THE PROPOSED ENVIRONMENTAL AUTHORISATION IN SUPPORT OF THE LIMESTONE MINING (PTY) LTD PROSPECTING RIGHT APPLICATION IN RESPECT OF PORTION 1 AND 3 OF THE FARM WITKRAAL 878 AND THE FARM STANDARD SALT PAN 1959, SITUATED IN THE LETSEMENG LOCAL MUNICIPALITY, XHARIEP DISTRICT MUNICIPALITY, FREE STATE PROVINCE.

Phase 1 Archaeological Impact Assessment

November 2023

PREPARED FOR:

PREPARED BY:

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QUALITY AND REVISION RECORD

Quality and revision record

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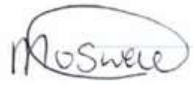
Author	Environmental Consultant and Heritage Specialist (EAPASA Reg: 2020/2956 (Candidate EAP), IAIAsa: 6624, ASAPA: 648)	Kuni Mosweu		31/10/2023
External Reviewer	Principal Heritage Consultant (ASAPA: 275)	Nkosinathi Tomose		

This report has been prepared in accordance with Enviroworks Quality Management System.

Revision record

Revision Number	Objective	Change	Date
1	Review	-	

DISCLAIMER:

Even though every care is taken to ensure the accuracy of this report, archaeological assessment studies are limited in scope, time and budget. Discussions are to some extent made on reasonable and informed assumptions built on bona fide information sources, as well as deductive reasoning. Since archaeological impact studies deal with dynamic natural systems additional information may come to light at a later stage. The author does not accept responsibility for conclusions made in good faith based on own databases or on the information provided. Although the author exercised due care and diligence in rendering services and preparing documents, she/he accepts no liability, and the client, by receiving this document, indemnifies the author against all actions, claims, demands, losses, liabilities, costs, damages, and expenses arising from or in connection with services rendered, directly or indirectly by the authors and by the use of this document. This report should therefore be viewed and acted upon with these limitations in mind.

SPECIALIST DETAILS

Details of the specialist

This Archaeological Impact Assessment was prepared and compiled by Kuni Mosweu from Enviroworks. The sections below provide the details of the Specialist and explain their expertise to prepare this assessment.

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Kuni Mosweu is an Environmental Consultant and Heritage Specialist at Enviroworks. Her qualifications include an MSc specialising in Environmental Archaeology and Geographical Information Systems (GIS) with five (5) years of experience in the environmental and heritage field.

Statement of independence – specialist

I, **Kuni Mosweu**, **ID 940605 0262 088**, declare that I:

- Am a Heritage Specialist at Enviroworks.
- act as an independent Heritage Specialist.
- have compiled this Archaeological Impact Assessment report.
- I do not have or will not have any financial interest in the undertaking of the activity other than remuneration for work as stipulated in the terms of reference.
- remuneration for services by the Proponent in relation to this proposal is not linked to approval by decision-making Authorities responsible for permitting this proposal.
- the consultancy has no interest in secondary or downstream developments as a result of the outcome of this Impact Assessment Report.
- have no and will not engage in conflicting interests in the undertaking of the Activity.
- undertake to disclose to the Client and the Competent Authority any material, information that have or may have the potential to influence the decision of the Competent Authority required in terms of the Environmental Impact Assessment Regulations 2014, as amended.

- will provide the Client and Competent Authority with access to all information at my disposal, regarding this project, whether favourable or not.

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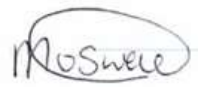

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LIST OF ABBREVIATIONS

ACRONYMS	DESCRIPTION
AIA	Archaeological Impact Assessment
ASAPA	Association of South African Professional Archaeologists
EIA	Early Iron Age
EIMP	Environmental Impact Management Report
EIR	Environmental Impact Report
ESA	Early Stone Age
FSPHRA	Free State Provincial Heritage Resources Authority
ha	Hectares
HCMP	Heritage Cultural Management Plan Report
HIA	Heritage Impact Assessment
LIA	Late Iron Age
LLM	Letsemeng Local Municipality
LSA	Late Stone Age
MIA	Middle Iron Age
MSA	Middle Stone Age
NEMA	National Environmental Management Act
NHRA	National Heritage Resources Act
SAHRA	South African Heritage Resources Agency
XDM	Xhariep District Municipality

TERMS AND DEFINITIONS

Archaeological resources

These include:

- Material remains resulting from human activities which are in a state of disuse and are in or on land and which are older than 100 years including artefacts, human and hominid remains and artificial features and structures.
- Rock art, being any form of painting, engraving or other graphic representation on a fixed rock surface or loose rock or stone, which was executed by human agency and which is older than 100 years, including any area within 10 m of such representation.
- Wrecks, being any vessel or aircraft, or any part thereof which was wrecked in South Africa, whether on land, in the internal waters, the territorial waters or in the maritime culture zone of the republic as defined in the Maritimes Zones Act, and any cargo, debris or artefacts found or associated therewith, which is older than 60 years or which SAHRA considers to be worthy of conservation.
- Features, structures and artefacts associated with military history which are older than 75 years and the site on which they are found.

Cultural significance

This means aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance.

Development

This means any physical intervention, excavation, or action, other than those caused by natural forces, which may in the opinion of the heritage authority in any way result in the change to the nature, appearance or physical nature of a place or influence its stability and future well-being, including:

- Construction, alteration, demolition, removal or change in use of a place or a structure at a place.
- Carrying out any works on or over or under a place.
- Subdivision or consolidation of land comprising a place, including the structures or airspace of a place.
- Constructing or putting up for display signs or boards; any change to the natural or existing condition or topography of land.

- And any removal or destruction of trees, or removal of vegetation or topsoil.

Heritage resources

This means any place or object of cultural significance

Living heritage

This means the intangible aspects of inherited culture, and may include cultural tradition; oral history; performance; ritual; popular memory; skills and techniques; indigenous knowledge systems; and the holistic approach to nature, society and social relationships

1. INTRODUCTION

1.1. Project description

Enviroworks (Pty) Ltd was appointed by Eco Elementum to conduct a Phase 1 Archaeological Impact Assessment study for the proposed Prospecting Right application, Portion 1 and 3 of the Farm Witkraal 878 and the Farm Standard Salt Pan 1959, located near Petrusburg, situated in the Letsemeng Local Municipality, within Xhariep District Municipality, Free State Province.

The proposed Prospecting Right involves the selection of several sites for geotechnical drilling. These boreholes and their associated activities will impact a surface area of between 250 m² and 625 m². The full extent of the drill site will also be demarcated and no drilling will be done outside of the boundary. The proposed project aims at determining if economically viable mineral deposits exist within the application area.

Current access roads will be used as far as possible, but in cases where access roads to drill sites do not exist, a single track will be selected based on the area where the least environmental impact will occur. The same tracks will be used should repeated access be required. Vegetation and topsoil excavated during the drilling process will be stockpiled next to sumps where it will serve as a storm water diversion berm. On completion of the drilling process, the rehabilitated sumps will be backfilled with the stockpiled material. Because a constant water supply is needed for the drilling process, 15 000l will be stored in tanks. The plastic-lined sumps will be used to recycle water through a filter process in order to maintain a constant clean water source for the purpose of drilling. In terms of potable water for employees and workers, a temporary 260l tank will be placed on-site. Additional facilities will include temporary portable toilets, berms, and a maximum of 60m³ of diesel fuel located on an impermeable surface with bunds.

The AIA investigated the potential impacts of the proposed project prospecting activities on any heritage resources identified within the receiving environment, such as archaeological artefacts, burial grounds and historical features of the built environment. The overall objective of the AIA is to give advice on the management of the heritage resources in and around the proposed project area in terms of known heritage resources management measures in line with the NHRA, No. 25 of 1999.

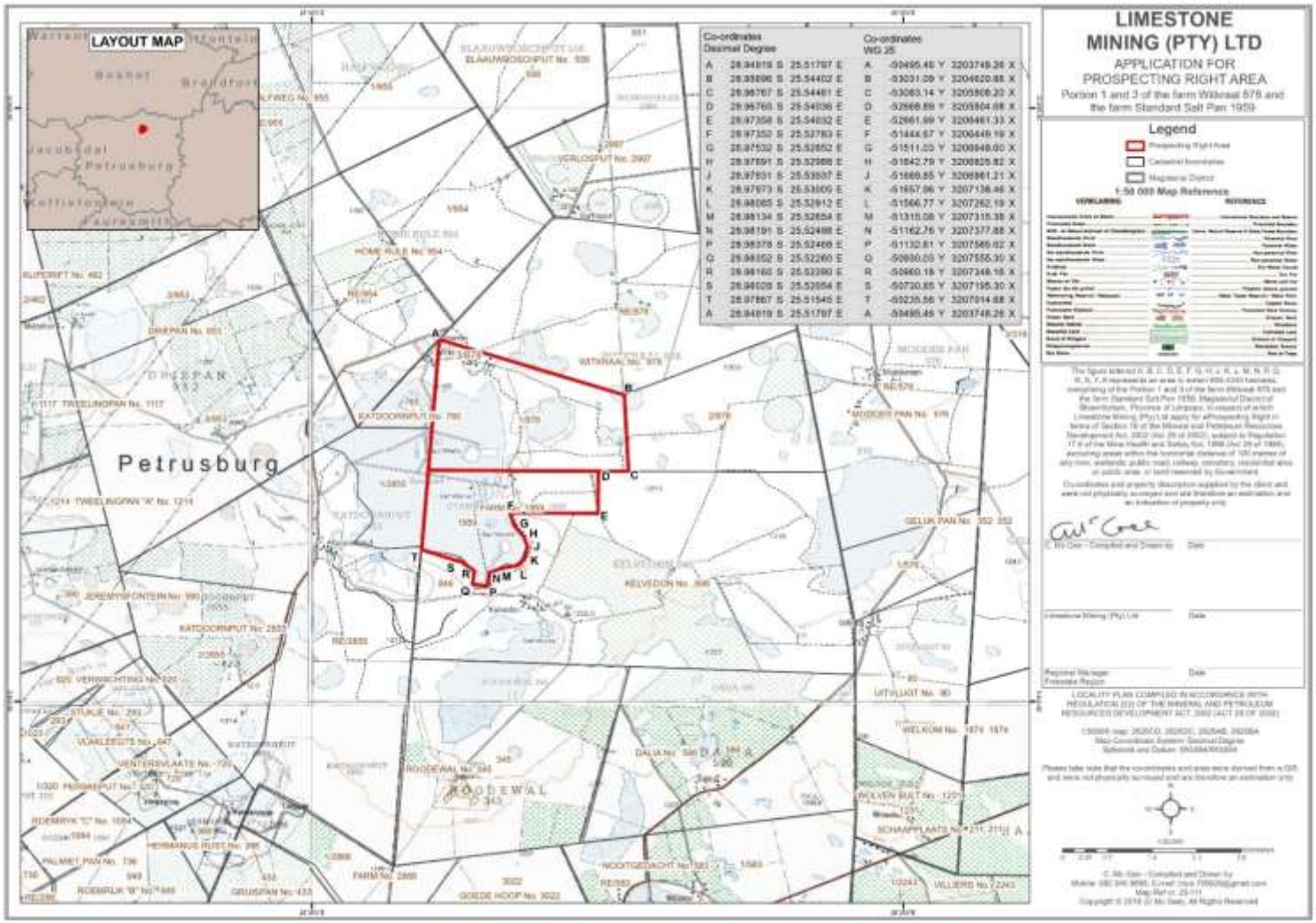


Figure 1: Map showing the location of the project area (Source: Eco Elementum 2023)

