HERITAGE IMPACT ASSESSMENT

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

FOR THE PROPOSED BEESHOEK MINE OPTIMISATION PROJECT, POSTMASBURG, NORTHERN CAPE PROVINCE

Type of development:

Mine Optimisation Project

Client:

Envirogistics (Pty) Ltd

Environmental Impact Practitioner information:

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Assmang (Pty) Ltd: Beeshoek Iron Ore Mine

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Project Reference:
HCAC Project number 2116
Report date:
April 2021
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APPROVAL PAGE

Project Name	Beeshoek Mine
Report Title	Heritage Impact Assessment for the Beeshoek Mine Optimisation Project, Postmasburg, Northern Cape Province
Authority Reference Number	TBC
Report Status	Draft Report
Applicant Name	Assmang (Pty) Ltd: Beeshoek Iron Ore Mine

	Name	Qualifications and Certifications	Date
Archaeologist	Jaco van der Walt	MA Archaeology ASAPA #159 APHP #114	March 2021
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Palaeontologist	Prof Marion Bamford	PhD PaleoBotany	March 2021

DOCUMENT PROGRESS

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Amendments on Document

Date	Report Reference Number	Description of Amendment
24 May 2021	2116	Technical revision and lay out changes.

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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 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 1.3
(k) Mitigation measures for inclusion in the EMPr	Section 10.1
(I) Conditions for inclusion in the environmental authorisation	Section 10. 1.
(m) Monitoring requirements for inclusion in the EMPr or environmental authorisation	Section 10. 5.
(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 10.3
(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 EIR report
(q) Any other information requested by the competent authority	Section 13

Executive Summary

EnviroGistics (Pty) Ltd was appointed as the Environmental Assessment Practitioner (EAP) by the Proponent [Assmang (Pty) Ltd: Beeshoek Iron Ore Mine] to undertake the required Environmental Authorisation Process for the proposed Beeshoek Mine Optimisation project. EnviroGistics appointed HCAC to conduct a Heritage Impact Assessment (HIA) for the project and the study area was assessed on desktop level and by a non-intrusive pedestrian field survey. Key findings of the assessment include:

- Large sections of the study area are disturbed by existing mining activities;
- Archaeological surveys have shown rocky outcrops and hills, drainage lines, riverbanks and confluences to be prime localities for Stone Age sites/finds. This pattern was corroborated during the survey where isolated artefacts were recorded (in undisturbed areas) with a higher frequency of background scatter of artefacts in the southern section (Strategic exploration area) where several pans dot the area;
- Dense vegetation after exceptionally high rainfall limited archaeological visibility, this limitation can be successfully mitigated as outlined under the recommendations;
- The heritage survey recorded a range of heritage features including Stone Age artefacts, Ruins, Stone cairns and cemeteries;
- In terms of the palaeontological component, the area is of high paleontological sensitivity and a separate study was conducted for this aspect (Bamford 2019 & 2021). This study concluded that it is extremely unlikely that any fossils would be preserved in the Campbell Rand Subgroup stromatolites or in the loose sands of the Quaternary. There is however a very small chance that fossil may occur in palaeopans in the ancient rocks;

The project is in line with surrounding land use and the impact to heritage resources can be mitigated to an acceptable level. The project can commence provided that the recommendations in this report are adhered to and based on the South African Heritage Resource Authority (SAHRA) 's approval.

Recommendations:

- Implementation of a chance find procedure for the project;
- It is recommended that the Strategic exploration area should be subjected to a heritage walk through prior to development;
- Graves and cemeteries (BH26 and BH27) should be retained *in situ* with access for family members and a sufficient buffer zone;
- Although unlikely, the recorded stone cairns (BH12 and BH24) could represent graves and should be confirmed during the social consultation process.

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	20/03/2021

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, Guinea and Tanzania. Through this, he has a sound understanding of the IFC Performance Standard requirements, with specific reference to Performance Standard 8 – Cultural Heritage.

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ABBREVIATIONS

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
EMPr: 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:

HCAC was appointed to conduct a HIA for the proposed Mine Optimisation Project at the Beeshoek Mine, located in the Tsantsabane Local Municipality, in the Northern Cape Province (Figure 1-1 to 1-4). The report forms part of the Environmental Impact Assessment (EIA) and Environmental Management Programme Report (EMPr) for the developments.

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. 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.

During the survey, a range of heritage features were identified ranging from Stone Age artefacts to ruins, stone cairns and cemeteries. 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, compiled in support of an Environmental Authorisation application as defined by NEMA EIA Regulations section 40 (1) and (2), to be submitted to SAHRA for commenting. Upon submission to SAHRA the project will be automatically given a case number as reference. As such the EIA 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 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).

1.2 Project Description

The proposed Beeshoek Mine Optimisation project is outlined in Table 2 and 3.

Table 2: Project Description

Farm and portions	Surface Rights Area to which this project relates: • Portion 0 of the farm Beesthoek 448 RD; • Portion 1 of the farm Beesthoek 448 RD; and • Portion 4 of the farm Olynfontein 475 RD.
Magisterial District	Tsantsabane Local Municipality, which is an administrative area in the ZF Mgcawu District Municipality.
Central co-ordinate of the development	28°18'39.94"S 22°59'59.26"E
Topographic Map Number	2822BD

Table 3: Infrastructure and project activities

Type of development	Mine Optimisation project
Size of the development	Approximate areas of the Mine include: Portion o of the farm Beesthoek 448 RD (1,543ha); Portion 1 of the farm Beesthoek 448 RD (1,231ha); and Portion 4 of the farm Olynfontein 475 RD (2,168ha).
Project Components*	Assmang (Pty) Ltd is the holder of the new order rights in terms of the MPRDA in respect of high-grade hematite iron ore deposits at Beeshoek on the farms Beesthoek and Olynfontein. The mining method currently entails an opencast mining operation, which consists of five (5) active opencast pits (Village Opencast Pit, HF Opencast Pit, BF Opencast Pit, East Opencast Pit, and BN Opencast Pit). Although other opencast pits are dormant at this time, these are continuously assessed in terms of their economic value. The current resources of the Mine are approximately 97.17 million tonnes with a reserve of about 26.18 million tonnes. Beeshoek can be broadly categorised as follows: • Northern mining area (North Mine): This area comprises active as well as historical mining areas. A number of small quarries and mine residue dumps of various categories are located within this area. The area also includes the existing iron ore beneficiation plant, tailings storage facility (slimes dam), as well as various opencast pits. The BN Pit is the main operational opencast pit in this area; • Main offices, village (since demolished) and recreational area; and • Southern mining area (South Mine): This area comprises large opencast pits and associated Waste Rock Dumps (WRDs). The Village Opencast Pit and associated WRD are the main activities in this area. This area also includes a crushing and screening area as pre-preparation of the Run of Mine (ROM) iron ore before being routed by overland conveyor to the iron ore beneficiation plant located at North Mine. The projects in question are briefly summaries below: **Project 1:** Consolidation of ROM Stockpiles on South Mine In areas where individual ROM stockpiles are located, these will be consolidated to allow for further capacity and operational management. The sites required by the mine include: South ROM Stockpiles and the South BIS Stockpile. **Project 2:** Amendments to the design of existing Waste Rock Dumps in terms of the increase in heights, and allowance for final slope, which will result in extension of footprints The Mine indicated the need to increase the height of the Village Pit North WRD to 111m (currently approved at 45m) an upon rehabilitation 112m. In addition to this, there is a potential to increase various other WRDs height, which may include: HF WRD; GF WRD; Discard Dump (for this an operational layout will suffice); Village Pit North WRD; West Pit WRD (Village Pit South WRD); and East Pit WRD.

The increase in the heights will also require an increase in the footprint areas to allow for the correct slope at closure. This project also includes the demarcation of the Discard Dump and associated footprint increase in this area.

Project 3: Increase of opencast footprint areas, as well as the undertaking of detrital mining
The Mine would like to make use of the opportunity to increase the approved footprints of active opencast pits, which will include:
BN Pit;
Village North Pit;
New Village East Pit;
New Village South Pit;
BF Pit expansion;
East Pit expansion, and
New detrital mining area.
Another mining method utilised on the mine is the mining of detrital ore, where the deposits of ore are shallow enough to be scooped out of the ground for processing as opposed to employing more extensive opencast mining methods. There are a few of these detrital zones on the mine area which still need to be exploited. According to the 2006 Environmental Management Plan (EMP) Alignment Report, the Mine will mine detrital ore that is available in small pockets that are easy to mine. Detrital mining entails the excavating of loose sedimentary deposited iron ore gravel material with other rock types present due to the sedimentary deposition process within dolomite karsts. The loose material is excavated and loaded, hauled and tipped into a feed bin and then separated into sizing to be fed as contaminated material to the existing Beneficiation Plant. The fines material from the screening plant is used as rehabilitation material back into the detrital mining area. Dolomite karst depth can vary from 4m to 25m deep in specific areas. The detrital mining strategy and depth is only determined once excavation starts and the quality of iron ore has been inspected within a karst deposition area.
One new haul road is proposed with a width of about 30m:
Village Haul Road: 1,100m at width of 30m (about 3.3ha)
The BN Pit and WHIMS Plant Haul Roads will be located in areas that are mostly disturbed by existing mining activities or along existing roads.

Project 4: Optimisation of Beneficiation and implementation of the Waste Management Hierarchy
To allow Beeshoek to optimise the mining process and reduce mineral waste on site (in line with the National Waste Management Hierarchy), the Mine wishes to implement two additional Beneficiation Projects, namely a new WHIMS Plant to rework the existing slimes from the Slimes Dam and a new Jig Plant to rework low-grade material from the plant processing operations and the existing Low-Grade Stockpile (Discard Dump). This project will have numerous economic and environmental benefits.

The Mine Residue Stockpiles which have been reworked prior to the inclusion of Mine Residue Stockpiles into the NEM:WA on 24 July 2015 include:
Discard Dump, North Mine – commenced during 2005.
Slimes Dam, North Mine – reworking of this material commenced during 2012.

In this regard the mine has identified the need to include two additional plants to the beneficiation circuit of the mine, namely the WHIMS Plant and the new Jig Plant.

WHIMS Plant
o WHIMS Plant which will beneficiate slimes from the Slimes Dam and arising material from the existing Beeshoek Plant;
o WHIMS Construction Laydown Area: approx. 1.5ha.
o Within the laydown area, a 2 500m2 Staging Stockpile comprising low grade feed material will be located. This will be a designed facility which will feed the WHIMS Plant. This material will be processed material (i.e. raw material) derived from the Tailings Storage Facility (Slimes Dam, a mineral waste) All waste (oversize from the Oversize Discard Bunker and slimes) will be disposed of onto the existing Slimes Dam and no new mine residue Stockpile will be developed.
o WHIMS Plant footprint, including access road of 160m, no wider than 30m:
approximately. 4ha.
o WHIMS Plant Central Process Water Dam: 0.4ha, capacity planned at 5 000m3.
o WHIMS Plant Clarifier: tank diameter 56m, capacity 9 700m3.
o WHIMS Plant Emergency Product Stockpile: 21m2 within WHIMS Plant footprint area.
o WHIMS 1mm Product Stockpile: 300m2 within the WHIMS Plant footprint area.
o Tailings Pipeline HDPE: 315mm diameter at 750m3/hr (208.3l/s):
 1.1km (new WHIMS Plant clarifier to northern perimeter of Slimes Dam;
 1.4km (new WHIMS Plant clarifier to southern perimeter of Slimes Dam; and
 existing pipeline of 1.3km to be rerouted from existing thickener directly to the new WHIMS Plant.

