

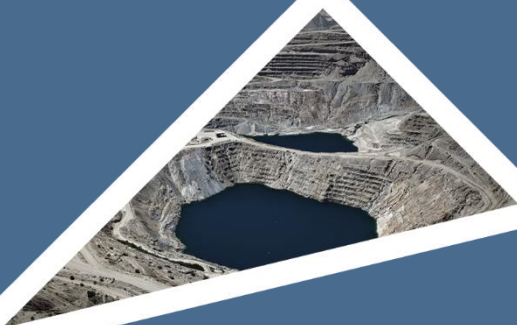


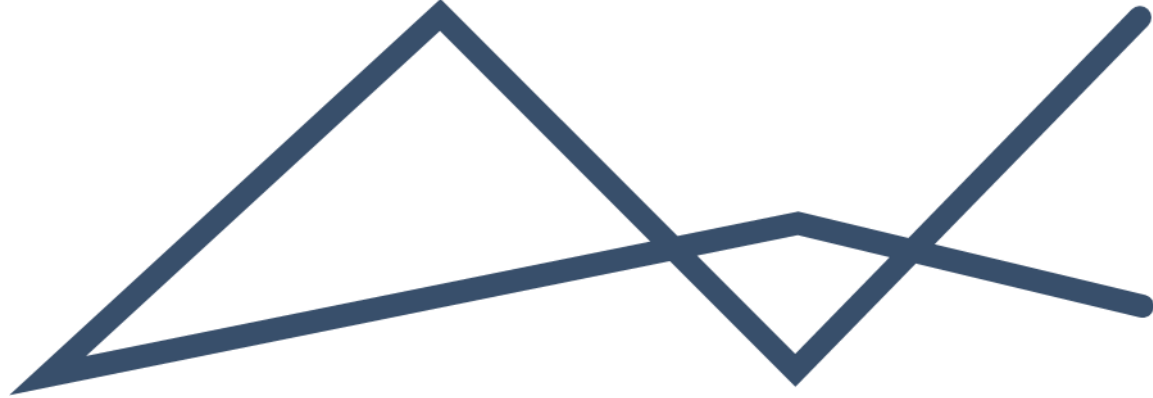
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NTCSA ARIES-PAULPUTS-KOKERBOOM 400KV LOOP-IN-LOOP-OUT POWERLINE AND PAULPUTS SUBSTATION UPGRADE ACROSS VARIOUS FARMS, KHÂI-MA AND KAI !GARIB LOCAL MUNICIPALITIES, NORTHERN CAPE PROVINCE

PHASE 1 HERITAGE IMPACT ASSESSMENT REPORT





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Appendix 1: CV of the Archaeologist

Appendix 2: Specialist Declaration



Abbreviations

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



Executive Summary

The National Transmission Company South Africa SOC Ltd (NTCSA) (hereafter referred to as the applicant) has appointed Environmental Impact Management Services (Pty) Ltd (EIMS) as the Environmental Assessment Practitioner (EAP) to undertake the required authorisation processes and compile the necessary documentation for the proposed Aries–Paulputs–Kokerboom 400 kV Loop-In Loop-Out (LILo) Powerline and Paulputs Substation Upgrade in the Northern Cape Province. This Heritage Impact Assessment (HIA) forms part of the Basic Assessment process required for the project.

The proposed activity entails the construction of a new 49 km long 400 kV LILo powerline and the expansion of the existing Paulputs Substation. The project is driven by the Northern Cape network strengthening requirements for renewable energy integration as outlined in IRP 2019. The infrastructure will enable reliable evacuation of renewable power from Paulputs Substation and provide flexibility for future generation capacity. The development footprint traverses multiple farms within the Khâi-Ma and Kai !Garib Local Municipalities, approximately 30 km northeast of Pofadder.

A comprehensive assessment was conducted to evaluate potential impacts on archaeological and heritage resources. The study included a literature review, desktop assessment, and a three-day field survey. For the sake of this assessment, a 1km corridor along the powerline route (500 meters on either side of the surveyed powerline route) was considered and a brief scan of potential features was conducted. Through the desktop investigation, three heritage features were identified, i.e., a windmill and farm infrastructure, the Hellum Farm Complex, and the Bladgrond Farm Cemetery. These features were confirmed to be older than 60 years and protected under the National Heritage Resources Act (NHRA). The field survey identified 32 additional sites, including Stone Age artefacts (ESA, MSA, and LSA), ostrich eggshell fragments, historical rubble, and middens. Most of these features were assessed as low significance; however, the hill site (ARI028), two knapping sites, and certain structures were graded as higher significance.

The proposed development can proceed, provided that recommended mitigation measures are implemented. These include applying 30-meter buffers around sensitive sites (structures, knapping sites, middens, and the hill) and adopting a Heritage Chance Find Procedure during construction. This procedure requires halting work if significant finds are uncovered, recording their location, and consulting a qualified archaeologist for evaluation.

No significant heritage resources were identified within the development footprint that would prevent the project from proceeding. As long as the proposed mitigation measures are followed, the overall impact on heritage resources is considered Low. Therefore, from an archaeological perspective, the development will not have significant foreseeable impacts and can proceed subject to compliance with the recommended measures.



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

National Transmission Company South Africa SOC Ltd (NTCSA) (hereafter referred to as the applicant) has appointed Environmental Impact Management Services (Pty) Ltd (EIMS) as the Environmental Assessment Practitioner (EAP) to assist with undertaking the required authorisation processes (including the statutory public participation), and to compile and submit the required documentation in support of their proposed development of an upgrade to Paulputs Substation and the construction of a Loop-In-Loop-Out (LILO) Powerline from Paulputs Substation connecting to the existing Aries-Kokerboom powerline in the Northern Cape Province.

The proposed project is for construction of a new 49km long 400kV loop-in loop-out powerline as well as an expansion of the existing Paulputs substation. The need for the project is based on the Northern Cape Strengthening for Renewable Generation Integration (IRP 2019). To provide future reliability and flexibility in the evacuation of renewable power from Paulputs Substation, an additional 400 kV infeed is proposed via a loop in loop out from the Aries – Kokerboom 400 kV line. The project is part of the group of projects identified for the Northern Cape network strengthening requirements in meeting the IRP 2019 renewables generation integration. The installed generation capacity in the Northern Cape already exceeds the peak load in the province. Generation capacity is expected to increase in the province as a result of bulk renewable energy generation capacity allocation due to favourable sun and wind conditions. Therefore, significant network infrastructure is required to enable the integration and evacuation of power from the renewable energy plants anticipated in the province.

For the sake of this assessment, a 1km corridor along the powerline route (500 meters on either side of the surveyed powerline route) was considered and a brief scan of potential features was conducted.

The project falls within the promulgated Strategic Transmission Corridors as per the GN R.113 dated 16 February 2018 and therefore will follow a Basic Assessment Process.

The proposed project is located on Farms Blad-Grond South No. 94 Portions 3, 0 (Remaining Extent), 1 (Remaining Extent), 4 (Remaining Extent), 5 (Remaining Extent), Blad-Grond North No. 77 Portion 2 (Remaining Extent), Steyns Puts 178 Portion 1 (Remaining Extent), Lucas Vlei No. 93 Portion 4 (Remaining Extent), 5 (Remaining Extent), Scuit-Klip No. 92 Portions 0 (Remaining Extent), 1 (Remaining Extent), 2 (Remaining Extent), 4, and Konkoonsies No. 91 Portion 1 and 6, in the Khâi-Ma and Kai !Garib Local Municipalities, Northern Cape. The site is approximately 30kms northeast of Pofadder. The key points of the site are proposed powerline route – Start: 28°52'43.12"S; 19°33'53.35"E; Middle: 28°52'47.57"S; 19°33'56.49"E; End: 28°51'42.17"S; 20°0'18.92"E. See Figure 1 for Locality Map.

1.2 HERITAGE SPECIALIST DETAILS

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

Dr Lucien James is an Environmental Consultant and Archaeologist with experience in different fields across the Arts, Social Science, Natural Science, and academia in general. He has been employed by EIMS as an environmental consultant since March 2023 working on several projects under various roles. He is registered with EAPASA (Environmental Assessment Practitioners Association of South Africa) as a Candidate EAP (Environmental Assessment Practitioner). Lucien has obtained a BSc (Hons) in Geography, Archaeology and Environmental Studies (Archaeology-focused) and is accredited as a Professional Archaeologist with the Association of South African Professional Archaeologists (ASAPA). He holds a MSc in Geography having done



research on phytoremediation and the mining industry. In 2024, he completed his Ph.D. through research with a focus on collaborative River Basin Management in South Africa. He has worked as a Teaching Assistant (TA) and researcher since 2018 and engages in academic work through publications and conferences. He has taught 1st year, 2nd year, 3rd year and Honour's Archaeology and Geography courses. His research has been funded by the National Research Foundation (NRF) and the Water Research Commission (WRC). He is also actively publishing new papers in international academic journals. He has presented his research at a national level through various conferences in South Africa and has participated in other conferences and workshops on Climate Change and Climate Change Adaptation.

Table 1: Details of the Archaeologist

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

1.3 DECLARATION

Refer to Appendix 2 for Declaration of the Archaeologist.

1.4 TERMS OF REFERENCE

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

- Identifies the sites as well as potential associated heritage objects within and in close proximity of the footprint of a study area,
- Assesses the significance of sites and heritage objects,
- Comment on the impact of the development,
- Make recommendations for the mitigation or conservation of sites and associated Heritage objects

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

1.5 LEGISLATIVE REQUIREMENTS

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

The National Heritage Resources Act (Act 25 of 1999 – NHRA) stipulates that cultural heritage resources may not be disturbed without authorisation from the relevant heritage authority. Section 34(1) of the NHRA states that,



“no person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority...” The NHRA is utilised as the basis for the identification, evaluation and management of heritage resources and in the case of Cultural Resource Management (CRM) those resources specifically impacted on by development as stipulated in Section 38 of NHRA, and those developments administered through the National Environmental Management Act (Act 107 of 1998 – NEMA), and Mineral and Petroleum Resources Development Act (Act 28 of 2002 – MPRDA). In the latter cases the feedback from the relevant heritage resources authority is required by the State and Provincial Departments managing these Acts before any authorisations are granted for a development. The last few years have seen a significant change towards the inclusion of heritage assessments as a major component of Environmental Impact Processes required by the NEMA and MPRDA.

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

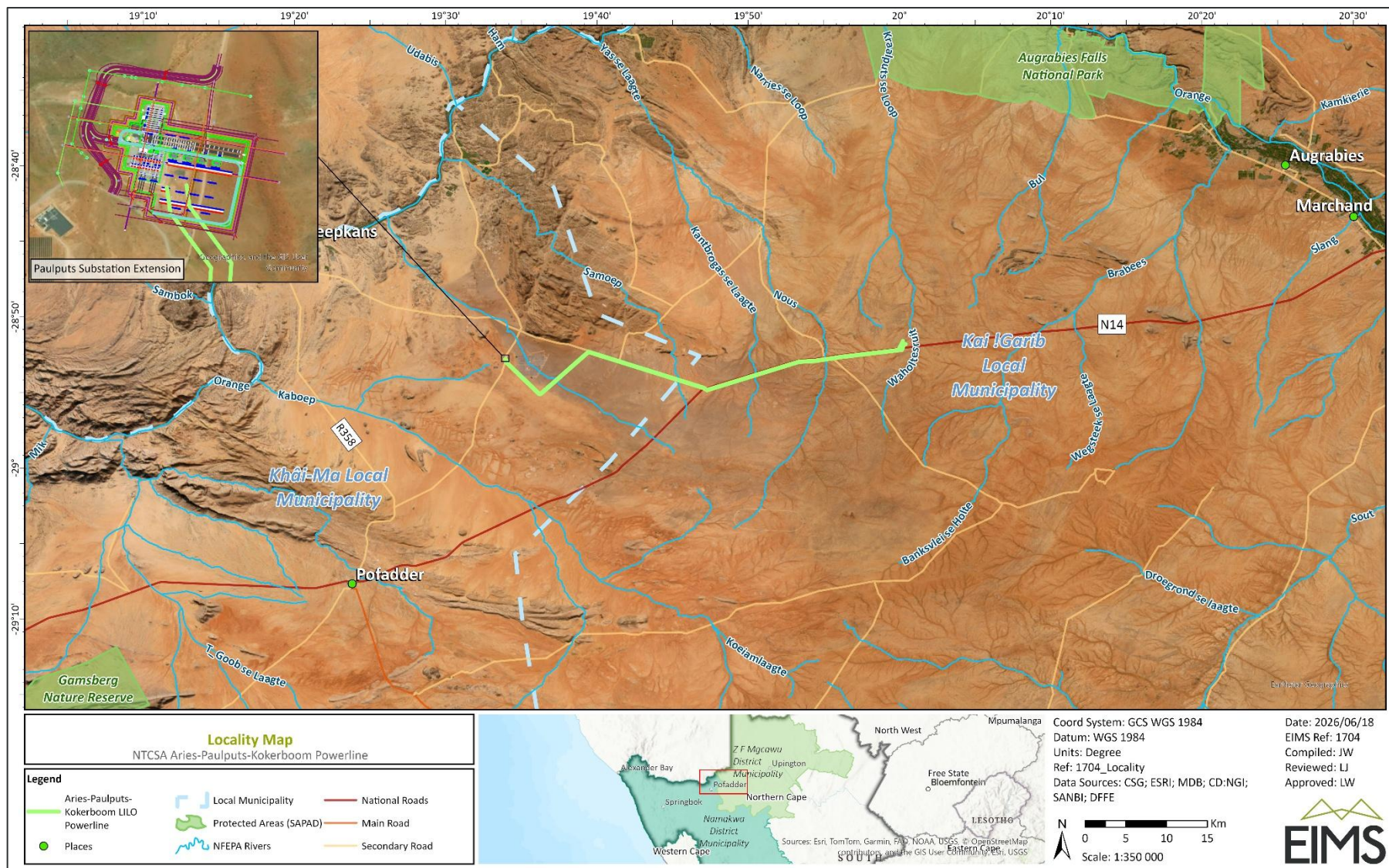


Figure 1: Locality Map



2 ARCHAEOLOGICAL BACKGROUND

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

2.1 LITERATURE REVIEW

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

2.1.1 OVERVIEW OF ARCHAEOLOGY IN SOUTH AFRICA

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

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

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

2.1.2 THE STONE AGE

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

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

A) EARLIER STONE AGE

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

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

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



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

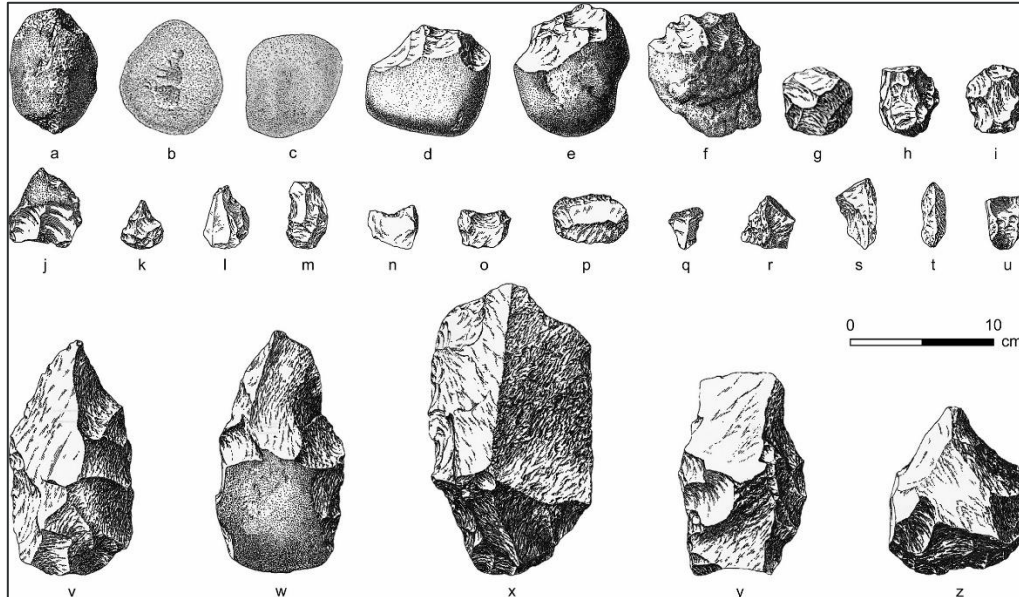


Figure 2: Examples of ESA lithics. Typical Oldowan tools (a-f). Acheulean LCTs (v-z) (after Kuman and Gibbon, 2018).

