

HERITAGE IMPACT ASSESSMENT

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

FOR THE PROPOSED KABIDA AGRICULTURAL DEVELOPMENT, LIMPOPO PROVINCE

Type of development:

Agricultural

Client:

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Project Reference:

2102

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January 2021

APPROVAL PAGE

Project Name	Kabida Dam en Lande
Report Title	Heritage Impact Assessment for the proposed Kabida agricultural development, Limpopo Province
Authority Reference Number	TBC
Report Status	Draft Report
Applicant Name	Mr J Pretorius

	Name	Qualifications and Certifications	Date
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Date	Report Reference Number	Description of Amendment

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REPORT OUTLINE

Appendix 6 of the GNR 326 EIA Regulations published on 7 April 2017 provides the requirements for specialist reports undertaken as part of the environmental authorisation process. In line with this, Table 1 provides an overview of Appendix 6 together with information on how these requirements have been met.

Table 1. Specialist Report Requirements.

Requirement from Appendix 6 of GN 326 EIA Regulation 2017	Chapter
(a) Details of - (i) the specialist who prepared the report; and (ii) the expertise of that specialist to compile a specialist report including a curriculum vitae	Section a Section 12
(b) Declaration that the specialist is independent in a form as may be specified by the competent authority	<i>Declaration of Independence</i>
(c) Indication of the scope of, and the purpose for which, the report was prepared	Section 1
(cA) an indication of the quality and age of base data used for the specialist report	Section 3.4 and 7.1.
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	9
(d) Duration, Date and season of the site investigation and the relevance of the season to the outcome of the assessment	Section 3.4
(e) Description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used	Section 3
(f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of site plan identifying site alternatives;	Section 8 and 9
(g) Identification of any areas to be avoided, including buffers	Section 8 and 9
(h) Map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers	Section 8
(l) Description of any assumptions made and any uncertainties or gaps in knowledge	Section 3.7
(j) a description of the findings and potential implications of such findings on the impact of the proposed activity including identified alternatives on the environment or activities;	Section 9
(k) Mitigation measures for inclusion in the EMPr	Section 10
(l) Conditions for inclusion in the environmental authorisation	Section 10
(m) Monitoring requirements for inclusion in the EMPr or environmental authorisation	Section 10
(n) Reasoned opinion - (i) as to whether the proposed activity, activities or portions thereof should be authorised; (iA) regarding the acceptability of the proposed activity or activities; and (ii) if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan	Section 10.2
(o) Description of any consultation process that was undertaken during the course of preparing the specialist report	Section 6
(p) A summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	Refer to Environmental Assessment report
(q) Any other information requested by the competent authority	Section 11

Executive Summary

Tua Conserva Environmental & Conservation Services CC was appointed by Overvlakte Boerdery CC to conduct an Environmental Authorisation (EA) Application process for the following activities collectively referred to as the Kabida project:

- Clearance of indigenous vegetation for croplands on the farm Overvlakte 125 MS (portion 5) and on the adjoining farm, the farm Bergen Op Zoom 124 MS,
- The clearance of indigenous vegetation for construction of a dam as well as a pipeline on both properties with an internal diameter of 0.36 metre.

The project is located approximately 61 kilometres west of Musina, district of Vhembe in the Limpopo Province. HCAC was appointed to conduct a Heritage Impact Assessment (HIA) for the project and the study area was assessed on desktop level and by a field survey. The field survey was conducted as a non-intrusive pedestrian survey to cover the extent of the footprint. Key findings of the assessment include:


- The study area was previously assessed for the Vele Colliery that included an HIA (Roodt 2009) and again by Pikirayi *et al* 2012 and both a desktop paleontological assessment (Durand 2009) and a field-based palaeontological assessment (PIA) (Millstead 2014). The current HIA considered the results of these studies that covered the existing impact areas;
- The above mentioned HIA's reported on numerous Stone Age sites, Iron Age Sites, Grave Sites and Historical structures of which two sites will be directly affected by the current project, these being Iron Age Sites, Vele 14 and Vele 15;
- The PIA (Millstead 2014) concluded there is no palaeontological reason to prejudice the progression of the proposed project subject to adequate mitigation programs being put in place;
- The current assessment recorded several Stone Age findspots and Iron Age/farming community sites in addition to the sites on record for the study area;
- The proposed pipeline follows the de Beers water pipeline servitude and these areas have already been impacted on.

The impact of the project on heritage resources can be mitigated to an acceptable level and it is recommended that the proposed project can commence on the condition that the following recommendations are implemented as part of the EMPr and based on approval from SAHRA:

- It is recommended that the project adheres to all paleontological recommendations included in the PIA report (Millstead 2014);
- Stone Age find spots (Sites Kab 1 to Kab 5) are made up of sparsely scattered Stone Age artefacts, the artefacts are out of context and of no significance apart from mentioning it in this report. No further action is recommended.
- It is recommended that the Iron Age grain bin site Kab 6 should be retained *in situ* with a buffer zone of 30 meters. This is a feasible option as the site is located on the periphery of the proposed crop land and preservation can be easily facilitated;
- The scatter of Iron Age ceramics in an agricultural field Site Kab 7 must be monitored during excavation of the pipeline;
- The stone packed wall at Site Kab 8 must be documented and a destruction permit applied for from SAHRA.
- A destruction permit can be applied for the Iron Age sites Kab 8, after which the site should be monitored during initial cultivation;
- Vele 11 is well outside (100 m to the west of the proposed pipeline) of the impact area and no further action is required;
- Vele 14 was identified as of negligible significance (Pikirayi *et al* 2012) and a destruction permit can be applied for the site;

- It is recommended that Vele 15 is test excavated to mitigate the complete loss of the resource after which a destruction permit can be applied for;
- Implementation of a chance find procedure for the project.

Declaration of Independence

Specialist Name	Jaco van der Walt
Declaration of Independence	<p>I declare, as a specialist appointed in terms of the National Environmental Management Act (Act No 108 of 1998) and the associated 2014 Environmental Impact Assessment (EIA) Regulations, that I:</p> <ul style="list-style-type: none"> • I act as the independent specialist in this application; • I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant; • I declare that there are no circumstances that may compromise my objectivity in performing such work; • I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity; • I will comply with the Act, Regulations and all other applicable legislation; • I have no, and will not engage in, conflicting interests in the undertaking of the activity; • I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority; • All the particulars furnished by me in this form are true and correct; and • I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.
Signature	
Date	25/01/2021

a) Expertise of the specialist

Jaco van der Walt has been practising as a CRM archaeologist for 15 years. He obtained an MA degree in Archaeology from the University of the Witwatersrand focussing on the Iron Age in 2012 and is a PhD candidate at the University of Johannesburg focussing on Stone Age Archaeology with specific interest in the Middle Stone Age (MSA) and Later Stone Age (LSA). Jaco is an accredited member of ASAPA (#159) and have conducted more than 500 impact assessments in Limpopo, Mpumalanga, North West, Free State, Gauteng, KZN as well as he Northern and Eastern Cape Provinces in South Africa.

Jaco has worked on various international projects in Zimbabwe, Botswana, Mozambique, Lesotho, DRC Zambia, Guinea and Tanzania. Through this, he has a sound understanding of the IFC Performance Standard requirements, with specific reference to Performance Standard 8 – Cultural Heritage.

