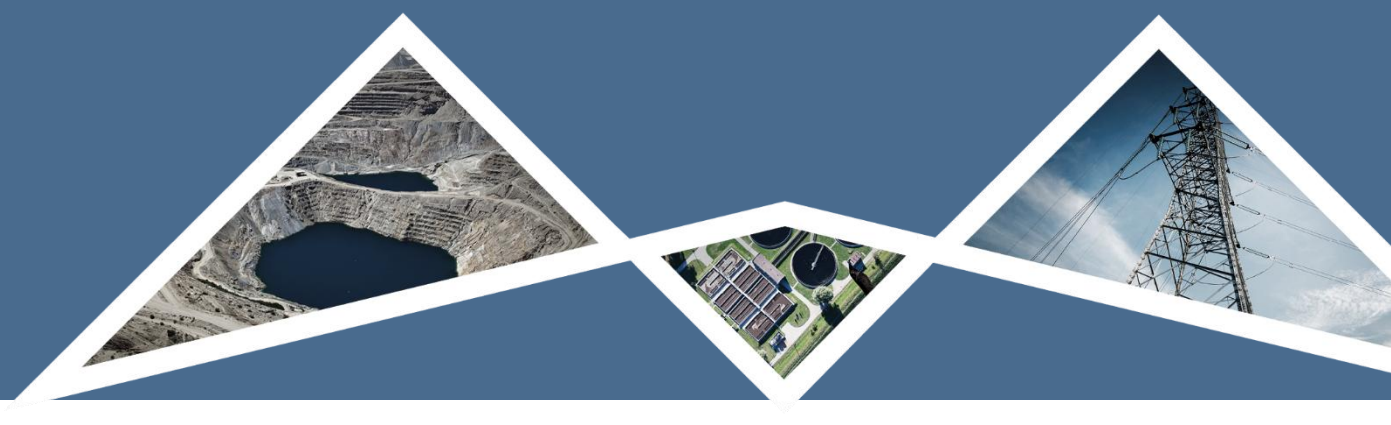
EIMS | ENVIRONMENTAL IMPACT MANAGEMENT SERVICES

T 011 789 7170 E info@eims.co.za W www.eims.co.za

HARMONY WEST WITS RECLAMATION AND DEPOSITION (PRE-FEASIBILITY AND FEASIBILITY) ON MULTIPLE FARM PORTIONS, MERAFONG CITY LOCAL MUNICIPALITY, GAUTENG PROVINCE

PHASE 1 HERITAGE IMPACT ASSESSMENT REPORT



DOCUMENT DETAILS

EIMS REFERENCE: 1716-1

DOCUMENT TITLE: Harmony West Wits Reclamation and Deposition (Pre-Feasibility and Feasibility) on multiple farm portions, Merafong City Local Municipality, Gauteng Province: Phase 1 Heritage Impact Assessment Report

DOCUMENT CONTROL

	NAME	SIGNATURE	DATE
COMPILED:	Dr Lucien James		2026/06/19
CHECKED:	John von Mayer		2026/06/19
AUTHORIZED:	Liam Whitlow		2026/06/19

REVISION AND AMENDMENTS

REVISION DATE:	REV #	DESCRIPTION
2025/11/11	ORIGINAL DOCUMENT	Desktop/ Background HIA for Scoping Report
2026/06/19	ORIGINAL DOCUMENT	HIA for EIA Report

This document contains information proprietary to Environmental Impact Management Services (Pty) Ltd. and as such should be treated as confidential unless specifically identified as a public document by law. The document may not be copied, reproduced, or used for any manner without prior written consent from EIMS. Copyright is specifically reserved.

Table of Contents

1 Background Information 1
1.1 Description of Project 1
1.2 Heritage Specialist Details 1
1.3 Declaration 2
1.4 Terms of Reference 2
1.5 legislative Requirements 2
2 Archaeological Background 5
2.1 Literature Review 5
2.1.1 Overview of Archaeology in South Africa 5
2.1.2 The Stone Age 5
2.1.3 The Iron Age 10
2.1.4 Historical Period 16
2.2 Site-Specific Background 21
2.2.1 Proximity to Cradle Of Humankind World Heritage Site 21
2.2.2 Cultural Heritage of Carletonville 21
2.3 Databases and Collections 22
2.4 Previous Relevant Impact Assessments 22
3 Methodology 23
3.1 Initial Desktop Assessment 23
3.2 Field Survey 24
3.3 Documentation and Analysis 24
3.4 Classification of Sites 25
3.5 Limitations 26
3.5.1 General Limitations 26
3.5.2 Project-Specific Limitations 26
4 Findings 26
4.1 Desktop Assessment Results 26
4.2 Summary of Findings 34
5 Impact Assessment 50
5.1 Impact Assessment Methodology 50
5.2 Identified Heritage Impacts 55
6 Recommendations and Mitigations 57
6.1 Site-Specific Recommendations and Mitigations 57
6.2 Overall Recommendations 58
6.3 Heritage Protocol and Chance Finds 58
7 Conclusion and Impact Statement 59
8 References 60

List of Figures

Figure 1: Locality Map 4

Figure 2: Examples of ESA lithics. Typical Oldowan tools (a-f). Acheaulean LCTs (v-z) (after Kuman and Gibbon, 2018). 6

Figure 3: Examples of MSA material evidence or artefacts after Wadley (2015). Abalone (*Haliotis midae*) shell with traces of an ochre-rich liquid (A); engraved ochre slab (B); perforated shells (C); Still Bay points (D). (after Henshilwood, 2012) 7

Figure 4: Examples of an adze (A), scrapers (B-D, G), backed bladelets (I), bladelet cores (e), and segments (F, H). Typical pieces associated with the LSA (after Forssman *et al.*, (2010)) 8

Figure 5: Some examples of LSA organic material remains from Border Cave. Bone awls and points (1-7), Ostrich Eggshell beads (8-21), tick shell beads (22-23), bound organic material (24), digging stick (25), poison applicator (26), implement made from warthog or bushpig lower canine (27), and notched bone tools (28-30)(after Backwell *et al.* (2023) and d'Errico *et al.* (2012)) 9

Figure 6: General understanding of Bantu migrations related to the larger ceramic traditions, Kalundu (Western Stream) and Urewe (Nkope and Kwale Branches) (After Huffman, 1989). 11

Figure 7: Examples of Bambata Potsherds (Huffman, 2005). 12

Figure 8: An Iron Age ceramic sequence demonstrating transitions between K2 and Mapungubwe ceramic styles (Huffman, 2009). 12

Figure 9: Famous golden implements of Mapungubwe (A - Golden Rhinoceros, B - Golden anklets) (Woodborne *et al.*, 2009). 13

Figure 10: Type N SWSs as illustrated by Maggs (1976). 13

Figure 11: An on-site photograph of a Group I or Type N SWS at Klipriviersberg Nature Reserve (James, 2018). 14

Figure 12: An aerial photograph of SWSs part of the Bokoni complex, Mpumalanga (after Delius *et al.* (2012)). 14

Figure 13: LiDAR imagery of Molokwane SWSs of Kweneng, a lost city discovered at Suikerbosrand Nature Reserve (after Sadr and Mshuqwana (2020)). 15

Figure 14: Distribution of the different types of SWSs across the northeastern region of South Africa (after Huffman, 2007) 16

Figure 15: A 1700s drawing of Vergelegen, a Cape Colony homestead including multiple buildings including slave lodges. (after Markell *et al.* 1995). 17

Figure 16: An Arabic script representing the first written texts of the Afrikaans language (late 19th Century) (after Davids (2018)) 18

Figure 17: A photograph of Johannesburg from the 1890s (after Chirisa and Matamanda (2019)) 19

Figure 18: A picture of Springfontein, a refugee war camp which was established as a repercussion of the war's influence (after British National Archives). 20

Figure 19: Nelson Mandela burning his pass in 1959. A pass was a requirement for people to move across the country. Such documents have now become items representing the Apartheid regime (Thompson, 2001). 21

Figure 20: IFRAO Standard Scale used for photography of Archaeological finds. 24

Figure 21: Map of relative Archaeological and Cultural Heritage Sensitivity (DFFE Screening Tool) 27

Figure 22: Extract of the First Edition Topographic map 2527CB dated 1968. Development footprint bordered in red. 27

Figure 23: Google Earth imagery of the ruins identified in First edition Topographic map 28

Figure 24: Football field located within the footprint of the proposed Return Water Dam. **Error! Bookmark not defined.**

Figure 25: First edition topographic mapping and current Google Earth Satellite imagery of the main and most early section of the Deelkraal Gold Mine complex. 29

Figure 26: Aerial Photograph of the Deelkraal Gold Mining Complex dated 1979 including the identified football field. 30

Figure 27: First Edition Topographic map dated 1958 including an overlay of the proposed pipelines (red, magenta, and blue). Note the settlements which occur around the proposed infrastructure 31

Figure 28: Some undisturbed areas and a potentially heritage sensitive area was identified corroborating findings from early topographic maps. 31

Figure 29: Aerial photograph dated 1955 of the site and surrounding areas. Site bordered in red. Note the patch of dense vegetation north of the site. 32

Figure 30: Buildings, ruins, farmsteads and "native huts" or settlements identified near eastern sections of the proposed infrastructure through an assessment of early topographic maps. 33

Figure 31: Track and stadium identified in early aerial photograph dated 1968 of the area. 33

Figure 32: Map of the different finds and sites of interest identified during the field survey. 49

List of Tables

Table 1: Details of the Archaeologist 2

Table 2: Different criteria and questions which guided the analysis of Archaeological and Heritage finds or sites. 24

Table 3: Classification of heritage sites as per the SAHRA Minimum Standards (2007) and adopted in this report 25

Table 4: Summary of different finds and sites identified. 47

Table 5: Criteria for Determining Impact Consequence. 50

Table 6: Probability Scoring. 52

Table 7: Determination of Risk. 52

Table 8: Significance Classes. 52

Table 9: Criteria for Determining Prioritisation. 53

Table 10: Determination of Prioritisation Factor. 54

Table 11: Final Significance Rating. 54

Table 12: Archaeological Impact Assessment 56

Table 13: List of site-specific mitigations and recommendations 58

Appendices

Appendix 1: CV of the Archaeologist

Appendix 2: Specialist Declaration

Abbreviations

AD	*Anno Domini*
APHP	Association of Professional Heritage Practitioners
ASAPA	Association of South African Professional Archaeologists
CDNGI	Chief Directorate of National Geo-spatial Information
CRM	Cultural Resource Management
DFFE	Department of Forestry, Fisheries and the Environment
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EAPASA	Environmental Assessment Practitioner Association of South Africa
EIA	Environmental Impact Assessment
EMP	Environmental Management Programme
ESA	Earlier Stone Age
HIA	Heritage Impact Assessment
LCT	Large Cutting Tool
LSA	Later Stone Age
MPRDA	Minerals and Petroleum Resources Development Act
MSA	Middle Stone Age
NEMA	National Environmental Management Act
NHRA	National Heritage Resources Act
NRF	National Research Foundation
SAHRA	South African Heritage Resources Agency
SAHRIS	South African Heritage Resources Information System
WRC	Water Research Commission
WUL	Water Use License
ya	Years ago

Executive Summary

Harmony Gold Mining Company Limited (Harmony) (hereafter referred to as the applicant) has appointed Environmental Impact Management Services (Pty) Ltd (EIMS) as the Environmental Assessment Practitioner (EAP) to assist with undertaking the required processes for obtaining Environmental Authorisation (EA) and a Water Use Licence (WUL) for the West Wits Reclamation and Deposition project. This Heritage Impact Assessment forms part of the assessments required as part of the application process.

Harmony is currently in the pre-feasibility stage of assessing and designing for the West Wits region's future deposition capacity needs (current reclamation, run off mine and future projects) and requires the necessary environmental and specialist studies to apply for the required authorisation and permits to execute the desired options. One specific option to commence at Feasibility level is to license and authorise the construction of the future Deelkraal 2 TSF receiving residue from Kusasalethu, and Mponeng plants and to reclaim the existing Deelkraal 1 TSF and Kusasalethu TSF for processing at Kusasalethu plant.

A comprehensive assessment was conducted to evaluate potential impacts on archaeological and heritage resources. The study included a literature review, desktop assessment, and a two-day field survey.

A total of 10 distinct heritage features were identified, of which 3 may potentially be impacted by the proposed development. These included a single stone tool (WWR020), and two structures or complexes older than 60 years (WWR001 and WWR021). All other heritage features identified will not be affected by the development, however, buffers have been recommended to protect these features.

Heritage resources were identified and these features need to be avoided, specifically the netball stadium (WWR001). As long as the proposed mitigation measures are implemented there should be no significant heritage impacts as a result of the development. Therefore, from an Archaeological perspective, the development will not have significant foreseeable impacts and can proceed, providing the mitigation measures are implemented.

1 BACKGROUND INFORMATION

This section provides an overview of the proposed project as well as details of the Archaeologist, the terms of reference, and legislative background informing this assessment.

1.1 DESCRIPTION OF PROJECT

Environmental Impact Management Services (Pty) Ltd (EIMS) was appointed by Harmony Gold Mining Company Limited (Harmony) to undertake the necessary environmental authorisation processes as required in terms of the National Environmental Management Act (No. 107 of 1998) (NEMA), National Water Act (Act 36 of 1998) (NWA), National Environmental Management: Waste Act, 2008 (Act No 59 of 2008) (NEM:WA), National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004) (NEM:AQA), National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEM:BA), National Heritage Resources Act, (Act No. 25 of 1999) (NHRA), Mineral and Petroleum Resources Development Act (Act 28 of 2002) (MPRDA) and any other acts and/or guidelines that may apply to the proposed activities. This Heritage Impact Assessment forms part of the assessments required as part of the application process.

Harmony is currently in the pre-feasibility stage of assessing and designing for the West Wits region's future deposition capacity needs (current reclamation, run off mine and future projects) and requires the necessary environmental and specialist studies to apply for the required authorisation and permits to execute the desired options.

Due to the need to fast track the regulatory processes and subsequent execution, key scope items will be elevated to feasibility level to ensure necessary detail is developed to initiate the application processes. Therefore, the scope entails the involvement of high-level trade off study options (prefeasibility level) and subsequent feasibility level work for the proposed options.

One specific option to commence at Feasibility level is to license and authorise the construction of the future Deelkraal 2 TSF receiving residue from Kusasalethu, and Mponeng plants and to reclaim the existing Deelkraal 1 TSF and Kusasalethu TSF for processing at Kusasalethu plant.

1.2 HERITAGE SPECIALIST DETAILS

As prescribed by the SAHRA (South African Heritage Resources Agency) Minimum Standards (2007), a Heritage Specialist (Professional Archaeologist) was appointed for the undertaking of the Archaeological Impact Assessment. Dr Lucien James was appointed in this regard. The following is a summary of the Heritage Specialist's details. Table 1 provides a summary of the Archaeologist's contact details, qualifications, and professional membership. Refer to Appendix 1 for full CV of Archaeologist.

Dr Lucien James is an Environmental Consultant and Archaeologist with experience in different fields across the Arts, Social Science, Natural Science, and academia in general. He has been employed by EIMS as an environmental consultant since March 2023 working on several projects under various roles. He is registered with EAPASA (Environmental Assessment Practitioners Association of South Africa) as a Candidate EAP (Environmental Assessment Practitioner). Lucien has obtained a BSc (Hons) in Geography, Archaeology and Environmental Studies (Archaeology-focused) and is accredited as a Professional Archaeologist with the Association of South African Professional Archaeologists (ASAPA). He holds a MSc in Geography having done research on phytoremediation and the mining industry. In 2024, he completed his Ph.D. through research with a focus on collaborative River Basin Management in South Africa. He has worked as a Teaching Assistant (TA) and researcher since 2018 and engages in academic work through publications and conferences. He has taught 1st year, 2nd year, 3rd year and Honour's Archaeology and Geography courses. His research has been funded by the National Research Foundation (NRF) and the Water Research Commission (WRC). He is also actively publishing new papers in international academic journals. He has presented his research at a national level through various conferences in South Africa and has participated in other conferences and workshops on Climate Change and Climate Change Adaptation.

Table 1: Details of the Archaeologist

Name:	Lucien Nicolas James
Tel no.	+27 11 789 7170
E-mail	lucien@eims.co.za
Professional Qualification/ Training:	BA (Archaeology and Geography); Wits University, 2017
	BSc (Hons) Geography, Archaeology and Environmental Studies; Wits University, 2018
	MSc (Geography, Archaeology and Environmental Studies); Wits University, 2021
	Ph. D; Wits University, 2024
Professional Membership/ Registrations:	Registered Candidate Environmental Assessment Practitioner (EAPASA reg. no. 2023/6772)
	Accredited Professional Archaeologist (ASAPA member no. 0619)
	Candidate Member of the Associated of Professional Heritage Practitioners (APHP member no. CHP0173)

1.3 DECLARATION

Refer to Appendix 2 for Declaration of the Archaeologist.

1.4 TERMS OF REFERENCE

This report aims to achieve several pre-defined objectives as per the prescription of the SAHRA Minimum Standards (2007), i.e. this report:

a) Identifies the sites as well as potential associated heritage objects within and in close proximity of the footprint of a study area,

b) Assesses the significance of sites and heritage objects,

c) Comment on the impact of the development,

d) Make recommendations for the mitigation or conservation of sites and associated Heritage objects

To address the terms of reference, a methodology has been adopted. This methodology is further elaborated on in sections to follow.

1.5 LEGISLATIVE REQUIREMENTS

This section describes the legislative requirements relating to this HIA report.

The National Heritage Resources Act (Act 25 of 1999 – NHRA) stipulates that cultural heritage resources may not be disturbed without authorisation from the relevant heritage authority. Section 34(1) of the NHRA states that, “no person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority…” The NHRA is utilised as the basis for the identification, evaluation and management of heritage resources and in the case of Cultural Resource Management (CRM) those resources specifically impacted on by development as stipulated in Section 38 of NHRA, and those developments administered through the National Environmental Management Act (Act 107 of 1998 – NEMA), and Mineral and Petroleum Resources Development Act (Act 28 of 2002 – MPRDA). In the latter cases the feedback from the relevant heritage resources authority is required by the State and Provincial Departments managing these Acts before any authorisations are granted for a development. The last few years



have seen a significant change towards the inclusion of heritage assessments as a major component of Environmental Impact Processes required by the NEMA and MPRDA.

The NEMA 23(2)(b) gives effect to the NHRA and states that an integrated environmental management plan should, "…identify, predict and evaluate the actual and potential impact on the environment, socio-economic conditions and cultural heritage". A study of subsections (23)(2)(d), (29)(1)(d), (32)(2)(d) and (34)(b) and their requirements reveals the compulsory inclusion of the identification of cultural resources, the evaluation of the impacts of the proposed activity on these resources, the identification of alternatives and the management procedures for such cultural resources for each of the documents noted in the Environmental Regulations. A further important aspect to be taken into account of in the EIA Regulations under the NEMA relates to the Specialist Report requirements (Appendix 6 of EIA Regulations 2014, as amended) which apply to Heritage Impact Assessments.

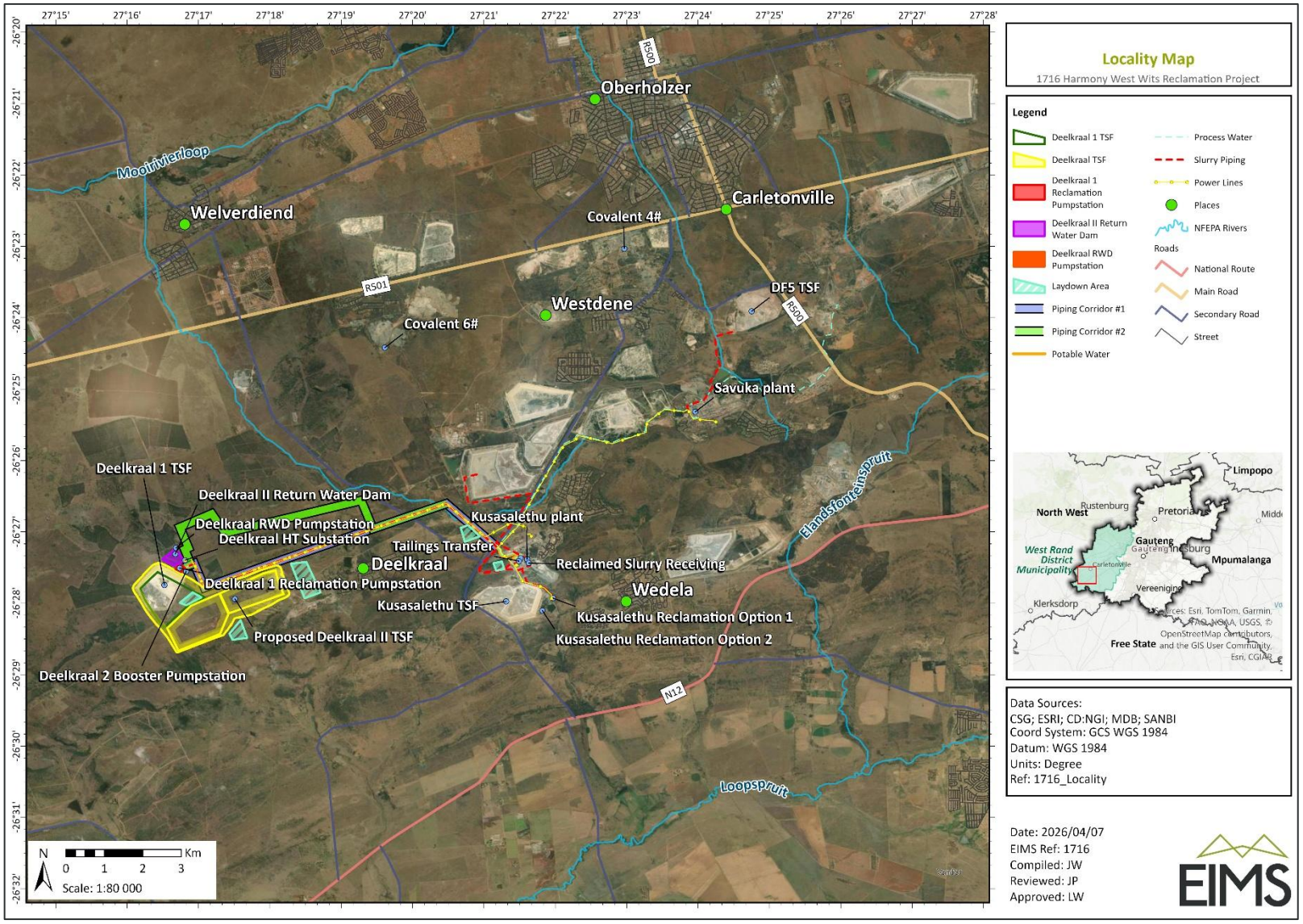


Figure 1: Locality Map

2 ARCHAEOLOGICAL BACKGROUND

This section presents the archaeological background to the study. A review of literature is presented to contextualise archaeology in South Africa. Available information on databases and collections as well as previous relevant assessments is presented.