	o Return Water Pipeline HDPE, 280mm diameter at 400m3/hr (111l/s): - 1.1km (rerouting of existing pipeline from Tailings Storage Facility (Slimes Dam) to Whims Plant clarifier). Process Water Pipelines: 350mm diameter - 1.3km (replacement of existing pipeline with new pipeline from Central Water Dam to new Process Water Tank (2 000m3) adjacent to existing Clarifier). o Water from Central Process Dam to Existing Beeshoek Plant: 200mm mild steel – 1.3km at 400m3/hr (111l/s). o New potable water pipeline 140mm diameter - 1.6km 100 m3/hr (28l/s) from steel potable water tank (100m3) at the new Jigs Plant to combined steel potable water/fire water tank (approximately 1 000m3, still to be confirmed pending final designs) at WHIMS Plant. o Process water tank (1000m3) adjacent to new WHIMS Plant Clarifier. and o Overland Powerline: 22kV powerline approx. 700m in length. **New Jig Plant** o New Jig Plant footprint: approx. 2.6ha. o New Jig Plant Construction Laydown Area: 2ha on existing Discard Stockpile footprint. o Feed from the existing Discard Dump (low-grade material fed into a loading bin by means of front end loaders and conveyed to the Washing and Screening Plant); o Washing and Screening Plant; o Crusher building containing a high pressure grind roll (HPGR) crusher; o Jig located in the Jig building; o MCC and transformer bay; o Re-routed existing water pipelines (buried, internal diameter 450mm); o Slurry from the new Jig Plant will be pumped to the existing Plant Thickener; o New process water tank (located near existing Plant Thickener) – 2,000m3 (this forms part of project 5). o Stockpiles [comprising of both material from the Discard Dump (also referred to as a Low Grade Stockpile] and arising low grade material from the existing Jig Beneficiation Plant). The stockpiles created from material reclaimed from the existing Low Grade Stockpile (Discard Dump) and the stockpile created with the arising material (low grade) from the existing Jig Beneficiation Plant are intermediate stockpiles created within the footprint of the existing Discard Dump (the Low Grade Intermediate Stockpile and the Arising Stockpile). Material from these intermediate stockpiles is transported to and fed into the new Jig Plant loading bin located south of the existing Low Grade Stockpile. Low low grade material from the new Jig Plant is then conveyed back to the Low Grade Stockpile footprint, deposited onto the ground and then moved back towards the existing Discard Dump. The three (3) stockpiles associated with the new Jig Plant includes the following: □ Low Grade -32+1mm Stockpile (Intermediate) (0,5ha) located between the existing Low Grade Stockpile (Discard Dump) and the new Jig Plant loading bin on the existing Low Grade Stockpile foot print. Low grade material transported to and from the intermediate stockpile by means of front end loaders. □ Arising -32+1mm Stockpile (Intermediate) (0.6ha) located between the to be constructed arisings conveyor discharge position and the new Jig Plant loading bin and within the existing Low Grade Stockpile footprint. Low grade material transported from the Arising -32+1mm Stockpile by means of front end loaders. □ Low low grade material from the new Jig Plant will be conveyed by means of earth moving equipment to positions adjoining the existing Discard Dump within the existing footprint (i.e. waste from the new Jig Plant to return to the approved Discard Dump footprint). No new stockpiles will be constructed outside of the demarcated Discard Dump or other Type 3 Stockpile footprints, these will however be demarcated as part of the EMPr and WUL processes. The area of the Low low Grade Dump (stockpile) (115m2). o New Jig Plant Conveyors: □ Approx. 25m conveyor from existing plant conveyor system to feed Jig Plant with low grade arising material; □ Approx. 330m conveyer to feed the new Jig Plant from Discard Dump to feed Discard feed bin. o New Jig Plant Roads, which are all connected: □ Road 1: 240m with a width of 30m. □ New Jig Plant Road 2: 700m with a width of 30m. □ Road 3: 280m with a width of 30m. □ Road 4: 135m with a width of about 30m □ Decommissioning of existing plant haul road: approximately 1000m in length and 30m wide. o Overhead Powerline: 22kV powerline of approx. 620m; o Rerouting of underground electrical cable: 22kV of approx. 380m. **Project 5: Water Management** The Mine will also establish additional water storage tanks on site which will include: A new additional storage tank near the existing BN Tank of 500m3. The purpose is to provide sufficient storage space for water from the approved in-pit dewatering activities;

	4x 10m3 plastic tanks at the existing clarifier, thickener area. To allow for the storage of water in the water balance system of the mine to capacitate the plant process to start up without delay; 1 x 2000 m3 process water tank adjacent to the existing Clarifier connected with a “balancing pipe”. To allow for the storage of water in the water balance system of the mine to capacitate the plant process to start up without delay; Existing Dam: Steel Dam 250m3 with capacity to store process water and allow for the storage of top-up water; Existing Dam: Zinc Dam: 90m3 with capacity to store input water where required.

**Most of these projects are in active mining areas already disturbed and the HIA only focussed on areas not previously impacted*.

1.3 Alternatives

Most of the projects presented above are located within the existing Mining Area and limited design and layout opportunities are present. Therefore, no property alternatives or location alternatives are relevant. The extent of the area assessed for the strategic exploration area allows for siting of the development to minimise impacts to heritage resources.

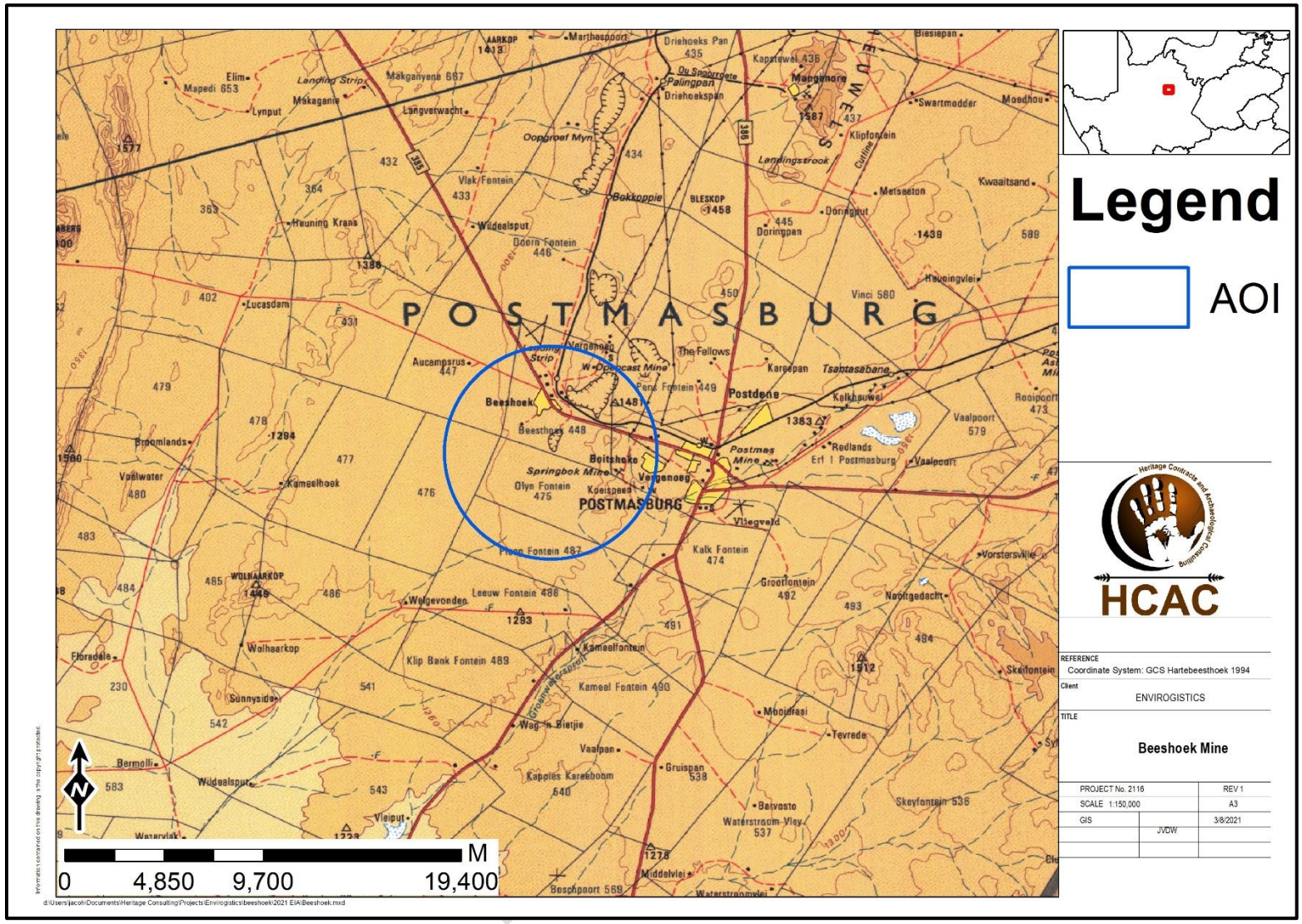


Figure 1-1. Regional setting (1: 250 000 topographical map).

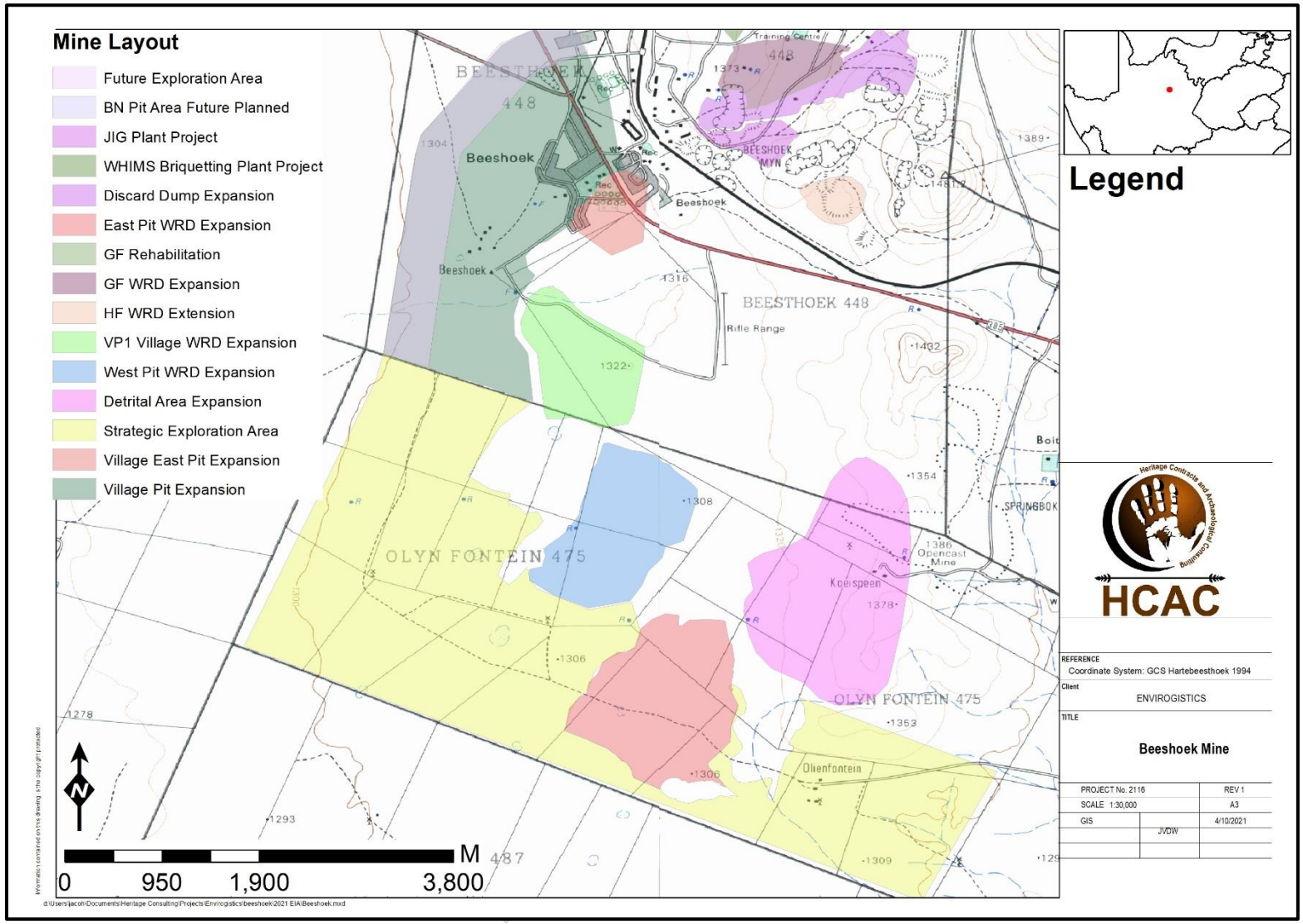


Figure 1-2: Local setting (1:50 000 topographical map).

