

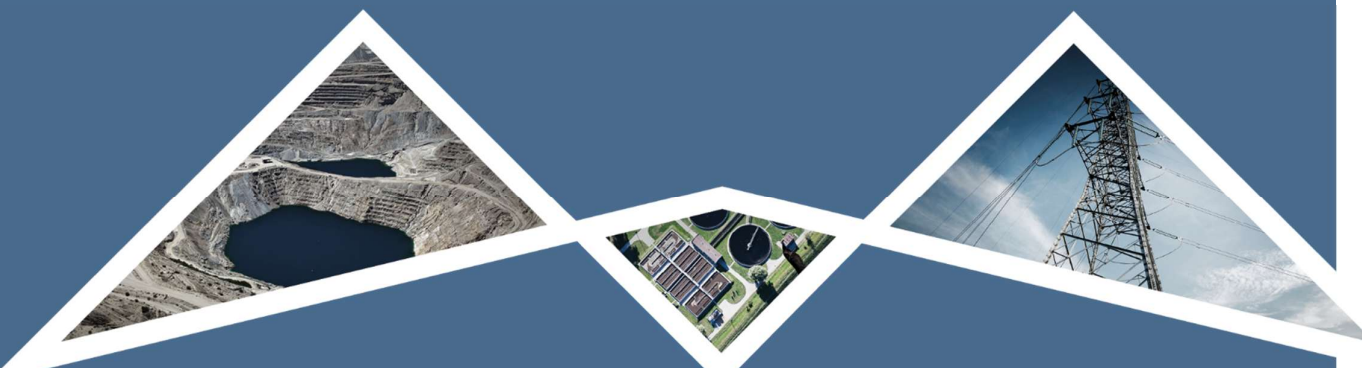


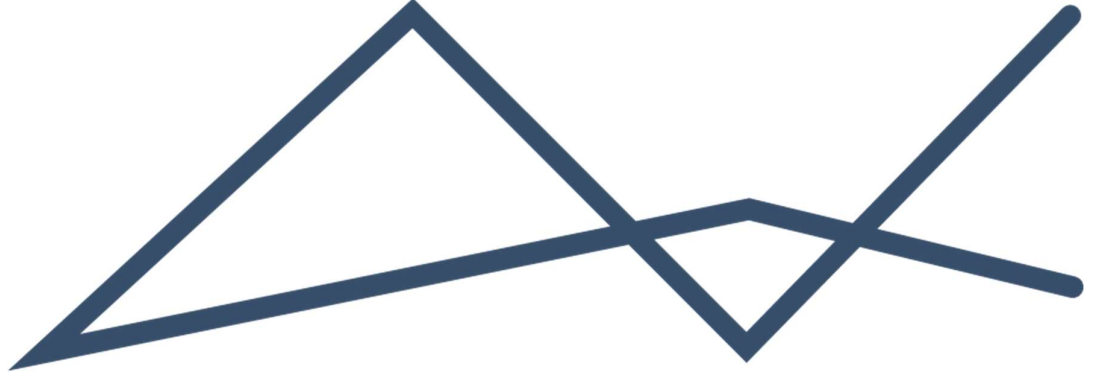
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AQUA FARMING DROOGFONTEIN PIVOT AGRICULTURE

PHASE 1 DESKTOP HERITAGE IMPACT ASSESSMENT REPORT





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Appendices

Appendix 1: CV of the Archaeologist

Appendix 2: Specialist Declaration



Abbreviations

AD	<i>Anno Domini</i>
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
DMR	Department of Mineral Resources
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	Mineral and Petroleum Resources Development Act
MSA	Middle Stone Age
NEMA	National Environmental Management Act
NHRA	National Heritage Resources Act
SAHRA	South African Heritage Resources Agency
SAHRIS	South African Heritage Resources Information System
ya	Years ago



Executive Summary

The project will involve the development of agricultural activities on the following properties: Portion 16 of the the farms Farm Droogfontein 62 portion 16, Farm Portion 2 of the Farm Eerste Aanleg 50, portion 2, the remainder of the Farm Bulpan 51 the remainder portion and Farm and the remainder of the Farm Witpan 52. The applicant (Aqua Farming (Pty) Ltd) plans to develop approximately 33 new pivots that will require the clearance of approximately 1050 ha of indigenous vegetation in total, primarily for the growing of potatoes. The development of these pivots will occur in phases/seasons over the course of 7 years. With each phase/season, approximately 175 Ha will be cleared for the pivots. Therefore, after approximately 7 years a total of 1050 Ha will have been cleared. Crop rotation will be done thereafter by planting potatoes, onions, Sorghum Sudan grass or Smuts finger grass, followed by a fallow period where livestock will be allowed to graze on the pivots systematically.

The irrigation water will be sourced from the Vaal River. The current existing water use licence allows for the abstraction of 519 152 m³/annum from the Vaal River, however, the licence will need to be amended to include the additional farms and farm portions designated for irrigation activities. An additional 500 000m³/annum volume of water is required to irrigate the pivot farms to be developed over the course of 7 years. A buffer dam will also be constructed to store 50 000 m³ of water. Environmental Impact Management Services (Pty) Ltd (EIMS) has been appointed by Aqua Farming (Pty) Ltd as the Environmental Assessment Practitioner (EAP) to assist with undertaking the required authorisation processes including the conducting of an Environmental Impact Assessment which includes this Heritage Impact Assessment.

A comprehensive assessment was conducted to evaluate the potential impact of the project on archaeological and heritage resources. The study included a literature review, desktop assessment, and a 3-day field survey.

Through a desktop investigation, a potential grave site of the late 1900s was identified, which corresponds with a small farm portion along the northern border of the farm Witpan 52. This site is approximately 30 meters from proposed activities. A 50-meter buffer has been further recommended around Witpan 52 Portion 1, to ensure that the grave that may be located within the property is in no way affected by the proposed development and its activities. Other finds and objects of interest were identified in the area proposed for the irrigation system on site include an LSA site and several isolated lithic finds. Although these finds have been considered to be of heritage significance, they will not be affected by the proposed activities. Other finds included 20th century glass fragments as well as a metal plate with inscriptions on it dating back as early as 1973. These finds are not considered to be of heritage significance. A grave site was also identified to the South of the area of interest. The graves were unmarked, and therefore their age was indeterminable. Nevertheless, considering a buffer of 50 meters around the grave site itself, proposed activities will not be in proximity to the graves as planning has taken their presence into account.

The construction activities could affect the potential grave site being about 40 meters from the property Witpan 52 Portion 1, however, the impact is mitigatable through the measures proposed. A Chance Find Procedure is recommended to manage any further discoveries during development should finds be discovered during the proposed activities. This includes halting activities if significant finds are discovered, recording their location, and consulting a qualified archaeologist for further evaluation.

Apart from the grave which is potentially located on farm Witpan 52 Portion 1, and which can be avoided, no other significant heritage resources were identified. As long as the proposed mitigation measures are implemented there should be no significant heritage impacts. Therefore, from an Archaeological perspective, the development will not have significant foreseeable impacts.



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

The project will involve the development of agricultural activities on the following properties: Portion 16 of the the farms Farm Droogfontein 62 portion 16, Farm Portion 2 of the Farm Eerste Aanleg 50, portion 2, the remainder of the Farm Bulpan 51 the remainder portion and Farm and the remainder of the Farm Witpan 52. The applicant, Aqua Farming (Pty) Ltd, plans to develop approximately 33 new pivots that will require the clearance of approximately 1050 ha of indigenous vegetation in total, primarily for the growing of potatoes. The development of these pivots will occur in phases/seasons over the course of 7 years. With each phase/season, approximately 175 Ha will be cleared for the pivots. Therefore, after approximately 7 years a total of 1050 Ha will have been cleared. Crop rotation will be done thereafter by planting potatoes, onions, Sorghum Sudan grass or Smuts finger grass, followed by a fallow period where livestock will be allowed to graze on the pivots systematically.

The irrigation water will be sourced from the Vaal River. The current existing water use licence allows for the abstraction of 519 152 m³/annum from the Vaal River, however, the licence will need to be amended to include the additional farms and farm portions designated for irrigation activities. An additional 500 000m³/annum volume of water is required to irrigate the pivot farms to be developed over the course of 7 years. A buffer dam will also be constructed to store 50 000 m³ of water.

The proposed project is located approximately 20 km North from Kimberley, on Farms Bulpan 51 remainder of portion, Witpan 52 remainder of portion, Eerste Aan Leg 50 portion 2, and Droogfontein 62 portions 16, in the Sol Plaatje Local Municipality, Frances Baard District Municipality, Northern Cape Province. See Figure 1 for Locality Map.

1.2 HERITAGE SPECIALIST DETAILS

As prescribed by the SAHRA 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 as a Candidate EAP. 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)

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.

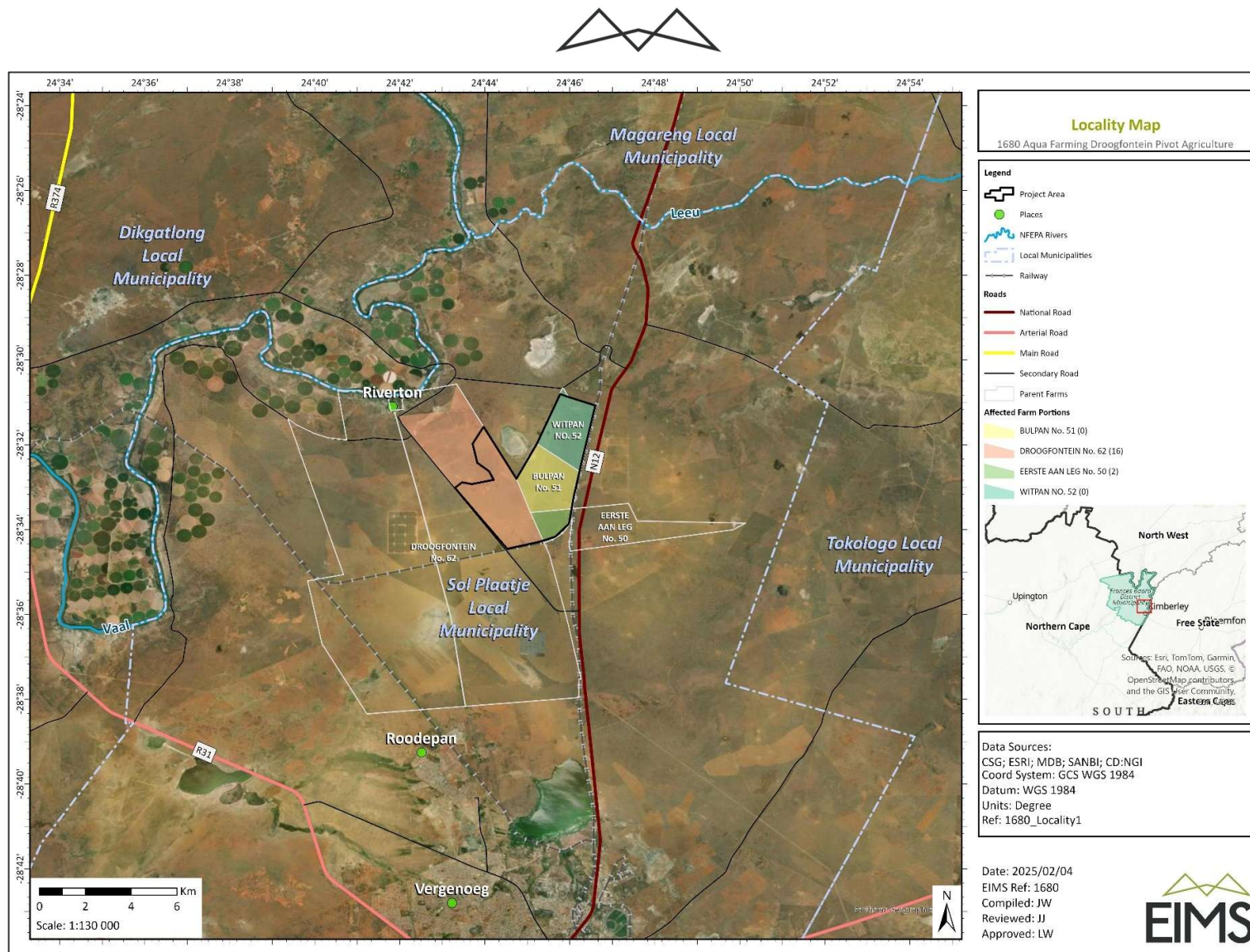


Figure 1: Locality Map



The MPRDA also gives effect to the NHRA as this Act defines ‘environment’ as it is in the NEMA and, therefore, acknowledges cultural resources as part of the environment. Section 39(3)(b) of this Act specifically refers to the evaluation, assessment and identification of impacts on all heritage resources as identified in Section 3(2) of the NHRA that are to be impacted on by activities governed by the MPRDA. Section 40 of the MPRDA requires the consultation with any State Department administering any law that has relevance on such an application through Section 39 of the MPRDA. This implies the evaluation of Heritage Assessment Reports in Environmental Management Plans or Programmes by the relevant heritage authorities.

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).

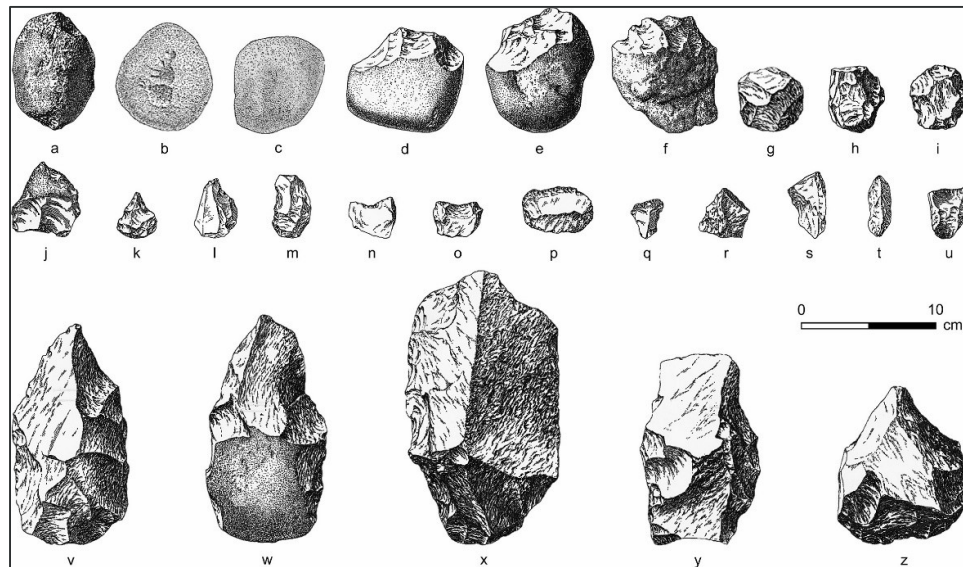


Figure 2: Examples of ESA lithics. Typical Oldowan tools (a-f). Acheulean LCTs (v-z) (after Kuman and Gibbon, 2018).

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.

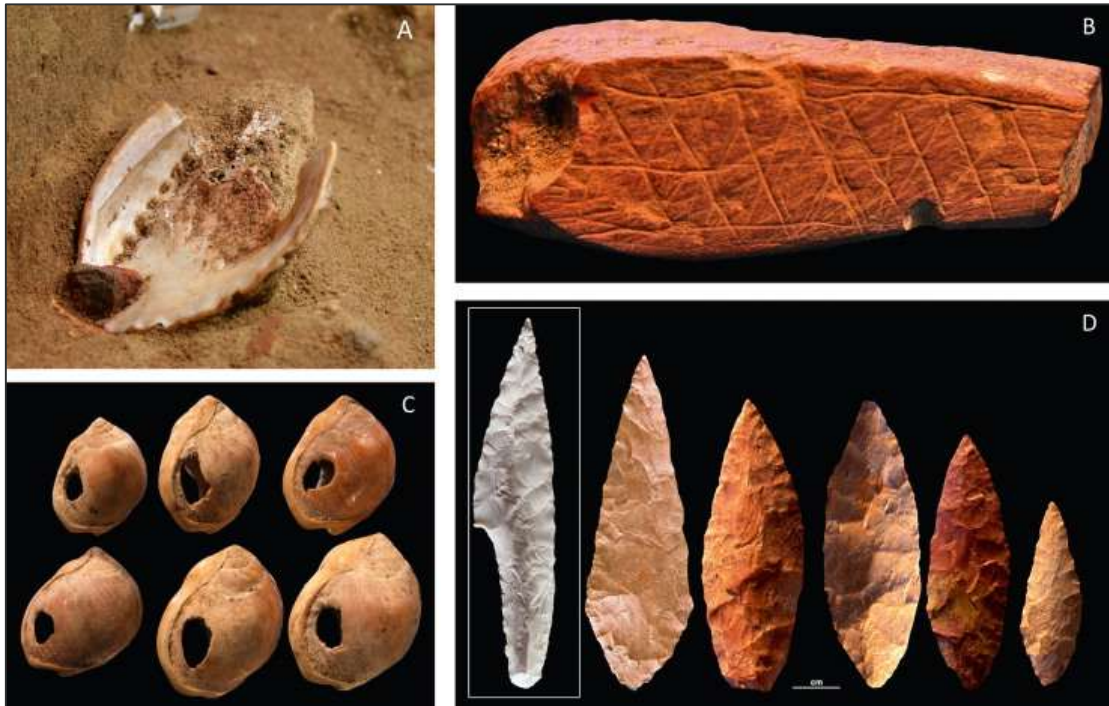


Figure 3: Examples of MSA material evidence or artefacts after Wadley (2015). Abalone (*Haliotis midae*) shell with traces of an ochre-rich liquid (A); engraved ochre slab (B); perforated shells (C); Still Bay points (D). (after Henshilwood, 2012)

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).