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.

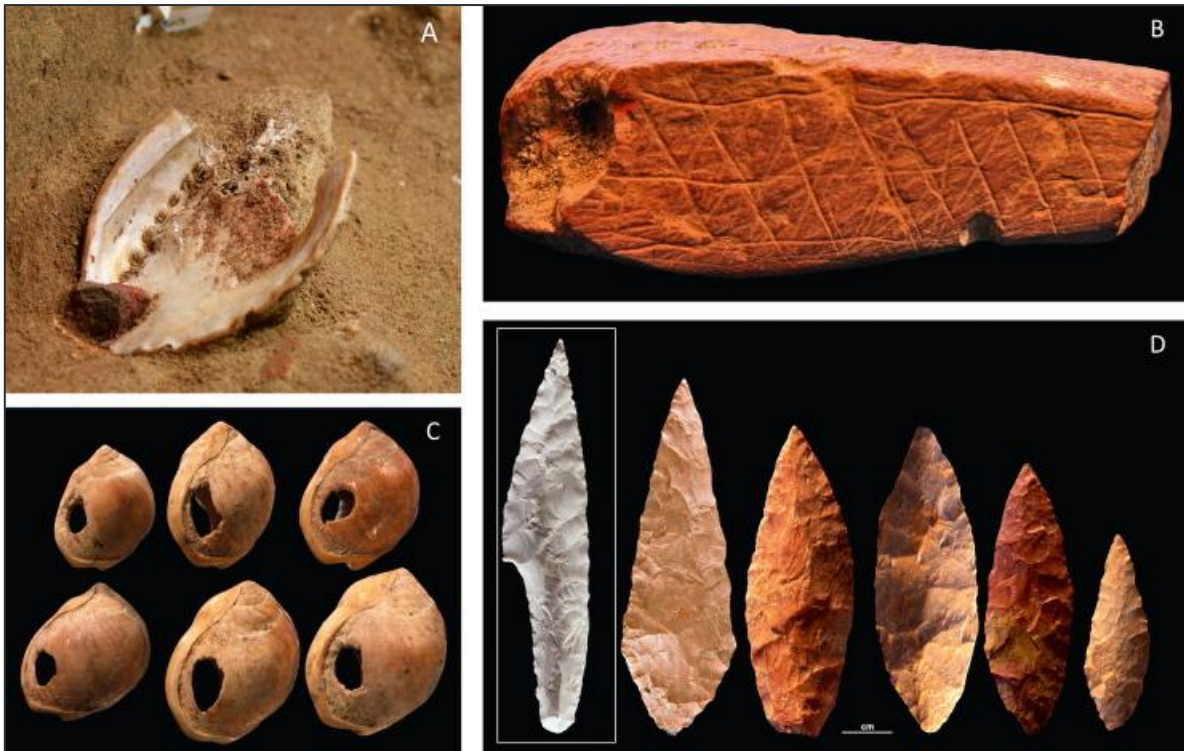


Figure 3: Examples of MSA material evidence or artefacts after Wadley (2015). Abalone (*Haliotis midae*) shell with traces of an ochre-rich liquid (A); engraved ochre slab (B); perforated shells (C); Still Bay points (D). (after Henshilwood, 2012)

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).

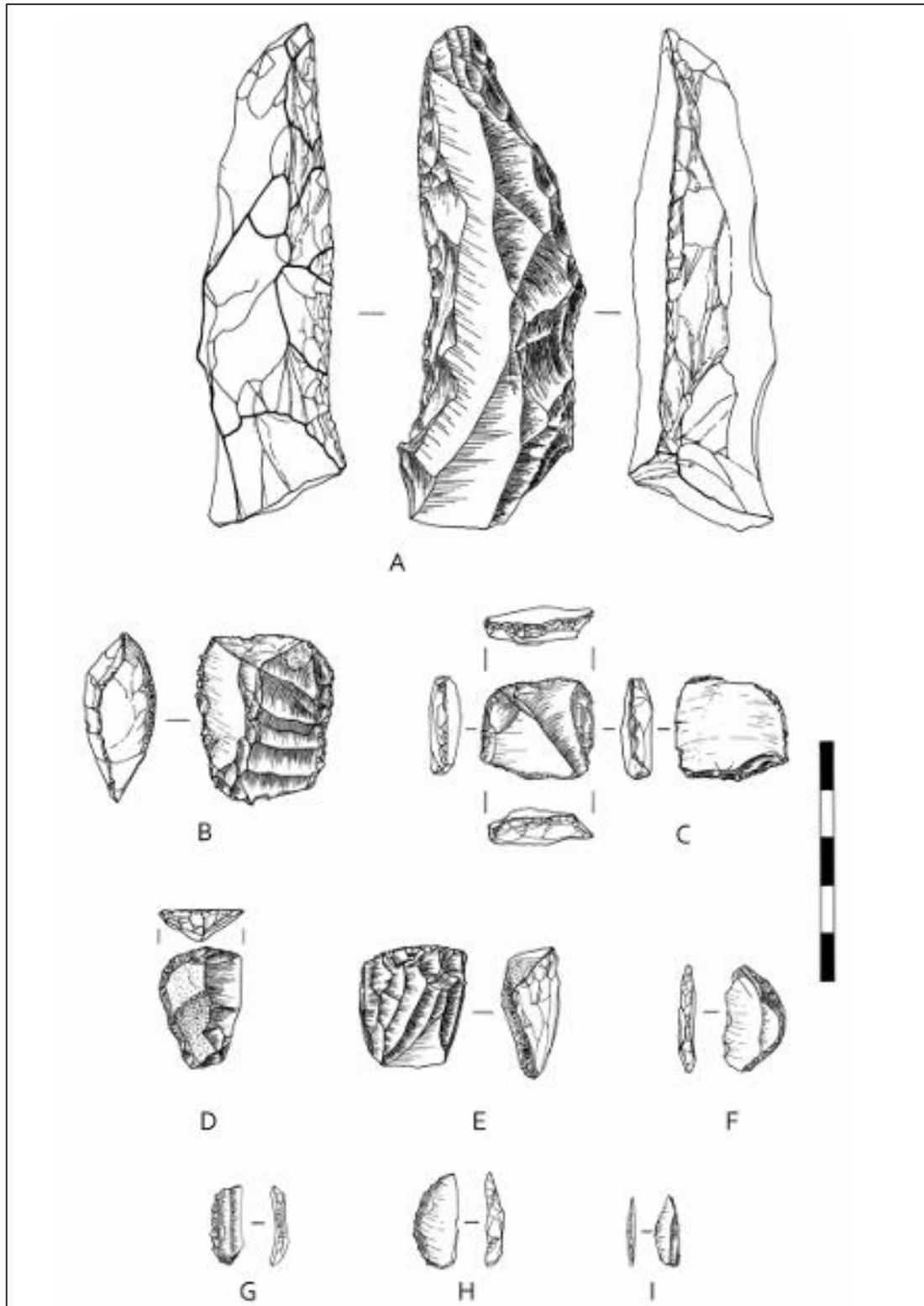


Figure 4: Examples of an adze (A), scrapers (B-D, G), backed bladelets (I), bladelet cores (E), and segments (F, H). Typical pieces associated with the LSA (after Forssman *et al.*, (2010))

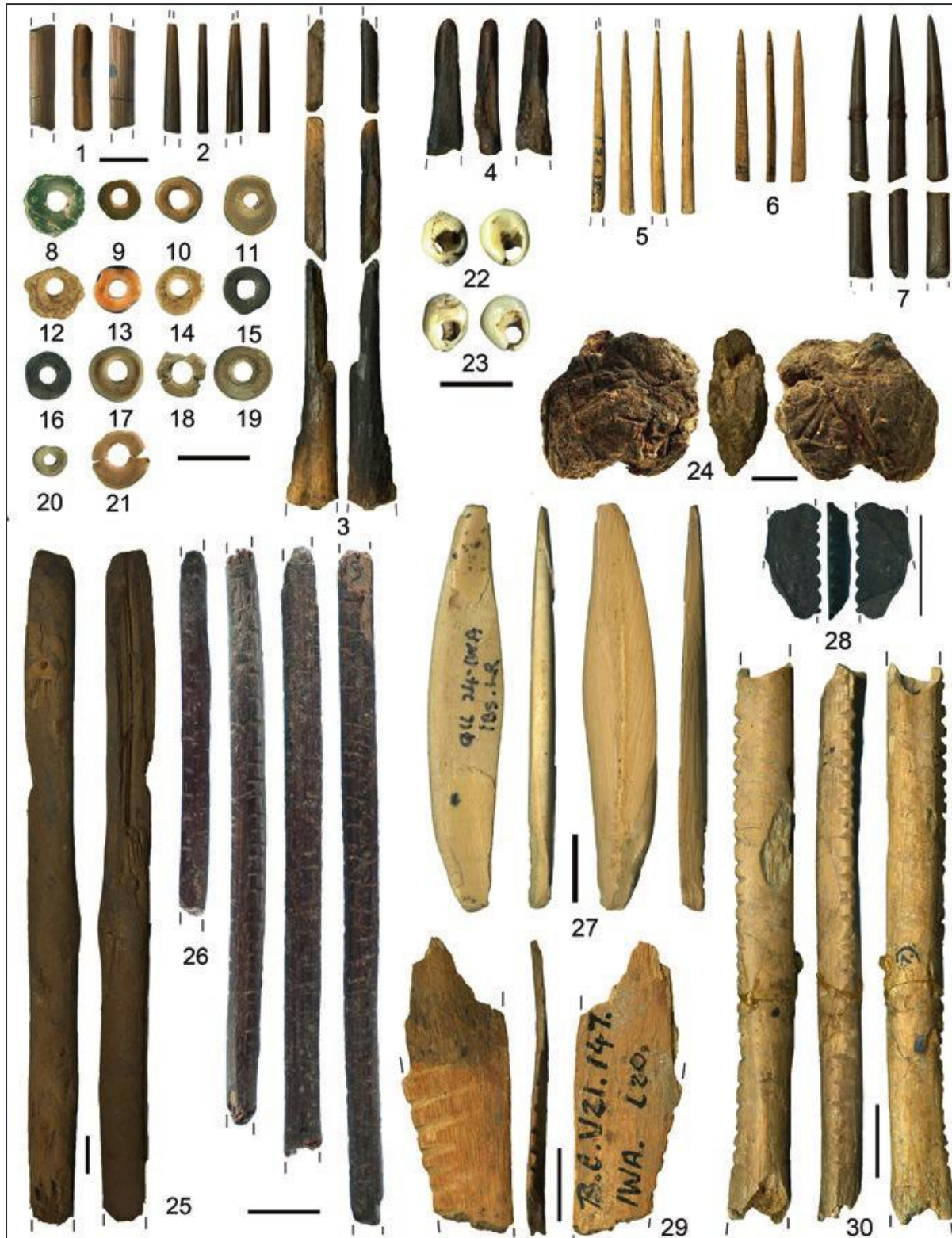


Figure 5: Some examples of LSA organic material remains from Border Cave. Bone awls and points (1-7), Ostrich Eggshell beads (8-21), tick shell beads (22-23), bound organic material (24), digging stick (25), poison applicator (26), implement made from warthog or bushpig lower canine (27), and notched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

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).

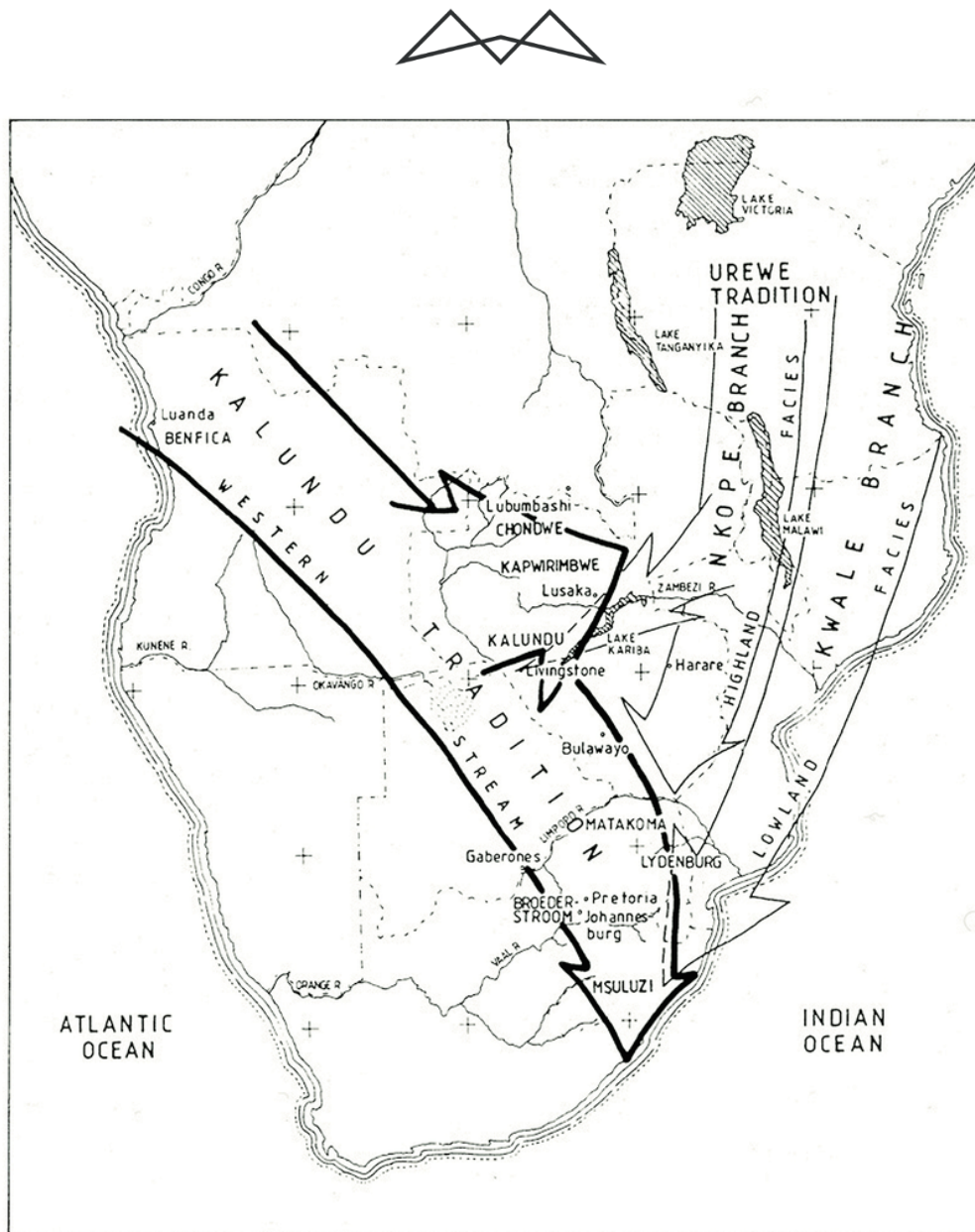


Figure 6: General understanding of Bantu migrations related to the larger ceramic traditions, Kalundu (Western Stream) and Urewe (Nkope and Kwale Branches) (After Huffman, 1989).

