08' 30.0002" E	25° 10' 45.3001" S	Pistorius 2017	Graves of Coetzee family associated with HH01	High Significance

58	GY03	Burial Site	Cemetery	30° 08' 43.9201" E	25° 10' 49.5599" S	Pistorius 2017	Graveyard of the Phetla community with 13 graves	High Significance
59	GY04	Burial Site	Cemetery	30° 08' 49.6799" E	25° 10' 32.2800" S	Pistorius 2017	Holds approximately 15 graves	High Significance
60	GY05	Burial Site	Cemetery	30° 08' 37.1401" E	25° 09' 14.6401" S	Pistorius 2017	Holds nine graves	High Significance
61	G01	Burial Site	Grave	30° 08' 22.0201" E	25° 10' 52.6199" S	Pistorius 2017	Single grave in iron frame	High Significance
62	G02	Burial Site	Grave	30° 08' 58.0800" E	25° 11' 00.7201" S	Pistorius 2017	Single grave with upright stone acting as headstone	High Significance
63	4	Burial Site	GY01	30° 07' 17.5799" E	25° 07' 58.0799" S	Additional Sites recorded S24G Pistorius 2017	GY01	High Significance
64	5	Historical	HH01	30° 07' 18.2401" E	25° 07' 58.7401" S	Additional Sites recorded S24G Pistorius 2017	HH01	Low to Medium Significance
65	6	Historical	HH02	30° 07' 18.7800" E	25° 07' 58.1399" S	Additional Sites recorded S24G Pistorius 2017	HH02	Low to Medium Significance
67	BD2	Historical	Rectangular cattle kraal	30° 08' 38.1121" E	25° 09' 06.9156" S	Van der Walt 2018	Rectangular cattle kraal	Low significance

8.3 Paleontological Resources (Section 35 of the NHRA)

An independent study was conducted by Rubidge (2017) and concluded that most of the area is underlain by Precambrian igneous rocks of the Rustenberg Layered Suite of the Bushveld Igneous Complex. This is an intrusive igneous body comprising a series of ultramafic-mafic layers and a suite of associated granitoid rocks. A very minor part of the TSF1 development will extend onto the arenaceous Steenkampsberg Formation of the Transvaal Supergroup. The geological map indicates that parts of the TSF1 development will be on unconsolidated Quaternary alluvial deposits

As the Precambrian Bushveld Igneous Complex is of igneous origin and the Precambrian arenaceous Steenkampsberg Formation of the Transvaal Supergoup is not known to host fossils it is highly unlikely that palaeontological heritage will be affected by the proposed mining development. The Quaternary alluvial sediments which are covered by vegetation in the study area are the only sedimentary deposits in the area which could host fossils of Quaternary-aged animals and plants. As these deposits are not consolidated it is very unlikely that any fossils will be present (Rubidge 2017).

8.4 Cultural Landscapes, Intangible and Living Heritage.

Long term impact on the cultural landscape is considered to be low as the surrounding area is extensively mined. Visual impacts to scenic routes and sense of place are also considered to be low as the development is in line with the existing mining character of the area.

8.5 Battlefields and Concentration Camps

There are no battlefields or concentration camp sites in the study area.

9 Potential Impact

9.1.1 Pre-Construction phase:

It is assumed that the pre-construction phase involves the removal of topsoil and vegetation as well as the establishment of infrastructure needed for the construction phase. These activities can have a negative and irreversible impact on heritage sites. Impacts include destruction or partial destruction of non-renewable heritage resources.

9.1.2 Construction Phase

During this phase, the impacts and effects are similar in nature but more extensive than the pre-construction phase. These activities can have a negative and irreversible impact on heritage sites. Impacts include destruction or partial destruction of non-renewable heritage resources.

9.1.3 Operation Phase:

No impact is envisaged during this phase.

Table 7. Impact Assessment table.

Nature: During the construction phase activities resulting in disturbance of surfaces and/or sub-surfaces may destroy, damage, alter, or remove from its original position archaeological and paleontological material or objects.		
	Without mitigation	**With mitigation (Preservation/ excavation of site)**
Extent	Regional (4)	Regional (4)
Duration	Permanent (5)	Permanent (5)
Magnitude	Low (4)	Low (3)
Probability	Probable (4)	Not Probable (2)
Significance	**52 (Medium to high)**	**24 (Low)**
Status (positive or negative)	Negative	Negative
Reversibility	Not reversible	Not reversible
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	No	Yes
Mitigation: There is a number of sites that will be impacted by the current expansion project (Site 5, 6, 7, 31 and 66) (Figure 16). For the Iron Age sites, the following mitigation measures are recommended: Feature 5, 7 and 66 should be mapped and test excavated. Site 66 should also be monitored during construction. It should be confirmed if Feature 6 is indeed a grave. Feature 68 was avoided by the developers by moving Tower 2 100 meters to the south and no further mitigation is required for this feature.		
Cumulative impacts: Other authorised projects (e.g., mining and infrastructure projects) in the area could have a cumulative impact on the heritage landscape. The added impact of Booysendal South Expansion project is seen as acceptable as this project is in line with current land use in the study area and will be constructed close to existing infrastructure, therefore minimising additional impacts on the cultural landscape. The impact on physical heritage sites can also be mitigated through preservation and mitigation of the sites.		
Residual Impacts: If sites are destroyed this results in the depletion of archaeological record of the area. However, if sites are recorded/mitigated or preserved this adds to the record of the area and can be seen as a positive impact.		