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ABBREVIATIONS

AIA: Archaeological Impact Assessment
ASAPA: Association of South African Professional Archaeologists
BGG Burial Ground and Graves
BIA: Basic Impact Assessment
CFPs: Chance Find Procedures
CMP: Conservation Management Plan
CRR: Comments and Response Report
CRM: Cultural Resource Management
DEA: Department of Environmental Affairs
EA: Environmental Authorisation
EAP: Environmental Assessment Practitioner
ECO: Environmental Control Officer
EIA: Environmental Impact Assessment*
EIA: Early Iron Age*
EIA Practitioner: Environmental Impact Assessment Practitioner
EMP: Environmental Management Programme
ESA: Early Stone Age
ESIA: Environmental and Social Impact Assessment
GIS Geographical Information System
GPS: Global Positioning System
GRP Grave Relocation Plan
HIA: Heritage Impact Assessment
LIA: Late Iron Age
LSA: Late Stone Age
MEC: Member of the Executive Council
MIA: Middle Iron Age
MPRDA: Mineral and Petroleum Resources Development Act
MSA: Middle Stone Age
NEMA National Environmental Management Act, 1998 (Act No. 107 of 1998)
NHRA National Heritage Resources Act, 1999 (Act No. 25 of 1999)
NID Notification of Intent to Develop
NoK Next-of-Kin
PRHA: Provincial Heritage Resource Agency
SADC: Southern African Development Community
SAHRA: South African Heritage Resources Agency

**Although EIA refers to both Environmental Impact Assessment and the Early Iron Age both are internationally accepted abbreviations and must be read and interpreted in the context it is used.*

GLOSSARY

Archaeological site (remains of human activity over 100 years old)
 Early Stone Age (~ 2.6 million to 250 000 years ago)
 Middle Stone Age (~ 250 000 to 40-25 000 years ago)
 Later Stone Age (~ 40-25 000, to recently, 100 years ago)
 The Iron Age (~ AD 400 to 1840)
 Historic (~ AD 1840 to 1950)
 Historic building (over 60 years old)

1 Introduction and Terms of Reference:

HCAC is contracted by Tua Conserva Environmental & Conservation Services CC to conduct a Heritage Impact Assessment of the proposed Kabida Project that consist of new dam, water pipeline and deforestation for agricultural activities. The study area is located on the farms Overvlakte 125 MS (portion 5) and on the adjoining farm, the farm Bergen Op Zoom 124 MS, in the Vhembe District Municipal area (Figure 1-1 to 1-3).

The aim of the study is to survey the proposed development footprint to identify cultural heritage sites, document, and assess their importance within local, provincial and national context. It serves to assess the impact of the proposed project on non-renewable heritage resources, and to submit appropriate recommendations with regard to the responsible cultural resources management measures that might be required to assist the developer in managing the discovered heritage resources in a responsible manner. It is also conducted to protect, preserve and develop such resources within the framework provided by the National Heritage Resources Act of 1999 (Act No 25 of 1999). The report outlines the approach and methodology utilized before and during the survey, which includes: Phase 1, review of relevant literature; Phase 2, the physical surveying of the area on foot and by vehicle; Phase 3, reporting the outcome of the study.

During the survey Iron Age sites and a background scatter of Stone Age lithics were recorded. General site conditions and features on sites were recorded by means of photographs, GPS locations and site descriptions. Possible impacts were identified and mitigation measures are proposed in the following report. SAHRA as a commenting authority under section 38(8) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) require all environmental documents, compiled in support of an Environmental Authorisation application as defined by NEMA EIA Regulations section 40 (1) and (2), to be submitted to SAHRA. As such the Basic Assessment report and its appendices must be submitted to the case as well as the EMP, once it's completed by the Environmental Assessment Practitioner (EAP).

1.1 Terms of Reference

Field study

Conduct a field study to: (a) locate, identify, record, photograph and describe sites of archaeological, historical or cultural interest; b) record GPS points of sites/areas identified as significant areas; c) determine the levels of significance of the various types of heritage resources affected by the proposed development.

Reporting

Report on the identification of anticipated and cumulative impacts the operational units of the proposed project activity may have on the identified heritage resources for all 3 phases of the project; i.e., construction, operation and decommissioning phases. Consider alternatives, should any significant sites be impacted adversely by the proposed project. Ensure that all studies and results comply with the relevant legislation, SAHRA minimum standards and the code of ethics and guidelines of ASAPA.

To assist the developer in managing the discovered heritage resources in a responsible manner, and to protect, preserve, and develop them within the framework provided by the National Heritage Resources Act of 1999 (Act No 25 of 1999).

Table 2: Project Description

Farm and portions	Overvlakte 125 MS (portion 5) Bergen Op Zoom 124 MS,
Magisterial District	Musina Local Municipality, Vhembe District
1: 50 000 map sheet number	2229 BA
Central co-ordinate of the development	The co-ordinates (WGS84) of the proposed sites are approximate: <ul style="list-style-type: none"> • Crop land (middle): Latitude 22° 9' 34.15" and Longitude 29° 38' 45.37". • Dam (middle): Latitude 22° 10' 30.53" and Longitude 29° 39' 22.23". • Pipeline: Start point at Latitude 22° 07' 56.50" and Longitude 29° 38' 37.86" ending at Latitude 22° 10' 27.24" and Longitude 29° 39' 25.65"

Table 3: Infrastructure and project activities

Type of development	Agricultural
Project size	Cropland – 163 hectares Dam 63 hectares Pipeline 5,7 km
Project Components	Clearance of indigenous vegetation for croplands as well as the clearance of indigenous vegetation for construction of a dam as well as a pipeline on both properties with an internal diameter of 0.36 metre

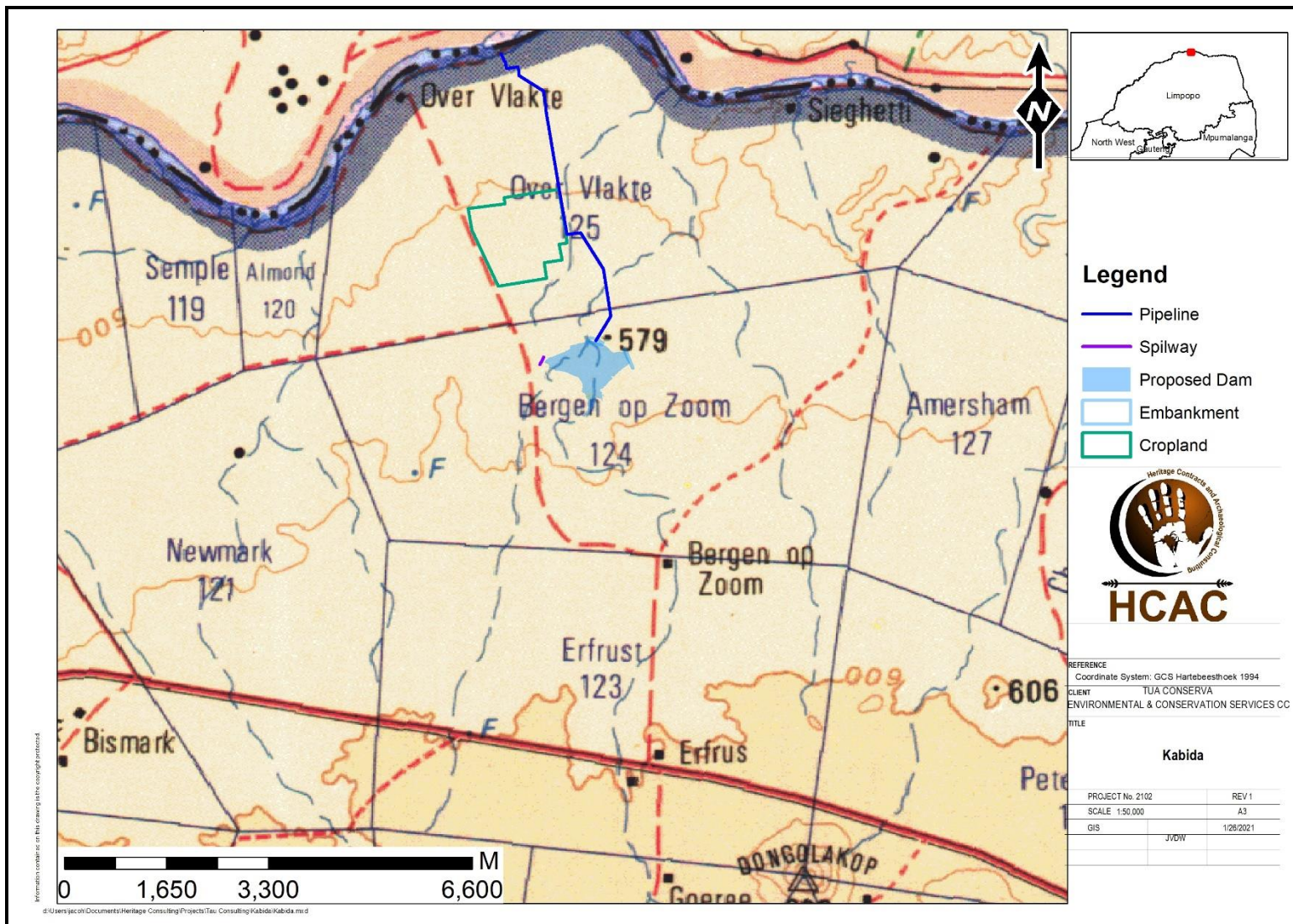


Figure 1. Regional setting (1: 250 000 topographical map).

