

HERITAGE IMPACT ASSESSMENT

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

FOR THE PROPOSED BEESHOEK RAILWAY LINE LINK, POSTMASBURG,
NORTHERN CAPE PROVINCE

Type of development:

Mining Infrastructure development

Client:

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Assmang (Pty) Ltd: Beeshoek Iron Ore Mine



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Project Reference:

HCAC Project number 2110

Report date:

July 2021

APPROVAL PAGE

Project Name	Railway Line Link (TFR and Beeshoek Siding) Northern Cape Province
Report Title	Heritage Impact Assessment for the Beeshoek Railway Line Link, 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
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DOCUMENT PROGRESS

Distribution List

Date	Report Reference Number	Document Distribution	Number of Copies
21 July 2021	2110	Envirogistics (Pty) Ltd	Electronic Copy

Amendments on Document

Date	Report Reference Number	Description of Amendment
20 July 2021	2110	Update of report based on revised layout of infrastructure.

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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	<i>Declaration of Independence</i>
(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
(l) 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 Railway line link including the TFR and Beeshoek Siding. HCAC was appointed 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:


- The surrounding area has been disturbed by mining activities, Tommy's airfield, road and railway developments;
- Stone Age material is on record in the general 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;
- None of the above-mentioned focal points occur in the study area although the heritage survey recorded two observation points, the first is an isolated find dating to the Earlier Stone Age and the second is a low-density scatter of lithics possibly dating to the Middle and Later Stone Age. The lithics that are in a deflated context, impacted on by the surrounding developments and found in low densities, forming part of the archaeological background scatter (Orton 2016) and are of low significance apart from providing evidence of use of the wider landscape from as early as >200 ka. No other heritage sites of significance were recorded within the proposed impact areas;
- In terms of the palaeontological component, the area is of moderate paleontological sensitivity and a separate study was conducted for this aspect (Bamford 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 are low. 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.

Declaration of Independence

Specialist Name	Jaco van der Walt
Declaration of Independence	<p>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:</p> <ul style="list-style-type: none"> • 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	20/07/2021

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 railway line link (TFR and siding) at the Beeshoek Mine, located in the Tsantsabane Local Municipality, which is an administrative area in the ZF Mgcawu District Municipality, in the Northern Cape Province (Figure 1-1 to 1-4). The report forms part of the Basic Assessment (BA) and Environmental Management Programme Report (EMPr) for the development.

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, two localities with Stone Age material were recorded. 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 railway line from the existing siding at the Mine to the existing TFR Line will enable Beeshoek Iron Ore Mine to export iron ore through the Saldanha Port. Project components and the location is outlined under Table 2 and 3.

Table 2: Project Description

Farm and portions	<ul style="list-style-type: none"> • Portion 0 of the farm Beesthoek 448, Postmasburg RD; • Portion 1 of the farm Beesthoek 448, Postmasburg RD; and • Portion 7 and 8 of the farm Beesthoek 448, Postmasburg RD (Transnet servitudes).
Magisterial District	Tsantsabane Local Municipality, which is an administrative area in the ZF Mgcawu District Municipality.
Central co-ordinate of the development	28°16'3.39"S & 22°59'14.09"E
Topographic Map Number	2822BD

Table 3: Infrastructure and project activities

Type of development	Railway Line
Size of development	2.3 km
Project Components	<p>The line (main western line) will comprise a 2.8km main link line of approximately 5.5m in width with a 5m bulk fill (varies along the alignment). The line will tie from the existing TFR Postmasburg line at the Beeshoek Iron Ore Mine, crossing over the road accessing Tommysfield Airport. The existing R385 road will be lifted into the road over rail system to allow for the railway line to cross under the R385 regional tar road before linking to the existing TFR Yard that services Kolomela Mine. Considering that one 4m access road will be constructed along the alignment with an 8m buffer on either side of the railway line, the approximate extent of the development is 9ha (85 400m²). A second line will be constructed (the northern link line), which will tie into the existing Orex line between Beeshoek and Khumani Iron Ore Mine. This line is approximately 1.3km in length with similar dimensions as the main western line. This latter line is about 2ha is extent.</p> <p>The revised approach of TFR is to run trains with 3 rakes of 116 wagons, giving trains a total length of 348 wagons. For this reason the current operational concept is for Beeshoek to load a single train rake (116 wagons) to form part of a 3 rake train (348 wagons) which would be transported to Saldanha. The other 2 rakes of the train will be loaded by Kolomela. This concept is to be explored further as part of the study.</p> <p>The project requirements will include:</p> <ul style="list-style-type: none"> • Overall Design: <ul style="list-style-type: none"> ○ Railway formation – 5.5m ○ Bulk fill – 5m ○ One service road – 4m ○ Buffer – 8m on each side • TFR train design <ul style="list-style-type: none"> ○ 348 wagons (3 x 116 rakes) ○ 30t axle load • Beeshoek Traffic <ul style="list-style-type: none"> ○ 1 x 116 rake (Saldanha traffic)

	<ul style="list-style-type: none"> ○ 30t axle loads <p>Two access roads will be constructed, one linking to Tommy’s field and one to the northern link line and from there to Tommy’s field airport. These will have a width less than 8m and respectively lengths of 550m and 420m. A Rail Contractor Laydown area will be required (Laydown 1). This will be located in an existing disturbed area to the south of the mines’ landfill site. Two laydown areas will be required for the bridge construction, which will require clearance. The South laydown area is located to the east of the decommissioned R385 road, at an area of 0.8ha. The North laydown areas is located just north of this area, north of the existing R385 railway line, at an area of 1ha.</p> <p>Borrow material will be required for the construction of the railway line and bridge. The borrow material will be sources from within the mine boundary, at existing opencast pits, such as from the Village opencast pit, the existing quartzite stockpile and the existing manganese stockpiles. Two (2) other borrow pit areas have also been identified next to the bridge laydown areas (north and south). These two areas will require clearance of 1.1ha each. A last borrow pit area will be considered, which will not require clearance as this is an existing borrow pit area, previously utilized in the construction of the R385 deviation.</p> <p>During the construction phase, currently planned for about 14 months, a temporary two-way deviation road (of less than 1km, will be provided for vehicles travelling on the R385 during the construction of the road bridge.</p>
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1.3 Alternatives

No alternatives were provided to be assessed although the extent of the area assessed allows for siting of the development to minimise impacts to heritage resources.