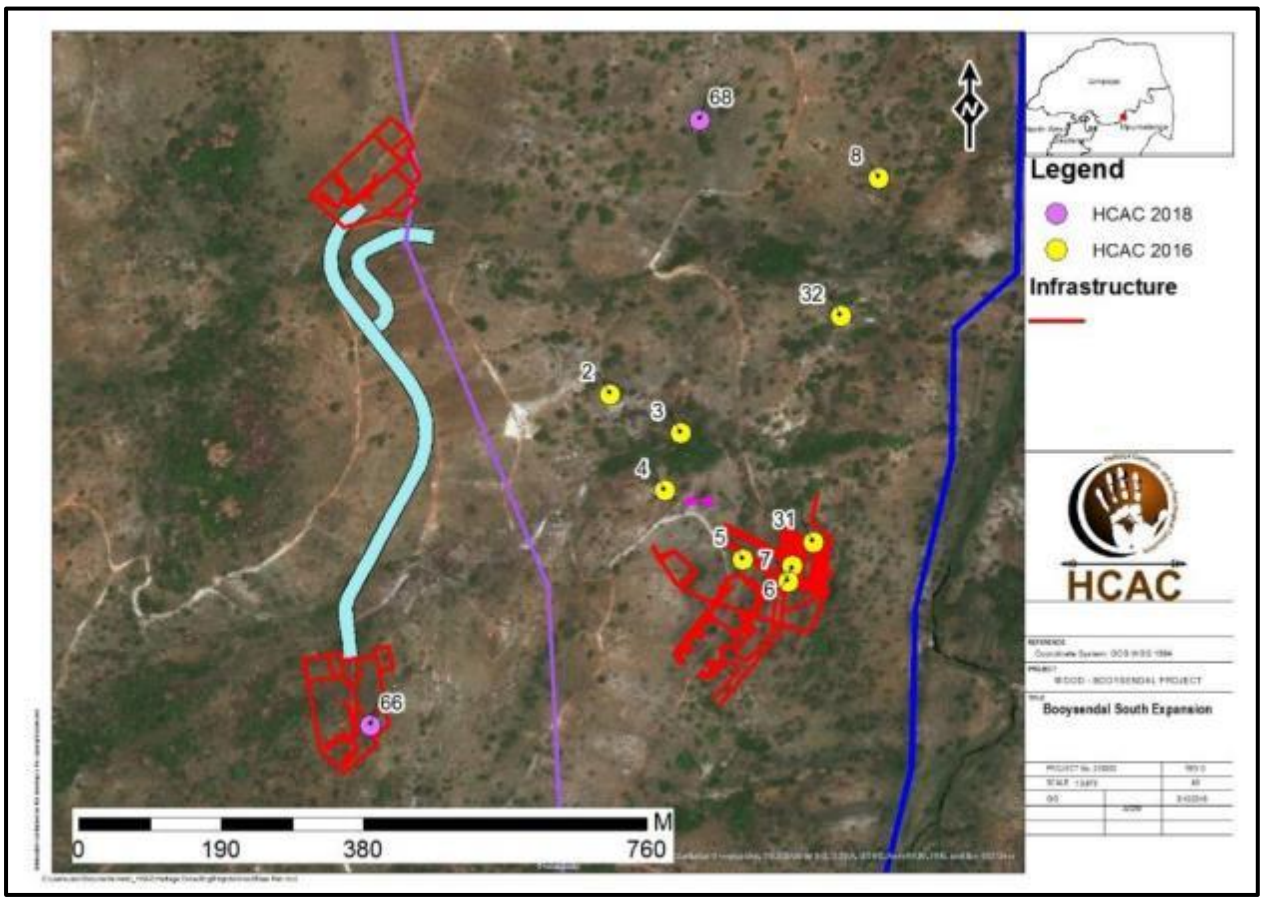

Figure 16. Map indicating sites that will be directly impacted on by the proposed expansion of the Booysendal South Expansion Project.

10 Conclusion and recommendations

Subsequent to the preparation of the overall Booysendal South Expansion EIA and EMP for the future activities there were some changes to the project definition. HCAC was appointed to conduct a Heritage Impact Assessment for the additional proposed expansion activities (Phase 2) to determine the presence of cultural heritage sites and the impact of the proposed development on these non-renewable resources.

The study area was assessed both on desktop level and by a field survey. The field survey was conducted as a non-intrusive pedestrian survey to cover the extent of the proposed development footprint. This report represents the results of the impacts of the Phase 2 expansion and to consolidate previous work done for this project to provide a complete record of the heritage resources in the project area.

The various studies conducted within the Booysendal South Expansion project area (Huffman & Schoeman 2001, 2002a & b, Pistorius 2007 & 2017, van der Walt & Celliers 2016) recorded a total of 68 heritage features (Annexure A & Figure 10). These studies provide a good understanding of the heritage of the area and use of the wider landscape. The heritage resources which were recorded by the various authors are similar in types and ranges. These heritage resources comprise the following:

- Stone walled sites which date from the Late Iron Age and/or the Historical Period. These settlements are mostly characterised by stone walls; the presence of mostly undiagnostic potsherds and lower grinding stones. In some instances, stone walls are ephemeral and difficult to identify and some ephemeral walls demarcate terraces.
- Stone and mud brick ruins which date from the Historical Period into the recent past. These vernacular buildings are characterised by elongated or square ground plans.
- Graveyards.
- Stone cairns dating from an unknown period.
- Engravings on a dolerite boulder consisting of a circular motif which may represent the layout (ground plan) of a stone walled settlement.