2.1 LITERATURE REVIEW

Prior to the implementation of the methodology to be discussed, a comprehensive literature review was conducted to understand the archaeological and historical background of the site. Two main components were considered, that is, (1) the pre-historical linkages (that is relationships between people and the area pre-dating written records) and (2) historical linkages between people and the area in question. A brief overview of South Africa's Archaeology is necessary to contextualise this report and this is provided in the sections below.

2.1.1 OVERVIEW OF ARCHAEOLOGY IN SOUTH AFRICA

South Africa's Archaeology is characterised by pre-historic events for the most part of the record. In this regard, the earliest archaeological evidence is mainly associated with the presence of hunter-gatherers and precolonial pastoralism. It is mainly in the last 2000 years when major social changes take place, including migrations, colonialism, industrialisation, and the establishment of complex societies and associated settlements (Huffman, 1982; Hall, 1993; Huffman, 2004; Mitchell and Whitelaw, 2005; Huffman, 2007). The country is characterised by three main periods, which are each associated with corresponding material evidence. These periods include:

1. The Stone Age (as early as 2.6 Million ya to as late as the last 100 years)
2. The Iron Age (100 AD to as late as the 19th century)
3. Historical Period (last 500 years)

This literature review considers these periods expanding on the context of each in terms of the current development and associated project site.

2.1.2 THE STONE AGE

South Africa's Stone Age stretches as far back as 2.6 Million ya, pre-dating modern humans. South Africa's Stone Age can be divided into three phases, namely:

A. Earlier Stone Age (ESA)
B. Middle Stone Age (MSA)
C. Later Stone Age (LSA)

A) EARLIER STONE AGE

The ESA represents the oldest material evidence in the archaeological record of South Africa. The phase can be divided according to different stone tool industries which are characterised by differing lithic technologies and assemblages. Specifically, ESA examples identified and studied in South Africa mainly relate to (a) Oldowan and (b) Acheulean stone tool industries (Klein, 2000).

The Oldowan dates as far back as 2.6 Million ya and examples of this industry can be found across Africa (Leakey, 1971; Chazan *et al.*, 2012; Kuman *et al.*, 2018; Stollhofen *et al.*, 2021; Favreau, 2023). The industry includes the earliest examples of key lithics such as hammerstones, manuports, cores, and flakes among other stone tool types. Figure 2 illustrates some of the different tools of this industry. Oldowan examples can be found across South Africa with some archaeological sites being the origins of some of the key examples of the type of lithics specifically found (Chazan *et al.*, 2012; Kuman *et al.*, 2018). These archaeological sites include Wonderwerk Cave in the Northern Cape and, Swartkrans Cave which forms part of the Cradle of Humankind near the Johannesburg area. Both of these sites are National Heritage Sites.

The Acheulean stone tool industry differs from the Oldowan since it includes examples of Large Cutting Tools (LCTs). This includes tools such as handaxes, picks, and cleavers. As highlighted by Li *et al.* (2018), the Acheulean

is characterised by the handaxe, which has been extensively studied. Differing from the Oldowan, these LCTs dating as far back as 1.7 Million ya (Kuman and Gibbon, 2018). Once more, the Cradle of Humankind and associated Sterkfontein hominid sites are key locations where some of the best examples of Acheulean stone tools have been found (Kuman and Gibbon, 2018; Li *et al.*, 2018). Figure 2 includes examples of the Acheulean LCTs (labelled v-z).

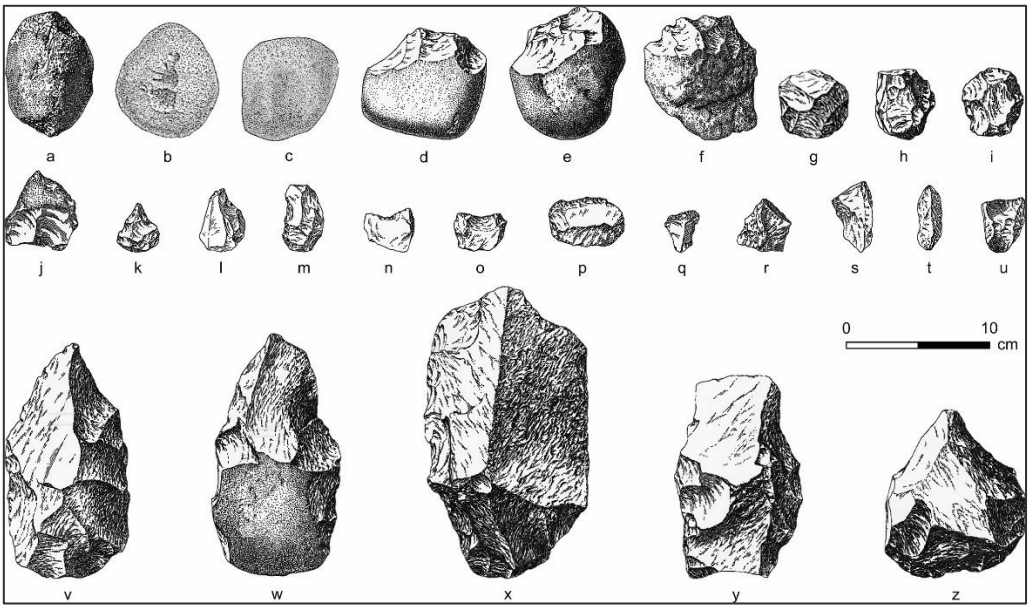


Figure 2: Examples of ESA lithics. Typical Oldowan tools (a-f). Acheaulean LCTs (v-z) (after Kuman and Gibbon, 2018).

B) MIDDLE STONE AGE

Following the ESA, a phase related to very specific industries and stone tool examples chronologically occurs. The MSA represents one of the most interesting prehistoric periods of, not only South Africa's archaeological record, but of global significance. The MSA brought with it new material evidence which suggests changes in lifestyle and complexity being inspired by environmental changes (Wadley, 2015). Dating between 280 000 and 30 000 ya, the MSA is characterised by a material culture that includes lithic technology, as well as an emerging material culture including artefacts such as shell beads (Villa *et al.*, 2009; Henshilwood, 2012). While MSA sites occur across South Africa, key sites include Blombos Cave, Sibudu Cave, and Klasies River. Figure 3 offers an illustrative overview of the material associated with the MSA.



Figure 3: Examples of MSA material evidence or artefacts after Wadley (2015). Abalone (*Haliotis midae*) shell with traces of an ochre-rich liquid (A); engraved ochre slab (B); perforated shells (C); Still Bay points (D). (after Henshilwood, 2012)

In terms of Stone tool technology, flake-based lithics are characteristic of the MSA (Jacobs *et al.*, 2008). In this regard, stone tool industries of the MSA include examples of worked stone flakes knapped off cores. Notable MSA examples include Still Bay and Howieson's Poort tools. Both Still Bay and Howieson's Poort lithics include examples of pointed tools, with the idea that such would have represented the earliest examples of hafted tools in South Africa (Jacobs *et al.*, 2008; Villa *et al.*, 2009; Henshilwood, 2012; Wadley, 2015). Still Bay technology (as seen in Figure 3), for example, includes examples of bifacial sharpened points which differ from past technologies such as the Acheulean (Henshilwood, 2012). Other examples of hafted stone tools are also associated with this phase, particularly those found at Klasies River (Wurz, 2002; Morrissey, Mentzer and Wurz, 2022).

C) LATER STONE AGE

The LSA represents a phase in the Stone Age which includes the widest record of material evidence. Dating between 43 000 ya and as late as the last 100 years, the LSA is associated with a period in South Africa's prehistory and history during which modern human ways of life, particularly hunter-gatherer activity is observed. Since South Africa was mainly occupied by hunter-gathering groups for the most of this period, LSA material culture has been studied in this regard. In other words, LSA material culture and artefacts have been associated with the lives of the San, for example (Mitchell, 2012; Villa *et al.*, 2012; Mesfin, 2024).

Key archaeological finds associated with the LSA are, firstly, a broad array of lithics. All LSA lithics include features of advanced shaping and working, otherwise referred to as retouch. Key tools include blades, bladelets and scrapers as pictured in Figure 4. Other tools include segments and adzes which are specific to the LSA. As previously stated, the LSA includes a large array of material evidence such as ostrich eggshell beads, bone tools, digging sticks, as well as other material which are also associated with Iron Age archaeology (Figure 5).

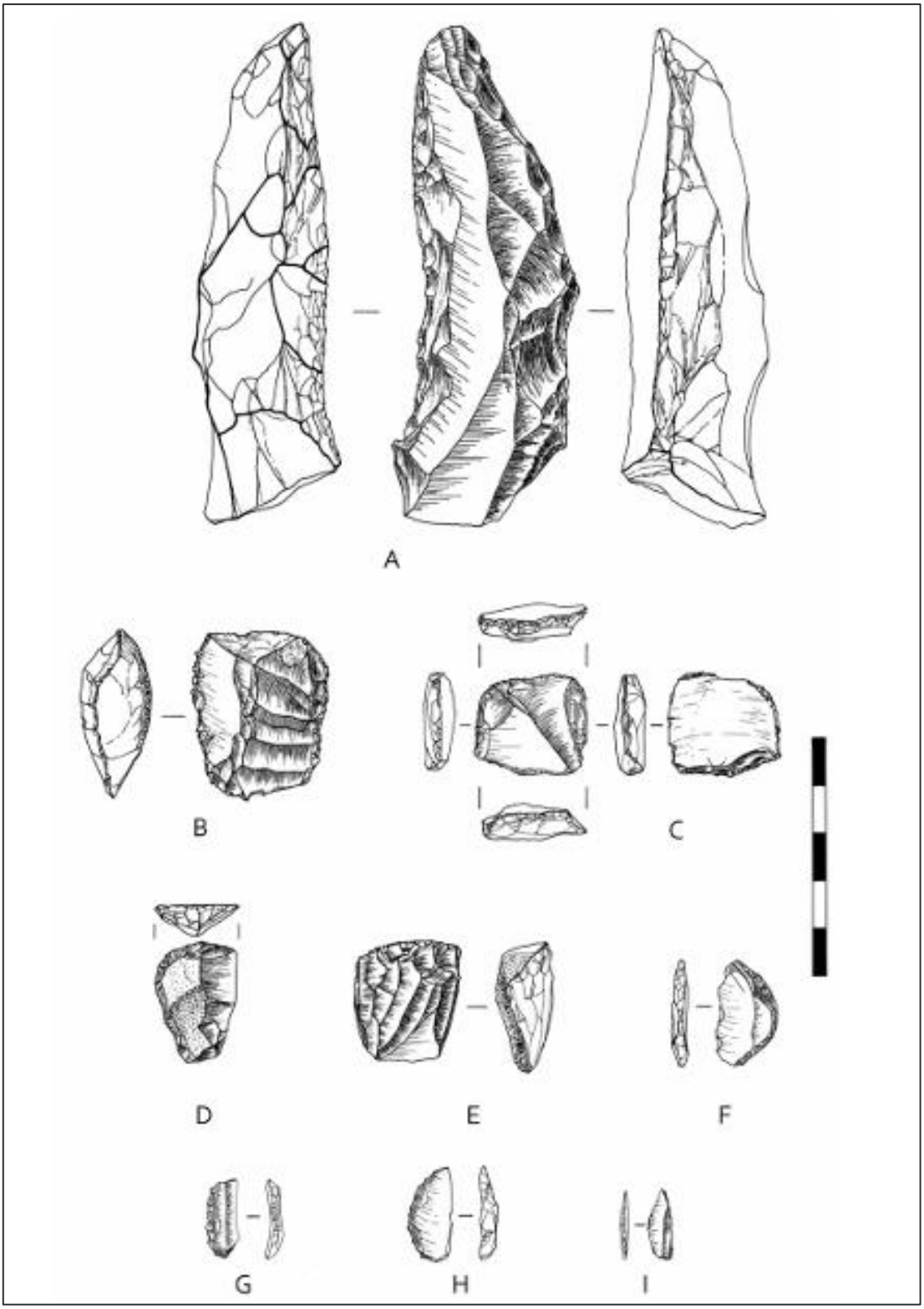


Figure 4: Examples of an adze (A), scrapers (B-D, G), backed bladelets (I), bladelet cores (e), and segments (F, H). Typical pieces associated with the LSA (after Forssman *et al.*, (2010))



Figure 5: Some examples of LSA organic material remains from Border Cave. Bone awls and points (1-7), Ostrich Eggshell beads (8-21), tick shell beads (22-23), bound organic material (24), digging stick (25), poison applicator (26), implement made from warthog or bushpig lower canine (27), and notched bone tools (28-30)(after Backwell *et al.* (2023) and d'Errico *et al.* (2012))

2.1.3 THE IRON AGE

South Africa's archaeological record diversifies as interactions, migrations, and major changes take place over the last 2000 years. While hunter-gatherers continue to occupy most of the southern African landscape, the area becomes a melting pot with pastoralists gradually moving in from the North, and changes in hunter-gather lifestyles take effect. Bantu pastoralists bring with them iron working, together with key associated markers of pastoralist lifestyles. Unlike hunter-gatherer lifestyles in South Africa which are generally nomadic, and without distinct settlement patterns, pastoralists transform the landscape, introducing structures and complex societies. Altogether, the Iron Age is characterised by materials that signify the depth of change that takes place across southern Africa over the last 2000 years.

The Iron Age can be divided into three phases:

A. Early Iron Age

B. Middle Iron Age

C. Late Iron Age

A) EARLY IRON AGE

Coinciding with the LSA, the Early Iron Age is characterised by the arrival of Bantu-speaking pastoralists, as well as Khoe herders. Dating between 200 and 1000 AD (200 to 900 AD according to Huffman (2007)), the Early Iron Age represents a period which transforms the southern African landscape with more people coming into the area, more interaction taking place, and the earliest examples of complex societies developing. The Early Iron Age and associated material evidence represent the first signs of migration and exchanges between hunter-gatherers, sheep herders, and pastoralists.

As summarised by Huffman (2007), during this period, the first occurrences of material culture related to groups originating from central to northern Africa can be observed. Huffman (2007) relates this occurrence to the spread and diffusion of Bantu languages across most of southern Africa. Above all, Huffman (2007) argues for the relationship between the spread of language to the spread of material culture and tradition observable through the stylistics of pottery and ceramic tradition.

Key ceramic types relate to the broader Kalundu and Urewe traditions, that is, the two main traditions associated with the Eastern and Western streams of migration supported by migration theories (Figure 6). Associated ceramic styles include Silver Leaves, Happy Rest, and Lydenberg, all related to similarly named sites. Another key ceramic tradition that occurs during this period is Bambata pottery which is indicative of hunter-gatherer and pastoralist interaction. Figure 7 provides an illustration of some examples of Bambata potsherds.

B) MIDDLE IRON AGE

The Middle Iron Age sees the rise of complex societies relating to interaction events, particularly those around the Shashe-Limpopo confluence area. As iconic markers in South Africa's Archaeological record, sites such as K2 and Mapungubwe represent examples of the Middle Iron Age which has been associated with dates between 1000 and 1300 AD. Several studies have considered the dynamics of the ways of life associated with the Shashe-Limpopo confluence area and its complex societies (Calabrese, 2000; Huffman, 2000; Meyer, 2000; Huffman, 2009). While this period marks more interaction between hunter-gatherers and farmers, its material culture becomes very specific.

In terms of ceramic tradition, Huffman (2009) suggests a development of ceramic styles throughout the Middle Iron Age (Figure 8). Huffman (2009) suggests that the phase is indicative of developing complex societies. Altogether, the Middle Iron Age is a period in South Africa's archaeological record that is indicative of some of the earliest examples of trade and interaction as well as the inception of complex societies in the country. This phase also sees the first occurrences of the use of gold and golden implements (Figure 9).

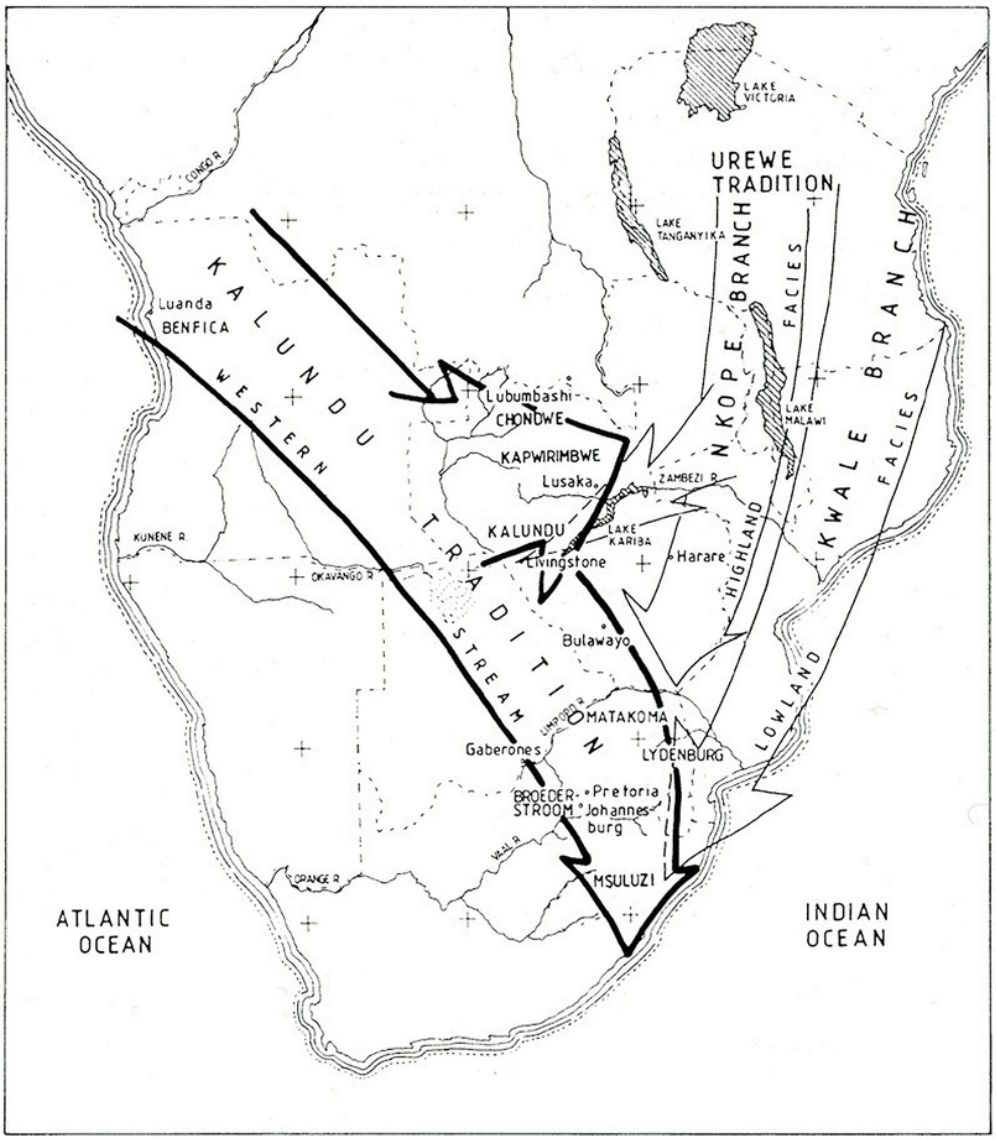


Figure 6: General understanding of Bantu migrations related to the larger ceramic traditions, Kalundu (Western Stream) and Urewe (Nkope and Kwale Branches) (After Huffman, 1989).