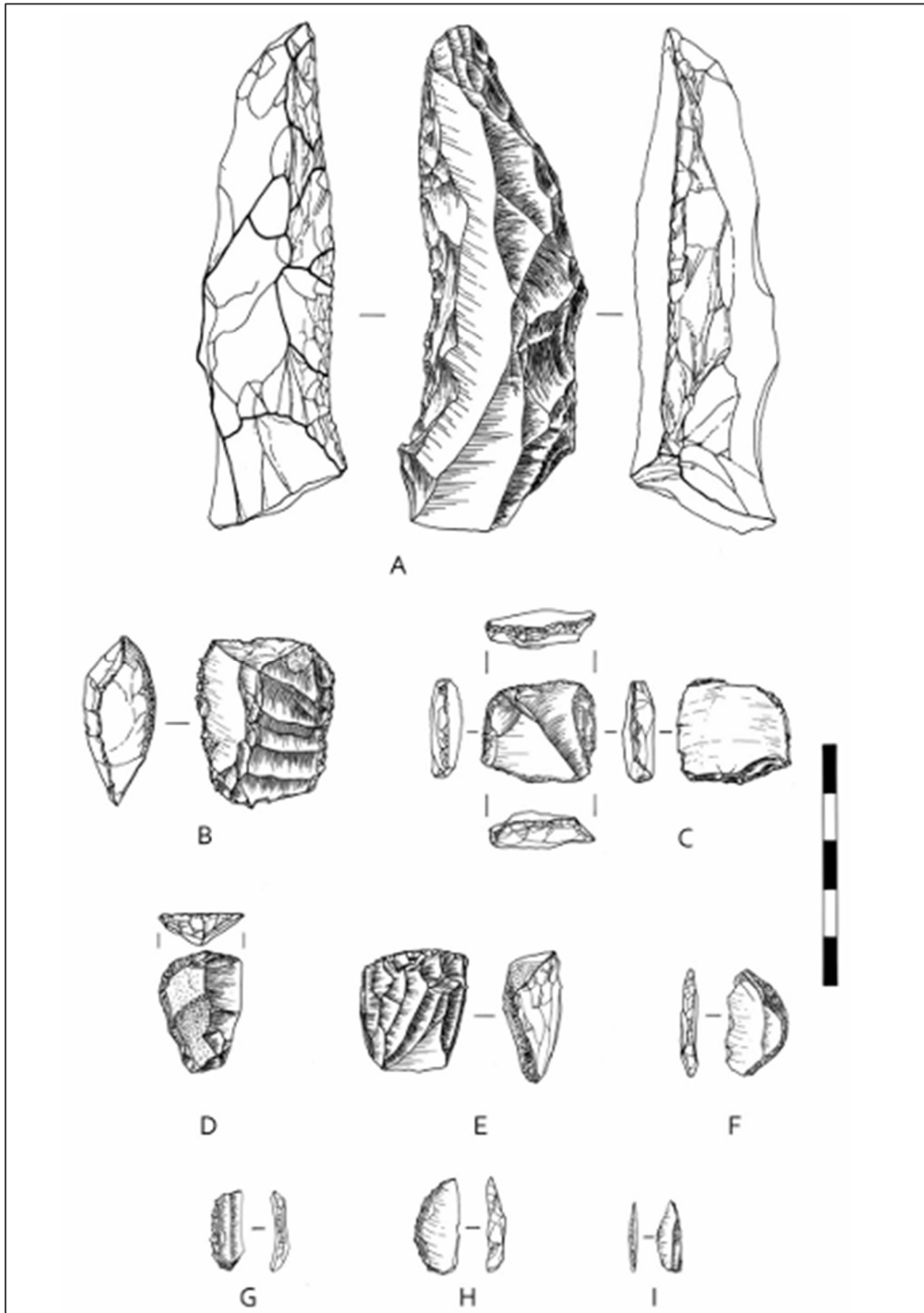


Figure 4: Examples of an adze (A), scrapers (B-D, G), backed bladelets (I), bladelet cores (e), and segments (F, H). Typical pieces associated with the LSA (after Forssman *et al.*, (2010))

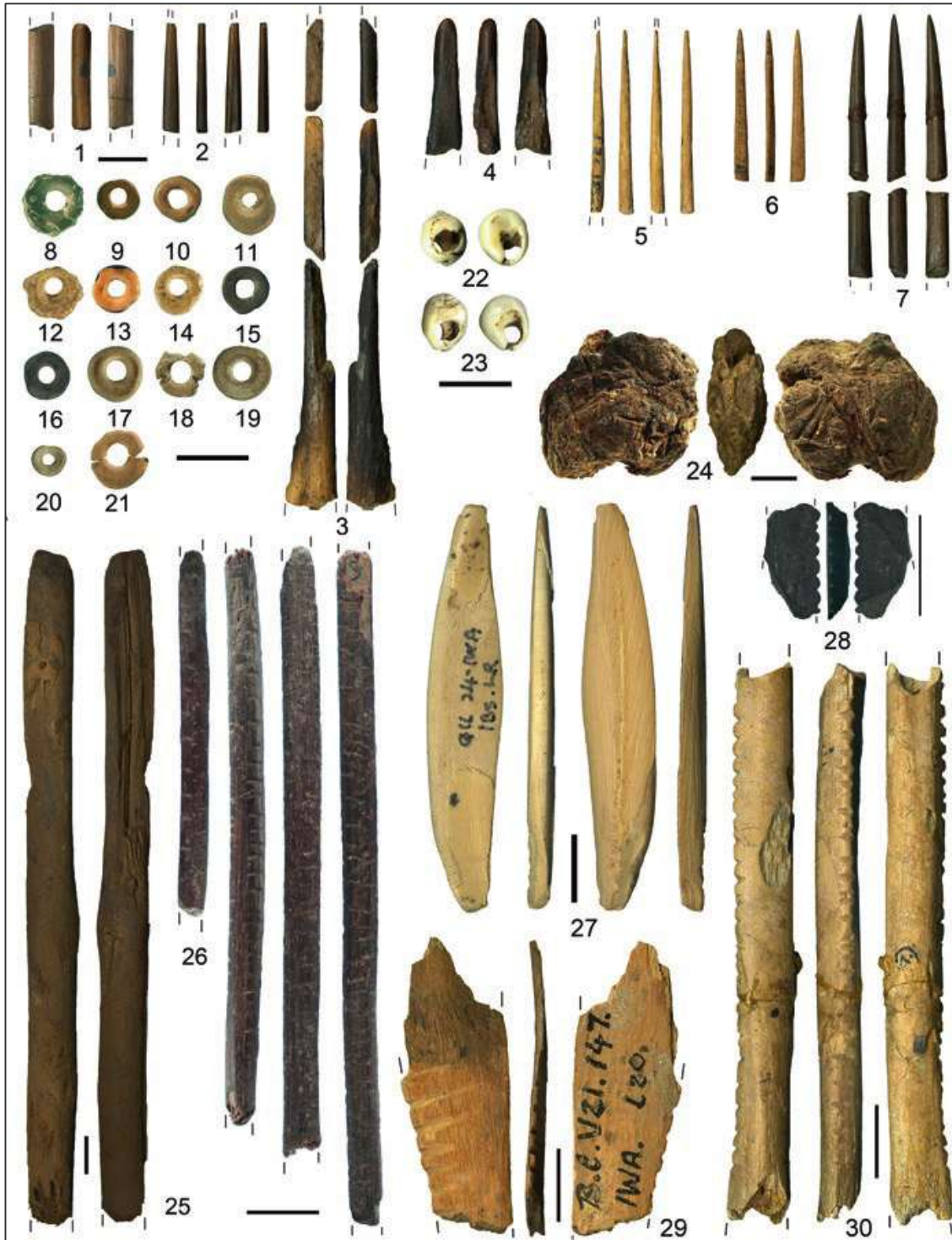


Figure 5: Some examples of LSA organic material remains from Border Cave. Bone awls and points (1-7), Ostrich Eggshell beads (8-21), tick shell beads (22-23), bound organic material (24), digging stick (25), poison applicator (26), implement made from warthog or bushpig lower canine (27), and notched 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).

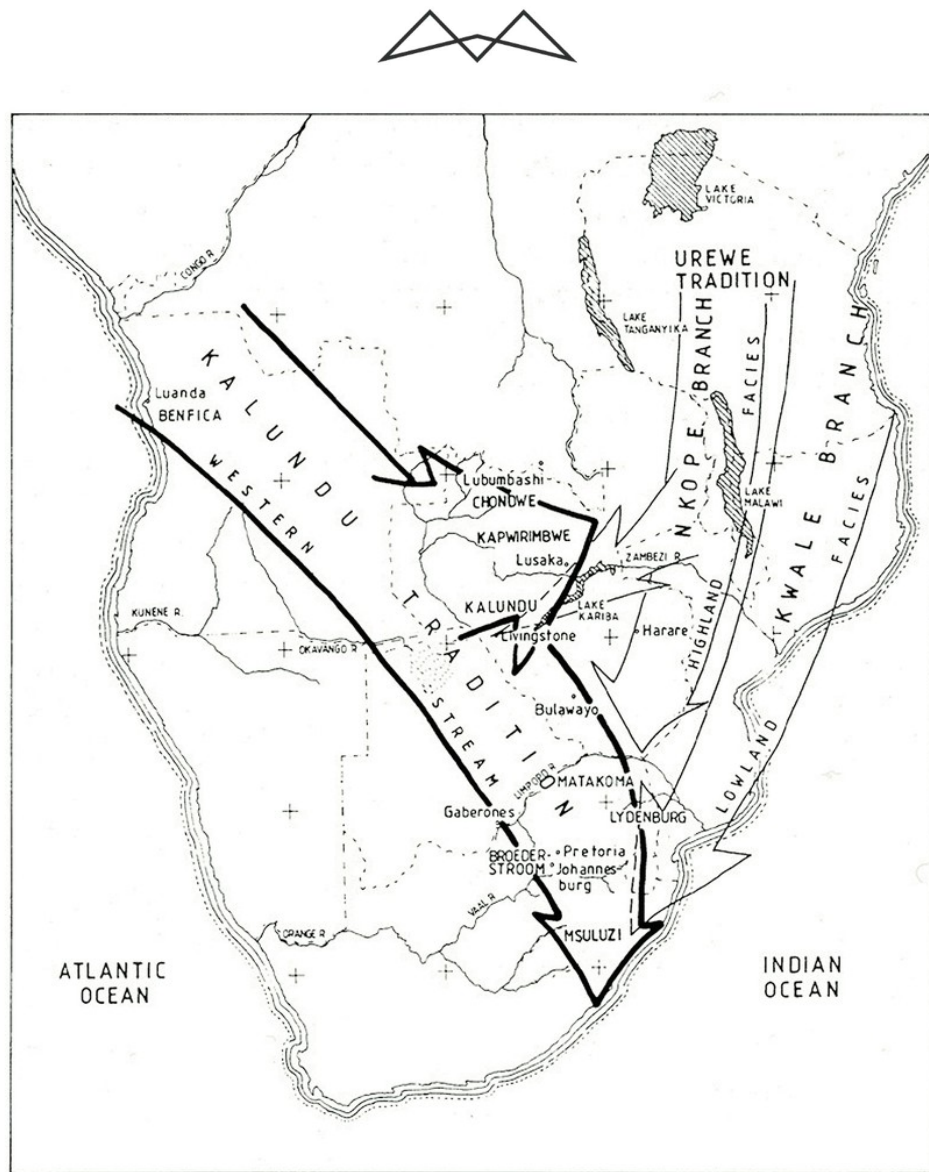


Figure 6: General understanding of Bantu migrations related to the larger ceramic traditions, Kalundu (Western Stream) and Urewe (Nkope and Kwale Branches) (After Huffman, 1989).

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 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 stone wall structures, 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 stone wall structures based on their layout and patterning.

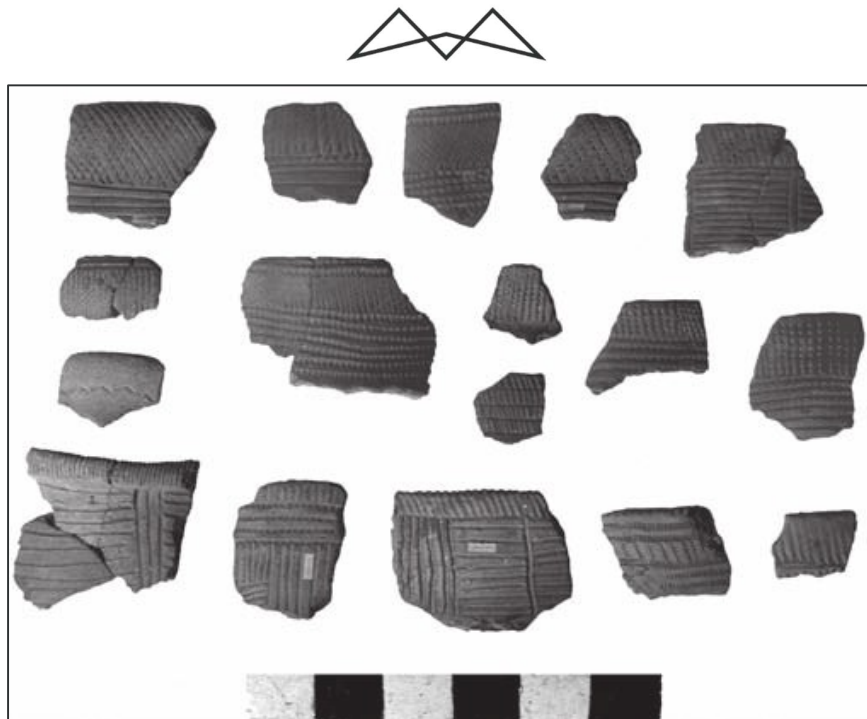


Figure 7: Examples of Bambata Potsherds (Huffman, 2005).

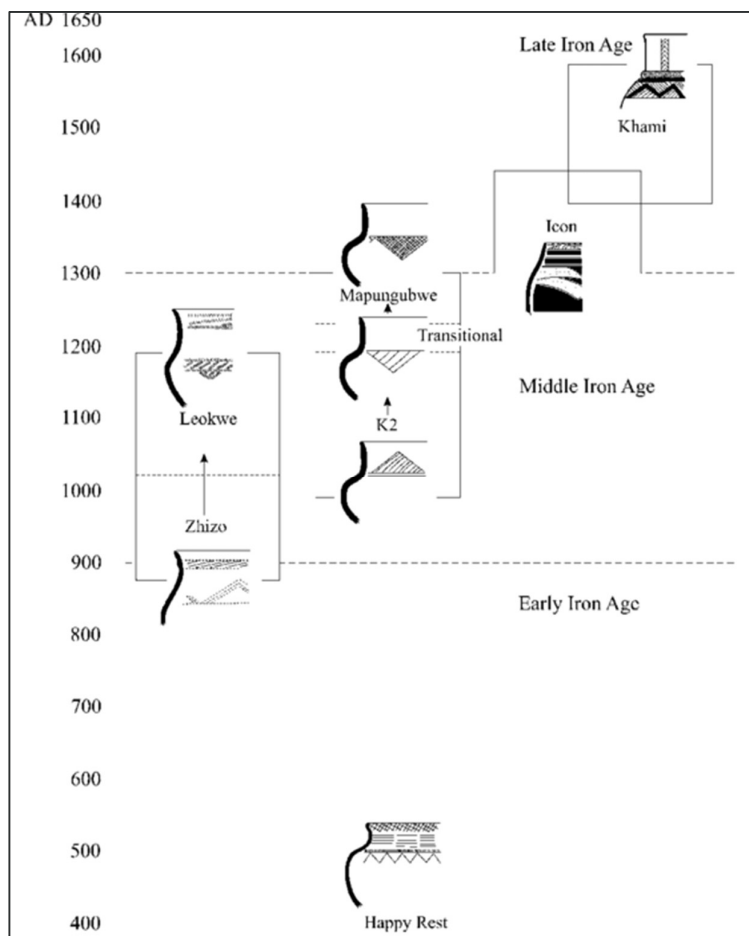


Figure 8: An Iron Age ceramic sequence demonstrating transitions between K2 and Mapungubwe ceramic styles (Huffman, 2009).