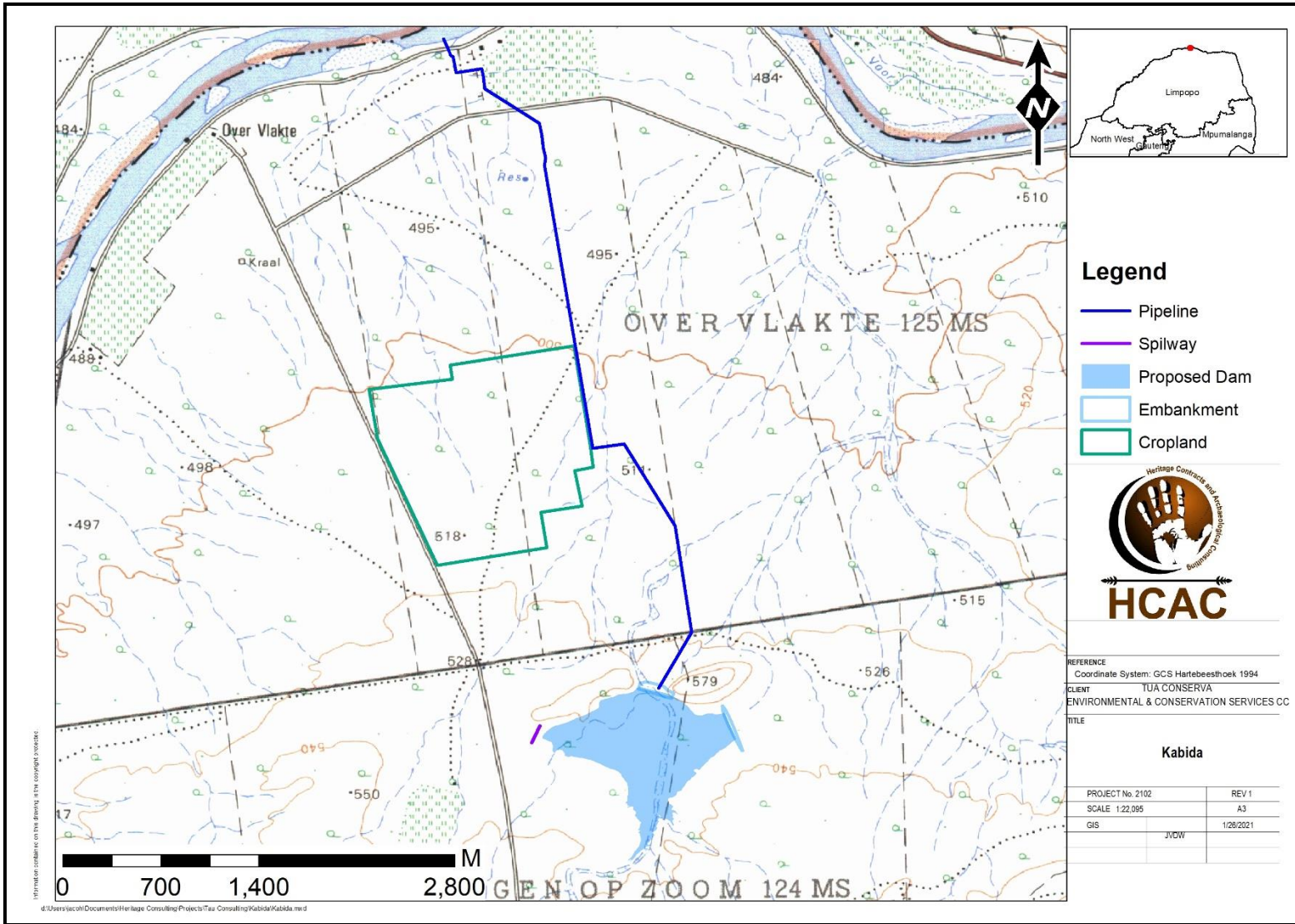


Figure 2: Local setting (1:50 000 topographical map).

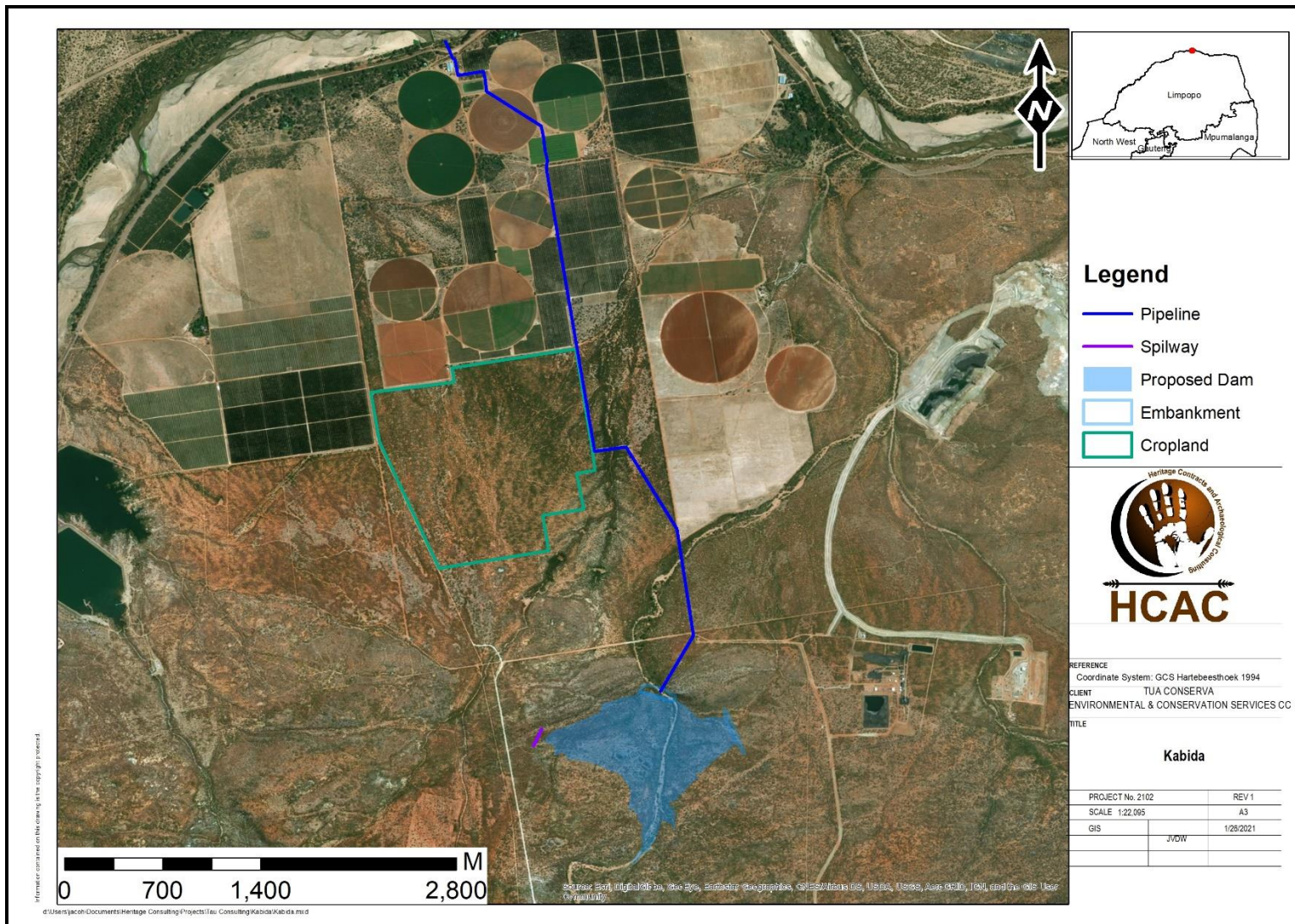


Figure 3. Aerial image of the proposed impact areas.