C) LATE IRON AGE

Moving towards and intersecting with the historical period of South Africa's archaeological record, Huffman (2007) emphasizes the importance of the occurrence of Great Zimbabwe following K2 and Mapungubwe. While Great Zimbabwe forms a cornerstone in understanding the life ways of the Late Iron Age, this phase, dating between 1300 until as late as 1840 AD, is associated with extensive migrations and diffusions of groups. These migrations and diffusions eventually result in the formation of a large part of the contemporary cultural makeup of South Africa. Above and beyond anything else, stone wall structures represent the archaeological evidence of these cultural developments.

Representing Late Iron Age community organisation and structure, Stone Wall Structures (SWS) have been studied extensively (Maggs, 1976; Huffman, 1989, 2002; Sadr, 2012; Sadr and Rodier, 2012). A main aim of these studies has been to date SWSs, as unlike most archaeological remains, these cannot be easily chronologically placed nor definitively associated with specific groups. Research has developed over the years, leading to the classification of SWSs based on their layout and patterning.

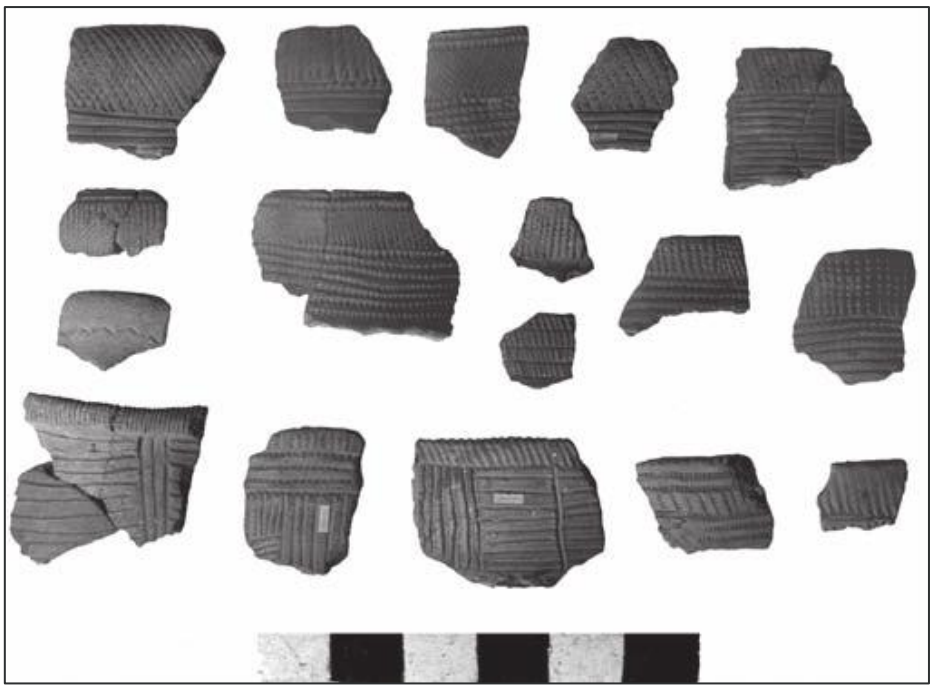


Figure 7: Examples of Bambata Potsherds (Huffman, 2005).

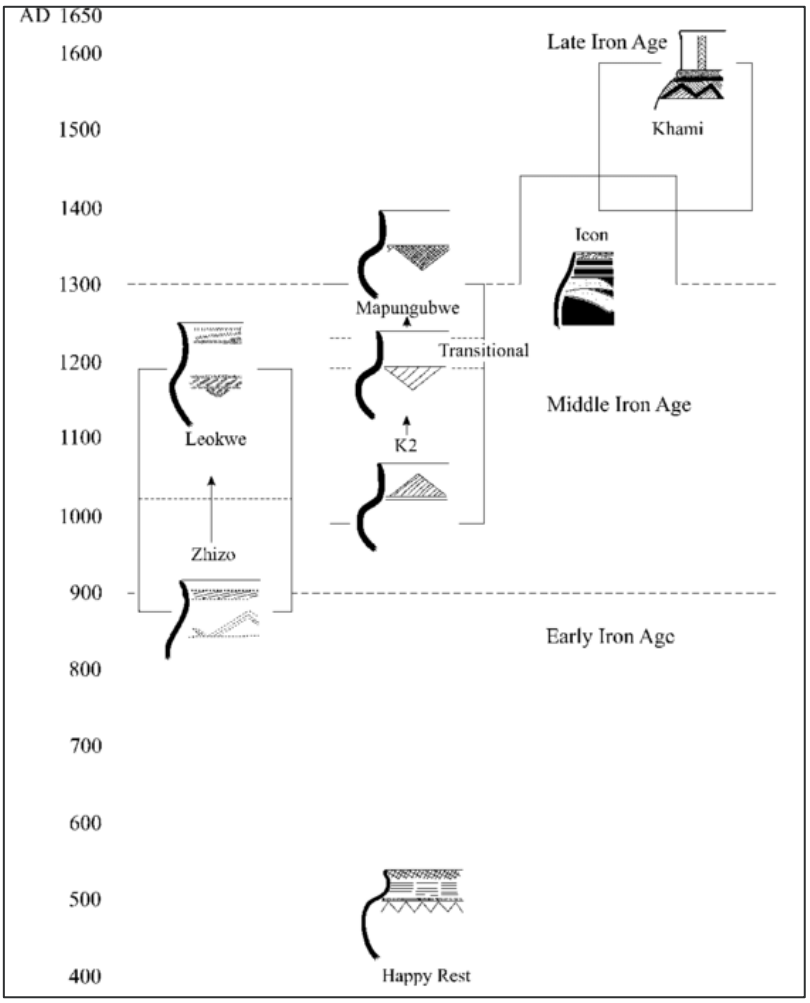


Figure 8: An Iron Age ceramic sequence demonstrating transitions between K2 and Mapungubwe ceramic styles (Huffman, 2009).

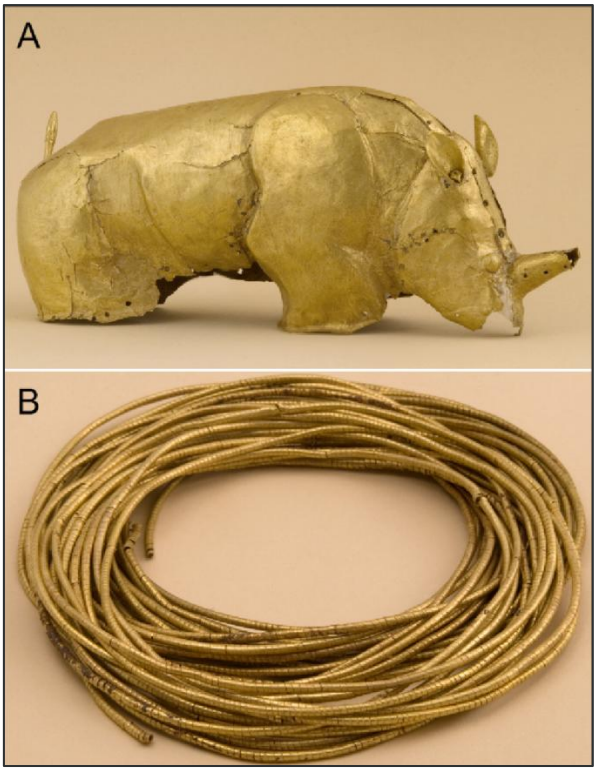


Figure 9: Famous golden implements of Mapungubwe (A - Golden Rhinoceros, B - Golden anklets) (Woodborne *et al.*, 2009).

Sadr and Rodier (2012) provide one of the most direct classifications of SWSs, drawing from previous understandings (Maggs, 1976; Huffman, 2007). Grouping stone wall structures into three groups (I, II and III), Sadr and Rodier (2012) argue for differences between SWSs. Group I SWSs are considered the earliest of the structures chronologically. These have also been classified as Type N structures, mainly being described as consisting of several cattle kraals in the centre linked by other walls (Maggs, 1976) (Figure 10). These structures have been noted in areas such as Klipriviersberg, south of Johannesburg, which has been related to early agropastoral activities in the area (James, 2018) (Figure 11).

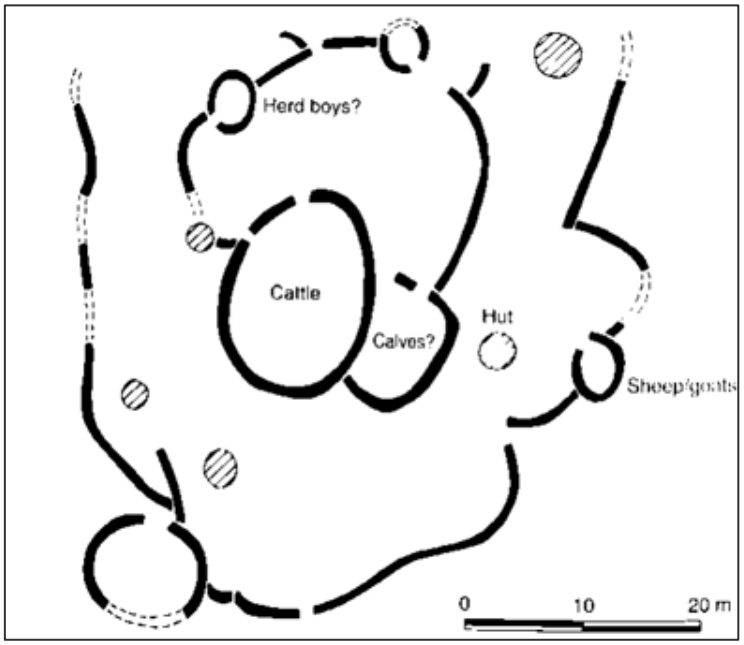


Figure 10: Type N SWSs as illustrated by Maggs (1976).



Figure 11: An on-site photograph of a Group I or Type N SWS at Klipriviersberg Nature Reserve (James, 2018).

Representing later events of occupation during the Later Iron Age, Group II and III SWSs consist of more complex layouts and clustering. Group II and III structures include structures that make up the Bokoni (Mpumalanga) (Figure 12) and Kweneng (Suikerbosrand Nature Reserve, Gauteng) complexes (Figure 13).



Figure 12: An aerial photograph of SWSs part of the Bokoni complex, Mpumalanga (after Delius *et al.* (2012)).

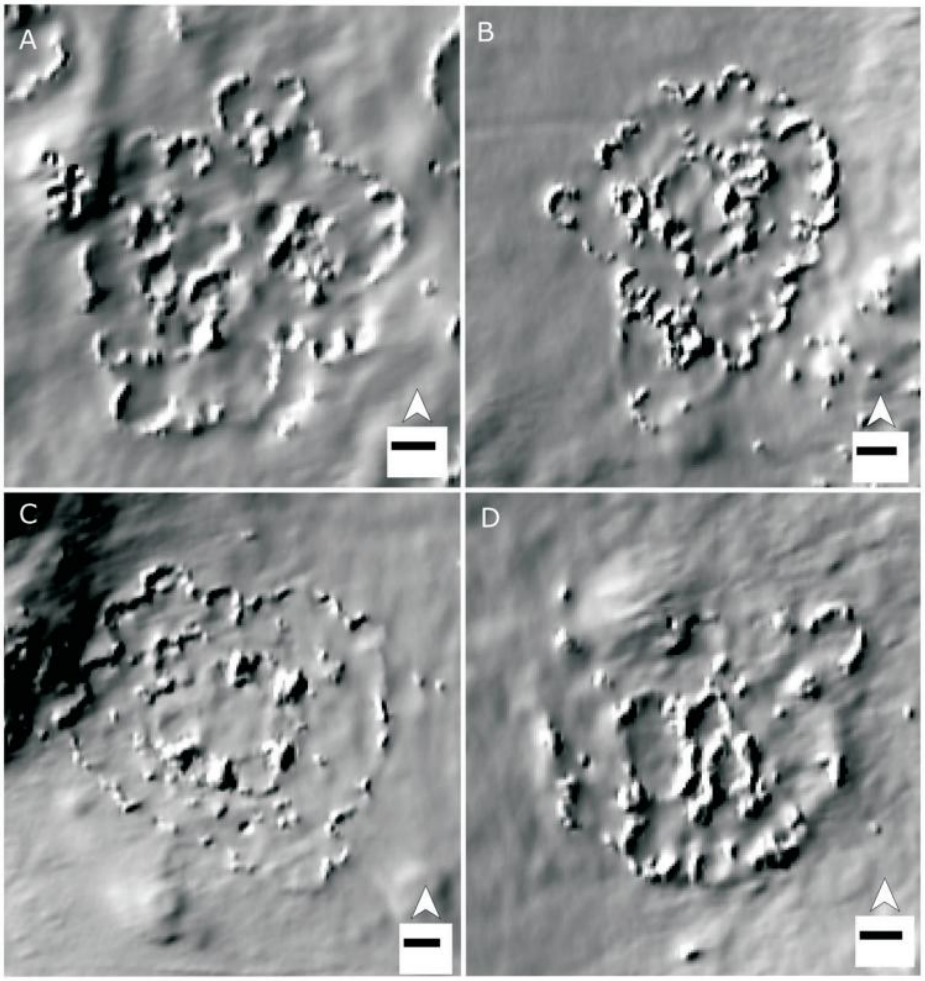


Figure 13: LiDAR imagery of Molokwane SWSs of Kweneng, a lost city discovered at Suikerbosrand Nature Reserve (after Sadr and Mshuqwana (2020)).

Different material culture is associated with the Late Iron Age including burials, ceramic remains, as well as LSA tools which continued to be used by different groups. The Late Iron Age and the groups associated coincide with the Historical Period of South Africa, which involved events including colonialism, industrialisation, various conflicts and social movements, ultimately leading to the development of the state as at present. Figure 14 provides an overview of the distribution of SWSs across the northeastern region of South Africa.

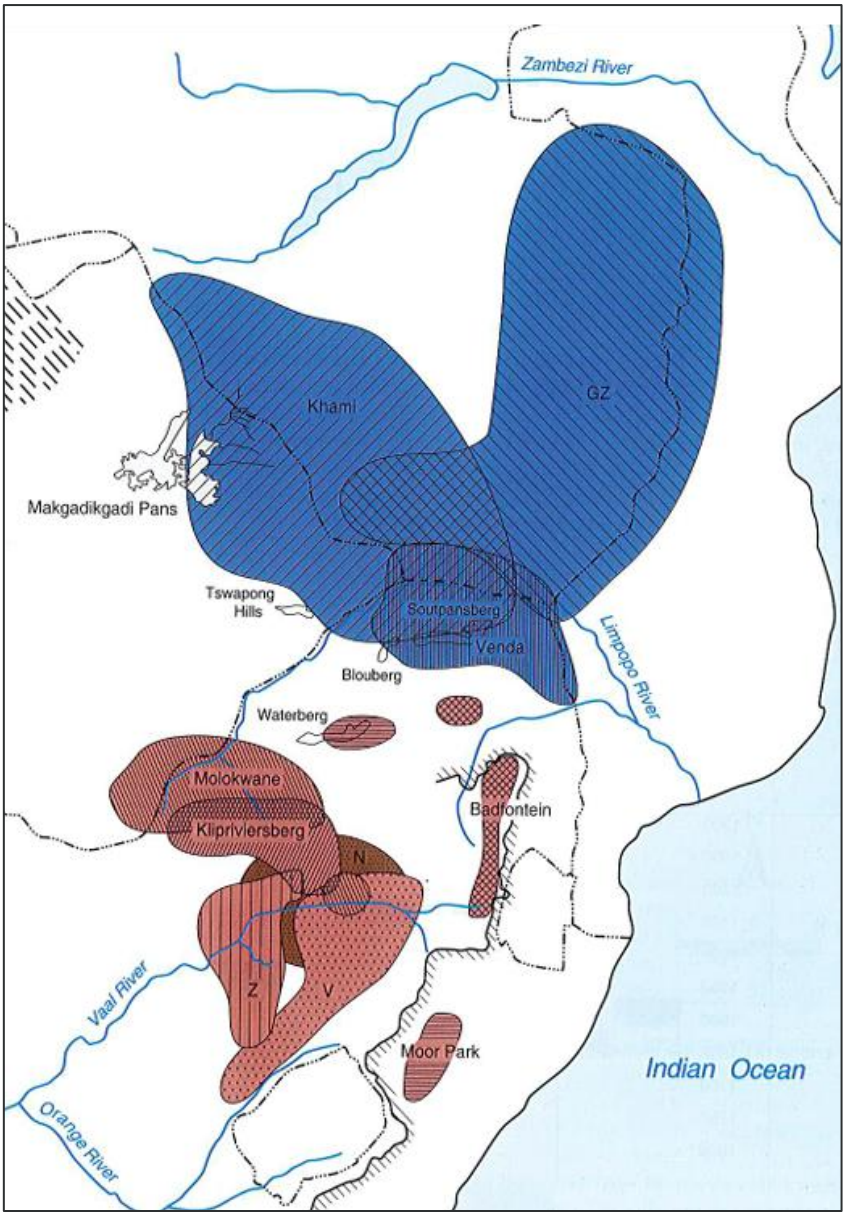


Figure 14: Distribution of the different types of SWSs across the northeastern region of South Africa (after Huffman, 2007)

2.1.4 HISTORICAL PERIOD

A) PORTUGUESE MARINERS AND SHIPWRECKS

Marking the documented history of South Africa, the Historical Period starts when the first European settlers arrive. Thompson (2001) provides an overview of the historical events in South Africa which have contributed to the archaeological record and overall heritage profile of the country.

The country's first encounter with Europeans is allocated to the first Portuguese expeditions which rounded the Cape of Good Hope in the sixteenth century. During their expeditions, several ships were wrecked given the harsh conditions the small vessels had to endure (Thompson, 2001; Gribble, 2002; Werz, 2010). Gribble (2002) provides a brief overview of the extent of shipwrecks off the South African coast, stating that over 3000 shipwrecks have been recorded. Shipwrecks represent the first signs of historical European interactions with South Africa.

B) THE CAPE COLONY

While Vasco de Gama and Bartolomeu Dias represent two of the first Portuguese mariners to round or interact with the South African coast, the country's history is transformed with the formation of the Dutch Cape Colony. The Dutch East India Company, establishing a port of call at Table Bay through the arrival of Jan van Riebeeck, intended for Cape Town to become a base for the rapidly growing enterprise. In the mid-1600s, the company encouraged some individuals to participate in farming and food production, in the hopes of solidifying and establishing the Cape Colony (Thompson, 2001). The Cape Colony developed into a melting pot of different people due to the expansion of the colony through slave trade, and arrival of other European groups. In terms of archaeology, research of some of the early homesteads of the Cape Colony such as Vergelegen provide more understanding of the extent of interaction between different groups from as far as East Asia, to Brazil (Markell *et al.*, 1995) (Figure 15).

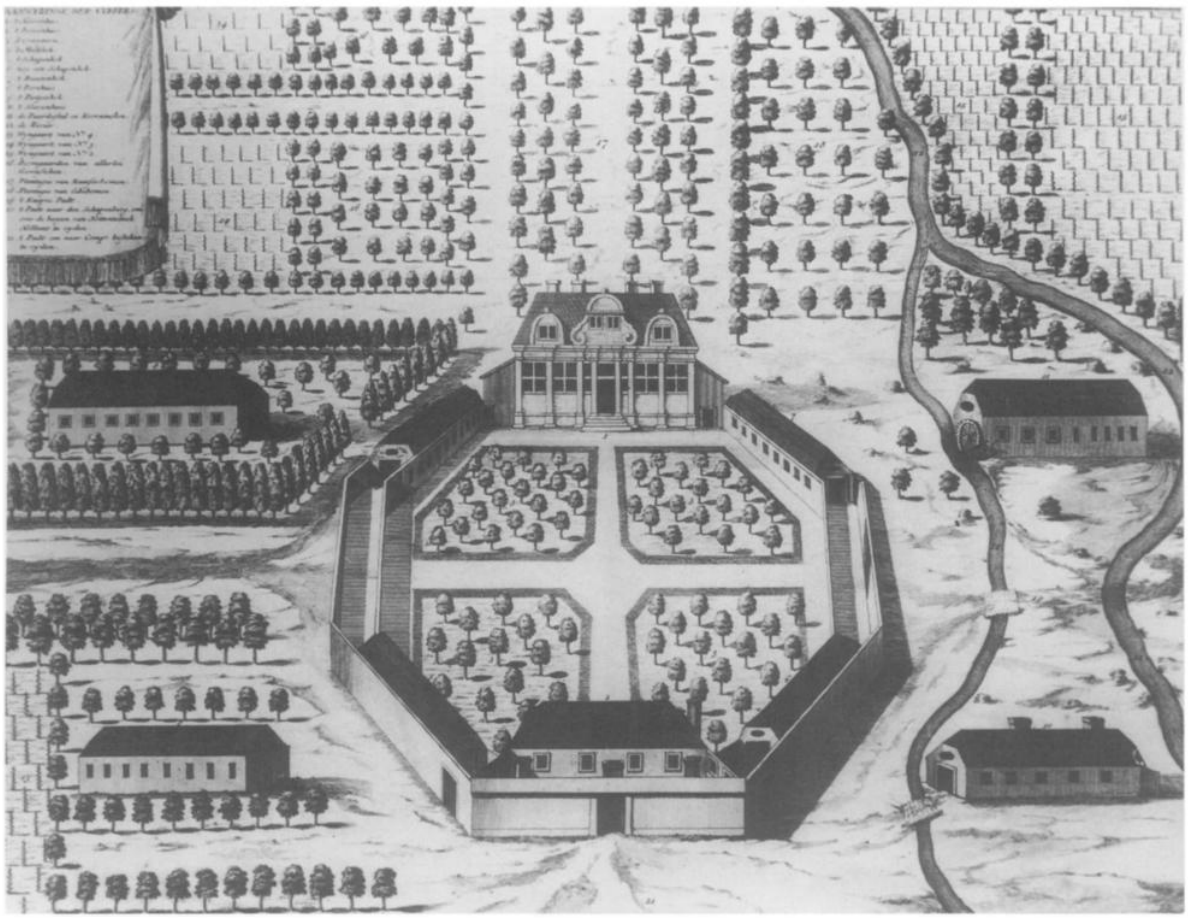


Figure 15: A 1700s drawing of Vergelegen, a Cape Colony homestead including multiple buildings including slave lodges. (after Markell *et al.* 1995).