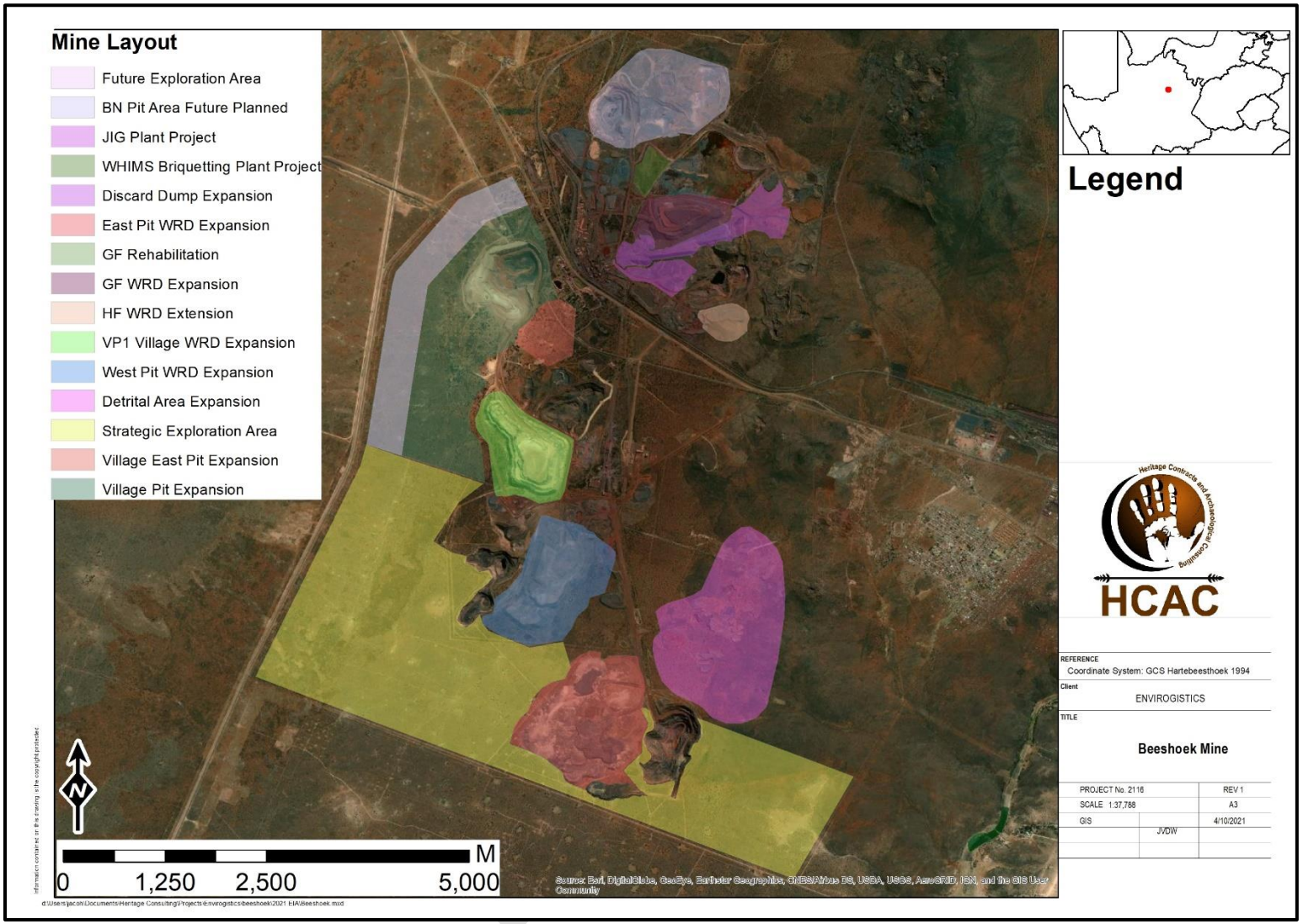


Figure 1-3. Aerial image of the development footprint.

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 PHRA if established in the province or to SAHRA. SAHRA will ultimately be responsible for the evaluation of Phase 1 HIA reports upon which review comments will be issued. 'Best practice' requires Phase 1 HIA 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 HIA 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 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 HIA'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 are 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 fieldwork 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
- The compilation of Environmental Impact Assessment (EIA) Report.

3.4 Site Investigation

The aim of the site visit was to:

a) 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 4: Site Investigation Details

	Site Investigation
Date	8-12 July 2019 and 2 to 6 February 2021.
Season	The study area is characterised by active mining limiting access and dense vegetation that hampers archaeological visibility. The study area was sufficiently covered to understand the heritage character of the area (Figure 3-1).

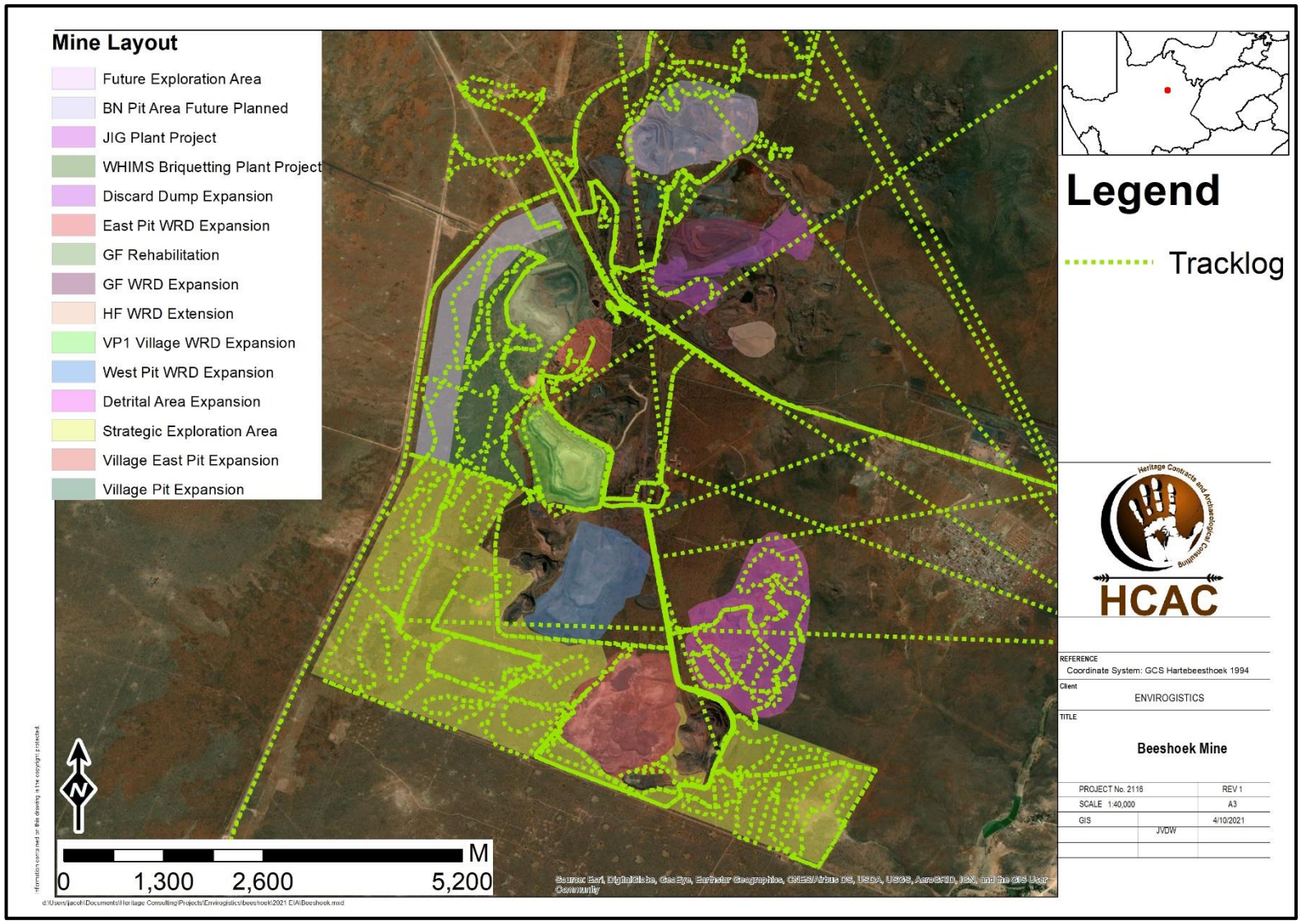


Figure 3-1: Tracklog of the survey in green.

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;
- 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 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.

Table 5. Heritage significance and field ratings

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 following impact assessment methodology was provided by the client.

The various environmental impacts and benefits of this project will be discussed in terms of impact status, extent, duration, probability, and intensity. Impact significance is regarded as the sum of the impact extent, duration, probability and intensity and a numerical rating system will be applied to evaluate impact significance; therefore, an impact magnitude and significance rating is applied to rate each identified impact in terms of its overall magnitude and significance.

To adequately assess and evaluate the impacts and benefits associated with the project it will be necessary to develop a methodology that would scientifically achieve this and to reduce the subjectivity involved in making such evaluations. To enable informed decision-making, it is necessary to assess all legal requirements and clearly defined criteria in order to accurately determine the significance of the predicted impact or benefit on the surrounding natural and social environment.
The nature or status of the impact is determined by the conditions of the environment prior to construction and operation. A discussion on the nature of the impact will include a description of what causes the effect, what will be affected and how it will be affected. The nature of the impact can be described as negative, positive, or neutral.

Status of Impact

RATING	DESCRIPTION	QUANTITATIVE RATING
Positive	A benefit to the receiving environment.	**P**
Neutral	No cost or benefit to the receiving environment.	**-**
Negative	**A cost to the receiving environment.**	**N**

Impact Extent

The extent of an impact is considered as to whether impacts are either limited in extent of if it affects a wide area or group of people. Impact extent can be site specific (within the boundaries of the development area), local, regional or national and/or international.

RATING	DESCRIPTION	QUANTITATIVE RATING
Low	Site Specific; Occurs within the site boundary.	**1**
Medium	Local; Extends beyond the site boundary; Affects the immediate surrounding environment (i.e. up to 5 km from the Project Site boundary).	**2**
High	Regional; Extends far beyond the site boundary; Widespread effect (i.e. 5 km and more from the Project Site boundary).	**3**
Very High	**National and/or international; Extends far beyond the site boundary; Widespread effect.**	**4**

Impact Duration

The duration of the impact refers to the time scale of the impact or benefit.

RATING	DESCRIPTION	QUANTITATIVE RATING
Low	Short term; Quickly reversible; Less than the project lifespan; 0 – 5 years.	**1**
Medium	Medium term; Reversible over time; Approximate lifespan of the project; 5 – 17 years.	**2**
High	**Long term; Permanent; Extends beyond the decommissioning phase; >17 years.**	**3**

Impact Probability

The probability of the impact describes the likelihood of the impact actually occurring.

RATING	DESCRIPTION	QUANTITATIVE RATING
Improbable	Possibility of the impact materialising is negligible; Chance of occurrence <10%.	**1**
Probable	Possibility that the impact will materialise is likely; Chance of occurrence 10 – 49.9%.	**2**
Highly Probable	It is expected that the impact will occur; Chance of occurrence 50 – 90%.	**3**
Definite	**I**mpact will occur regardless of any prevention measures; Chance of occurrence >90%.	**4**
Definite and Cumulative	Impact will occur regardless of any prevention measures; Chance of occurrence >90% and is likely to result in in cumulative impact.	**5**

Impact Intensity

The intensity of the impact is determined to quantify the magnitude of the impacts and benefits associated with the proposed project.

RATING	DESCRIPTION	QUANTITATIVE RATING
Maximum Benefit	Where natural, cultural and / or social functions or processes are positively affected resulting in the maximum possible and permanent benefit.	**+ 5**
Significant Benefit	Where natural, cultural and / or social functions or processes are altered to the extent that it will result in temporary but significant benefit.	**+ 4**
Beneficial	Where the affected environment is altered but natural, cultural and / or social functions or processes continue, albeit in a modified, beneficial way.	**+ 3**
Minor Benefit	Where the impact affects the environment in such a way that natural, cultural and / or social functions or processes are only marginally benefited.	**+ 2**
Negligible Benefit	Where the impact affects the environment in such a way that natural, cultural and / or social functions or processes are negligibly benefited.	**+ 1**
Neutral	Where the impact affects the environment in such a way that natural, cultural and / or social functions or processes are not affected.	**0**
Negligible	Where the impact affects the environment in such a way that natural, cultural and / or social functions or processes are negligibly affected.	**- 1**
Minor	Where the impact affects the environment in such a way that natural, cultural and / or social functions or processes are only marginally affected.	**- 2**
Average	Where the affected environment is altered but natural, cultural and / or social functions or processes continue, albeit in a modified way.	**- 3**
Severe	Where natural, cultural and / or social functions or processes are altered to the extent that it will temporarily cease.	**- 4**
Very Severe	Where natural, cultural and / or social functions or processes are altered to the extent that it will permanently cease.	**- 5**

Impact Significance

The impact magnitude and significance rating is utilised to rate each identified impact in terms of its overall magnitude and significance.