2 Legislative Requirements

The HIA, as a specialist sub-section of the EIA, is required under the following legislation:

- National Heritage Resources Act (NHRA), Act No. 25 of 1999
- National Environmental Management Act (NEMA), Act No. 107 of 1998 - Section 23(2)(b)
- Mineral and Petroleum Resources Development Act (MPRDA), Act No. 28 of 2002 - Section 39(3)(b)(iii)

A Phase 1 HIA is a pre-requisite for development in South Africa as prescribed by SAHRA and stipulated by legislation. The overall purpose of heritage specialist input is to:

- Identify any heritage resources, which may be affected;
- Assess the nature and degree of significance of such resources;
- Establish heritage informants/constraints to guide the development process through establishing thresholds of impact significance;
- Assess the negative and positive impact of the development on these resources; and
- Make recommendations for the appropriate heritage management of these impacts.

The HIA should be submitted, as part of the impact assessment report or EMPr, to the PHRA if established in the province or to SAHRA. SAHRA will ultimately be responsible for the professional evaluation of Phase 1 AIA reports upon which review comments will be issued. 'Best practice' requires Phase 1 AIA reports and additional development information, as per the impact assessment report and/or EMPr, to be submitted in duplicate to SAHRA after completion of the study. SAHRA accepts Phase 1 AIA reports authored by professional archaeologists, accredited with ASAPA or with a proven ability to do archaeological work.

Minimum accreditation requirements include an Honours degree in archaeology or related discipline and 3 years post-university CRM experience (field supervisor level). Minimum standards for reports, site documentation and descriptions are set by ASAPA in collaboration with SAHRA. ASAPA is based in South Africa, representing professional archaeology in the SADC region. ASAPA is primarily involved in the overseeing of ethical practice and standards regarding the archaeological profession. Membership is based on proposal and secondment by other professional members.

Phase 1 AIA's are primarily concerned with the location and identification of heritage sites situated within a proposed development area. Identified sites should be assessed according to their significance. Relevant conservation or Phase 2 mitigation recommendations should be made. Recommendations are subject to evaluation by SAHRA.

Conservation or Phase 2 mitigation recommendations, as approved by SAHRA, are to be used as guidelines in the developer's decision-making process.

Phase 2 archaeological projects are primarily based on salvage/mitigation excavations preceding development destruction or impact on a site. Phase 2 excavations can only be conducted with a permit, issued by SAHRA to the appointed archaeologist. Permit conditions are prescribed by SAHRA and includes (as minimum requirements) reporting back strategies to SAHRA and deposition of excavated material at an accredited repository.

In the event of a site conservation option being preferred by the developer, a site management plan, prepared by a professional archaeologist and approved by SAHRA, will suffice as minimum requirement.

After mitigation of a site, a destruction permit must be applied for with SAHRA by the applicant before development may proceed.

Human remains older than 60 years are protected by the National Heritage Resources Act, with reference to Section 36. Graves older than 60 years, but younger than 100 years fall under Section 36 of Act 25 of 1999 (National Heritage Resources Act), as well as the Human Tissues Act (Act 65 of 1983) and are the jurisdiction of SAHRA. The procedure for Consultation Regarding Burial Grounds and Graves (Section 36[5]) of Act 25 of 1999) is applicable to graves older than 60 years that are situated outside a formal cemetery administrated by a local authority. Graves in this age category, located inside a formal cemetery administrated by a local authority, require the same authorisation as set out for graves younger than 60 years, in addition to SAHRA authorisation. If the grave is not situated inside a formal cemetery, but is to be relocated to one, permission from the local authority is required and all regulations, laws and by-laws, set by the cemetery authority, must be adhered to.

Human remains that are less than 60 years old are protected under Section 2(1) of the Removal of Graves and Dead Bodies Ordinance (Ordinance No. 7 of 1925), as well as the Human Tissues Act (Act 65 of 1983) and are the jurisdiction of the National Department of Health and the relevant Provincial Department of Health and must be submitted for final approval to the office of the relevant Provincial Premier. This function is usually delegated to the Provincial MEC for Local Government and Planning; or in some cases, the MEC for Housing and Welfare. Authorisation for exhumation and reinternment must also be obtained from the relevant local or regional council where the grave is situated, as well as the relevant local or regional council to where the grave is being relocated. All local and regional provisions, laws and by-laws must also be adhered to. To handle and transport human remains, the institution conducting the relocation should be authorised under Section 24 of Act 65 of 1983 (Human Tissues Act).

3 METHODOLOGY

3.1 Literature Review

A brief survey of available literature was conducted to extract data and information on the area in question to provide general heritage context into which the development would be set. This literature search included published material, unpublished commercial reports and online material, including reports sourced from the South African Heritage Resources Information System (SAHRIS).

3.2 Genealogical Society and Google Earth Monuments

Google Earth and 1:50 000 maps of the area were utilised to identify possible places where sites of heritage significance might be located; these locations were marked and visited during the fieldwork phase. The database of the Genealogical Society was consulted to collect data on any known graves in the area.

3.3 Public Consultation and Stakeholder Engagement:

Stakeholder engagement is a key component of any BAR process, it involves stakeholders interested in, or affected by the proposed development. Stakeholders are provided with an opportunity to raise issues of concern (for the purposes of this report only heritage related issues will be included). The aim of the public consultation process was to capture and address any issues raised by community members and other stakeholders during key stakeholder and public meetings. The process involved:

- Placement of advertisements and site notices
- Stakeholder notification (through the dissemination of information and meeting invitations);
- Stakeholder meetings undertaken with I&APs;
- Authority Consultation
- The compilation of a Report.

Please refer to section 6 for more detail.

3.4 Site Investigation

Conduct a field study to: a) systematically survey the proposed project area to locate, identify, record, photograph and describe sites of archaeological, historical or cultural interest; b) record GPS points of sites/areas identified as significant areas; c) determine the levels of significance of the various types of heritage resources recorded in the project area.

Table 4: Site Investigation Details

	Site Investigation
Date	24 to 26 November 2021
Season	Summer – A small section (approximately 100 meters) on the northern portion of the pipeline was adjusted after the survey, traversing through existing agricultural fields and this section was therefore not surveyed. The impact area was however sufficiently covered (Figure 3-1) to understand the heritage character of the study area