It was through these first extensive events of interaction that essentially led to the formation of the Afrikaans language, and Afrikaner culture. In short, through extensive interaction and influence, Afrikaans was formed, with the first written scripts of the language curiously having been written in Arabic script (Figure 16).

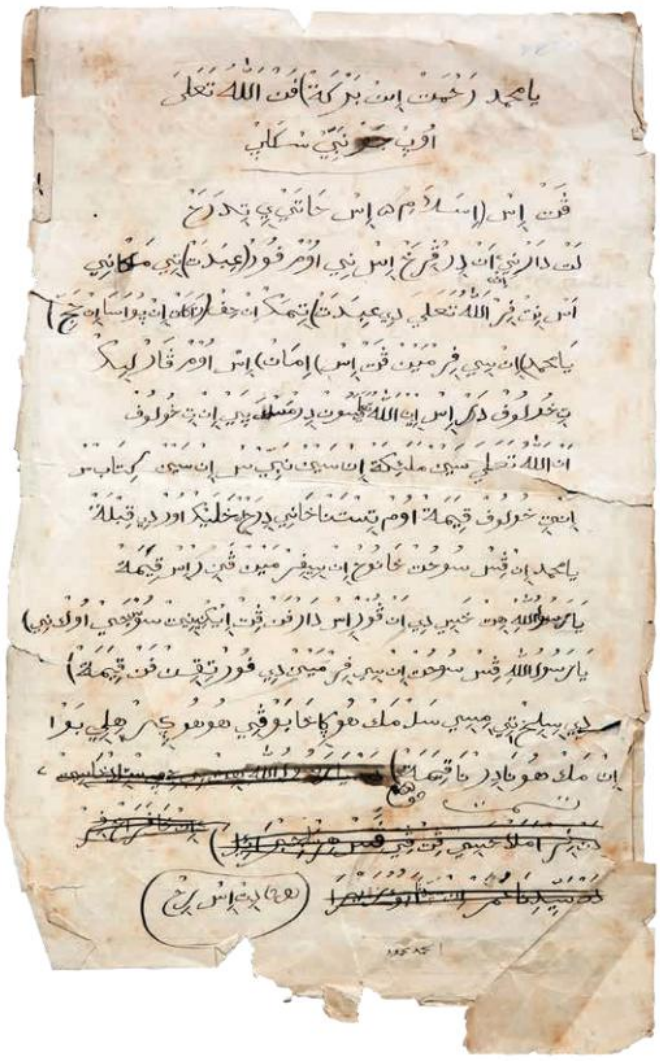


Figure 16: An Arabic script representing the first written texts of the Afrikaans language (late 19th Century) (after Davids (2018))

In the context of the Northern Cape, the Cape Colony's influence is argued by Penn (2005) to have taken a different form characterised by shifting frontiers between the colony and original inhabitants of the region. Interaction between the group, documented through records which were often forgotten to the historical narrative of South Africa. As the Cape Colony advanced towards the Orange River, conflicts ensued between trekboers and the Khoisan hunters and herders. This led to either, the detriment of Khoisan groups, or the absorption of these groups into the colony itself. This further demonstrates the extensive nature of interaction and resulting influence of the Cape Colony on South Africa.

C) DEVELOPMENT OF THE SOUTH AFRICAN MINING INDUSTRY

It was in the late 1800s that South Africa's economic development reached a point of rapid acceleration. While the coast was represented by a richly diverse Cape Colony, the central landmass of the country had been heavily invested in for the exploitation of mineral resources following key discoveries. Diamonds and gold were of particular interest. It was only later when platinum was discovered as part of the Bushveld Complex to the north of the country, which further inspired investment in mining and mining infrastructure (Cawthorn, 2010). Given the complex nature of the deep gold reefs of key locations such as Johannesburg, investments of substantial time and money were necessary, ultimately leading to the establishment of merged and expansive mining companies (Durand, 2012; Harrison and Zack, 2012). This fact led to the development of key settlements which have since developed into modern cities such as Kimberley and Johannesburg (Figure 17).

As South Africa's influence in the world economy grew, so did colonial interest. This essentially initiated the first colonial and civil conflicts recorded in the modern history of the country. Essentially, these conflicts involved the British Empire's efforts towards colonising the country, being opposed by Afrikaans Boers and associated powers.



Figure 17: A photograph of Johannesburg from the 1890s (after Chirisa and Matamanda (2019))

The deeper consequence of the mining industry's development was experienced not only at a national level, but also localised. Some historians (Turrell, 1987; Worger, 1987) have contemplated the social impact of South Africa's diamond mining industry. As Kimberley represents the origins of South Africa's early diamond mining industry, the location was characterised by different social phenomena including immigration, industrialisation, and establishment of labour forces. Further, the initial labour conditions of the diamond mining industry had effects on local populations, which can ultimately be argued to have shaped the development of the industry

D) CONFLICTS OF SOUTH AFRICA

As the country continued to economically expand, several conflicts arose prior to the intense colonial imposition the country was about to face. In the early 1800s, conflict had arisen among Nguni groups, essentially being driven by environmental pressures as well as the injection of trade activities. Shaka Zulu becomes a key figure in what has come to be known as the Mfecane, or the period of "the crushing". The period is marked by the conquests and rise of the Zulu kingdom which essentially had a bearing on the lifestyle and organisation of groups across the country. Given that this conflict had taken place during a period when South Africa was being extensively documented, the events of the Mfecane have formed part of historical records.

Similarly, conflicts west of the Drakensberg including groups such as the Sesotho, Pedi, and Tswana, become more relevant to the interior parts of the country. The conflicts and period in question are referred to Difacane. Although the word is often used synonymously with Mfecane, the two words describe different events and repercussions thereof.

Near the turn of the 20th century, conflict between colonial powers took form. One of the most notable of these conflicts was the Anglo-Boer War, or the South African War. Between 1899 and 1902, this war was largely supported by the British Empire's push towards controlling the country and its many smaller colonies. As Thompson (2001) highlights, the war essentially ended in the favour of the British. The influence of the British had since transformed the South African landscape with much of its cultural and colonial history being founded on the Empire's rule. It is important to note this conflict as it presents opportunity in terms of archaeological and cultural heritage resources.

Locations such as Mafikeng (now Mahikeng) have become key in recounts of the South Africa War. The war also led to the movement of people, which has been recorded, for example, Springfontein, which saw the formation of a war refugee camp (Figure 18). As many battle sites have been recorded, key archaeological finds related to these events can still be found. These resources, and in some cases, monuments, tell the story of South Africa's early struggles of colonialism and the origins of racial laws and regulations.

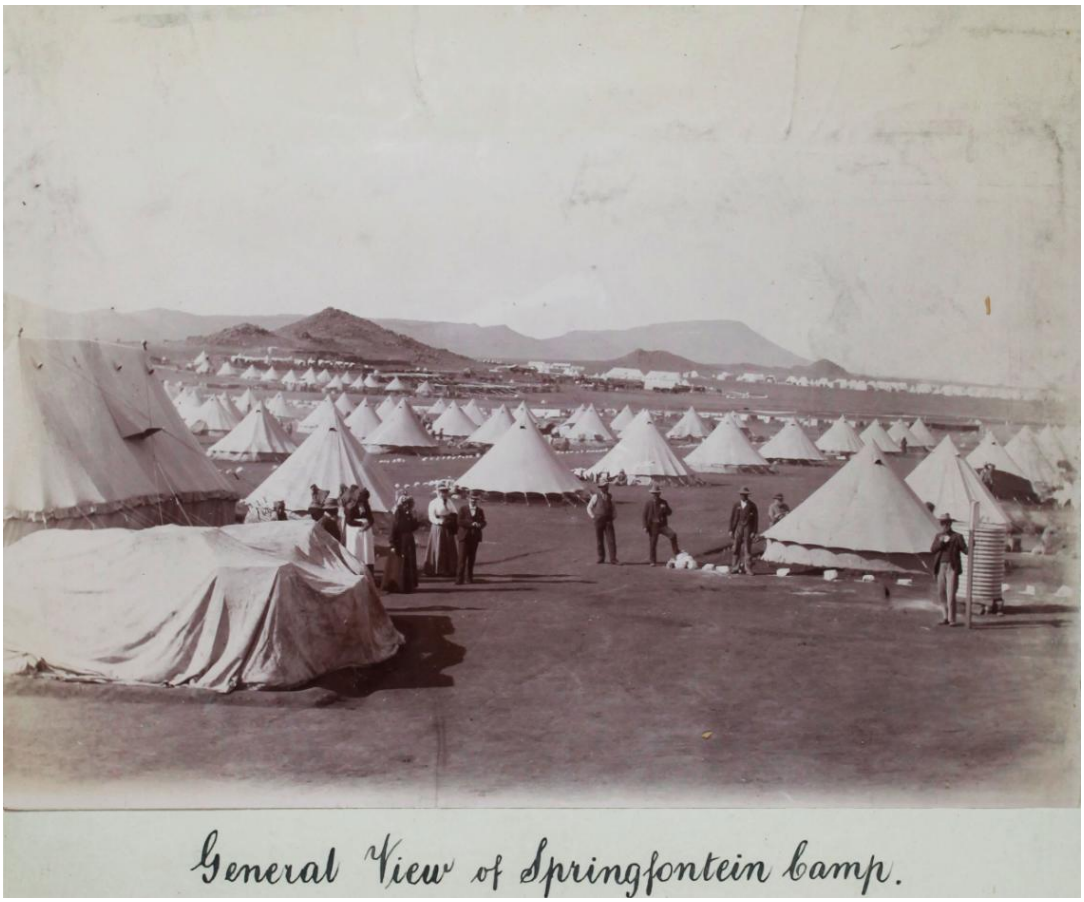


Figure 18: A picture of Springfontein, a refugee war camp which was established as a repercussion of the war's influence (after British National Archives).

E) APARTHEID AND CONTEMPORARY HISTORY

It was after the Anglo-Boer War that the initial motions towards racial segregation through law and regulation came to be. The establishment and expansion of mining towns led to the marginalisation of different racial groups. By the mid-20th century, the Apartheid regime had been put in place, controlling the movement and settlement of people. For one, new documentation was required for many racially marginalised people to move into areas that were otherwise restricted. Such laws inspired revolutionary responses (Figure 19), ultimately leading to the struggle against apartheid, which has characterised the 20th century of South Africa ((Thompson, 2001).

After being abolished in 1994, the legacy of Apartheid has been argued to have had a lasting effect on society. This has been argued beyond the context of history, being observed in social dynamics, contemporary

infrastructure, as well as urban growth and development. Leading to contemporary history and modern approaches to development, Apartheid is seen as the most recent event having shaped and formed South Africa as we know it today.

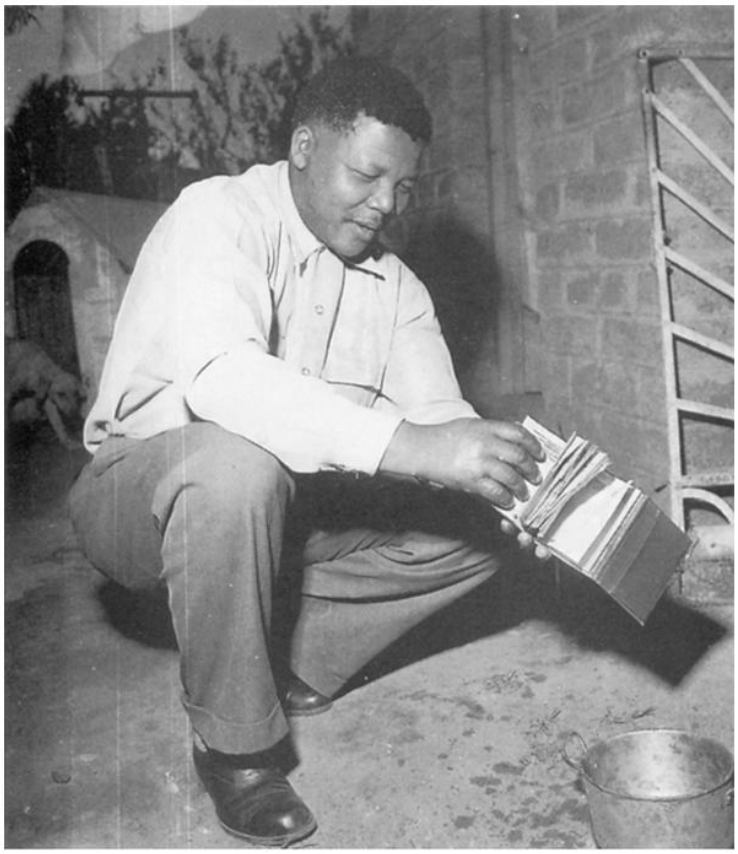


Figure 19: Nelson Mandela burning his pass in 1959. A pass was a requirement for people to move across the country. Such documents have now become items representing the Apartheid regime (Thompson, 2001).

2.2 SITE-SPECIFIC BACKGROUND

The Gauteng Province is associated with a long archaeological record that spans across pre-colonial and colonial periods. Most notable is the region's significant role in terms of the development of the mining industry of South Africa. The closest town to the site in question being Carletonville, is specifically important in this regard.

2.2.1 PROXIMITY TO CRADLE OF HUMANKIND WORLD HERITAGE SITE

The site, as well as the associated mining operations are ~50kms south of the World Heritage Site, Cradle of Humankind. The Cradle of Humankind is globally recognised for its palaeontological value and contribution to our understandings of Human Evolution. Key fossils found in the area include examples of early hominid species such as Mrs. Ples, Little Foot, and the newly discovered fossils of *Homo Naledi*. While these fossils have mainly been associated with cave systems, the site's proximity to the heritage site must be acknowledged.

2.2.2 CULTURAL HERITAGE OF CARLETONVILLE

Like other small towns of the Far West Rand of Johannesburg, Carletonville was founded and defined by the growing mining industry of the Gauteng Province. (Van Eeden, 1998). While the town was established and further developed through the mining industry, the area was previously inhabited by groups including the Le Ghoya who were later affected by the events related to Mzilikazi's capture and domination of the area.

Following these early occupations of the region, the region became the settlement of farmers of the Zuid-Afrikaansche Republiek from as early as 1836. The area was later involved in the South African War between 1899-1902. The redevelopment of the town following the war gave rise to its establishment as a key gold mining

town of the region. Apart from Carletonville, several other towns were established in the West Rand or West-Wits Line area. From between the 1930s to 1990s, Carletonville continued to develop with different groups settling in the town, stimulating its growing economy and adding new facets to Carletonville's overall cultural heritage. In the 1990s, Carletonville's gold mines contributed as much as 23% towards South Africa's overall gold production (Van Eeden, 1998).

Carletonville since became a melting pot of different cultures, with different people contributing to the continued economic development of the town and associated mining companies. Several church presences were associated with the population of Carletonville. Further, several community groups were formed, adding to the nature of cultural activities of the town as it developed.

2.3 DATABASES AND COLLECTIONS

Several museums are key sources of information and archaeological material evidence of Carletonville, western Gauteng, and it's past. These include the Roodepoort Museum, Krugersdorp Museum, and the Apartheid Museum. It is also important to note that the study site is ~50 kms South of the World Heritage Site, the Cradle of Humankind.

2.4 PREVIOUS RELEVANT IMPACT ASSESSMENTS

In the context of the current assessment, a background examination of previous historical finds and associations was conducted. Considering available information through the SAHRIS database and previous Archaeological assessments of the area, the following key reports on finds have come to light:

> *Mann, N. 2022. Proposed Carpe Diem Solar Photovoltaic Plant and Associated Infrastructure on the Farms Varkenslaagte 119 IQ and Doornfontein 118 IQ, near Carletonville, Gauteng Province*

The report was prepared towards the EIA of a Solar PV project west of, and adjacent to some of the infrastructure proposed. Two features were noted within the footprint of the area to be affected by the Solar PV development. These included 10 informal graves (here labelled and marked as WWR013), and stone walling (here labelled as WWR014).

> *Kraljević, L. 2024. Heritage Baseline Report for the DSIBAN Battery Energy Storage (BESS) Facility, Gauteng Province.*

A Heritage Baseline Study conducted for the Dsiban BESS Project directly west and adjacent to the current study site. As a baseline assessment, the study concluded that the area has the potential to yield LIA and Colonial Period heritage features, including features associated with the Anglo-Boer War or South African War as well as features associated with Carletonville's mining history. As a baseline assessment, the study did not identify any specific features.

> *Kraljević, L. 2024. Heritage Walk-down Report for the proposed DSIBAN Battery Energy Storage (BESS) Facility, Gauteng Province.*

Following the above Baseline Study, a walk-down assessment was undertaken for the same project. No heritage features were observed during this field assessment.

> *Lavin, J. 2024. Heritage Impact Assessment in terms of Section 38(3) of the NHRA for the Proposed development of a Battery Energy Storage System (BESS) (10ha; 600MWh) and Associated Grid Connection at Merafong, Gauteng*.

Heritage Impact Assessment for a development project ~8km east of the current study site. The study added to previous assessments, identifying additional stone walling features. The sites identified are found in a cluster, and are further away from the current project but add to the overall understanding of the region's cultural heritage.

> *Van Schalkwyk, J.A. 2022. Phase 1 Cultural Heritage Impact Assessment: The Development of the Carmel Solar 1 Photovoltaic Solar Energy Facility, near Carletonville, Gauteng Province.*

The report was prepared for a Solar PV Facility west and directly adjacent to the current study site. The assessment did not identify any cultural heritage features but highlighted the key components of the cultural heritage of the landscape, mainly being associated with different occupational periods, both pre-colonial and colonial.

> *Van Schalkwyk, J.A. 2022. Phase 1 Cultural Heritage Impact Assessment: The Development of the Carmel Solar 2 Photovoltaic Solar Energy Facility, near Carletonville, Gauteng Province.*

This assessment covers an area immediately south of the assessment mentioned above, being a second section of the Carmel Solar PV project. In a similar way, no heritage features or impacts were noted.

> *Mabehle, N. 2024. Pipeline Optimisation of the Far West Gold Recoveries Execution of the West Rand Tailings Retreatment Project: Heritage Impact Assessment.*

As a pipeline project very similar to the current study, this study identified several heritage features along the pipeline routes proposed. While the assessment covers a large area to the east of the current study site, most of the identified heritage features do not intersect with the current project. Heritage features included stone wall structures, historic buildings, and graves. One feature, that is a historic farmstead with observable structures is in proximity to but not affected by the current project.

> *Kraljević, L. 2024. Heritage Impact Assessment for the proposed Midas Battery Energy Storage (BESS) Facility, Gauteng Province.*

A HIA conducted for a project ~12kms east of the current study site. This HIA confirmed the presence of a burial site/ cemetery. The current project will not affect this feature however cognisance must be taken that similar features may be observable within the footprint of the current project.

> *Mann, N. 2023. Proposed Kusasalethu Return Water and Backfill Pipelines, in the Merafong Local Municipality, Gauteng Province, South Africa.*

As a key assessment undertaken, this HIA assessed a pipeline route which overlaps to some degree with the current project footprint. No heritage features were identified through this assessment.

3 METHODOLOGY

The following section describes the methodology used to gather information on potential heritage resources and impacts in this report. An initial desktop assessment was conducted to identify key areas of heritage sensitivity and potential features identified in the past. A field survey will later be conducted to verify the significance of any identified features as well as identify any additional features.

3.1 INITIAL DESKTOP ASSESSMENT

To evaluate the overall sensitivity and extent of Archaeological and Heritage features within and around the development footprint, a desktop assessment of the area was conducted. The desktop assessment involved making use of existing information related to heritage resources of the area.