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.

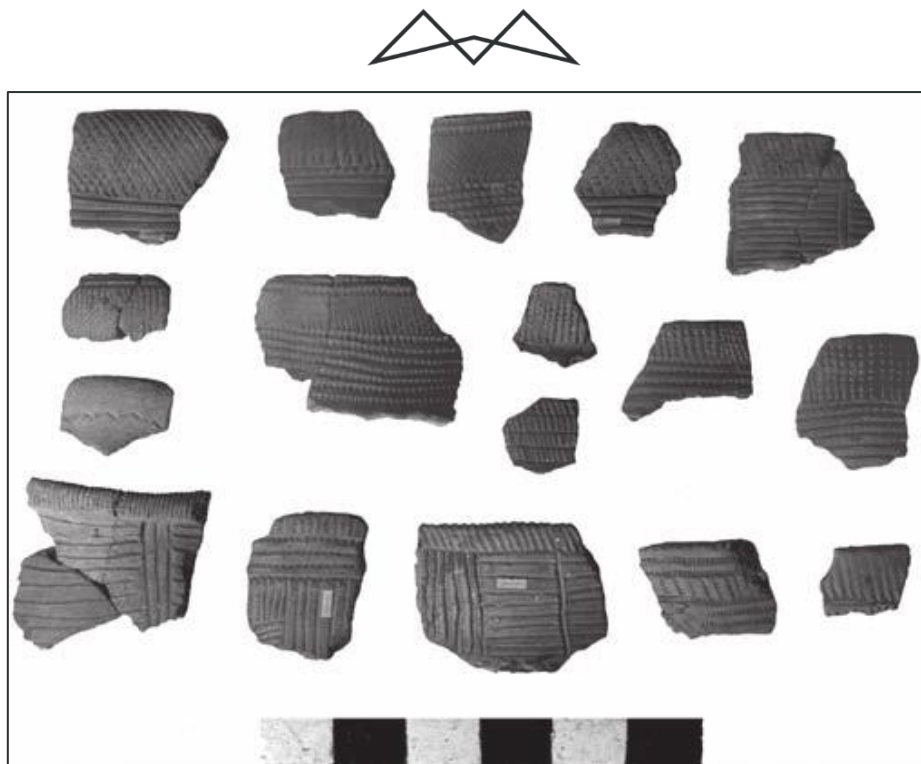


Figure 7: Examples of Bambata Potsherds (Huffman, 2005).

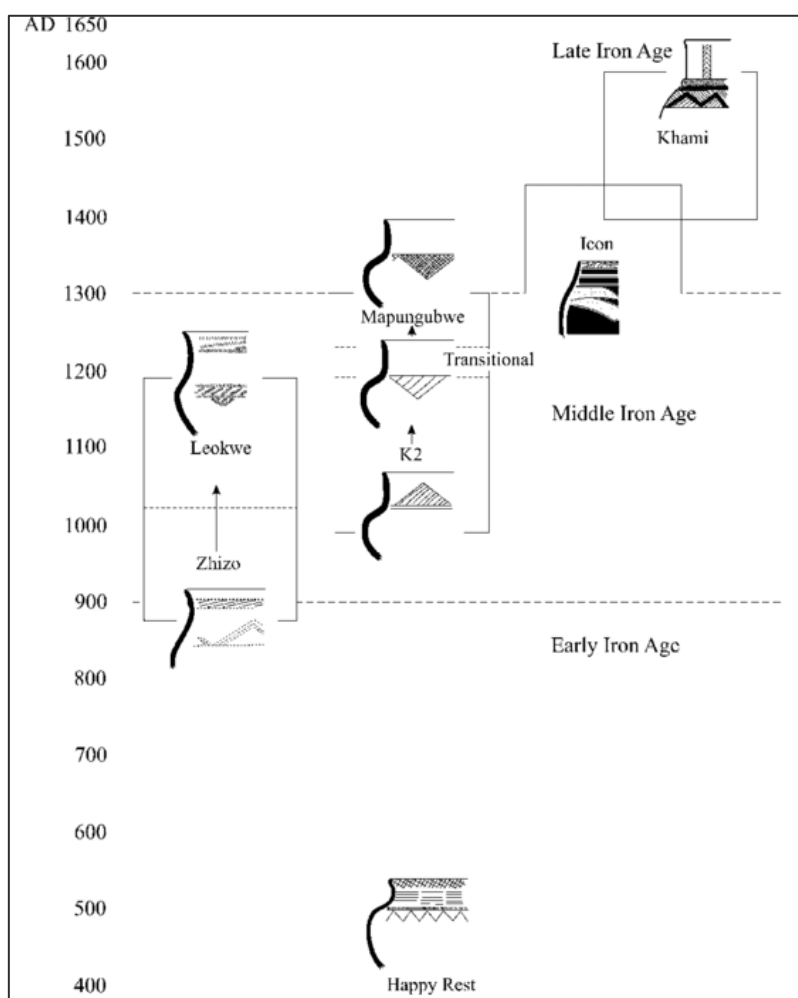


Figure 8: An Iron Age ceramic sequence demonstrating transitions between K2 and Mapungubwe ceramic styles (Huffman, 2009).

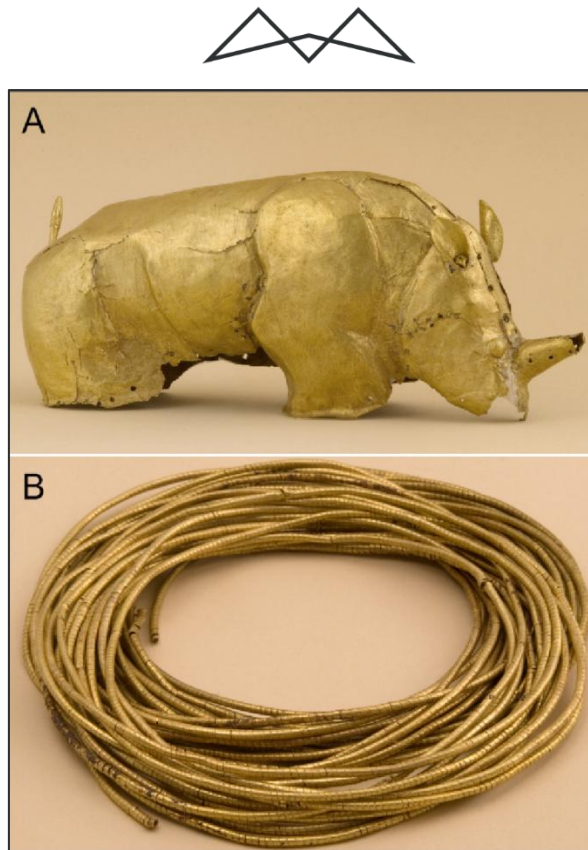


Figure 9: Famous golden implements of Mapungubwe (A - Golden Rhinoceros, B - Golden anklets) (Woodborne *et al.*, 2009).

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).

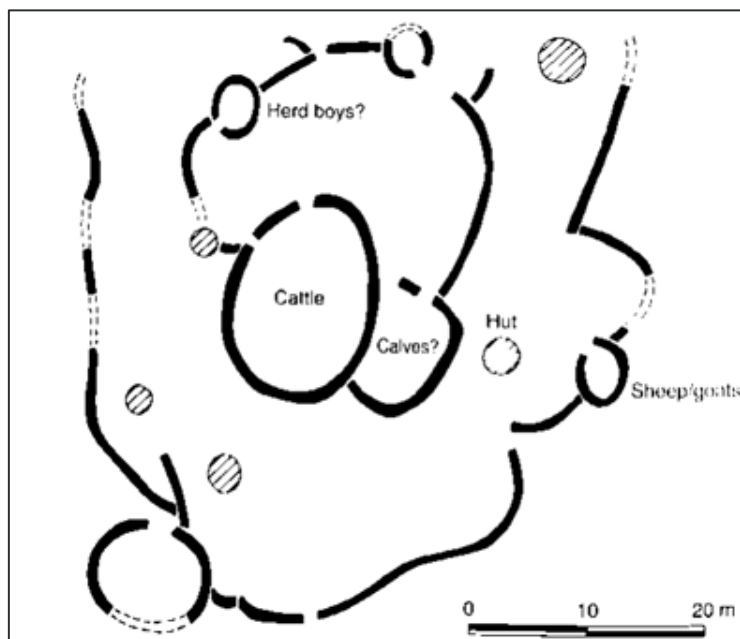


Figure 10: Type N stone wall structures as illustrated by Maggs (1976).



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)).

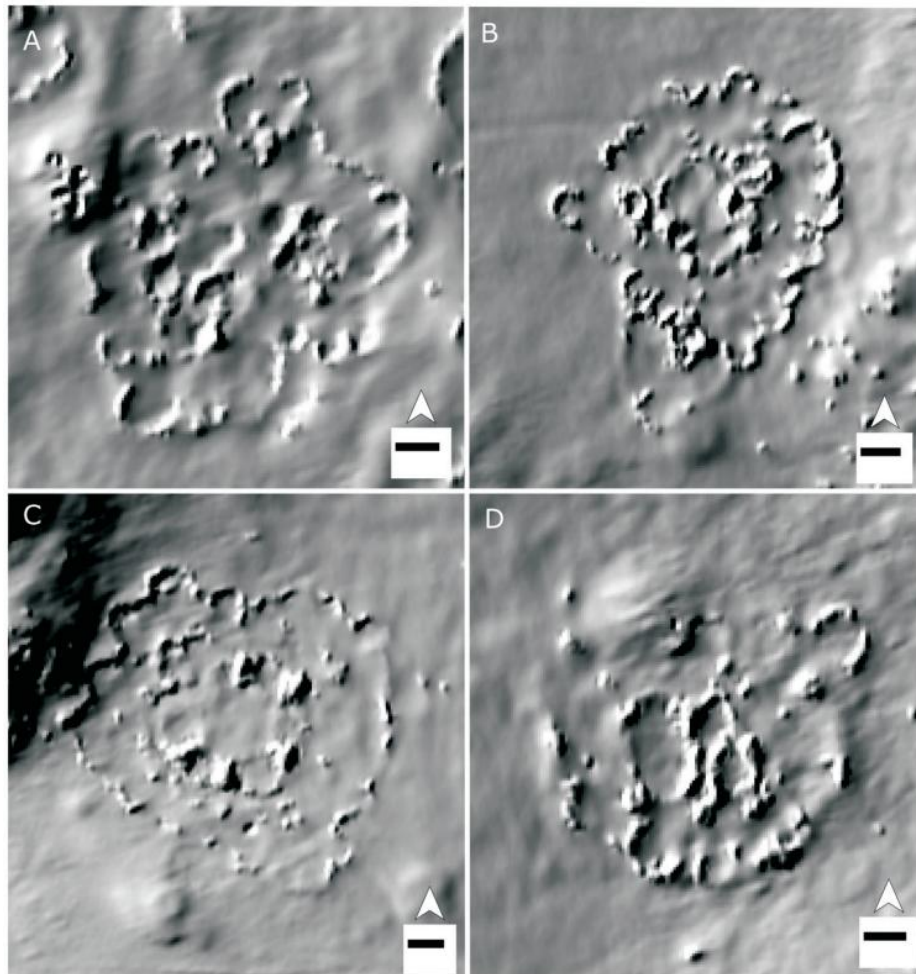


Figure 13: LiDAR imagery of Molokwane stone wall structures of Kweneng, a lost city discovered at Suikerbosrand Nature Reserve (after Sadr and Mshuqwana (2020)).

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. Figure 14 provides an overview of the distribution of stone wall structures across the northeastern region of South Africa.

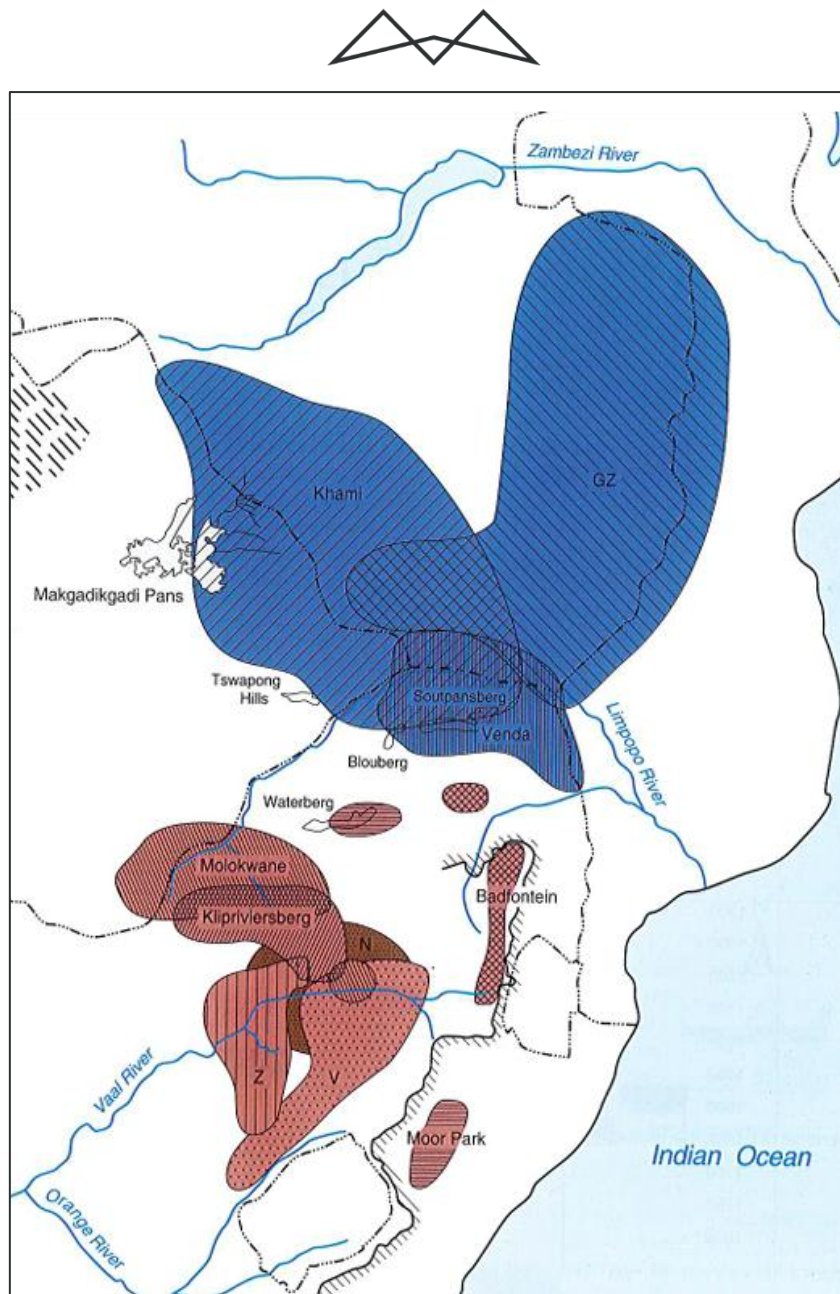


Figure 14: Distribution of the different types of stone wall structures across the northeastern region of South Africa (after Huffman, 2007)

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).