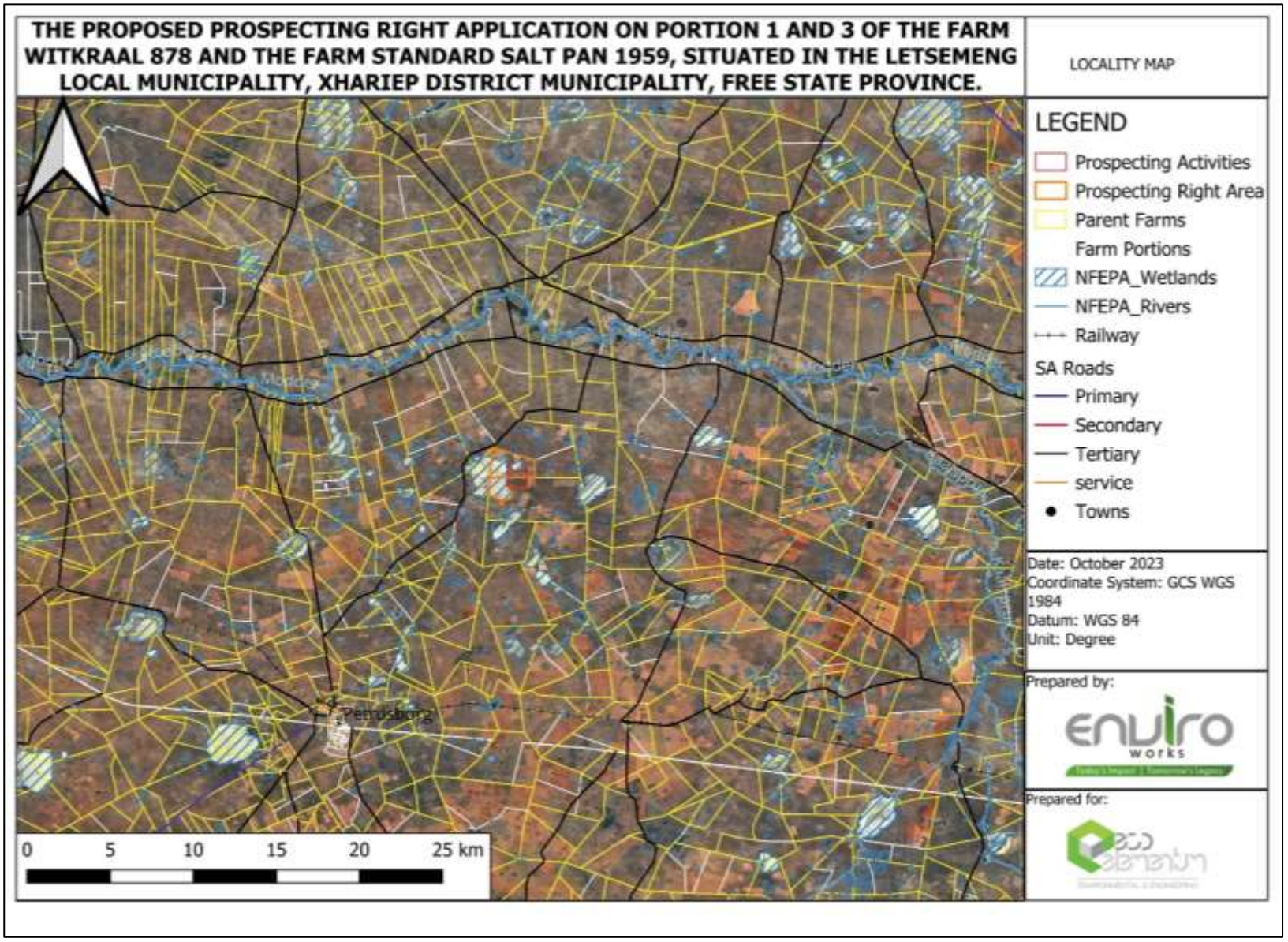


Figure 2: Map of the Prospecting Right Area and Prospecting Activities Area.

1.2. Description of the Affected Environment

1.2.1. Land Use

The project area is located approximately 18 km southwest of Petrusburg, in the LLM of the XDM situated in the Free State Province of South Africa. It is located 8 kilometeres from Modder River. The N8 national road runs east-west approximately 16 km to the south, while the R64 primary road runs 32 km to the north.

The proposed Prospecting Right Area is situated within the Grassland Biome known for summer rainfall regions, which covers roughly 28% of South Africa. The study area locally belongs to the Bloemfontein Dry Grassland vegetation unit, while two areas feature salt pans. The vegetation type is classified as Bloemfontein Dry and on many parts of the farm the vegetation is overgrown. The area spans from Petrusburg in the west to the Rustfontein Dam in the east, and from Reddersburg in the south to the Soetdoring Nature Reserve in the north. This specific type of vegetation is currently endangered and is under a conservation target of 24%. Only a small portion of the Soetdoring Nature Reserve is legally protected, while over 40% has already undergone significant change due to crop cultivation and urban development.

The farms fall within a heavily disturbed area, as the area is characterised by underground irrigation pipes (*Figure 5*), Eskom powerlines (*Figure 8*), agricultural activities such as pickle pear and pica nuts fields (*Figure. 10*), game farming (e.g., springbok), and on-going salt mining activities. On some parts, the proposed project area is characterised by a quarry (*Figure 11*), which according to Mr. Petrus Kamakatse - Farm Manager, the rocks extracted from the outcrops are utilized in the construction of gravel roads. There are various types of fauna in the farm (e.g., tortoise, cow, sheep) (*Figure. 12*).

Table 1: Site Location and Property Information

Erf or farm number/s	Portion 1 and 3 of the Farm Witkraal 878 and the Farm Standard Salt Pan 1959
Size of development footprint	Approximately 693 hectares (ha)
Town	Near Petrusburg
Responsible local authority	Letsemeng Local Municipality
Magisterial district	Xhariep District Municipality
Region	Free State Province
Site centre GPS coordinates	28°58'3.93"S; 25°31'57.60"E

Figure 3: General view of the area where prospecting activities will occur.

Figure 4: General view of the pan located outside specific prospecting area (Yellow arrow).

Figure 5: General view of the specific prospecting area.

Figure 6: Limestone rocks located in the prospecting area.

Figure 7: General view of the limestone rocks within prospecting area.

Figure 8: Powerlines running through the prospecting area.

Figure 9:Pine nuts and pickle pear farm fields within the prospecting area.

Figure 10: Rock outcrops in and around the quarry within the prospecting area.

Figure 11: Fauna found within the prospecting area.

1.3. Legislation regarding archaeology and heritage sites

The South African Heritage Resources Agency (SAHRA) and its provincial offices have a primary mission of preserving and overseeing the management, research, alteration, and protection of cultural resources in South Africa. It is of utmost significance to consistently comply with heritage resource legislation to safeguard our valuable cultural heritage.

Archaeological Impact Assessments (AIAs) should be done by qualified professionals with adequate knowledge to identify all heritage resources that might occur in areas of development and (b) make recommendations for protection or mitigation of the impact of the sites.

The AIA is conducted in terms of Sections 38 the NHRA, No. 25 of 1999. This prescript of the Act Section 38:

"the responsible heritage resources authority must specify the information to be provided in a report required in terms of subsection (3) (a): Provided that the following must be included:

(a) The identification and mapping of all heritage resources in the area affected.

(b) An assessment of the significance of such resources in terms of the heritage assessment criteria set out in section 6(2) or prescribed under section 7.

(c) An assessment of the impact of the development on such heritage resources.

(d) An evaluation of the impact of the development on heritage resources relative to the sustainable social and economic benefits to be derived from the development.

(e) The result of consultation with communities affected by the proposed development and other interested parties regarding the impact of the development on heritage resources.

(f) If heritage resources will be adversely affected by the proposed development, the consideration of alternatives.

(g) Plans for mitigation of any adverse effects during and after the completion of the proposed development."

National Heritage Resources Act No 25 of 1999, section 34 - Structures

According to Section 34 of the NHRA, no person may alter, damage or destroy any structure, which forms part of the sites-built environment older, that is 60 years without the necessary permits from the relevant provincial heritage authority.

National Heritage Resources Act No 25 of 1999, section 35

This act (Act 107 of 1998) states that a survey and evaluation of cultural resources must be done in areas where development projects, that will change the face of the environment, will be undertaken. The impact of the

development on these resources should be determined and proposals for the mitigation thereof are made. Environmental management should also take the cultural and social needs of people into account. Any disturbance of landscapes and sites that constitute the nation's cultural heritage should be avoided as far as possible and where this is not possible the disturbance should be minimized and remedied.

According to the National Heritage Resources Act No 25 of 1999 (section 35) the following features are protected as cultural heritage resources:

Archaeological artefacts, structures and sites older than 100 years

a. Ethnographic art objects (e.g. prehistoric rock art) and ethnography
b. Objects of decorative and visual arts
c. Military objects, structures and sites older than 75 years
d. Historical objects, structures and sites older than 60 years
e. Proclaimed heritage sites
f. Grave yards and graves older than 60 years
g. Meteorites and fossils
h. Objects, structures and sites of scientific or technological value.

In addition, the national estate includes the following:

a. Places, buildings, structures and equipment of cultural significance
b. Places to which oral traditions are attached or which are associated with living heritage
c. Historical settlements and townscapes
d. Landscapes and features of cultural significance
e. Geological sites of scientific or cultural importance
f. Archaeological and paleontological sites
g. Graves and burial grounds
h. Sites of significance relating to the history of slavery
i. Movable objects (e.g., archaeological, paleontological, meteorites, geological specimens, military, ethnographic, books etc.)

National Heritage Resources Act No 25 of 1999, section 36 – Burial Grounds & Graves

A section 36 permit application is made to the SAHRA or the competent provincial heritage authority which protects burial grounds and graves that are older than 60 years and must conserve and generally care for burial grounds and graves protected in terms of this section, and it may make such arrangements for their conservation as it sees fit. SAHRA must also identify and record the graves of victims of conflict and any other graves which it deems to be of cultural significance and may erect memorials associated with these graves and must maintain such memorials. A permit is required under the following conditions:

Permitting requirements for burial grounds and graves older than 60 years to the South African Heritage Resources Agency:

a. destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority; or
b. destroy, damage, alter, exhume or remove from its original position or otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves.
c. Bring onto or use at a burial ground or grave referred to in paragraph (a) or (b) any excavation equipment, or any equipment which assists in the detection or recovery of metals.

SAHRA or a provincial heritage resources authority may not issue a permit for the destruction or damage of any burial ground or grave referred to in subsection (3)(a) unless it is satisfied that the applicant has made satisfactory arrangements for the exhumation and re-interment of the contents of such graves, at the cost of the applicant.

Human Tissue Act of 1983 and Ordinance on the Removal of Graves and Dead Bodies of 1925

Graves and burial grounds are commonly divided into the following subsets:

a. ancestral graves
b. royal graves and graves of traditional leaders
c. graves of victims of conflict
d. graves designated by the Minister
e. historical graves and cemeteries
f. human remains

Graves 60 years or older are heritage resources and fall under the jurisdiction of both the National Heritage Resources Act and the Human Tissues Act of 1983. However, graves younger than 60 years are specifically protected by the Human Tissues Act (Act 65 of 1983) and Ordinance on Excavations (Ordinance no. 12 of 1980) as well as any local and regional provisions, laws and by-laws. Such burial places also fall under the jurisdiction of the National Department of Health and the Provincial Health Departments.

1.4. Limitations and Assumptions

Although a comprehensiveness physical survey was undertaken, it should be noted that some of the archaeological material, including artefacts and graves can be buried underground and as such, may not have been identified during the initial survey and site visit. Due to time restrictions and the large extent of the proposed project area the survey was limited to the proposed area where prospecting activities will occur and

priority areas, that most likely contained heritage resources. The vegetation in the project area was largely made up of grassland, with intermittent trees and mixed grasslands. In some sections of the project area, visibility posed a minor hindrance. In the case where the proposed development activities bring these materials to the surface, they should be treated as Chance Finds. Should such resources be unearthed, it is recommended that the development activities be stopped immediately, and an archaeologist be contacted to conduct a site visit and make recommendations on the mitigation of the finds. SAHRA and FS-PHRA should also be informed immediately on such finds. In this case, no archaeological material of graves should be moved from the site until the archaeological specialist has been able to make an assessment regarding the significance of the site and archaeological material, which is also subject to SAHRA approval.

2. METHODOLOGY

Ms. Kuni Mosweu is responsible for the compilation of the current AIA report for the proposed Prospecting Right application.

2.1. Step I – Desktop Study

A comprehensive archaeological and historical analysis was conducted on the proposed site and the broader area in which it is located. Various academic papers and research articles were consulted to provide a historical background for the project. In addition, archival sources, aerial photographs, historical maps, and local histories were utilised to establish the heritage of the landscape. Interpretation of legislation (the NHRA, No. 25 of 1999) and local bi-laws forms form the backbone for the study.

2.2. Step II – Physical Survey

The survey was conducted by Ms. Kuni Mosweu on Tuesday, 24 October 2023. The aim of the survey was to identify archaeological and heritage sites and resources within the area proposed for development activities as well as within the 500 m radius:

- The survey of the proposed prospecting application area was conducted on foot and the site was accessed using a bakkie.
- The aim of the surveys was to identify archaeological, burial grounds and graves and built environment heritage sites and resources in and around the area where the Prospecting Right activities will occur.
- To record and document the sites using applicable tools and technology

2.3. Step III – Report Writing and Site Rating

The final step involves the compilation of the report using desktop research as well as the physical survey results. Archaeological resources, graves and sites found in the project area are rated according to the site significance classification standards as prescribed by SAHRA.