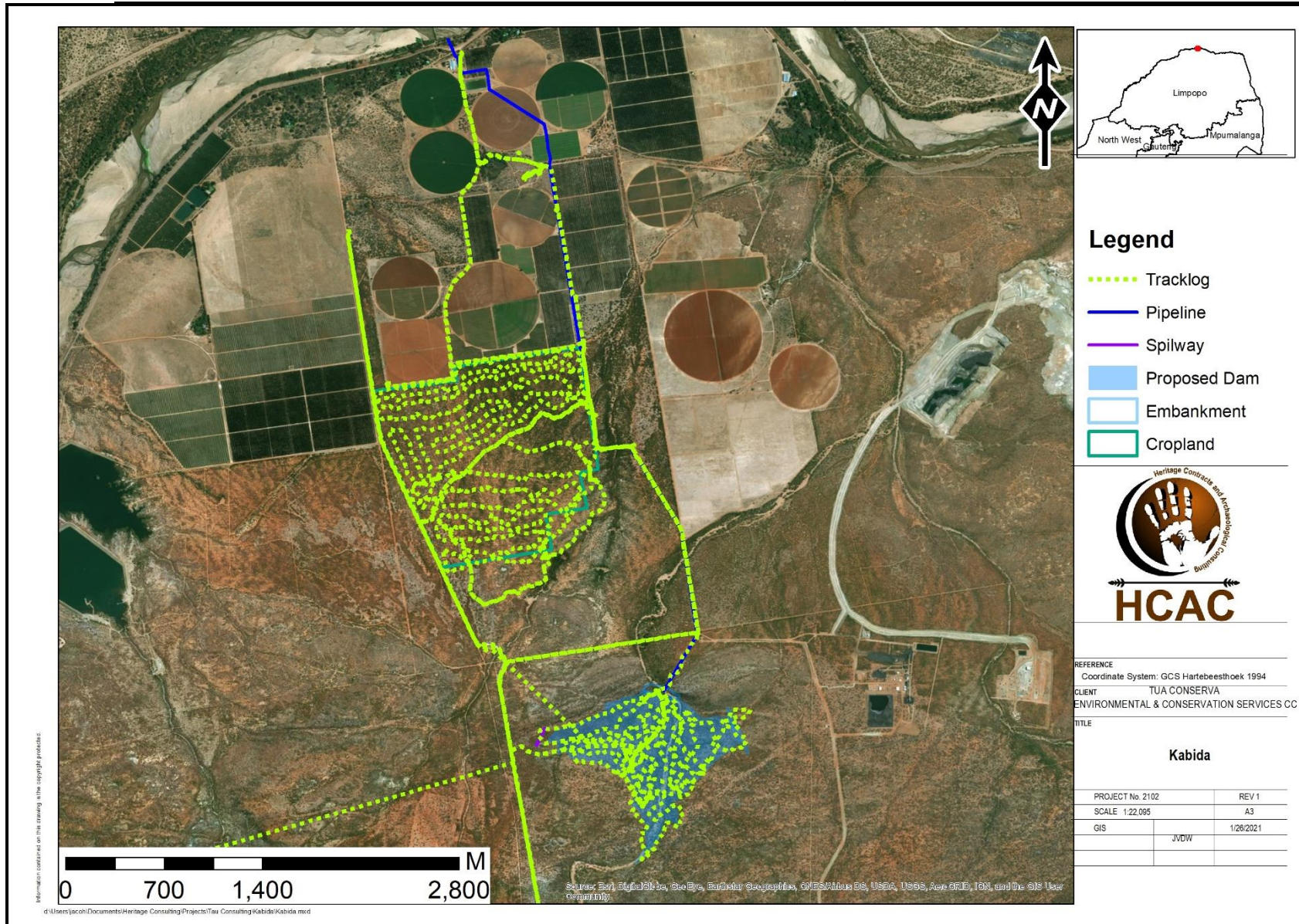


Figure 4: Tracklog of the survey in green.

3.5 Site Significance and Field Rating

Section 3 of the NHRA distinguishes nine criteria for places and objects to qualify as 'part of the national estate' if they have cultural significance or other special value. These criteria are:

- Its importance in/to the community, or pattern of South Africa's history;
- Its possession of uncommon, rare or endangered aspects of South Africa's natural or cultural heritage;
- Its potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage;
- Its importance in demonstrating the principal characteristics of a particular class of South Africa's natural or cultural places or objects;
- Its importance in exhibiting particular aesthetic characteristics valued by a community or cultural group;
- Its importance in demonstrating a high degree of creative or technical achievement at a particular period;
- Its strong or special association with a particular community or cultural group for social, cultural or spiritual reasons;
- Its strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa;
- Sites of significance relating to the history of slavery in South Africa.

The presence and distribution of heritage resources define a 'heritage landscape'. In this landscape, every site is relevant. In addition, because heritage resources are non-renewable, heritage surveys need to investigate an entire project area, or a representative sample, depending on the nature of the project. In the case of the proposed project the local extent of its impact necessitates a representative sample and only the footprint of the areas demarcated for development were surveyed. In all initial investigations, however, the specialists are responsible only for the identification of resources visible on the surface. This section describes the evaluation criteria used for determining the significance of archaeological and heritage sites. The following criteria were used to establish site significance with cognisance of Section 3 of the NHRA:

- The unique nature of a site;
- The integrity of the archaeological/cultural heritage deposits;
- The wider historic, archaeological and geographic context of the site;
- The location of the site in relation to other similar sites or features;
- The depth of the archaeological deposit (when it can be determined/is known);
- The preservation condition of the sites; and
- Potential to answer present research questions.

In addition to this criteria field ratings prescribed by SAHRA (2006), and acknowledged by ASAPA for the SADC region, were used for the purpose of this report. The recommendations for each site should be read in conjunction with section 10 of this report.

FIELD RATING	GRADE	SIGNIFICANCE	RECOMMENDED MITIGATION
National Significance (NS)	Grade 1	-	Conservation; national site nomination
Provincial Significance (PS)	Grade 2	-	Conservation; provincial site nomination
Local Significance (LS)	Grade 3A	High significance	Conservation; mitigation not advised
Local Significance (LS)	Grade 3B	High significance	Mitigation (part of site should be retained)
Generally Protected A (GP. A)	-	High/medium significance	Mitigation before destruction
Generally Protected B (GP. B)	-	Medium significance	Recording before destruction
Generally Protected C (GP.C)	-	Low significance	Destruction

3.6 Impact Assessment Methodology

The criteria below are used to establish the impact rating on sites:

- The **nature**, which shall include a description of what causes the effect, what will be affected and how it will be affected.
- The **extent**, wherein it will be indicated whether the impact will be local (limited to the immediate area or site of development) or regional, and a value between 1 and 5 will be assigned as appropriate (with 1 being low and 5 being high):
- The **duration**, wherein it will be indicated whether:
 - * the lifetime of the impact will be of a very short duration (0-1 years), assigned a score of 1;
 - * the lifetime of the impact will be of a short duration (2-5 years), assigned a score of 2;
 - * medium-term (5-15 years), assigned a score of 3;
 - * long term (> 15 years), assigned a score of 4; or
 - * permanent, assigned a score of 5;
- The **magnitude**, quantified on a scale from 0-10 where; 0 is small and will have no effect on the environment, 2 is minor and will not result in an impact on processes, 4 is low and will cause a slight impact on processes, 6 is moderate and will result in processes continuing but in a modified way, 8 is high (processes are altered to the extent that they temporarily cease), and 10 is very high and results in complete destruction of patterns and permanent cessation of processes.
- The **probability of occurrence**, which shall describe the likelihood of the impact actually occurring. Probability will be estimated on a scale of 1-5 where; 1 is very improbable (probably will not happen), 2 is improbable (some possibility, but low likelihood), 3 is probable (distinct possibility), 4 is highly probable (most likely) and 5 is definite (impact will occur regardless of any prevention measures).
- The **significance**, which shall be determined through a synthesis of the characteristics described above and can be assessed as low, medium or high; and
- the **status**, which will be described as either positive, negative or neutral.
- the degree to which the impact can be reversed.
- the degree to which the impact may cause irreplaceable loss of resources.
- the *degree* to which the impact can be mitigated.

The **significance** is calculated by combining the criteria in the following formula:

$$S=(E+D+M) P$$

S = Significance weighting

E = Extent

D = Duration

M = Magnitude

P = Probability

The **significance weightings** for each potential impact are as follows:

- < 30 points: Low (i.e., where this impact would not have a direct influence on the decision to develop in the area),
- 30-60 points: Medium (i.e., where the impact could influence the decision to develop in the area unless it is effectively mitigated),
- 60 points: High (i.e., where the impact must have an influence on the decision process to develop in the area).

3.7 Limitations and Constraints of the study

The authors acknowledge that the brief literature review is not exhaustive on the literature of the area. Due to the nature of heritage resources and pedestrian surveys, the possibility exists that some features or artefacts may not have been discovered/recorded during the survey and the possible occurrence of graves and other cultural material cannot be excluded. Similarly, the depth of the deposit of heritage sites cannot be accurately determined due its subsurface nature. It is assumed that the spatial data available to the author for the World Heritage Site and buffer zones are accurate and up to date. This report only deals with the footprint area of the proposed development and consisted of non-intrusive surface surveys. This study did not assess the impact on medicinal plants and intangible heritage as it is assumed that these components would have been highlighted through the public consultation process if relevant. It is possible that new information could come to light in future, which might change the results of this Impact Assessment.

4 Description of Socio Economic Environmental

According to StatsSA the Musina Municipality is a multi-racial municipality, due to the influence of the mining industry and the Beit bridge border gate. Only 50% of the population in the municipality speaks Tshivenda as their first language, followed by 8,8% who speak Sesotho, which is unusual in this area. The population in the municipality is dominated by people of aged 15–36. There are over 20 042 household in Musina Municipality with an average of 3,1 persons per household. The majority of households live in a house or brick/concrete block structures at 78%, followed by those who lives in traditional dwelling at 15,4 %. The majority of households in the district have access to piped water at 93%.

5 Description of the Physical Environment:

The study area is located within the Limpopo Valley and the terrain is relatively flat sloping to the north towards to Limpopo River. Few major topographic features are located within the proposed cropland and water pipeline, these areas area characterised by low vegetation and Mopani trees (Figure 5-1). An unnamed drainage line and a few rocky outcrops occur within the proposed dam area (Figure 5-2). The vegetation is predominantly: Subtropical alluvial Vegetation in the Cropland area with Limpopo Ridge Bushveld in the dam area.