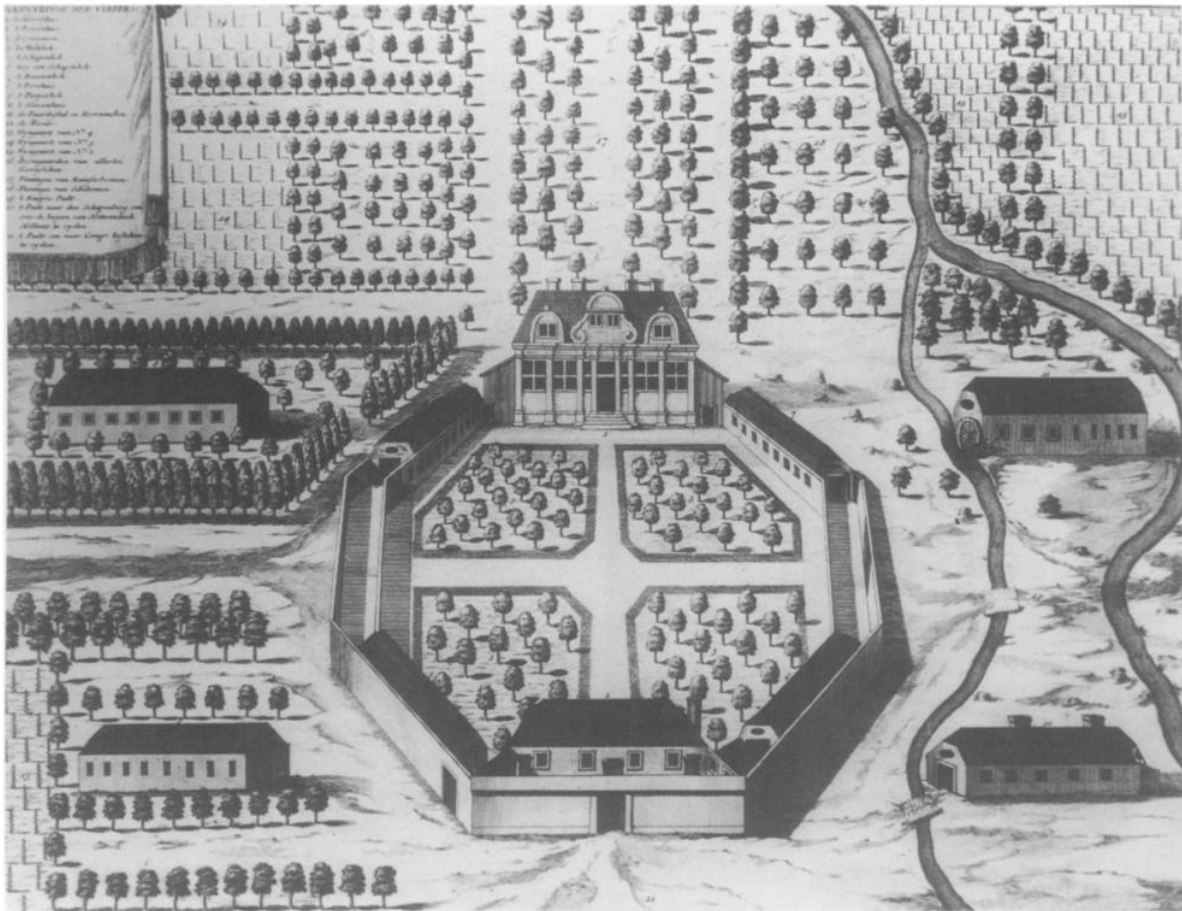


Figure 15: A 1700s drawing of Vergelegen, a Cape Colony homestead including multiple buildings including slave lodges. (after Markell *et al.* 1995).

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 Difaqane. Although the word is often used synonymously with Mfecane, the two words describe different events and repercussions thereof.



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

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

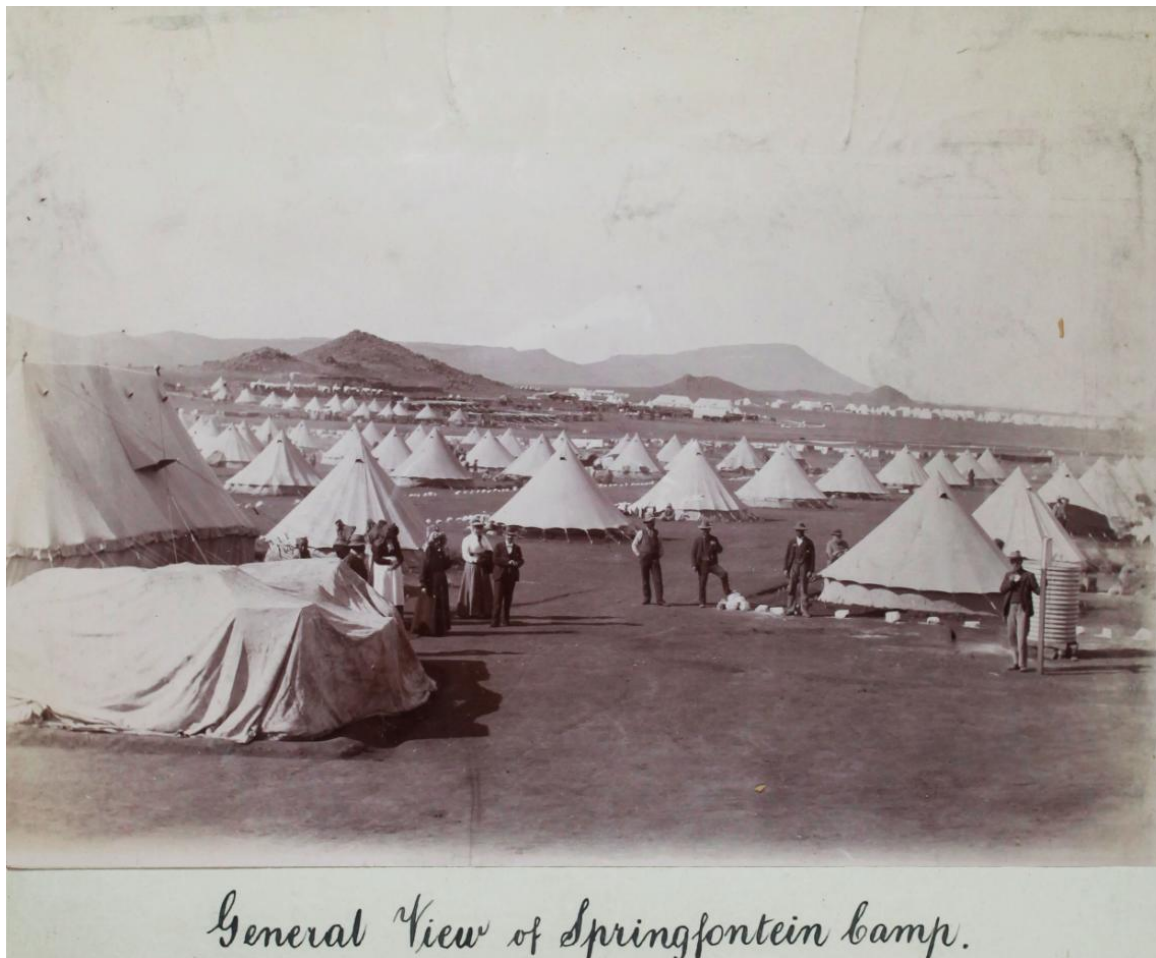


Figure 18: A picture of Springfontein, a refugee war camp which was established as a repercussion of the war's influence (after British National Archives).

E) APARTHEID AND CONTEMPORARY HISTORY

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



After being abolished in 1994, the legacy of Apartheid has been argued to have had a lasting effect on society. This has been argued beyond the context of history, being observed in social dynamics, contemporary infrastructure, as well as urban growth and development. Leading to contemporary history and modern approaches to development, Apartheid is seen as the most recent event having shaped and formed South Africa as we know it today.

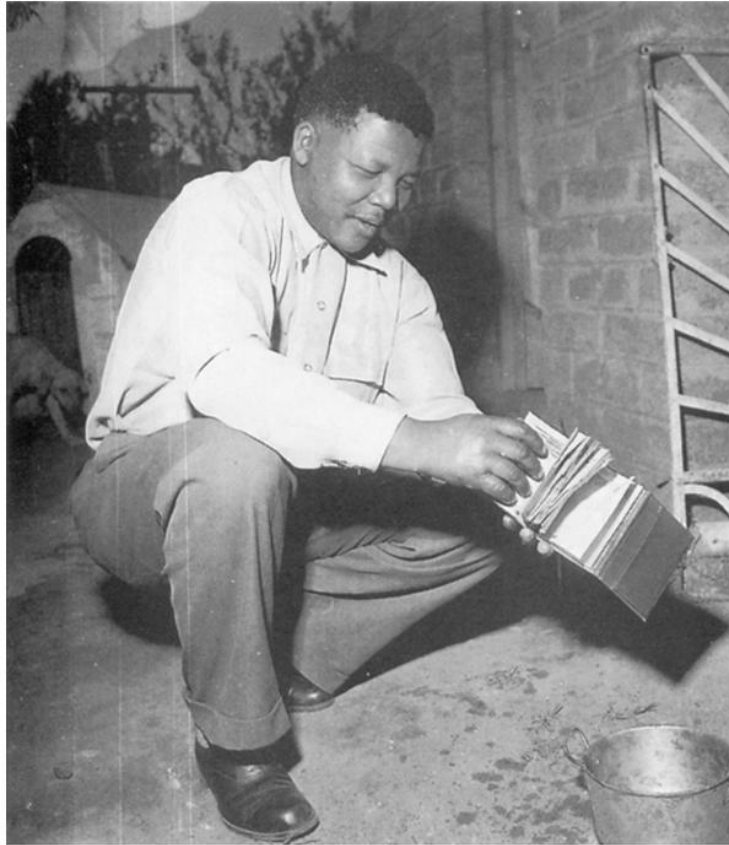


Figure 19: Nelson Mandela burning his pass in 1959. A pass was a requirement for people to move across the country. Such documents have now become items representing the Apartheid regime (Thompson, 2001).

2.2 SITE-SPECIFIC BACKGROUND

The Northern Cape Province is associated with a long archaeological record that spans across pre-historic and historic periods. Most notable is the region's significant role in terms of Hunter-gatherer activity. The closest town to the site in question is Pofadder, 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.

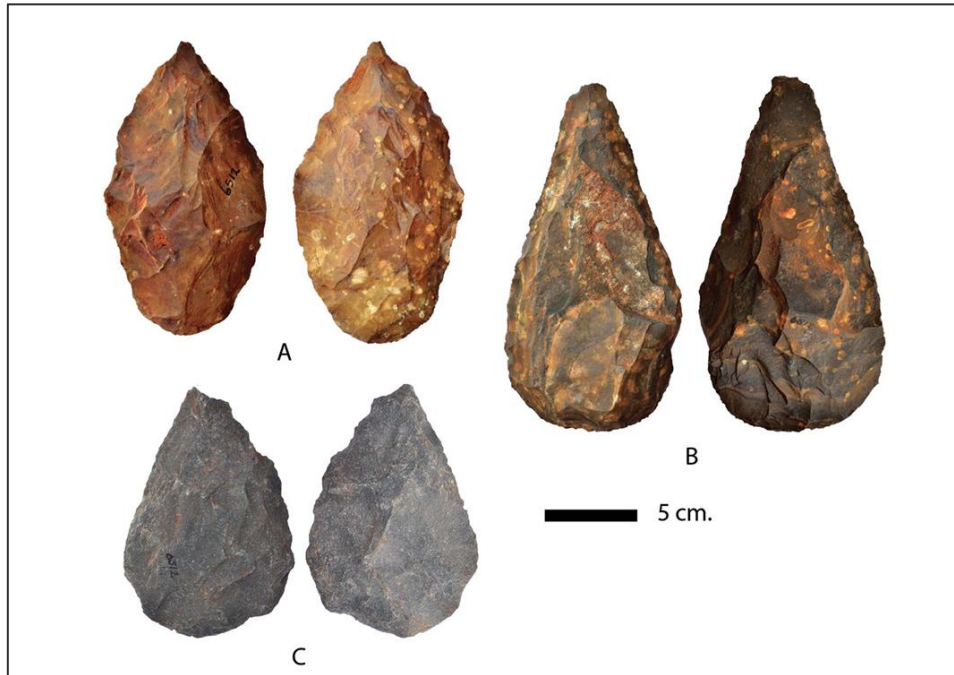


Figure 20: Some key examples of handaxes found near the Kathu Townlands. The examples are banded ironstone (A and B), and Quartzite (C) (After Walker et al., 2014)

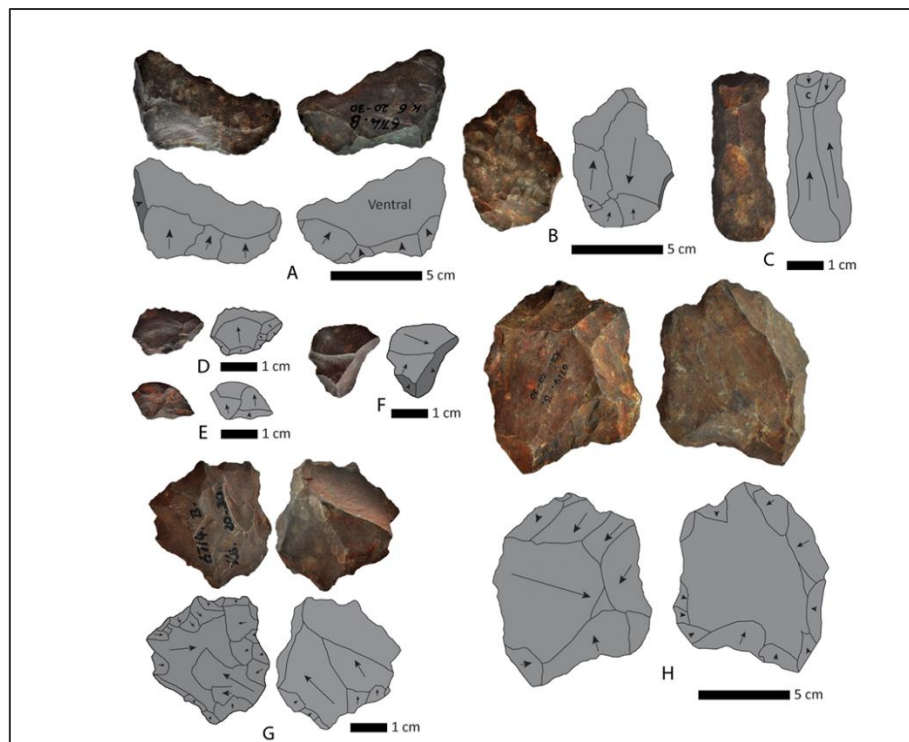


Figure 21: Examples of small flakes and cores. (A) Large flake off of the edge of the core consistent with biface shaping removal, (B) Large flake with dorsal scars (C) Blade (D–F) Small flakes (G–H) Discoidal cores. (After Walker et al., 2014)



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 POFADDER

Established in 1875 as a mission station, Pofadder has a rich colonial history. The town was named after the Koranna chief, Klaas Pofadder. The town had been subsequently renamed to Theronville, but the name was never fully adopted hence why the town preserved its original name. A notable landmark of Pofadder is a Roman Catholic Church (Figure 23). Many of the original mission buildings and churches of the town continue to be used as cultural heritage markers.