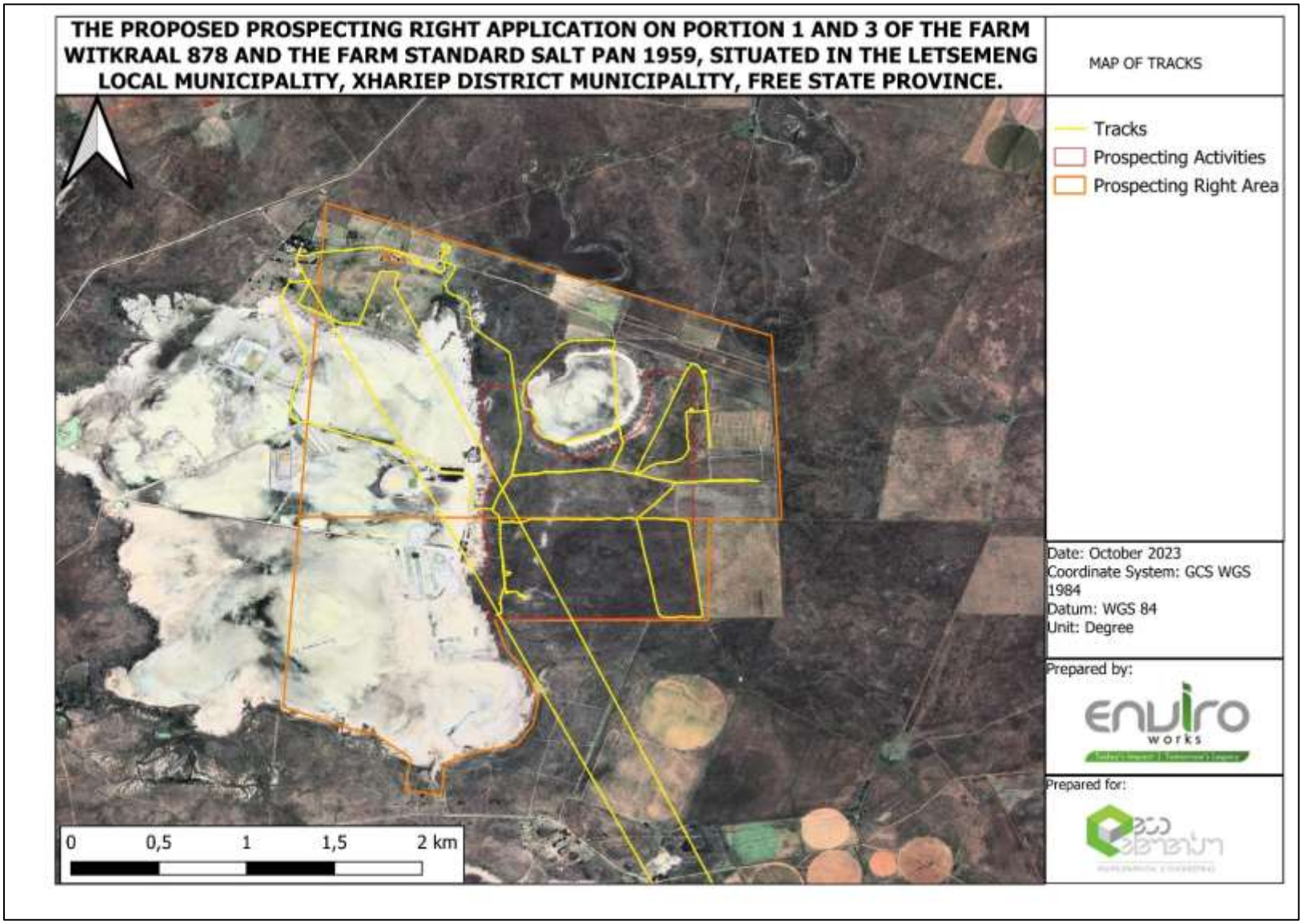


Figure 12: Track log of the site survey.

2.4. Assessment of Site Significance in Terms of Heritage Resources Management Methodologies

The identified heritage resources or sites were graded using the site significance classification minimum standards as prescribed by the SAHRA (2006) and approved by ASAPA for the SADC region (refer to Table 2). This statement indicating heritage significance does not exempt from any national, provincial, or local legal or regulatory requirements, including those related to protection, management, or general provisions outlined in the NHRA, No. 25 of 1999.

Table 2: Site significance classification standards as prescribed by SAHRA

FIELD RATING	GRADE	SIGNIFICANCE	RECOMMENDED MITIGATION
National Significance (NS)	Grade 1	High Significance	Conservation; National Site nomination
Provincial Significance (PS)	Grade 2	High Significance	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. A)	-	Low Significance	Destruction

2.5. Impact Significance Rating in Accordance to Environmental Requirement

The assessment of impacts must adhere to the minimum requirements in the EIA Regulations, 2014 as amended and should take applicable official guidelines into account. It provides a summary and anticipated significance of the potential direct, indirect and cumulative impacts that are likely to occur as a result of the planning and design phase, construction phase, operational phase, decommissioning and closure phase, including impacts relating to the choice of site/activity/technology alternatives as well as the mitigation measures that may eliminate or reduce the potential impacts listed.

Table 3: Impact Assessment Methodology

Impact Assessment Methodology

For each potential impact, the EXTENT (spatial scale), MAGNITUDE, DURATION (time scale), PROBABILITY of occurrence, IRREPLACEABLE loss of resources and the REVERSIBILITY of potential impacts must be assessed by the specialist by using the results of their specialist studies. The assessment of the above criteria will be used to determine the significance of each impact, with and without the implementation of the proposed mitigation measures. The scales to be used to assess these variables and to define the rating categories are tabulated in Table 1 and Table 2 below.

Evaluation component	Ranking scale and description (criteria)
MAGNITUDE of NEGATIVE IMPACT (at the indicated spatial scale)	**10 - Very high**: Bio-physical and/or social functions and/or processes might be *severely* altered. **8 - High**: Bio-physical and/or social functions and/or processes might be *considerably* altered. **6 - Medium**: Bio-physical and/or social functions and/or processes might be *notably* altered. **4 - Low** : Bio-physical and/or social functions and/or processes might be *slightly* altered. **2 - Very Low**: Bio-physical and/or social functions and/or processes might be *negligibly* altered. **0 - Zero**: Bio-physical and/or social functions and/or processes will remain *unaltered.*
MAGNITUDE of POSITIVE IMPACT (at the indicated spatial scale)	**10 - Very high (positive)**: Bio-physical and/or social functions and/or processes might be *substantially* enhanced. **8 - High (positive)**: Bio-physical and/or social functions and/or processes might be *considerably* enhanced. **6 - Medium (positive)**: Bio-physical and/or social functions and/or processes might be *notably* enhanced. **4 - Low (positive)**: Bio-physical and/or social functions and/or processes might be *slightly* enhanced. **2 - Very Low (positive)**: Bio-physical and/or social functions and/or processes might be *negligibly* enhanced. **0 - Zero (positive)**: Bio-physical and/or social functions and/or processes will remain *unaltered.*
DURATION	**5 - Permanent** **4 - Long term**: Impact ceases after operational phase/life of the activity > 60 years. **3 - Medium term**: Impact might occur during the operational phase/life of the activity – 60 years. **2 - Short term**: Impact might occur during the construction phase - < 3 years. **1 - Immediate**
	5 - International: Beyond National boundaries.

EXTENT (or spatial scale/influence of impact)	**4 - National**: Beyond Provincial boundaries and within National boundaries. **3 - Regional**: Beyond 5 km of the proposed development and within Provincial boundaries. **2 - Local**: Within 5 km of the proposed development. **1 - Site-specific**: On site or within 100 m of the site boundary. **0 -** None
IRREPLACEABLE loss of resources	**5 – Definite** loss of irreplaceable resources. **4 – High** potential for loss of irreplaceable resources. **3 – Moderate** potential for loss of irreplaceable resources. **2 – Low** potential for loss of irreplaceable resources. **1 – Very low** potential for loss of irreplaceable resources. **0 - None**
REVERSIBILITY of impact	**5 –** Impact **cannot** be reversed. **4 – Low** potential that impact might be reversed. **3 – Moderate** potential that impact might be reversed. **2 – High** potential that impact might be reversed. **1 –** Impact **will be** reversible. **0 –** No impact.
PROBABILITY (of occurrence)	**5 - Definite**: >95% chance of the potential impact occurring. **4 - High probability**: 75% - 95% chance of the potential impact occurring. **3 - Medium probability**: 25% - 75% chance of the potential impact occurring **2 - Low probability**: 5% - 25% chance of the potential impact occurring. **1 - Improbable**: <5% chance of the potential impact occurring.
Evaluation component	**Ranking scale and description (criteria)**
CUMULATIVE impacts	**High**: The activity is one of several similar past, present or future activities in the same geographical area, and might contribute to a very significant combined impact on the natural, cultural, and/or socio-economic resources of local, regional or national concern. **Medium**: The activity is one of a few similar past, present or future activities in the same geographical area, and might have a combined impact of moderate significance on the natural, cultural, and/or socio-economic resources of local, regional or national concern. **Low**: The activity is localised and might have a negligible cumulative impact. **None**: No cumulative impact on the environment.

Table 4: Evaluation components, rankings scales and description (criteria).

Significance Points	Environmental Significance	Description

125 – 150	**Very high (VH)**	An impact of very high significance will mean that the project cannot proceed, and that impacts are irreversible, regardless of available mitigation options.
100 – 124	**High (H)**	An impact of high significance which could influence a decision about whether or not to proceed with the proposed project, regardless of available mitigation options.
75 – 99	**Medium-high (MH)**	If left unmanaged, an impact of medium-high significance could influence a decision about whether or not to proceed with a proposed project. Mitigation options should be relooked.
40 – 74	**Medium (M)**	If left unmanaged, an impact of moderate significance could influence a decision about whether or not to proceed with a proposed project.
<40	**Low (L)**	An impact of low is likely to contribute to positive decisions about whether or not to proceed with the project. It will have little real effect and is unlikely to have an influence on project design or alternative motivation.
+	**Positive impact (+)**	A positive impact is likely to result in a positive consequence/effect, and is likely to contribute to positive decisions about whether or not to proceed with the project.

Table 5: Definition of significance ratings (positive and negative)

Once the evaluation components have been ranked for each potential impact, the significance of each potential impact will be assessed (or calculated) using the following formula:

- **SP (significance points) = (magnitude + duration + extent + irreplaceability +reversibility) x probability**

The maximum value is 150 SP (significance points). The unmitigated and mitigated scenarios for each potential environmental impact should be rated as per Table below.

3. BACKGROUND LITERATURE REVIEW: ARCHAEOLOGY

Southern Africa has one of the longest human species occupations record in the world. The occupation dates to approximately 2 million years ago (Mitchell 2002). This extensive occupation history has provided southern Africa with a wealth of archaeological material. The archaeology of South Africa is divided into three periods, which are mainly the Stone Age, Iron Age and the Historical Period. Each period is characterised by a unique cultural marker that distinguishes it from other archaeological periods.

3.1. Stone Age

The archaeology of South Africa is categorized into three main periods: the Early Stone Age (ESA), the Middle Stone Age (MSA), and the Later Stone Age (LSA). The Stone Age refers to a period when humans predominantly utilised stone as their primary technological marker.

3.1.1. Early Stone Age (ESA)

The ESA is the earliest phase identified within South Africa's archaeological record and is characterised by two technological industries which are the Oldowan, which dates from approximately 2 million years ago to 1.5 million years ago, and the Acheulean dates from approximately 1.5 million years ago to 300 000 years ago (Klein 2000; Lombard *et al.,* 2012). The Oldowan industry is characterised by flakes produced from pebbles, cobbles, percussive tools (Klein 2000; Roche et al. 2009). The Acheulean industry is characterised by large hand axes, cleavers, other bifacial tools, large flakes > 10 cm; some flakes with deliberate retouch (Klein 2000; Lombard *et al.,* 2012). Archaeological evidence from the ESA have been discovered in Sterfontein, Swartkrans and Kromdraai. Additionally, stone of Oldowan and Acheulean have been found in riverbeds and terraces along the Vaal River and the Klip River in Vereeniging.

3.1.2. Middle Stone Age (MSA)

The MSA dates approximately from 300 000 to 40 000 years ago. It is a phase that is highly debated as it marks the emergence of anatomically modern humans (Wadley, 2007). Evidence found in MSA sites of southern Africa, such as the use of ochre and ostrich eggshell water flasks which indicate the emergence of symbolic behaviour, as well as distinctive stone tools, suggests that this phase is the origin of cognitive modern humans. The MSA is linked to small flakes, points, and blades believed to have been used for hunting and cutting prey (Wurz 2013), as well as arrowheads or spears (Wadley 2007). The MSA is characterised by small flakes, points and blades that are suggested to be made for hunting activities and cutting prey (Wurz 2013) and arrowheads or spears (Wadley 2007). Associated sites with significant MSA findings include Klasies River Caves, Mossel Bay, Sibudu Caves, Blombos Cave, and Border Cave.