The prevailing vegetation type and landscape features of the larger area form part of the Musina Mupane Bushveld. It is described as undulating plains to very irregular plains with some hills. In the western section, open woodland to moderately closed shrubveld is dominated by *Colophospermum mopane* on clayey bottomlands and *Combretum apiculatum* on hills. In the eastern section on basalt, moderately closed to open shrubveld it is dominated by *Colophospermum mopane* and *Terminalia prunoides*. On areas with deep sandy soils, moderately open savannah is dominated by *Colophospermum mopane*, *T. sericea*, *Grewia flava* and *Combretum apiculatum*. The field layer is well developed (especially on the basalt), open during the dry season; the herbaceous layer is poorly developed in areas with dense cover of *Colophospermum mopane* shrubs, for example, north of Alldays bordering the Limpopo floodplain (Mucina & Rutherford, 2006).



Figure 5. General site conditions in the proposed cropland.

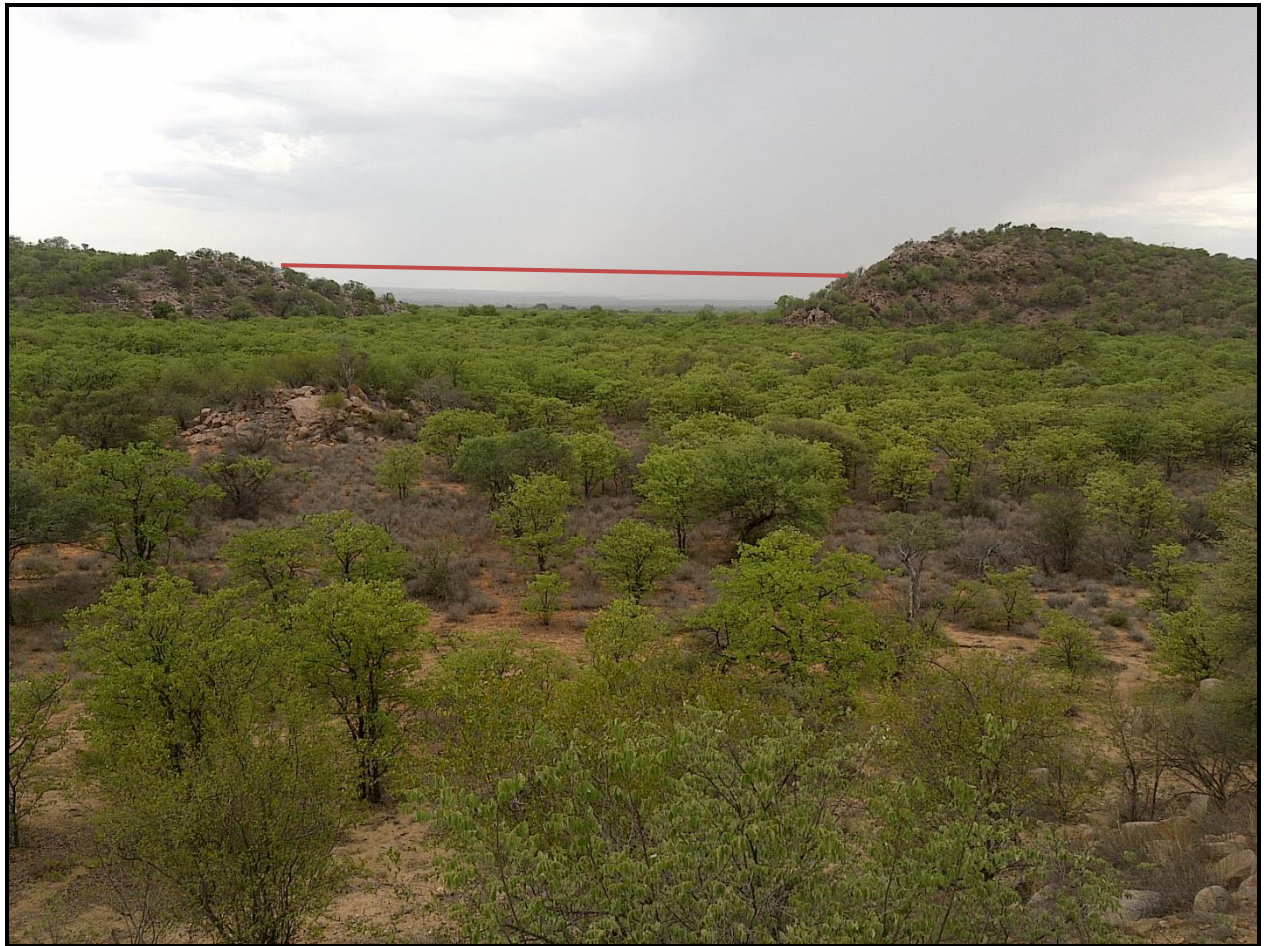


Figure 6. General site conditions in the dam area. The proposed location of the Embankment is indicated in red.

6 Results of Public Consultation and Stakeholder Engagement:

6.1.1 Stakeholder Identification

Adjacent landowners and the public at large were informed of the proposed activity as part of the BA process. Site notices and advertisements notifying interested and affected parties were placed at strategic points and in local newspapers as part of the process.

7 Literature / Background Study:

7.1 Literature Review (SAHRIS)

The study area is located to the east of the World Heritage Site of Mapungubwe and a vast amount of research is available on the larger area. Due to tourism and mining developments as well as a strong agricultural sector numerous reports were conducted in the vicinity of the study area and were consulted for this report. Reports included finds ranging from fossils and Stone Age sites to important Farming Community/ Iron Age Settlements as well as burial sites. For the purposes of this report the term Iron Age will be used, in line with the referenced sources.

Previous HIA's conducted on the area under investigation were conducted by Roodt (2009) as well as a revised HIA report for Department of Environmental Affairs by Pikirayi *et al* (2012). In 2007 (Munyai & Roodt) and 2018 (Roodt & Stegman) HIA's were conducted for agricultural projects on the Farm Overvlakte. The studies were consulted together with the studies listed in Table 5 and known sites are indicated in Figure 7-1.

Table 5. Studies consulted for this project.

Author	Year	Project	Findings
Gaigher, S.	2000	Preliminary Archaeological impact assessment of two agricultural fields on the farm Alyth 118MS	Stone Age, Iron Age and burial sites.
Huffman, T.	2003	Archaeological assessment of tourism developments in the Mapungubwe Cultural Landscape.	Stone Age and Iron Age sites
Munyai, R & Roodt, F.	2007	Heritage Impact Assessment – an archaeological investigation of a proposed irrigation dam at farm Overvlakte 125 MS, Musina Municipality, Vhembe district,	No sites
Roodt, F.	2009	Heritage Impact Assessment Report Proposed Vele Colliery Weipe Vhembe District Municipality: Limpopo	Stone Age, Iron Age, Grave Sites and Historical structures.
Pikirayi, I. Chirikure, S. Manyanga, M Mothulatshipi, S.	2012	Heritage Impact Assessment Report and Management Plan Relating to the Establishment of the Vele Colliery near Mapungubwe World Heritage Site, Musina, Limpopo Province: South Africa	36 Sites ranging from Stone Age artefacts to significant Iron Age and Burial sites.
Steggman, L. & Roodt, F.	2018	Phase 1 Heritage Resources Scoping Report Proposed Expansion of the Existing Dam on Rem Portion of the Farm Overvlakte 125 MS, Musina Local Municipality, Vhembe District, Limpopo Province	Iron Age grain bin and ceramic site. The study also indicated that for the paleontological component there is a very high likelihood of the occurrence of fossils
Van der Walt, J.	2020	Heritage Impact Assessment on the Farm Skutwater 115MS, Limpopo Province.	Iron Age sites and Stone Age scatters