In addition to the recorded heritage features low density scatters of isolated Stone Age artefacts were noted in the study area. These artefacts are classified as Middle Stone Age (MSA) and consist of flakes and Levalois type cores usually found in vertic soils and are not *in-situ*. These background scatters of artefacts do not constitute an archaeological site and are scattered too sparsely to be of any significance apart from noting their presence, which has been done in previous reports (Huffman & Schoeman 2002a, van der Walt & Celliers 2016).

The palaeontology of the Booysendal South Expansion Project was assessed by Rubidge (2017) who concluded that it is extremely unlikely that fossils will be exposed as a result of the development and that the development should continue with the implementation of a protocol for finds. During the public participation process for the project no heritage concerns were raised.

Phase 2 of the Booysendal South expansion project will impact directly on five features (Table 2 and illustrated in Figure 16). The five features consist of features 5 to 7 and 31 that forms part of one archaeological site as well as feature 66 associated with the Iron Age occupation of the area.

The impacts on identified heritage resources in the study area resulting from this project can be mitigated to an acceptable level with the correct mitigation measures and management actions. Furthermore, the socio-economic benefits derived from this project outweigh the impact on heritage resources with the correct mitigation measures in place. It is therefore recommended the project is authorised from a heritage perspective on the condition that the recommendations as made in this report are implemented as part of the EMPr and based on approval from SAHRA.

The following recommendations apply:

- Site specific recommendations in Table 2 should be adhered to for features 5 – 7, 31 and 66;
- Recommendations made in previous reports (Pistorius 2017 and Van der Walt & Celliers 2016) should be adhered to;
- If in the unlikely event that fossils are exposed in Quaternary sediments in the course of the proposed development, a qualified palaeontologist must be contacted to assess the exposure for fossils so that the necessary rescue operations are implemented (Rubidge 2017);
- It is recommended that Environmental Officers (EO) or other responsible persons should be briefly inducted on heritage management and identification of heritage resources;
- Finally, a heritage specialist should assess any material change to the conceptual layout plan.

The following are conditions for authorisation of the Phase 2 expansion project:

- A Heritage Management Plan should be compiled for the Booysendal Mine;
- A Chance find procedure should be implemented for the heritage resources as detailed under Section 10.1 of this report;
- Mitigation measures must be implemented for the sites that will be impacted on as indicated in Table 2 (features 5 – 7, 31 and 66)

The table below is a summary of all heritage resources recorded during the current and previous studies for the Booysendal South Expansion project with the additional impact of the new additions to project description highlighted in yellow.

Table 8. All heritage resources recorded in past and current studies.

Site Number	Field Number	Type Site	Type Site-Description	Longitude	Latitude	Source	Description	Significance Rating	Mitigation	Cause of Impact
1	344	Historical	Historical Ruin	30° 06' 55.5553" E	25° 05' 53.9016" S	Van der Walt 2016	Site is fenced in by green palisade fence (fenced by mine). The site consists of several circular enclosures and least two rectangular enclosures.	Low to Medium Significance	Community Liaison, Test excavation, Mapping, Monitoring	No impact
2	345	Historical	Historical Ruin	30° 07' 01.9849" E	25° 06' 50.1949" S	Van der Walt 2016	Consists of the foundations of a mud dwelling (circular enclosure) as well as a rectangular foundation of a house with at least three rooms. Additional stone circle built up against natural rocks. Cultural material consists of cans and undecorated pottery, lower grinders and a possible deflated midden.	Low to Medium Significance	Community Liaison, Test excavation, Mapping, Monitoring	Inside development footprint
3	346	Historical	Historical Ruin	30° 07' 05.0483" E	25° 06' 51.8832" S	Van der Walt 2016	Consists of mud and stone foundations of the ruins of several large rectangular features. Lower grinders and undecorated pottery together with the ruins of approximately 6 houses. Burnt daga fragments.	Low to Medium Significance	Community Liaison, Test excavation, Mapping, Monitoring	Inside development footprint
4	347	Burial Site	Cemetery	30° 07' 04.3609" E	25° 06' 54.3563" S	Van der Walt 2016	Three graves with headstones. Oldest visible date is 1962.	High Significance	Graves are already fenced and should be preserved in situ.	Inside development footprint
5	350	Iron Age	Iron Age	30° 07' 07.7520" E	25° 06' 57.3659" S	Van der Walt 2016	Possible deflated midden. A little bit of slag and undecorated ceramics. One decorated piece was found with a cross hatching motif as decoration.	Low to Medium Significance	Test excavation	Inside development footprint
6	351	Stone Cairn	Stone Cairn	30° 07' 09.8977" E	25° 06' 57.6288" S	Van der Walt 2016	Rectangular stone dressing orientated north to south. Purpose is unknown but could be a possible grave.	If confirmed as a grave it is of high social significance.	Preservation in situ.	Inside development footprint
7	352	Iron Age	Communal Grinding Area	30° 07' 09.7031" E	25° 06' 58.3201" S	Van der Walt 2016	Large communal grinding area on exposed bedrock with 7 grinding hollows. Possibly associated with the Iron age.	Low to Medium Significance	Surrounding communal grinding area could contain the subsurface remains of an Iron Age site. Mapping and test excavations are recommended.	Inside development footprint