Human evidence of human occupation dated approximately 77 000 to 66 000 years ago at the Lovedale Donga, along the Modder River (Wroth *et al.* 2022). According to Wroth *et al.* (2002), the MSA stone tools clearly indicates that the occupation was related to hunting activities that took place close to the river. The Vredefort Dome, recognized as a UNESCO World Heritage site and situated roughly 370 km from the development area, serves as a notable example of an MSA (Middle Stone Age) site within the Free State Province. This distinction is attributed to the discovery of MSA stone tools in the vicinity (Mitchell 2002). Furthermore, the Florisbad site, located approximately 100 km from the proposed development area, has yielded an archaic Homo sapiens skull within MSA layers (Mitchell 2002).

3.1.3. Later Stone Age (LSA)

The LSA dates approximately from about 40 000 to 2000 years ago. The LSA is distinguished by the presence of microlithic stone tools, as well as flakes and scrapers (Binneman 1995; Lombard *et al.,* 2012). During the LSA, there was a development of an economic system, with inland hunter-gatherer communities hunting wildlife and gathering plants, as evidenced by seed remains found in archaeological assemblages. Additionally, this phase reveals evidence of symbolic behaviour in southern African archaeological sites. Symbolic behaviour of LSA period is shown by the purposeful burial of the dead (Hall 1990), decorating using ostrich eggshell beads and the use of ochre (Hall & Binneman 1987; Huffman 2005).

LSA groups preferred to settle in rock shelters and caves close to rivers. Evidence of LSA inhabitants have been found in the case of rock engravings. For instance, LSA rock engravings have between found around the Vaal River (Bergh 1999). LSA rock art has also been found in Rose Cottage cave and at Tandjiesberg (Wadley 1995). Animal bones, stone tools such as small scrappers and grinding stones have also been found at Tandjiesberg (Wadley 1995).

3.2. Iron Age

The Iron Age is divided into the Early Iron Age (EIA) (AD 200 – 900), the Middle Iron Age (MIA) (AD 900 – 1300), and the Late Iron Age (LIA) (AD 1300 – 1840). It was characterised by farming communities who domesticated animals, cultivated plants, created various ceramic vessels, smelted iron to develop weapons and crafted tools. In northern Southern Africa, there is also evidence of small-scale mining of copper, iron and gold (Friede & Steel 1981). The Iron Age societies migrated with their material culture, which is evident in the archaeological record. Material culture serves as an expression of these societies' identity, as it comprises distinct patterns and cultural symbols (Huffman 2002). In the field of Iron Age archaeology, ceramic style is utilised to differentiate the various Iron Age groups that resided in the southern African terrain and track their movements.

3.2.1. Early Iron Age (EIA)

The EIA is characterised by the first settlements of Bantu farming communities in southern Africa (Badenhorst 2010). These farmers mainly cultivated plants, herded domestic animals primarily sheep and goats and produced metal and

ceramic vessels. The farmers settled in houses erected on valley floors (Badenhorst 2010) for the purpose of sustaining their livestock and crops. During the EIA, three streams of pottery are identified in Africa, which are the Kalundu Tradition, which is referred as the western stream, the Kwale Branch which is the eastern stream and the Nkope Branch which is the central stream. Both the Nkope and Kwale streams form part of the Urewe Tradition (Mitchell 2002; Huffman 2002, 2007), which can be traced back to east Africa (Boeyens 2003). Several ceramics that are associated with the EIA have been found in areas surrounding the Orange River Scheme region (Samson 1972).

3.2.2. Middle Iron Age (MIA)

The MIA is a period that is mainly focussed in the Mapungubwe region, in southern Africa. The inhabitants that lived in the Mapungubwe region were mainly farmers and traders of gold. The inhabitants of the Mapungubwe region were primarily gold traders and farmers. During the MIA, there was a rise in the population size of southern African communities, including those who settled in Mapungubwe (Badenhorst 2010). This increase was encouraged by the triumphs of established trading networks for ivory and gold across the trans-Indian Ocean, providing goods such as beads and cloth (Badenhorst 2010).

3.2.3. Late Iron Age (LIA)

The LIA is characterised by the domestication of cattle, hilltop settlements, and ceramics production. Studies examining the classification of LIA stone wall settlement patterns have been conducted by Maggs (1976) and Mason (1986). Mason (1968) focused his research on stone wall sites situated in the Magaliesberg region where the 19th-century Tswana town of Marothodi is also located (Anderson 2009). Mason (1986) conducted further research in the area and subsequently published a review of his settlement types featuring stone walls. This period is believed to coincide with the migration of Sotho-Tswana speaking groups from east Africa to southern Africa, driven by the region's climatic conditions (Boeyens 2003). Ceramics from the Moloko Branch have been linked to these Sotho-Tswana groups (Evers 1983; Huffman 2002; Mitchell & Whiteland 2005; Anderson 2009). The prevalence of Moloko-style ceramic among the Sotho-Tswana groups in the Limpopo Province and Botswana regions suggests that this design replaced the earlier Eiland ceramics during the period spanning from AD 1000-1300 (Mitchell 2002; Boeysens 2003; Huffman 2007). This is evidenced by tracing the Moloko ceramics back to the EIA of the Urewe Tradition (Boeyens 2003; Huffman 2007). In the Free State Province, Moloko-style ceramics have been located near the Vaal River.

During the 16th to 18th Century AD, Sotho-Tswana speaking groups migrated from the central Highveld across the Vaal River into the southern Highveld in the Free State Province (Thorp 1996). Extensive stone wall sites have also been found in the Kroonstad region (Dreyer 2006). These sites are associated with Sotho-Tswana speakers who occupied the site from around 16th Century. Ceramics of the Ntsuanatsatsi facies and N- Type walling have also been found in the Free State Province, suggesting the presence of Nguni speakers in the Free State from AD 1450 to 1650.

Ntsuanatsatsi facies are characterised by broad band stamping in the neck with stamped arcades on the shoulder (Huffman 2007). The Uitkomst facies (AD 1650 – 1820) of the same branch is seen as the successors to the Ntsuanatsatsi facies and contains elements of both Nguni (Ntsuanatsatsi facies) and Sotho-Tswana speakers (Olifantspoort facies) pottery styles (Huffman 2007). They are characterised by stamped arcades and blocks of parallel incisions and cord impressions, which represents contact between these two groups. Olifantspoort facies (AD 1500-1700) and Thabeng facies (AD 1700-1840) of the Moloko Branch have been found at Iron age sites in the Free state Province, around the Vaal River region (Mason 1986; Mitchell 2002; Huffman 2007). Olifantspoort pottery is characterised by "multiple bands of fine stamping and narrow incision separated by colour" (Huffman 2007). The presence of ceramics of the Olifantspoort facies (AD 1500-1700) and Thabeng facies (AD 1700-1840) around the Vaal River region provides evidence of the contact between Nguni and Sotho-Tswana speaking groups during the LIA.

Buispoort ceramics (AD 1700 – 1840), of the Moloko Branch, have been found to the north of Potchefstroom (Mason 1986; Boeyens 2003; Huffman 2007). Buispoort ceramics are characterised by "rim notching, broadly incised chevrons and white bands" (Huffman 2007). To the north of Kroonstad, in the Vredefort Dome, several LIA stone walled settlements, most likely related to Fokeng settlements, have been identified dating to AD 1450 – 1650 (Huffman 2007).

3.3. Historical Period of the Free State Area

The Historical Period dates from AD 1600 and is generally the period related to colonial settlement in South Africa. In the 1820s and 1830s, the Mfeqane conflict and expansion of the Voortrekkers resulted in instability in South Africa (Huffmann 2004; Morton 2013). The conflict arose mainly as a result of environmental changes that caused drought in southern Africa, leading to scarce arable land and competition for it, resulting in a rise in invasions (Eldredge 1987; Morton 2013). In the Free State region, the Mfeqane conflict was escalated by Mzilikazi. At about 1827, Mzilikazi migrated north-wards from Natal settling in the interior of South Africa. Mzilikazi invaded parts of the interior of South Africa capturing, killing and driving away the Batlokwa of Sekonyela and Mantatise of the Sotho-Tswana groups. In response, the Batlokwa displaced the Bafokeng of Sebetoane from Kurutlele (Biddulphsberg) near Senekal. The Bafokeng were attempting to escape the AmaNdebele forces, and as a result, they eventually found themselves in the Caprivi region, as documented (Dreyer & Kilby 2003). This led to Mzilikazi expanding his territory in the interior of Southern Africa (Okihiro 1973).

During the same period in the 1830s, the Voortrekkers were migrating northwards from the Cape Colony due to dissatisfaction with the British rule (Eldredge 1987). These migrations sparked a sequence of conflicts and wars involving the Zulus, Voortrekkers, and Sotho-Tswana communities within the Orange Free State (Gutteridge 2008). This resulted in the Sotho-Tswana people being displaced from their historical settlements (Morton 2013). In October 1836, the Voortrekkers engaged in a battle with 3000 of Mzilikazi's warriors on Vegkop hill (Zvobgo 2009). The Voortrekkers who were assisted by the Sotho-Tswana and Griqua groups defeated Mzilikazi's Matabele, who

fled to the Limpopo Province and settled in Zimbabwe (Zvobgo 2009). In 1848, Sir Harry Smith declared the area between the Orange and Vaal Rivers as British Possession (Scott-Keltie & Epstein 1925). The Sand River Convention of 1852, signed between Great Britain and the Voortrekkers, granted independence to the Voortrekkers (Kruger 2018). Following the convention, the South African Republic (Transvaal) was formed by the Voortrekkers (Ashman 1996). The Orange Free State was established in 1854 (Pistorius 2004).

3.3.1. Historical Background of Petrusburg – the battle of Paardeberg

The town of Petrusburg was founded in 1891 with the purpose of serving the farms situated in the area between Bloemfontein and Kimberley. The initial development of the town began on a farm near the Emmaus railway station, which was part of the railway line connecting Bloemfontein and Kimberley. During the Anglo-Boer War (1900-1902), on the 10th of February 1900, Lord Roberts directed his formidable army away from the Modder River, where it had confronted the Boers at Magersfontein (Lunderstedt 2023). Roberts intended to traverse the Riet River that was thirty kilometres (30 km) southeast. Following that barrier, his infantry would advance towards the east into the Orange Free State. Simultaneously, General John French's cavalry unit would proceed towards the north, cross the Modder River thirty kilometres (30km) east of the major Boer encampment and then release Kimberley (Lunderstedt 2023).

The success of this plan caught the Boer commander at Magersfontein, General Piet Cronje, by surprise(Lunderstedt 2023. French's cavalry managed to bypass the primary Boer resistance at Klipdrift and successfully entered Kimberley on February 15, 1900. Cronje, realizing he was in danger of being cut off from the Orange Free State, decided to retreat towards Bloemfontein. On February 16, 1900, his Boer forces moved across the front of the British infantry guarding the fords over the Modder River without being detected, although their rearguard was spotted by a British mounted infantry unit on the way to Kimberley (Lunderstedt 2023). On February 17, General John French's received orders to change direction and pursue Cronje's retreating force. Despite their initial confidence, Cronje's Boer command reached the Modder River at Paardeberg and Vendutie Drifts on February 17, 1900 (Lunderstedt 2023). Soon after their arrival, General John French and the British cavalry engaged the Boers from short range. Although French's cavalry was outnumbered, they managed to hold the Boers in place until General Lord Kitchener arrived with additional British troops.

After Kitchener fell ill, he took charge at Paardeberg on February 18, 1900, initially holding an ambiguous position, as Lieutenant-General Sir Thomas Kelly-Kenny outranked him. Eventually, Lord Roberts confirmed Kitchener's authority. Kitchener dismissed a planned bombardment and instead ordered a frontal assault on the Boer camp. The attack on February 18 resulted in 320 dead and 942 wounded British soldiers, the highest single-day casualties of the war. Kitchener, in his report to Lord Roberts, pledged to do better the next day, prompting Roberts to hasten to Paardeberg. Roberts arrived on February 19, 1900, preventing another costly attack and choosing to lay siege to the Boer camp rather than risk further heavy losses. The siege lasted eight days, during which the British bombarded the

Boer camp from all sides. Lord Roberts offered safe conduct for women and children inside the camp, but Boer leader Cronjé declined. The polluted Modder River led to a typhus epidemic among the British forces. The Boers had only four guns, while the British had nearly fifty. A relief attempt by Christiaan de Wet was short-lived, and he eventually retreated to avoid capture.

The Canadians, supported by some New South Wales Mounted Rifles, worked their way close to the Boer lines on the night of 26th February 1900. On 27th February 1900, Cronjé finally signalled his willingness to surrender, which was followed by the surrender of over 4,000 of his men the next morning. Cronjé's surrender brought about a sense of despair and despondency among the Boer republics. In the subsequent battle at Poplar Grove on 7th March, the Boers fled without any resistance.