As an initial step, the Screening Tool of the Department of Forestry, Fisheries and the Environment was consulted. The Screening Tool includes a geospatial database of recorded and identified sensitivities relating to Archaeological and Cultural Heritage sites or finds. The information available through the Screening Tool provided a basis which informed further desktop assessments and the extent to which the field survey would be conducted. This information was then corroborated with information available through the South African Heritage Resources Information System (SAHRIS), Chief Directorate: National Geospatial Information (CD:NGI), as well as Google Earth Imagery. Various aerial photographs and 1st Edition Topographic maps were consulted to verify the extent of heritage and archaeological sensitivity in and around the development footprint. Altogether, the data consulted included geospatial records dating as far back as 1955.

3.2 FIELD SURVEY

To verify and add to the observations made through the desktop assessment, a field survey has been planned. The field survey will involve traversing the footprint of the development to be assessed, with a focus on assessing areas which may have been of heritage significance, and since been disturbed. The survey will also include consulting personnel on site, to gather more insight on any known archaeological sites and finds.

The Archaeologist will survey key areas of the development footprint, as well as key areas immediately outside of the development footprint, for example, some surrounding roads, undisturbed areas, and areas where the displacement and stockpiling of earth was observed. A Garmin eTrex 10 will be used to record track logs of the extent of the survey itself.

3.3 DOCUMENTATION AND ANALYSIS

All observations gathered through the desktop assessment were documented and analysed in terms of their significance. Through remote sensing, any sites noted through the Screening Tool and SAHRIS were documented in relation to the development. During the field survey, the location of larger Archaeological and Heritage finds will be recorded.

Geotagged photographs will be taken throughout the survey. This included the photographing of finds, as well as the surrounding environment. Physical scales will be included in all photographs which require an understanding of dimensions, sizes and the colour of finds. For larger finds, a 1,5-meter scale divided into 10cm segments will be used. For smaller finds, an IFRAO Standard Scale (Figure 20) will be used.



Figure 20: IFRAO Standard Scale used for photography of Archaeological finds.

Sites and finds were subsequently analysed in terms of their significance. Several criteria were used to assess the significance of finds and their bearing on the overall heritage significance and sensitivity of the affected area. Table 2 provides a list of the different criteria considered when assessing the significance of finds and or site. In relation to each criterion, different questions were embedded in the analysis of sites and finds.

Table 2: Different criteria and questions which guided the analysis of Archaeological and Heritage finds or sites.

Criterion	Questions which guided analysis
Overall Integrity or condition	1. Is the find or site recognisable beyond initial identification? 2. Is the find or site well or poorly preserved? 3. Has the find or site been disturbed or removed from their original context? 4. Has the find been exposed to severe post-depositional damage or disturbance? 5. What types of meteorological and geomorphological events may have disturbed or compromised the integrity of the find or site?
Context	1. Has the surrounding area been highly disturbed?

	2. Is it likely that the find has been removed from its original context? 3. Have other individual finds been located within 15 meters of the find, meriting the description of the find as part of a site? 4. Does the find form part of a collection of more than 3 finds located within 15 meters of each other? 5. Could the find form part of a larger, chronologically or contextually related collection of finds in the area?
Spatial relation to other sites	1. Are there any identified sites located near the find or site? 2. To what extent can the find or site be related to all other sites identified? 3. How close are the other sites to the site or find? 4. Does the occurrence of this site or find change the regional heritage or archaeological narrative?
Prehistoric and historical provenance	1. Can the find or site be identified in terms of which period it relates to, i.e. Stone Age, Iron Age, or Historical? 2. Does the find corroborate or correlate with general understandings of the period it relates to? 3. Does the find or site fit into the heritage narrative of the region or province? 4. Does this find or site add new insight to contemporary understandings of the period it relates to? 5. Does this find or site add new insight to contemporary understandings of Archaeology in South Africa?

3.4 CLASSIFICATION OF SITES

Considering the above-described documentation and analysis methods, heritage finds and sites were classified or graded according to the SAHRA Minimum Standards (2007) recommendations. The grading system adopted in this report is captured in Table 3.

Table 3: Classification of heritage sites as per the SAHRA Minimum Standards (2007) and adopted in this report

Level	Grade	Significance	Action
National	I	High	Nominate for Field Rating/Grade I
Provincial	II	High	Nominate for Field Rating/Grade II
Local	IIIA	High	Retain as heritage register site, no mitigation advised
Local	IIIB	High	Mitigate and retain as heritage register site
General Protection A	IV A	High/Medium	Mitigate before destruction
General Protection B	IV B	Medium	Record before destruction
General Protection C	IV C	Low	No further recording required

The different criteria considered when analysing finds and sites allowed for subsequent grading and classification. In this regard, prehistoric and historic provenance, spatial relations to other sites, and context allowed for the identification of the level of importance of the site or find. In this regard, finds and sites were

graded according to if they were of National, Provincial, Local or General significance. Overall Integrity or condition and context guided the advised mitigation action.

3.5 LIMITATIONS

This section details the different limitations associated with the implemented methodology of this assessment. Approaches to mitigate these limitations are therefore presented.

3.5.1 GENERAL LIMITATIONS

Several limitations were expected and encountered while implementing the above-described methodology. Some of these limitations relate to the project itself, while some are more general, relating to the implementation of the methodology.

Firstly, such investigations are limited to desktop observations from which findings are drawn. In this regard, the findings presented here are limited to surface observations. Below-ground archaeological contexts would only apply in cases where the methodology includes components involving excavations and test pits. To mitigate this limitation, this report advises the application of heritage procedures considering what has been noted or already disturbed on site.

Although an extensive methodology was adopted to address the desktop and baseline assessment, one must remain cognisant of the fact that this assessment may not identify all heritage features possibly existing. For this reason, mitigation measures have been proposed to accommodate for chance finds as well as features that may not have been encountered and identified through the implementation of this study's methodology.

3.5.2 PROJECT-SPECIFIC LIMITATIONS

As a key limitation, it is understood that the landscape had been extensively disturbed by mining and agricultural activities. As a desktop and baseline study, this report draws from available information to provide an overview of the heritage significance of the area which will form the foundation and guide the approach of the pending field survey.

4 FINDINGS

The following section presents the findings of both the desktop assessment as well as the field survey. In summary, a single area of interest was noted through the desktop assessment. The presence of this site was verified through the field survey.

4.1 DESKTOP ASSESSMENT RESULTS

An initial desktop assessment was undertaken to ascertain the overall sensitivity of the area in terms of heritage features. The DFFE Screening Tool was used as an initial point of reference in this regard. The Screening Tool suggested that the area to be developed is of Low Sensitivity as captured in Figure 21.

The DFFE Screening Tool highlighted no heritage features within or in close proximity of the area to be affected by the proposed activities. The affected area was assessed using Google Earth as well as available surveys and mapping resources via the CDNGI Geospatial Portal (http://www.cdngiportal.co.za/cdngiportal/). The First Edition Topographic map (2627AD) of the area was analysed. As the map was drawn in 1958, it would include information on observations within the footprint of the development.

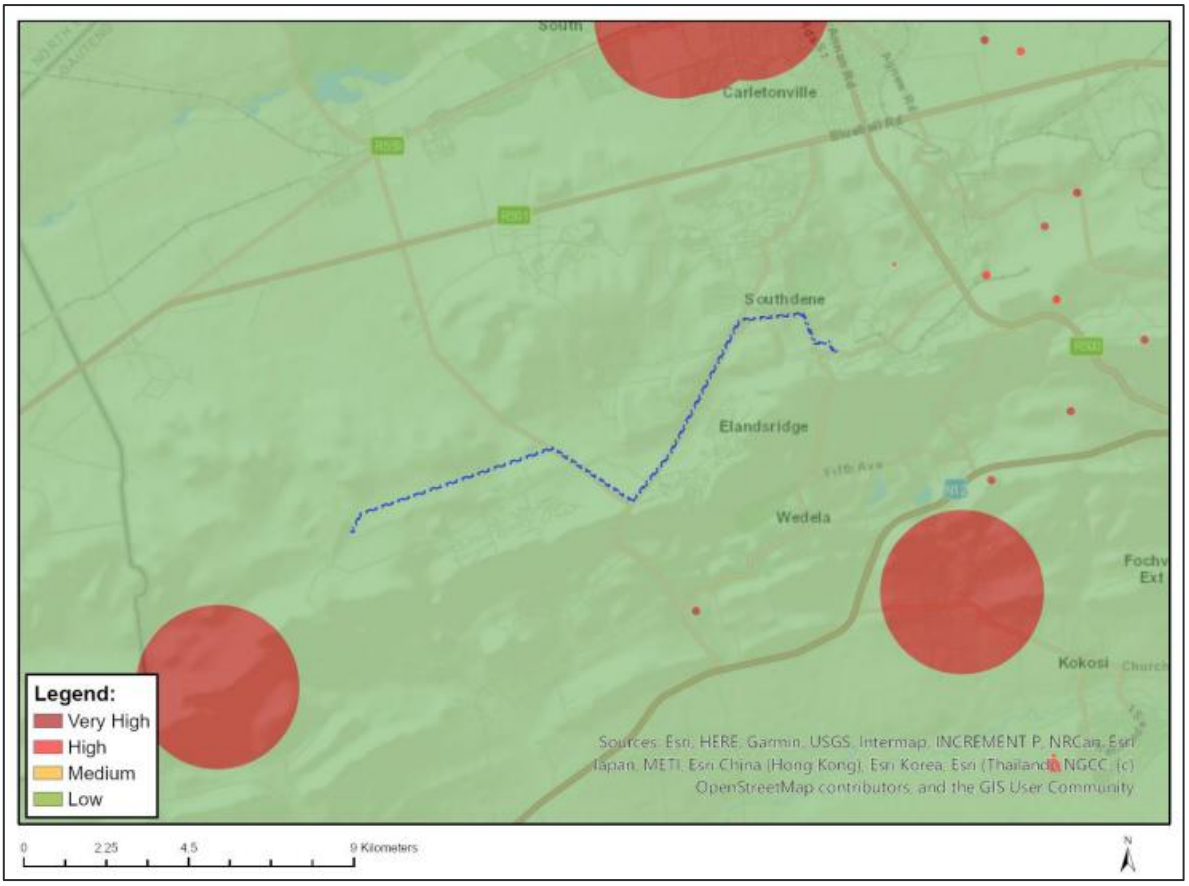


Figure 21: Map of relative Archaeological and Cultural Heritage Sensitivity (DFFE Screening Tool)

The proposed Deelkraal TSFs were considered firstly as these activities would cover an area and have a more extensive impact on heritage features. After assessing the first edition topographic map dated 1958, some ruins (labelled “Murasie”) were identified within and around the TSF footprints (Figure 22). Only a single feature was noted through satellite imagery which corresponded with the general location of the demarcated ruins on the early maps (Figure 23). These observations were further corroborated and verified through the field survey.

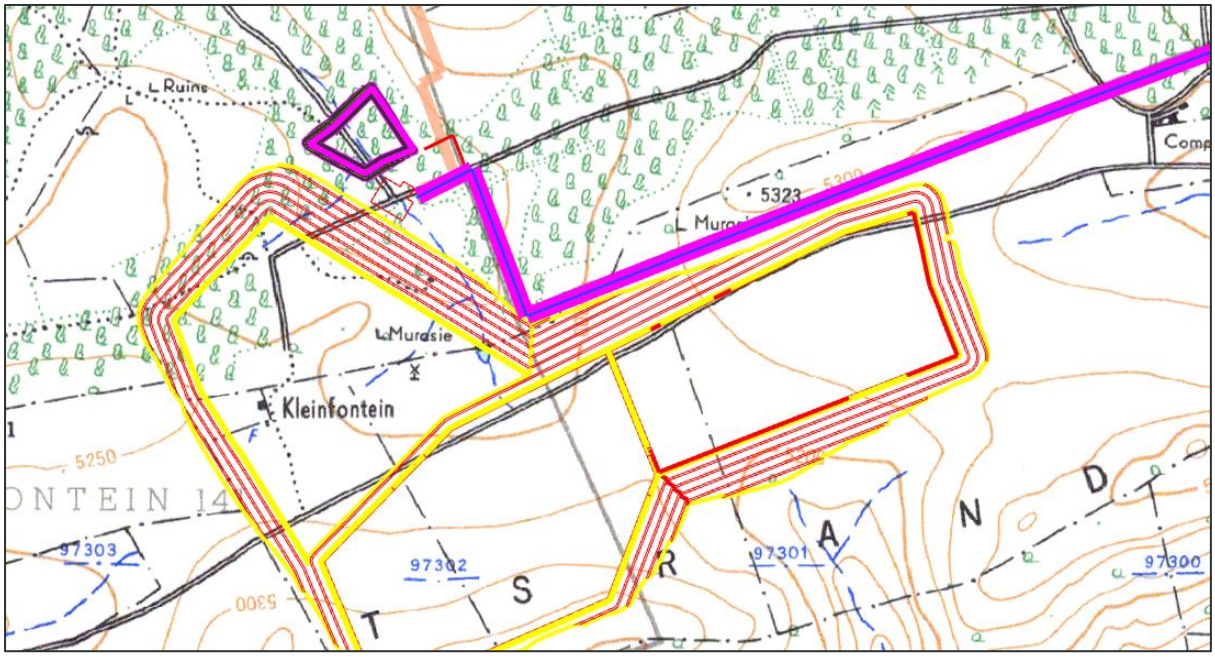


Figure 22: Extract of the First Edition Topographic map 2627AD dated 1958.

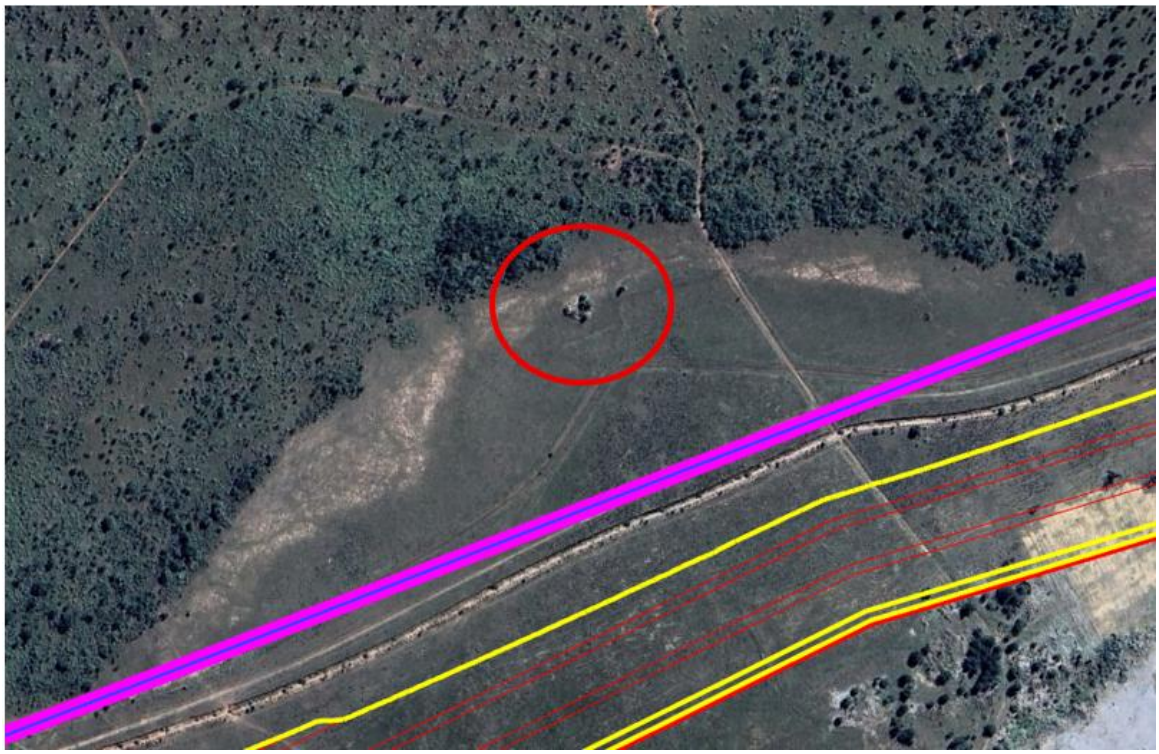


Figure 23: Google Earth imagery of a feature corresponding to the location of the ruins identified in First edition Topographic map

More notably, the proposed Deelkraal II TSF area covers an extensive number of buildings and ruins. While these features are not present in the first edition topographic map, they present the potential of the area being rich in heritage associated with the colonial period and early establishment of the West Wits mining industry. The features noted on early maps and records relate to infrastructure associated with the Deelkraal Gold Mine operations. Infrastructure of the Deelkraal Gold Mine is observable in records from as early as 1979, but not as early as 1958 (Figure 24 and Figure 25). All the infrastructure of Deelkraal Gold Mine has now been demolished with remnants of the demolished structures remaining. The remaining structures or ruins thereof have since been repurposed by a small community which resides within the footprint of the proposed TSF. These ruins were visited during the site survey.

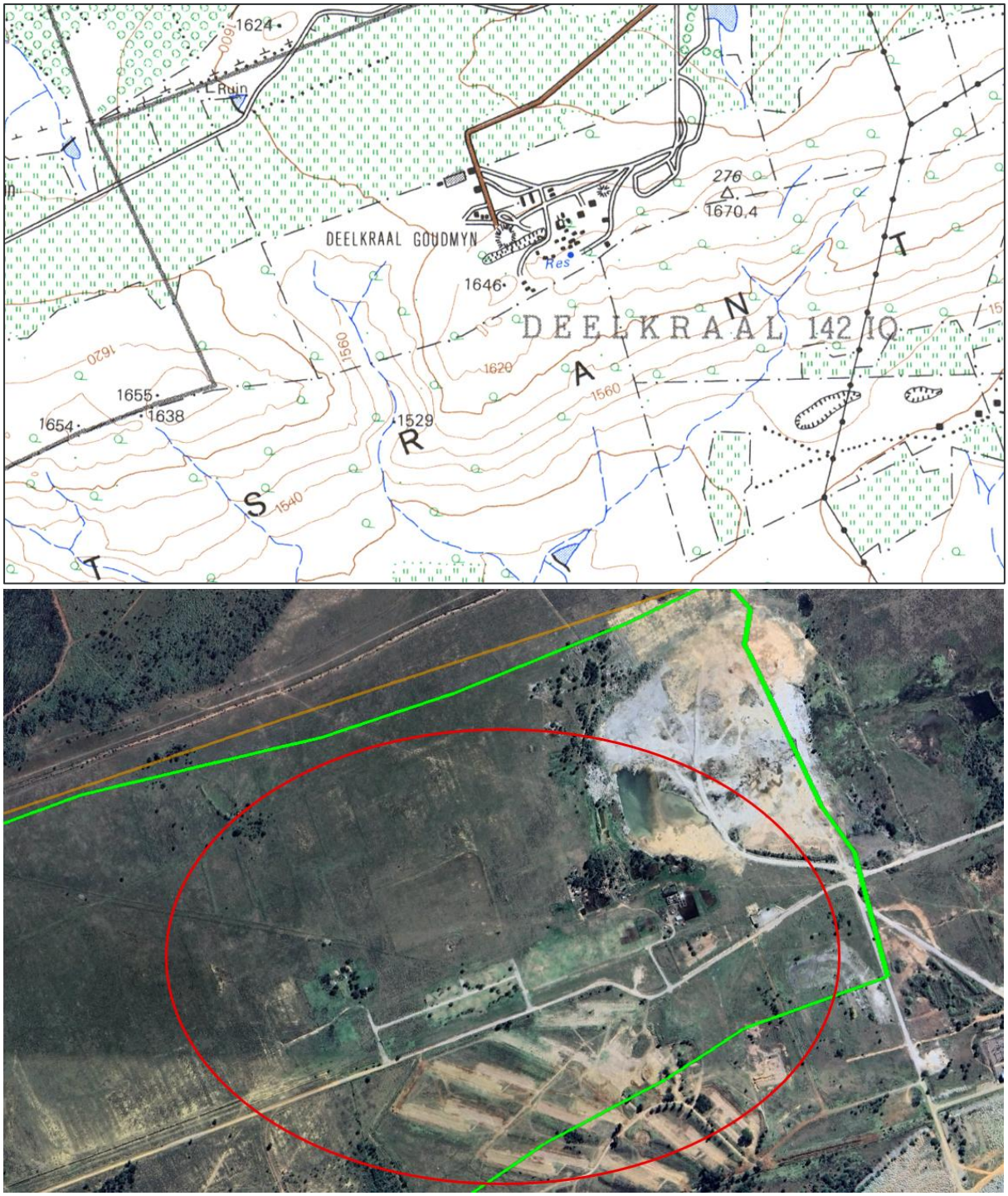


Figure 24: First edition topographic mapping and current Google Earth Satellite imagery of the remains of the Deelkraal Gold Mine complex.



Figure 25: Aerial Photograph of the Deelkraal Gold Mining Complex dated 1979.