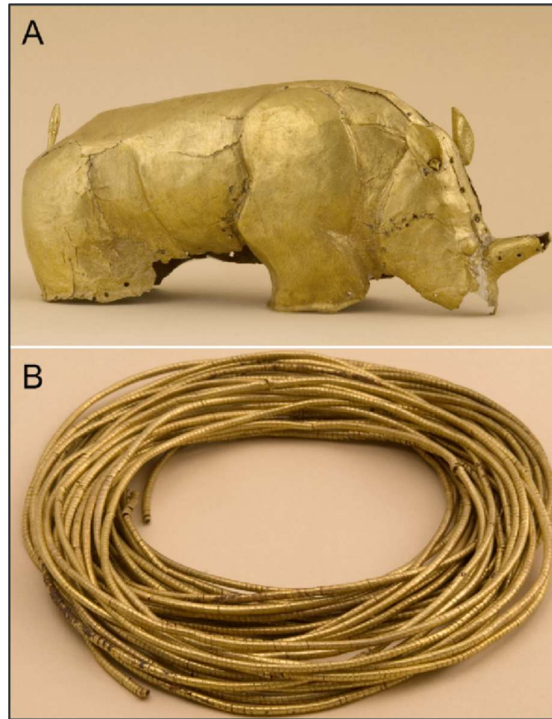


Figure 9: Famous golden implements of Mapungubwe (A - Golden Rhinoceros, B - Golden anklets) (Woodborne *et al.*, 2009).

Sadr and Rodier (2012) provide one of the most direct classifications of stone wall structures, 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 stone wall structures. Group I stone wall structures 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).

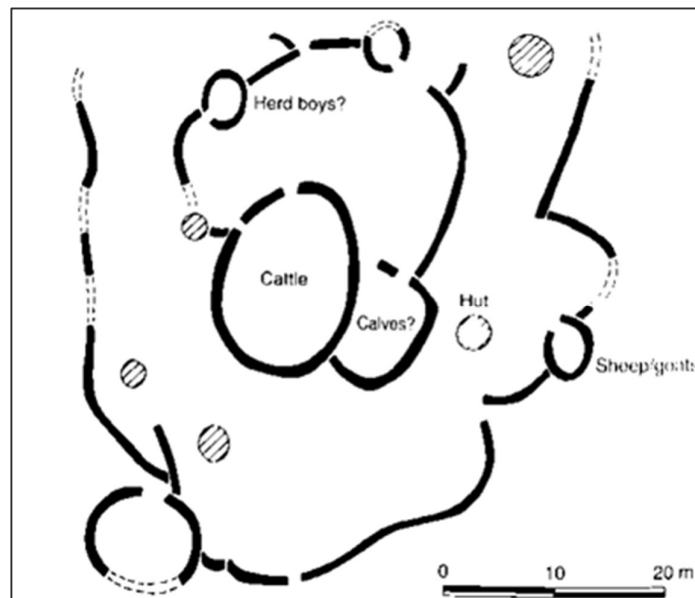


Figure 10: Type N stone wall structures as illustrated by Maggs (1976).



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

Representing later events of occupation during the Later Iron Age, Group II and III stone wall structures 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 stone wall structures part of the Bokoni complex, Mpumalanga (after Delius *et al.* (2012)).

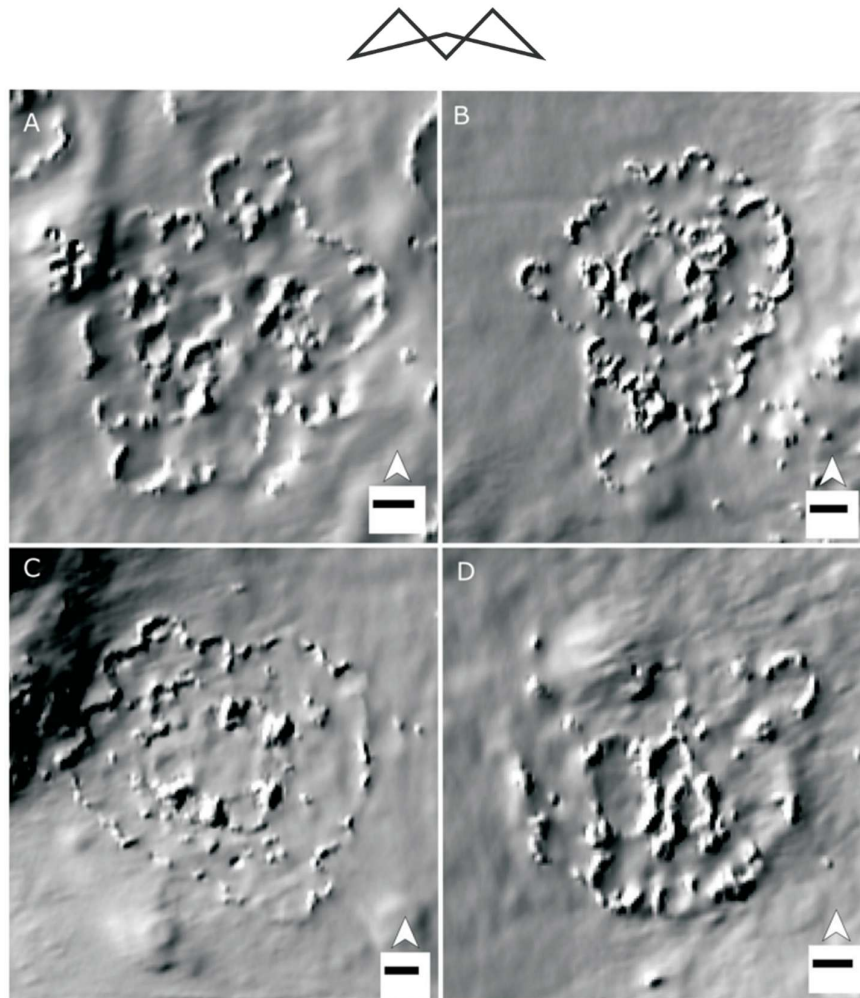


Figure 13: LiDAR imagery of Molokwane stone wall structures of Kweneng, a lost city discovered at Suikerbosrand Nature Reserve (after Sadr and Mshuqwana (2020)).

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.

Considering the broader distribution of stone wall structures across South Africa, Type Z structures are more common around the Northern Cape area. Type Z structures are described by Huffman (2007) as similar to Molokwane, with a “loose circle of individual bilobial households surrounding the core”. Figure 14 provides an overview of the distribution of stone wall structures across the northeastern region of South Africa. Note that Type Z walling is documented by Huffman as spread towards the southwest. This distribution spreads further west.

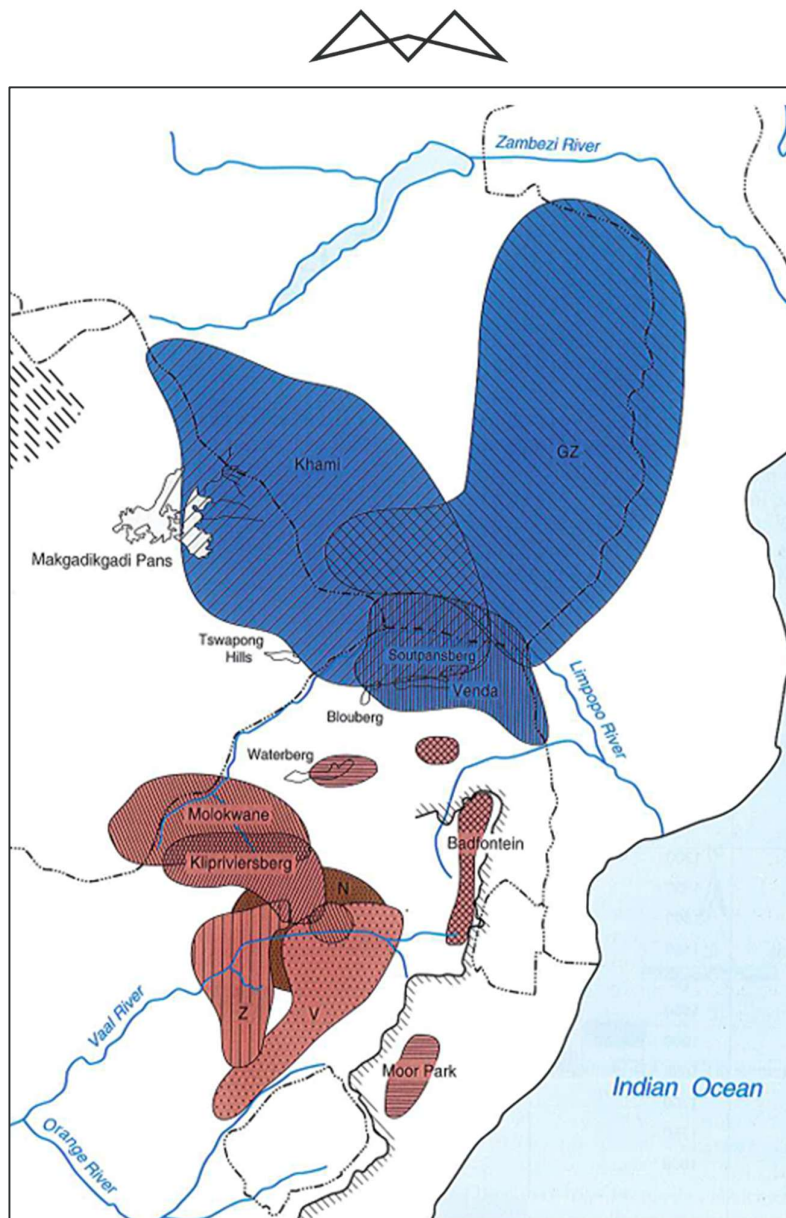


Figure 14: Distribution of the different types of stone wall structures across the northeastern region of South Africa (after Huffman, 2007)

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).

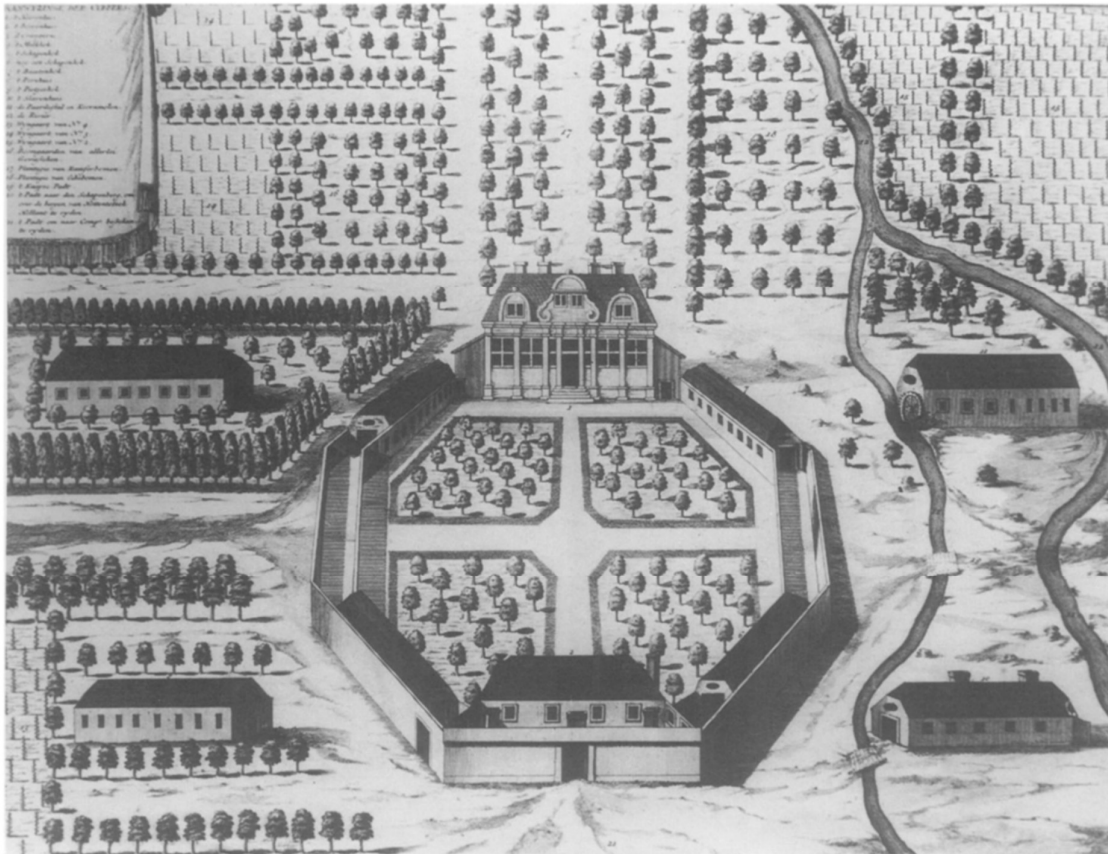


Figure 15: A 1700s drawing of Vergelegen, a Cape Colony homestead including multiple buildings including slave lodges. (after Markell *et al.* 1995).

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).

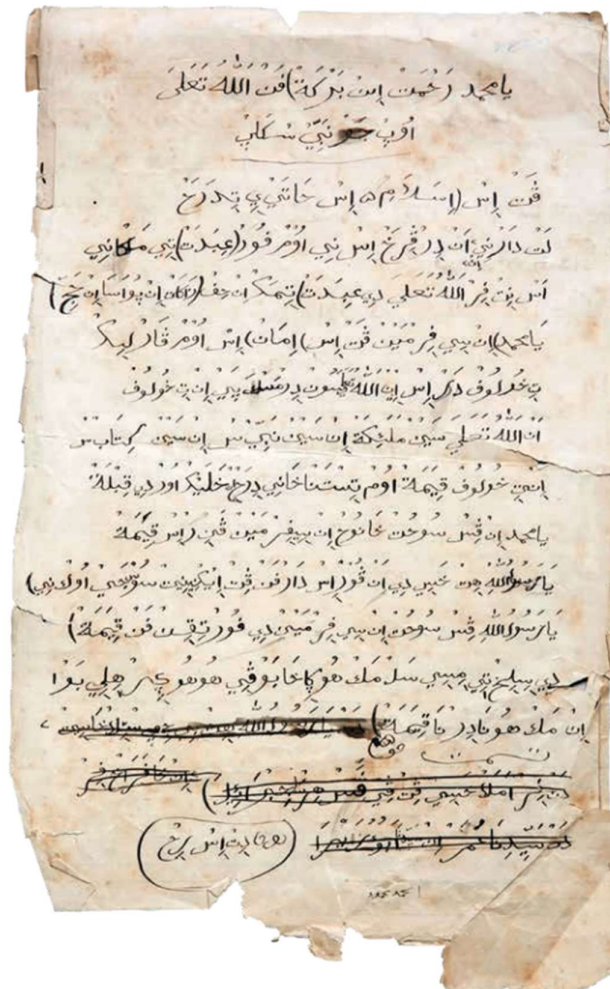


Figure 16: An Arabic script representing the first written texts of the Afrikaans language (late 19th Century)
(after Davids (2018))

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 Difaane. 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.

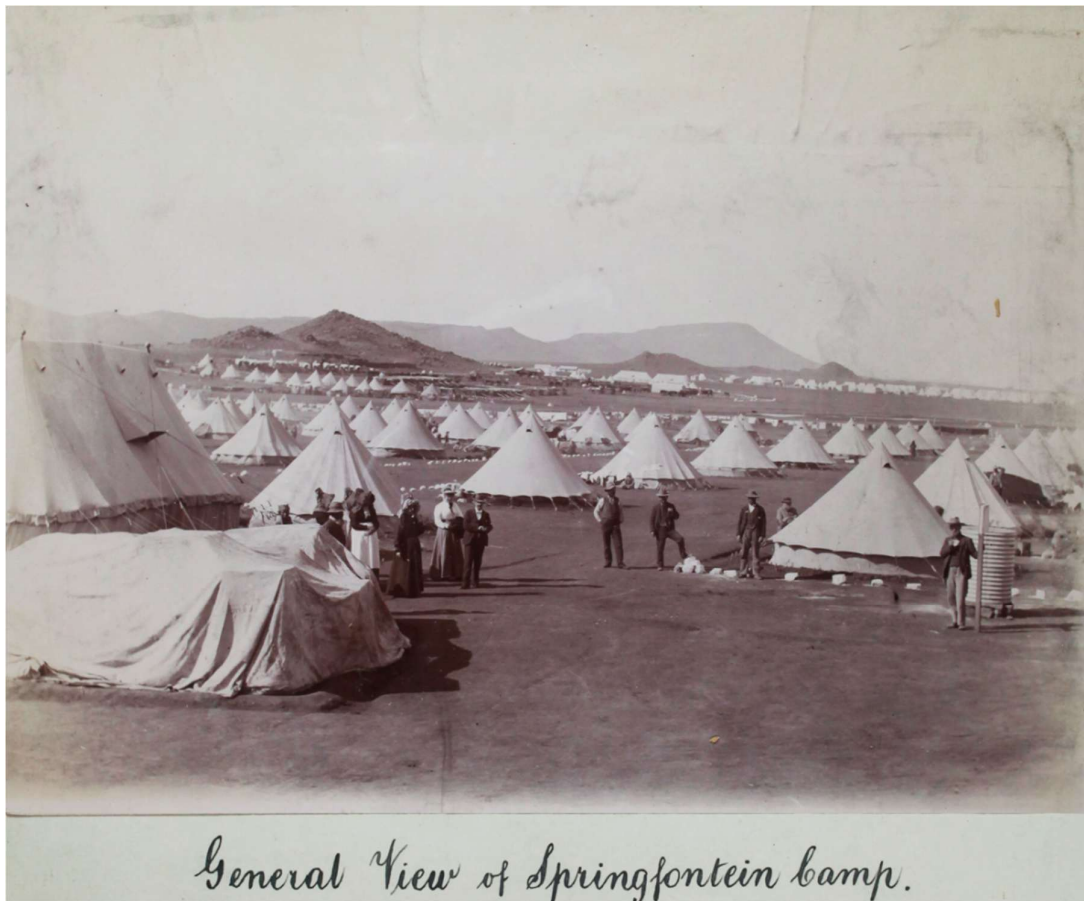


Figure 18: A picture of Springfontein, a refugee war camp which was established as a repercussion of the war's influence (after British National Archives).