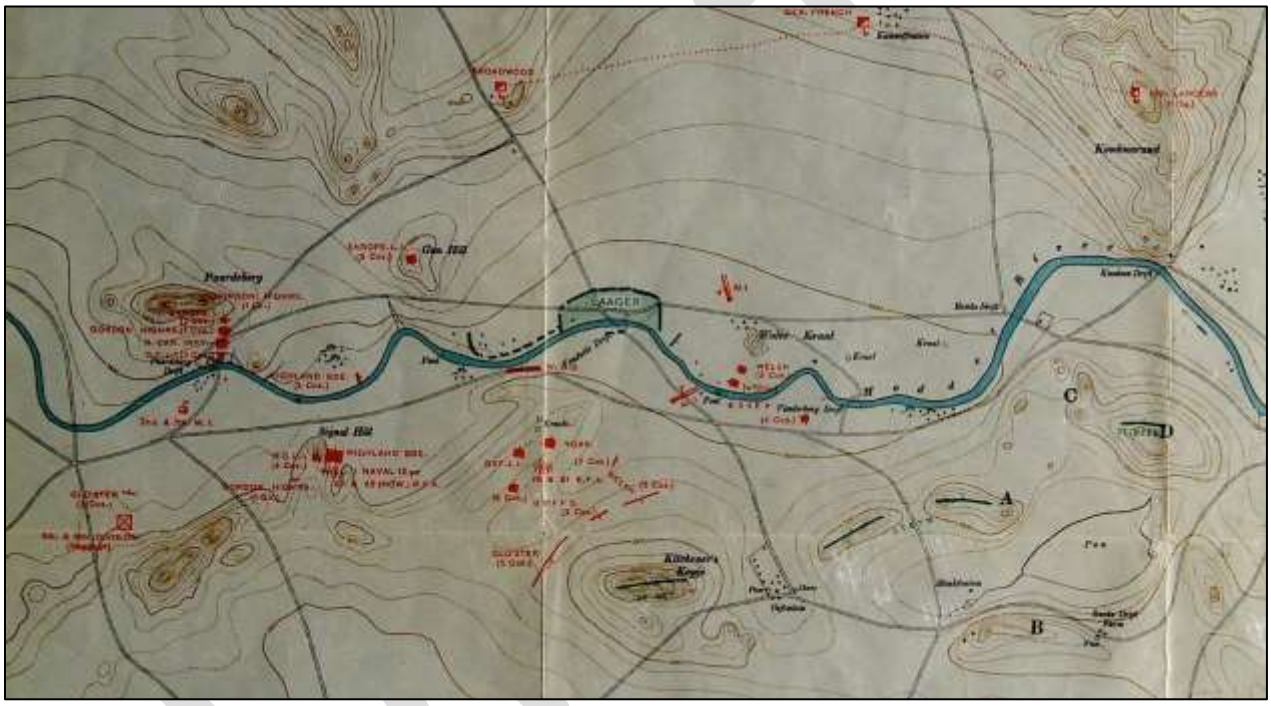


Figure 13: Map depicting the landscape of the battle of Paardeberg (Source: https://www.kimberley.org.za/today-in-kimberleys-history-17-february)

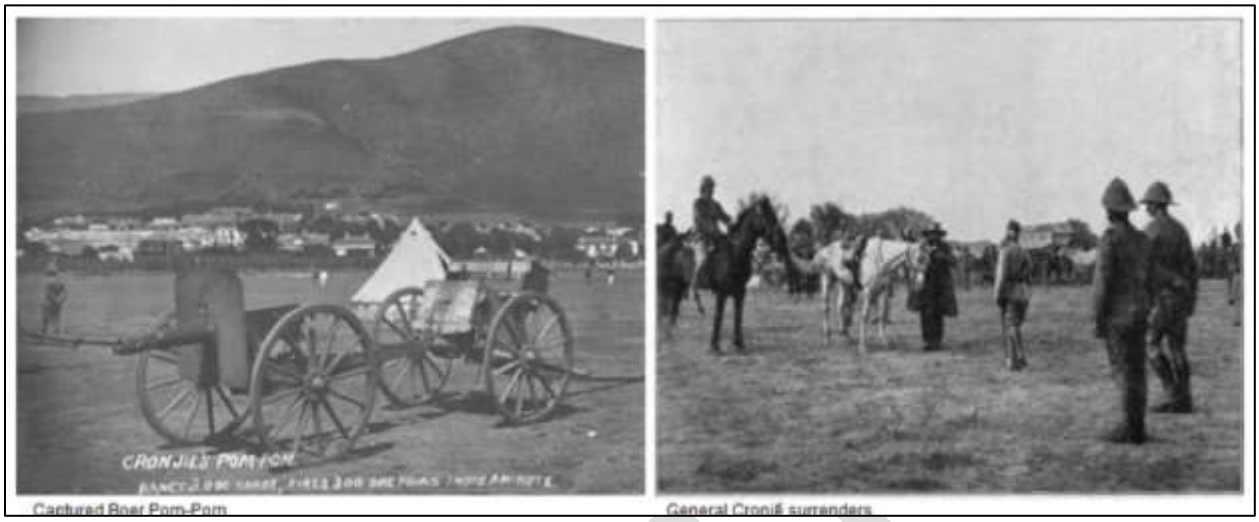


Figure 14: Image depicting the surrender of General Cronje (Source: The Australian Boer War Memorial)

3.4. Previous Archaeological and Heritage Studies

Several HIA and Archaeological Impact Assessments (AIA) have been conducted in and around the proposed development area. From an assessment of the South African Heritage Resources Information System (SAHRIS) database, previous Heritage and Archaeological Impact Reports of the proposed development area were reviewed.

- Coetze, T. 2023. Archaeological Desktop Study for the Application of a Prospecting Right on the Farm Standard Salt Pan 1959 and Portions 1 & 3 of the Farm Witkraal 878, Petrusburg, Free State. **No survey was conducted.**
- Dreyer, J. 2006. First Phase Archaeological and Cultural Heritage Assessment of the Proposed Township Developments at Bolokanang, Petrusburg, Free State. Prepared for Phetogo Consultants. **No archaeological or cultural remains were found in the development area.**
- Dreyer, J. 2014. First Phase Archaeological & Heritage Assessment of the Proposed Diamond Prospecting at Tafelkop 1154, (Petrusburg), Bloemfontein District. Prepared for De Beers Exploration. **This study found Middle Stone Age flakes, Anglo-Boer Historical sites and graves during the survey.**
- Morris, D. 2016. Heritage Impact Assessment for Proposed Drilling Site at Treurhoek/Doorndam, south east of Boshof, western Free State. **This study found Middle Stone Age flake and two cemeteries during the survey.**
- Van Schalkwyk, J.A. 2003. Mercury – Perseus 400 kV Transmission Line. Cultural Heritage Resources. Prepared for Strategic Environmental Focus. **No archaeological or cultural remains were found in the development area.**

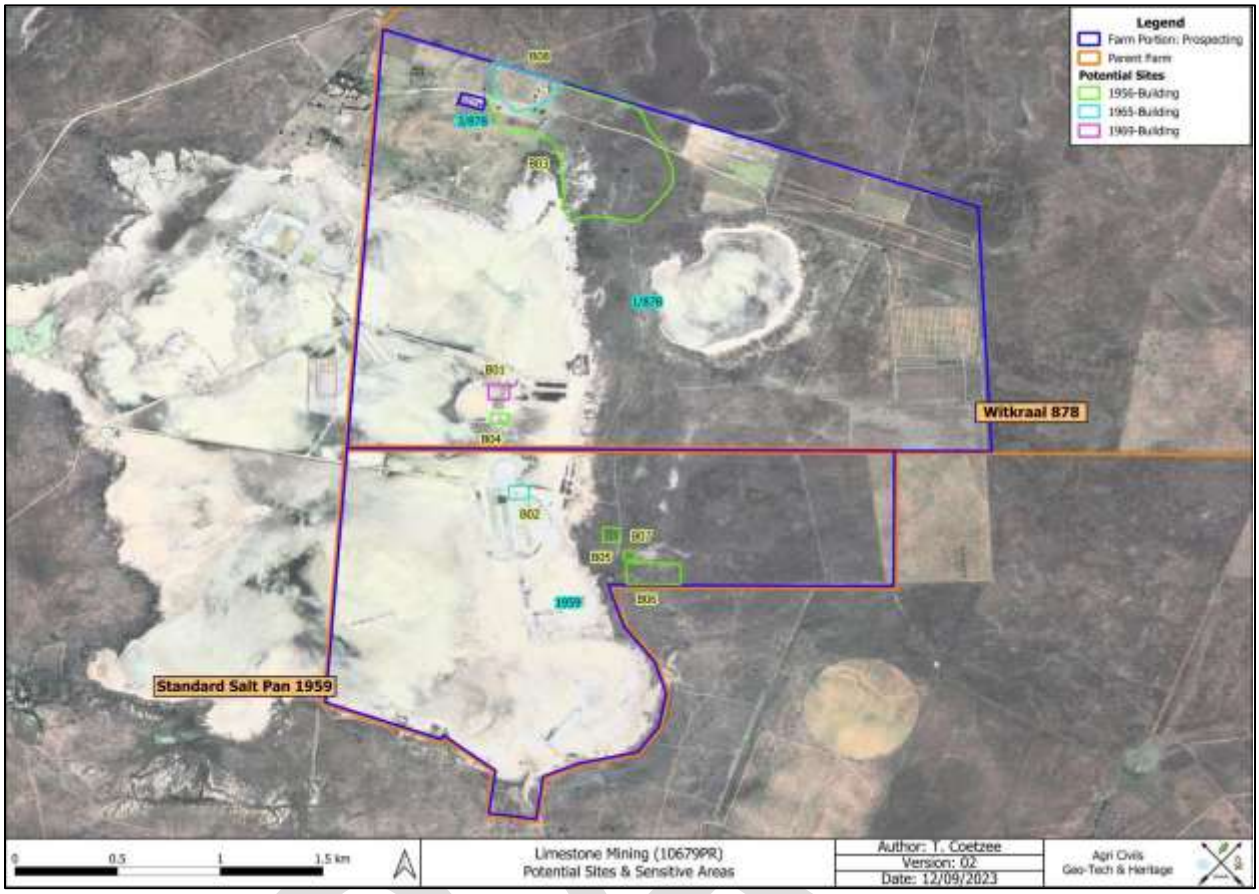


Figure 15: Image depicting potential sites in the proposed prospecting area ((Source: Coetzee 2023)

3.5. Conclusion on Literature Review

The proposed development area is situated in a province that is rich in archaeology, history and heritage. The province is home to several archaeological sites that have yielded significant material culture related to the Stone and Iron Age. Archaeological stone tool artefacts, Iron-Age material and graves have been found throughout the province.

4. RESULTS

The background information yielded information about known archaeological and heritage resources located in the Free State Province, particularly the general Petrusburg region. The broader Free State Province has a long history with Sotho-Tswana speaking people migrating and settling in the area during the Iron Age.

The physical survey focused on the area proposed for prospecting activities on Portion 1 and 3 of the Farm Witkraal 878 and the Farm Standard Salt Pan 1959, in Petrusburg, situated in the Free State Province. The survey identified two cemeteries, one within where prospecting activities will occur and one outside the prospecting area. Possible

stone tools were observed on the pan which is outside the area of prospecting activities, Furthermore, farm houses were located in various parts of the farm, however there were contemporary in nature.