8	353	Historical	Historical Ruin	30° 07' 13.6201" E	25° 06' 40.8419" S	Van der Walt 2016	Rectangular stone wall structure incorporated into natural rock. Entrance is orientated to the North. Possible filled in entrance to the South. Several ephemeral terraces surround the feature. Cultural material consists of undecorated ceramics. Linear walls are located to the East and West of this feature.	Low to Medium Significance	Test excavation, Mapping, Monitoring	No impact
9	354	Historical	Historical Ruin	30° 07' 03.7236" E	25° 07' 37.1279" S	Van der Walt 2016	Rectangular stone walled structure measuring 5 x 4 meters.	Low to Medium Significance	Community Liaison, Test excavation, Mapping, Monitoring	Inside development footprint
10	355	Historical	Historical Ruin	30° 07' 04.7927" E	25° 07' 38.4493" S	Van der Walt 2016	Linear stone wall, most likely associated with Feature 354. Cultural material consists of fragments of an iron 3-legged cooking pot.	Low to Medium Significance	Community Liaison, Test excavation, Mapping, Monitoring	BS1/2 Infrastructure (S24)
11	356	Historical	Historical Ruin	30° 07' 04.1771" E	25° 07' 40.1231" S	Van der Walt 2016	Rectangular stone walled ruin. Entrance orientated east. Could be a goat kraal. Cultural material consists of an old plough.	Low significance	Community Liaison, Test excavation, Mapping, Monitoring	BS1/2 Infrastructure (S24)
12	357	Historical	Historical Ruin	30° 07' 20.0280" E	25° 07' 56.5068" S	Van der Walt 2016	Stone walls that form a funnel towards a rectangular stone walled structure (8 x 8 meters). Fragments of undecorated pottery noted. The possibility exists that more structures might be present as the area is highly overgrown.	Low to Medium Significance	Community Liaison, Test excavation, Mapping, Monitoring	Inside development footprint
13	358	Iron Age	Terracing	30° 07' 43.1401" E	25° 08' 13.0885" S	Van der Walt 2016	Possible terrace wall measuring approximately 12 meters in length. Various other ephemeral walls are visible between rock outcrops. The site is overgrown and visibility is poor due to the vegetation.	Low significance	Monitoring if the site will be impacted on.	Inside development footprint
14	359	Stone Cairn	Stone Cairn	30° 07' 45.6851" E	25° 08' 14.9603" S	Van der Walt 2016	Two stone cairns of unknown purpose. One is rectangular in shape and the other circular. Measuring 1.2 meters in diameter.	If confirmed as graves it is of high social significance.	Preservation in situ.	Inside development footprint
15	360	Iron Age	Terracing	30° 07' 44.4757" E	25° 08' 16.7065" S	Van der Walt 2016	Ephemeral terrace walls, surrounding a koppie with undecorated ceramics present on site.	Low to Medium Significance	Test excavation	Inside development footprint
16	362	Historical	Historical Ruin	30° 07' 10.3331" E	25° 08' 18.5640" S	Van der Walt 2016	Consists of the mud foundations of a possible residential dwelling. The ruin measures 12 by 8 meters.	Low to Medium Significance	Community Liaison, Test excavation, Mapping, Monitoring	Inside development footprint

17	363	Burial Site	Possible Graves	30° 07' 10.3835" E	25° 08' 18.1609" S	Van der Walt 2016	Stone standing upright, possibly a grave marker. Cultural material consists of a 20-c piece dating to 1989. Glass and metal fragments. Several lower grinders.	If confirmed as a grave it is of high social significance.	Preservation in situ.	Inside development footprint
18	365	Stone Cairn	Stone Cairn	30° 07' 43.4497" E	25° 08' 41.3449" S	Van der Walt 2016	4 Stone cairns of unknown purpose. Could be linked with initiation. Although unlikely, it could also be possible graves. Measure between 0.5 to 1.5 / 2 meters. Cultural material includes broken lower and upper grinders, pottery - decoration indicate possible Marateng pottery (Pedi). Possible Iron Age site with terracing.	If confirmed as graves it is of high social significance.	Test excavation	Inside development footprint
19	366	Iron Age	Terracing	30° 07' 48.1513" E	25° 08' 44.3364" S	Van der Walt 2016	Ephemeral terrace walls. Fragments of daga with pole impressions and undecorated ceramic scatter occur on site.	Low to Medium Significance	Monitoring if the site will be impacted on.	Inside development footprint
20	367	Iron Age	Terracing	30° 08' 05.8560" E	25° 09' 00.1260" S	Van der Walt 2016	Ephemeral terrace walls with undecorated ceramics. Sheet erosion is washing ceramics downhill.	Low significance	No mitigation required.	Inside development footprint
21	368	Iron Age	Terracing	30° 08' 04.3404" E	25° 09' 00.7093" S	Van der Walt 2016	Ephemeral terrace walls with undecorated ceramics. Sheet erosion is washing ceramics downhill.	Low significance	No mitigation required.	Inside development footprint
22	369	Iron Age	Rock Engraving	30° 07' 19.4088" E	25° 05' 31.7004" S	Van der Walt 2016	Rock engravings. Circular motifs. Possibly resembling later Iron Age lay outs.	Medium significance	Preservation in situ.	No impact
23	370	Iron Age	Iron Age	30° 08' 46.8169" E	25° 09' 17.9029" S	Van der Walt 2016	Disturbed area due to bulldozing activities. Several undecorated ceramics scattered over the area. The site is extensively disturbed.	Low significance	No mitigation required.	Inside Development footprint
24	372	Historical	Linear Stone Wall	30° 08' 50.9171" E	25° 08' 43.1629" S	Van der Walt 2016	Linear stone wall, probably associated with the exploration road and is approximately 5 meters wide.	Low significance	No mitigation required.	Inside Development footprint
25	373	Historical	Historical Ruin	30° 08' 51.9901" E	25° 08' 44.2607" S	Van der Walt 2016	Rectangular structure with a North facing entrance. Walls are well preserved. Structure measures 18 x 15 meters. Several other foundations of mud dwellings are also visible. Cultural material consists of modern iron and glass artefacts together with undecorated ceramics. the site also includes the remains of two rectangular stone packed kraals measuring 12 x 18 meters (approximately).	Low to Medium Significance	Community Liaison, Test excavation, Mapping, Monitoring	Inside Development footprint