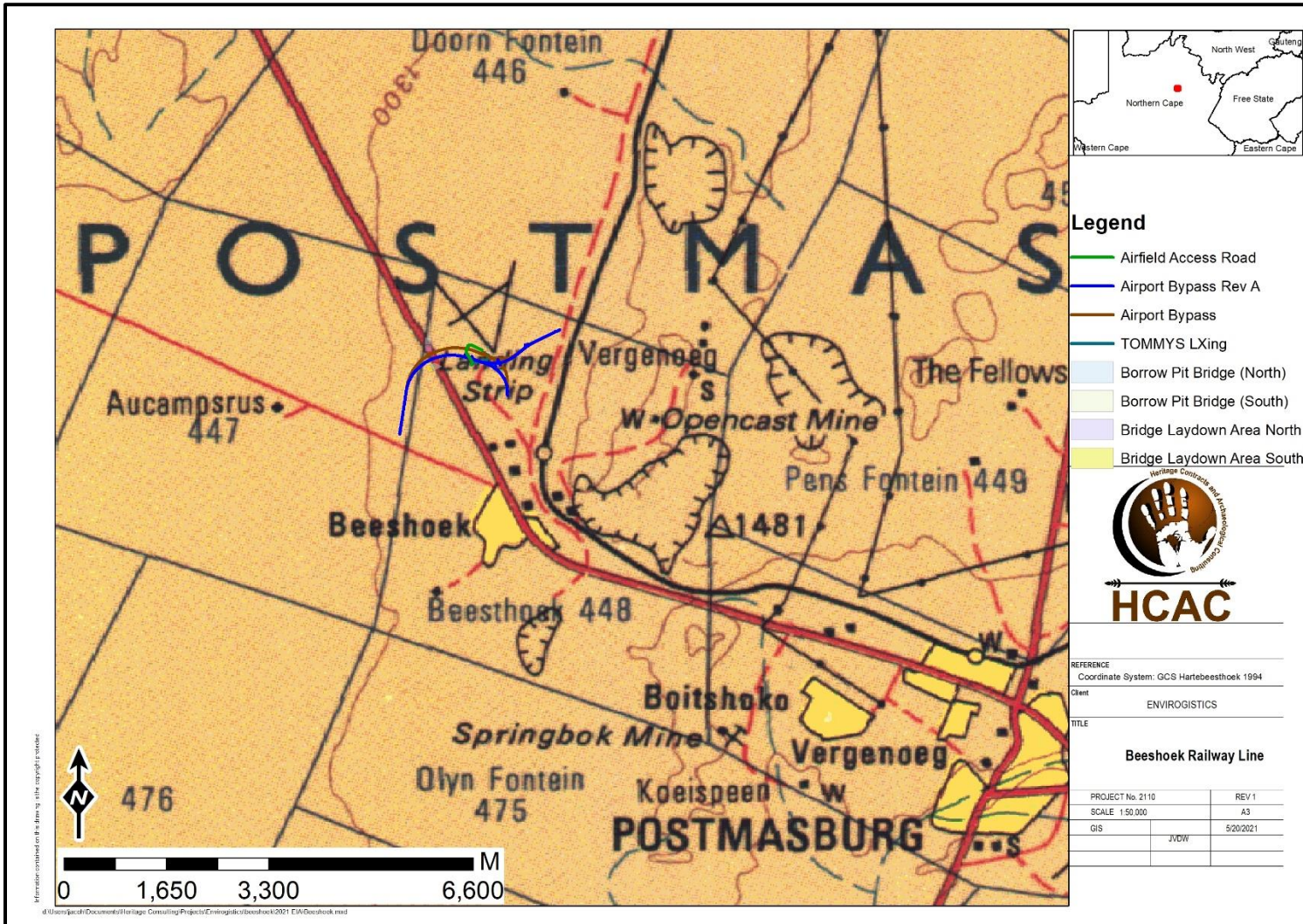


Figure 1.1. Regional setting (1: 250 000 topographical map).

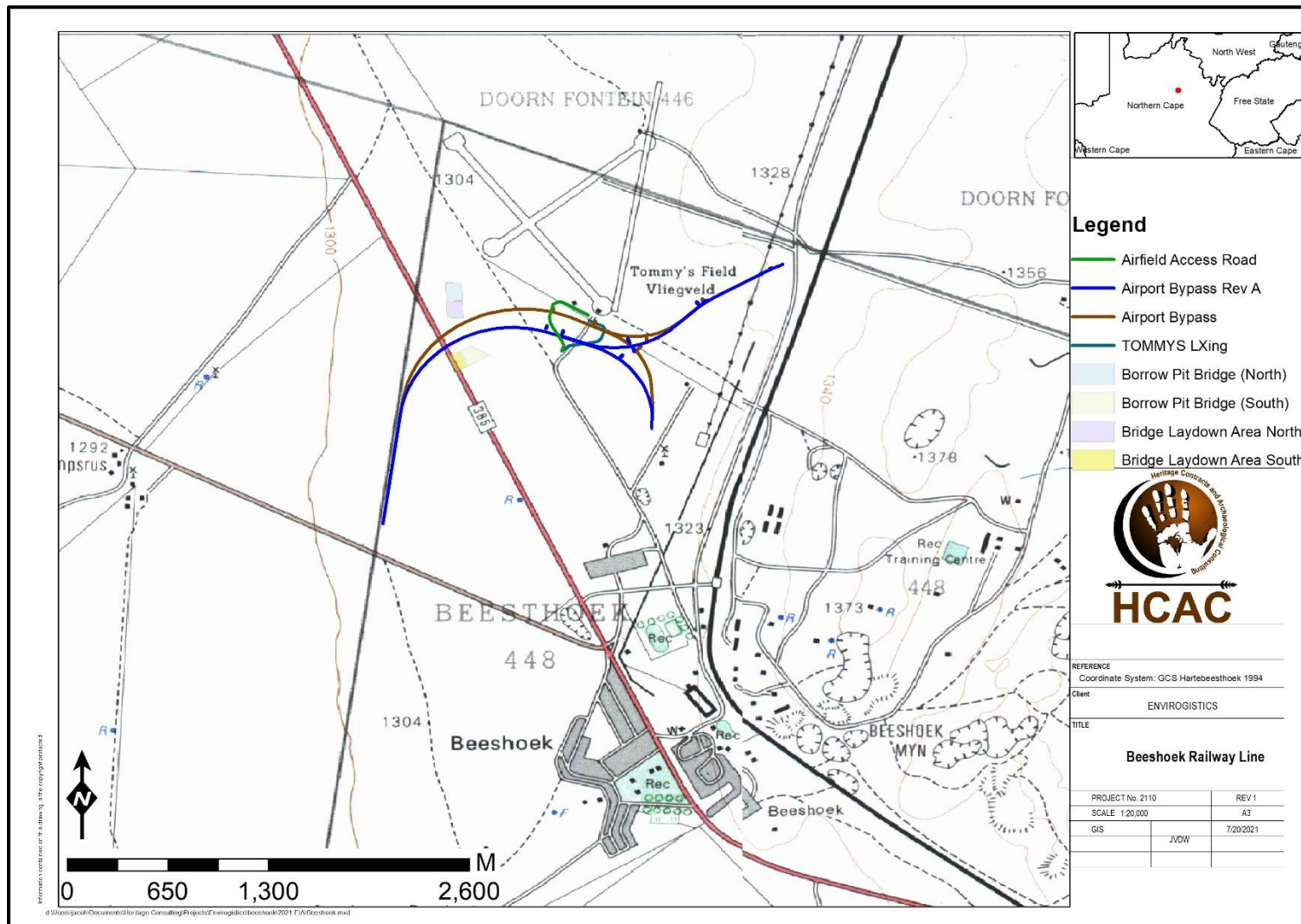


Figure 1.2: Local setting (1:50 000 topographical map).