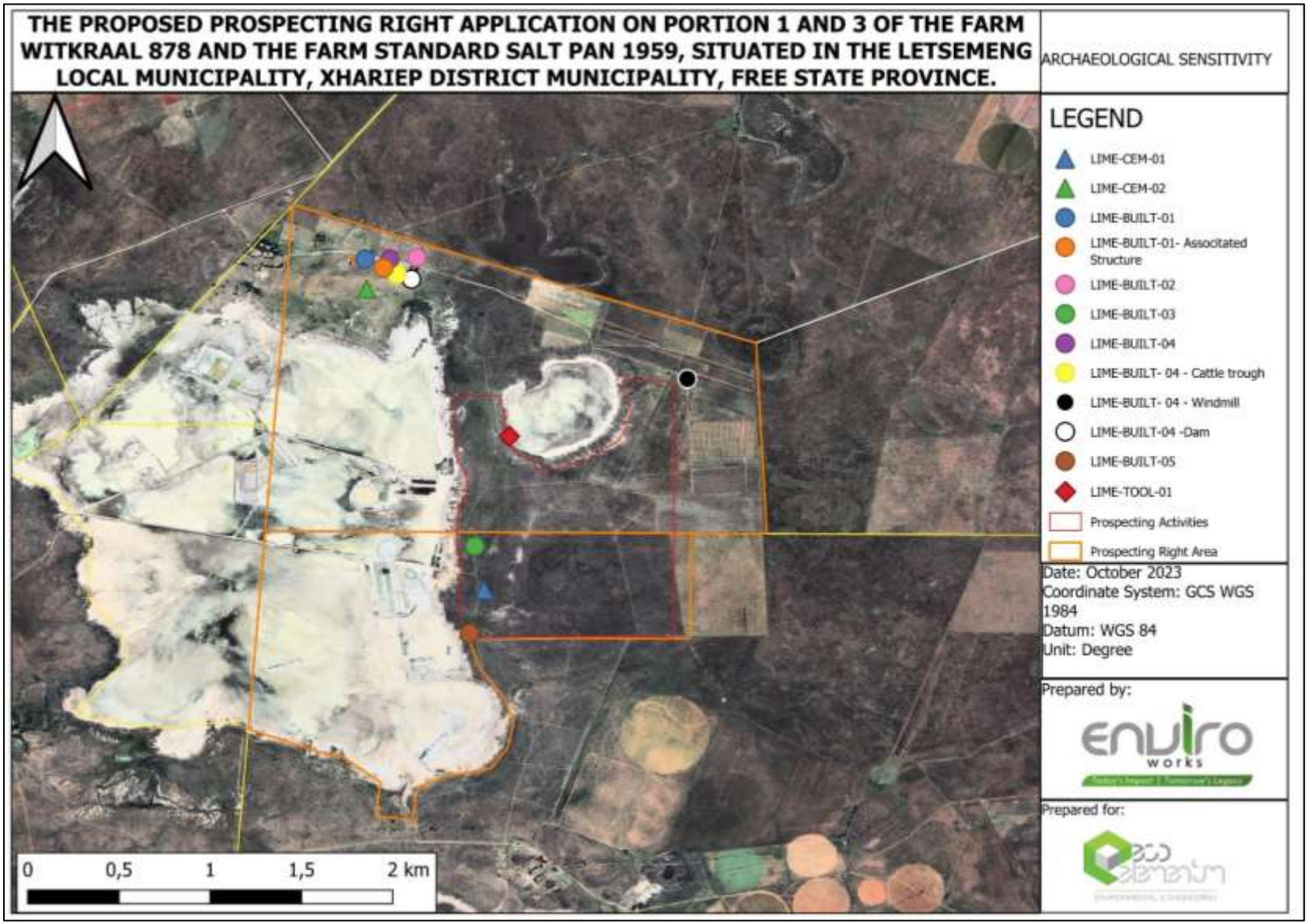


Figure 16: Heritage sensitivity map indicating possible sensitive areas around and within the prospecting activities area.

4.1 Fieldwork Findings

Table 6: LIME-CEM-01

Site Number:	**LIME-CEM-01**
Type:	Burial Ground and Graves
Heritage Significance	High density
Approximate Age:	Historical
Applicable Sections of the Relevant Acts:	Section 36 of the NHRA, No. 25 of 1999

Description:

A cemetery was located in the south west within the area where prospecting activities will occur during survey. The cemetery contains 20 graves; 1 grave had a tombstone, 19 were unmarked and were characterized by packed stones. The area where the cemetery is located characterised by an overgrown vegetation thus making the visibility of the graves difficult.

The following graves were identified:

- 1 grave marked with a tombstone (*Figure 17*); and,
- 19 unmarked graves of unknown individuals with packed stones *(Figure 18 - 32).*

Figure 17: Grave A1

Figure 18: Grave A2

Figure 19: Grave A3

Figure 20: Grave A4

Figure 21: Grave A5

Figure 22: Grave A6

Figure 23: Grave A7

Figure 24: Grave A8

Figure 25: Grave A9

Figure 26: Grave A10

Figure 27: Grave A11

Figure 28: Grave 12

Figure 29: Grave A13

Figure 30: Grave A14

Figure 31: Grave A15

Figure 32: Graves A16. Five graves hidden by overgrown vegetation.

Table 7: LIME-CEM-02

Site Number:	**LIME-CEM-02**
Type:	Burial Ground and Graves
Heritage Significance	High
Approximate Age:	Historical
Applicable Sections of the Relevant Acts:	Section 36 of the NHRA, No. 25 of 1999
Description:	
A cemetery is located on Farm Witkraal No. 978, outside where prospecting activities will occur. The cemetery appears to contain graves with cement headstones, and the visible headstones indicate that individuals were buried between 1960 and 1962. Moreover, there are unmarked graves in the cemetery, which are identified by packed stones. It's worth noting that the cemetery area is currently covered by overgrown vegetation, making it challenging to see some of the graves. Burial grounds and graves are protected under Section 36 of the NHRA 25 of 1999. All graves hold significant emotional, religious and, in some cases, historical value. It is also crucial to acknowledge that the identified graves	

may possess significant heritage importance to relevant families. The site is provisionally rated as IIIA with high heritage significance.

Figure 33: Cemetery located outside the area where prospecting activities will occur.

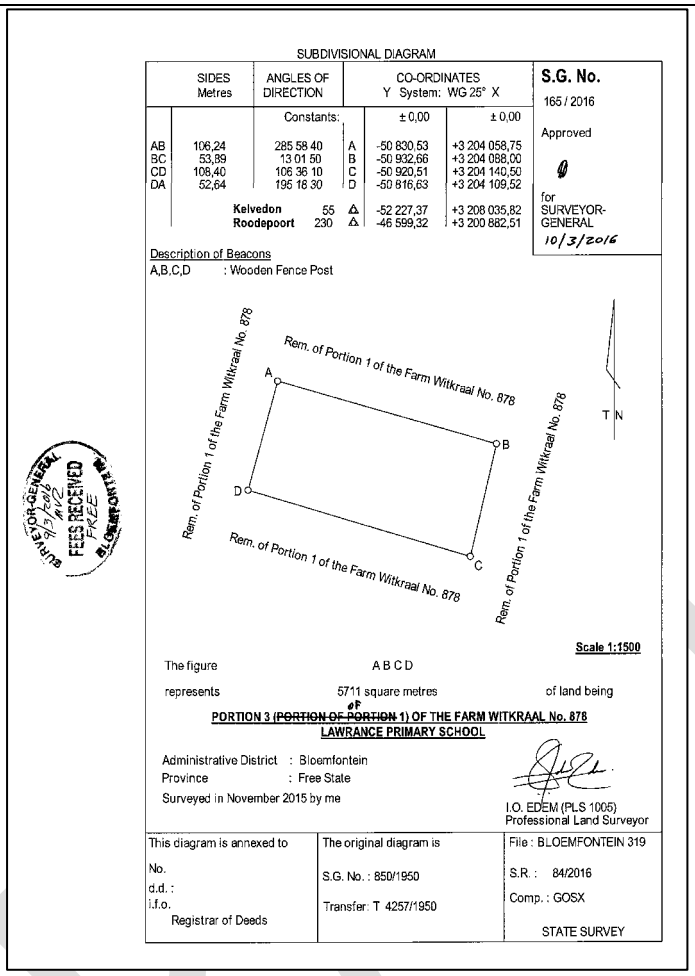
Table 8: LIME-BUILT-01

Site Number:	**LIME-BUILT-01**
Type:	Bulit Environment
Heritage Significance	Low
Approximate Age:	Contemporary
Applicable Sections of the Relevant Acts:	Section 34 of the NHRA, No. 25 of 1999
Description:	

During the survey a building which was formally known as the Lawrence Primary School was observed (*Figure 35*). The building is currently utilised as a house for the Farm Manager and his family. The farm Manager stated that the school has been relocated to the township. The building structures are made with brick and painted with white paint. The roof is of corrugated iron. A small veranda is also observed on the building.

It appears that the building in question, as indicated on the 1986 topographical map from Coetzee 2023 (refer to the Desktop Study), has been visible on historical maps since 1986. Consequently, it can be deduced that the building is less than 60 years old. Therefore, the building does not fall under the protection of Section 34 of the NHRA, No. 25 of 1999.

Figure 34: The old Lawrence Primary School building.



SUBDIVISIONAL DIAGRAM

SIDES Metres	ANGLES OF DIRECTION		CO-ORDINATES Y System: WG 25° X	
	Constants:		± 0,00	± 0,00
AB 106,24	285 58 40	A	-50 830,53	+3 204 058,75
BC 53,89	13 01 50	B	-50 932,66	+3 204 088,00
CD 108,40	106 36 10	C	-50 920,51	+3 204 140,50
DA 52,64	195 18 30	D	-50 816,63	+3 204 109,52
	Kelvedon 55	△	-52 227,37	+3 208 035,82
	Roodepoort 230	△	-46 599,32	+3 200 882,51

S.G. No. 165 / 2016

Approved

for SURVEYOR-GENERAL 10/3/2016

Description of Beacons
A,B,C,D : Wooden Fence Post

Rem. of Portion 1 of the Farm Witkraal No. 878
Rem. of Portion 1 of the Farm Witkraal No. 878
Rem. of Portion 1 of the Farm Witkraal No. 878
Rem. of Portion 1 of the Farm Witkraal No. 878
A
B
C
D
T N

Scale 1:1500

The figure A B C D represents 5711 square metres of land being

PORTION 3 (~~PORTION OF PORTION~~ 1) OF THE FARM WITKRAAL No. 878
LAWRANCE PRIMARY SCHOOL

Administrative District : Bloemfontein
Province : Free State
Surveyed in November 2015 by me

I.O. EDEM (PLS 1005)
Professional Land Surveyor

This diagram is annexed to	The original diagram is	File : BLOEMFONTEIN 319
No.	S.G. No. : 850/1950	S.R. : 84/2016
d.d. :	Transfer: T 4257/1950	Comp. : GOSX
i.f.o. Registrar of Deeds		STATE SURVEY

SURVEYOR-GENERAL 10/3/2016 FEES RECEIVED FREE BLOEMFONTEIN

Figure 35: Title deed for the Lawrance Primary School building.

Table 9:LIME-BUILT-02

Site Number:	**LIME-BUILT-02**
Type:	Bulit Environment
Heritage Significance	Low
Approximate Age:	Contemporary
Applicable Sections of the Relevant Acts:	Section 34 of the NHRA, No. 25 of 1999
Description:	
During the survey, several farm worker houses were recorded. The building structures are made with brick and painted with white paint. The roof is of corrugated iron. The structures identified during the survey are of contemporary design and does not have any heritage significance. As far has been determined, the houses do not	

have a special relationship between the community and the surrounding environment. Thus, the site it no research potential or is it of other cultural significance.

It must be noted that according to the historical topography map by Coetzee (2023), building structures appear at the same location. It may be possible that the buildings were demolished and replaced by contemporary buildings.

Figure 36: A farm worker house.

Figure 37: A farm worker house.

Figure 38: A farm worker house.

Figure 39: A farm worker house.

Figure 40: A farm worker house.

Figure 41: A farm worker house.

Table 10: LIME-BUILT-03

Site Number:	**LIME-BUILT-03**
Type:	Bulit Environment
Heritage Significance	Low
Approximate Age:	Contemporary
Applicable Sections of the Relevant Acts:	Section 34 of the NHRA, No. 25 of 1999

Description:

During the survey several ruin farm worker houses were recorded. The building structures are made with brick and plastered with clay. The roof is of corrugated iron. The structures identified during the survey are of contemporary design and does not have any heritage significance. As far has been determined, the houses do not have a special relationship between the community and the surrounding environment. Thus, the site it no research potential or is it of other cultural significance.

Figure 42: A ruin farm worker house.

Figure 43: A ruin farm worker house.

Figure 44: A ruin farm worker house.

Figure 45: A ruin farm worker house.

Figure 46: A ruin farm worker house.

Figure 47: A ruin farm worker house.

Figure 48: A ruin farm worker house.

Figure 49: A ruin farm worker house.

Figure 50: A ruin farm worker house.

Figure 51: A ruin farm worker house.

Table 11: LIME-BUILT-04

Site Number:	**LIME-BUILT-04**
Type:	Bulit Environment
Heritage Significance	Low
Approximate Age:	Historical to Contemporary
Applicable Sections of the Relevant Acts:	Section 34 of the NHRA, No. 25 of 1999

Description:

- During the survey a building structure that was used as a shower was identified. According to the farm Manager, the building structure is presently used as a pump. The site is reasonably well preserved but its exact age is not known.
- A dam, pump and foundation structure were found on Portion 1 of Farm Witkraal No. 878. The dam is currently being used to pump water for farm activities. However, according to the farm Manager, the pump gives them operational challenges.
- A contemporary cattle trough was observed during the survey. The trough is associated with current farming activities.
- A windmill, dam and trough were observed on site. The dam and windmill are reasonably well preserved their exact age is not known. However, although the trough is likely to be older than 60 years and generally protected under Section 34 of the NHRA 25 of 1999, it does not represent any unique features that should be preserved. Thus, the site is provisionally rated as low as it has **no research potential or of other cultural significance.**
- All these structures were observed outside the area where prospecting activities will occur.

Figure 52: A pump that was previously used as a shower located outside of the prospecting area.

Figure 53: A dam and foundation structure outside of the prospecting area.

Figure 54: A contemporary cattle water trough outside of the prospecting area.

Figure 55: Windmill, dam and cattle water trough outside the prospecting area.