26	374	Burial Site	Cemetery	30° 08' 19.0859" E	25° 09' 42.5808" S	Van der Walt 2016	Site is highly overgrown and the number of graves could not be determined. The graves are located within a kraal wall and belongs to the Mokala family.	High Significance	Preservation in situ.	Inside development footprint
27	375	Stone Cairn	Stone Cairn	30° 08' 13.5241" E	25° 09' 44.8777" S	Van der Walt 2016	Orientated north to south and measures 2.5 x 1.5 m. The cairn is of unknown purpose but could represent a grave.	If confirmed as a grave it is of high social significance.	Preservation in situ.	Inside development footprint
28	376	Historical	Linear Stone Wall	30° 08' 19.9969" E	25° 09' 44.1683" S	Van der Walt 2016	Long stone packed wall close to exploration road. Measures 12 meters in length. The wall is of unknown purpose and no cultural material is present.	Low significance	No mitigation required.	Inside development footprint
29	378	Iron Age	Terracing	30° 06' 39.4199" E	25° 05' 59.6185" S	Van der Walt 2016	Terrace walls located at the foot of the mountain. Undecorated ceramics are present on site. Possible agricultural terraces leading up to Iron Age site higher up on the mountain.	Low to Medium Significance	If the site is impacted on it is recommended that the site should be mapped and monitored.	Ropecon / Aerial rope way
30	379	Iron Age	Iron Age	30° 6'39.87"E	25° 6'8.13"S	Van der Walt 2016	Extensive Iron Age stone walled settlement in the saddle on top of a hill. Various enclosures with middens and archaeological deposit present. High frequency of undecorated ceramics.	Medium to high significance	It is preferable to preserve the site in situ if this is not possible and if the site is impacted on it is recommended that the site should be excavated, mapped and monitored.	
31	600	Iron Age	Terracing	30° 07' 10.7868" E	25° 06' 56.5956" S	Van der Walt 2016	Various stone packed terrace walls.	Low significance	No mitigation required.	Inside development footprint
32	601	Iron Age	Terracing	30° 07' 11.9820" E	25° 06' 46.8144" S	Van der Walt 2016	Terrace wall next to erosion gulley or drainage line. Measure 7 meters in a North South direction and is about half a meter high.	Low significance	Community Liaison , Test excavation, Mapping, Monitoring	Inside development footprint
33	602	Burial Site	Grave	30° 08' 47.2000" E	25° 09' 01.0000" S	Huffman and Schoeman 2002A	African grave with headstone. Located next to stone foundations of a rectangular house.	High Significance	Preservation in situ.	No impact
34	603	Iron Age	Historic Pedi Complex	30° 08' 45.0000" E	25° 09' 01.0000" S	Huffman and Schoeman 2002A	Substantial Pedi Complex centres around a rock dome. The site is characterised by low stone lapa walls and burnt daga.	Low to Medium Significance	If the site is impacted on it is recommended that the site should be mapped and monitored.	No impact
35	604	Stone Age	MSA	30° 08' 45.0000" E	25° 09' 02.8000" S	Huffman and Schoeman 2002	Middle stone Age scatter.	Low significance	No mitigation required.	No impact

36	605	Historical	Stone Kraal 2	30° 08' 31.4000" E	25° 09' 28.2000" S	Huffman and Schoeman 2002	Historic stone kraal.	Low significance	Monitoring if the site will be impacted on.	Inside development footprint
37	606	Historical	Stone Kraal	30° 08' 34.8000" E	25° 09' 26.0000" S	Huffman and Schoeman 2002	Historic stone kraal.	Low significance	Monitoring if the site will be impacted on.	Inside development footprint
38	607	Burial Site	Graves	30° 08' 41" E	25° 09' 30" S	Huffman and Schoeman 2001	Graveyard Complex inside an old homestead	High Significance	Preservation in situ	Inside development footprint
39	608	Iron Age	Iron Age	30° 07' 26.2000" E	25° 06' 59.3001" S	Huffman and Schoeman 2002 B	Middle Iron age Eiland villages with burnt daga	Medium significance		No impact
40	609	Iron Age	Iron Age	30° 07' 18.6001" E	25° 07' 12.9000" S	Huffman and Schoeman 2002B	Middle Iron age Eiland villages with burnt daga	Medium significance		No impact
41	610	Iron Age	Iron Age	30° 07' 56.3401" E	25° 08' 53.6399" S	Pistorius 2007	Rudimentary Terrace walls against slope of low protrusion.	Medium significance	Sites should be mapped, test excavated and the results recorded. It is also recommended that the presence of unmarked graves should be confirmed through community liaison. .	BS1/2 Infrastructure (S24)
42	611	Iron Age	Iron Age	30° 07' 45.9600" E	25° 08' 52.6800" S	Pistorius 2007	Interrupted circular stone wall on low protrusion.	Medium significance	Sites should be mapped, test excavated and the results recorded. It is also recommended that the presence of unmarked graves should be confirmed through community liaison. .	Cleared Area (S24)