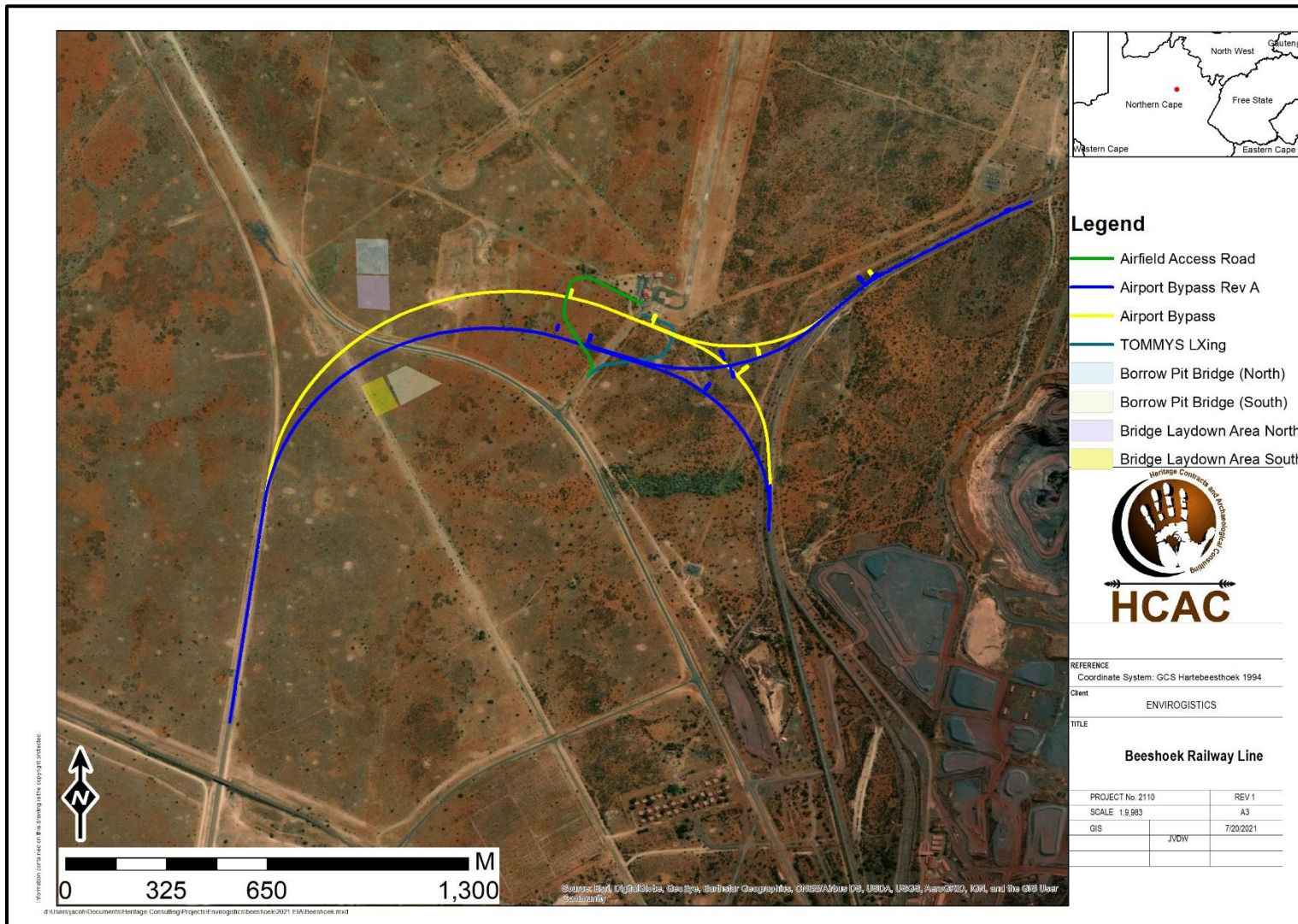


Figure 1.3. Aerial image of the development footprint.

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 Basic Assessment Report (BAR).

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	3 February & 30 June 2021
Season	Winter. Vegetation in the study area varies after the high rainfall experienced and some sections are covered by dense vegetation limiting archaeological visibility. The study area was however sufficiently covered to understand the heritage character of the area (Figure 3-1).

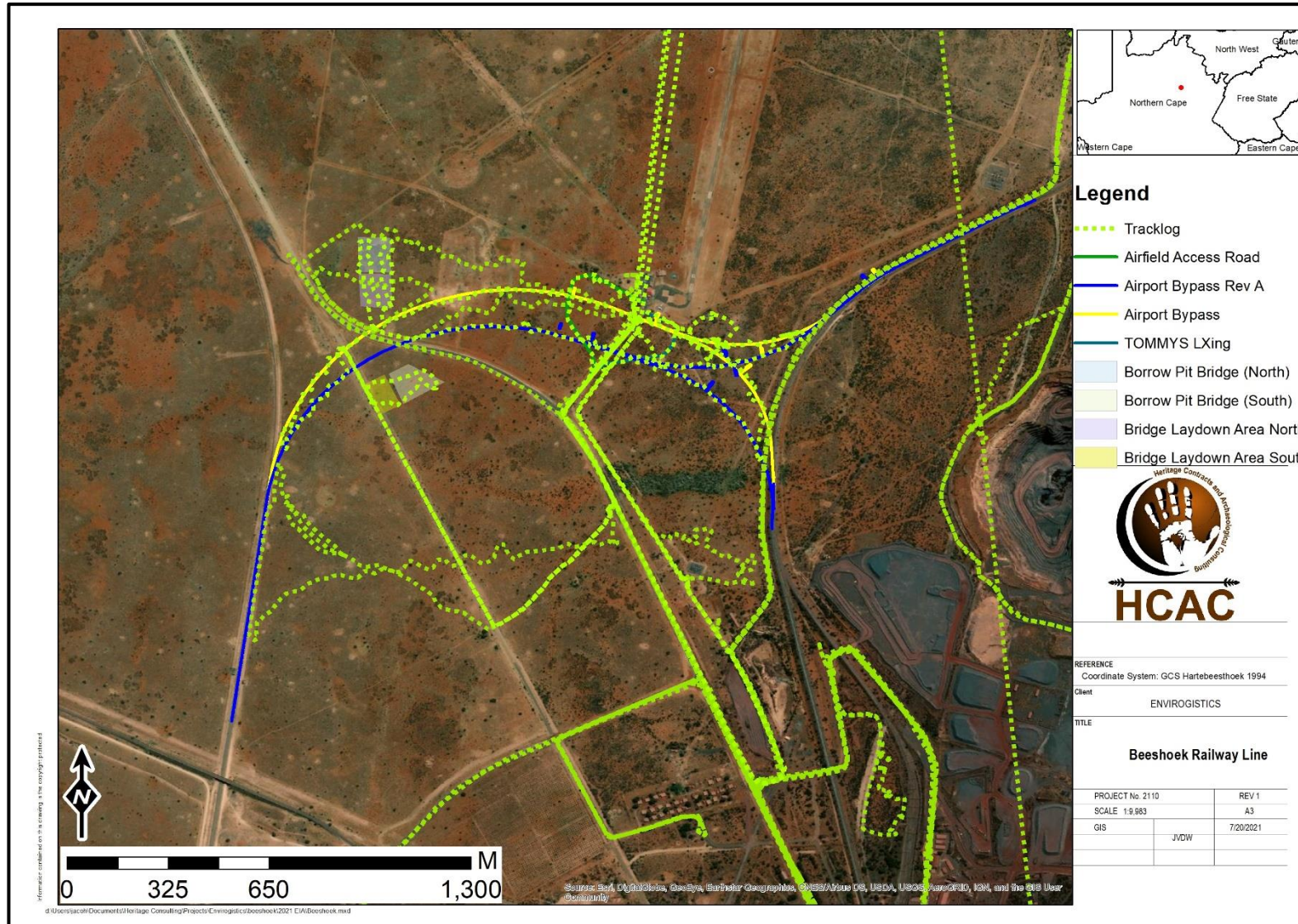


Figure 3.1: Tracklog of the survey in green.