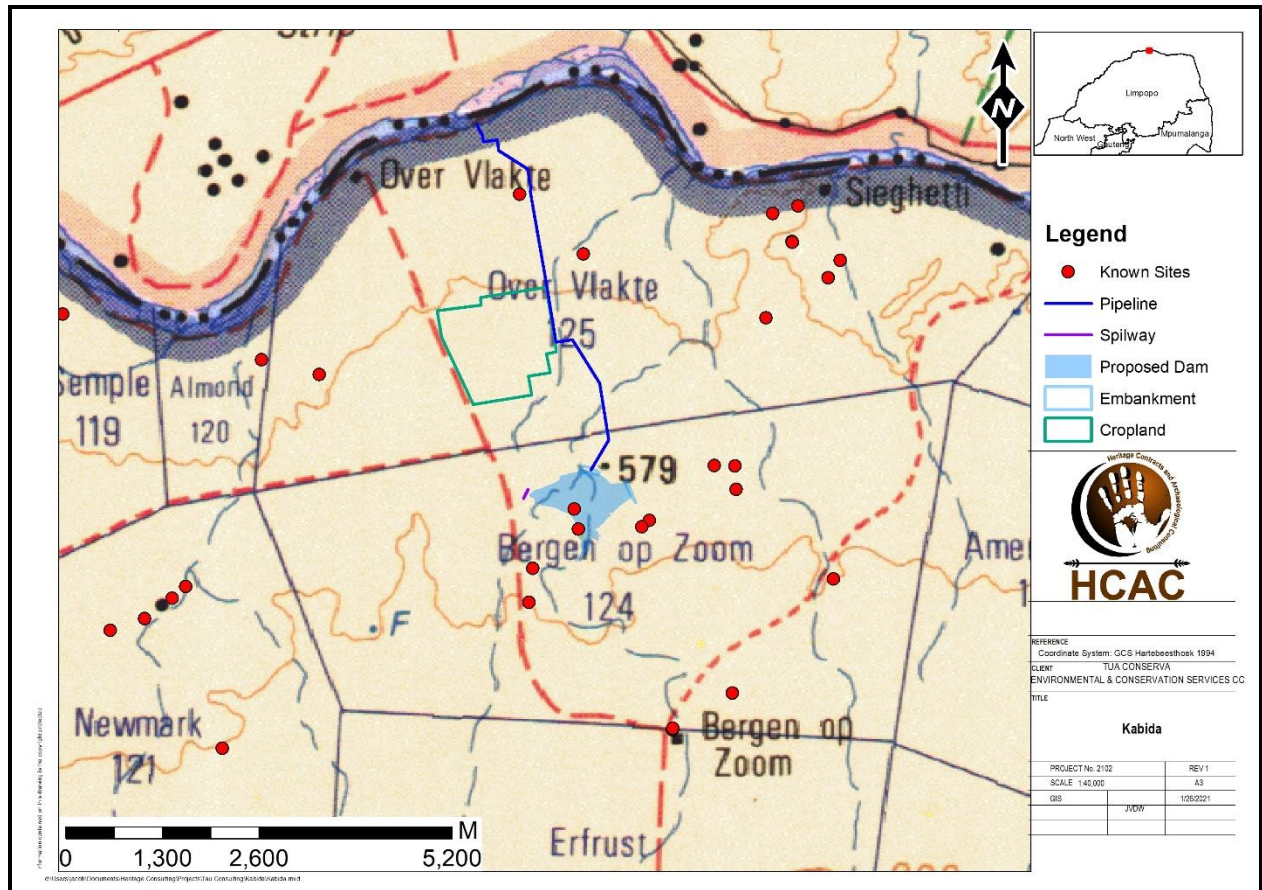


Figure 7: Known sites in relation to the study area from the Wits database and SAHRIS.

7.1.1 Genealogical Society and Google Earth Monuments

No known grave sites are indicated in the study area.

7.2 General History of the area

7.2.1 Archaeology of the area

The archaeological record for the greater study area consists of the Stone Age and Iron Age.

7.2.1.1 Stone Age

South Africa has a long and complex Stone Age sequence of more than 2 million years. The broad sequence includes the Later Stone Age (LSA), the Middle Stone Age (MSA) and the Earlier Stone Age (ESA). Each of these phases contain sub-phases or industrial complexes, and within these we can expect regional variation regarding characteristics and time ranges. The three main phases can be divided as follows;

- * Later Stone Age; associated with Khoi and San societies and their immediate predecessors. Recently to ~30 thousand years ago
- * Middle Stone Age; associated with Homo sapiens and archaic modern humans. 30-300 thousand years ago.
- * Earlier Stone Age; associated with early Homo groups such as Homo habilis and Homo erectus. 400 000-> 2 million years ago.

The larger geographical area was inhabited since the ESA and was subjected to intensive research (Kuman *et al* 2000). In terms of the MSA evidence of bipolar flaking that is associated with the MSA Pietersburg Industry (Mason 1962) occurs at the earlier Limpopo site, Kudu Koppie (Sumner 2013).

During the LSA, people started to occupy sites on a recurring basis often in rock shelters and caves and often left panels of rock art in these shelters a rock art survey on both sides of the Limpopo Sashi confluence area identified close to 150 rock art sites (Eastwood and Cnoops 1999).

7.2.1.2 The Iron Age

The Iron Age as a whole represents the spread of Bantu speaking people and includes both the pre-Historic and Historic periods. The Iron Age is characterised by the ability of these early people to manipulate and work Iron ore into implements that assisted them in creating a favourable environment to make a better living. The Iron Age is divided into three distinct periods:

- The Early Iron Age: Most of the first millennium AD.
- The Middle Iron Age: 10th to 13th centuries AD
- The Late Iron Age: 14th century to colonial period.

Phases within each period are marked by different ceramic *facies* (Figure 7-2). A short summary of occupation in the Limpopo valley will now be discussed.

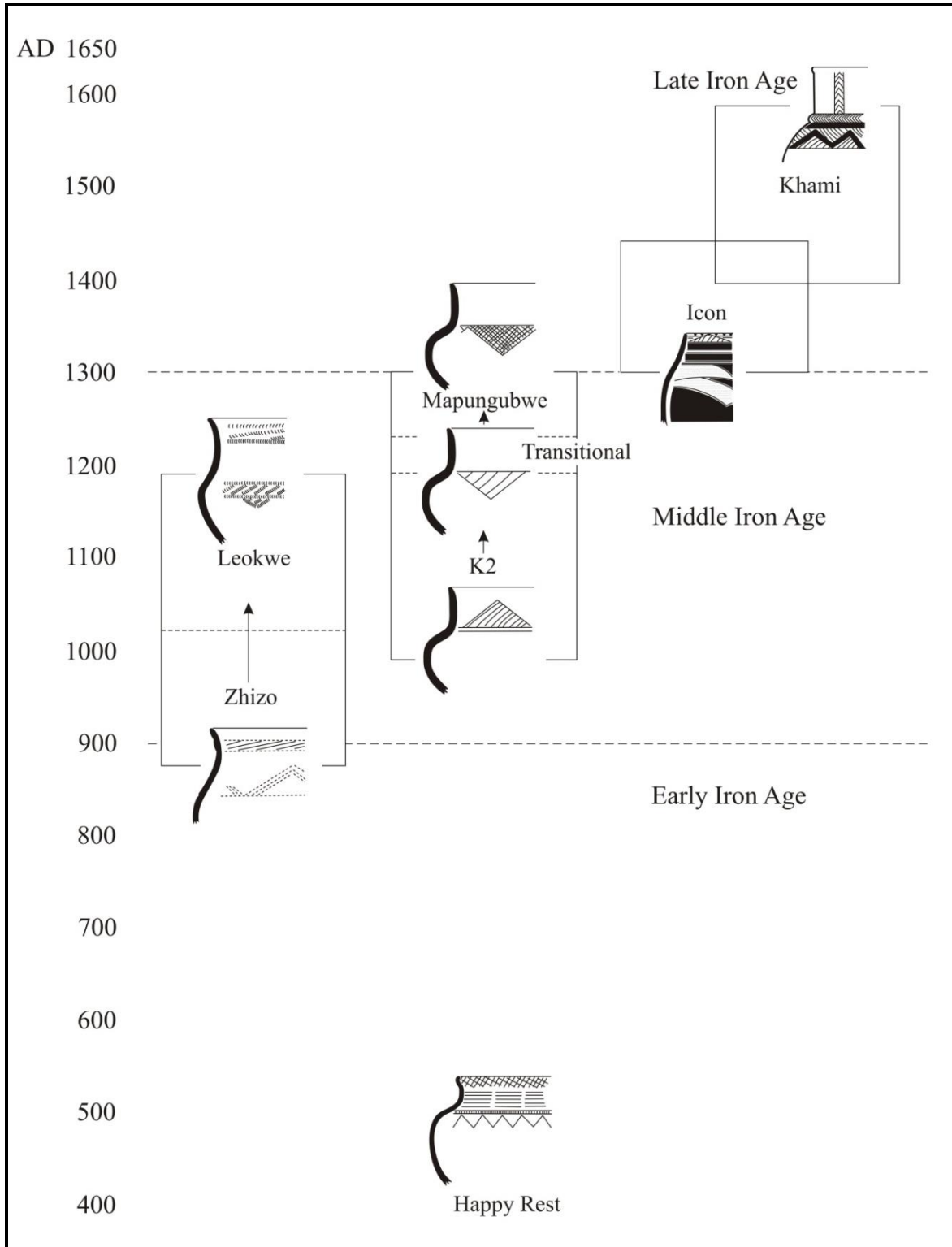


Figure 8: Iron Age ceramic facies for the Mapungubwe region (Adapted from Huffman 2009b).