43	612a	Iron Age	Iron Age	30° 07' 55.2601" E	25° 08' 53.2799" S	Pistorius 2007	Rudimentary Terrace walls against slope of low protrusion.	Medium significance	Sites should be mapped, test excavated and the results recorded. It is also recommended that the presence of unmarked graves should be confirmed through community liaison. .	BS1/2 Infrastructure (S24)
44	612b	Iron Age	Iron Age	30° 07' 54.9599" E	25° 08' 52.9199" S	Pistorius 2007	Rudimentary Terrace walls against slope of low protrusion.	Medium significance	Sites should be mapped, test excavated and the results recorded. It is also recommended that the presence of unmarked graves should be confirmed through community liaison. .	BS1/2 Infrastructure (S24)
45	613	Iron Age	Iron Age	30° 07' 50.3401" E	25° 08' 52.1399" S	Pistorius 2007	Rudimentary Terrace walls against slope of low protrusion.	Medium significance	Sites should be mapped, test excavated and the results recorded. It is also recommended that the presence of unmarked graves should be confirmed through community liaison. .	No Impact

46	614	Iron Age	Iron Age	30° 07' 45.3601" E	25° 08' 49.4999" S	Pistorius 2007	Stacks of stone on flat surface. Possible boundary walls for homestead.	Medium significance	Sites should be mapped, test excavated and the results recorded. It is also recommended that the presence of unmarked graves should be confirmed through community liaison. .	Cleared Area (S24)
47	615	Iron Age	Iron Age	30° 07' 44.7599" E	25° 08' 48.4200" S	Pistorius 2007	Stacks of stone on flat surface. Possible boundary walls for homestead.	Medium significance	Sites should be mapped, test excavated and the results recorded. It is also recommended that the presence of unmarked graves should be confirmed through community liaison. .	Cleared Area (S24)
48	618	Iron Age	Iron Age	30° 07' 43.4401" E	25° 08' 47.8801" S	Pistorius 2007	Clay with pole impression marking.	Medium significance	Sites should be mapped, test excavated and the results recorded. It is also recommended that the presence of unmarked graves should be confirmed through community liaison. .	Cleared Area (S24)

49	617	Iron Age	Iron Age	30° 07' 42.4799" E	25° 08' 50.3400" S	Pistorius 2007	Interrupted circular stone wall on low protrusion.	Medium significance	Sites should be mapped, test excavated and the results recorded. It is also recommended that the presence of unmarked graves should be confirmed through community liaison. .	Cleared Area (S24)
50	H01	Historical	Historical Village	30° 08' 30.6601" E	25° 10' 40.0201" S	Pistorius 2017	Historical House Coetzee family	Medium to high significance	As per Pistorius 2017	
51	H02	Historical	Historical Village	30° 07' 07.4399" E	25° 09' 31.0199" S	Pistorius 2017	1st Hamlet in Groot Dwars River Valley	Medium to high significance	As per Pistorius 2017	
52	H03	Historical	Historical Village	30° 07' 04.0199" E	25° 09' 36.6001" S	Pistorius 2017	2nd Hamlet in Groot Dwars River Valley	Medium to high significance	As per Pistorius 2017	
53	V01	Historical	Historical Village	30° 07' 52.2599" E	25° 11' 05.9400" S	Pistorius 2017	Village against the slope of a hill	Medium to high significance	As per Pistorius 2017	
54	V02	Historical	Historical Village	30° 08' 46.9201" E	25° 09' 13.4400" S	Pistorius 2017	Village situated between and next to boulders	Medium to high significance	As per Pistorius 2017	Will be destroyed ARS
55	V03	Historical	Historical Village	30° 08' 39.7201" E	25° 09' 12.9600" S	Pistorius 2017	Close to GY05 dates from more recent past	Medium to high significance	As per Pistorius 2017	
56	GY01	Burial Site	Cemetery	30° 07' 07.4399" E	25° 09' 31.0199" S	Pistorius 2017	Three graves on bottom of Groot Dwars River Valley	High Significance	As per Pistorius 2017	
57	GY02	Burial Site	Cemetery	30° 08' 30.0002" E	25° 10' 45.3001" S	Pistorius 2017	Graves of Coetzee family associated with HH01	High Significance	As per Pistorius 2017	
58	GY03	Burial Site	Cemetery	30° 08' 43.9201" E	25° 10' 49.5599" S	Pistorius 2017	Graveyard of the Phetla community with 13 graves	High Significance	As per Pistorius 2017	
59	GY04	Burial Site	Cemetery	30° 08' 49.6799" E	25° 10' 32.2800" S	Pistorius 2017	Holds approximately 15 graves	High Significance	As per Pistorius 2017	
60	GY05	Burial Site	Cemetery	30° 08' 37.1401" E	25° 09' 14.6401" S	Pistorius 2017	Holds nine graves	High Significance	As per Pistorius 2017	
61	G01	Burial Site	Grave	30° 08' 22.0201" E	25° 10' 52.6199" S	Pistorius 2017	Single grave in iron frame	High Significance	As per Pistorius 2017	
62	G02	Burial Site	Grave	30° 08' 58.0800" E	25° 11' 00.7201" S	Pistorius 2017	Single grave with upright stone acting as headstone	High Significance	As per Pistorius 2017	
63	4	Burial Site	GY01	30° 07' 17.5799" E	25° 07' 58.0799" S	Additional Sites recorded S24 G Pistorius 2017	GY01	High Significance	As per Pistorius 2017	