While to the north, Mahikeng was a key focus of the South African War, to the South, Kimberley was in the interest of besiegers given its economic importance in South Africa. The Siege of Kimberley is the most notable event having had repercussions on the development and heritage of colonial Northern Cape. While the siege lasted a few months from late 1899 to early 1900, several developments ensued during the war and its aftermath including the establishment of black concentration camps (Benneyworth, 2024). These are argued to contrast with camps such as Springfontein, demonstrating the impact the war had on different groups and their lives. Further, such arguments demonstrate the diverse nature of the social fabric of South Africa, and how it became a means of division as the country developed.



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. Several key figures are associated with the city of Kimberley, including Sol Plaatje and Robert Sobukwe.

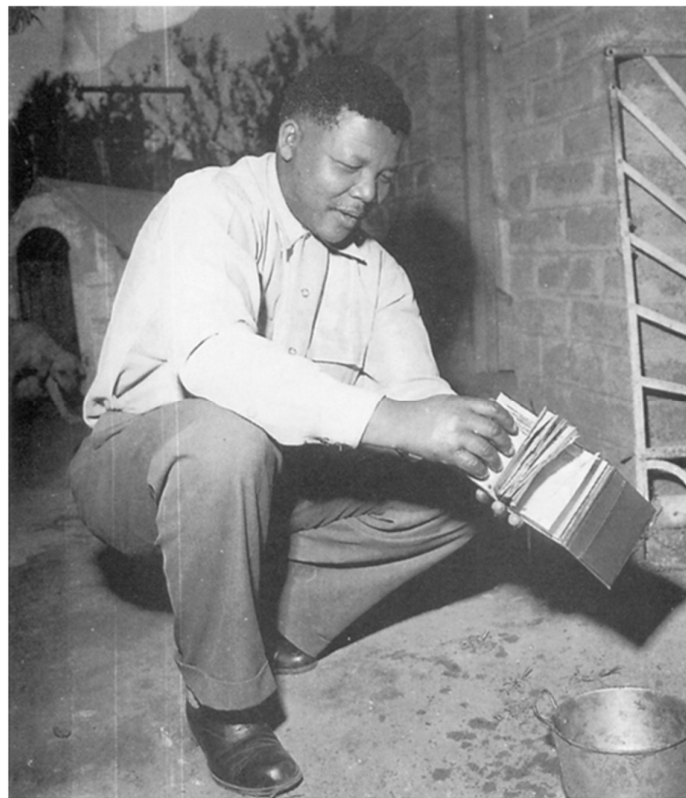


Figure 19: Nelson Mandela burning his pass in 1959. A pass was a requirement for people to move across the country. Such documents have now become items representing the Apartheid regime (Thompson, 2001).

2.2 SITE-SPECIFIC BACKGROUND

The Northern Cape 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 Hunter-gatherer activity. The closest town to the site in question is Kimberley, which itself embodies rich heritage in relation to the colonial history and modern economic development of South Africa.



2.2.1 EARLY HOMININ SUBSISTENCE BEHAVIOR AND LATER EMERGENT HUNTER-GATHERER ACTIVITY

Stone Age artefacts or finds and sites form a key component of the archaeological record of the Northern Cape. This is related to the extensive early hominin and later hunter-gatherer activity in the area. The Northern Cape Stone Age is defined by its lithic collection which includes examples of ESA, MSA, and LSA. Key examples of the lithic finds associated with the Northern Cape can be observed at Wonderwerk Cave and Canteen Kopje as previously discussed, and around the Kathu Townlands (Walker *et al.*, 2014). Figure 20 and Figure 21 includes some examples of the lithic finds one can expect associated with early hominin sites in the Northern Cape.

Other finds include the occurrence of graves and human remains as well as stone engravings or petroglyphs. Rock engravings have been observed in areas around the Northern Cape and have been attached to hunter-gatherer activity. Driekopseiland near Kimberley is a key example site including rock engravings in the Northern Cape. This site has been extensively studied and interpreted in relation to hunter-gatherer traditions and belief systems (van Riet Lowe, 1952; Deacon, 1997; Morris, 2016, 2022). Further, the petroglyphs observed in the Northern Cape (Figure 22) are but some examples of similar rock art found across the country.

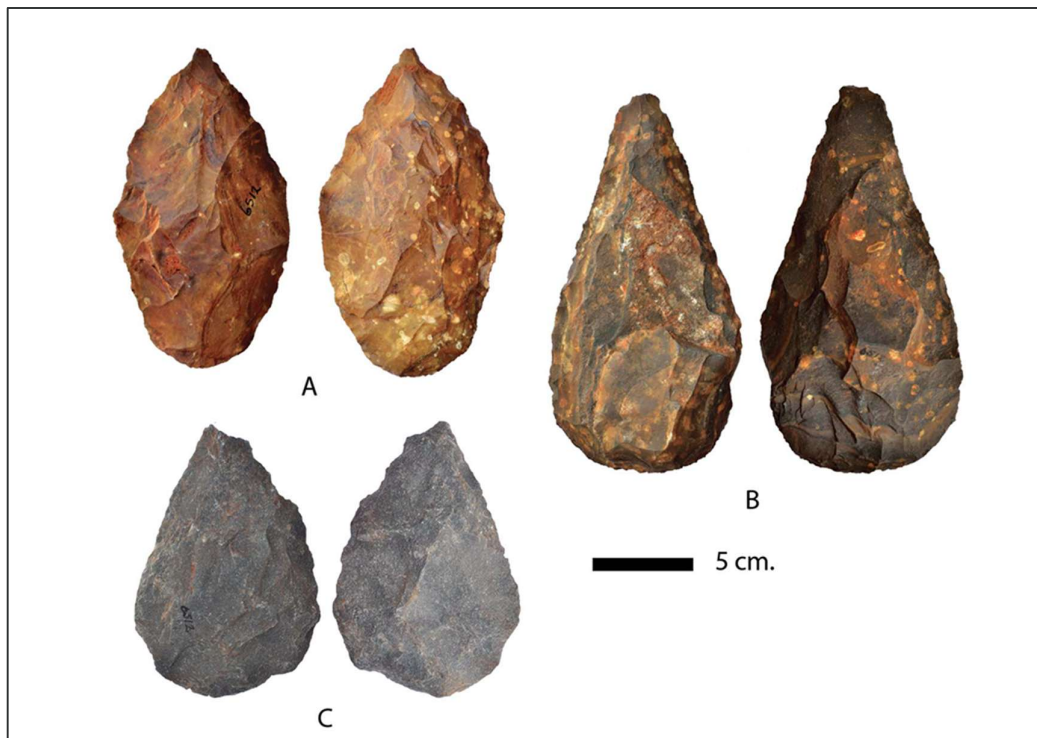


Figure 20: Some key examples of handaxes found near the Kathu Townlands. The examples are banded ironstone (A and B), and Quartzite (C) (After Walker *et al.*, 2014).

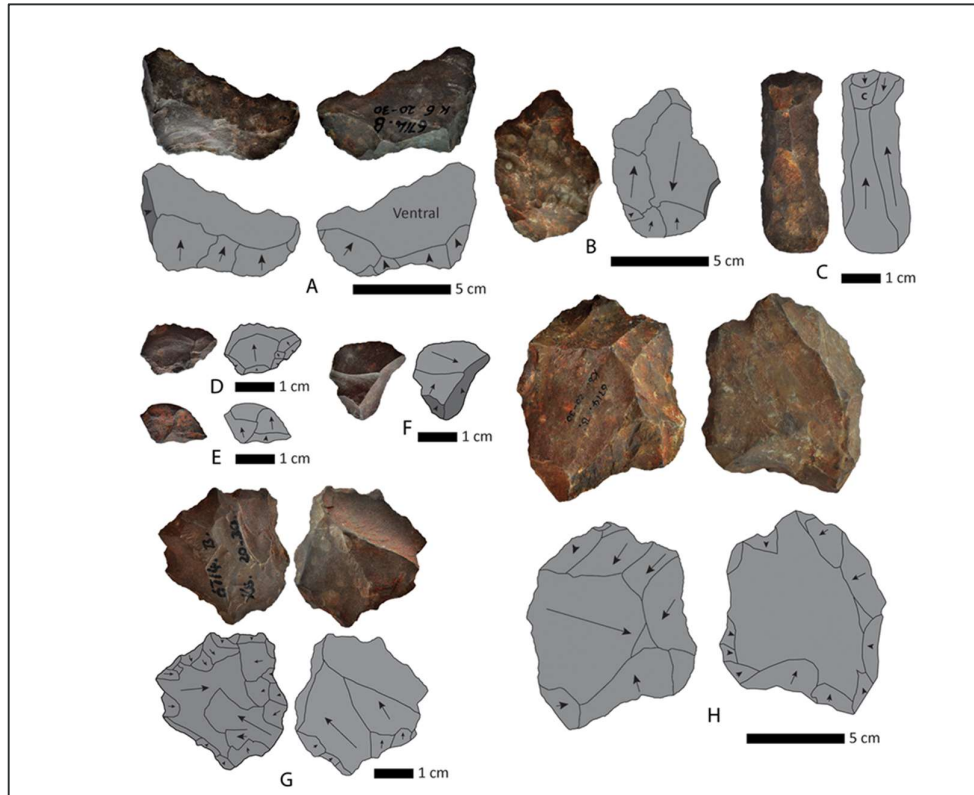


Figure 21: Examples of small flakes and cores. (A) Large flake off of the edge of the core consistent with biface shaping removal, (B) Large flake with dorsal scars (C) Blade (D–F) Small flakes (G–H) Discoidal cores. (After Walker *et al.*, 2014)



Figure 22: A photograph taken of engraved motifs forming part of the petroglyphs identified at Driekopseiland near Kimberley, Northern Cape (After Morris, 2022).

2.2.2 CULTURAL HISTORY OF KIMBERLEY

The closest town or city to the site of interest is Kimberley. Kimberley has a rich cultural history being one of the main early mining towns of South Africa. The city was founded following the discovery of diamonds between the late 1860s and early 1870s. Kimberley was originally a mining camp called “New Rush” which was later then incorporated into the Cape Colony. Later in its history, Kimberley became a key player in the South African War given its economic standpoint in the country.

Kimberley has become a tourist destination founded on its cultural heritage value. Several monuments and points of interest can be found in the city, which include statues of colonial figures such as Cecil Rhodes. An iconic monument is Kimberley’s Big Hole. The Big Hole is considered the world’s largest hand-excavated open-pit diamond mine.

2.3 DATABASES AND COLLECTIONS

A key source of information and material on the finds and sites of the Northern Cape is housed by the McGregor Museum in Kimberley. The museum hosts both pre-colonial and colonial archaeological collections. Further, the museum also hosts geological and palaeontological collections. Specifically, the museum houses key examples of lithic artefacts, as well as examples of fossils found in the Northern Cape.

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:



Proposed construction of a 132kV power line associated with the Photovoltaic Solar Plants on the Farm Droogfontein, Northern Cape Province

The report was compiled as part of a Basic Assessment Report in support of the Environmental Authorisation Application for the construction of a 132kV overhead powerline from the Droogfontein Solar Energy Plant – PV 2 – to the existing Kimberley-Macfarlane 132kV powerline. The powerline runs along the south boundary of the farms to be developed, and along the railway line. The report in question reports on findings of a Walk-Down Heritage Impact Survey. No heritage resources or features of significance were identified.

Phase I Archaeological and Cultural Heritage Impact Assessment Specialist Report for the proposed Diamond and Sand Prospecting Right Application on the Farm Hartland No.203, Farm Rietpan No.39, Farm Kopje Enkelt Annexe No.42 and Portion 1 of Farm Parcel No.40 within the Administrative District of Kimberley, Northern Cape Province

This report was compiled supporting a proposed diamond and sand Prospecting Right Application. The report also included a summary of findings of an associated field survey. This project is located approximately 4km northeast of the area and farms of the proposed development. As a conclusion, no features of heritage significance were identified. This was also due to the fact that the landscape was highly disturbed.

Archaeological Phase 1 Impact Assessment Report for a Basic Assessment Report for the Droogfontein 4 Solar and Battery Storage Energy Facility, north of Kimberley, Northern Cape Province.

This report was compiled as part of a Basic Assessment Report in support of the Environmental Authorisation Application for the proposed Droogfontein 4 Solar and Battery Storage Energy Facility. This project is located immediately south of the proposed development. Sparsely distributed heritage resources were reported which included lithic artefacts of the MSA and LSA of very low significance.

A Report on a Heritage Impact Assessment for the proposed Eskom Kimberley strengthening Phase 4 project between the boundary and Ulco Substations in the Northern Cape Province

This report was compiled as another Walk-Down assessment for a powerline spanning across approximately 94 kms. The powerline runs west to east just north of Kimberley, and approximately 3kms south of the proposed development area. Although further from the site in question, several features of interest are reported. Several historical mining sites and associated infrastructure were identified (Figure 23). Further, stone walled structures were also identified.



Figure 23: Satellite imagery of the stone wall structures (left) and historical mining infrastructure (right) identified during the Heritage Impact Assessment for the proposed Eskom Kimberley strengthening Phase 4 project.

Concentrated Solar Power EIA – Droogfontein 2: Heritage Impact Assessment

This Heritage Impact Assessment was compiled as part of the EIA conducted for the Droogfontein 2 – Concentrated Solar Project for Mainstream Renewable Power South Africa. The site assessed is approximately 2kms southwest from the proposed development, making it a key study to consider in the context of the current HIA. The study identified four lithic scatters which were considered not significant. This was considered an indicator that the area may present sensitivities in terms of stone age archaeology.

3 ENVIRONMENTAL ATTRIBUTES AND BASELINE ENVIRONMENT

This section discusses the overall environmental attributes of the site in question. This includes key aspects of the landscape and general conditions associated with the area.

3.1 CLIMATE

The climate of the Northern Cape is characterized by extreme temperatures, with hot summers and very cold winters. The rainy season usually occurs from late summer through to autumn, with the months of January to April being particularly notable for precipitation. Temperature and precipitation vary significantly across the region, with the eastern and mountainous areas receiving rainfall of about 200-400 mm per annum, while the arid western areas receive less than 100 mm per annum.

The climate in the Northern Cape is mostly semi-arid to arid, characterized by hot and dry summers during the months of November to February and cold winters starting from May to August. The region experiences occasional thunderstorms in the late summer months, and the winter season sees little to no precipitation.

Figure 24 provides an understanding of the general climatic conditions of the area, including an understanding of monthly temperatures and rainfall.