IMPACT	RATING	DESCRIPTION	QUANTITATIVE RATING
Positive	High	Of the highest positive order possible within the bounds of impacts that could occur.	**+ 12 – 16**
	Medium	Impact is real, but not substantial in relation to other impacts that might take effect within the bounds of those that could occur. Other means of achieving this benefit are approximately equal in time, cost and effort.	**+ 6 – 11**
	Low	Impacts is of a low order and therefore likely to have a limited effect. Alternative means of achieving this benefit are likely to be easier, cheaper, more effective and less time-consuming.	**+ 1 – 5**
No Impact	No Impact	Zero impact.	**0**
Negative	Low	Impact is of a low order and therefore likely to have little real effect. In the case of adverse impacts, mitigation is either easily achieved or little will be required, or both. Social, cultural, and economic activities of communities can continue unchanged.	**- 1 – 5**
	Medium	Impact is real, but not substantial in relation to other impacts that might take effect within the bounds of those that could occur. In the case of adverse impacts, mitigation is both feasible and fairly possible. Social cultural and economic activities of communities are changed but can be continued (albeit in a different form). Modification of the project design or alternative action may be required.	**- 6 – 11**
	High	**Of the highest order possible within the bounds of impacts that could occur. In the case of adverse impacts, there is no possible mitigation that could offset the impact, or mitigation is difficult, expensive, time-consuming or a combination of these. Social, cultural and economic activities of communities are disrupted to such an extent that these come to a halt.**	**- 12 - 16**

The impacts for each individual phase of the project, namely the construction, operational and decommissioning / closure phases will be rated for with and without management measures.

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 nature of heritage resources and pedestrian surveys, the possibility exists that some features or artefacts may not have been discovered/recorded and the possible occurrence of graves and other cultural material cannot be excluded. Similarly, the depth of cultural deposits and the extent 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 Environment

According to the Integrated Development Plan for the Tsantsabane Local Municipality and Census 2011 the population figures for Tsantsabane Local Municipality is 35 093, this indicates a population growth 4079 from a population size of 31 014 (Census 2001). The attributing factor to this population growth is 21 the increase of people who come to the municipal area in search for better living conditions or jobs in the mining and solar industrial sectors. The statistics indicate that although a high number of students enrolling for primary school a very low number of students complete grade 12. This has resulted in a very low probability for employment. Only 5% of those who enrolled for grade 1 make it into tertiary. Less than 15% of the population has a tertiary qualification or have completed Grade 12.

Economically Tsantsabane is known for being rich in minerals, and for its mining, agriculture, manufacturing, and farming sectors. Tsantsabane has reinvented itself over the years as one of the leading investment hot spots in the Northern Cape.

5 Results of Public Consultation and Stakeholder Engagement:

5.1.1 Stakeholder Identification

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

6 Literature / Background Study:

6.1 Literature Review (SAHRIS)

Several assessments were conducted in the general area, studies listed in Table 6 were consulted for this report.

Table 6. Studies consulted for this project.

Author	Year	Project	Findings
Morris, D.	2005	Report on a Phase 1 Archaeological Impact Assessment of proposed mining areas on the farms Ploegfontein, Klipbankfontein, Welgevonden, Leeuwfontein, Wolhaarkop and Kapstevel, west of Postmasburg, Northern Cape.	Stone Age Sites
Van Ryneveld, K.	2005	Cultural Heritage inspection of a portion Skeyfontein 536, Postmasburg Distrik Northern Cape.	Middle Stone Age Artefacts
Van der Ryst, M.	2011	Specialist report on the Stone Age and other heritage resources at Kolomela, Postmasburg, Northern Cape	Stone Age features and historical features.
Kusel, U.	2013	Phase 1 AIA report on archaeological contexts and heritage resources on the farms Heuningkrans 364 and Langverwacht 432 in the Postmasburg District Municipality of the Northern Cape Province	Structures and infrastructure relating to historical farmsteads as well as Stone Age material, sites and shelters.
Birkholtz, P	2014	Proposed Mining Activities Sections of Portion 1 of the farm Doornpan 445, north of Postmasburg, Northern Cape Province Heritage Impact Assessment	Stone Age and historical features
Van der Walt, J.	2020	Scoping study for Khumani Mine, Nortern Cape.	Numerous Stone Age find spots and a historical find spot was recorded.
Van der Walt, J.	2021	HIA for the Beeshoek Railway Siding Northern Cape	No sites

6.1.1 Genealogical Society and Google Earth Monuments

No known grave sites are indicated in the study area.

6.2 Background to the general area

6.2.1 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 Cultural Resources Management (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 2011). 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.

The larger study area has a wealth of pre-colonial archaeological sites (Morris & Beaumont 2004). Famous sites in the region include the world renowned Wonderwerk Cave to the north of the study area. Closer to Kuruman two shelters on the northern and southern faces of GaMohaan (in the Kuruman Hills north west of the town) contain Later Stone Age remains and rock paintings. Rock art is known to occur at Danielskuil to the north east and on Carter Block (Morris 2008). Middle Stone Age material is on record around the study area where archaeological surveys have shown rocky outcrops and hills, drainage lines, riverbanks and confluences to be prime localities for archaeological finds and specifically Stone Age sites, as these areas were utilized for settlement of base camps close to water and hunting ranges.

According to Morris (2005) in the immediate area to the north of the study area, the Earlier Stone Age is represented by 11 known sites (Bruce, Kathu, Uitkoms, Sishen, Demaneng, Lylyveld and Mashwening); the Middle Stone Age by 5 sites (all in the vicinity of Kathu); and the Later Stone Age by 10 sites (one on King, one at Mashwening and eight at Kathu). Rock engravings have been identified from Sishen and Bruce (the Bruce site was salvaged and recorded by Fock & Fock 1984), as well as at Beeshoek (Fock & Fock 1984; Morris 1992; Beaumont 1998). Specularite sources are known on Demaneng and Lylyveld and were mined in Stone Age times at a site on Doornfontein to the south (Beaumont 1973; Beaumont & Boshier 1974) and at Tsantsabane to the east of Postmasburg (Beaumont 1973; Thackeray et al. 1983): numerous other specularite workings have also been recorded (Beaumont 1973).

Stone Age artefacts are often recorded at industrial sites like the Beeshoek mine operations and the effects of heavy-duty earth moving machinery on the formation of lithic debitáge at open-air Stone Age/Palaeolithic sites was examined by Bradfield and Van der Walt (2018) at a site close to Kathu. The experiment with heavy-duty machinery produced only one pseudo-formal tool, most of the debitáge produced mimics that occasioned by knapping and this could attribute to some of the debitage/ artefacts identified on industrial sites.

6.2.2. Iron Age

Iron Age expansion southwards past Kuruman into the Ghaap plato and towards Postmasburg dates to the 1600's (Humphreys, 1976 and Thackeray, 1983). Definite dates for Tswana presence in the Postmasburg area are around 1805 when Lichtenstein visited the area and noted the mining activities of the Tswana (probably the Thlaping) tribes in the area. The Thlaro and Thlaping settled the area from Campbell in the east to Postmasburg and towards the Langeberg close to Olifantshoek in the north west before 1770 (Snyman, 1988). The Korana expansion after 1770 started to drive the Thlaro and Thlaping further north towards Kuruman (Shillington, 1985); Morris (2005) indicated that 3 Iron Age sites close to the study area are on record (Demaneng, Lylyveld and Kathu).

6.3 Historical information

6.3.1 Postmasburg

Postmasburg is situated on the Cape Plateau, 1300 meters above sea level. An average of 325 millimeters of rain is usually recorded in the autumn and summer seasons. This area is semi-arid and forms part of the Kalahari thornveld biome. Farming practices include livestock cultivation and, to a much lesser degree, crop farming. It could not yet be determined with certainty what group of people had lived in the Postmasburg area before the Bushmen. However, a large number of stone tools, as well as glass beads, have been found in the Blinkklipkop ("Shiny Stone Hill"), which testifies to early human activity. (Snyman 1983: 1)

Rock paintings in the area serve as evidence that the hunter gatherer Bushmen had inhabited Griqualand West for centuries. In the 1770s, the Korana (people of Nama ancestry) moved into the Postmasburg area and disrupted the Bushmen's way of life. The Korana regularly visited a primitive mine in the Blinkklipkop, which today forms part of the town of Postmasburg, to exploit shimmering substances, namely hematite and specularite, which were mixed with fat and applied to the skin to give a sought-after shiny red appearance. With the later arrival of the Tswana, Korana, Griqua and Europeans the Bushmen gradually emigrated to the Kalahari, Botswana and Namibia. (Snyman 1983: Foreword, 1-3)

Figure 6-1. 1929 photograph of Blinkklipkop, with a cave in the right middle distance. Hematite and specularite were mined here. (NARSSA *SAB, MNW: 976 MM1204/29*).

The Tswana (Western Sotho) invaded the Northern Cape about 500 years ago, but the later Hay district in which Postmasburg was located was only occupied in the early 1800s. Long before settling in this area the Tswana also undertook journeys to Blinkklipkop to mine for the cosmetic substance that they called *sibilo*. In 1813 the missionary John Campbell came across a group of Bushmen near the mine and commented the following: "Blink Mountain is a kind of Mecca to the nations around, who are constantly making pilgrimages to it, to obtain fresh supplies of the blue shining powder and the red stone." (Snyman 1983: 3-4)

In the 1820s the Griqua leader Andries Waterboer was able to expel his enemies, the Bergenaars of the Langeberge, from Blinkklip, as the area was called at the time. This became a permanent outpost of the Griqua tribe. The remaining Tswana and Bushmen either moved away or were assimilated by Waterboer's people. By the 1830s the Blinkklip population had grown to the extent that missionary of the London Mission Society, John Baillie, was stationed there for a time. Nikolaas Waterboer succeeded his father in 1853, and after this the tribe's authority in the area started to wane. Waterboer and his tribe became British subjects in 1871 after the British annexed Griqualand West. The discovery of diamonds further paved the way for white settlement in this district. (Snyman 1983: 4-5; Breutz 1963: 8)

The reason that the settlement of Europeans in Postmasburg took so long was that the country was so bare, waterless and stony that it was almost impossible to make a living there. Tribes that lived in the area occupied large parts of the country because it was so difficult to find water for their stock. It was only the later prosperity that came from mining that sparked agricultural development, the sinking of thousands of boreholes and the construction of roads. (Breutz 1963: 21)

Farms were surveyed by the British in the Griekwastad district in the 1870s, and between 1876 and 1878 the first farms owned by Europeans were purchased in this area. There were still a number of Griqua landowners in the area as well. The Griqualand West Rebellion disrupted life in the region in 1878, causing some to move away. In 1880 the Griqualand West district was incorporated into the Cape Colony and brought under formal administration. As of the early 1880s a much larger area surrounding Blinkklip was surveyed and more white settlers moved into the area. It was however only in 1882 with the establishment of a Reformed Church five kilometers south of Blinkklip that this settlement started to gain prominence. Between 1884 the Magistrate of the Hay district, J. J. Christie, lobbied for the establishment of a town at Blinkklip. This was already the most populous part of the Hay district. By the late 1880s the Reformed Church and its members were also campaigning for the establishment of the town, and on 30 November 1889 it was finally decided that the church would move to Blinkklip. The church was consecrated in Blinkklip on 28 February 1891, and a new Reformed Church building was completed in 1908. (Snyman 1983: 5-10, 43)

Figure 6-2. 1891 consecration of the Reformed Church. (Snyman 1983: 43)

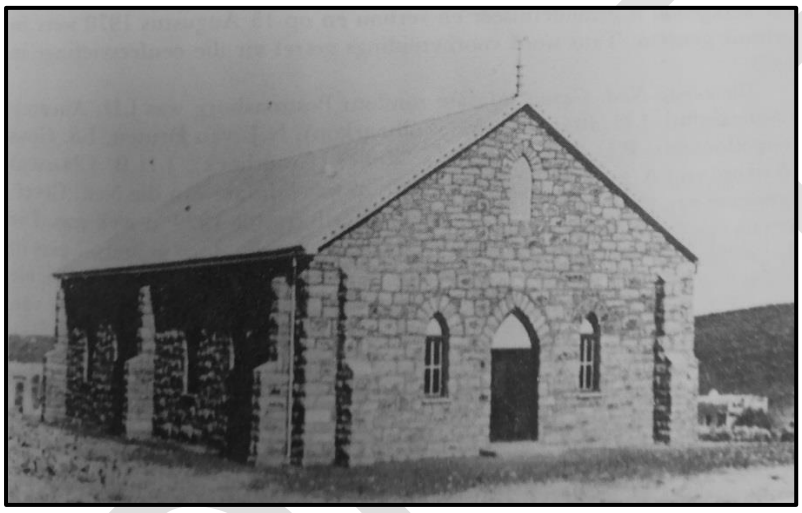


Figure 6-3. Reformed Church building that was completed in 1908. (Snyman 1983: 43)

It was only in 1891 that 82 town plots were surveyed around the existing police station at Blinkklip. In the same year members of the church petitioned the Commissioner of Crown Lands to rename this town Postmasburg, in remembrance of Professor Dirk Postma, a minister of the Dutch Reformed Church in South Africa. This name change was affected in April 1892. (Snyman 1983: 10).