64	5	Historical	HH01	30° 07' 18.2401" E	25° 07' 58.7401" S	Additional Sites recorded S24 G Pistorius 2017	HH01	Low to Medium Significance	As per Pistorius 2017	
65	6	Historical	HH02	30° 07' 18.7800" E	25° 07' 58.1399" S	Additional Sites recorded S24 G Pistorius 2017	HH02	Low to Medium Significance	As per Pistorius 2017	
66	BD1	Iron Age	Ephemeral Stone Walling	30° 06' 51.5915" E	25° 07' 04.5192" S	Van der Walt 2018	Ephemeral Stone Walling	Low to Medium Significance	Mapping after which a destruction permit can be applied for. Monitoring during construction.	Inside development footprint
67	BD2	Historical	Rectangular cattle kraal	30° 08' 38.1121" E	25° 09' 06.9156" S	Van der Walt 2018	Rectangular cattle kraal	Low significance	Sufficiently recorded.	
68		Historical	Ruin	30°07'05.85"S	25°06'38.32"	Van der Walt 2018	Historical Homestead	Low to Medium Significance	Moved Tower 2 (100 m south). No further impact.	Secondary impact

10.1 Chance Find Procedures

The possibility of the occurrence of subsurface finds cannot be excluded. Therefore, if during construction any possible finds such as stone tool scatters, artefacts or bone and fossil remains are made, the operations must be stopped and a qualified archaeologist must be contacted for an assessment of the find and therefor chance find procedures should be put in place as part of the EMP. A short summary of chance find procedures is discussed below.

This procedure applies to the developer's permanent employees, its subsidiaries, contractors and subcontractors, and service providers. The aim of this procedure is to establish monitoring and reporting procedures to ensure compliance with this policy and its associated procedures. Construction crews must be properly inducted to ensure they are fully aware of the procedures regarding chance finds as discussed below.

- If during the pre-construction phase, construction, operations or closure phases of this project, any person employed by the developer, one of its subsidiaries, contractors and subcontractors, or service provider, finds any artefact of cultural significance or heritage site, this person must cease work at the site of the find and report this find to their immediate supervisor, and through their supervisor to the senior on-site manager.
- It is the responsibility of the senior on-site Manager to make an initial assessment of the extent of the find and confirm the extent of the work stoppage in that area.
- The senior on-site Manager will inform the ECO of the chance find and its immediate impact on operations. The ECO will then contact a professional archaeologist for an assessment of the finds who will notify the SAHRA.

Rubidge (2017) recommended that the following protocol for paleontological finds should be implemented as part of the EMPr: "*If in the unlikely event that fossils are exposed in Quaternary sediments in the course of the proposed development, a qualified palaeontologist must be contacted to assess the exposure for fossils so that the necessary rescue operations are implemented."*

10.2 Reasoned Opinion

The proposed project is acceptable from a heritage point of view, if the above recommendations are adhered to and based on approval from SAHRA, HCAC is of the opinion that the development can continue. If any heritage resources of significance are exposed during the proposed project the South African Heritage Resources Authority (SAHRA) should be notified immediately, all mining activities must be stopped and an archaeologist accredited with the Association for Southern African Professional Archaeologist (ASAPA) should be notify in order to determine appropriate mitigation measures for the discovered finds. This may include obtaining the necessary authorisation (permits) from SAHRA to conduct the mitigation measures

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12 Appendices:

Curriculum Vitae of Specialist

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Education:

Particulars of degrees/diplomas and/or other qualifications:

Name of University or Institution:		University of Pretoria
Degree obtained	**:**	BA Heritage Tourism & Archaeology
Year of graduation	**:**	2001
Name of University or Institution:		University of the Witwatersrand
Degree obtained	**:**	BA Hons Archaeology
Year of graduation	**:**	2002
Name of University or Institution	**:**	University of the Witwatersrand
Degree Obtained	**:**	MA (Archaeology)
Year of Graduation	:	2012
Name of University or Institution	**:**	University of Johannesburg
Degree	**:**	PhD
Year	:	Currently Enrolled

EMPLOYMENT HISTORY:

2011 – Present:	**Owner – HCAC (Heritage Contracts and Archaeological Consulting CC)**.
2007 – 2010 :	**CRM Archaeologist,** Managed the Heritage Contracts Unit at the University of the Witwatersrand.
2005 - 2007:	**CRM Archaeologist**, Director of Matakoma Heritage Consultants
2004:	**Technical Assistant**, Department of Anatomy University of Pretoria
2003:	**Archaeologist**, Mapungubwe World Heritage Site
2001 - 2002:	**CRM Archaeologists,** For R & R Cultural Resource Consultants, Polokwane
2000:	**Museum Assistant**, Fort Klapperkop.