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 or 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	Impact 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 Kapstevl, 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
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.	2017	Heritage Impact Assessment Khumani Mine	No sites of significance were identified but Stone Age occurrences were recorded.
Van der Walt, J.	2019	Heritage Impact Assessment for the proposed Khumani Iron Ore Mine New Water Return Dam (WRD), pipelines and water containment facility, Sishen, Northern Cape	No sites of significance were identified. Stone Age occurrences were recorded.
Van der Walt, J.	2021	Heritage Impact Assessment for the Beeshoek EIA, Northern Cape Province.	Stone Age occurrences, possible graves and historical homesteads.

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 GaMohaana (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 northeast 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 Beeshoek, to the south (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). At Kolomela (Van der Ryst 2011) Middle Stone Age sites also occur.

Stone Age artefacts are often recorded at industrial sites similar to the Beeshoek mine operations and the effects of heavy-duty earth moving machinery on the formation of lithic debitage 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 debitage 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)

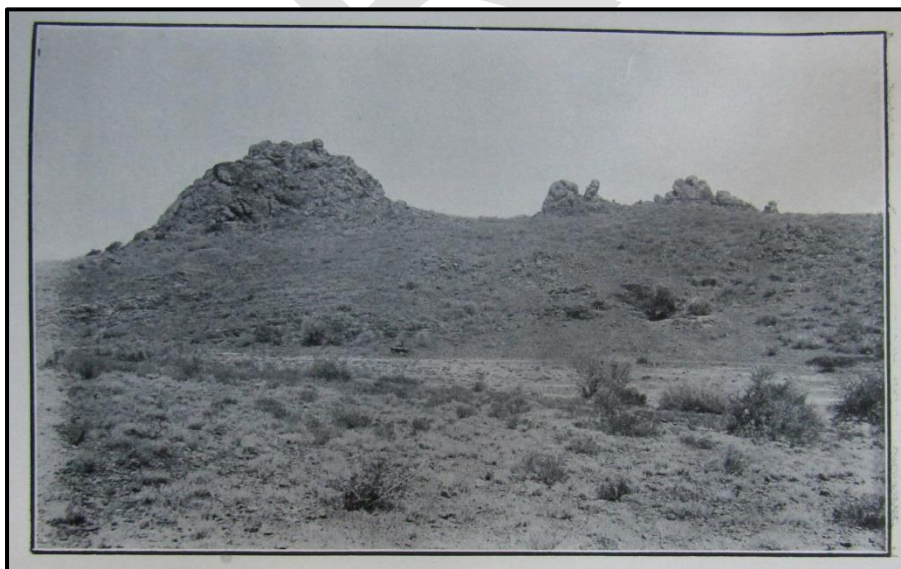


Figure 6.1. 1929 photograph of Blinkklipkop, with a cave in the right middle distance. Hematite and specularite were mined here. (NARSSA SAB, MNW: 976 MM1204/29).

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)

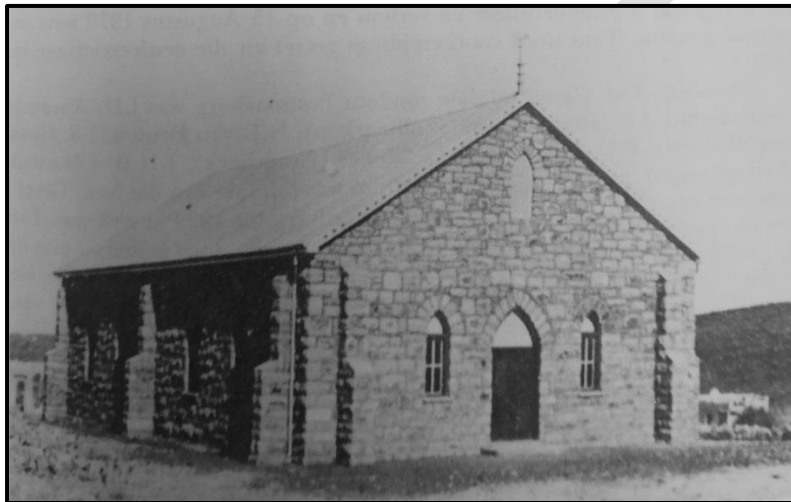


Figure 6.3. Reformed Church building that was completed in 1908. (Snyman 1983: 43)

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 effected in April 1892. (Snyman 1983: 10).

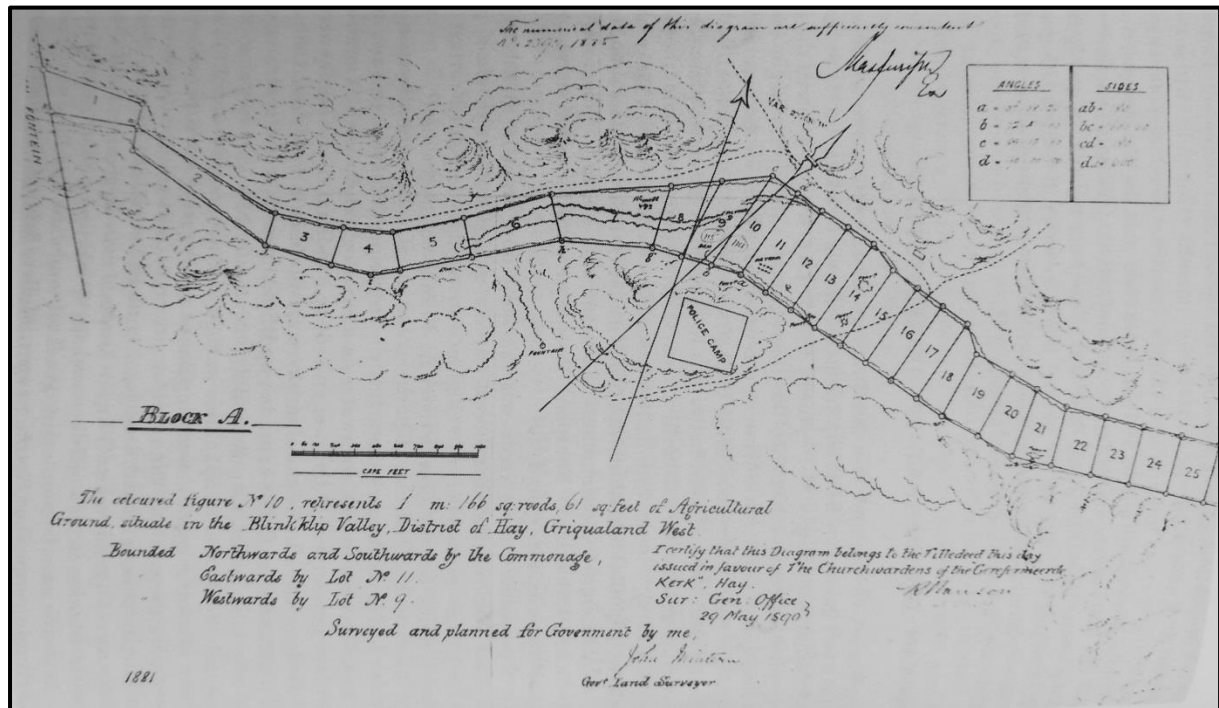


Figure 6.4. Portion of the first agricultural plots that were surveyed by John Minters in 1881 in the Blinkklip Valley. (Snyman 1983: 6)