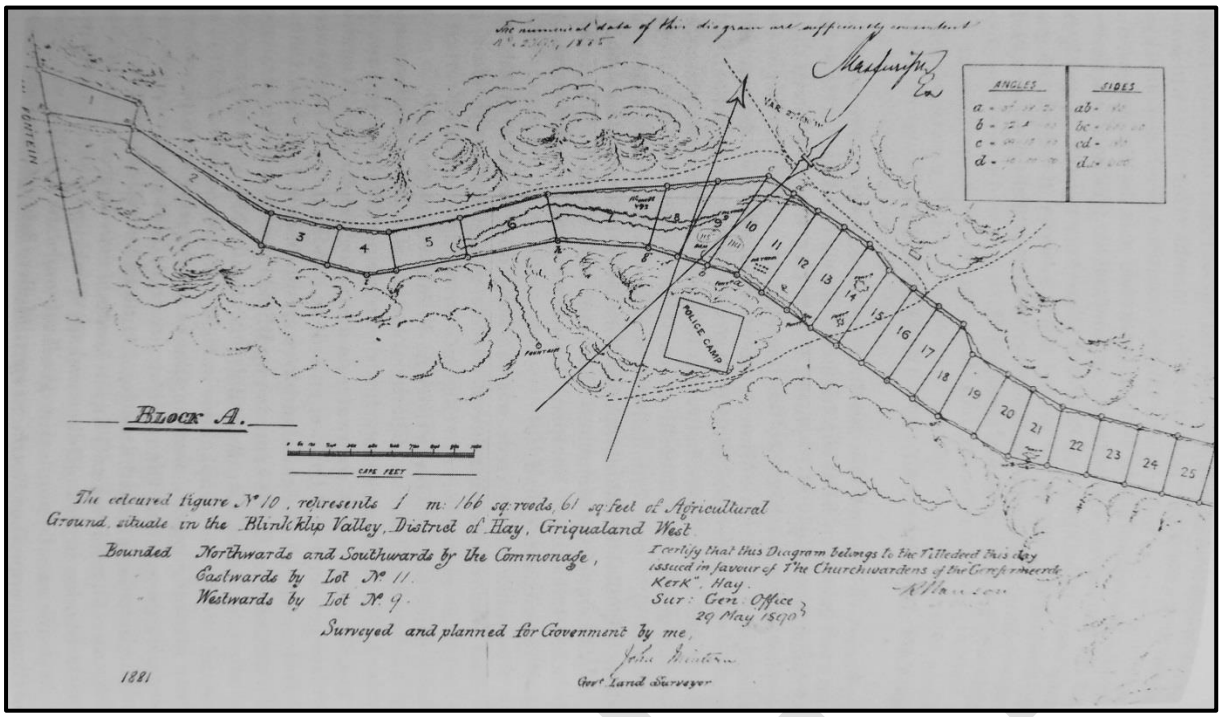


Figure 6-4. Portion of the first agricultural plots that were surveyed by John Minters in 1881 in the Blinkklip Valley. (Snyman 1983: 6)

By June 1892 there were only three buildings in the town of Postmasburg: a police station, a church building and a small house belonging to a policeman. This soon changed, and by March 1893 the little settlement that was established around a church had a post office, two shops, a partially completed school building and twenty dwelling houses. The town's first town management council was elected in May of that year. (Snyman 1983: 10-11)

The manganese fields in the Postmasburg area were opened for prospecting in 1922, and this greatly boosted the development of the town and caused an influx of new residents. The economic depression of the 1930 adversely affected mining in the area, but the town economy could still rely on the agricultural sector. Postmasburg became a municipality in 1936. (Snyman 1983: 12)

6.3.2 Manganese and Beeshoek:

Manganese was discovered on the farm Doornfontein in 1922. By that time it was already known that manganese deposits could be found in the area, but it was Mr. T. L. H. Shone that started seriously mining this mineral and who alerted others to its importance. Today he is known as an important figure in the establishment of the manganese trade in South Africa. In 1924 Shone established the Union Manganese Mines and Minerals Limited and applied to prospect for manganese on a number of farms. Dr. A. L. Hall published a geological report on South Africa in 1925, which also helped to get the attention of mining companies. In December 1926 Niels Langkilde and A. J. Bester established a second company, the South African Manganese Limited. The Union Government started showing interest in the manganese mining industry in the years to come, especially after the establishment of YSKOR was approved and when a detailed geological report on the area was published by Dr. L. T. Nel in 1929. Since then the manganese fields of Postmasburg have been exploited, and the most important deposits were found on Beeshoek, Doornfontein, Paling, Glosam, Lohatla and Bishop. (Snyman 1983: 29; NARSSA *SAB, MNW: 976 MM1204/29*)

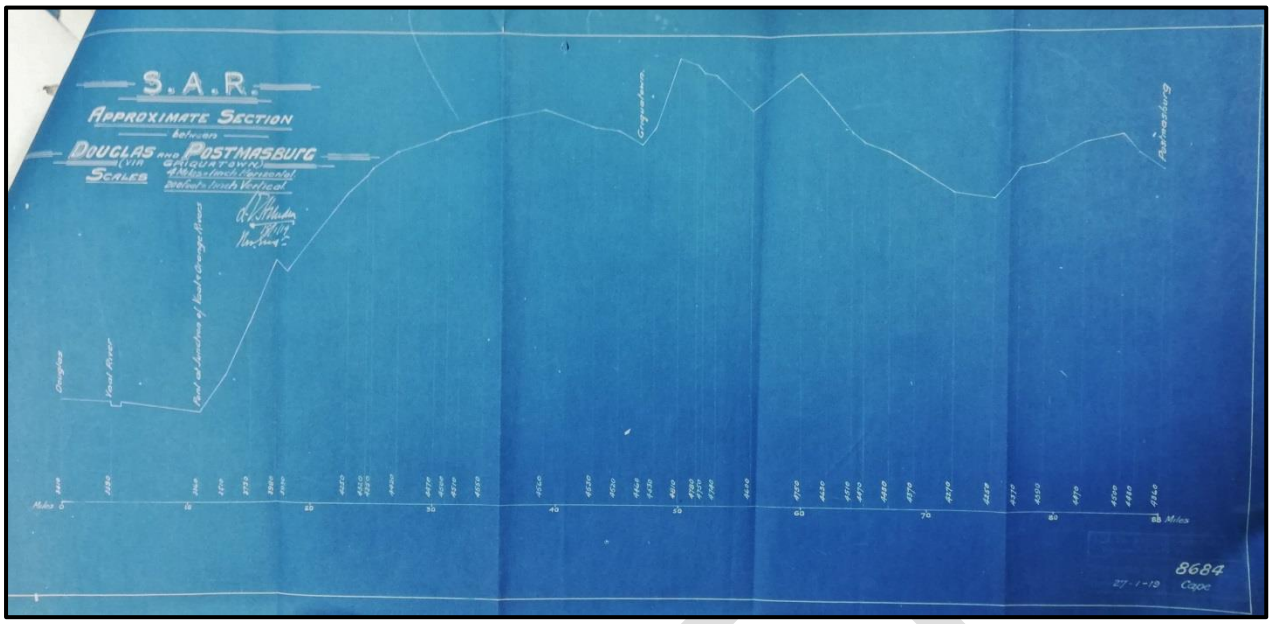


Figure 6-5. 1919 diagram showing the section of the railway between Douglas and Postmasburg. (NARSSA *SAB, SAS: 834 P4/7/41*)

In 1929 the British Swiss International Corporation Limited founded the Manganese Corporation Limited (or Mancorp) to mine for manganese to the north west of Postmasburg on its Beeshoek property. The corporation negotiated with the Minister of Railways to extend the railway from Koopmansfontein to Postmasburg, and this was a great boost for manganese mining in the area. A side line to Beeshoek and Lohatla was constructed in 1930, for the transport of manganese. In 1917, even before major mining operations had started in the Postmasburg area, planning for the construction of a railway from Douglas to Postmasburg had already begun. The productiveness of the soil and production of agricultural produce served as extra motivation. (Snyman 1983: 29-30; NARSSA *SAB, SAS: 834 P4/7/41;* NARSSA *SAB, MNW: 976 MM1204/29*)

By 1930 about 200 Europeans and 1500 black workers were employed by the Manganese Corporation Limited on Beeshoek. In February of the same year there was a disturbance at this mine when a white overseer and a black worker got into a scuffle and drew a crowd of onlookers. A white worker indiscreetly fired a shot in the neighborhood of the white quarters some distance from the compound with the intention of proving that he was not unarmed. Later that day a group of about 60 black workers went to the compound manager's house to complain about the events of the day. The matter was investigated and the overseer was reprimanded. This was written off as a regrettable but minor event. (NARSSA *SAB, MNW: 1025 MM1245/30;* (NARSSA *TAB, GNLB: 410 73/17*)

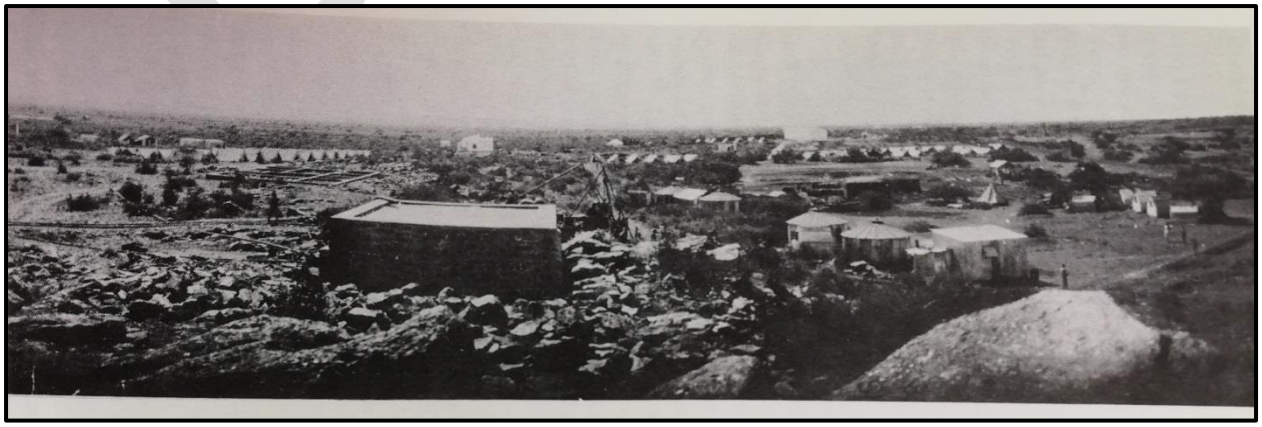


Figure 6-6. 1930 photograph of Beeshoek. (Snyman 1983: 28)

The international Depression stopped Mancorp's operation in its tracks between 1931 and 1933. Several small mining companies were amalgamated during this time and became the South African Manganese Limited (SAM) and Associated Manganese Mines of South Africa Limited (AMMOSAL). With the influx of mine workers the mining towns of Manganore and Lohatla, as well as Mancorp Mine on Beeshoek, were established between 1935 and 1937. The Second World War (1939-1945) caused another dip in the manganese market, as the mineral could not be exported during this time. After the war the international demand for manganese intensified. The production of iron ore in the area also gained importance after 1948. Assmang (previously known as AMMOSAL) mined iron ore at Beeshoek, and SAMANGAN at Manganore. (Snyman 1983: 29-30; Snyman 1993: 43; Assmang 2016; Breutz 1963: 12)