Table 12: LIME-BUILT-05

Site Number:	**LIME-BUILT-05**
Type:	Bulit Environment
Heritage Significance	Low
Approximate Age:	Historical to Contemporary
Applicable Sections of the Relevant Acts:	Section 34 of the NHRA, No. 25 of 1999
Description:	
During the survey the ruins of an Old Farmhouse were identified in the south-western section of the site. In several areas around area building rubble has been dumped. The Built Environment found is of low significance and have no heritage value as it has been already destroyed.	

Figure 56: Ruins of the old Farmhouse found on the site

Table 13: LIME-TOOL-O1

Site Number:	**LIME-TOOL-01**
Type:	Stone Tool
Heritage Significance	Low
Approximate Age:	Historical to Contemporary
Applicable Sections of the Relevant Acts:	Section 34 of the NHRA, No. 25 of 1999
Description:	

Possible weathered MSA stone tools were observed at the pan on site. Stone artefact scatters are usually located in areas with fluvial gravels along drainage lines, pans and rocky outcrops. The stone artifacts are of low heritage value due to temporally mixed contexts and the absence of faunal, organic and other cultural remains. The Stone Age localities are not conservation-worthy and even though the resources may be destroyed during construction, the impact is minor.

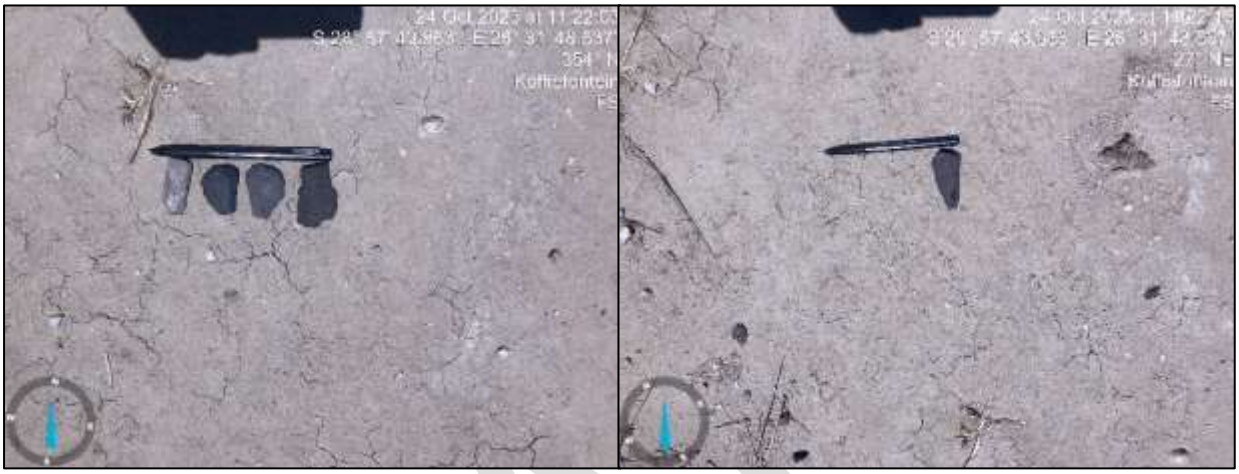


Figure 57: Possible MSA stone artifacts observed at the pan.

5. IMPACT ASSESSMENT OF PROPOSED DEVELOPMENT

In this section, an assessment will be made of the impact of the proposed development on the identified archaeological and heritage sites. Archaeological and heritage sites with a Low Significance are not included in these impact risk assessment calculations. The reason for this is that sites of Low Significance will not require mitigation. See sites LIME-BUILT-01, LIME-BUILT-02, LIME-BUILT 03, LIME-BUILT 03, LIME-BUILT-05 and LIME-TOOL-O1

Planning, design and construction phase	Preferred Layout		No-Go Alternative
	Before Mitigation	After Mitigation	
POTENTIAL IMPACT OF THE PLANNING PHASE:			
Nature of impact: Disturbance/destruction of burial grounds and graves – LIME-CEM-01	**Activity:** The planning phase consist of the following: ○ Layout planning; ○ Feasibility studies; ○ Site assessments; ○ Budgeting, ○ Project scheduling, ○ Design development; and, ○ Permitting.		N/A
Magnitude:	6	4	
Duration:	3	2	
Extent:	1	1	
Irreplaceable:	4	3	
Reversibility:	4	3	
Probability:	3	2	
Total SP:	54	26	
Significance rating:	M	L	
Cumulative impact:	-	-	
Proposed Mitigation:	The Graves found at LIME-CEM- 01 are of high significance and have heritage value. It is proposed that: • A buffer zone of at least 100 metres should be maintained around the site. • The identified gravesites be fenced off for protection from machinery and human impact during the prospecting activities, it should be treated as a No-Go-Zone. • Provisions of access to the communities and descendant families should be made. • If future prospecting activities are proposed for the area surrounding the cemetery, leading to direct impact on the graves a permit to exhume and relocate the graves should be applied for. • Subject to approval from SAHRA.		N/A
Planning, design and construction phase	**Preferred Layout Alternative**		**No-Go Alternative**
	Before Mitigation	**After Mitigation**	
POTENTIAL IMPACT OF THE CONSTRUCTION PHASE:			
Nature of impact: Disturbance/destruction of burial grounds and graves – LIME-CEM-01	**Activity:** The planning phase consist of the following: ○ Construction of access roads; ○ Construction of drilling platforms;		N/A

	○ Construction of camp facilities; and ○ Construction of storage areas.		
Magnitude:	10	6	
Duration:	5	2	
Extent:	4	3	
Irreplaceable:	5	3	
Reversibility:	5	3	
Probability:	5	3	
Total SP:	145	51	
Significance rating:	VH	M	
Cumulative impact:	-	-	
Proposed Mitigation:	The Graves found at LIME-CEM- 01 are of high significance and have heritage value. It is proposed that: • A buffer zone of at least 100 metres should be maintained around the site. • The identified gravesites be fenced off for protection from machinery and human impact during the prospecting activities, it should be treated as a No-Go-Zone. • Provisions of access to the communities and descendant families should be made. • If future prospecting activities are proposed for the area surrounding the cemetery, leading to direct impact on the graves a permit to exhume and relocate the graves should be applied for. • No work may continue in the vicinity of the find until SAHRA has indicated, in writing, that it is appropriate to proceed. • Heritage remains uncovered or disturbed during earthworks must not be disturbed further until the necessary approval has been obtained from the Heritage Authority. A registered Heritage Specialist must be called to the site for inspection and removal once authority to do so, has been given. • All operations of prospecting equipment must be made aware of the possibility of the occurrence of sub-surface heritage features and the following procedures must be followed: ○ All construction in the immediate 50 m vicinity radius of the site must cease; ○ The Heritage Practitioner must be informed as soon as possible; ○ In the event of obvious human remains SAPS must be notified; ○ Mitigation measures (such as refilling, etc.) must not be attempted; and, ○ The area in a 50 m radius of the find must be cordoned off with hazard tape. ○ Public access must be limited, and the area must be placed under guard.		N/A
Planning, design and construction phase	**Preferred Layout Alternative**		**No-Go Alternative**
	Before Mitigation	**After Mitigation**	
POTENTIAL IMPACT OF THE OPERATION PHASE:			
Nature of impact:	**Activity:**		N/A

Disturbance/destruction of burial grounds and graves – LIME-CEM-01	The planning phase consist of the following: ○ Geological surveys; ○ Drilling, sampling; and, ○ Data analysis to assess the potential of a site for the extraction of resources.		
Magnitude:	8	6	
Duration:	5	2	
Extent:	4	3	
Irreplaceable:	5	3	
Reversibility:	5	3	
Probability:	5	3	
Total SP:	135	51	
Significance rating:	VH	M	
Cumulative impact:	-	-	
Proposed Mitigation:	The Graves found at LIME-CEM- 01 are of high significance and have heritage value. It is proposed that: • A buffer zone of at least 100 metres should be maintained around the site. • The identified gravesites be fenced off for protection from machinery and human impact during the prospecting activities, it should be treated as a No-Go-Zone. • Provisions of access to the communities and descendant families should be made. • If future prospecting activities are proposed for the area surrounding the cemetery, leading to direct impact on the graves a permit to exhume and relocate the graves should be applied for. • Subject to approval from SAHRA		N/A
Planning, design and construction phase	**Preferred Layout Alternative**		**No-Go Alternative**
	Before Mitigation	**After Mitigation**	
POTENTIAL IMPACT OF THE DECOMMISSIONNING PHASE:			
Nature of impact: Disturbance/destruction of burial grounds and graves – LIME-CEM-01	**Activity:** The planning phase consist of the following: ○ Site Reclamation; and, ○ Equipment Removal.		N/A
Magnitude:	6	4	
Duration:	3	2	
Extent:	3	2	
Irreplaceable:	3	2	
Reversibility:	5	0	
Probability:	3	2	
Total SP:	60	20	
Significance rating:	M	L	

Cumulative impact:	-	-	
Proposed Mitigation:	The Graves found at LIME-CEM- 01 are of high significance and have heritage value. It is proposed that: • A buffer zone of at least 100 metres should be maintained around the site. • The identified gravesites be fenced off for protection from machinery and human impact during the prospecting activities, it should be treated as a No-Go-Zone. • Provisions of access to the communities and descendant families should be made. • If future prospecting activities are proposed for the area surrounding the cemetery, leading to direct impact on the graves a permit to exhume and relocate the graves should be applied for. • Subject to approval from SAHRA		N/A

Planning, design and construction phase	**Preferred Layout**		**No-Go Alternative**
	Before Mitigation	**After Mitigation**	
POTENTIAL IMPACT OF THE PLANNING PHASE:			
Nature of impact: Disturbance/destruction of burial grounds and graves – LIME-CEM-02	**Activity:** The planning phase consist of the following: ○ Layout planning; ○ Feasibility studies; ○ Site assessments; ○ Budgeting, ○ Project scheduling, ○ Design development; and, ○ Permitting.		N/A
Magnitude:	6	4	
Duration:	3	2	
Extent:	1	1	
Irreplaceable:	4	3	
Reversibility:	4	3	
Probability:	3	2	
Total SP:	54	26	
Significance rating:	M	L	
Cumulative impact:	-	-	
Proposed Mitigation:	The Graves found at LIME-CEM- 02 are of high significance and have heritage value. It is proposed that: • A buffer zone of at least 100 metres should be maintained around the site. • The identified gravesites be fenced off for protection from machinery and human impact during the prospecting activities, it should be treated as a No-Go-Zone.		N/A

	• Provisions of access to the communities and descendant families should be made. • If future prospecting activities are proposed for the area surrounding the cemetery, leading to direct impact on the graves a permit to exhume and relocate the graves should be applied for. • Subject to approval from SAHRA		
Planning, design and construction phase	**Preferred Layout Alternative**		**No-Go Alternative**
	Before Mitigation	**After Mitigation**	
POTENTIAL IMPACT OF THE CONSTRUCTION PHASE:			
Nature of impact: Disturbance/destruction of burial grounds and graves – LIME-CEM-02	**Activity:** The planning phase consist of the following: ○ Construction of access roads; ○ Construction of drilling platforms; ○ Construction of camp facilities; and ○ Construction of storage areas.		N/A
Magnitude:	6	4	
Duration:	3	2	
Extent:	2	1	
Irreplaceable:	4	3	
Reversibility:	5	0	
Probability:	3	2	
Total SP:	60	24	
Significance rating:	M	L	
Cumulative impact:	-	-	
Proposed Mitigation:	The Graves found at LIME-CEM- 02 are of high significance and have heritage value. It is proposed that: • A buffer zone of at least 100 metres should be maintained around the site. • The identified gravesites be fenced off for protection from machinery and human impact during the prospecting activities, it should be treated as a No-Go-Zone. • Provisions of access to the communities and descendant families should be made. • If future prospecting activities are proposed for the area surrounding the cemetery, leading to direct impact on the graves a permit to exhume and relocate the graves should be applied for. • Subject to approval from SAHRA.		N/A
Planning, design and construction phase	**Preferred Layout Alternative**		**No-Go Alternative**
	Before Mitigation	**After Mitigation**	
POTENTIAL IMPACT OF THE OPERATION PHASE:			
Nature of impact:	**Activity:** The planning phase consist of the following: ○ Geological surveys;		N/A