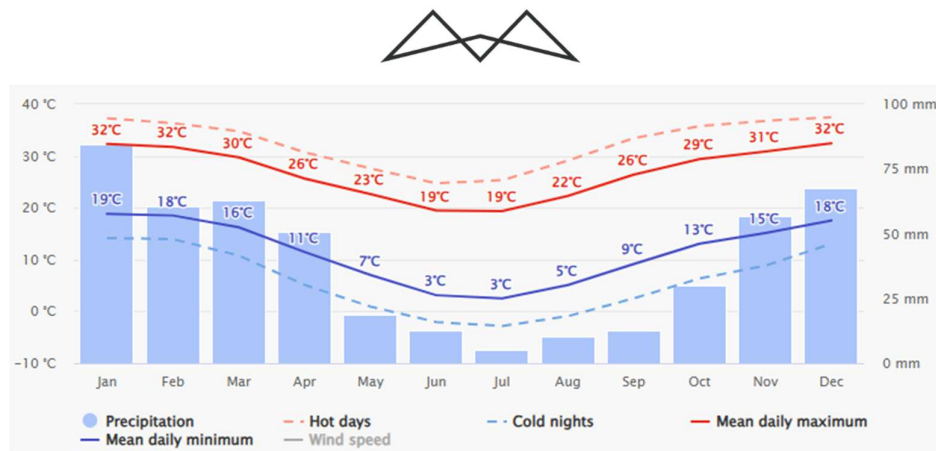


Figure 24: Annual Climatic conditions typical of the Northern Cape (considering data from Kimberley, after www.meteoblue.com/en/weather/historyclimate/climatemodelled/kimberley_south-africa_990930)

3.2 TOPOGRAPHY

The development area falls in an area between 1100 and 1200 m above sea-level in elevation. The landscape gently slopes towards to the northwest, where the Vaal River is located. The landscape is flat, with a pan located at the centre of the proposed area. See Figure 25 for an overview of the topography of the site to be developed and surrounding areas.

3.3 DRAINAGE AND CATCHMENT

The closest river to the site is the Vaal, approximately 3 km to the northwest of the proposed activities. The proposed development falls within the C91D Quaternary Catchment.

3.4 GEOLOGY

Several geological features characterise and have made Kimberley famous. The site in question shares some of these geological characteristics with the surrounding areas. The overall geology of the site is characterised by aeolian sands and sand dunes. These aeolian sands are otherwise referred to as Hutton Sands. The geology of the site also includes Karoo Dolerite, as well as Allanridge andesitic lavas and tuffs. As a key feature observed and verified, some surface limestone and calcrete has been noted around the site. Finally, dykes and kimberlites intersect with the site, particularly to the east, where at least two dykes are observable through data available. Figure 28 is a simplified overview of the geology of the site and surrounding areas.

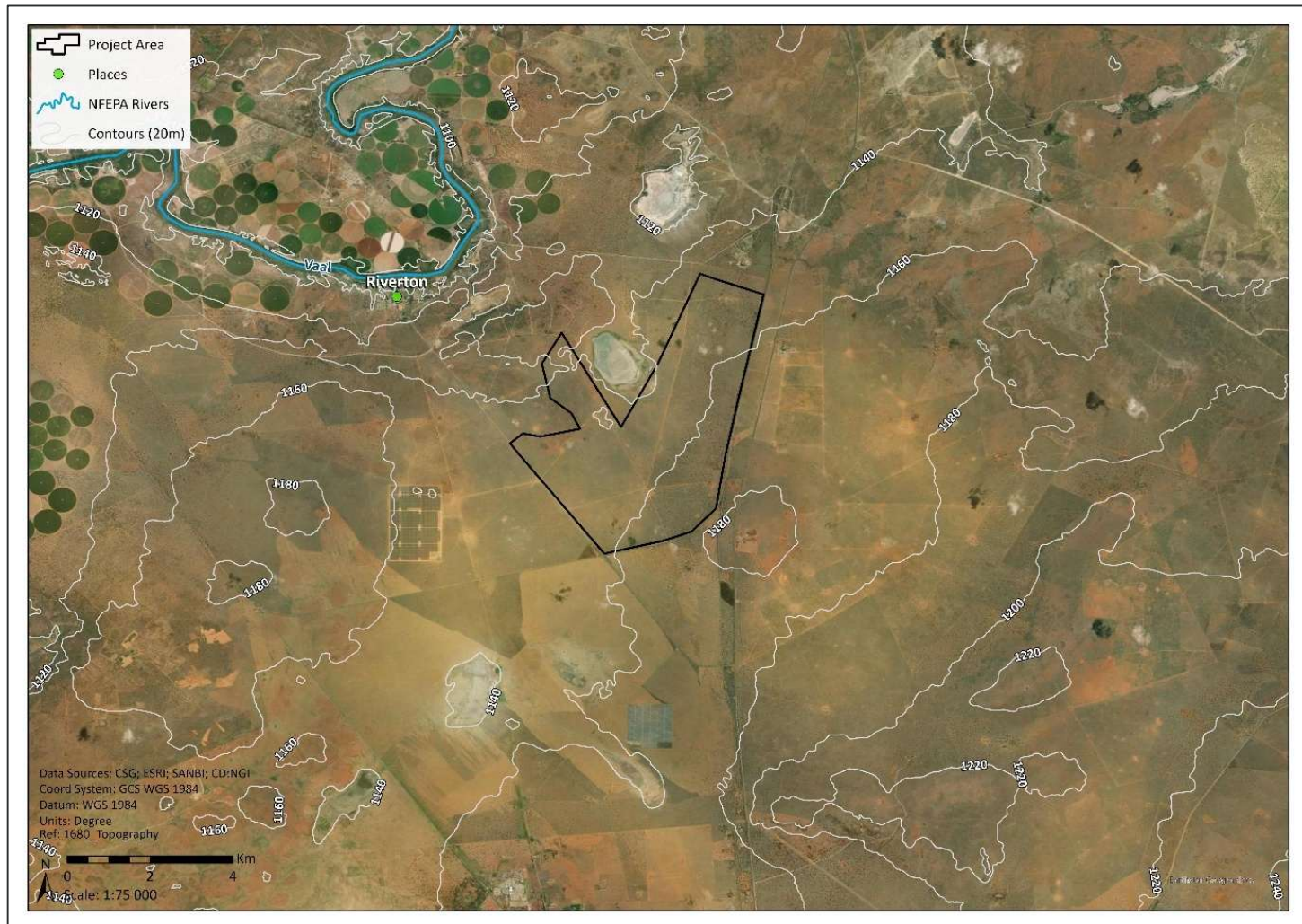


Figure 25: Topography Map of the site and surrounding areas.

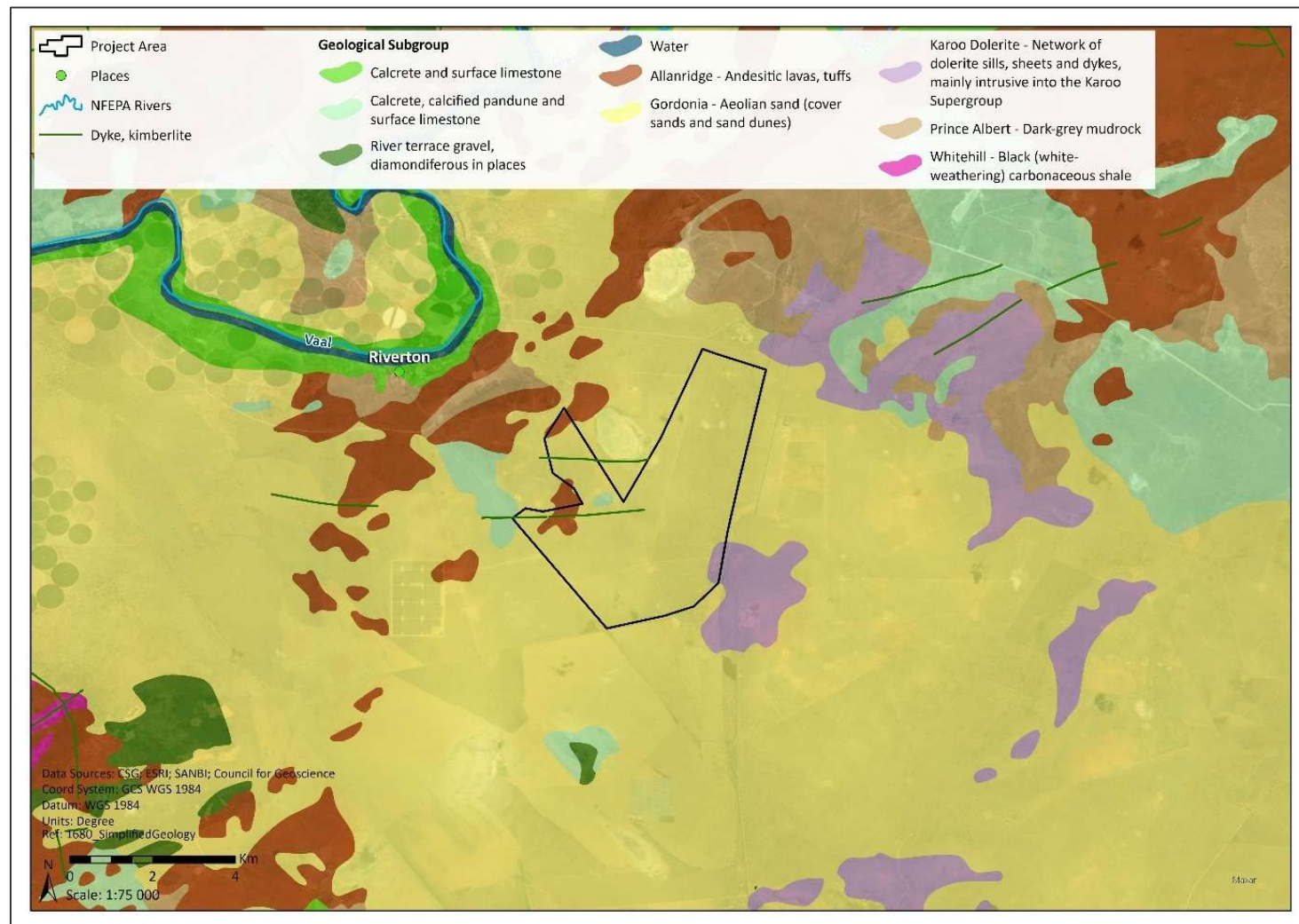


Figure 26: Map of the geology of the site and surrounding areas.



4 METHODOLOGY

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

4.1 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 1941.

4.2 FIELD SURVEY

To verify and add to the observations made through the desktop assessment, a three-day field survey was conducted by Dr Lucien James from 29 to 31 January 2025. The field survey involved traversing the proposed development footprint, with a focus on assessing areas which appear to be undisturbed. The survey also included consulting personnel on site, to gather more insight on any known archaeological sites and finds. While most of the area is already disturbed by different land uses including agriculture, a site survey was necessary to evaluate the overall sensitivity of the area, as well as identify archaeological sites and objects which may not have been identified since.

The Archaeologist surveyed key areas of the development footprint, as well as key areas immediately outside of the development footprint, for example, some surrounding roads. A Garmin eTrex 10 was used to record track logs of the extent of the survey itself.

4.3 DOCUMENTATION AND ANALYSIS

All observations gathered through the desktop assessment as well as the field survey 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 proposed development. During the field survey, the location of larger Archaeological and Heritage finds was recorded. Smaller Archaeological and Heritage finds were recorded in situ. A 30-meter buffer was placed around finds which constituted a site. A 50-meter buffer was placed around graves or potential grave sites.

Geotagged photographs were taken throughout the survey. This included the photographing of finds, as well as the surrounding environment. Physical scales were 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 was used. For smaller finds, an IFRAO Standard Scale (Figure 27) was used.



Figure 27: IFRAO Standard Scale used for photography of Archaeological finds.

The appointed Archaeologist also kept written notes about the different findings as well as their context. These were recorded in the Archaeologist's personal field journal.

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	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 1. Can the find or site be identified in terms of which period it relates to, i.e. Stone Age, Iron Age, or Historical?



	<ol style="list-style-type: none"> 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?
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4.4 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.

4.5 LIMITATIONS

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

4.5.1 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 itself.

Firstly, such investigations are limited to desktop and field surveys 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 adopted by the developer in cases where construction activities lead to the identification of unexpected finds.



The field survey conducted for this report does not account for any finds further than immediate surrounding areas which are not potentially affected by the proposed development. To mitigate this, the initial desktop assessment considers surrounding pre-identified heritage resources and prior heritage studies done in the area.

Although an extensive methodology was adopted to address the desktop assessment and field survey, 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.

4.5.2 PROJECT-SPECIFIC LIMITATIONS

As a key limitation, some areas and farms were inaccessible due to perimeter fences. These areas accounted for very few sections of the overall footprint. The field survey itself was limited to a 3-day site visit which may present as a limitation to the extent of the investigation. However, strategic points were identified prior to the survey to ensure that an adequate representation of the site could be obtained through the site visit.

5 FINDINGS

The following section presents the findings of both the desktop assessment as well as the field survey. In summary, a single site was identified through the desktop assessment, and 8 finds or sites were identified through the field survey.

5.1 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 28.

The DFFE Screening Tool highlighted no heritage features within or in close proximity of the area to be affected by the proposed activities.

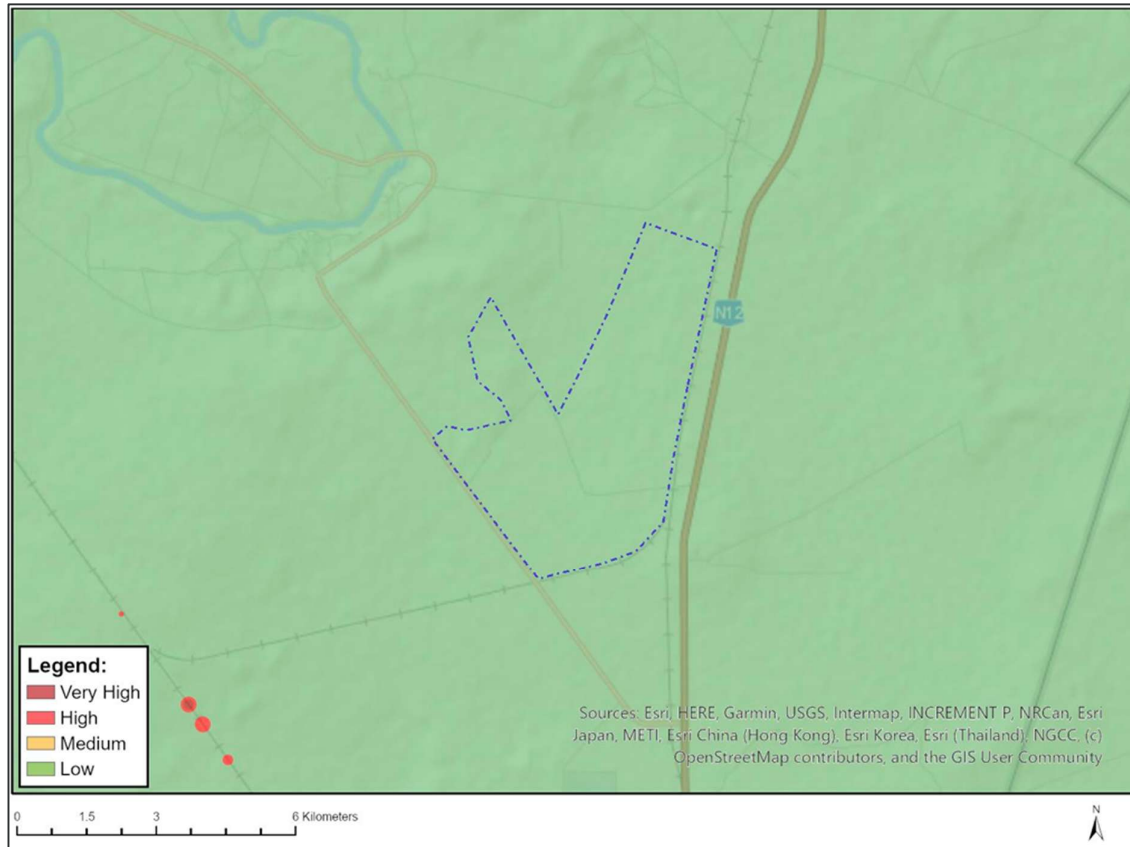


Figure 28: Map of relative Archaeological and Cultural Heritage Sensitivity (DFFE Screening Tool)

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/>). First Edition Topographic maps (2824DA and 2824DB) of the area was analysed. As the map was drawn in 1941, it would include information on observations within the footprint of the development. An assessment of the maps revealed several features marked outside and in proximity of the development footprint. Features outside the parameter of the development footprint include several ruins of old mine infrastructure as well as a grave (DR001). Three sites were identified in total as depicted in Figure 29. This included two ruins or structures, as well as a single grave.

Further investigation revealed that a small farm portion of the farm Witpan 52 corresponds with the location of the grave (Figure 30). This fact merited further investigation, and several details related to Witpan 52 Portion 1, and the potential grave were uncovered. Firstly, the small farm portion, approximately 80m² in size, is understood to be government property. Further, deed searches reveal that the property was registered in 1907 and is currently considered the property of “colonial government”. This suggests that the property was specifically isolated and demarcated for a specific purpose. It is here argued that because the First Edition Topographic Map and the cadastral information related to Witpan 52 Portion 1 align, this property represents the demarcated grave. It is further argued that the grave would likely pre-date the registration of the property. This feature, that is the property Witpan 52 Portion 1, is considered a key discovery of this study as has therefore been rated as a Grade III A feature, that is, a feature of potentially High heritage significance. A 50-meter buffer is therefore recommended around the entire property, given that the grave itself could not be located.