The Kalahari manganese field was opened for prospecting in the 1950s, causing most of the larger mining companies to withdraw from the Postmasburg area. Smaller companies however continued operations. By 1966 manganese and iron ore mining in the area started to fizzle out, due to a declining market, high production costs and shrinking reserves. By the late 1970s most of the smaller mines had been closed. (Snyman 1983: 22, 29-30)

By 1961 Associated Manganese owned a mine on Beeshoek, which by then formed part of the Postmasburg district. On 11 November 1962 there was a brawl between a number of Xhosa workers and Zulu and Bechuana workers that were all employed at the Palyn Mine. The Xhosa workers felt that the mining company had given the other groups preferential treatment, and this is what had caused the friction. Sentences were imposed on 22 of the 86 accused for instigating public violence. (NARSSA *SAB, BAO: 2370 C31/3/71/2*)

In 1966, Associated Manganese Mines employed 1915 black women and 1761 men on its Beeshoek mine. These employees were housed in single and family quarters on Beeshoek. It was reported by the Inspector of Bantu Labourers that the living conditions at the mine were good. (NARSSA *SAB, BAO: 2370 C31/3/71/2*)

By 1962 Eskom power reached Beeshoek, and primitive mining methods gave way to industrial machinery. By 1964 the first iron ore was exported by Assmang, and in 1970 this company became the biggest individual exporter of iron ore in South Africa. During the 1970s Assmang struck a deal with US Steel, who agreed to buy iron ore for at least 15 years. Beeshoek was consequently upgraded and the scattered quarries on the property were consolidated into open-cast pits. In 1975 the Beeshoek iron ore facilities were enlarged – this included the commissioning of a full washing and screening plant and a jig plant. During the 1980s Assmang reached an agreement with Iscor Ltd, the owner of Shishen Iron Ore Mine, for cooperation on mining and railing to the port of Saldanha bay. Two recessions and the aftermath of the Soweto uprising disrupted Assmang's operations in the early 1980s, but by 1988 the company's performance had once again improved. In 1999 a new southern extension at Beeshoek Mine, known as Beeshoek South, was commissioned. A new jig plant and an iron recovery plant were built at Beeshoek in 2001, but the mine was nearing the end of its productive life. It was projected that the remaining reserves would not last far beyond 2010. Assmang continued mining iron ore, manganese and chromes at various mines. In 2015 the company started production on Village Pit at Beeshoek Mine. (Assmang 2016)

6.3.3 Cultural Landscape

The larger study area is industrial in character with various mining operations. The area has been subjected to prospecting and mining activities from the 1950's onwards and this includes the development of Beeshoek mine.

6.4 Graves and Burial Sites

No known graves are indicated on databases consulted but graves and cemeteries are widely distributed across the landscape and can be expected anywhere.

7 Description of the Physical Environment

Beeshoek is in the Northern Cape Province, approximately 7km west of the town of Postmasburg. The study area is characterised by existing large scale mining activities like open cast pits, haul roads and mine rock dumps (Figure 7-1 & 7-2) that altered the landscape with thick clusters of "Geelhaak" (*Senegalia erubescens*) that hampers accessibility. The Strategic exploration area is undulating, gently sloping to the south dotted with several pans that holds water after the high rainfall (Figure 7-3 & 7-4).

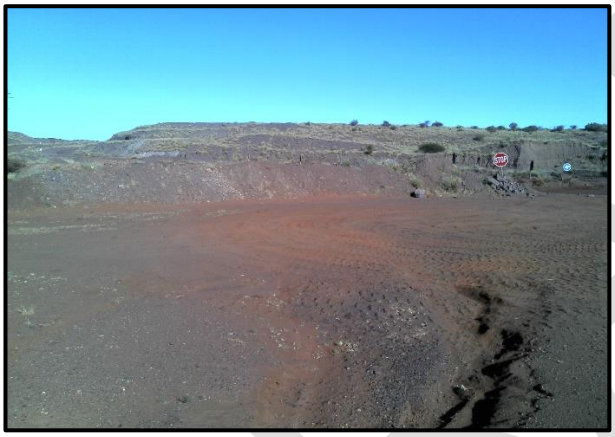


Figure 7-1: Existing mining activities.

Figure 7-2: Figure 7 1: Existing mining activities.

Figure 7-3:Seasonal pans holding water after the rainy season.

Figure 7-4: Seasonal pans holding water after the rainy season.

8 Findings of the Survey

8.1 Heritage Features

It is important to note that only the development footprint of the project was surveyed and was conducted over two different field trips. Sparse Stone Age material is known to occur in the wider area and in the study area findings of Stone Age scatters and isolated artefacts concurred with these findings.

27 Features were identified during the surveys (Figure 8-1) including 16 observation points where isolated Stone Age artefacts were noted. These scatters are often marked by isolated artefacts that is out of context and were recorded as Archaeological Findspots. These scatters are defined as background scatter (Orton 2016) and are of low significance, apart from mentioning in this report. Additionally, ruins of structures of unknown age and pits dug into the calcrete substrata were noted as well as cairns of unknown purpose and two cemeteries. The ruins potential to contribute to aesthetic, historic, scientific, and social aspects are non-existent, and it is therefore of little heritage significance. The stone cairns are most probably due to clearing or construction activities, but although unlikely these can represent graves. Graves and cemeteries are of high social significance and should be avoided and retained *in situ*. Heritage features were assigned the prefix BH (for Beeshoek) and numbered numerically from 1 to 27 as described in Table 7 and illustrated in Section 9 of this report.

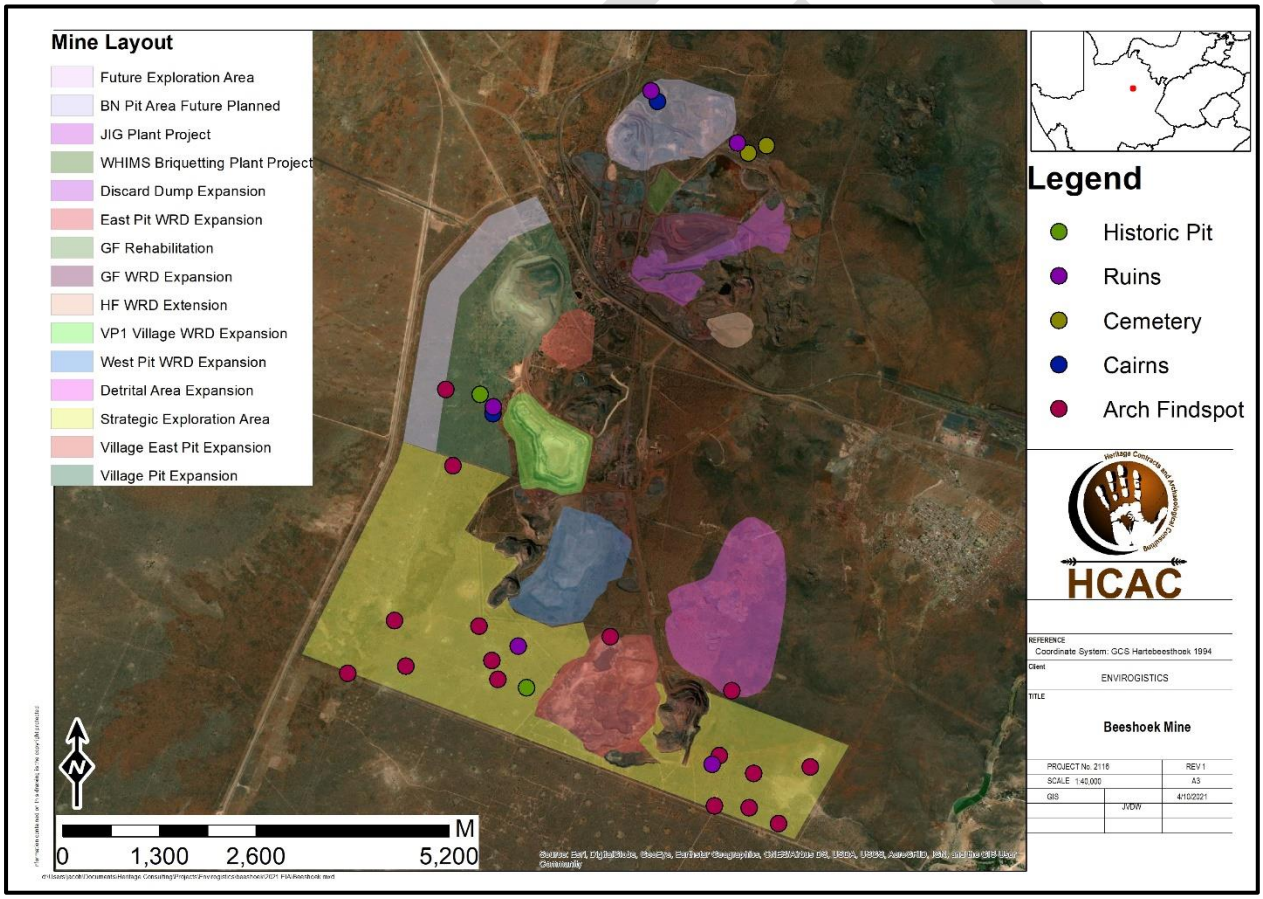


Figure 8-1. Distribution of heritage features recorded in the study area.

Table 7. Recorded heritage features.

Number	Longitude	Latitude	Type Site	Description
BH1	23.000449	-28.332608	Archaeological Findspot	Archaeological – MSA, Broken flake with large bulb of percussion
BH2	22° 58' 27.0695" E	28° 19' 49.9655" S	Archaeological Findspot	Exposed calcrete with a low-density scatter of tools mostly miscellaneous flakes possibly MSA with a few cobbles with removals
BH3	22° 59' 09.5605" E	28° 20' 07.4832" S	Archaeological Findspot	Broken hornfel flake, MSA pointed flake with use wear/trampling, pebble with removal, circular scraper with retouch, miscellaneous flake. All next to large pan on top of calcrete
BH4	22° 59' 20.9977" E	28° 20' 01.2551" S	Ruin	10x8 meter modern cement slab with bricks. Circular cement slab possibly for water tank, Recent Past/Modern
BH5	22° 58' 32.0197" E	28° 20' 09.9600" S	Archaeological Findspot	MSA side scraper on quartzite
BH6	22° 58' 06.6541" E	28° 20' 13.0776" S	Archaeological Findspot	Possible ESA flake
BH7	22° 59' 24.6697" E	28° 20' 19.2876" S	Possibly Historic Pit	Pit dug into calcrete filled with bones from sheep etc
BH8	22° 59' 12.1884" E	28° 20' 15.7019" S	Archaeological Findspot	Broken MSA blade on banded ironstone
BH9	22° 59' 03.8255" E	28° 19' 52.4172" S	Archaeological Findspot	Low density scatter of MSA flakes with faceted platforms.
BH10	22° 58' 52.4927" E	28° 18' 42.4764" S	Archaeological Findspot	LSA end scraper on red material
BH11	22° 59' 04.3548" E	28° 18' 11.4084" S	Possibly Historic Pit	Pit in calcrete of more than 2 meters deep. Filled with rubbish
BH12	22° 58' 49.4221" E	28° 18' 09.3529" S	Archaeological Findspot and stone cairn,	Overgrown mound measuring 3x1.5. Aligned east to west. Unlikely to be grave possibly from road works. Feature is located next to a dirt track / Single platform core, MSA/LSA
BH13	23° 01' 28.3621" E	28° 20' 53.8261" S	Archaeological Findspot	Broken MSA point on banded iron stone
BH14	23° 01' 14.6063" E	28° 21' 18.4572" S	Archaeological Findspot	Broken MSA blade on banded iron stone. On calcrete ridge next to drainage line
BH15	23° 01' 01.6788" E	28° 21' 11.6099" S	Archaeological Findspot	Miscellaneous flake on quartzite
BH16	23° 01' 03.7452" E	28° 20' 56.6592" S	Archaeological Findspot and ruin	Double side scraper on blade MSA Fine grained green material Dwelling with cement bricks. Structure is a shed that was build up for a dwelling. Two rooms