The central section of the proposed development is associated with a number of past settlement areas according to the first edition topographic map of 1958 (Figure 26). This was corroborated by satellite imagery through which a potential site including buildings which may be of heritage significance were identified (Figure 27). Aerial photography of as early as 1938 confirmed the presence of activity in the same area, however, development of the area seems to have only taken place much later (Figure 28). The settlement itself is currently occupied by a community engaged in various farming activities in the area.

Of more importance, a grave site (WWR016) was identified on the first edition topographic map. While the feature was more than 300m away from the proposed development, the feature was noted as being of heritage significance. Through satellite imagery, it was ascertained that the grave site can be associated with at least 12 individual graves (Figure 29). The site was not visited during the field assessment as it does not intersect with the development footprint.

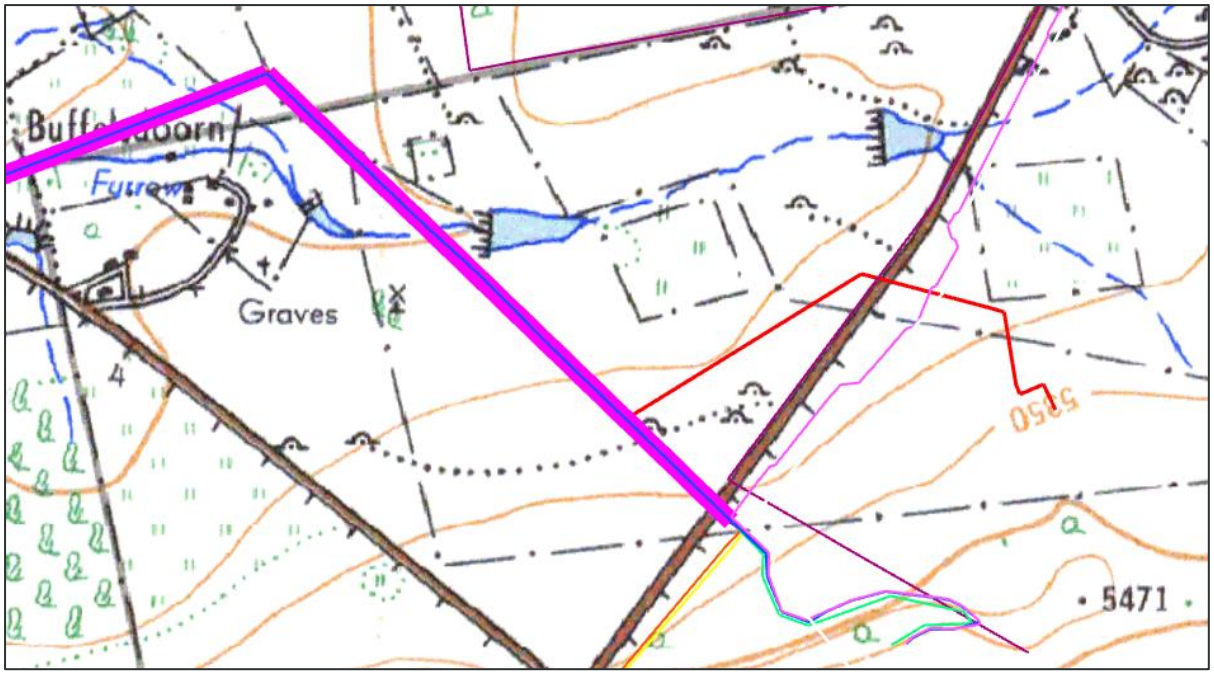


Figure 26: First Edition Topographic map dated 1958 including an overlay of the proposed pipelines (red, magenta, and blue). Note the settlements which occur around the proposed infrastructure

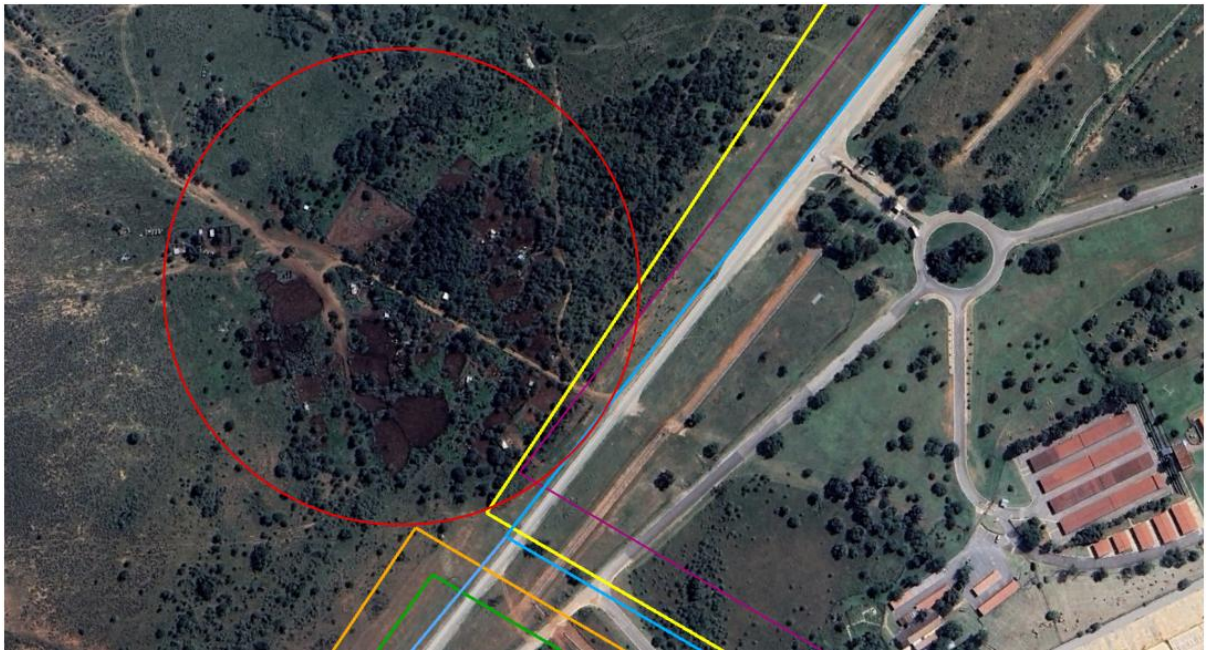


Figure 27: Some undisturbed areas and a potentially heritage sensitive area was identified corroborating findings from early topographic maps.



Figure 28: Aerial photograph dated 1955 of the site and surrounding areas. Site bordered in red. Note the patch of dense vegetation north of the site.



Figure 29: WWR016 – Satellite imagery of a grave site identified through the desktop assessment including at least 12 individual graves

Finally, some potential features around the eastern section of the project were identified in the first edition topographic maps of 1958 (Figure 30). These included buildings, ruins, farmsteads, and settlements. While the topographic maps give little information in terms of when these features were established, aerial photography provide evidence in terms of the overall development of the area. By 1968, much of the area had been

completely disturbed and many features prior to development would have been incorporated or destroyed to make way for the extensive mining infrastructure to replace it. The extent of development can be noted through the appearance of features such as the track and stadium in historical imagery of 1968 (Figure 31).

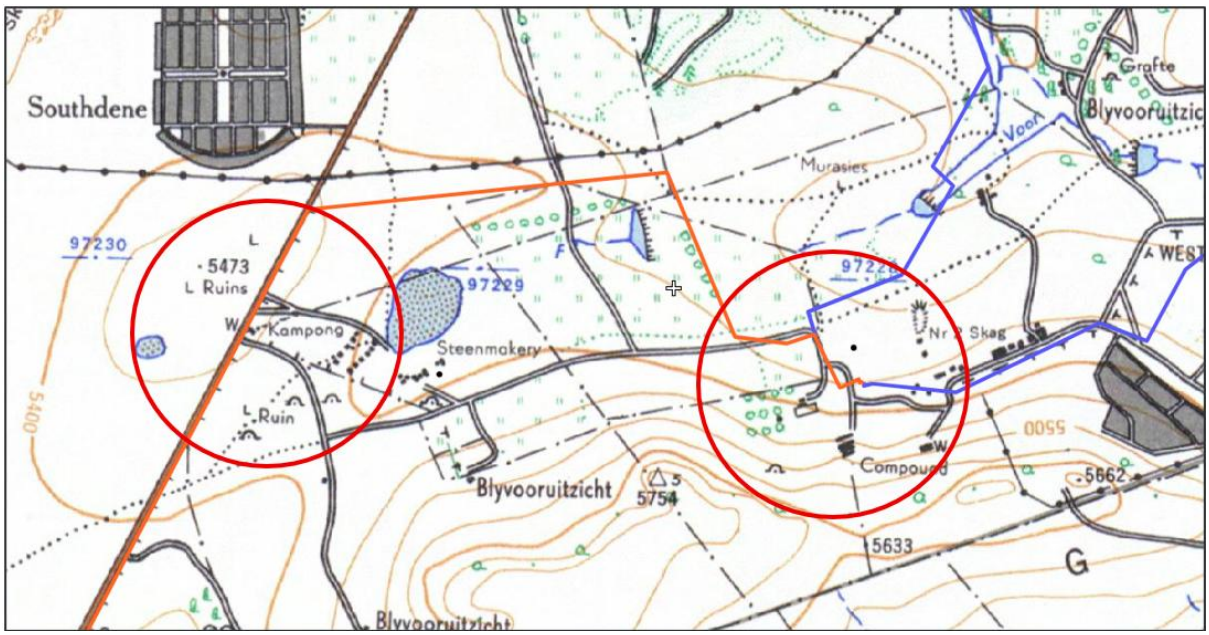


Figure 30: Buildings, ruins, farmsteads and settlements identified near eastern sections of the proposed infrastructure through an assessment of early topographic maps.



Figure 31: Track and stadium identified in early aerial photograph dated 1968 of the area.

4.2 FIELD ASSESSMENT RESULTS

The appointed Archaeologist surveyed the various areas which fall within the proposed development footprint. The survey covered the extent of the area to be developed with the intention to identify sensitivities in terms of heritage significance. Figure 32 is a map of all the areas surveyed, specifically including the paths tracked out by the Archaeologist. The field survey was conducted on two separate days during Winter.

4.2.1 GENERAL OBSERVATIONS

Given its vast extent, the area includes different land uses. For the most part, the area to be developed intersects with existing mining infrastructure. A large portion of this infrastructure is operational, with some having been decommissioned or demolished. The area also hosts groups who engage in pastoralist activities rearing cattle and goats which graze freely across the landscape. These groups have made use of some decommissioned structures as previously elaborated. Pertaining to its general heritage significance, the area does not have any inherent heritage significance. However, it must be noted that the landscape's heritage significance is defined by the history of mining in the area. Consisting of several mining operations, imposing tailings storage facilities, and mining villages, the area hosts several ruins which may be protected by the NHRA.

4.2.2 ARCHAEOLOGICAL FINDS

Four (4) finds were noted during the field assessment, most of which were not of heritage value or not conservation worthy. These included an in-situ guy stay anchor and some foundation remains (WWR017), a trigonometrical beacon structure (WWR018), a midden of contemporary material (WWR019), and a singular stone tool (WWR020). Including these finds, several of the features identified through the desktop assessment were verified, with several being confirmed as being of heritage significance.

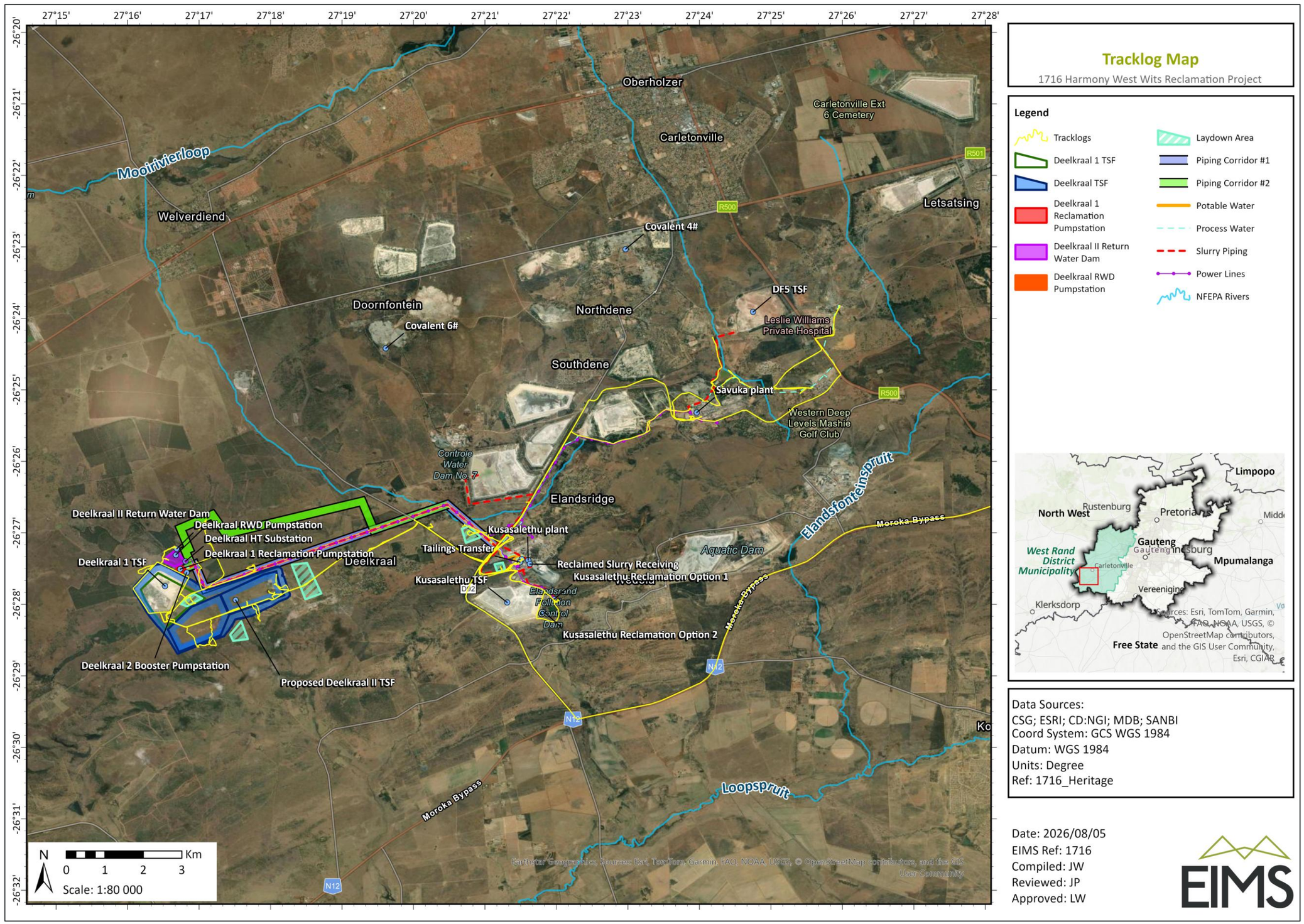


Figure 32: Map of areas surveyed and tracked.

A) STONE AGE FINDS

A single stone tool was identified during the site visit (WWR020). The tool was identified as a core including several flake removals as photographed in Figure 33. No other stone tools were identified in this area; hence it could not be concluded that the find is associated with any specific site.

The feature has been graded as being Not Conservation Worthy (NCW) given that no other finds could be identified.



Figure 33: WWR020 – A singular stone core including several flake removals

B) HISTORICAL PERIOD FINDS

The most important on-site observations made related to historical mining activities and buildings associated with the development of the landscape. Several buildings which were identified through the desktop assessment were visited, and their heritage significance confirmed. One of which was the old and abandoned stadium and track (WWR001). This site included two features, an abandoned netball stadium, and a still in use football field and grandstand. Much of the infrastructure of the stadium remains intact, albeit the entire site being overgrown (Figure 34). After engagement with Harmony officials, the age of the stadium was confirmed to have been constructed sometime during the 1950s. This suggests that the structure is currently protected by the NHRA. The feature was built for a nearby village which has since been demolished and includes key architectural features such as rafters holding grape vines which would have formed the roof of a walkway around the stadium. The stadium represents some of the last remnants of the communities which were part of the development of the mining operations of the West Wits area.

The feature sustains a Grade III A rating as a heritage feature being of High significance. This is mainly due to how well the feature has preserved over the years and the value it could impart relating to the evolution and development of the West Wits gold mining industry.



Figure 34: WWR001 – Photographs of the abandoned netball stadium

The grandstand and football field adjacent to the netball stadium was also surveyed to establish the feature's heritage significance. The grandstand appeared largely abandoned, however, the football field is maintained and used. An old turnstile and ticket office was also observed as part of the abandoned sections of the infrastructure (Figure 35). Upon assessing the interior of the building under the grandstand, a sign board was identified (Figure 36). The sign board included the logo and name of "TEBA Cash", currently renamed to Ubank. Ubank went through several rebrands since its inception in 1976. Most notably, the savings fund was renamed to Teba Bank in 1983. This suggests that the stadium reached the height of its use in the late 1970s. While this does not confirm if the feature is currently protected by the NHRA, it does provide evidence as to the age of the infrastructure.

As the grandstand and football field is still used, these features have not been graded as being of heritage significance. The feature will also not be affected by the proposed development. However, caution and further engagement with SAHRA is advised should the feature be expected to be affected by future developments.

The infrastructure associated with the above-mentioned mining village and sports facilities extended to further reaches. A firing range (WWR009) (Figure 37) and an abandoned nursery (WWR021) (Figure 38) were confirmed on site. While WWR009 was not identified as being older than 60 years, some of the infrastructure associated with WWR021 was confirmed to be protected under the NHRA. Because the buildings are in proximity to a proposed pipeline route, the feature may be impacted. Therefore, while the buildings themselves have been rated as not conservation worthy (NCW), they still remain protected by the NHRA as they are older than 60 years and should be avoided.

Other features were identified which further affirms that most of the infrastructure whether demolished, abandoned or still in operation were established in the mid to late 1970s. This was confirmed through different pieces of evidence found in left over rubble. For instance, a roof tile was identified which was partly engraved with the label "Double Roman" (Figure 39). This type of roof tile was popularised in the 1970s. This suggested that the structures which were demolished were built during this period or earlier which corroborates with desktop-based observations. WWR004 and WWR005 were identified as ruins or features in proximity to where the roof tile and associated demolished buildings were found and are two sites which will be affected by the proposed TSF development. These features are not older than 60 years and are thus not protected by the NHRA. These features, including WWR015 have been considered as structures which are not conservation worthy (NCW).

Figure 40 is a photograph of a structure associated with the WWR005.



Figure 35: WWR001 – Elements of the football stadium including grandstand and turnstile



Figure 36: WWR001 – TEBA Cash sign board found inside the grandstand building



Figure 37: WWR009 – An abandoned firing range part of the old mining infrastructure



Figure 38: WWR021 – What remains of a nursery complex which was part of past mining infrastructure



Figure 39: A broken roof tile which would have been labelled as “Double Roman” associated with sites WWR004, WWR005, and WWR015 and other demolished infrastructure



Figure 40: WWR005 – A destroyed structure associated with the overall WWR005 site

Another significant find was a trigonometrical station or a trig beacon (WWR018) (Figure 41). A trigonometrical station is used for mapping and marking of elevation, and in the past, was built as a post to allow for easier surveying of the land. This specific station or beacon exhibited features typical of early constructed markers of elevation from as early as the 1920s. One key observation which confirms the structure's age is the lack of a metal marking post on top of the beacon. Instead, the beacon allows for the mounting of heavy surveying equipment. Figure 42 is an AI-generated rendition of how the beacon would have been used for surveying purposes between the 1920s and 1930s. This beacon would have been a critically important feature for the mapping and surveying of the area and is hence considered a heritage feature of significance. The feature has therefore been rated as Grade III A or being of High heritage significance.

As final observations made on site, two sites were identified which may not be of heritage significance. The first site, WWR019, was identified as a midden of rubble or dumped and burnt material. Upon assessing some of the material, several buttons were found in what appeared to be burnt items (Figure 43). One of the buttons was labelled "OBR". OBR or "Outback Red" refers to a local sub-brand of modern denim jeans. Therefore, it is argued that the midden of material was recently dumped and burnt and holds no heritage value. The second site, WWR017, was likewise considered as a site of no heritage value. At the site, a guy stay meant for cabling was identified. The guy stay was fixed in the ground with some evidence of concrete observable. No other features were noted in the area, nor were any structures observed in proximity which may have been related to the stay. It is possible that the feature was part of rubble dumped in the area. While rated as being not conservation worthy (NCW), the development will have an impact on the site. During construction, should any associated below-surface finds be identified, a Chance Find Protocol must be followed for further study of the site.