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)

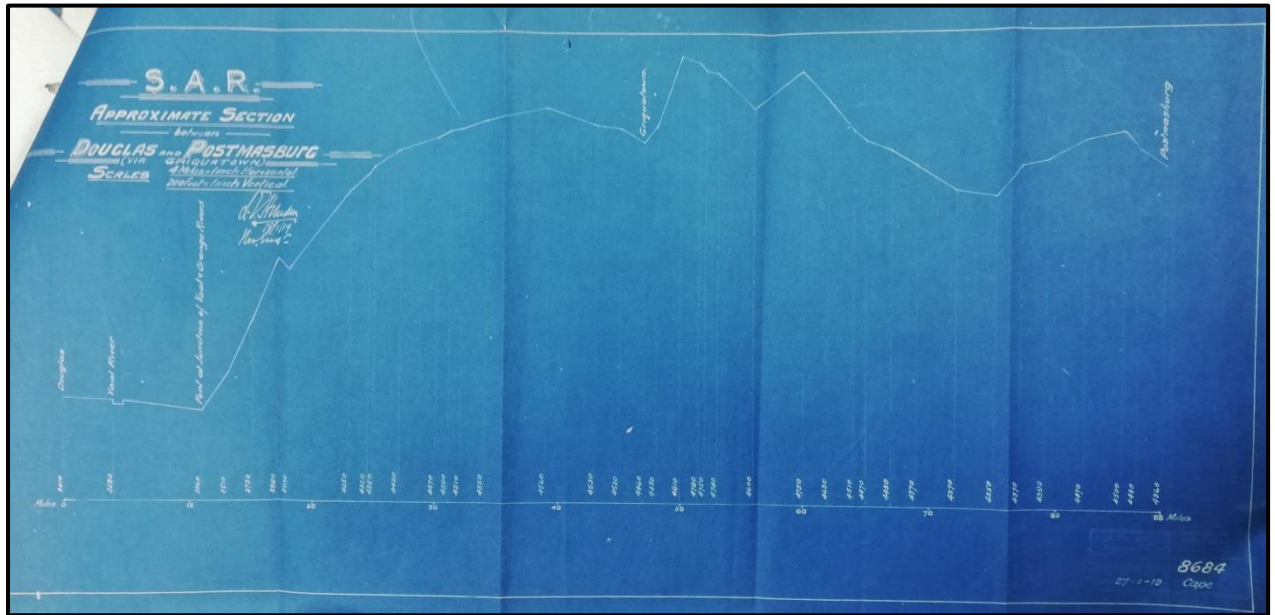


Figure 6.5. 1919 diagram showing the section of the railway between Douglas and Postmasburg. (NARSSA SAB, SAS: 834 P4/7/41)

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)

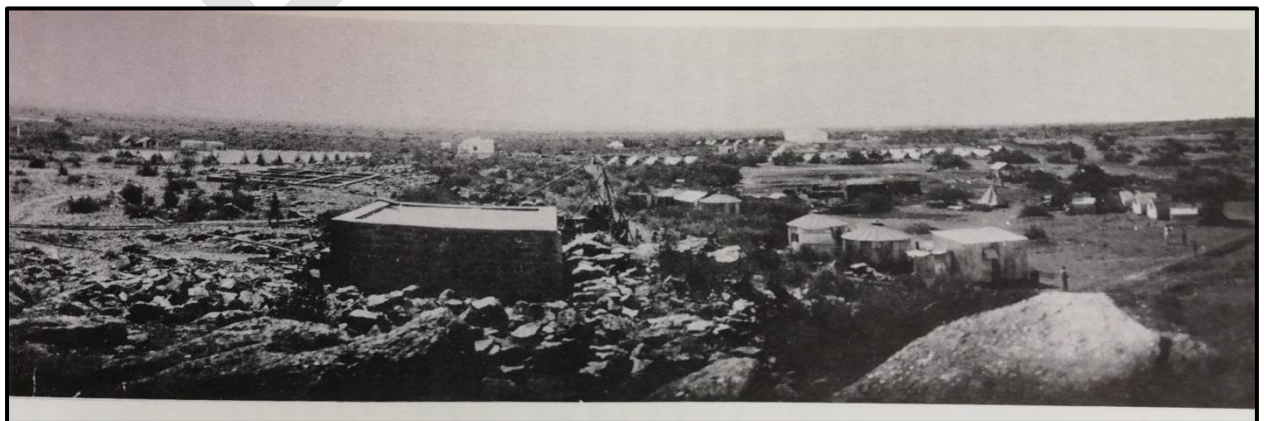


Figure 6.6. 1930 photograph of Beeshoek. (Snyman 1983: 28)

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 raiing 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 proposed railway link is in areas that has been fallow in recent years but impacted on by road development, Tommy's airfield and sparse farming infrastructure dating from the 1960's (Figure 6-7 & 6-8) and more recently the existing railway line. The proposed railway link is in line with current land use and will not significantly alter the cultural landscape that is industrial in character.