Figure 23: Photograph of the Pofadder Catholic Church



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 sites was conducted. Considering available information through the SAHRIS database and previous Archaeological assessments of the area, the following key reports have come to light:

Morris, D. 2016. Paulputs CSP Project and Road Realignment of the MN73 near Pofadder, Northern Cape

The Heritage Impact Assessment was conducted for the Concentrated Solar Plant (CSP) adjacent to Paulputs Substation. This report provided a vital background which informed the current study. As a main observation, the HIA identified several LSA sites and associated artefacts including scatters of quartz stone tools as well as ostrich eggshell (OES) fragments. A total of 22 individual observations formed the findings of this assessment. Finds were concentrated around rocky outcrops and hills. A comment was provided on the low heritage significance of LSA finds. However, the cumulative significance of these finds presented an understanding of the behaviours in relation to different landscape features. Therefore, landscape features were given buffers. This approach has been adopted as part of the current study.

De Jong, RC. 2011. Heritage Impact Assessment Report Rev 1: Proposed Solar Power Station on a Portion of Portion 6 of the farm Konkoonsies 91, Pofadder Registration Division, Khai-Ma Local Municipality, Northern Cape Province

This HIA consists of the assessment which was completed for the Solar PV facility immediately south of Paulputs Substation. Several observations were made which mainly consisted of the discovery of Stone Age finds which were concentrated or situated near hills and outcrops.

Pelser, A.J. 2012. A Report on a Heritage Impact Assessment (HIA) for the proposed Photo-Voltaic Solar Power generation plant on Konkoonsies 91, Pofadder District, Northern Cape

As an extension of the HIA conducted by De Jong (2011), this HIA reports on findings following a study of an expansion of the Solar PV facility south of Paulputs. The site is located adjacent to the previously studied area. Main finds included OES as well as quartz points, similar to those observed by Morris (2016). This further corroborates Morris' (2016) position regarding the cumulative heritage significance of the landscape, particularly slopes, hills, and outcrops.

Orton, J. 2019. Heritage Impact Assessment: Proposed Paulputs Wind Energy Facility and associated grid connection near Pofadder, Kenhardt Magisterial District, Northern Cape

As an assessment conducted for a Wind Energy Facility still to be constructed in the area, the site is located ~21 kms east of Paulputs Substation and intersects some areas around the mid-way point of where the proposed LILO powerline is to run. Several of the observations made as part of this study identified finds and sites near dolerite hills. These included clearings where OES was also noted. Additionally, like with the other studies, quartz stone tool scatters were prominent in the area. This parallels with the findings of the other studies solidifying predictions in terms of what could be expected in the area.

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.

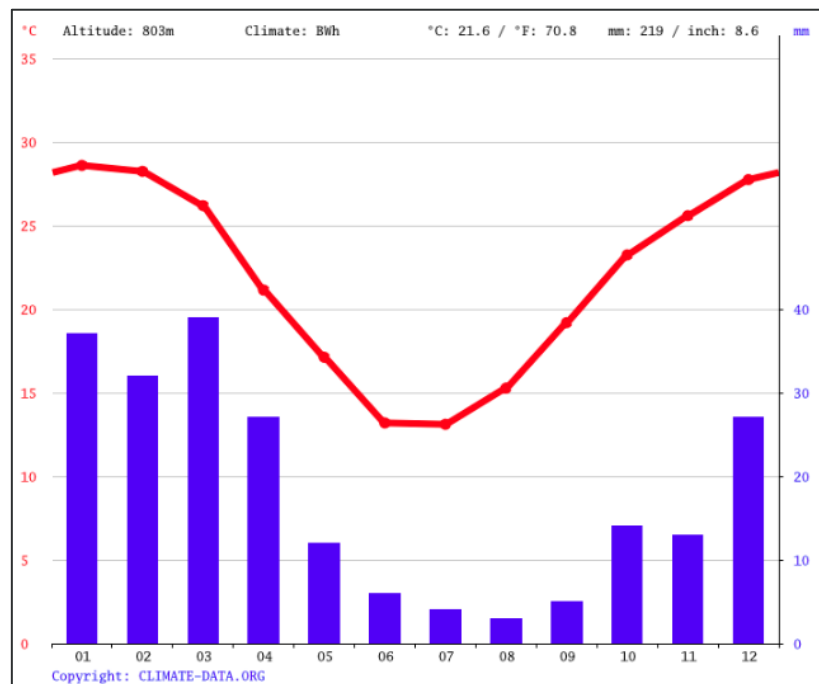


Figure 24: Annual Climatic conditions typical of the Northern Cape (considering data from Upington)(x-axis: 01=January, to 12=December)

3.2 TOPOGRAPHY

The development area falls in an area between 820 and 920 m above sea-level in elevation. The landscape gently slopes towards to the west. The landscape is flat, with some hills occurring around the general area. One hill is traversed by the proposed powerline route. Higher elevation areas are observed to the far north of the site consisting of ridges and hills which contribute to the formation of drainage lines running from north to south across the project 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 proposed development falls within the D81D and D81E Quaternary Catchments. The area to be traversed by the powerline and affected by the substation intersects with four NFEPA rivers (Nous, Kantbrogas se Laagte, Samoep, and an unnamed tributary), several ephemeral drainage lines, and a single temporary depression wetland.



3.4 GEOLOGY

The proposed Aries-Paulputs-Kokerboom 400 kV Loop-In Loop-Out (LILO) powerline traverses an area underlain by recent Quaternary alluvium and calcrete deposits, with superficial sediments of the Kalahari Group present in the eastern sections. Occasional outcrops of Palaeozoic diamictites (Dwyka Group) and gneisses or metasediments of Mokolian age occur along the route.

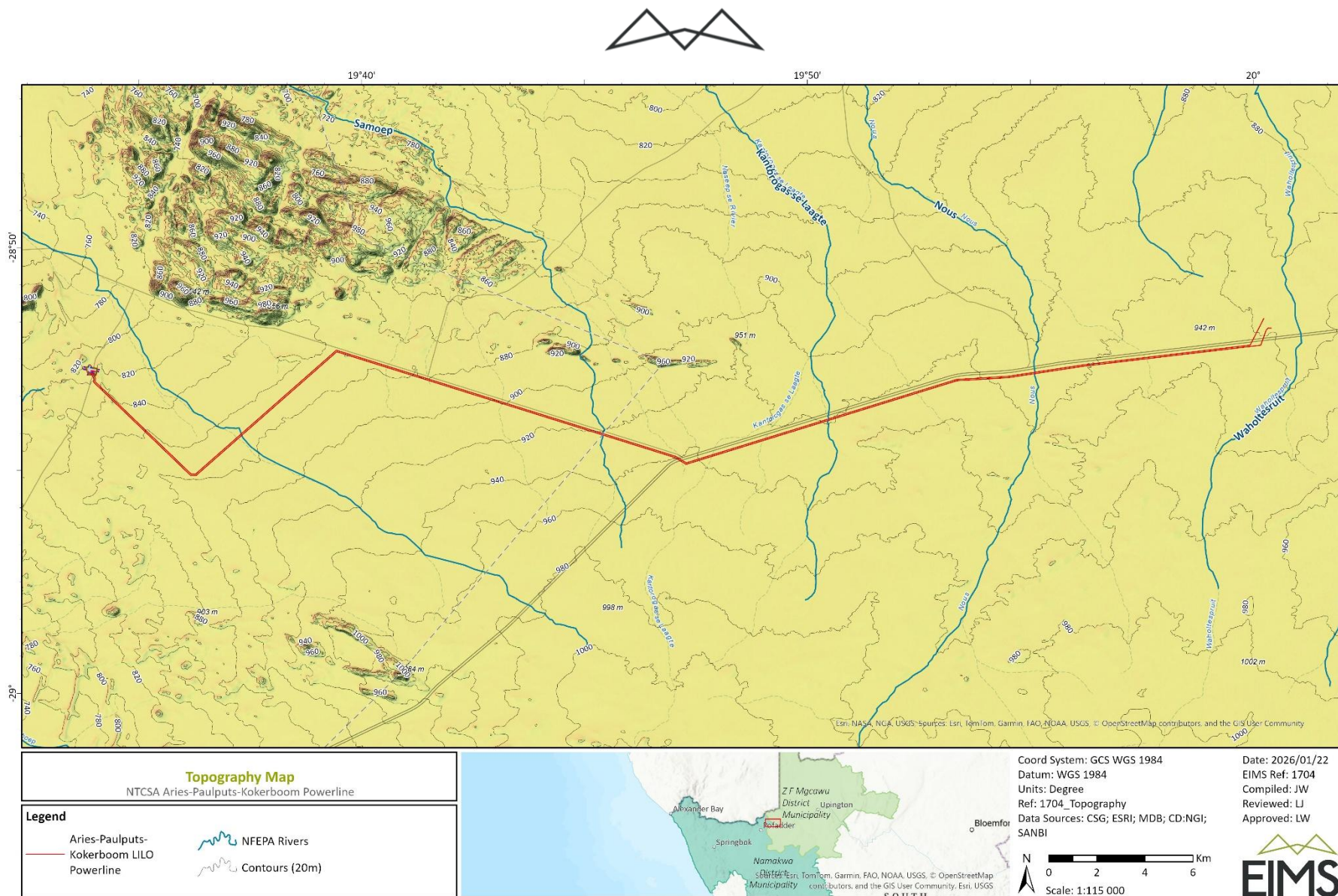


Figure 25: Topography Map of the site and surrounding areas.

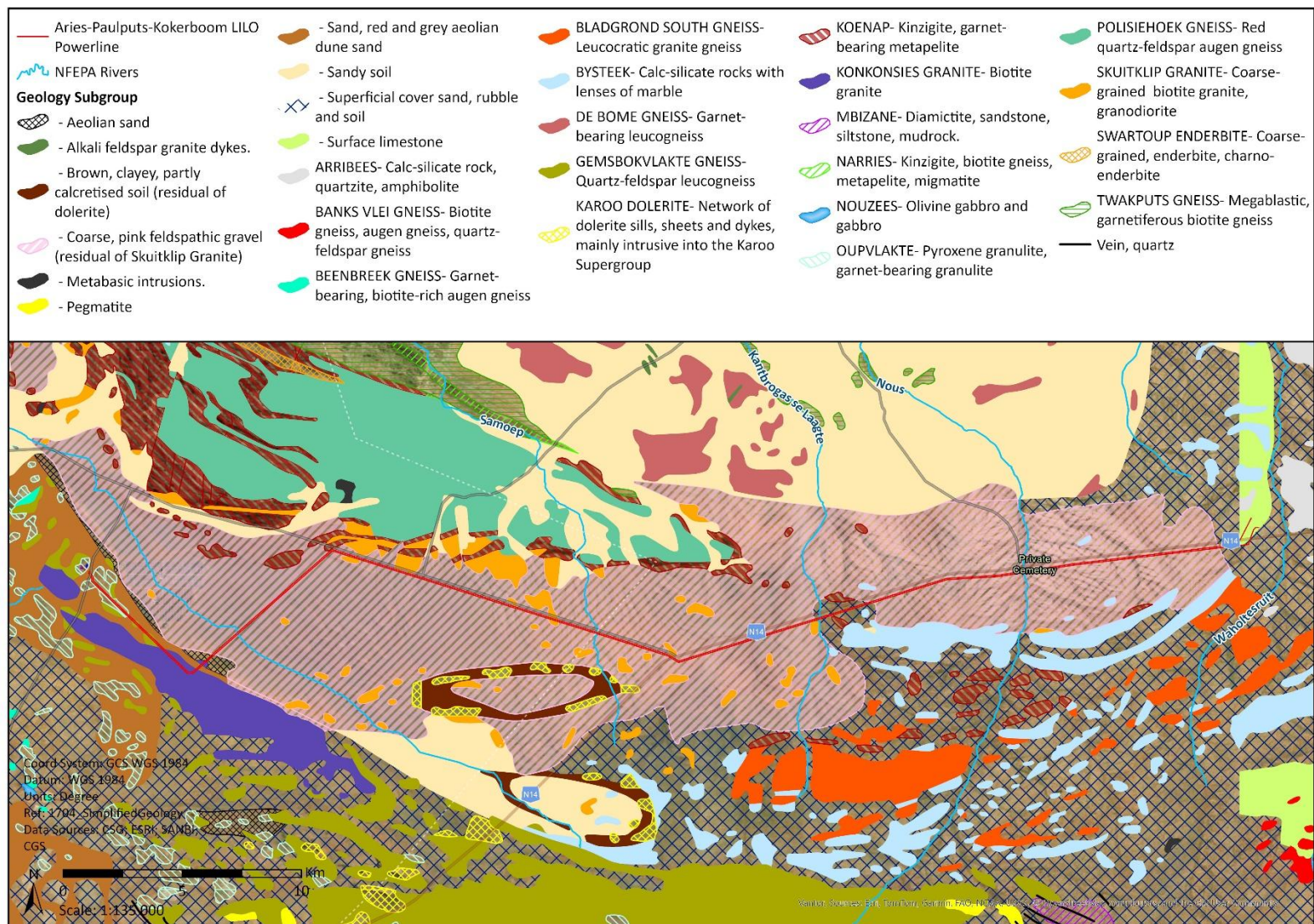


Figure 26: Map of the geology of the site and surrounding areas.