Figure 41: WWR018 – Trigonometrical Station or Trig beacon of the 1920s to 1930s

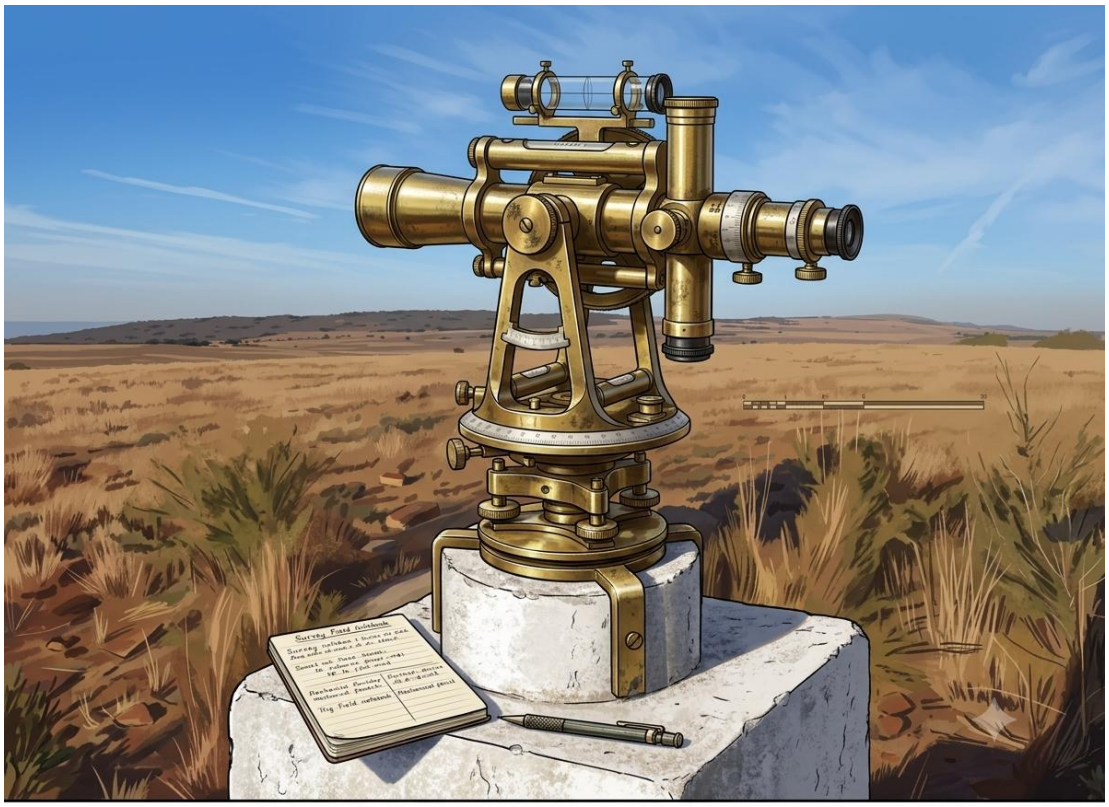


Figure 42: An AI-generated rendition of a 1930s Troughton & Simms Theodolite mounted at the top of a trigonometrical Station



Figure 43: WWR019 - Denim buttons found among what appeared to be burnt material



Figure 44: WWR017 – A guy stay identified with surrounding evidence of concrete

4.3 SUMMARY OF FINDINGS

Following a desktop assessment, 16 potential heritage features were identified in proximity and intersecting the development footprint. The field-based assessment aided in verifying the significance of these observations as well as in the identification of additional features. A total of 21 observations were made, of which 10 were confirmed to be of heritage significance. The following is a categorised description of the different potential heritage features identified:

- WWR012, WWR016 – Potential grave sites
- WWR001, WWR002, WWR007, WWR011, WWR014, WWR018, WWR021 – Structures, Abandoned buildings, mining, and farming infrastructure.
- WWR020 – Stone Age find
- WWR013 – Stone Wall Structure site

Figure 45 presents a visual summary of the different findings and their locations, including observations which were noted as not being of heritage significance, and or not being affected by the development. Table 4 provides a summary of the different observations made, including heritage features, a description of the feature, as well as the coordinates of where the features are located or associated relative central points. Highlighted in yellow are observations identified as heritage features which may be affected by the development.

Table 4: Summary of different observations and their heritage rating and significance.

Feature No.	Description	Rating and Significance	Coordinate
WWR001	Abandoned netball stadium – constructed in the 1950s – feature confirmed to be older than 60 years.	Grade III A High	26°25’22.75”S 27°23’54.54”E
WWR002	Foundation associated with demolished/decommissioned mining infrastructure. **No features of heritage significance.**	N/A	26°25’17.64”S 27°23’47.58”E
WWR003	Ruins of a mining village. Site has since been cleared. **Not affected by development.**	N/A	26°26’54.37”S 27°20’13.68”E
WWR004	~~Farm complex ruins with components potentially older than 60 years.~~ Ruin associated with demolished/decommissioned mining infrastructure. The feature is not older than 60 years. **No features of heritage significance confirmed.**	N/A	26°27'55.36"S 27°17'39.70"E
WWR005	Ruin associated with demolished/decommissioned mining infrastructure. The feature is not older than 60 years. **No features of heritage significance confirmed.**	N/A	26°27'49.96"S 27°18'3.30"E
WWR006	~~Farm building and associated property. Confirmed older than 60 years.~~ Diggings or excavations associated with surrounding mining activities. **No features of heritage significance confirmed.**	N/A	26°27'27.28"S 27°17'46.00"E
WWR007	Demolished house and other structures associated with the original Doornfontein Gold Mine – Confirmed older than 60 years. **Not affected by development.**	Grade III C Medium	26°24'39.19"S 27°19'34.11"E
WWR008	Train track plinths identified through desktop assessment. Age of feature not confirmed. Verified on site to not be of heritage significance.	N/A	26°24'19.52"S 27°25'45.72"E
WWR009	~~Ruin associated with either mining or farming activities – age not confirmed.~~ Abandoned firing range. Not older than 60 years.	N/A	26°24'51.11"S 27°24'11.89"E
WWR010	Site identified through desktop assessment. Verified on site to not be of heritage significance.	N/A	26°27'6.08"S 27°21'11.86"E
WWR011	Reservoir associated with mining or farming activities – feature older than 60 years. **Not affected by development.**	Grade III C Medium	26°24'59.24"S 27°22'25.46"E
WWR012	Confirmed and previously identified grave site – including the graves of 10 or more individual. **Not affected by development.**	Grade III A High	26°25'51.48"S 27°18'58.23"E
WWR013	Previously identified SWS. **Not affected by development.**	Grade III A High	26°26'2.46"S 27°19'12.02"E



WWR014	Farm dams and other structures associated with farming activities – Structures may be older than 60 years. **Not affected by development.**	Grade III C Medium	26°24'15.42"S 27°24'49.16"E
WWR015	Abandoned sports field and associated grandstand – constructed between 1977 and 1979 – feature is not older than 60 years but will carry heritage value at a later period. **Not affected by development.**	N/A	26°28'14.44"S 27°17'53.70"E
WWR016	Graveyard identified including at least 12 individual graves.	Grade III A High	26°26'52.54"S 27°20'29.20"E
WWR017	Guy stay anchor and other material evidence. **No features of heritage significance confirmed.**	N/A	26°28'32.62"S 27°17'8.69"E
WWR018	Trigonometrical Station or Beacon constructed for land surveying purposes between 1920-1930s – Older than 60 years. **Not affected by development.**	Grade III A High	26°27'29.96"S 27°17'39.94"E
WWR019	Rubble Midden including buttons and burnt materials. Potentially a dumping spot of occupants of the area. **No features of heritage significance confirmed.**	N/A	26°28'30.16"S 27°17'12.70"E
WWR020	Singular stone core including at least 4 flake removals. Find is not associated with any other surface finds.	NCW	26°28'26.37"S 27°17'10.65"E
WWR021	Abandoned Nursery complex. Some associated buildings older than 60 years.	NCW	26°24'57.35"S 27°24'19.62"E

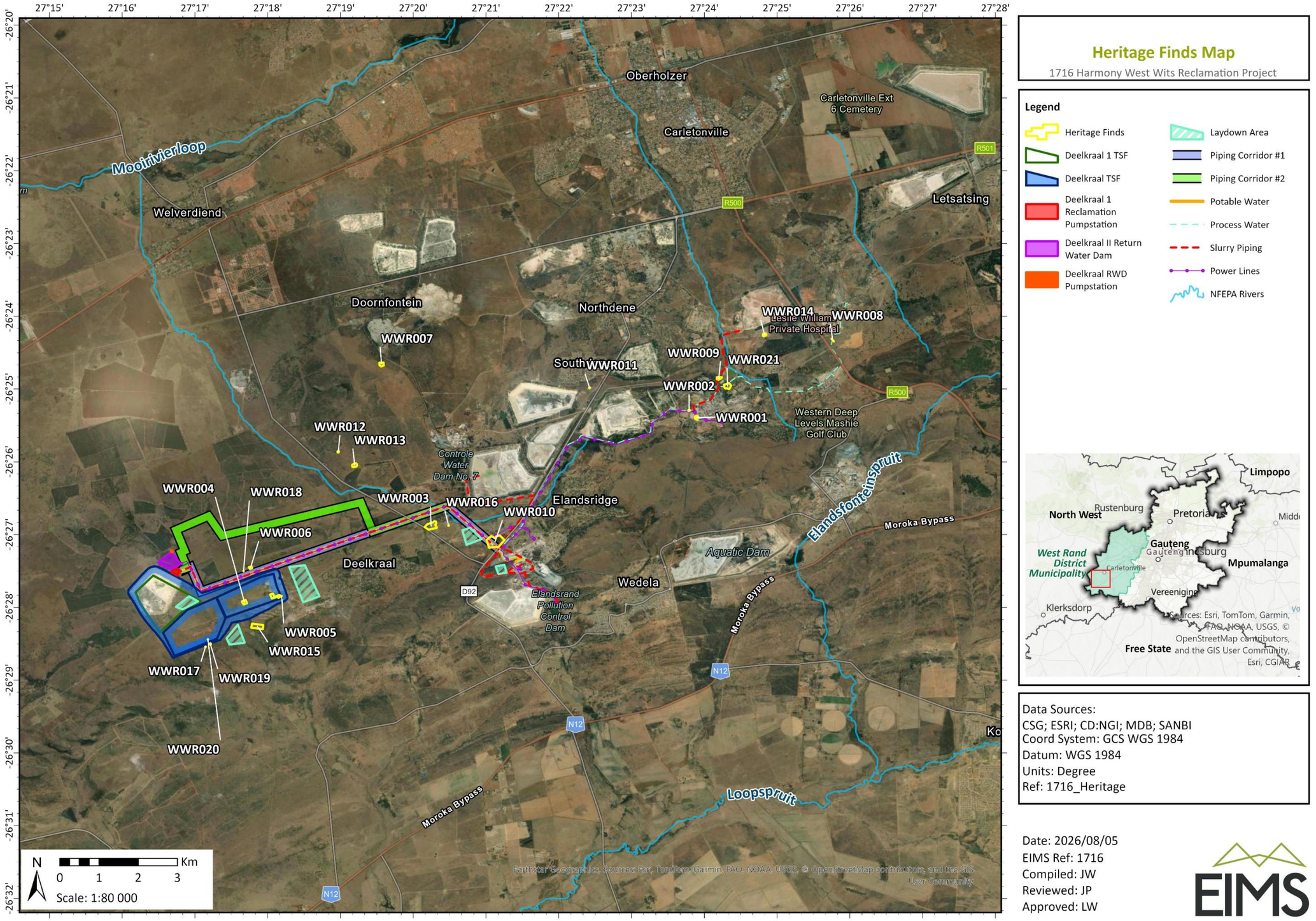


Figure 45: Map of the different finds and sites of interest identified during the field survey.

5 IMPACT ASSESSMENT

This section describes the impact assessment methodology adopted, and the impacts identified during the Heritage Impact Assessment.

5.1 IMPACT ASSESSMENT METHODOLOGY

The impact significance rating methodology, as presented herein and utilised for all EIMS Impact Assessment Projects, is guided by the requirements of the NEMA EIA Regulations 2014 (as amended). The approach may be altered or substituted on a case-by-case basis if the specific aspect being assessed requires such- such instances require prior EIMS Project Manager approval. The broad approach to the significance rating methodology is to determine the significance (S) of an environmental risk or impact by considering the consequence (C) of each impact (comprising Nature, Extent, Duration, Magnitude, and Reversibility) and relating this to the probability/ likelihood (P) of the impact occurring. The S is determined for the pre- and post-mitigation scenario. In addition, other factors, including cumulative impacts and potential for irreplaceable loss of resources, are used to determine a prioritisation factor (PF) which is applied to the S to determine the overall final significance rating (FS). The impact assessment will be applied to all identified alternatives.

The final significance (FS) of an impact or risk is determined by applying a prioritisation factor (PF) to the post-mitigation environmental significance. The significance is dependent on the consequence (C) of the particular impact and the probability (P) of the impact occurring. Consequence is determined through the consideration of the Nature (N), Extent (E), Duration (D), Magnitude (M), and Reversibility (R) applicable to the specific impact.

For the purpose of this methodology the consequence of the impact is represented by:

$$\boldsymbol{C = \frac{(E + D + M + R) * N}{4}}$$

Each individual aspect in the determination of the consequence is represented by a rating scale as defined in Table 5 below.

Table 5: Criteria for Determining Impact Consequence.

Aspect	Score	Definition
Nature	- 1	Likely to result in a negative/ detrimental impact
	+1	Likely to result in a positive/ beneficial impact
Extent	1	Activity (i.e. Highly localised, limited to the area applicable to the specific activity)
	2	Site (i.e. within the development property or site boundary, or the area within a few hundred meters of the site)
	3	Local (i.e. beyond the site boundary within the Local administrative boundary (e.g. Local Municipality) or within consistent local geographical features, or the area within 5 km of the site)
	4	Regional (i.e. Far beyond the site boundary, beyond the Local administrative boundaries within the Regional administrative boundaries (e.g. District Municipality), or extends into different distinct geographical features, or extends between 5 and 50 km from the site).
	5	Provincial / National / International (i.e. extends into numerous distinct geographical features, or extends beyond 50 km from the site).
Duration	1	Immediate (<1 year, quickly reversible)

	2	Short term (1-5 years, less than project lifespan)
	3	Medium term (6-15 years)
	4	Long term (15-65 years, the impact will cease after the operational life span of the project)
	5	Permanent (>65 years, no mitigation measure of natural process will reduce the impact after construction/ operation/ decommissioning).
Magnitude/ Intensity	1	Minor (where the impact affects the environment in such a way that natural, cultural and social functions and processes are not affected)
	2	Low (where the impact affects the environment in such a way that natural, cultural and social functions and processes are slightly affected, or affected environmental components are already degraded)
	3	Moderate (where the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; moderate improvement for +ve impacts; or where change affects area of potential conservation or other value, or use of resources).
	4	High (where natural, cultural or social functions or processes are altered to the extent that it will temporarily cease; high improvement for +ve impacts; or where change affects high conservation value areas or species of conservation concern)
	5	Very high / don't know (where natural, cultural or social functions or processes are altered to the extent that it will permanently cease, substantial improvement for +ve impacts; or disturbance to pristine areas of critical conservation value or critically endangered species)
Reversibility	1	Impact is reversible without any time and cost.
	2	Impact is reversible without incurring significant time and cost.
	3	Impact is reversible only by incurring significant time and cost.
	4	Impact is reversible only by incurring very high time and cost.
	5	Irreversible Impact.

Once the C has been determined, the significance is determined in accordance with the standard risk assessment relationship by multiplying the C and the P. Probability is rated/ scored as per Table 6.

It is noted that both environmental risks as well as environmental impacts should be identified and assessed. Environmental Risk can be regarded as the potential for something harmful to happen to the environment, and in many instances is not regarded as something that is expected to occur during normal operations or events (e.g. unplanned fuel or oil spills at a construction site). Probability and likelihood are key determinants or variables of environmental risk. Environmental Impact can be regarded as the actual effect or change that happens to the environment because of an activity and is typically an effect that is expected from normal operations or events (e.g. vegetation clearance from site development results in loss of species of concern). Typically the probability of an unmitigated environmental impact is regarded as highly likely or certain

(management and mitigation measures would ideally aim to reduce this likelihood where possible). In summary, environmental risk is about what could happen, while environmental impact is about what does happen.

Table 6: Probability Scoring.

Probability	1	Improbable (Rare, the event may occur only in exceptional circumstances, the possibility of the impact materialising is very low as a result of design, historic experience, or implementation of adequate corrective actions; <5% chance).
	2	Low probability (Unlikely, impact could occur but not realistically expected; >5% and <20% chance).
	3	Medium probability (Possible, the impact may occur; >20% and <50% chance).
	4	High probability (Likely, it is most probable that the impact will occur- > 50 and <90% chance).
	5	Definite (Almost certain, the impact is expected to, or will, occur, >90% chance).

The result is a qualitative representation of relative significance associated with the impact. Significance is therefore calculated as follows:

S = C x P

Table 7: Determination of Risk.

Consequence	5- Very High[1]	5	10	15	20	25
	4- High	4	8	12	16	20
	3- Medium	3	6	9	12	15
	2- Low	2	4	6	8	10
	1- Very low	1	2	3	4	5
		1- Improbable	2- Low	3- Medium/ Possible	4- High/ Probable	5- Highly likely/ Definite
		Probability				

The outcome of the risk assessment will result in a range of scores, ranging from 1 through to 25. These R scores are then grouped into respective classes as described in Table 8.

Table 8: Significance Classes.

S Score	Description
≤4.25	Low (i.e. where this impact is unlikely to be a significant environmental risk/ reward).
>4,25, ≤8.5	Low-Medium (i.e. where the impact could have a significant environmental risk/ reward).
>8.5, ≤13.75	High-Medium (i.e. where the impact could have a significant environmental risk/ reward).

[1] In the event that an impact or risk has very high or catastrophic consequences, but the likelihood/ probability is low, then the resultant significance would be Low-medium. This does in certain instances detract from the relative importance of this impact or risk and must consequently be flagged for further specific consideration, management, mitigation, or contingency planning.

S Score	Description
>13.75	High (i.e. where the impact will have a significant environmental risk/ reward).

The impact significance will be determined for each impact without relevant management and mitigation measures (pre-mitigation significance), as well as post implementation of relevant management and mitigation measures (post-mitigation significance). This allows for a prediction in the degree to which the impact can be managed/mitigated.

Further to the assessment criteria presented in the section above, it is necessary to assess each potentially significant impact in terms of:

1. Cumulative impacts; and
2. The degree to which the impact may cause irreplaceable loss of resources.

To ensure that these factors are considered, an impact prioritisation factor (PF) will be applied to each impacts' post-mitigation significance (post-mitigation). This prioritisation factor does not aim to detract from the significance ratings but rather to focus the attention of the decision-making authority on the higher priority/significance issues and impacts. The PF will be applied to the post-mitigation significance based on the assumption that relevant suggested management/mitigation impacts are implemented.

Table 9: Criteria for Determining Prioritisation.

Cumulative Impact (CI)	Medium (2)	Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is probable that the impact will result in spatial and temporal cumulative change.
	High (3)	Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is highly probable/ definite that the impact will result in spatial and temporal cumulative change.
Irreplaceable Loss of Resources (LR)	Low (1)	Where the impact is unlikely to result in irreplaceable loss of resources.
	Medium (2)	Where the impact may result in the irreplaceable loss (cannot be replaced or substituted) of resources but the value (services and/or functions) of these resources is limited.
	High (3)	Where the impact may result in the irreplaceable loss of resources of high value (services and/or functions).

The value for the final impact priority is represented as a single consolidated priority, determined as the sum of each individual criteria represented in Table 9. The impact priority is therefore determined as follows:

Priority = CI + LR

The result is a priority score which ranges from 2 to 6 and a consequent PF ranging from 1 to 1.5 (refer to Table 10).



Table 10: Determination of Prioritisation Factor.

Priority	Prioritisation Factor
2	1
3	1.125
4	1.25
5	1.375
6	1.5

In order to determine the final impact significance (FS), the PF is multiplied by the post-mitigation significance scoring. The ultimate aim of the PF is an attempt to increase the post mitigation environmental risk rating by a factor of 0.5, if all the priority attributes are high (i.e. if an impact comes out with a high medium environmental risk after the conventional impact rating, but there is significant cumulative impact potential and significant potential for irreplaceable loss of resources, then the net result would be to upscale the impact to a higher significance).

Table 11: Final Significance Rating.

Significance Rating	Description
<-25	**Very High (Impacts in this class are extremely significant and pose a very high environmental risk. In certain instances these may represent a fatal flaw. They are likely to have a major influence on the decision and may be difficult or impossible to mitigate. Offsets may be necessary.**
<-13.75 to -25	High negative (These impacts are significant and must be carefully considered in the decision-making process. They have a high environmental risk or impact and require extensive mitigation measures).
-8.5 to -13.75	Medium-High negative (i.e. Impacts in this class are more substantial and could have a significant environmental risk. They may influence the decision to develop in the area and require more robust mitigation measures).
<-4.25 to <-8.5	Medium- Low negative (i.e. These impacts are slightly more significant than low impacts but still do not pose a major environmental risk. They might require some mitigation measures but are generally manageable).
-1 to -4.25	Low negative (i.e. Impacts in this class are minor and unlikely to have a significant environmental risk. They do not influence the decision to develop in the area and are typically easily mitigated.
0	No impact
1 to 4.25	Low positive
>4.25 to <8.5	Medium-Low positive
8.5 to 13.75	Medium-High positive

Significance Rating	Description
>13.75	High positive

The significance ratings and additional considerations applied to each impact will be used to provide a quantitative comparative assessment of the alternatives being considered. In addition, professional expertise and opinion of the specialists (in this case, the Archaeologist) and the environmental consultants will be applied to provide a qualitative comparison of the alternatives under consideration. This process will identify the best alternative for the proposed project.