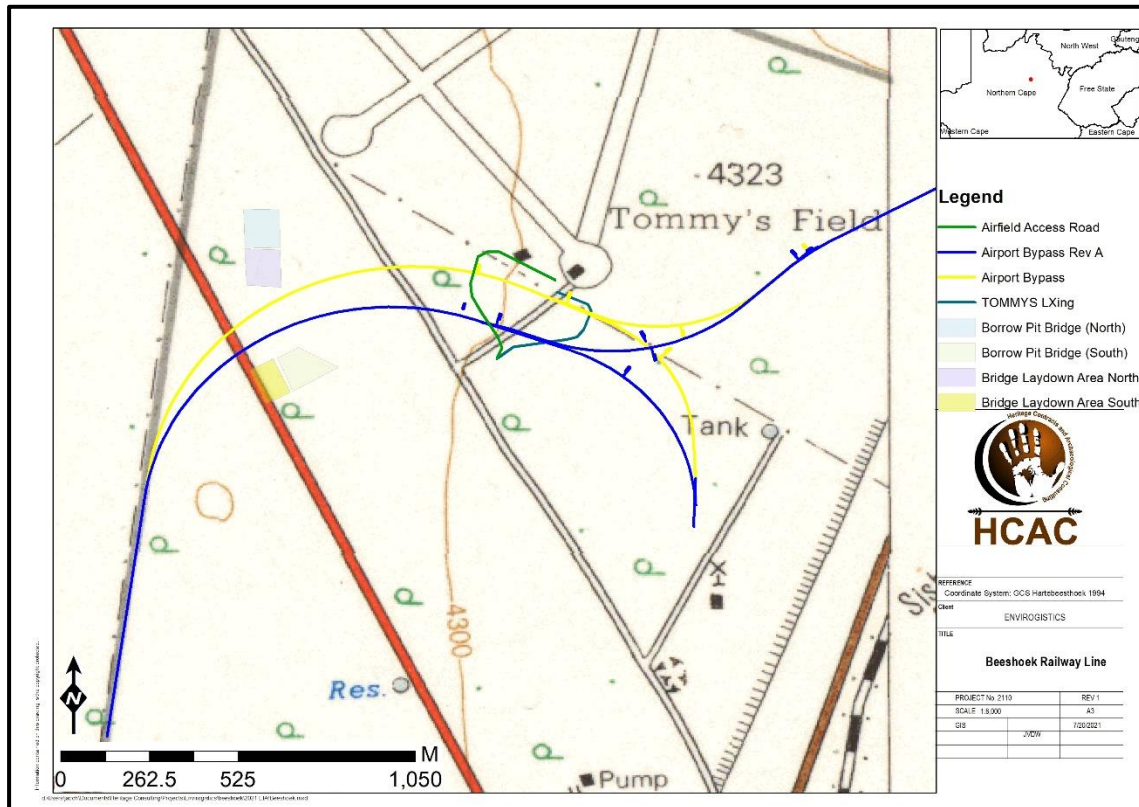


Figure 6.7. 1967 Topographic map of the area. Roads and fences as well as a pump and a tank as well as fences are indicated.

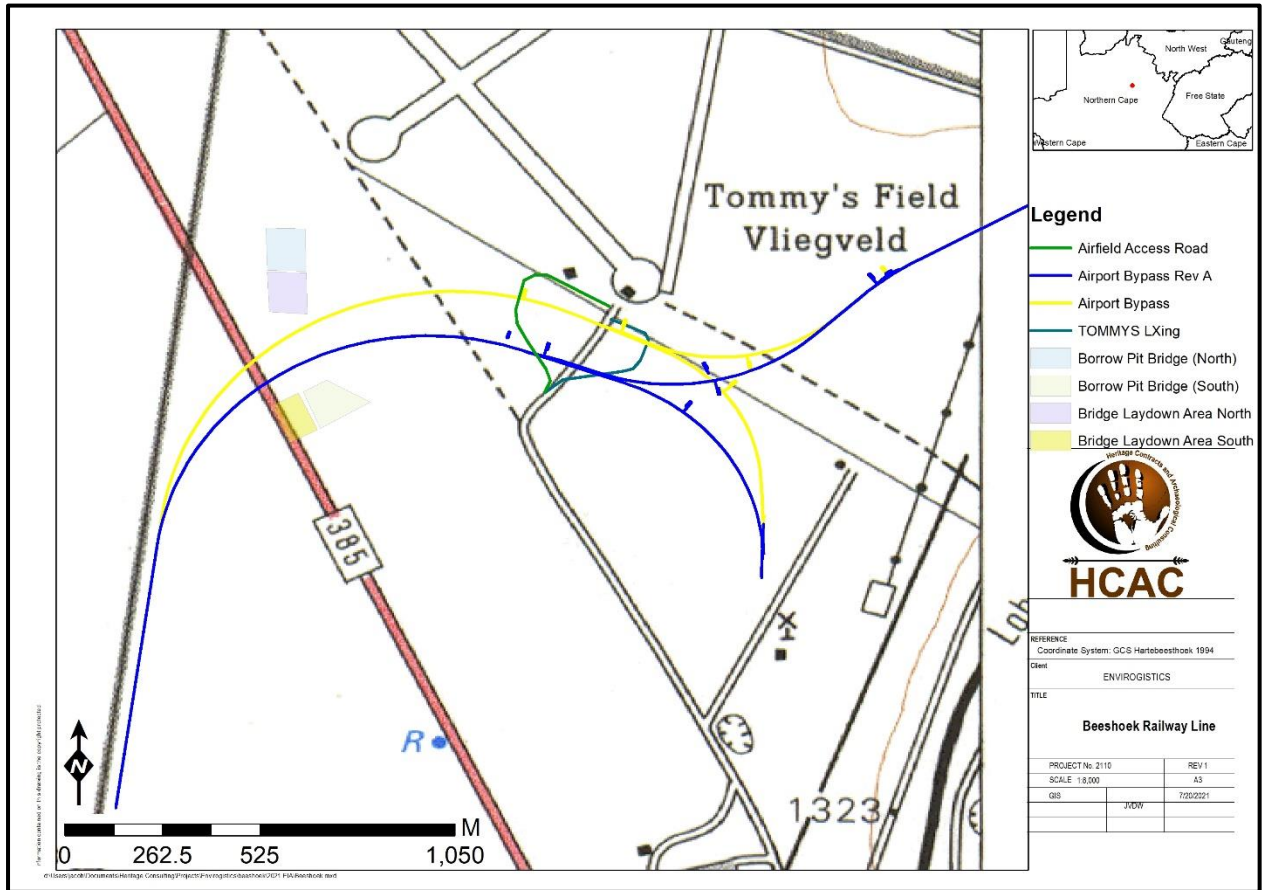


Figure 6.8. 1987 Topographic map of the impact area. The area is further developed from the 1967 image and includes additional diggings, roads and infrastructure to the south of the proposed link.

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 traversed by the regional road R385 (Figure 7-1), as well as the Transnet Railway Line link. The study area is fenced (Figure 7-2) and characterised by a gently undulating topography with dense grass cover after the high rainfall experienced in the area (Figure 7-3 & 7-4).



Figure 7.1. R385 traversing the study area.



Figure 7.2. Fences in the study area.



Figure 7.3. General site conditions during the initial survey.



Figure 7.4. General site conditions during the June site visit.

8. Findings of the Survey

It is important to note that only the development footprint of the project was surveyed over 1 day by two professional archaeologists. The study area is flat without focal points like natural pans or rocky outcrops that would have attracted human occupation in antiquity and a paucity of sites was immediately noted during the survey, although sparse Stone Age material is known to occur in the wider area. The disturbed character of the study area (quarries, road and railway developments) and high vegetation cover in the study area could have masked isolated finds but not major sites. Two occurrences of lithic scatters were recorded as observation points, but no sites of significance were recorded or are expected to occur in the study area. All the known sites of significance are located along watercourses or hills of which none occur in the study area (Van der Ryst 2011 and Morris 2005). The location of the observation points recorded as field point 492 & 493 is illustrated in Figure 8.1. with a brief description in Table 7.