Disturbance/destruction of burial grounds and graves – LIME-CEM-02	○ Drilling, sampling; and, ○ Data analysis to assess the potential of a site for the extraction of resources.		
Magnitude:	6	4	
Duration:	2	1	
Extent:	4	2	
Irreplaceable:	5	2	
Reversibility:	5	0	
Probability:	2	1	
Total SP:	44	9	
Significance rating:	M	L	
Cumulative impact:	-	-	
Proposed Mitigation:	The Graves found at LIME-CEM- 02 are of high significance and have heritage value. It is proposed that: • A buffer zone of at least 100 metres should be maintained around the site. • The identified gravesites be fenced off for protection from machinery and human impact during the prospecting activities, it should be treated as a No-Go-Zone. • Provisions of access to the communities and descendant families should be made. • If future prospecting activities are proposed for the area surrounding the cemetery, leading to direct impact on the graves a permit to exhume and relocate the graves should be applied for. • Subject to approval from SAHRA		N/A
Planning, design and construction phase	**Preferred Layout Alternative**		**No-Go Alternative**
	Before Mitigation	**After Mitigation**	
POTENTIAL IMPACT OF THE DECOMMISSIONNING PHASE:			
Nature of impact: Disturbance/destruction of burial grounds and graves – LIME-CEM-02	**Activity:** The planning phase consist of the following: ○ Site Reclamation; and, ○ Equipment Removal.		N/A
Magnitude:	4	2	
Duration:	2	1	
Extent:	4	2	
Irreplaceable:	5	2	
Reversibility:	5	0	
Probability:	2	1	
Total SP:	40	7	
Significance rating:	M	L	
Cumulative impact:	-	-	

Proposed Mitigation:	The Graves found at LIME-CEM- 02 are of high significance and have heritage value. It is proposed that: • A buffer zone of at least 100 metres should be maintained around the site. • The identified gravesites be fenced off for protection from machinery and human impact during the prospecting activities, it should be treated as a No-Go-Zone. • Provisions of access to the communities and descendant families should be made. • If future prospecting activities are proposed for the area surrounding the cemetery, leading to direct impact on the graves a permit to exhume and relocate the graves should be applied for. • Subject to approval from SAHRA	N/A

6. CONCLUSION AND RECOMMENDATIONS

Based on the results of literature review, field survey and the assessment of identified heritage resources, the following conclusions and recommendations are made in terms of the National Heritage Act No 25 of 1999 for the proposed activities:

- The assessment concludes that the proposed prospecting area is situated in a region with a high presence of archaeology resources.
- The graves discovered within the cemeteries hold significant heritage value.
    - The site must be recommended clearly demarcated, and a protective fence should be erected around the graves, designating it as a No-Go-Zone.
    - Given that the graves at LIME-CEM-01 fall within the area designated for prospecting activities, the cemetery's boundaries should be clearly marked, signifying that it is an area to be completely avoided.
    - A buffer zone of at least 100 meters should be maintained around the graves.
    - The identified gravesites must be enclosed with a protective fence to safeguard them from potential harm caused by machinery and human activities during the prospecting operations.
        - This fenced area should be treated as a No-Go-Zone, prohibiting any entry.
        - Provisions should also be made to allow access to the communities and descendant families for respectful and appropriate visitation.
        - In the event that future prospecting activities are planned for the vicinity of the cemetery, with the potential for direct impact on the graves, it is essential to apply for a permit to exhume and relocate the graves, ensuring that this process is conducted with the utmost care and respect for the heritage significance of the site.
- Contemporary built environment structures have been identified in the area. It is determined that these sites hold low significance and lack any archaeological value.
- Possible weathered MSA stone tools were observed at the pan on site. Stone artefact scatters are usually located in areas with fluvial gravels along drainage lines, pans and rocky outcrops. The stone artifacts are of low heritage value due to temporally mixed contexts and the absence of faunal, organic and other

cultural remains. The Stone Age localities are not conservation-worthy and even though the resources may be destroyed during construction, the impact is minor and thus, deemed acceptable.

- Water sources, such as drainage lines, and pans, have historically been attractive locations for human activity. These areas should be considered as sensitive areas and designated it as a No-Go-Zone in terms of the potential existence of subsurface deposits.

- It should be noted that some archaeological material, including artefacts and graves can be buried underground and as such, may not have been identified during the initial survey. In the case where the proposed development activities bring these materials to the surface, they should be treated as **Chance Finds**. Should such resources be unearthed it is recommended that, the prospecting activities be stopped immediately, and an archaeologist be contacted to conduct a site visit and make recommendations on the mitigation of the finds. SAHRA and FS-PHRA should also be informed immediately on such finds.

- The proposed prospecting activities on the proposed project area will not have impact on the heritage and archaeological resources in the broader area.

- It is recommended that FS-PHRA and SAHRA grant the project a **Positive Review Comment** and allow the proposed prospecting activities to occur on as planned on condition that all the above-mentioned recommendations be adhered to.

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RELEVANT QUALIFICATIONS AND TRAINING

- MSc Environmental Archaeology and GIS: University of the Witwatersrand (2019)
- BSc Hons Geography, Archaeology and Environmental Studies: University of the Witwatersrand (2016)
- BA Geography: University of Johannesburg (2015)

WORK EXPERIENCE – 5 Years

March 2017 – September 2018:	Data Manager and Field/ Laboratory Assistant (University of the Witwatersrand)
October 2018 – March 2019:	Assistant Archaeologist and Field Technician (NGT Holdings (Pty) Ltd)
April 2019 – September 2020:	Environmental and Sustainability Officer (NGT Holdings (Pty) Ltd)
October 2020 – May 2021:	Teaching Assistant / Health and Safety Officer (Gauteng Department of Education)
February 2021 – April 2023:	Freelance Environmental and GIS Consultant (Tsimba Archaeological Footprints (Pty) Ltd) and Kemu Holdings (Pty) Ltd
June 2021 – April 2023:	Volunteer Science Communicator (South African Agency for Science and Technology Advancement)
May 2023 – Present:	Environmental Officer (Enviroworks)

PROJECT EXPERIENCE

BASIC ASSESSMENT/ ENVIRONMENTAL IMPACT ASSESSMENTS:

- The proposed development of a bulk water pipeline from Sedibeng Reservoir to Winburg Reservoir, Winburg, Free State Province (Umzuzo Infrastructure (Pty) Ltd). **(In progress)**
- The proposed development of a three-point eight Kilometre (3.8km) Bulk Sewer Line and associated infrastructure in the Mokwena Suburb of Thaba Nchu, Free State Province (Nako Iliso (Pty) Ltd) . **(In progress)**
- The proposed expansion of aboveground diesel storage tanks on Erf 762, Frankfort, Free State Province (Industria Consilatio (Pty) Ltd). **(In progress)**
- Basic Assessment Report for the Prospecting Right and Environmental Authorisation on the Farms Houmoed 206 And Van-Tittens-Ville, Aggeneys, Northern Cape Province (Meteor Mining Investments (Pty) Ltd - 2023
- The Basic Assessment Report exemption and Sustainability report for the proposed Refurbishment of Lettable Facility: Katlehong Arts Centre Situated on Erf 203, Phooko Township, Katlehong, and Within the City of Ekurhuleni Metropolitan Municipality (Makone Consulting Engineers (Pty) Ltd) – 2019
- The proposed mining project for Prospecting Right on the Farm Three sisters and an application for Environmental Authorization of Barberton, within the City of Mbombela Local District, Mpumalanga, South Africa (Sunshine Mineral Reserves (Pty) Ltd) – 2019

ENVIRONMENTAL MANAGEMENT PLANS:

- The proposed development of a bulk water pipeline from Sedibeng Reservoir to Winburg Reservoir, Winburg, Free State Province (Umzuzo Infrastructure (Pty) Ltd). **(In progress)**
- The proposed development of a three-point eight Kilometre (3.8km) Bulk Sewer Line and associated infrastructure in the Mokwena Suburb of Thaba Nchu, Free State Province (Nako Iliso (Pty) Ltd) . **(In progress)**
- The proposed expansion of aboveground diesel storage tanks on Erf 762, Frankfort, Free State Province (Industria Consilatio (Pty) Ltd). **(In progress)**
- Environmental Management Plan (EMP) for the Prospecting Right and Environmental Authorisation on the Farms Houmoed 206 And Van-Tittens-Ville, Aggeneys, Northern Cape Province (Meteor Mining Investments (Pty) Ltd – 2023
- The proposed Refurbishment of Lettable Facility: Katlehong Arts Centre Situated on Erf 203, Phooko Township, Katlehong, and Within the City of Ekurhuleni Metropolitan Municipality (Makone Consulting Engineers (Pty) Ltd) – 2019
- Environmental Management Plan (EMP) report for the proposed expansion of Koppies Greenhouse Primary Cooperative's Commercial Agriculture Greenhouse Vegetable Production Farm on Plot 21 Koppies, in Ngwathe Local Municipality, Fezile Dabi District Municipality, Free State Province – 2021

ENVIRONMENTAL SCREENING ASSESSMENTS

- Environmental Legal Query for the Schweizer-Reneke Waste Water Treatment Work, Schweizer Reneke, North West Province (Moedi Consulting Engineers (Pty) Ltd) – 2023

SOCIO-ECONOMIC IMPACT ASSESSMENTS:

- Socio-Economic Impact Assessment for the proposed Bushveld Vametco Expansion, North West Province, South Africa (Nsovo Environmental Consultants (Pty) Ltd) - 2019
- Baseline Socio-Economic Impact Assessment Report for the proposed Exxaro DMC discard dump facility development, within Emalahleni local municipality, Mpumalanga, South Africa (Nsovo Environmental Consultants (Pty) Ltd) – 2019
- Socio-Economic Impact Assessment for the proposed refurbishment of Lettable Facility: Katlehong Arts Centre Situated on Erf 203, Phooko Township, Katlehong, and Within the City of Ekurhuleni Metropolitan Municipality (Makone Consulting Engineers (Pty) Ltd) - 2019
- Socio-Economic Impact Assessment for the conservation of Madimatle Cave as a Grade II Provincial Heritage Site and a good example of an African Holy site (Motjoli Resources (Pty) Ltd – 2019

PUBLIC PARTICIPATION PROCESS:

- The proposed Sokhulu Mine project for Farm Reserve no. 4 15823 and 7638/1 situated in the province of KwaZulu-Natal, South Africa (Kemu Holdings (Pty) Ltd) – 2019

ENVIRONMENTAL CONTROL OFFICER (ECO):

- The periodic maintenance of National Route 7 section 8 from Steinkop (Km 47.11) to Vioolsdrift (Km 116.71) and National Route 14 section 1 from Springbok (Km 0.0) to Pofadder (Road(Km 162.4) (Roadmac Surfacing) - 2023
- The periodic maintenance of National Route 14 section 2 from Pofadder (Km 0.00) to section 3 At Keimoes (Km 41.2) (Roadmac Surfacing) - 2023
- The periodic maintenance of National Route 10 sections 11 and 12 from Groblershoop (Km 0.00) to Uitkyk and Upington (Km 0.00) to Nakop (Km130.00) (Roadmac Surfacing) - (**In Progress)**
- The period maintenance of National Route 14 sections 5 and 7 from Upington (Km 7.37) to Kuruman (km 47.30) (Roadmac Surfacing) - **(In Progress)**
- The proposed 132kv power line between Sorata switching station and Witsieshoek Substation, Free State Province (Eskom) - 2023

HERITAGE IMPACT ASSESSMENTS:

- Heritage Impact Assessment for the proposed construction of the bulk water supply pipeline pipes in Selcourt, in the Ekurhuleni Metropolitan Municipality, Gauteng Province – 2019
- Heritage Impact Assessment for the mining right application for Farm Woodlands 407, situated in the Free State Province - 2019

- Heritage Impact Assessment for the proposed new Lambano Sub Acute Facility on stands 5454, 5455, 5456, 5456, 5457 and new Training Facility on stands 5458 and 5460 in Kensington within the City of Johannesburg Metropolitan Municipality, Gauteng Province, South Africa – 2018

RESEARCH, FIELD ASSISTANCE AND OTHER EXPERIENCE:

- GIS maps for the proposed upgrade of the Mofokeng sewer pump station, Katlehong, City of Ekurhuleni, Gauteng Province - 2022
- Heritage Sensitivity map for the Basokhele Mine Heritage Impact Assessment - 2021
- GIS maps for the Heritage Impact Assessment for the relocation of dwellers at Ingula pumped storage scheme - 2021
- Heritage Sensitivity map for the Heritage Impact Assessment report for the proposed development of Langkloof Package Plant and Bulk Supply within Ward 10 of the Okhahlamba Local Municipality, uThukela District, KwaZulu Natal – 2020
- Gap analysis for the Basic Assessment Report of the proposed mining project for prospecting right on the Farm Three sisters and an application for environmental authorization of Barberton, within the City of Mbombela local district, Mpumalanga, South Africa – 2018
- Archival search and literature background study of the Lyttelton Primary School, Lyttelton Manor, Centurion, Gauteng Province - 2018
- Heritage Impact Assessment for the prospecting right and environmental authorization application for Ventersburg B situated in the Free State Province - 2018
- Heritage Impact Assessment for the amendment of an existing prospecting right and environmental authorisation for Bothaville NE Ext A, situated in the Free State Province - 2018
- Heritage Impact Assessment for the proposed construction of the bulk water supply pipeline and feeder pipes in Dunnottar, Gauteng Province - 2018