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 between 3 and 5 November 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. 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 including the areas earmarked for the construction of towers/pylons, 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. A 30-meter buffer was placed around finds which constituted a site. A 50-meter buffer was placed around graves or potential grave sites.

In the context of this report, **sites** were defined as **locations of a 15-meter radius, which included more than three individual finds**. Sites in this regard, included finds which were not in context. However, given that multiple finds were noted, these specific locations were noted as sites as they would have the potential to yield more finds.

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?



Criterion	Questions which guided analysis
	<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?

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

The field survey itself was limited to a three-day site visit which may present as a limitation to the extent of the investigation. The study area itself, being extensive in nature covering over 50kms and a 1km corridor presented as a site which would have been too extensive to survey altogether and in fine detail. 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. Further, the exact locations of proposed infrastructure were obtained which served as a guideline. The site visit was undertaken in Summer, with temperatures easily reaching more than 40°C during the day. For this reason, survey time had to be extended to allow for breaks. As a key limitation of this project, the 1km corridor on either side of the proposed 50km powerline servitude would have been too extensive to cover through walking. Therefore, observations related to this area were drawn from desktop-available information, previous studies, and archival information. It is expected, however, that minor changes to the layout would be expected as opposed to major changes leading to the realignment of the entire powerline. Therefore, the area covered would have effectively addressed the area earmarked for development.

5 FINDINGS

The following section presents the findings of both the desktop assessment as well as the field survey. In summary, Three sites were identified through the desktop assessment, and 32 sites 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 Very High Sensitivity as captured in Figure 28.

This is because the proposed infrastructure and 1 km corridor intersects with Grade III features as well as ungraded heritage finds. In particular, it must be noted that a lot of those sensitivities are concentrated around the areas closer to Paulputs Substation overlapping with the footprints of the already-constructed PV facilities. It is here understood that the sensitivities noted in the screening tool were identified when the HIAs for those facilities were conducted (See Section 2.4). Following the site survey, the sensitivity of the area flagged by the Screening Tool can be confirmed.

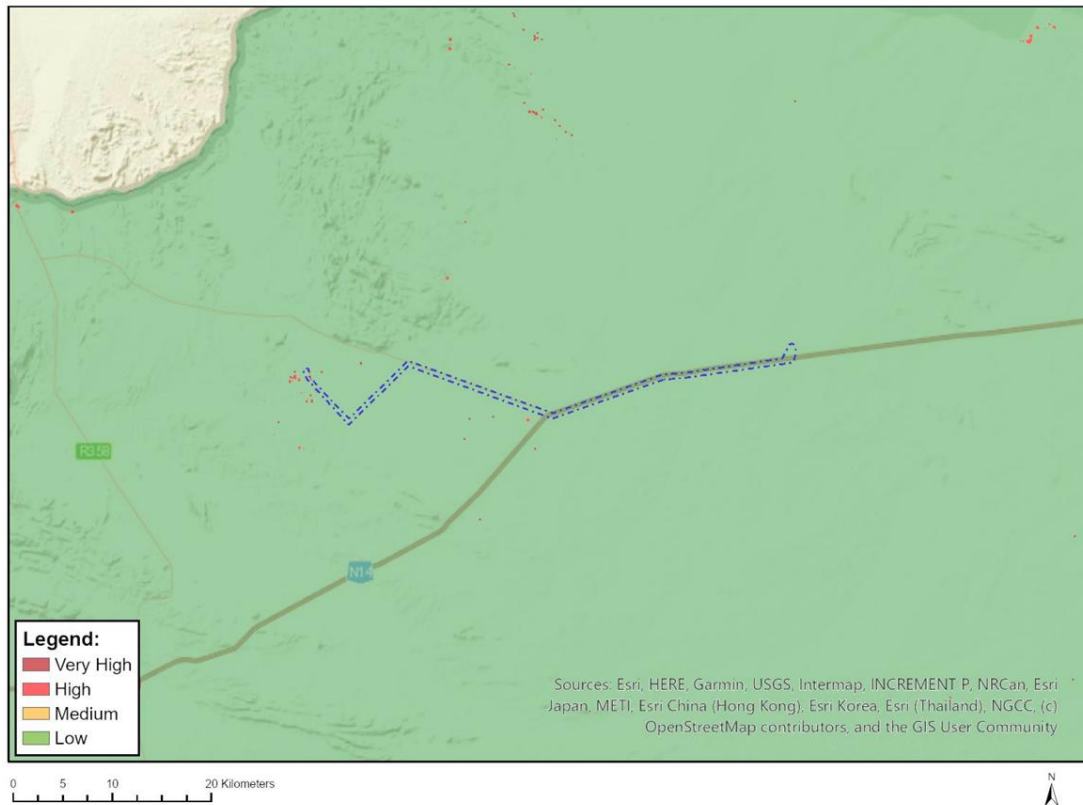


Figure 28: Map of relative Archaeological and Cultural Heritage Sensitivity (DFE Screening Tool)

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/>). A First Edition Topographic map (2819DD) of the area was analysed. As the map was drawn in 1972, it would include information on observations within the footprint of the development, however, further verification regarding the features' age was necessary. This was achieved through the assessment of aerial photography. Three features were identified which appeared on the first edition topographic map. These included a windmill and associated farm infrastructure (ARI001)(Figure 29), Hellum farm complex (ARI002)(Figure 30), and the Bladgrond Farm Cemetery (ARI003)(Figure 31).



Figure 29: ARI001 - Extract of the First Edition Topographic map 2819DD dated 1972. Features circled in red.

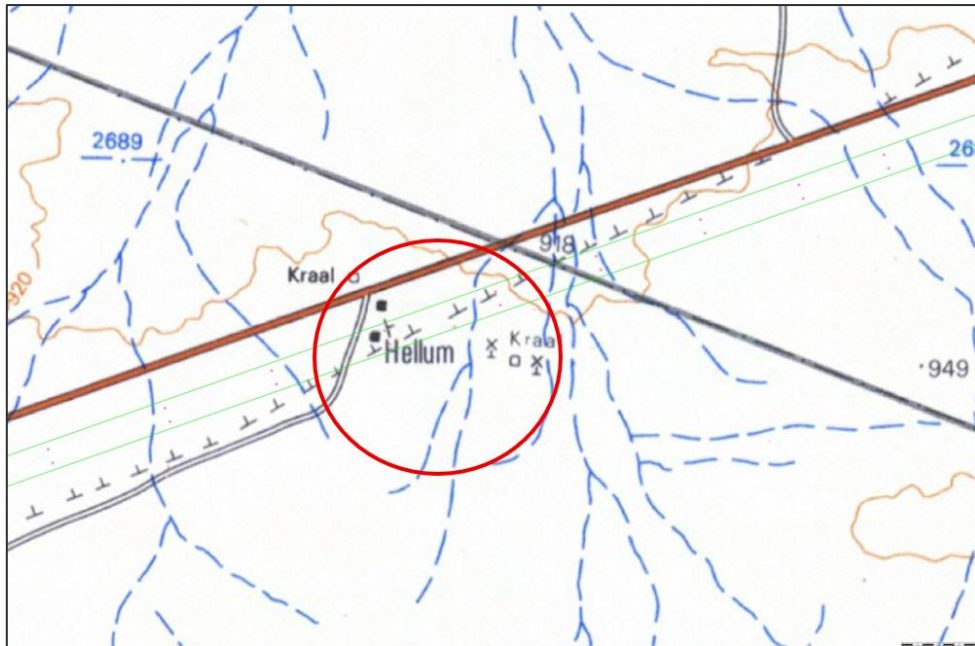


Figure 30: ARI002 - Extract of the First Edition Topographic map 2819DD dated 1972. Features circled in red.

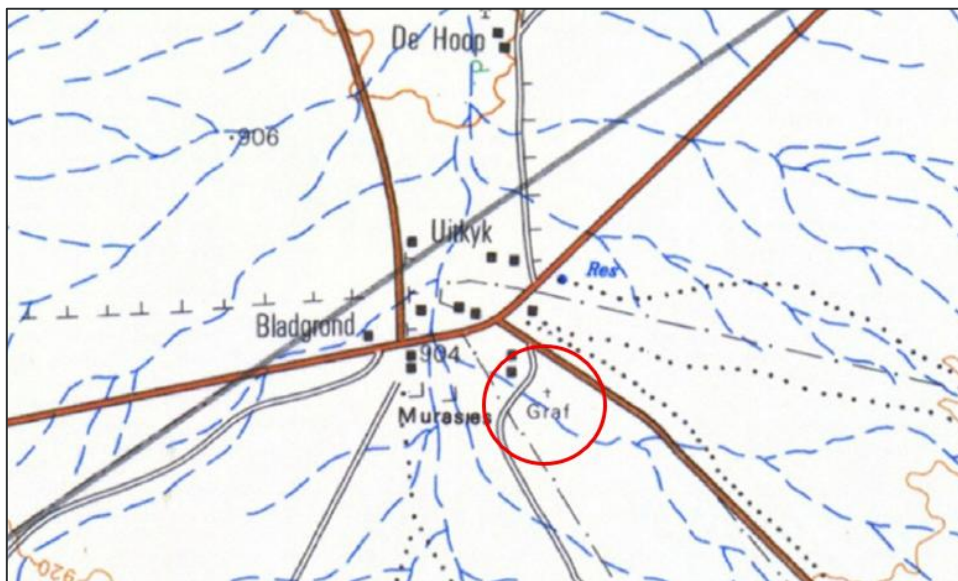


Figure 31: ARI003 - Extract of the First Edition Topographic map 2819DD dated 1972. Features circled in red.

Since the First Edition topographic map was dated 1972, further verification of the age of the sites was necessary through other available sources. Aerial photography was therefore consulted.

All three features (ARI001, ARI002, and ARI003) were confirmed to be older than 60 years. ARI001 and ARI002 were observed in aerial photography from as early as 1962 (Figure 32 and Figure 33). ARI003, that is the Bladgrond Farm Cemetery, has been recorded by the Genealogical Society of South Africa where records indicate that the cemetery's presence may date as far back as the 1900s (Figure 34).



Figure 32: Aerial photograph dated 1962. Note the presence of ARI001 (circled in red)

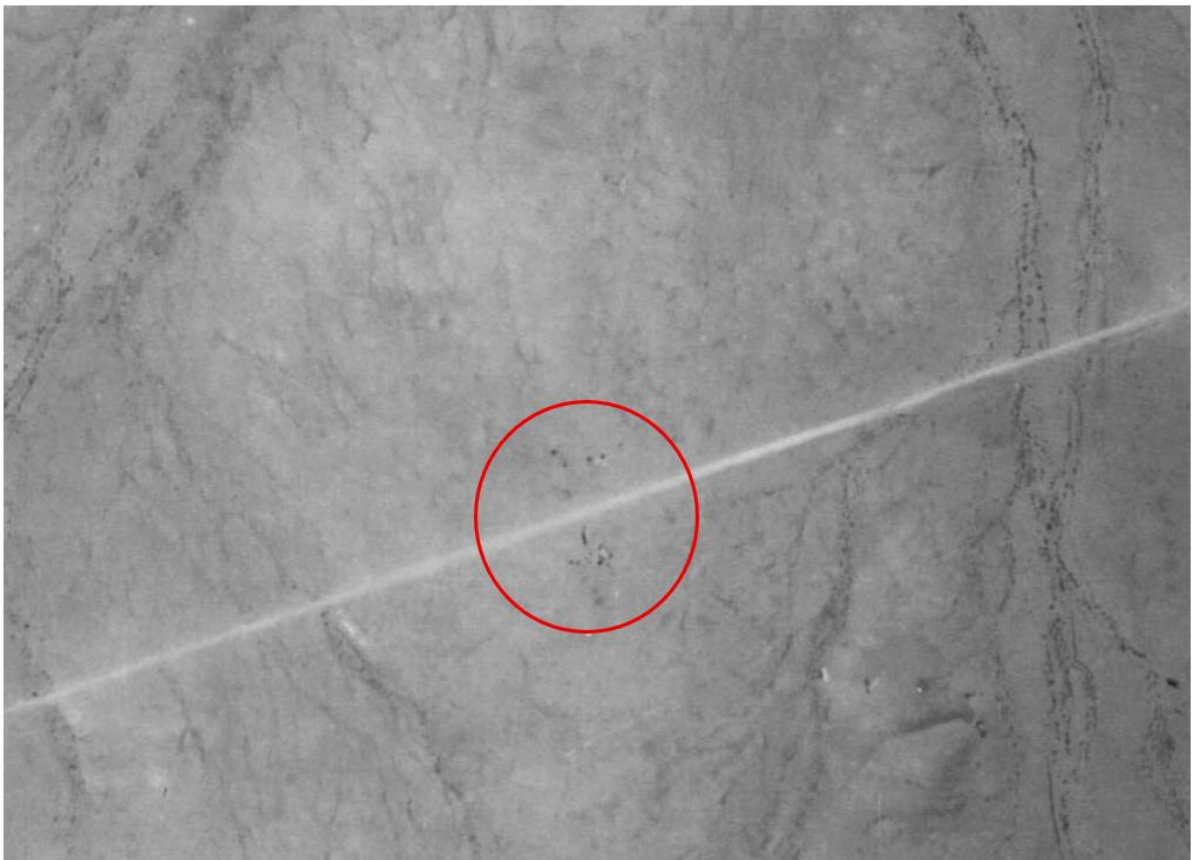


Figure 33: Aerial photograph dated 1962. Note the presence of ARI002 (circled in red)



Figure 34: Oldest grave plaque of the Bladgrond Farm Cemetery with date of death 1904

5.2 FIELD ASSESSMENT RESULTS

The appointed Archaeologist surveyed the various areas which fall within the proposed development footprint. The survey covered the extent of the area to be developed with the intention to identify and verify previously identified sensitivities in terms of heritage significance. Figure 35 is a series of maps of all the areas surveyed, specifically including the paths tracked out by the Archaeologist. The field survey was conducted over three days during Summer.

5.2.1 GENERAL OBSERVATIONS

The area of the proposed development crosses through extensive open spaces. Most of the area is divided into privately-owned farms. For the most part, the landscape has very little vegetation which is typical of this region of the Kalahari Desert. Very few large trees can be observed, many of which were identified as protected species including quiver trees. The landscape was completely flat with almost no hills, koppies, or slopes in elevation. The only features which changed the elevation of the landscape were outcrops, of which very few were noted along the project area.

The area had seen human activity, both historical and pre-historical. Main markers of this interaction include disturbances brought about by farming activities. Majority of the proposed powerline runs along an existing road, between 250-500 meters from the road reserve. Extensive disturbance of the area around Paulputs Substation was noted. This was as a result of drainage, various infrastructure on site, and the impact of access routes. Drainage was noted as a major form of disturbance across the site, as the powerline crosses several non-perennial drainage lines. This has had an impact on the integrity of context of heritage features.