5.2 IDENTIFIED HERITAGE IMPACTS

Table 12 provides a breakdown of the potential and incurred impacts identified through this assessment, considering the above-cited and adopted methodology.

As described in previous sections, finds include the identified 10 heritage features. These included abandoned and destroyed buildings, grave sites, and previously identified SWS. While many of these features only occur in proximity to the development, they have been considered while assessing in what ways they may be affected by the proposed project.

Three features confirmed to be of heritage significance will be affected by the proposed development. WWR020, which was identified as a single stone tool, will be disturbed or destroyed by the proposed TSF. As no associated site was identified, the disturbance of the single stone tool, being rated as a feature NCW, will have a Low impact on the heritage significance of the overall landscape. WWR001 and WWR021 were both identified as structures initially part of the early development and evolution of the West Wits gold mining industry. Both structures are in proximity of proposed pipelines and may be affected. While WWR021 or the old nursery was rated as being NCW, the well-preserved integrity of WWR001, the netball stadium, holds heritage value related to the nearby demolished mining village. As a feature rated as Grade III A, or being of High heritage significance, mitigations must be considered.

Considering other features of High heritage significance which may be in proximity of the proposed activities, it is here proposed that buffers be placed around each of these features, with proposed activities not taking place within 30 meters of the buildings or structures, and 50 meters of the grave sites. It is here argued that the features should be avoided. The impact assessment methodology has therefore been applied considering scenarios where the proposed activities would impact identified features.

While the features identified represent markers of heritage significance (in particular, ruins and graves), the occurrence of below-ground heritage finds may be possible. For this reason, as a mitigation measure proposed, a Heritage Finds or Chance Find Procedure for addressing heritage finds must be adopted as part of construction processes. Should finds of an alarming significance, for example, a grave or high density of small finds be discovered during construction, this procedure will inform the next steps taken to ensure the documentation of these finds, and further action to be taken should a heritage professional deem necessary.

Altogether, post-mitigation of the identified heritage impacts is rated a Medium to Low Negative, given that the impacts can be avoided, and the potential for a heritage procedure to allow for the documentation, recording, and further assessment of undiscovered finds and sites. A heritage procedure can present opportunity to limit the impact of development on heritage finds to construction activities, with the potential to document and further assess finds should they be related to broader sites. This ultimately presents opportunity to reverse the adverse effects of development of heritage finds, given that their value can be evaluated through documentation. This also presents opportunity to better understand the heritage significance of the area to be developed.

Table 12: Archaeological Impact Assessment

Impact Description				Pre-Mitigation									Post Mitigation									Priority Factor Criteria				
Identifier	Impact	Alternative	Phase	Pre-Nature	Pre-Extent	Pre-Duration	Pre-Magnitude	Pre-Reversibility	Consequence	Pre-Probability	Pre-mitigation Significance Score	Pre-Mitigation Significance	Post-Nature	Post-Extent	Post-Duration	Post-Magnitude	Post-Reversibility	Consequence	Post-Probability	Post-mitigation Significance Score	Post-Mitigation Significance2	Confidence	Cumulative Impact	Irreplaceable loss	Priority Factor	Final Score	Final Score Significance
WWR021 – Singular stone tool	Destruction or disturbance of single stone tool	Alternative 1	Construction	-1	1	1	1	2	-1,25	**4**	-5	Medium to low -	-1	1	1	1	2	-1,25	**4**	-5	Medium to low -	High	**1**	**2**	1,13	-5,63	Medium to low -
WWR001 and WWR022 Historic Structures	Destruction of disturbance of structures older than 60 years	Alternative 1	Construction	-1	2	5	2	2	-2,75	2	-5,5	Medium to low -	-1	1	5	1	2	-2,25	1	-2,25	Low -	Medium	2	1	1,13	-2,53	Low -
Unidentified below-ground heritage features (U)	Destruction or disturbance of undiscovered below-ground heritage features.	Alternative 1	Construction	-1	1	5	4	5	-3,75	3	-11,25	Medium to low -	-1	1	1	2	3	-1,75	3	-5,25	Medium to low -	Medium	1	2	1,13	-5,91	Medium to low -

6 RECOMMENDATIONS AND MITIGATIONS

Considering the Impact Assessment above, the following presents a list of mitigations proposed in light of the identified impacts.

6.1 SITE-SPECIFIC RECOMMENDATIONS AND MITIGATIONS

Table 14 and Table 14 provide a breakdown of recommendations and mitigations to be considered for inclusion in the EMPr related to this project. These mitigations are associated with construction phase which may involve clearing of land for the proposed infrastructure, leading to the potential disturbance of heritage. Firstly, mitigation measures here advise for the avoidance of identified heritage features at risk considering a 30-meter buffer for historic buildings, and 50-meter buffer for graves. Further, the mitigation measures recommended serve to address the potential of further discoveries advising for the implementation or recognition of a heritage protocol and chance find procedure as contemplated in Section 6.3.

Table 13: List of site-specific mitigations and recommendations

Impact	Phase	Pre-mitigation Impact	Post-mitigation impact	Final Significance
Destruction or disturbance of single stone tool	Construction	Medium to low -	Medium to low -	Medium to low -
Mitigation Measures				
No mitigation required as site is Not Conservation Worthy (NCW)				
Destruction of disturbance of structures older than 60 years (WWR001 and WWR021)	Construction	Medium to low -	Low -	Low -
Mitigation Measures				
• Sites must be avoided to prevent disturbance of features protected by the NHRA • Existing pipeline routes should be used where possible				
Destruction or disturbance of undiscovered below-ground heritage features.	Construction	Medium to low -	Medium to low -	Medium to low -
Mitigation Measures				
A Heritage Procedure is advised to be followed should additional heritage finds or sites be encountered.				

Table 14: Table of mitigations to be included in the EMPr

Activities	Phase	Impact	Mitigation Measures / Management Actions	Compliance with Standards	Time Period for Implementation
Clearing of land for the proposed infrastructure (various pipelines, TSFs, and Return Water Dams)	Construction	Destruction or disturbance of single stone tool	• No mitigation required as site is Not Conservation Worthy (NCW)	NHRA and SAHRA Minimum Standards (2007)	N/A
		Destruction of disturbance of structures older than 60 years	• Sites must be avoided to prevent disturbance of features protected by the NHRA • Existing pipeline routes should be used	NHRA	During construction activities
		Other heritage features identified	• Identified heritage sites must be avoided considering a buffer of 30 meters. • Graves must be avoided considering a buffer of 50 meters.	NHRA and SAHRA Minimum Standards (2007)	Construction and Operation
		Unidentified below-ground heritage features (U)	• A Chance Find Procedure is advised to be followed should additional heritage finds or sites be encountered.	NHRA	During construction activities

6.2 OVERALL RECOMMENDATIONS

The landscape holds heritage particularly in relation to the development of the West Wits gold mining industry. Several of the observed features are not older than 60 years, and therefore not protected by the NHRA. The features, particularly the buildings intersecting with pipeline routes should be avoided. It is here recommended that existing pipeline routes be utilised and, where not possible, the structures themselves be avoided. As a key overall recommendation, the developer is reminded to remain cognisant of the potential to discover unidentified above-ground and below-ground finds and sites. Upon discovery of any additional heritage finds of an alarming significance, example, grave or high density of small finds, a Heritage Finds or Chance Find Procedure should be followed.

6.3 HERITAGE PROTOCOL AND CHANCE FINDS

A heritage procedure is applicable where finds are identified during the initiation of the proposed activities. This procedure is guided by the NHRA but should correspond with the overall EMPr drafted for the development. The following is a guideline on how a Heritage or Chance Find Procedure can be structured:

- In the event of a chance find which appears of significant value to the lay person, all development activities must be temporarily halted.
- Finds should not be displaced. Instead, their location should be recorded, and a short description prepared for further evaluation to follow.



- A qualified Archaeologist must be consulted, firstly to record the find and evaluate its heritage significance, reporting observations to the heritage authority. The Archaeologist should provide recommendations on how to approach the finds moving forward. This may include recommendations for the mitigation of impacts on the heritage resources in question.
- Should the Archaeologist recommend, development can resume following the application of recommendations and mitigation measures.
- Alternatively, the Archaeologist may advise towards the application for heritage permits from the heritage authority in the event of unavoidable disturbance, relocation, or the need for Phase 2 mitigation.

The above should act as a brief guideline which should form an intrinsic element of current or future Heritage Procedures or Protocols adopted by the developer of the project in question.

7 CONCLUSION AND IMPACT STATEMENT

This report was prepared as part of a Phase 1 Heritage Impact Assessment for the proposed Harmony West Wits Reclamation and Deposition Project. As part of this assessment, a desktop baseline assessment as well as an on-site field assessment of heritage impacts was conducted.

Through the methodology adopted as part of this assessment, heritage features were identified which can all be avoided during the implementation of the proposed activities. Apart from unassessed chance finds, a Medium to Low impact on heritage features can be expected should the proposed mitigation measures be followed. Therefore, from an Archaeological perspective, the development will not have any significant foreseeable impacts and can proceed as long as the recommended mitigation measures are implemented.

8 REFERENCES

Backwell, L. *et al.* (2023) "Border Cave, South Africa," in, pp. 1297–1310. Available at: https://doi.org/10.1007/978-3-031-20290-2_84.

Calabrese, J.A. (2000) "Metals, Ideology and Power: The Manufacture and Control of Materialised Ideology in the Area of the Limpopo-Shashe Confluence, c.AD 900 to 1300," *Goodwin Series*, 8, pp. 100–111. Available at: https://doi.org/10.2307/3858051.

Cawthorn, R.G. (2010) "The Platinum Group Element Deposits of the Bushveld Complex in South Africa," *Platinum Metals Review*. Johnson Matthey. Available at: https://doi.org/10.1595/147106710X520222.

Chazan, M. *et al.* (2012) "The Oldowan horizon in Wonderwerk Cave (South Africa): Archaeological, geological, paleontological and paleoclimatic evidence," *Journal of Human Evolution*, 63(6), pp. 859–866. Available at: https://doi.org/10.1016/j.jhevol.2012.08.008.

Chirisa, I. and Matamanda, A. (2019) "Forces shaping urban morphology in Southern Africa Today: unequal interplay among people, practice and policy," *Journal of Urbanism: International Research on Placemaking and Urban Sustainability*, 12(3), pp. 354–372. Available at: https://doi.org/10.1080/17549175.2019.1626262.

Davids, A. (2018) *Afrikaans van die Kaapse Moslems*. Western Cape: Taal Museum.

Delius, P., Maggs, T. and Schoeman, M. (2012) "Bokoni: Old Structures, New Paradigms? Rethinking Pre-colonial Society from the Perspective of the Stone-Walled Sites in Mpumalanga," *Journal of Southern African Studies*, 38(2), pp. 399–414. Available at: https://doi.org/10.1080/03057070.2012.682841.

Durand, J.F. (2012) "The impact of gold mining on the Witwatersrand on the rivers and karst system of Gauteng and North West Province, South Africa," *Journal of African Earth Sciences*, 68, pp. 24–43. Available at: https://doi.org/10.1016/j.jafrearsci.2012.03.013.

d'Errico, F. *et al.* (2012) "Early evidence of San material culture represented by organic artifacts from Border Cave, South Africa," *Proceedings of the National Academy of Sciences*, 109(33), pp. 13214–13219. Available at: https://doi.org/10.1073/pnas.1204213109.

Favreau, J. (2023) "Sourcing Oldowan and Acheulean stone tools in Eastern Africa: Aims, methods, challenges, and state of knowledge," *Quaternary Science Advances*, 9, p. 100068. Available at: https://doi.org/10.1016/j.qsa.2022.100068.

FORSSMAN, T.R. *et al.* (2010) "A LATER STONE AGE ASSEMBLAGE FROM CANTEEN KOPJE, NORTHERN CAPE," *The South African Archaeological Bulletin*, 65(192), pp. 204–214.

Gribble, J. (2002) "Past, Present, and Future of Maritime Archaeology in South Africa," in C.V. Ruppé and J.F. Barstad (eds.) *International Handbook of Underwater Archaeology*. Boston, MA: Springer US, pp. 553–567. Available at: https://doi.org/10.1007/978-1-4615-0535-8_33.

Hall, M. (1993) "The Archaeology of Colonial Settlement in Southern Africa," *Annual Review of Anthropology*, 22, pp. 177–200.

Harrison, P. and Zack, T. (2012) "The power of mining: the fall of gold and rise of Johannesburg," *Journal of Contemporary African Studies*, 30(4), pp. 551–570. Available at: https://doi.org/10.1080/02589001.2012.724869.

Henshilwood, C.S. (2012) "Late Pleistocene Techno-traditions in Southern Africa: A Review of the Still Bay and Howiesons Poort, c. 75–59 ka," *Journal of World Prehistory*, 25(3), pp. 205–237. Available at: https://doi.org/10.1007/s10963-012-9060-3.

Huffman, T.N. (1982) "Archaeology and ethnohistory of the African Iron Age," *Annual review of Anthropology*, pp. 133–150.

Huffman, T.N. (1989) “Ceramics, settlements and Late Iron Age migrations,” *African Archaeological Review*, 7(1), pp. 155–182. Available at: https://doi.org/10.1007/BF01116842.

Huffman, T.N. (2000) “Mapungubwe and the Origins of the Zimbabwe Culture,” *Goodwin Series*, 8, pp. 14–29. Available at: https://doi.org/10.2307/3858043.

Huffman, T.N. (2002) “Regionality in the Iron Age: the case of the Sotho-Tswana,” *Southern African Humanities*, 14, pp. 1–22.

Huffman, T.N. (2004) “The archaeology of the Nguni past,” *Southern African Humanities*, 16(1), pp. 79–111.

Huffman, T.N. (2007) *Handbook to the Iron Age: The Archaeology of Pre-colonial Farming Societies in Southern Africa*. Scottville: University of KwaZulu-Natal Press.

Huffman, T.N. (2009) “Mapungubwe and Great Zimbabwe: The origin and spread of social complexity in southern Africa,” *Journal of Anthropological Archaeology*, 28(1), pp. 37–54. Available at: https://doi.org/10.1016/j.jaa.2008.10.004.

Jacobs, Z. *et al.* (2008) “Ages for the Middle Stone Age of southern Africa: implications for human behavior and dispersal,” *Science*, 322(5902), pp. 733–735.

James, L. (2018) *Plants of the walls: Studying the relationship between plants and stone walls of the Klipriviersberg Nature Reserve*. Unpublished Honour’s Research Report. University of the Witwatersrand.

Klein, R.G. (2000) “The earlier stone age of southern Africa,” *The South African Archaeological Bulletin*, pp. 107–122.

Kuman, K. *et al.* (2018) “The Oldowan industry from Swartkrans cave, South Africa, and its relevance for the African Oldowan,” *Journal of Human Evolution*, 123, pp. 52–69. Available at: https://doi.org/10.1016/j.jhevol.2018.06.004.

Kuman, K. and Gibbon, R.J. (2018) “The Rietputs 15 site and Early Acheulean in South Africa,” *New perspectives on Acheulean and Acheulean-like adaptations*, 480, pp. 4–15. Available at: https://doi.org/10.1016/j.quaint.2016.12.031.

Leakey, M.D. (1971) *Olduvai Gorge: Volume 3, excavations in beds I and II, 1960-1963*. Cambridge University Press.

Li, H. *et al.* (2018) “Handaxes in South Africa: Two case studies in the early and later Acheulean,” *New perspectives on Acheulean and Acheulean-like adaptations*, 480, pp. 29–42. Available at: https://doi.org/10.1016/j.quaint.2016.08.025.

Maggs, T. (1976) “Iron age patterns and Sotho history on the southern Highveld: South Africa,” *World Archaeology*, 7(3), pp. 318–332. Available at: https://doi.org/10.1080/00438243.1976.9979644.

Markell, A., Hall, M. and Schrire, C. (1995) “The historical archaeology of Vergelegen, an early Farmstead at the Cape of Good Hope,” *Historical Archaeology*, 29(1), pp. 10–34. Available at: https://doi.org/10.1007/BF03374206.

Mesfin, I.I. (2024) “The Knapping of Quartz Crystals during the Later Stone Age at Matupi Cave, Ituri Province, Democratic Republic of Congo,” *Lithic Technology*, 49(1), pp. 41–62. Available at: https://doi.org/10.1080/01977261.2023.2188342.

Meyer, A. (2000) “K2 and Mapungubwe,” *Goodwin Series*, 8, pp. 4–13. Available at: https://doi.org/10.2307/3858042.

Mitchell, P. (2012) “San origins and transition to the Later Stone Age: New research from Border Cave, South Africa,” *South African Journal of Science*, 108(11/12), p. 2 pages.

Mitchell, P. and Whitelaw, G. (2005) “THE ARCHAEOLOGY OF SOUTHERNMOST AFRICA FROM c. 2000 BP TO THE EARLY 1800s: A REVIEW OF RECENT RESEARCH,” *The Journal of African History*. 2005/07/01 ed, 46(2), pp. 209–241. Available at: https://doi.org/10.1017/S0021853705000770.

Morrissey, P., Mentzer, S.M. and Wurz, S. (2022) “A Critical Review of the Stratigraphic Context of the MSA I and II at Klasies River Main Site, South Africa,” *Journal of Paleolithic Archaeology*, 5(1), p. 5. Available at: https://doi.org/10.1007/s41982-022-00110-2.

Penn, N. (2005) *The Forgotten Frontier: Colonist and Khoisan on the Cape’s Northern Frontier in the 18th Century*. Ohio University Press (The Forgotten Frontier: Colonist and Khoisan on the Cape’s Northern Frontier in the 18th Century). Available at: https://books.google.co.za/books?id=-gX2QTfSkMMC.

Pistorius, J.C. (1999) “Spatial identity and expressions in a stone walled complex on Kroondal,” *South African Journal of Ethnology*, 22(3), pp. 116–128.

Sadr, K. (2012) “The origins and spread of dry laid, stone-walled architecture in pre-colonial southern Africa,” *Journal of Southern African Studies*, 38(2), pp. 257–263.

SADR, K. and MSHUQWANA, F. (2020) “KWENENG,” *The South African Archaeological Bulletin*, 75(212), pp. 75–86.

Sadr, K. and Rodier, X. (2012) “Google Earth, GIS and stone-walled structures in southern Gauteng, South Africa,” *Journal of Archaeological Science*, 39(4), pp. 1034–1042. Available at: https://doi.org/10.1016/j.jas.2011.11.024.

Stollhofen, H. *et al.* (2021) “Olduvai’s oldest Oldowan,” *Journal of Human Evolution*, 150, p. 102910. Available at: https://doi.org/10.1016/j.jhevol.2020.102910.

Thompson, L.M. (2001) *A history of South Africa*. Yale University Press.

Turrell, R.V. (1987) *Capital and labour on the Kimberley diamond fields, 1871-1890*. Cambridge University Press.

Van Eeden, E.S. (1998) “The effect of mining development on the cultural experience of the Carlentonville community,” *South African Journal of Cultural History*, 12(1), pp. 75–89.

Villa, P. *et al.* (2009) “The still bay points of Blombos cave (South Africa),” *Journal of Archaeological Science*, 36(2), pp. 441–460.

Villa, P. *et al.* (2012) “Border Cave and the beginning of the Later Stone Age in South Africa,” *Proceedings of the National Academy of Sciences*, 109(33), pp. 13208–13213. Available at: https://doi.org/10.1073/pnas.1202629109.

Wadley, L. (2015) “Those marvellous millennia: the Middle Stone Age of Southern Africa,” *Azania: Archaeological Research in Africa*, 50(2), pp. 155–226. Available at: https://doi.org/10.1080/0067270X.2015.1039236.

Werz, B.E.J.S. (2010) “SUB-SAHARAN AFRICA’S OLDEST SHIPWRECK: HISTORICAL-ARCHAEOLOGICAL RESEARCH OF AN EARLY MODERN-ERA PORTUGUESE MERCHANTMAN ON THE NAMIBIAN COAST,” *The Mariner’s Mirror*, 96(4), pp. 430–442. Available at: https://doi.org/10.1080/00253359.2010.10657159.

Woodborne, S., Pienaar, M. and Tiley-Nel, S. (2009) “Dating the Mapungubwe Hill Gold,” *Journal of African Archaeology*, 7(1), pp. 99–105. Available at: https://doi.org/10.3213/1612-1651-10122.

Worger, W.H. (1987) *South Africa’s city of diamonds: mine workers and monopoly capitalism in Kimberley, 1867-1895*. New Haven: Yale University Press (!821530038!Yale historical publications, Miscellany), p. 330.

Wurz, S. (2002) “Variability in the Middle Stone Age Lithic Sequence, 115,000–60,000 Years Ago at Klasies River, South Africa,” *Journal of Archaeological Science*, 29(9), pp. 1001–1015. Available at: https://doi.org/10.1006/jasc.2001.0799.



Appendix 1: CV of the Archaeologist



Appendix 2: Specialist Declaration