BH17	23° 00' 46.6019" E	28° 21' 10.8685" S	Archaeological Findspot	End and double side scraper on yellow material
BH18	23° 00' 48.7800" E	28° 20' 48.8867" S	Archaeological Findspot	Broken MSA Flake
BH19	23° 00' 45.6264" E	28° 20' 52.7497" S	Ruin	Three room dwelling with veranda.
BH20	23° 00' 54.2160" E	28° 20' 20.6880" S	Archaeological Findspot	Large flake on Banded iron stone possibly MSA
BH21	22° 59' 10.0717" E	28° 18' 19.8323" S	Cairns	Stone and cement cairn. Can and corrugated iron. Orientation is east to west measuring approximately 2x1,7 meters. Possible grave or structure.
BH22	22° 59' 10.2156" E	28° 18' 16.9561" S	Ruin	Sun dried mud brick remains of ruin. Measuring approximately 4x4 meter. Some tin and cans.
BH23	23° 00' 18.9648" E	28° 15' 59.2344" S	Ruin	Possible stone walled site could be dumped stone as well. Overgrown cannot determine layout. Walling approximately 50cm high. Over an area of 23 meters
BH24	23° 00' 21.7333" E	28° 16' 03.8533" S	Cairns	Half circle scallop with at least 3 stone cairns. Although unlikely could be graves. On top of thick red sand. Could be dumped is located on periphery of disturbed areas.
BH25	23° 00' 56.6315" E	28° 16' 21.9289" S	Ruin	Sundried mud bricks indicating ruin. No other material or artefacts. It should be noted that features like these are often associated with the graves of stillborn children.
BH26	23° 01' 01.3592" E	28° 16' 26.3622" S	Cemetery	Located next to slimes dam. Graves are fenced and aligned east to west. Grave dressings of stone. Some have headstones with metal crosses with painted names. Cement crosses. Some discernible names are Andries Bok, Jan Bok, Sylvestien Afrikaner, Mietjie Afrikaner. Visible dates of deceased 2006, cemetery is overgrown and exact count of graves not possible but approximately 100 graves.
BH27	23° 01' 09.1920" E	28° 16' 23.0318" S	Cemetery	Possible mine workers cemetery Inscription RIP Elliot Melapu mine no 104 died 31-1-66. As well as ithers with mine numbers. Grave dressings stone with metal ate on headstone with details painted on. Cemetery is fenced. Approximately 47 graves dating 1965-1968

Figure 8-2. Stone Age Artefacts at BH 1.

Figure 8-3. Stone Age Artefact on calcrete at BH2

Figure 8-4. Stone age artefact at BH16.

Figure 8-5. LSA Scraper at BH10

Figure 8-6. Ruin of three-bedroom dwelling at BH19.

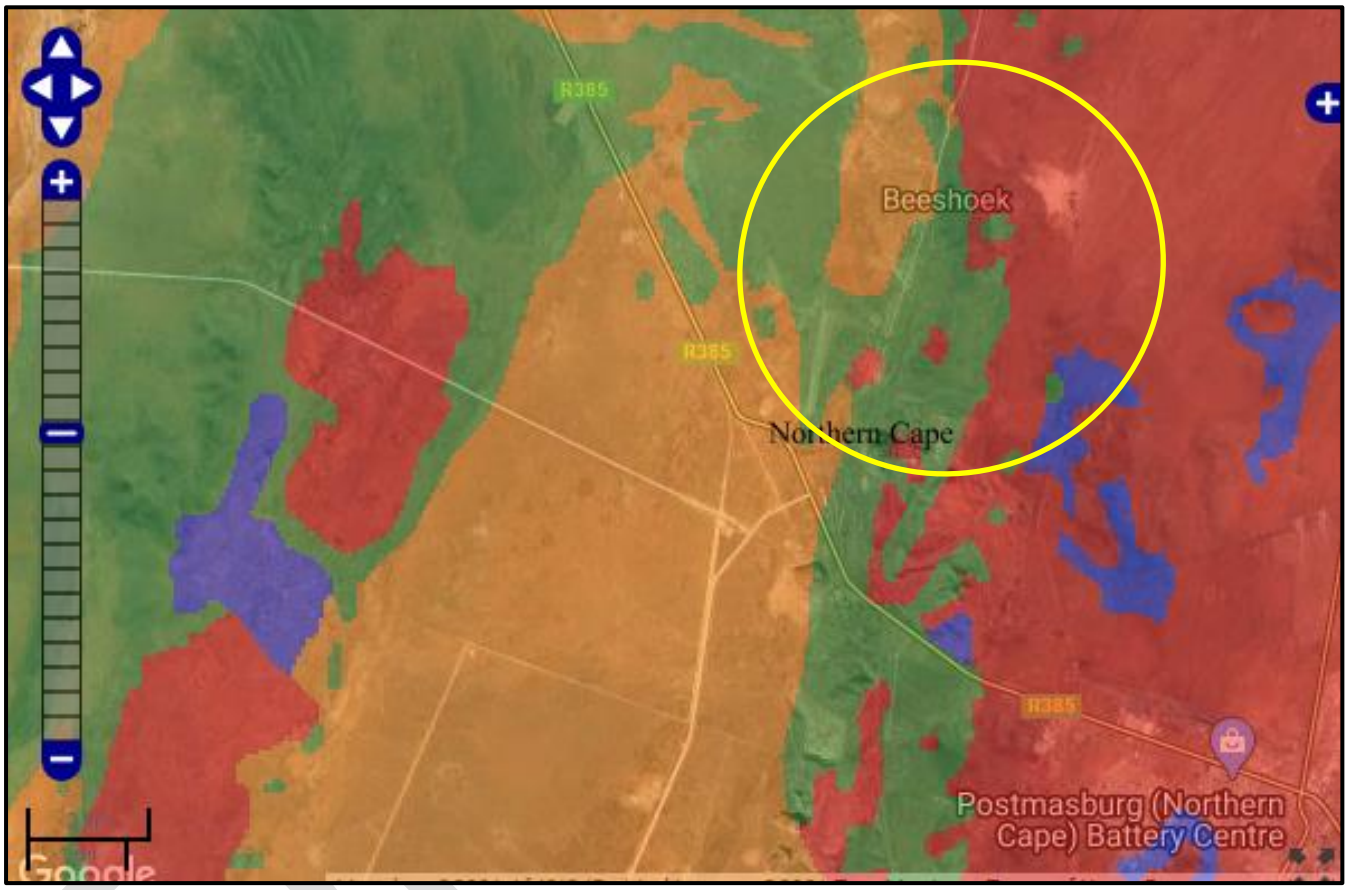
Figure 8-7. Ruin of three-bedroom dwelling BH 19

Figure 8-8. Remains of dwelling at BH16.

Figure 8-9. Stone cairn at BH12.

8.1.1 Paleontological Heritage

Based on the SAHRA Paleontological map the area (Fig 8-10) is of moderate to very high paleontological sensitivity and a separate study was conducted for this aspect (Bamford 2019). This study concluded that it is extremely unlikely that any fossils would be preserved in the Campbell Rand Subgroup stromatolites or in the loose sands of the Quaternary. There is a small chance that fossil may occur in palaeopans in the ancient rocks and therefore recommended that a Fossil Chance Find Protocol should be added to the EMPr.



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

Figure 8-10. Paleontological Sensitivity of the approximate area of the project (yellow polygon) is indicated as moderate to very high.

9 Potential Impact

Any direct impacts that could occur would be during the construction and operation phases and would be of low to high significance depending on the type of site. Impacts to burial sites would be of high social significance.

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 features if any occur. 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. Potential impacts include destruction or partial destruction of non-renewable heritage resources.

9.1.3 Impact Assessment for the Project

27 Features were identified during the surveys for the project including 16 Archaeological Findspots of low significance. The scatters are isolated and out of context and are of low significance, apart from mentioning in this report. Expected impacts are illustrated in Figure 9-1 to 9-2 and outlined in Table 8 and 9.

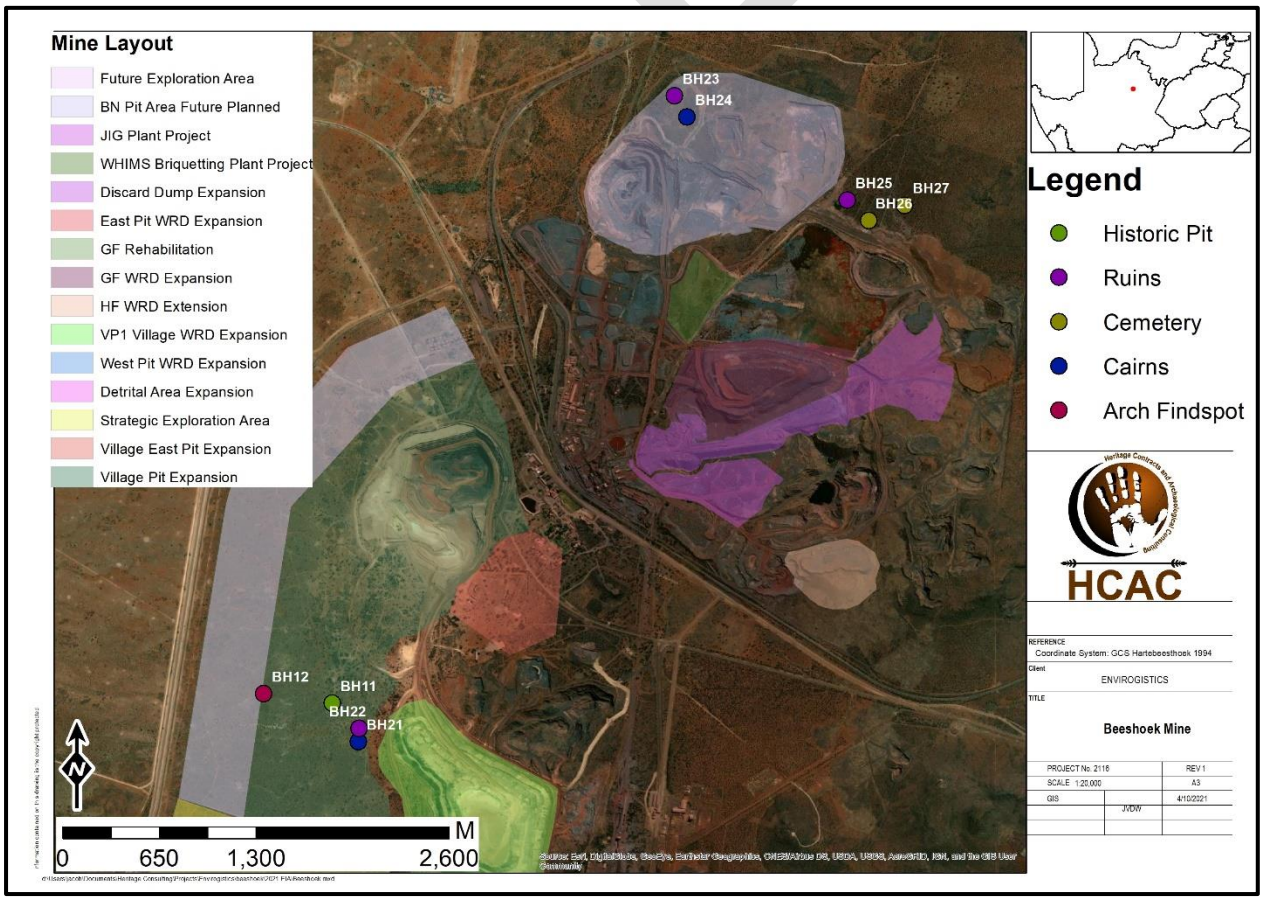


Figure 9-1. Expected impacts in the northern section.