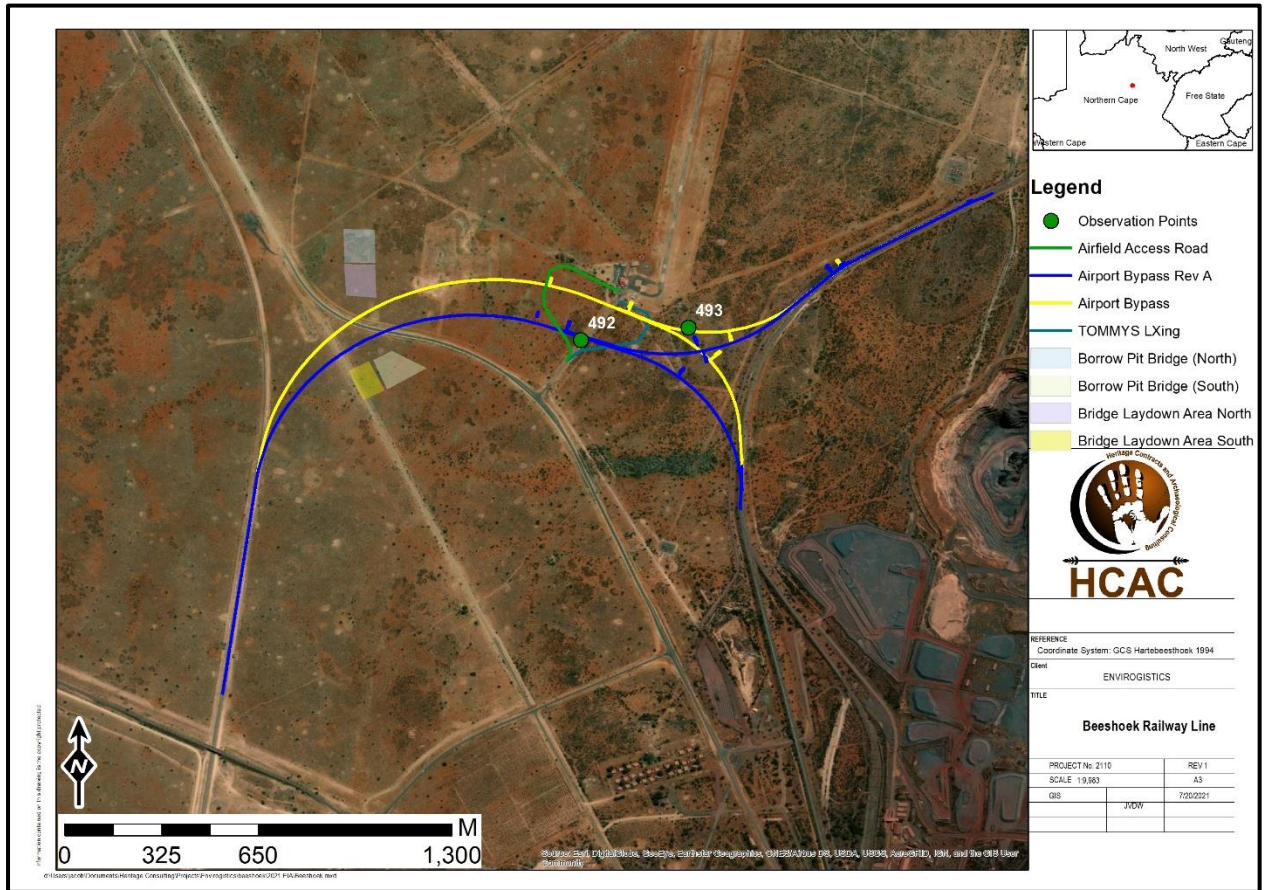


Figure 8.1. Site distribution map.

Table 7. Observation points identified during the survey.

Feature number	Description	Heritage significance	Coordinates	Mitigation
492	Isolated bifacial artefact possibly Acheulean found on surface next to airfield access road and fence. The site is disturbed by these developments and no other artefacts or cultural deposit is present.	Low GP C	28° 16' 05.7359" S, 22° 59' 21.9805" E	None required
493	Lithics found in a deflated context in a gravel layer on top of calcrete substrate. The lithics are found in low density's (less than 4 tools per m ²) over a small area measuring approximately 3 x 3 meters. Few formal tools present but based on size and typological markers like raw material, faceted striking platforms possibly dating to the MSA and LSA. MSA component consists of large flakes with faceted platforms on jaspelite. LSA thumbnail scrapers with retouch - microlithic on CCS and other fine grained material.	Low GP C	28° 16' 04.3895" S, 22° 59' 33.6805" E	None required



Figure 8.2 Bifacial artefact at waypoint 492.



Figure 8.3. General site conditions at waypoint 492.



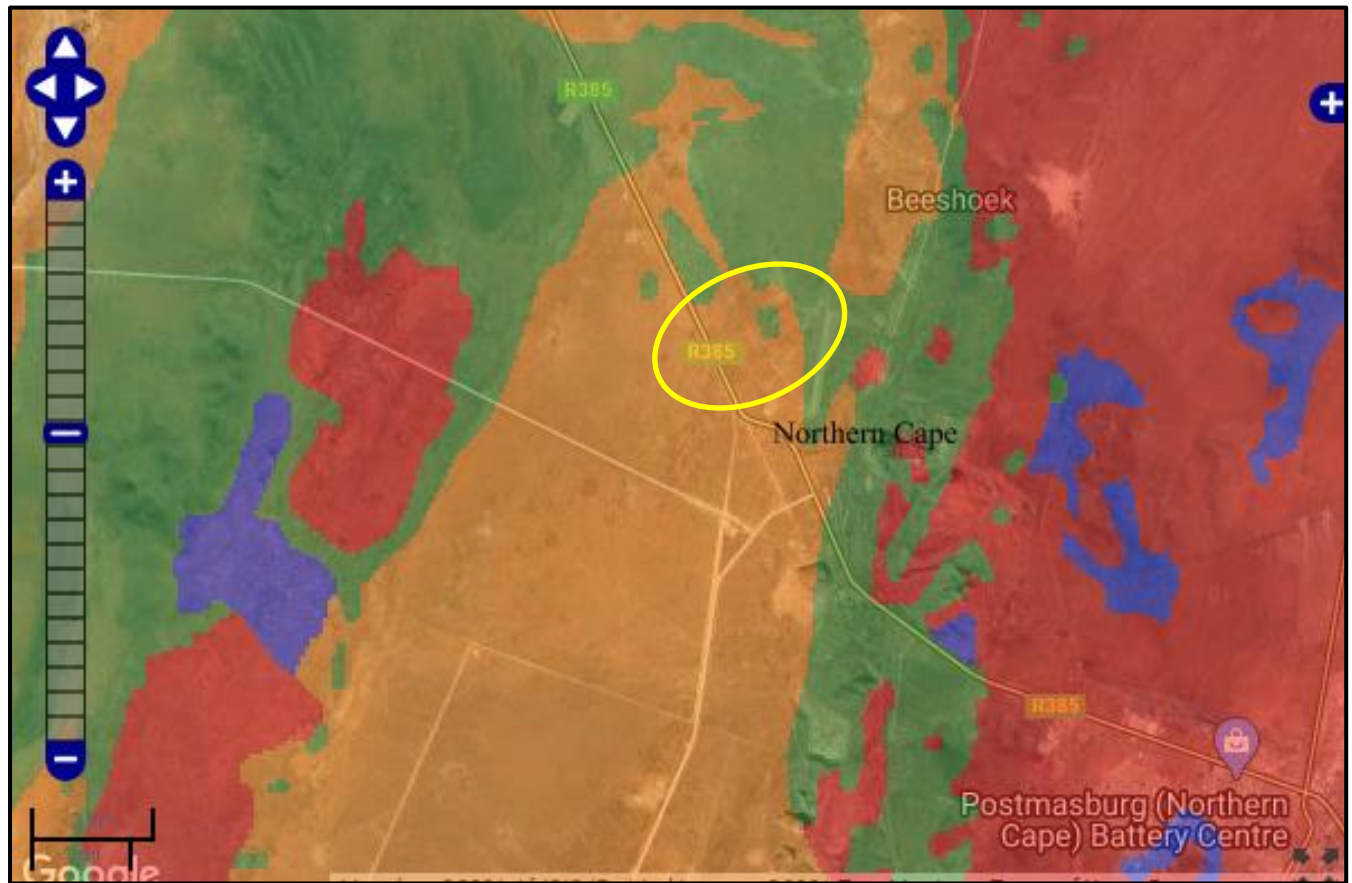
Figure 8.4. Dorsal and Ventral view of artefacts at Waypoint 493.