No other features were identified within the study area, as depicted in Figure 31.

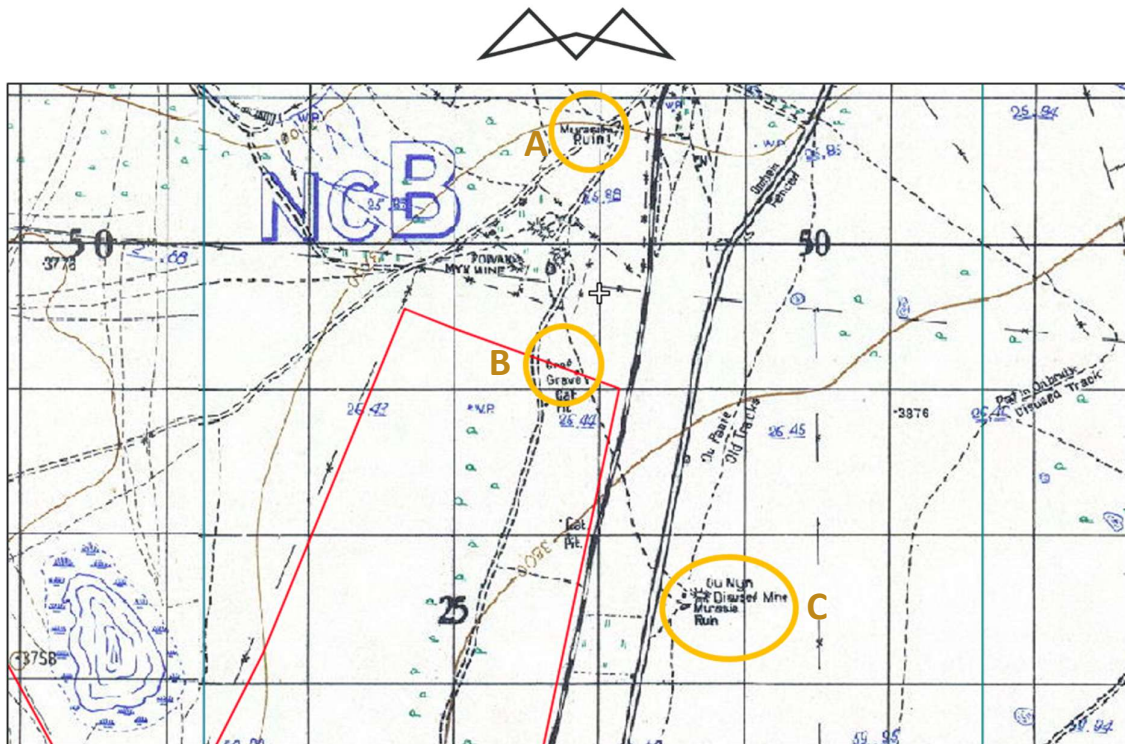


Figure 29: Extract of the First Edition Topographic map dated 1941. Orange circles indicate features identified which are or may be of heritage value. (A) northernmost feature labelled "ruin", (B) single grave feature identified, (C) eastern feature labelled "ruin". Note the grave within the site of interest (site bordered in red)

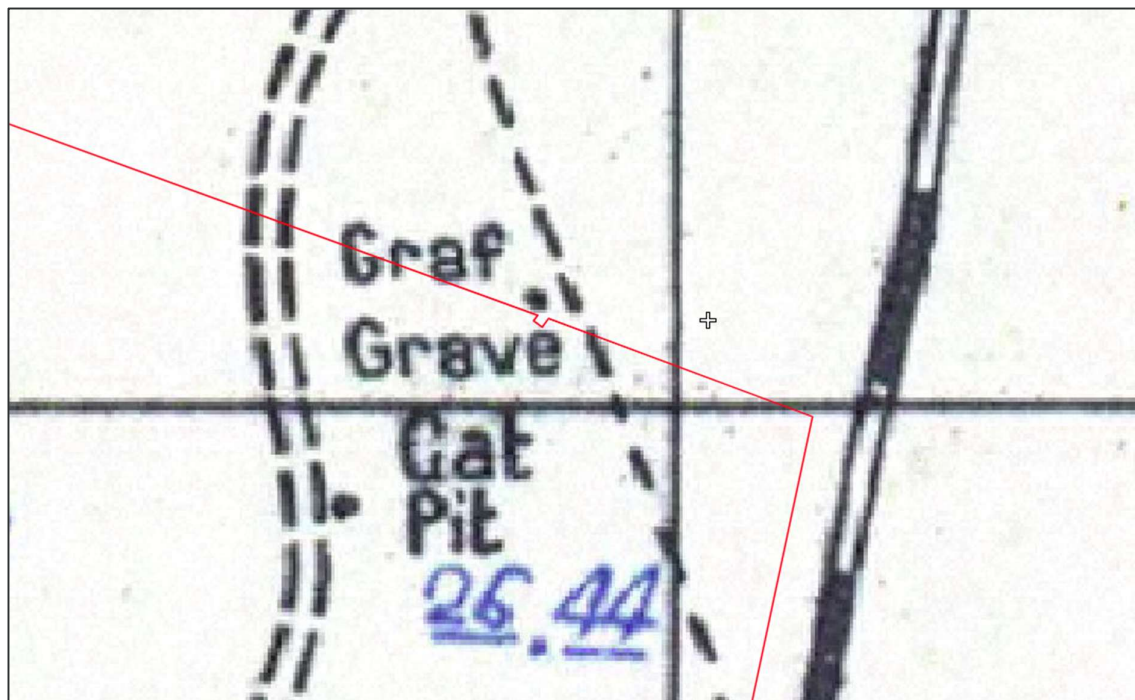


Figure 30: A scaled-up extract of the First Edition Topographic map, and the affected area. Note the correspondence between the point marked as "Grave" and the boundary of the development area. A small indent can be noted corresponding with the boundary between Witpan 52 remaining extent, and Witpan 52 Portion 1.

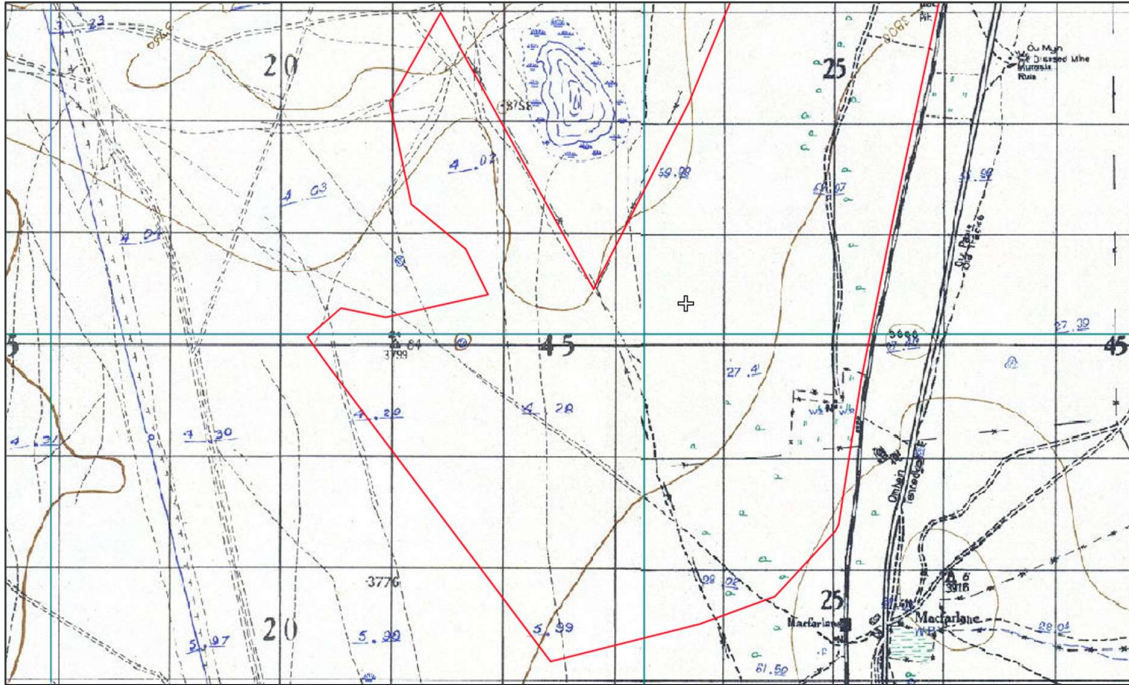


Figure 31: Extract of the First Edition Topographic map dated 1941. No other potential heritage resources were demarcated near or in the southern section of the site of interest (site bordered in red).

Of the three sites identified, only the identified grave (feature B) was considered of particular interest potentially being impacted on by the proposed activities and hence was further investigated through a study of aerial photography. Aerial photographs were also consulted to verify the absence or presence of the heritage feature. Aerial photographs consulted dated 1940 and 1984 respectively. Aerial photography did not reveal any sign or marker of the heritage feature, and therefore, on-site verification would be necessary to determine the presence and significance of the feature.



Figure 32: Aerial photograph taken in 1940 of the general location of the grave (feature B) identified through the first edition topographic maps. No clear depiction of the feature is observed. Orange circle highlights the potential location of the grave. Feature is located at the north boundary of the area to be developed.

5.2 FIELD ASSESSMENT RESULTS

The appointed Archaeologist surveyed the various areas which fall within the proposed development footprint. The survey the extent of the area to be developed with the intention to identify sensitivities in terms of heritage significance. Figure 33 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 Summer.

5.2.1 GENERAL OBSERVATIONS

The area of the proposed development includes large farmlands some of which remain undisturbed by human activities. Several paths and roads cross the area, allowing for most of the land to be traversed by car. Large portions are currently used for cattle grazing, as noted to the south of the area. Access to certain areas is restricted by fences which are otherwise not noticeable in satellite or Google Earth imagery. The landscape is covered in different types of grass and tree species. Vegetation is denser towards the northern sections of the development area. The northern area is also less disturbed and showed little to no signs of past or present human activity.

Pertaining to the general heritage significance of the area, the area lies some kilometres from Kimberley itself. Some observations were made of surrounding features including the landscape's relationship to old ox-wagon routes which can be observed throughout the surrounding areas of Kimberley. Apart from observations and following engagement with stakeholders, there appeared to be very little perceivable heritage significance associated with the landscape itself.

5.2.2 ARCHAEOLOGICAL FINDS

Some archaeological finds were discovered during the field survey conducted. These included the identification of a single LSA site (DR002), some singular LSA pieces (DR003, DR004, DR005, DR006), an array of different 20th century finds (DR007, DR008), as well as the verification of pre-identified graves to the south of the site, which have not yet been discussed or presented in this report (DR009).

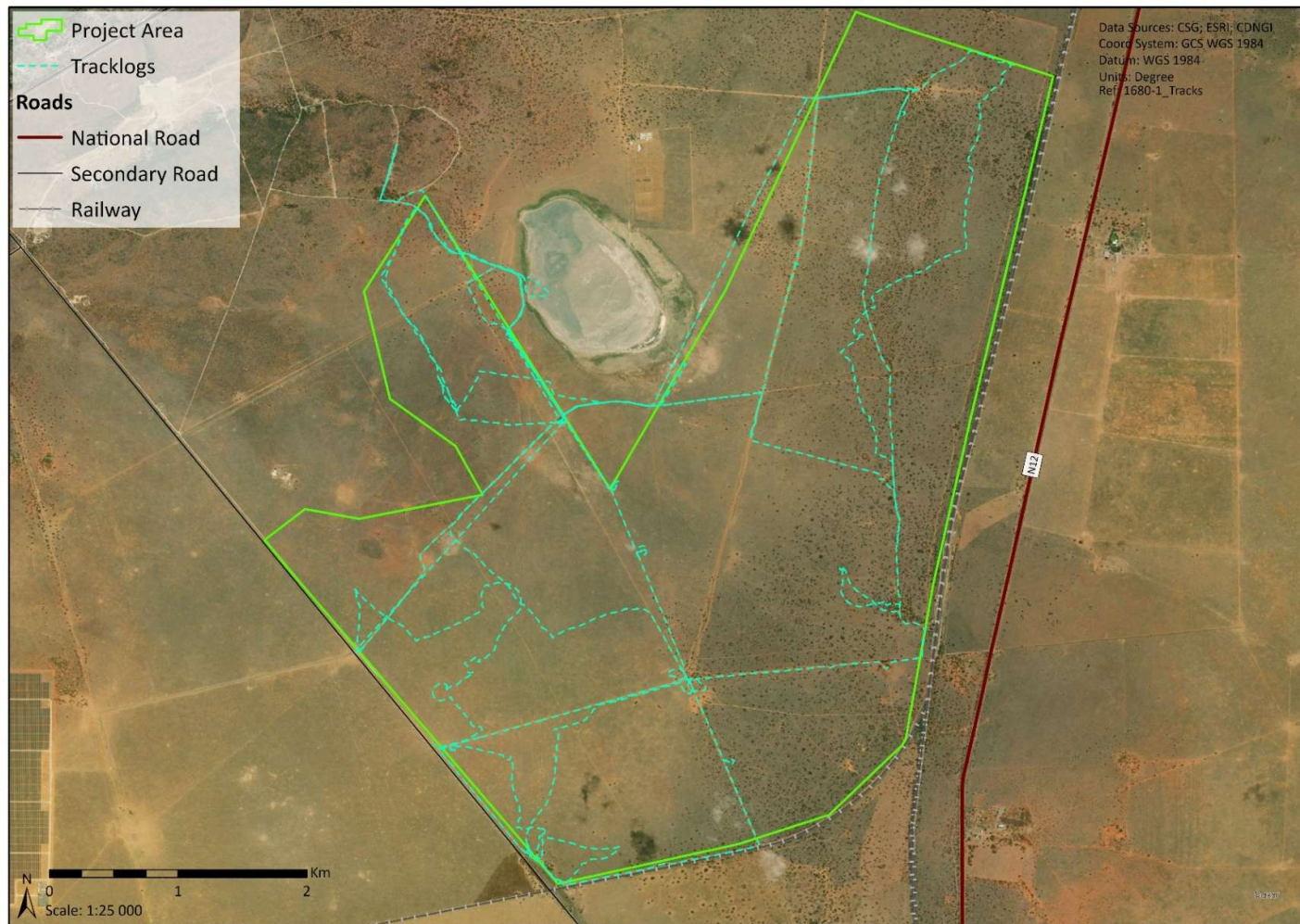


Figure 33: Map of areas surveyed and tracked.



A) STONE AGE FINDS

A single LSA site was identified within the project area as well as three other lithic-related finds. Each of these finds and the site in question are presented below. Although the finds and site are located within the project area, these features will not be affected by the proposed activities.

DR002 constituted a complete LSA site (Figure 34). The site was disturbed by an insect colony which may have allowed below-ground deposits to surface. The finds associated with the site include knapped and retouched lithics as well as several chunks and evidence of debitage as a result of knapping (Figure 35). At least one retouched piece as well as a fragment of a blade was identifiable among the pieces. Altogether, at least 6 lithic pieces were identified in a 1x1m quadrant, each measuring no more than 5cms in length or width. The site has been rated as Grade IV B and should at the least be recorded before it is destroyed. Mitigation further than recording is not suggested given that the site itself is of Medium heritage significance as the site corroborates with general understandings of the area and does not constitute new insight about the period it relates to. As the site will not be affected by the proposed activities, no impact on its heritage significance can be expected.

A single LSA retouched chert flake (DR003) was located approximately 20 meters north of the identified site DR002 (see Figure 36). At the same time, a pair of quartzite flakes (DR004) were identified approximately 20 meters South of the identified site DR002 (see Figure 37). Given that the pieces were potentially removed from context, DR003 and DR004 have been rated as Grade IV C respectively, with no further recording needed.

Another LSA retouched flake or hornfels piece was located along the road further south of the other finds (DR005) (Figure 38). Finally, two chert cores were identified further south (DR006) (Figure 39). Similar to DR003 and DR004, these finds have been rated as Grade IV C. All individual stone tool finds are considered to be of Low heritage significance.



Figure 34: DR002 – LSA Stone tool site. Note the insect nest/ colony to the left.