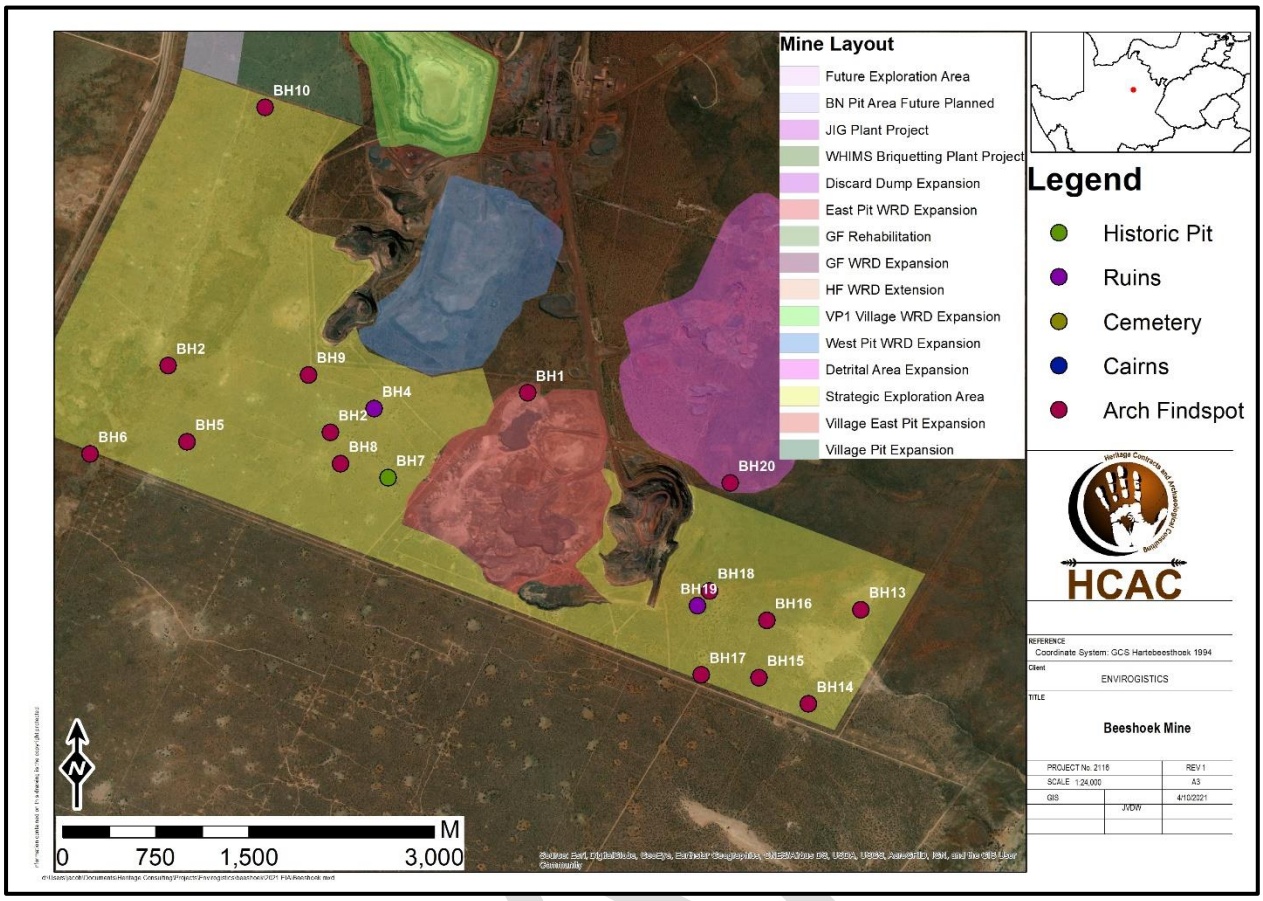


Figure 9-2. Expected impacts in the southern section.

Table 8. Impact on heritage features and mitigation measures.

Number	Type Site	Significance	Impact	Mitigation
BH1	Archaeological Findspot	Low	East Pit Waste Rock Dump Expansion	No mitigation required
BH2	Archaeological Findspot	Low	Strategic exploration area	No mitigation required
BH3	Archaeological Findspot	Low	Strategic exploration area	No mitigation required
BH4	Ruin	Low	Strategic exploration area	The presence of graves should be confirmed during social consultation. The area should be monitored during construction.
BH5	Archaeological Findspot	Low	Strategic exploration area	No mitigation required
BH6	Archaeological Findspot	Low	Strategic exploration area	No mitigation required
BH7	Possibly Historic Pit	Low	Strategic exploration area	No mitigation required
BH8	Archaeological Findspot	Low	Strategic exploration area	No mitigation required
BH9	Archaeological Findspot	Low	Strategic exploration area	No mitigation required

BH10	Archaeological Findspot	Low	Strategic exploration area	No mitigation required
BH11	Possibly Historic Pit	Low	Village Pit Expansion	No mitigation required
BH12	Archaeological Findspot	Low	Village Pit Expansion	No mitigation required
BH13	Archaeological Findspot	Low	Strategic exploration area	No mitigation required
BH14	Archaeological Findspot	Low	Strategic exploration area	No mitigation required
BH15	Archaeological Findspot	Low	Strategic exploration area	No mitigation required
BH16	Archaeological Findspot	Low	Strategic exploration area	No mitigation required
BH17	Archaeological Findspot	Low	Strategic exploration area	No mitigation required
BH18	Archaeological Findspot	Low	Strategic exploration area	No mitigation required
BH19	Ruin	Low to medium	Strategic exploration area	The presence of graves should be confirmed during social consultation. The area should be monitored during construction.
BH20	Archaeological Findspot	Low	Detrital Area Expansion	No mitigation required
BH21	Cairns	Low	Village Pit Expansion	The presence of graves should be confirmed during social consultation. The area should be monitored during construction.
BH22	Ruin	Low	Village Pit Expansion	The presence of graves should be confirmed during social consultation. The area should be monitored during construction.
BH23	Ruin	Low	BN Pit Area Future Plan	The presence of graves should be confirmed during social consultation. The area should be monitored during construction.
BH24	Cairns	Low (if proven to be graves High social significance)	BN Pit Area Future Plan	The presence of graves should be confirmed during social consultation. The area should be monitored during construction.
BH25	Ruin	Low	No impact	The presence of graves should be confirmed during social consultation. The area should be monitored during construction.
BH26	Cemetery	High Social Significance	No impact	The cemetery should be retained *in situ*. It should be fenced with an access gate for family members and an adequate buffer zone.
BH27	Cemetery	High Social Significance	No impact	The cemetery should be retained *in situ*. It should be fenced with an access gate for family members and an adequate buffer zone.

Table 9. Impact assessment of the proposed project on heritage resources with implementation of mitigation measures.

Description	Impact	Extent	Intensity	Duration	Probability	Significance	Status	Confidence	Reversibility
Beeshoek Mine optimisation project	Vegetation clearing, construction, and excavations	Low (1)	Minor (-2) Negative	High (3)	Highly Probable (3)	Low (-5)	Negative	High	No

10 Conclusion and recommendations

Beeshoek can broadly be divided into North and South mine. North mine consist of active as well as historical mining areas. A number of small quarries and mine residue dumps of various categories are located within this area. The area also includes the existing iron ore beneficiation plant, tailings storage facility (slimes dam), as well as various opencast pits. The BN Pit is the main operational opencast pit in this area with the main offices, village (since demolished) and recreational area.

South Mine consist of large opencast pits and associated WRDs. The Village Opencast Pit and associated WRD are the main activities in this area. This area also includes a crushing and screening area as pre-preparation of the ROM iron ore before being routed by overland conveyor to the iron ore beneficiation plant located at North Mine.

The large-scale mining activities altered the landscape with thick clusters of “Geelhaak” (*Senegalia erubescens*) in between disturbed areas that hampers accessibility. The strategic exploration area is undulating, gently sloping to the south dotted with several pans that holds water after high rainfall. The disturbed character of the study area and high vegetation cover could have masked isolated archaeological finds. Even so 27 Features were identified during the surveys including 16 archaeological findspots where low density scatters of Stone Age artefacts were noted. These scatters are often marked by isolated artefacts that is out of context and were recorded as Archaeological Findspots. These scatters are defined as background scatter and are of low significance, apart from mentioning in this report. Additionally, ruins of structures and two pits dug into the calcrete substrata used as dumping sites were recorded. The age of these features is unknown but their potential to contribute to aesthetic, historic, scientific and social aspects are non-existent, and it is therefore of low heritage significance.

Two cemeteries were recorded located **outside** of the mining footprints in addition to stone cairns of unknown purpose within the mining footprint. The stone cairns are most probably the result of clearing or construction activities and although unlikely these can represent graves. Graves and cemeteries are of high social significance and should be avoided and retained *in situ*.

The impact of the proposed project on heritage resources can be mitigated to an acceptable level and it is recommended that the proposed project can commence on the condition that the recommendations in Table 8 and below are implemented as part of the EMPr and based on approval from SAHRA:

10.1 Recommendations for condition of authorisation

The following recommendations for Environmental Authorisation apply and the project may only proceed based on approval from SAHRA:

Recommendations:

- Implementation of a chance find procedure for the project (as outlined in Section 10.2).
- It is recommended that the strategic exploration area should be subjected to a heritage walk through prior to development;
- Graves and cemeteries should be retained *in situ* with access for family members and a sufficient buffer zone;
- Although unlikely the stone cairns could represent graves and the presence of graves should be confirmed during the social consultation process**.**

10.2 Chance Find Procedures

10.2.1 Chance Find procedures for Heritage Features

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.

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10.2.2 Chance find procedure for paleontology–Procedure to be implemented once the excavations begin.

1. The following procedure is only required if fossils are seen on the surface and when excavations/ construction commence.
2. When excavations begin the rocks and must be given a cursory inspection by the environmental officer or designated person. Any fossiliferous material (plants, insects, bone, coal) should be put aside in a suitably protected place. This way the mining activities will not be interrupted.
3. Photographs of similar fossil plants must be provided to the developer to assist in recognizing the fossil plants in the shales and mudstones (for example see Figure 1.5). This information will be built into the EMP's training and awareness plan and procedures.
4. Photographs of the putative fossils can be sent to the palaeontologist for a preliminary assessment.
5. If there is any possible fossil material found by the developer/environmental officer/miners then the qualified palaeontologist sub-contracted for this project, should visit the site to inspect the selected material and check the dumps where feasible.
6. Fossil plants or vertebrates that are considered to be of good quality or scientific interest by the palaeontologist must be removed, catalogued and housed in a suitable institution where they can be made available for further study. Before the fossils are removed from the site a SAHRA permit must be obtained. Annual reports must be submitted to SAHRA as required by the relevant permits.
7. If no good fossil material is recovered, then the site inspections by the palaeontologist will not be necessary.
8. If no fossils are found and the excavations have finished, then no further monitoring is required.

10.1. Reasoned Opinion

The overall impact of the project to heritage resources is considered to be low and residual impacts can be managed to an acceptable level through implementation of the recommendations made in this report. The socio-economic benefits also outweigh the possible impacts of the development if the correct mitigation measures are implemented for the project.

10.4 Potential risk

Potential risks to the proposed project are the occurrence of intangible features and unrecorded cultural resources (of which graves are the highest risk). This can cause delays during construction, as well as additional costs involved in mitigation, as well as require additional layout changes.

10.5 Monitoring Requirements

Ideally, site monitoring should be conducted by an experienced archaeologist or heritage specialist. Day to day monitoring can be conducted by the Environmental Control Officers (ECO). The ECO or other responsible persons should be trained along the following lines:

- *Induction training:* Responsible staff identified by the developer should attend a short course on heritage management and identification of heritage resources.
- *Site monitoring and watching brief*: As most heritage resources occur below surface, all earth-moving activities need to be routinely monitored in case of accidental discoveries. The greatest potential impacts are the initial soil removal and subsequent earthworks during construction. The ECO should monitor all such activities daily. If any heritage resources are found, the chance finds procedure must be followed as outlined above.

Table 10. Monitoring requirements for the project

Heritage Monitoring					
Aspect	**Area**	**Responsible for monitoring and measuring**	**Frequency**	**Proactive or reactive measurement**	**Method**
Clearing activities and construction	Entire project area	ECO	Weekly (Preconstruction and construction phase)	Proactively	• If risks are manifested (accidental discovery of heritage resources) the chance find procedure should be implemented: 1. Cease all works immediately; 2. Report incident to the Sustainability Manager; 3. Contact an archaeologist/ palaeontologist to inspect the site; 4. Report incident to the competent authority; and 5. Employ reasonable mitigation measures in accordance with the requirements of the relevant authorities. • Only recommence operations once impacts have been mitigated.

10.6 Management Measures for inclusion in the EMPr

Table 11. Heritage Management Plan for EMPr implementation

Area	Mitigation measures	Phase	Timeframe	Responsible party for implementation	Target	Performance indicators (monitoring tool)
Burial Sites	All graves should be indicated on development plans and avoided	All	Throughout the project	Applicant and ECO	Retain graves *in situ*	ECO Checklist/ Report
Stone Cairns	Confirm the presence of graves during social consultation. If so retain graves *in situ* with an adequate buffer zone and safe access for family members	Confirmation of graves prior to development,	Throughout the project	Applicant and ECO Archaeologist	Retain graves in situ	ECO Checklist/ Report
General project area	Implement chance find procedures in case possible heritage finds are uncovered	Pre-Construction and construction	Throughout the project	Applicant EAP	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 35, 36 and 38 of NHRA	ECO Checklist/Report

10.7 Knowledge Gaps

Due to the subsurface nature of heritage resources, the possibility of discovery of heritage resources during the construction phase cannot be excluded. This limitation is successfully mitigated with the implementation of a chance find procedure. High grass cover limited visibility and access was restricted in some areas.

11. References

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