Further, the general area was observed to be linked to the Stone Age and historical heritage considering the types of heritage features expected and subsequently observed.



5.2.2 ARCHAEOLOGICAL FINDS

A total of 32 key finds were noted during the field assessment, which mainly consisted of Stone Age artefacts, as well as historical artefacts and structures. Some of the main features identified through the field survey included scatters of and individual stone tools. Rubble was also noted along the proposed powerline route. Individual finds of the historical period were also noted including items such as glass bottles, cans, and a bullet shell.

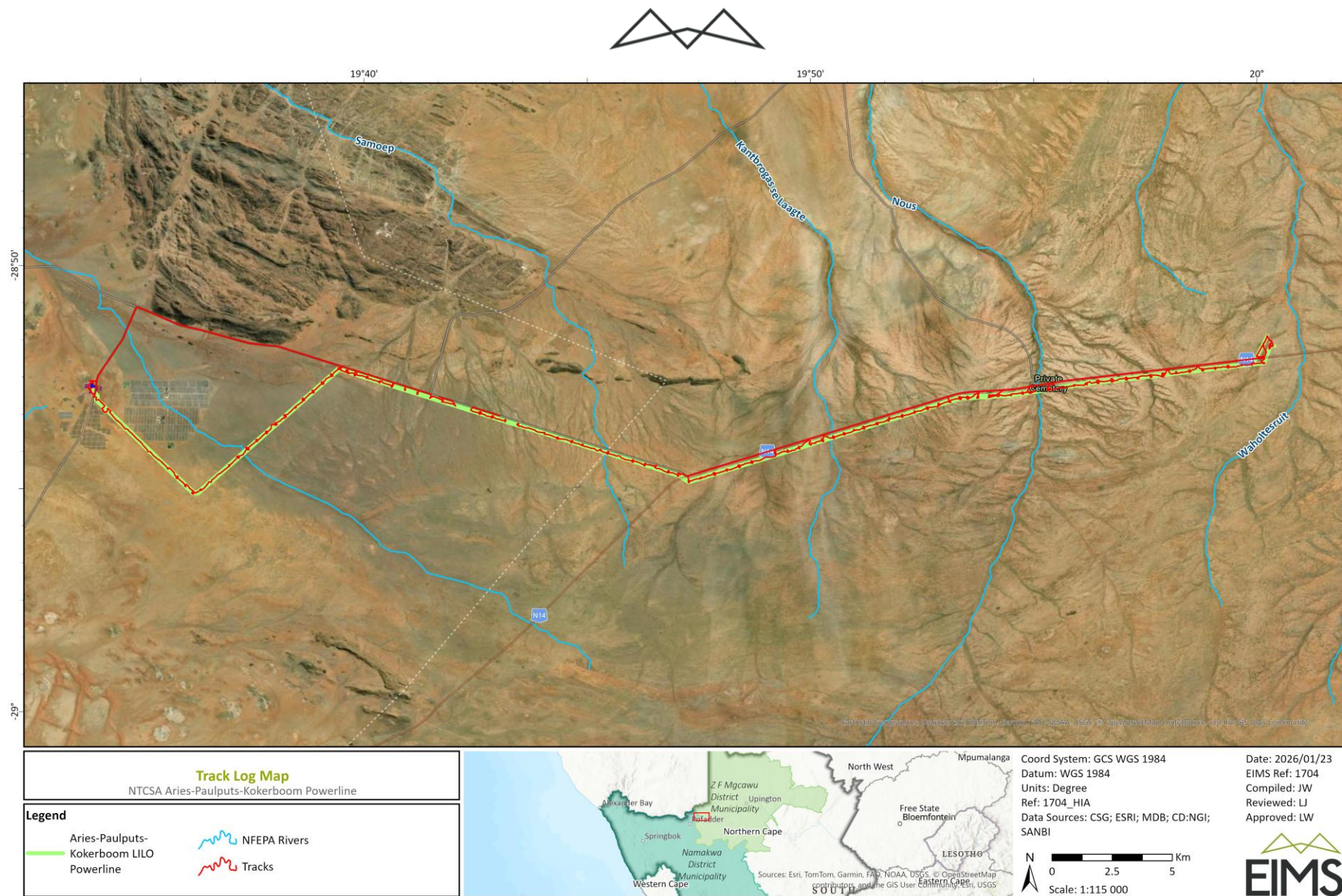


Figure 35: Map of areas surveyed and tracked.



A) STONE AGE FINDS

A range of different Stone Age finds and sites were noted along the powerline route. These mainly included individual ESA tools (ARI006, ARI020, ARI031, ARI032, ARI033) as well as scatters of LSA Quartz artefacts (ARI004, ARI015, ARI018, ARI020, ARI021, ARI029, ARI035). The findings correspond with those of previous studies. Ostrich Egg Shell fragments were also noted (ARI005, ARI028) in proximity to LSA Quartz pieces. The finds noted here add to the observations of Morris (2016) relating to the overall cumulative sensitivity of the region in terms of behavioural patterns.

ESA tools noted were individual stone tools or LCTs. For instance, large handaxes, cleavers and picks were among some of the ESA tools identified.

The shelter identified, while not including extensive evidence, corroborates the findings of Morris (2016). While the individual noted stone tools are of Low sensitivity, a note is provided here that areas such as the hill site (ARI028) must be avoided.

Other sites included stone tool knapping sites (ARI022, ARI034) which were considered of more significance as they represent areas in context with the potential to yield more information on the chaîne d'opérateur related to some of the stone tools noted on site.

The individual stone tools and stone tool scatters have been graded as Grade IV C and not worth further recording or conservation. Stone tool knapping sites have been graded as Grade IV B, with the recommendation to record these features before destruction or disturbance. The hill, given in what ways it adds to the cumulative heritage sensitivity of the region, has been graded as Grade III A, that is, of High Sensitivity.

Refer to Summary of Findings which includes photographs of the finds and sites, as well as their environmental context where applicable.

B) HISTORICAL PERIOD FINDS

Apart from Stone Age, finds and sites of the historical period formed a large portion of the total heritage sensitivities noted. These included structures (ARI001, ARI002, ARI025), discard or rubble (ARI013, ARI023, ARI030), and individual items (ARI008, ARI012, ARI014, ARI017).

Importantly, several structures were noted which are not older than 60 years and are still in use (ARI011, ARI016, ARI024, ARI026, ARI027). It is here advised that the landowner be liaised regarding these features should they be disturbed by the proposed activities.

Finally, ARI007 was observed as a foundation which was noted to only have been constructed and destroyed in the 2000s. This site would hold no heritage significance.

While the discard or rubble sites could not be associated with dates, the midden (ARI030) could be associated with a date through the identification of a well-preserved Sparletta bottle. Considering the logo on the bottle and the address of the bottle, "Nigel, Transvaal" the date of the bottle could be tied to no later than the early 1990s. Considering the logo, it is possible that the midden represents material deposited between the 1970s and 1980s.

Single items observed included a metal bullet (ARI008), potentially from hunting activities in the area, a rusted metal can (ARI012), large metal canisters (ARI014), and a fully intact glass bottle (ARI017).

All structures older than 60 years identified have been graded as Grade IIIA. Discard and rubble sites have been graded as Grade IV B, to allow for recording before these sites are disturbed should there be items of a higher heritage significance. Individual items, given that majority of their age could not be verified, have been given the graded as Grade IV C, and not worthy of conservation.

Refer to Summary of Findings which includes photographs of the finds and sites, as well as their environmental context where applicable.



C) GRAVES

The Bladgrond Farm Cemetery (Figure 36) was the only grave site noted along the powerline, within the 1km corridor, and in proximity to Paulputs Substation. The cemetery includes between 30 to 50 graves belonging to several families. All graves have markers or tombstones, with some not including inscriptions. Information on the cemetery can be found online with a good deal of recording having been done (see <https://www.graves.eggse.org/northerncape/KENHARDT-Rural/Bladgrond/> for more information on the individual graves of the site). The earliest date of death on record was 1904. The cemetery is fenced off, and access is controlled by the landowner.

The feature has been graded as a Grade III A heritage feature.



Figure 36: ARI003 – The Bladgrond Farm Cemetery

5.3 SUMMARY OF FINDINGS

Following a desktop assessment, potential heritage features were identified outside of the development footprint. This mainly included (1) a windmill and farm infrastructure older than 60 years, (2) the Hellum Farm Complex which is older than 60 years, and (3) the Bladgrond Farm Cemetery. The windmill as well as parts of the Hellum Farm Complex are in proximity of the proposed infrastructure, namely the pylons and powerline proposed, and may potentially be affected by the development. The Bladgrond Farm Complex is not close enough to the infrastructure to be impacted, however does fall within the 1km corridor.

The field survey further corroborated the presence and extent of the features identified through the desktop assessment, particularly noting the location of the windmill and farm infrastructure (ARI001), and the extent of the Hellum Farm Complex (ARI002). Through the site visit, a clearer understanding was drawn in relation to the proposed activity's potential impact on these heritage features.

A range of individual Stone Age finds and scatters of finds were noted. The significance of these finds are generally Low given that similar examples have been noted in the same area and have been considered of Low significance in previous studies as well. Given that several farm complexes and farm activities do take place in the area, rubble and discard was noted along the route of the powerline. The significance of these discard piles and individual finds such as glass bottles and cans has also been considered Low.


As an important find of the field survey, the hill site (ARI028) was identified as a heritage sensitivity. While not much evidence was identified at the hill specifically, its cumulative heritage value across the landscape relating to other similar landscape features is here noted. At the same time, the individual Stone Age, and OES finds are noted in a similar way as they add value to the understandings of behavioural patterns across this landscape.






As this project considers a 1km corridor together with the surveyed area, it is noted here that similar finds may be encountered within the area which was not surveyed. Further, several hills were identified by Morris (2016). These must be viewed and approached in the same way as ARI028.

Figure 37 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 are located or associated relative central points.




Table 4: Summary of different finds and sites identified.

Feature No.	Description	Rating and Significance	Coordinate
ARI001	<p>A windmill as well as additional farm infrastructure including farm dam or reservoir. Feature identified initially through desktop/archival assessment. Features identified as early as 1962 through Aerial Photographs. Feature is older than 60 years and protected by NHRA.</p> 	Grade III A High	28°54'31.35"S 19°46'30.86"E
ARI002	<p>Hellum Farm Complex consisting of three main structures including a house, and two sheds. Feature identified initially through desktop/archival assessment. Features identified as early as 1962 through Aerial Photographs. Feature is older than 60 years and protected by NHRA.</p>	Grade III A High	28°54'0.24"S 19°49'58.54"E





Feature No.	Description	Rating and Significance	Coordinate
	 		
ARI003	<p>Bladgrond Farm Cemetery. Includes an enclosed graveyard of between 30-50 individual graves. Some graves dating back as early as 1904</p> 	Grade III A High	28°52'41.01"S 19°55'20.23"E





Feature No.	Description	Rating and Significance	Coordinate
	 		
ARI004	<p>LSA Quartz artefacts. Single Quartz flake.</p> 	<p>Grade IV C Low</p>	<p>28°52'1.86"S 20° 0'0.03"E</p>





Feature No.	Description	Rating and Significance	Coordinate
ARI005	<p>Pieces of broken OES. Not worked.</p> 	<p>Grade IV C Low</p>	<p>28°51'49.30"S 20° 0'7.36"E</p>
ARI006	<p>Large ESA Handaxe</p> 	<p>Grade IV C Low</p>	<p>28°51'49.00"S 20° 0'19.45"E</p>
ARI007	<p>Remains of a foundation. Buildings appears to have been part of the complex constructed and destroyed in the 2000s. The foundation is not older than 60 years and is not protected by the NHRA.</p>	<p>N/A</p>	<p>28°51'59.84"S 20° 0'11.93"E</p>





Feature No.	Description	Rating and Significance	Coordinate
			
ARI008	<p>Large metal bullet shell.</p> 	Grade IV C Low	28°52'14.99"S 19°59'20.14"E
ARI009	<p>MSA-LSA Quartzite flake. The flake included several removals on the dorsal face and distal end. Proximal end included an edge similar to that of a large scraper.</p>	Grade IV C Low	28°52'22.64"S 19°58'26.65"E





Feature No.	Description	Rating and Significance	Coordinate
			
ARI010	<p>MSA-LSA Quartzite unifacial point. Included a minimum of three removals on the dorsal face, producing a sharp proximal end.</p> 	<p>Grade IV C Low</p>	<p>28°52'30.77"S 19°57'18.85"E</p>
ARI011	<p>An arrangement of stones forming a large cross on the ground. May have been placed more recently as part of farm complex building activities.</p>	<p>N/A</p>	<p>28°52'36.43"S 19°56'15.94"E</p>






Feature No.	Description	Rating and Significance	Coordinate
			
ARI012	<p>Rusted metal can. Can did not include any inscriptions or markings to indicate age.</p> 	Grade IV C Low	28°52'43.49"S 19°55'46.77"E




Feature No.	Description	Rating and Significance	Coordinate
ARI013	<p>Rubble including bricks and other building material. Deposition potentially related to the Bladgrond farm complex</p>  	Grade III A High	28°52'44.53"S 19°55'40.07"E
ARI014	Large metal canisters. Three individual canisters identified.	Grade IV C Low	28°52'54.11"S 19°53'47.07"E



Feature No.	Description	Rating and Significance	Coordinate
	 		
ARI015	LSA Quartz artefacts. Single Quartz flake/blade. Included a single worked edge. 	Grade IV C Low	28°52'58.80"S 19°53'19.40"E



Feature No.	Description	Rating and Significance	Coordinate
ARI016	<p>Iron markers approximately 1,5m apart from each other. Appears to have been placed for fencing purposes.</p> 	<p>Grade IV C Low</p>	<p>28°53'6.49"S 19°52'51.88"E</p>
ARI017	Fully intact clear glass bottle. Age unknown.	<p>Grade IV C Low</p>	<p>28°53'15.89"S 19°52'26.24"E</p>






Feature No.	Description	Rating and Significance	Coordinate
			
ARI018	<p>LSA Quartz artefacts. Site includes at least 8 examples of quartz flakes and stone tools.</p> 	Grade IV C Low	28°53'18.52"S 19°52'19.68"E
ARI019	<p>MSA artefacts. Site includes at least 7 examples of flaked and worked stone tools. Several examples of unifacial pieces including worked dorsal sides.</p>	Grade IV C Low	28°53'19.87"S 19°52'14.15"E





Feature No.	Description	Rating and Significance	Coordinate
			
ARI020	<p>ESA-LSA artefacts. Site includes an ESA cleaver, quartzite flake/chunk as well as LSA Quartz flakes.</p> 	Grade IV C Low	28°53'29.91"S 19°51'39.85"E
ARI021	<p>MSA-LSA artefacts. Site includes Quartz stone tools or flakes as well as larger flakes of different stone.</p>	Grade IV C Low	28°53'42.67"S 19°50'57.78"E