Figure 35: Some pieces identified and photographed from the DR002 site

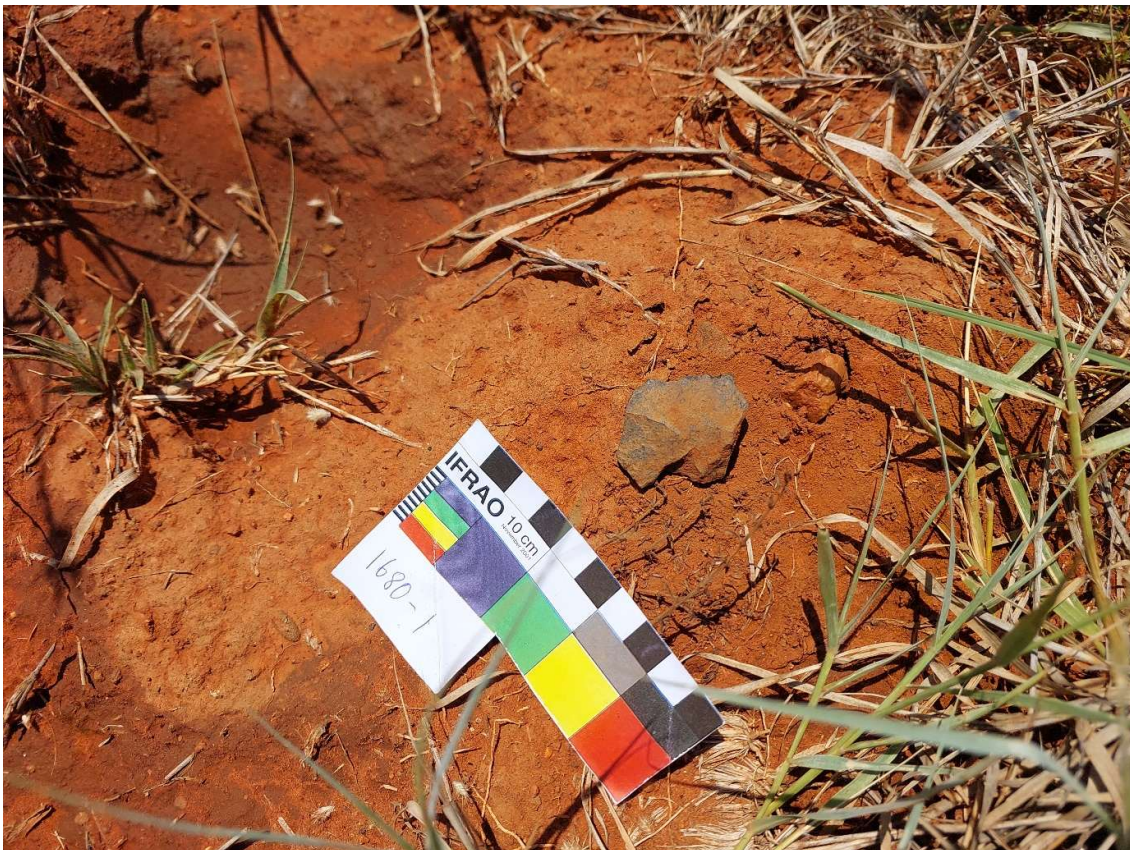


Figure 36: DR003 - A single LSA retouched chert flake identified approximately 20 meters north of the DR002 site.



Figure 37: DR004 - Two quartzite flakes identified approximately 20 meters south of the DR002 site.



Figure 38: DR005 - A single LSA retouched flake or scraper identified along the disturbed road to the south of DR002.



Figure 39: DR006 - Two large chert cores identified to the south of the area.

B) HISTORICAL FINDS

As a notable observation, ox-wagon ruts pre-dating modern roads were identified running from north to south across the area. These routes would have connected the outer-lying farms and areas with Kimberley town. The ruts are visible on Google Earth imagery, and are observed as wide, yet shallow trenches (Figure 40). The ruts themselves provide context on the significance of old routes to Kimberley and surrounding areas. These routes have since been replaced with modern roads and railways, many of which run parallel with the ruts in certain areas, with some cutting across the old ruts. As the ruts themselves do not constitute structures or archaeological objects as defined by the NHRA, they have not been graded nor considered as features protected by the NHRA.

Several historical items (no earlier than 20th century) were identified along a dirt road to the south of the area. Items included fragments of thick glass bottles (Figure 41) (DR007), as well as a metal plate holding inscribed or engraved information (Figure 42) (DR008). Based on the information on the plate, a relative date was obtainable, dating the finds to no earlier than 1973. Further, the inscriptions “SAR” and “SAS” were legible on the plate. After further research, it was concluded that the inscriptions on the plate refer to “South African Railways” and “Suid Afrikaanse Spoorwee” suggesting that the plate was associated with South Africa’s transport networks. A nearby railway to the south could suggest that the finds originated from passing trains. It is important to note that the finds were initially contemplated to be part of intersecting ox-wagon ruts. However, given the date on the plate, a relationship between the ruts and the finds is unlikely. Further, the nearby railway was already established since 1890, and the ox-wagon ruts no longer used. Following the date on the plate found, the finds are likely to date back no earlier than the early 1970s, and hence, it is difficult to consider these features as finds of heritage significance. Further, the finds will not be disturbed by the proposed activities since the dirt road in question is approximately 100m from the area to be developed.

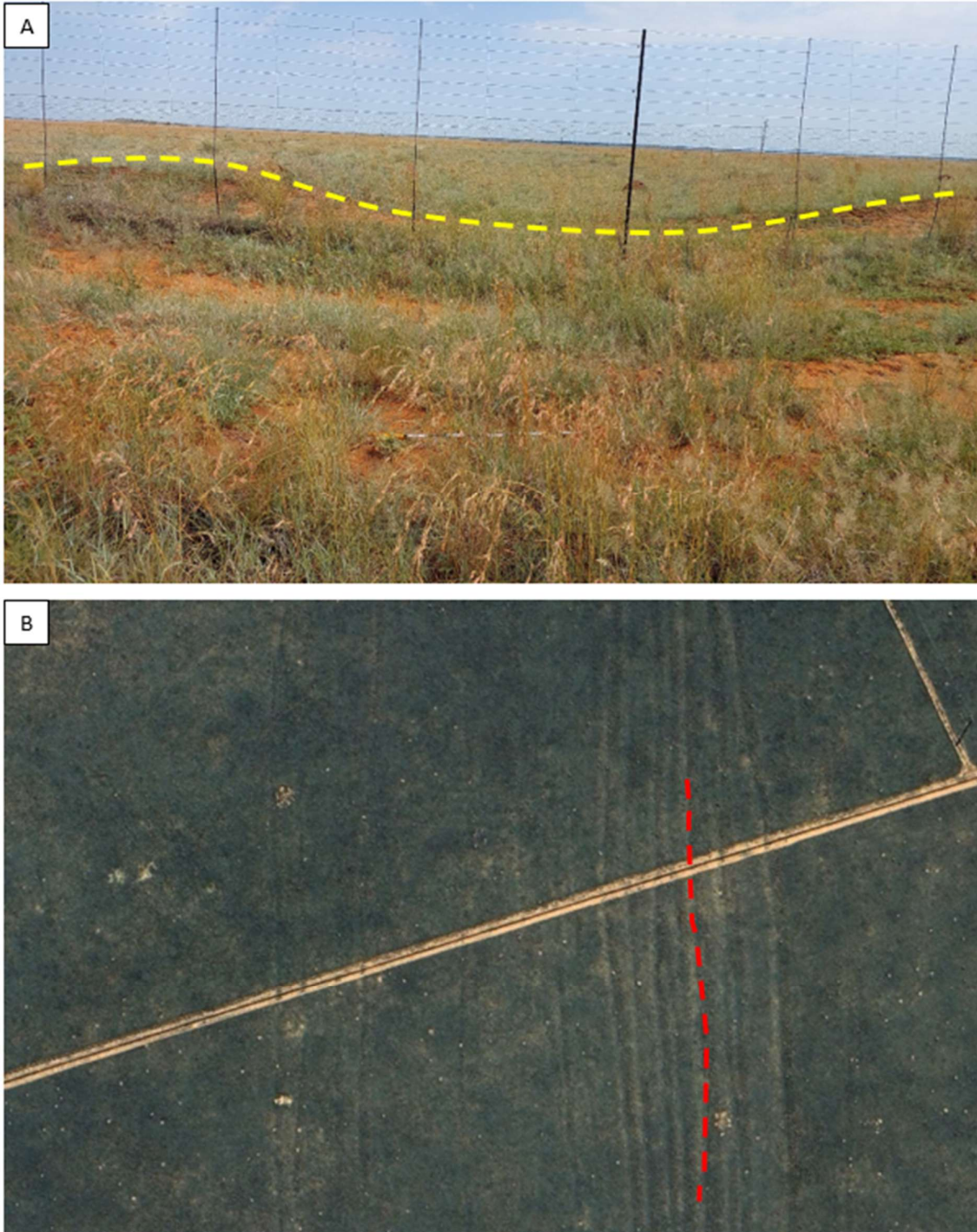


Figure 40: (A) Photograph of a cross-section of a single ox-wagon rut. Yellow line represents the curvature presented on the surface. (B) Google Earth satellite image of ox-wagon ruts running north to south of the area. Red line represents a single rut.

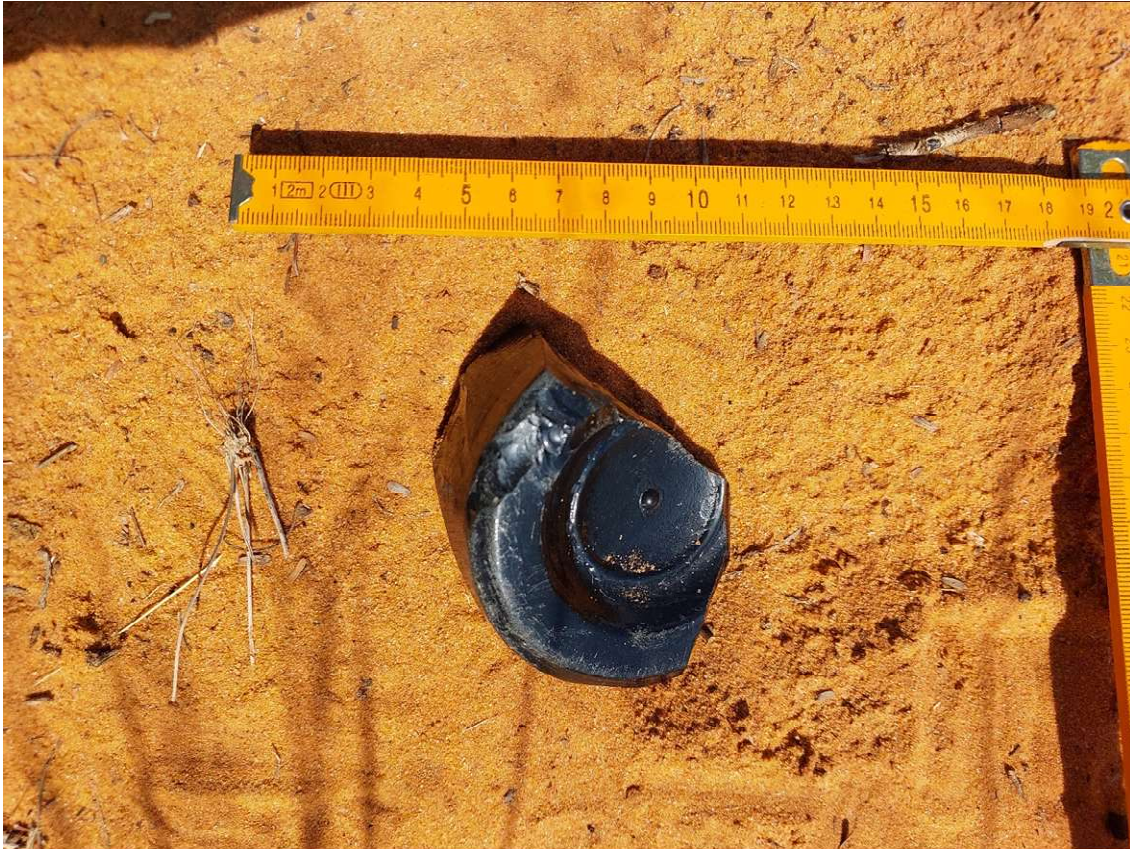


Figure 41: DR007 - The base of a thick glass bottle. Such bottles were typically produced between the early to mid-20th century.



Figure 42: DR008 - A metal plate with inscriptions discovered along an existing dirt road to the south of the farms. Plate is inscribed "1973 SAS SAR AMF, BR 306 P"



C) GRAVES

After liaising with the landowners and occupiers, a grave site in the south of the project area was pointed out (DR009)(Figure 43). The site is in proximity to old farm infrastructure and is densely vegetated. At least two unmarked graves were identifiable. The graves were covered with calcrete stones, with one including a stone meant to be a headstone. No details were obtainable about the date or people buried at the site. For this reason, this area was flagged as a site to be considered as potentially being of heritage significance. It is important to note that since the site was identified prior to the planning of the proposed activities, the site has been avoided since planning and will therefore not be affected. This grave site has been rated as Grade IV A, necessitating mitigation should destruction of the site be necessary in the future. This suggests that the site should be considered of High heritage significance. A 50-meter buffer around this site must be considered given its significance.

Following the field survey, it was concluded that the unmarked grave identified through the assessment of the First Edition Topographic maps does not fall within the properties affected. Further, the approximate location of this grave is about 80m from the northern boundary of the farms. The feature, although not discovered, will not be affected by the proposed activities.

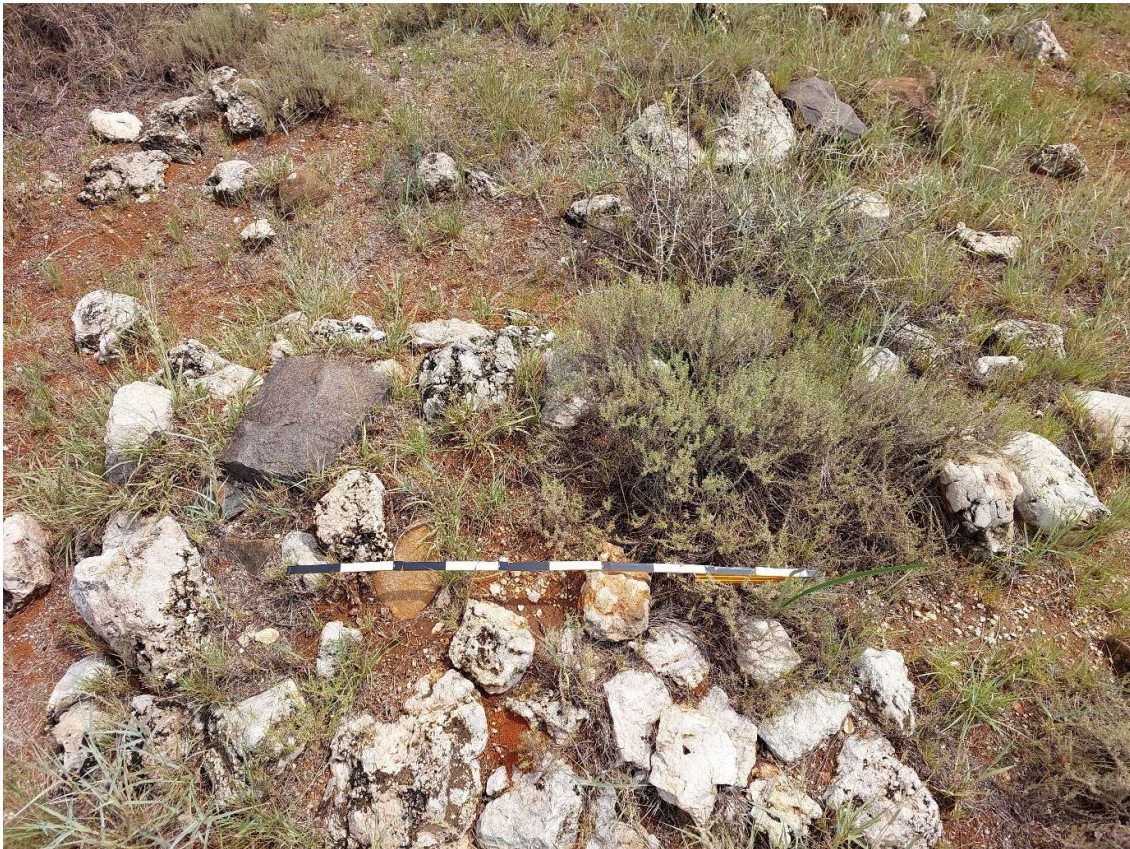


Figure 43: DR009 - Grave site identified to the south of the farms. Note the apparent headstone contrasting with calcrete stones around the grave.

5.3 SUMMARY OF FINDINGS

Following a desktop assessment, some potential heritage features or sensitivities were identified such as a grave to the north of the boundary of the farms to be developed. The grave's potential location corresponds with the location of the property Witpan 52 Portion 1 which was registered in 1907 and government property. On-site verification was unable to verify the exact location of the grave. While the grave may not be affected by activities, a buffer of 50 meters from the property Witpan 52 Portion 1 is here recommended. Through the field survey, 8



new finds and sites were identified, some of which hold heritage significance or value. This included stone age finds, 20th Century items, as well as graves. Although the 20th Century items hold historical value, their heritage significance is considered low, given that some of the items date back no earlier than 1973. The graves pre-identified through stakeholder engagement remain without associated dates or context, but as graves they have high sensitivity, it is preferable that they should remain undisturbed. They should also have a 50-meter buffer demarcated. Figure 44 and Figure 45 presents a visual summary of the different findings and their locations. Table 4 provides a summary of the different features identified, a description of the feature, as well as the coordinates of where the feature is located or a relative central point associated with a site.