Figure 8.5. Gravel layer at Waypoint 493.

8.2.1. Paleontological Heritage

Based on the SAHRA Paleontological map the area (Fig 8-6) is of moderate to high paleontological sensitivity and a separate study was conducted for this aspect (Bamford 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 a very 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 8.6. Paleontological Sensitivity of the approximate area of the railway line link (yellow polygon) is indicated as moderate to high.

9. Potential Impact

Based on the current lay out no direct impact is expected on any significant heritage resources. Two observation points were recorded in the study area, but the recorded Stone Age lithics are scattered sparsely and are out of context. These features will be indirectly impacted (Field number 492 is approximately 14 meters south of the railway line and field number 493 10meter north of the railway line) by the project (Figure 9.1 and Table 8) but are of no significance apart from mentioning them in this report and are considered as background scatter (Orton 2016). The impact is therefore low.

9.2.1. 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.

9.2.2. 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.

9.2.3. Impact Assessment for the Project

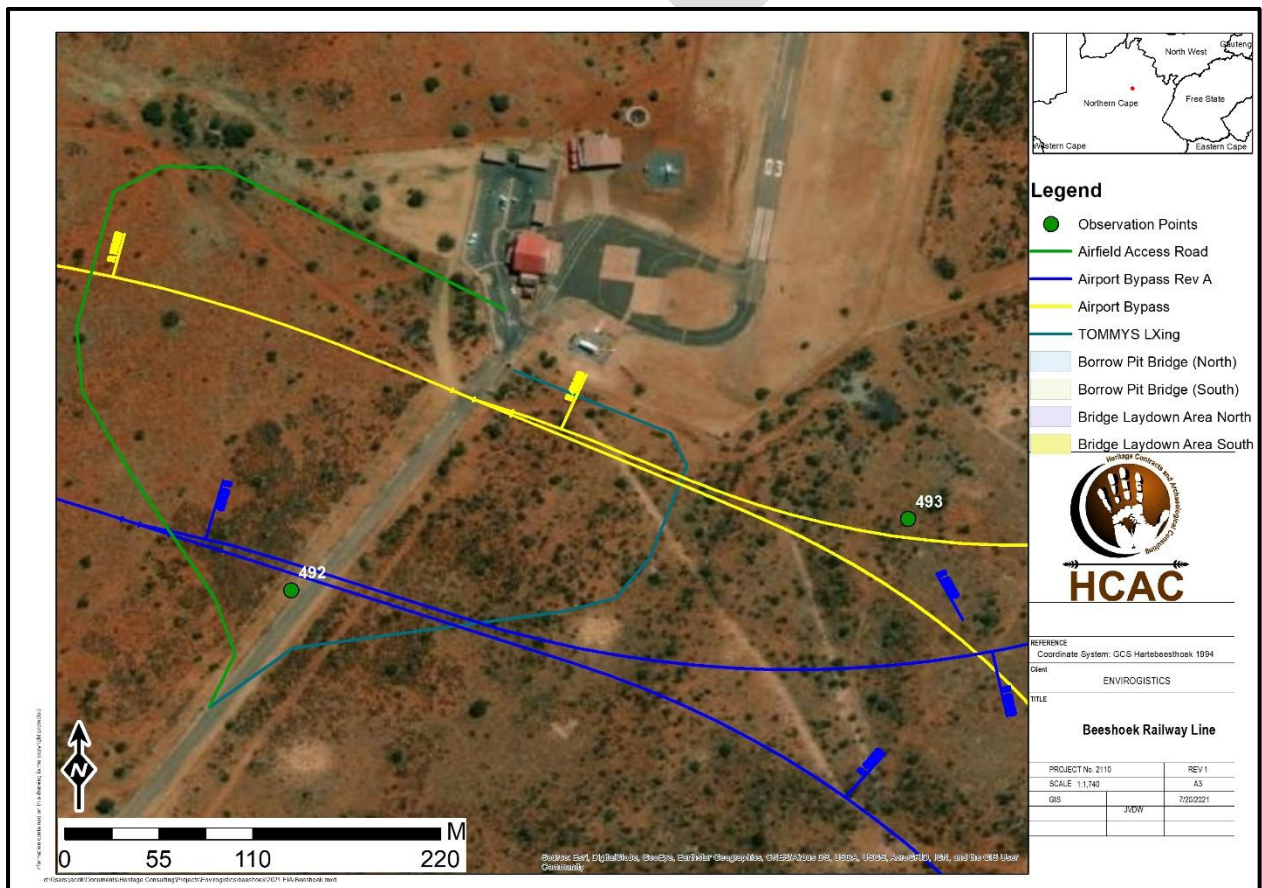


Figure 9.1. The two recorded observation points in relation to the proposed project.

Table 8. Impact assessment of the proposed project.

Description	Impact	Extent	Intensity	Duration	Consequence	Probability	Significance	Status	Confidence	Reversibility
Beeshoek Railway Link	Vegetation clearing and excavations	1	-1	3	Very low	Probable(3)	Low (-6)	Negative	High	No

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10. Conclusion and recommendations

The study area is flat without focal points like natural pans or rocky outcrops that would have attracted human occupation in antiquity. Sparse Stone Age material is known to occur in the wider area with known sites of significance, located along watercourses or hills (Van der Ryst 2011 and Morris 2005) of which none occur in the study area. The disturbed character of the study area (quarries, road and railway developments) and high vegetation cover could have masked isolated finds but not major sites.

The study area is flat without focal points like natural pans or rocky outcrops that would have attracted human occupation in antiquity and a paucity of sites was immediately noted during the survey, although the heritage survey recorded two observation points. The first is an isolated find possibly dating to the Earlier Stone Age and the second is a low-density scatter of lithics possibly dating to the Middle and Later Stone Age. The lithics are in a deflated context, impacted on by the surrounding developments and found in low densities, forming part of the archaeological background scatter (Orton 2016) and are of low significance apart from providing evidence of use of the larger landscape from possibly as early as >200 ka. No other heritage sites of significance were recorded within the proposed impact areas.

The impact of the proposed project on heritage resources low and it is recommended that the proposed project can commence on the condition that the following recommendations are implemented as part of the EMP and based on approval from SAHRA:

10.2. 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).

10.3. Chance Find Procedures

10.3.1. 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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10.3.2. 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 in Paleo report). 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 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.

6.4 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.

10.4. 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 9. 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 (Pre construction and construction phase)	Proactively	<ul style="list-style-type: none"> • If risks are manifested (accidental discovery of heritage resources) the chance find procedure should be implemented: <ol style="list-style-type: none"> 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.

10.5. Management Measures for inclusion in the EMPr

Table 10. Heritage Management Plan for EMPr implementation

Area	Mitigation measures	Phase	Timeframe	Responsible party for implementation	Target	Performance indicators (monitoring tool)
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

10.6. KNOWLEDGE GAPS

Due to the subsurface nature of heritage resources and high grass cover, the possibility of discovery of heritage resources including graves during the construction phase cannot be excluded. This limitation is successfully mitigated with the implementation of a chance find procedure.

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