Feature No.	Description	Rating and Significance	Coordinate
			
ARI022	<p data-bbox="339 770 1016 831">Stone Age knapping site. Includes debitage as well as flakes and cores.</p>  	<p data-bbox="1045 770 1177 846">Grade IV B Medium</p>	<p data-bbox="1209 770 1385 831">28°53'58.85"S 19°50'6.73"E</p>





Feature No.	Description	Rating and Significance	Coordinate
ARI023	<p>Rubble including loose, unused bricks.</p> 	Grade IV B Medium	28°52'49.02"S 19°55'1.85"E
ARI024	<p>Iron farm dam with foundation. Feature was not noted in archival information. Feature is not older than 60 years and is not protected by the NHRA.</p> 	N/A	28°52'49.94"S 19°54'58.82"E
ARI025	<p>Old water trough. Age of the structure unconfirmed. However, given its appearance, the structure may be older than 60 years.</p>	Grade III A High	28°53'36.25"S 19°43'32.28"E






Feature No.	Description	Rating and Significance	Coordinate
			
ARI026	<p>Windmill, troughs, and farm dam. Currently in use and not older than 60 years.</p> 	N/A	28°53'36.38"S 19°43'29.48"E
ARI027	<p>Windmill and farm dam. Currently in use and not older than 60 years.</p>	N/A	28°52'35.51"S 19°40'24.11"E






Feature No.	Description	Rating and Significance	Coordinate
			
ARI028	<p>Hill including shelter. OES and LSA quartz artefacts, particularly small flakes were noted scattered around the hill. Shelter included no signs of human occupation. Additional burrows were noted in the shelter. May have been dug out by an animal.</p> 	Grade III A High	28°52'25.01"S 19°39'38.94"E





Feature No.	Description	Rating and Significance	Coordinate
	  		





Feature No.	Description	Rating and Significance	Coordinate
	  		
ARI029	LSA Quartz artefacts. Two small Quartz flakes noted.	Grade IV C	28°52'48.03"S 19°38'50.64"E





Feature No.	Description	Rating and Significance	Coordinate
		Low	
ARI030	<p>Midden of items from the mid-late 20th century including a Sparletta bottle of no later than the 1970s. Two broken clear bottles were also noted as well as a metal oil can.</p> 	Grade IV B Medium	28°53'10.89"S 19°38'27.87"E





Feature No.	Description	Rating and Significance	Coordinate
			
ARI031	ESA Handaxe 	Grade IV C Low	28°54'16.50"S 19°37'10.17"E



Feature No.	Description	Rating and Significance	Coordinate
ARI032	ESA Cleaver 	Grade IV C Low	28°54'25.97"S 19°37'2.45"E
ARI033	ESA Pick 	Grade IV C Low	28°54'27.34"S 19°37'0.72"E
ARI034	Stone Age knapping site. Extensive site including debitage as well as flakes and cores.	Grade IV B Medium	28°54'28.82"S 19°36'58.97"E



Feature No.	Description	Rating and Significance	Coordinate
			
ARI035	<p>LSA Quartz artefacts. Site includes at least 4 examples of Quartz flakes and stone tools.</p> 	Grade IV C Low	28°54'39.99"S 19°36'46.20"E

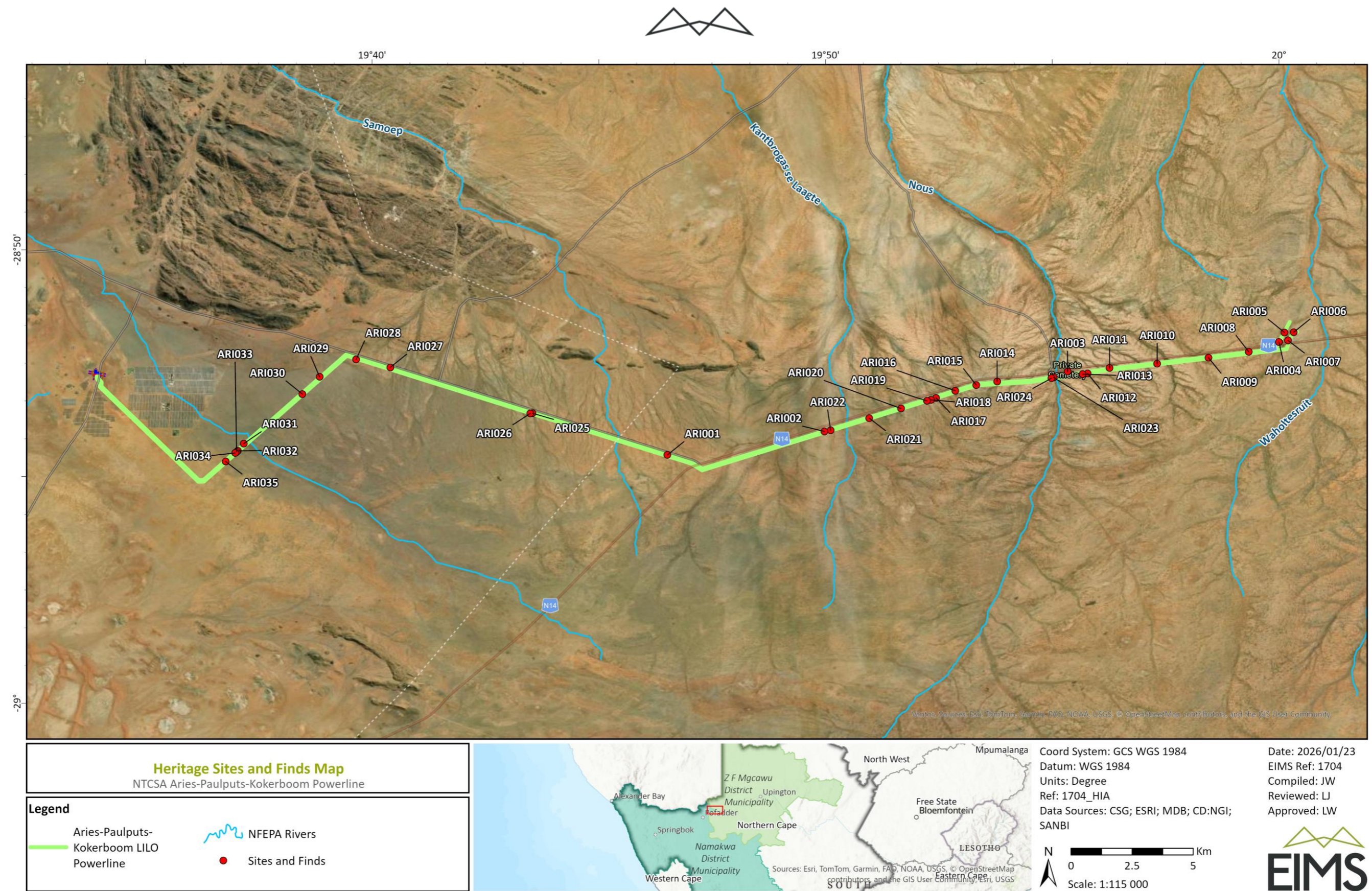


Figure 37: Map of the different finds and sites of interest identified during the field survey.



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)	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.

The potential disturbance or destruction of the various observed finds and sites is noted as a potential impact the project may have. However, the extent, duration, magnitude, reversibility, and probability of the impact varies depending on the heritage feature(s) affected. Features considered were (1) Stone Age finds, (2) Historical finds, (3) rubble and middens, (4) knapping sites, (5) structures including ARI001 and ARI002, and (6) ARI028, or the hill site. For the most part, mitigations proposed address the probability of the impact occurring. In this regard, impacts can be managed through avoidance of the features. The Bladgrond Farm Cemetery was also considered as it falls within the 1km corridor. It is, however, expected that the site can be comfortably avoided given the corridor, and current planned tower positions.

It is important to note that the impact on Stone Age and Historical finds is considered Low even post-mitigation given the low heritage value of these features. At the same time, the potential impact on rubble and middens was noted as Medium to Low, given the potential of the impact to be of a greater magnitude should middens include items of higher heritage value. The potential impact on Stone Age knapping sites was considered higher in significance given that the disturbance of the context of these sites would be irreversible.

The Hellum Farm Complex and the Windmill at ARI001 will be affected by the proposed infrastructure. Both of these features are older than 60 years and protected by the NHRA. This was noted as an impact of Medium to High significance pre-mitigation. Key contributors to the increased significance of the impact include the irreversibility of the damage or disturbance the activities may have on the features.

The hill site (ARI028) contributes to the cumulative understandings of human behaviour of the area. Hence, impacts on this feature would have a greater extent as well as be irreversible as compared with singular finds which could be collected.

As an additional consideration made in terms of impacts, the project will have an impact on the sense of place associated with the largely undisturbed and natural landscape. It is important to note that not much can be done to mitigate this impact. As such it will remain a Medium to Low impact on area affected.

While the features identified outside of the site represent markers of heritage significance (in particular, individual finds, scatters, and structures), the occurrence of below-ground heritage finds is still 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.

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 Table

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 Significance	Confidence	Cumulative Impact	Irreplaceable loss	Priority Factor	Final Score	Final Score Significance
Stone Age Finds	Disturbance of identified Stone Age individual finds and scatters	Alternative 1	Construction	-1	1	1	1	2	-1,25	3	-3,75	Low -	-1	1	1	1	2	-1,25	2	-2,5	Low -	High	2	1	1,13	-2,81	Low -
Historical Finds	Destruction or disturbance of identified historical period finds such as glass bottles, cans, and and old metal canisters	Alternative 1	Construction	-1	1	1	1	2	-1,25	3	-3,75	Low -	-1	1	1	1	2	-1,25	2	-2,5	Low -	High	1	1	1,00	-2,50	Low -
Rubble and Middens	Destruction or disturbance of rubble and middens which may include unidentified historical finds	Alternative 1	Construction	-1	1	1	2	2	-1,5	3	-4,5	Medium to low -	-1	1	1	1	2	-1,25	2	-2,5	Low -	High	1	1	1,00	-2,50	Low -
Knapping sites	Destruction or disturbance of Stone Age knapping sites	Alternative 1	Construction	-1	2	5	3	2	-3	3	-9	Medium to high -	-1	2	1	3	2	-2	2	-4	Low -	Medium	1	1	1,00	-4,00	Low -
Structures	Disturbance of existing structures (ARI001 and ARI002) due to their proximity to the powerline	Alternative 1	Construction	-1	2	5	3	3	-3,25	3	-9,75	Medium to high -	-1	2	5	3	3	-3,25	1	-3,25	Low -	High	1	1	1,00	-3,25	Low -
Hill	Disturbance of the Hill (ARI028) which is part of the landscape's cumulative heritage value	Alternative 1	Construction	-1	3	5	3	3	-3,5	3	-10,5	Medium to high -	-1	3	5	2	4	-3,5	1	-3,5	Low -	Medium	2	1	1,13	-3,94	Low-
Sense of place	Disturbance of the Sense of Place	Alternative 1	Construction	-1	2	4	1	3	-2,5	5	-12,5	Medium to high -	-1	2	4	1	3	-2,5	5	-12,5	Medium to high -	High	1	1	1,00	-12,5	Medium to high -
Below-ground heritage features	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 EMP related to this project. These mitigations are associated with construction phase which may involve clearing of land, excavating, and the transformation of the landscape to accommodate for the construction of the proposed infrastructure and the associated servitude. Firstly, mitigation measures here advise for the avoidance of identified heritage features as a primary approach to mitigating impacts. Key impacts considered were the potential disturbance of rubble or middens, Stone Age knapping sites, structures, and the hill. While individual Stone Age and historical finds will be affected, these features are of Low significance, so no further mitigation has been advised. The impact the project will have on sense of place will not be easily mitigatable. Hence, no mitigation has been advised, and the impact will remain the same. While it is within the 1km corridor, the Bladgrond Farm Cemetery can be comfortably avoided and no impacts on the feature are expected, a buffer of 50-meters has been recommended should infrastructure be planned near this feature. 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

Impact	Phase	Pre-mitigation Impact	Post-mitigation impact	Final Significance
Disturbance of identified Stone Age individual finds and scatters	Construction	Low -	Low -	Low -
Mitigation Measures				
No specific mitigation advised as features are of Low significance.				
Destruction or disturbance of identified historical period finds such as glass bottles, cans, and old metal canisters	Construction	Low -	Low -	Low -
Mitigation Measures				
No specific mitigation advised as features are of Low significance.				
Destruction or disturbance of rubble and middens which may include unidentified historical finds	Construction	Medium to low -	Low -	Low -



Impact	Phase	Pre-mitigation Impact	Post-mitigation impact	Final Significance
Mitigation Measures				
Sites must be avoided considering a buffer of 30 meters.				
Destruction or disturbance of Stone Age knapping sites (ARI022, ARI034)	Construction	Medium to high -	Low -	Low -
Mitigation Measures				
Sites must be avoided considering a buffer of 30 meters.				
Disturbance of existing structures (ARI001 and ARI002) due to their proximity to the powerline	Construction	Medium to high -	Low -	Low -
Mitigation Measures				
Sites must be avoided considering a buffer of 30 meters.				
Disturbance of the Hill (ARI028) which is part of the landscape's cumulative heritage value	Construction	Medium to high -	Low -	Low -
Mitigation Measures				
Sites must be avoided considering a buffer of 30 meters.				
Disturbance of the Sense of Place	Construction	Medium to high -	Medium to high -	Medium to high -
Mitigation Measures				
Impact cannot easily be mitigated. Hence impact will remain the same.				
Destruction or disturbance of undiscovered below-ground heritage features.	Construction	Medium to low -	Low -	Low -
Mitigation Measures				
A Heritage Procedure is advised to be followed should additional heritage finds or sites be encountered.				



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

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures / Management Actions	Compliance with Standards	Time Period for Implementation
Clearing of land, excavating, and the transformation of the landscape	Construction	Disturbance of rubble and middens (ARI013, ARI023, ARI030), structures (ARI001, ARI002, ARI025), Stone Age knapping sites (ARI022, ARI034), and hill (ARI028)	<ul style="list-style-type: none"> Sites must be avoided considering a buffer of 30 meters. 	NHRA	During construction activities
	Construction	Unidentified below-ground heritage features	A Chance Find Heritage Procedure is advised to be followed should additional heritage finds or sites be encountered.	NHRA	During construction activities

7.2 OVERALL RECOMMENDATIONS

Identified heritage features were identified within the footprint of the development. It is expected that these will be disturbed or impacted on through the proposed activities. A 30-meter buffer has been proposed for the avoidance of rubble and middens, structures, Stone Age knapping sites, and the hill identified (ARI028). The project will have an impact on the Sense of Place of the overall area, however, no mitigation can be advised to lower the significance of the impact. 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 AND IMPACT STATEMENT

This report was prepared as part of a Phase 1 Heritage Impact Assessment for the proposed Aries-Paulputs-Kokerboom 400kV LILO Powerline and Substation Upgrade Project. As part of this assessment, a desktop as well as an on-site walkdown and tower-to-tower site-specific evaluation of heritage impacts was conducted.

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



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Appendix 1: CV of the Archaeologist



Appendix 2: Specialist Declaration