Table 4: Summary of different finds and sites identified.

Feature No.	Description	Rating and Significance	Coordinate
DR001	Grave site identified through desktop assessment. The grave's potential location corresponds with the location of the small farm Witpan 52 Portion 1.	Grade III A High	Corner 1: 28°31'1.08"S, 24°46'26.06"E Corner 2: 28°31'1.28"S, 24°46'26.37"E Corner 3: 28°31'1.55"S, 24°46'26.14"E Corner 4: 28°31'1.35"S, 24°46'25.84"E
DR002	LSA stone tool site. Includes different formal tools and debitage.	Grade IV B Medium	28°32'28.17"S, 24°44'6.39"E
DR003	Single stone tool find – Retouched flake (LSA) found in proximity to stone tool site DR001.	Grade IV C Low	28°32'27.52"S, 24°44'6.61"E
DR004	Single stone tool finds – Two quartzite flakes found in proximity to stone tool site DR001.	Grade IV C Low	28°32'28.82"S, 24°44'5.98"E
DR005	Single stone tool find – Retouched flake (LSA) found along an existing dirt road.	Grade IV C Low	28°32'55.74"S, 24°44'6.23"E
DR006	Single stone tool finds – Two large chert cores found to the south of the area to be developed.	Grade IV C Low	28°33'16.93"S, 24°45'57.05"E
DR007	20 th Century glass fragments found along an existing dirt road to the far south of the area to be developed.	None	28°34'21.36"S, 24°44'26.00"E
DR008	Metal plate with punched inscriptions. A date was observed on the plate – 1973. Found at the same location as DR006.	None	28°34'21.36"S, 24°44'26.00"E
DR009	Grave site identified by landowners and land occupiers. Site includes at least two graves characterised by calcrete stones, with at least one inclusive of what appears to be a headstone.	Grade III A High	28°33'16.83"S, 24°45'53.78"E

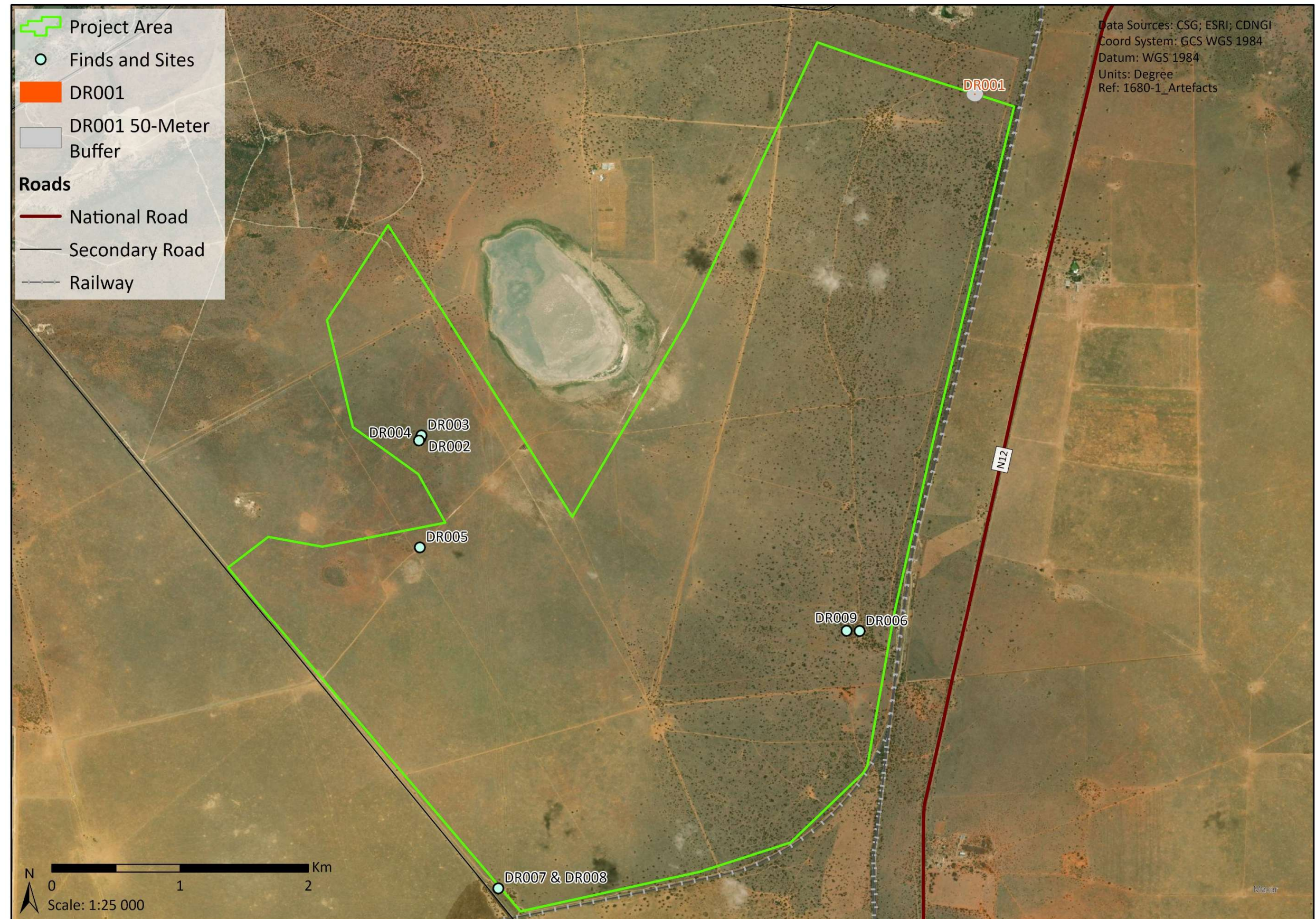


Figure 44: Map of the different finds and sites of interest identified during the field survey.



Figure 45: Map indicating the extent and location of DR001 and proposed 50-meter buffer.



6 IMPACT ASSESSMENT

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

6.1 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:

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

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:

$$S = C \times P$$

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)	Low (1)	Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is unlikely that the impact will result in spatial and temporal cumulative change.
	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:

$$\text{Priority} = \text{CI} + \text{LR}$$

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.

6.2 IDENTIFIED HERITAGE IMPACTS

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

As described in previous sections, identified impacts include the proposed activities' impact on the potential grave site (DR001) along the northern boundary of the farm Witpan 52. Due to the grave potentially dating to 1907, which would correspond with dates after the South African War, this site could potentially be the grave of a lost or unidentified soldier or veteran. This would likely explain why the property Witpan 52 Portion 1 was registered as "Colonial Government" property. Because of this, disturbance of the site may have an impact on regional heritage integrity. Hence, pre-mitigation, any impact on or threat to this site has been scored as High. It has therefore been proposed that the site be avoided considering a buffer of 50 meters from the property Witpan 52 Portion 1. This would ensure that the integrity of the potential below-ground remains are not disturbed. Not considering the buffer, the proposed activities are approximately 40 meters away from Witpan 52 Portion 1. The proposed 50-meter buffer will ensure that activities do not disturb any potential burial, and therefore renders the post-mitigation score as Low. The implementation of the proposed buffer would necessitate an alternative approach to the proposed activities, mainly the clearance of land, to ensure that the grave site is avoided.

The identified graves (DR009) represent areas of higher sensitivity and will be avoided. However, a 50-meter buffer is here proposed to be placed around the grave site as a precautionary measure despite not being affected by the proposed activities.

While the features identified represent markers of heritage significance (in particular, the stone age finds as well as grave sites), the occurrence of below-ground heritage finds is 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 it necessary.

Altogether, post-mitigation of the identified heritage impacts is rated a 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 diminish the adverse effects of development on heritage resources and features, 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
DR001	Destruction or disturbance of potentially important grave site	Alternative 1	Construction	-1	4	5	3	5	-4,25	4	-17	High -	-1	1	1	2	1	-1,25	2	-2,5	Low -	Medium	1	2	1,13	-2,81	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	2	-7,5	Medium to low -	-1	1	1	2	3	-1,75	2	-3,5	Low -	Medium	1	2	1,13	-3,94	Low -



7 RECOMMENDATIONS AND MITIGATIONS

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

7.1 SITE-SPECIFIC RECOMMENDATIONS AND MITIGATIONS

Table 13 provides 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 vegetation and removal of topsoil for proposed pivot agriculture activities. Firstly, mitigation measures here advise for the avoidance of identified heritage features at risk considering a 50-meter buffer. Further, the mitigation measures recommended serves to address the potential of further discoveries advising for the implementation or recognition of a heritage protocol and chance find procedure as contemplated in 7.3.

Table 13: List of site-specific mitigations and recommendations

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures / Management Actions	Compliance with Standards	Time Period for Implementation
Construction which may involve clearing of land	Construction	Destruction or disturbance of potential important grave sites (DR001 and DR009).	<ul style="list-style-type: none"> Site should be avoided considering a 50-meter buffer. The Heritage Protocol or Chance Find Procedure as described in 7.3 is advised to be followed should additional heritage finds or sites be encountered. 	NHRA	During construction activities
Construction which may involve clearing of land	Construction	Unidentified below-ground heritage features	A Heritage Procedure is advised to be followed should additional heritage finds or sites be encountered.	NHRA	During construction activities

7.2 OVERALL RECOMMENDATIONS

As a key overall recommendation, the site to be developed (that is the farm portions themselves, and not the footprint of the development) holds several heritage resources including graves, stone tool finds and sites. Many of these will not be disturbed or impacted on through the proposed activities. A 50-meter buffer has been proposed for the avoidance of two potential heritage features (DR001 and DR009). The developer is further reminded to remain cognizant of the potential to discover unidentified above-ground and below-ground finds and sites. Upon discovery of any additional heritage finds of high significance, for example, graves or high density of small finds, a Heritage Finds or Chance Find Procedure should be followed.

7.3 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.

8 CONCLUSION

This report was prepared as part of a Phase 1 Heritage Impact Assessment for the proposed Aqua Farming Droogfontein Pivot Agriculture Project. As part of this assessment, a desktop as well as an on-site evaluation of heritage impacts was conducted.

Through the methodology adopted as part of this assessment, heritage features were identified which can be avoided during the implementation of the proposed activities. Apart from unassessed chance finds, a 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 significant foreseeable impacts and can proceed as long as the recommended mitigation measures are implemented.



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Appendix 1: CV of the Archaeologist

CURRICULUM VITAE

Name:	Lucien Nicolas James
Nationality:	South African
Date of Birth:	4 May 1993
Profession:	Environmental Consultant and Archaeologist
Professional Qualification/ Training:	BA (Archaeology and Geography); Wits University, 2017
	BSc (Hons) Geography, Archaeology and Environmental Studies; Wits University, 2018
	MSc (Geography); Wits University, 2021
	Ph. D. (Geography); Wits University, 2024
Professional Membership/ Registrations:	Registered Candidate Environmental Assessment Practitioner (EAPASA reg. no. 2023/6772)
	Accredited Professional Archaeologist (ASAPA member no. 0619)
Publications:	James, L. & Simatele, M.D. 2024. Bystanders or active participants? Mobilising meaningful participation in River Basin Management: Lessons from the Gauteng Province, South Africa. <i>International Journal of River Basin Management</i> . https://doi.org/10.1080/15715124.2024.2417405 .
Current Employer:	Environmental Impact Management Services (Pty) Ltd.

KEY EXPERIENCE

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 as a Candidate EAP. Lucien has obtained a BSc (Hons) in Geography, Archaeology and Environmental Studies (Archaeology-focused) and is accredited as a Professional Archaeologist with 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 has also published his research in an international academic journal. 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.



CAREER SUMMARY

Period: Current	Organisation: EIMS	Position: Environmental Consultant and Archaeologist
Key Projects/Assignments	<p><u>Project experience:</u></p> <ul style="list-style-type: none"> • AEMFC Herbert Prospecting Basic Assessment – Public Participation • Aries-Kronos 400kV Powerline Upgrade – Project Assistance, on-site specialist oversight, Water Use License • Block 3B/4B Oil and Gas Offshore Exploration EIA – Public Participation • ENEL Solar PV – External Audit • Harmony Freddie's to Target Pipeline Part 1 EA Amendment and WUL Amendment – Project Management • Harmony FSN Pipeline Basic Assessment – Public Participation • Harmony Kusasaletu Pipeline Basic Assessment – Public Participation • Harmony Mispah Pipeline Basic Assessment – Public Participation • Harmony Nooitgedacht TSF EIA – Public Participation • Harmony Valley TSF EIA – Public Participation • Kusile Power Station Temporary Stacks MES Postponement and AEL Variation Application • Mine Waste Solutions Kareerand Pipeline Basic Assessment – Public Participation • Mooiplaats WUL Amendment – Project Management • Mulilo Struisbult PV2 EMPr Amendment – Public Participation • Mulilo Struisbult PV2 Grid Connection Basic Assessment – Public Participation • Selkirk Avenue Development Pipeline Basic Assessment and EMPr – Project Assistance • Sibanye KDT1 Remining EIA – Public Participation and Heritage Impact Assessment (Exemption) • Sibanye Western Limb Tailings Re-treatment Facility Retrofitting Basic Assessment – Public Participation • Tetra4 Cluster 2 Gas Production EIA – Public Participation • Tetra4 Powerline Basic Assessment – Public Participation • Thungela Lephalale CBM EIA – Public Participation and Water Use License 	
Heritage Project/ Assignments	<ul style="list-style-type: none"> • Motouane RBD12 Pre-drill Survey Heritage Reporting 	



	<ul style="list-style-type: none">• Glencore RCM Phase 1 HIA• BMM Sandgat Prospecting Desktop HIA• BMM Oubip Prospecting Desktop HIA• Aqua Farming Droogfontein Pivot Agriculture HIA
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LANGUAGE CAPABILITY

Language	Speak	Read	Write
English	Excellent	Excellent	Excellent
Afrikaans	Basic	Intermediate	Intermediate
French	Excellent	Excellent	Excellent
Spanish	Basic	Intermediate	Intermediate
Latin	N/A	Basic	Basic

DECLARATION

I confirm that the above information contained in the CV is an accurate description of my experience and qualifications at the time of signature.


Signature of Staff Member

24/01/2025

Date



Appendix 2: Specialist Declaration

 EIMS ENVIRONMENTAL IMPACT MANAGEMENT SERVICES		SPECIALIST DECLARATION	
EIMS Ref	1680	Project Name	Aqua Farming Droogfontein Pivot Agriculture

Project Details

Project Name	Aqua Farming Droogfontein Pivot Agriculture
Applicant	Aqua Farming (Pty) Ltd
Competent Authority	Northern Cape Department of Environment and Nature Conservation


Specialist Details

Specialist Company	Environmental Impact Management Services (Pty) Ltd			
Specialist Name	Lucien James			
Contact details	Tel	0117897170	Cell	0812376735
	E-mail	lucien@eims.co.za		
	Postal Address	PO Box 2083, Pinegowrie 2123, South Africa		
	Physical Address	8 Dalmeny Road, Pine Park, Randburg		

General Declaration

By signing this form, I hereby declare that:

- I act as an independent specialist in this application.
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant.
- I declare that there are no circumstances that may compromise my objectivity in performing such work.
- I have expertise in conducting undertaking the specialist work as required, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity.
- I will comply with the Act, Regulations, and all other applicable legislation.
- I have not, and will not engage in, conflicting interest in the undertaking of the activity.
- I understand to disclose to the applicant and competent authority all material information in my possession that reasonably has or may have the potential of influencing- any decision to be taken with respect to the application by the competent authority; and the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority.
- I have taken into account, to the extent possible, the matters referred to in Regulation 18 when preparing the report, plan or document.
- I will provide the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not.
- All the particulars furnished by me this form are true and correct.

 EIMS ENVIRONMENTAL IMPACT MANAGEMENT SERVICES		SPECIALIST DECLARATION	
EIMS Ref	1680	Project Name	Aqua Farming Droogfontein Pivot Agriculture

- I will perform all other obligations as expected from an environmental assessment practitioner in terms of the Regulations.
- I am aware of what constitutes an offence in terms of Regulation 48 and that a person convicted of an offence in terms of Regulation 48(1) is liable to the penalties as contemplated in Section 49B of the Act.

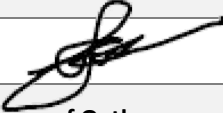
Disclosure of Vested Interest

- I do not have and will not have any vested interest (either business, financial, personal or other) in the proposed activity proceeding other than remunerative for work performed in terms of the Regulations.

Undertaking Under Oath/Affirmation

By signing this form, I swear under oath/affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.

Signatures

Specialist					
Name	Lucien James	Signature		Date	09/01/2025
Commissioner of Oaths					
Name		Signature		Date	
Commissioner of Oaths Official Stamp					