Countries of work experience include:

Republic of South Africa, Botswana, Zimbabwe, Mozambique, Tanzania, The Democratic Republic of the Congo, Lesotho and Zambia.

SELECTED PROJECTS INCLUDE:

Archaeological Impact Assessments (Phase 1)

Heritage Impact Assessment Proposed Discharge Of Treated Mine Water Via The Wonderfontein Spruit Receiving Water Body Specialist as part of team conducting an Archaeological Assessment for the Mmamabula mining project and power supply, Botswana

Archaeological Impact Assessment Mmamethlake Landfill

Archaeological Impact Assessment Libangeni Landfill

Linear Developments

Archaeological Impact Assessment Link Northern Waterline Project At The Suikerbosrand Nature Reserve

Archaeological Impact Assessment Medupi – Spitskop Power Line,

Archaeological Impact Assessment Nelspruit Road Development

Renewable Energy developments

Archaeological Impact Assessment Karoshoek Solar Project

Grave Relocation Projects

Relocation of graves and site monitoring at Chloorkop as well as permit application and liaison with local authorities and social processes with local stakeholders, Gauteng Province.

Relocation of the grave of Rifle Man Maritz as well as permit application and liaison with local authorities and social processes with local stakeholders, Ndumo, Kwa Zulu Natal.

Relocation of the Magolwane graves for the office of the premier, Kwa Zulu Natal

Relocation of the OSuthu Royal Graves office of the premier, Kwa Zulu Natal

Phase 2 Mitigation Projects

Field Director for the Archaeological Mitigation For Booysendal Platinum Mine, Steelpoort, Limpopo Province. Principle investigator Prof. T. Huffman

Monitoring of heritage sites affected by the ARUP Transnet Multipurpose Pipeline under directorship of Gavin Anderson.

Field Director for the Phase 2 mapping of a late Iron Age site located on the farm Kameelbult, Zeerust, North West Province. Under directorship of Prof T. Huffman.

Field Director for the Phase 2 surface sampling of Stone Age sites effected by the Medupi – Spitskop Power Line, Limpopo Province

Heritage management projects

Platreef Mitigation project – mitigation of heritage sites and compilation of conservation management plan.

MEMBERSHIP OF PROFESSIONAL ASSOCIATIONS:

- Association of Southern African Professional Archaeologists. Member number 159

  Accreditation:
  - Field Director Iron Age Archaeology
  - Field Supervisor Colonial Period Archaeology, Stone Age Archaeology and Grave Relocation
- Accredited CRM Archaeologist with SAHRA
- Accredited CRM Archaeologist with AMAFA
- Co-opted council member for the CRM Section of the Association of Southern African Association Professional Archaeologists (2011 – 2012)

PUBLICATIONS AND PRESENTATIONS

- A Culture Historical Interpretation, Aimed at Site Visitors, of the Exposed Eastern Profile of K8 on the Southern terrace at Mapungubwe.
  - J van der Walt, A Meyer, WC Nienaber
  - Poster presented at Faculty day, Faculty of Medicine University of Pretoria 2003
- 'n Reddingsondersoek na Anglo-Boereoorlog-ammunisie, gevind by Ifafi, Noordwes-Provinsie. South-African Journal for Cultural History 16(1) June 2002, with A. van Vollenhoven as co-writer.
- Fieldwork Report: Mapungubwe Stabilization Project.
  - WC Nienaber, M Hutten, S Gaigher, J van der Walt
  - Paper read at the Southern African Association of Archaeologists Biennial Conference 2004
- A War Uncovered: Human Remains from Thabantšho Hill (South Africa), 10 May 1864.
  - M. Steyn, WS Boshoff, WC Nienaber, J van der Walt
  - Paper read at the 12th Congress of the Pan-African Archaeological Association for Prehistory and Related Studies 2005
- Field Report on the mitigation measures conducted on the farm Bokfontein, Brits, North West Province .
  - J van der Walt, P Birkholtz, W. Fourie
  - Paper read at the Southern African Association of Archaeologists Biennial Conference 2007
- Field report on the mitigation measures employed at Early Farmer sites threatened by development in the Greater Sekhukhune area, Limpopo Province. J van der Walt
  - Paper read at the Southern African Association of Archaeologists Biennial Conference 2008
- Ceramic analysis of an Early Iron Age Site with vitrified dung, Limpopo Province South Africa.
  - J van der Walt. Poster presented at SAFA, Frankfurt Germany 2008

- Bantu Speaker Rock Engravings in the Schoemanskloof Valley, Lydenburg District, Mpumalanga (*In Prep)*
    - J van der Walt and J.P Celliers
- Sterkspruit: Micro-layout of late Iron Age stone walling, Lydenburg, Mpumalanga. W. Fourie and J van der Walt. A Poster presented at the Southern African Association of Archaeologists Biennial Conference 2011
- Detailed mapping of LIA stone-walled settlements' in Lydenburg, Mpumalanga. J van der Walt and J.P Celliers
    - Paper read at the Southern African Association of Archaeologists Biennial Conference 2011
- Bantu-Speaker Rock engravings in the Schoemanskloof Valley, Lydenburg District, Mpumalanga. J.P Celliers and J van der Walt
    - Paper read at the Southern African Association of Archaeologists Biennial Conference 2011
- Pleistocene hominin land use on the western trans-Vaal Highveld ecoregion, South Africa, Jaco van der Walt.
    - J van der Walt. Poster presented at SAFA, Toulouse, France. Biennial Conference 2016

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