Early Iron Age

Between AD 500 and 700, agro-pastoralists joined the hunter gatherers in the region. This was marked by ceramics belonging to the *Happy Rest* and *Mzonjani* facies (Figure 7-3). These societies were patrilineal (cf. Hammond-Tooke 1993) and spoke an Eastern Bantu language (Huffman & Herbert 1994/1995).

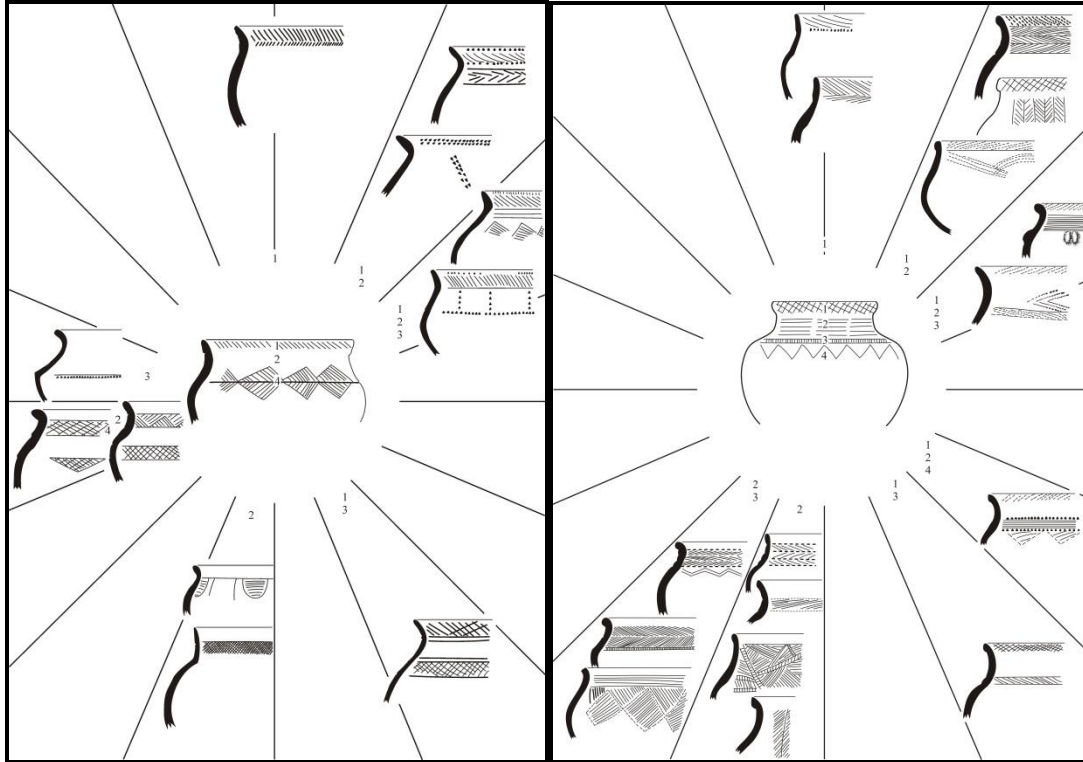


Figure 9: Definition of *Mzonjani* ceramics on the left and *Happy Rest* ceramics on the right (Adapted from Huffman 2007a).

After this initial intrusion, agro-pastoralists seem to have abandoned the area until AD 900 because of adverse climatic conditions (Huffman 1996a). From AD 900 to 1000, *Zhizo* pottery (Figure 7-3) marks the second phase of occupation. *Zhizo* ceramics belong to the Nkope Branch of the Urewe Tradition (or Central Stream) (Figure 7-4). Initially it was thought that *Zhizo* people moved into the area to practise agriculture (Huffman 1996a). However, isotopic analysis shows that the climate was no better than today (Smith 2005). *Zhizo* farmers would therefore have found farming difficult, and some other factors must have lured them to the area. Presumably, they moved into the valley to take advantage of the East Coast trade (Huffman 2000; Smith 2005), where the Limpopo River acted as a route into the interior. The location of settlements (most are located away from the rich agricultural soils around the floodplain because elephants would have destroyed the crops) as well as ivory chippings and exotic goods at Schroda (Hanisch 1980) suggest that trade was the main attraction. Ivory, like gold, was a lucrative export commodity, and historical accounts record large amounts of ivory reaching Sofala from the interior (Kusimba 1999). In addition, the wide distribution of *Zhizo*-period glass beads (Wood 2005) suggests that *Zhizo* people traded them for grain with more successful farmers outside the valley.

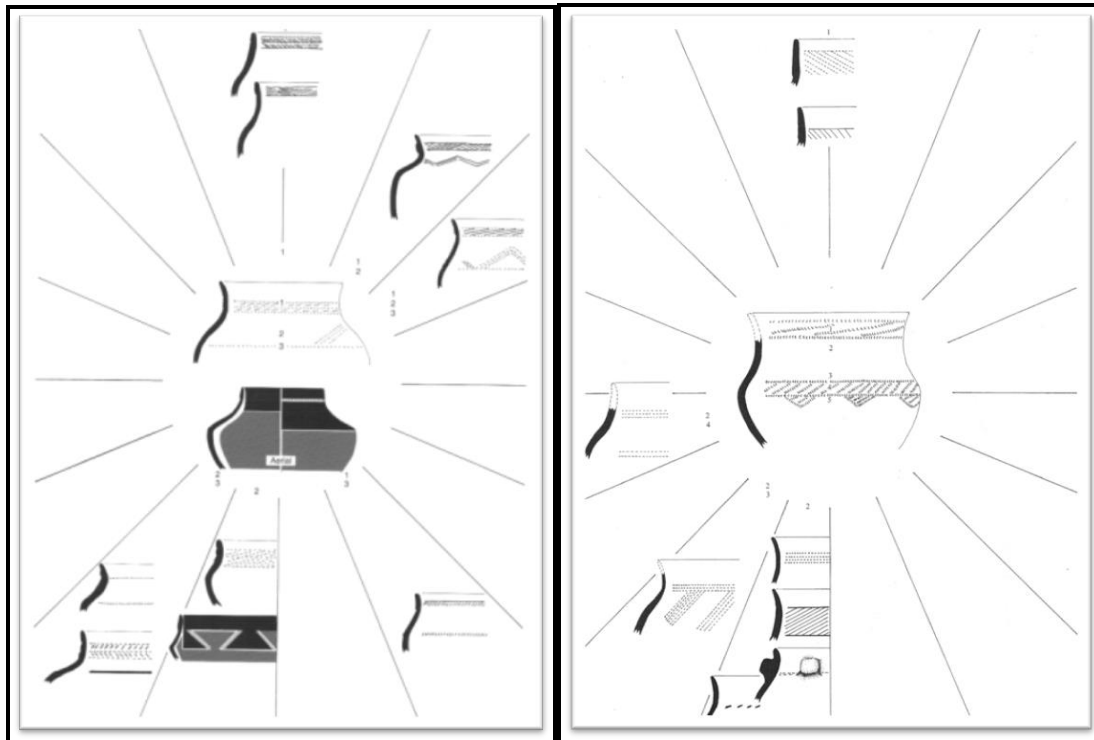


Figure 10: Definition of *Zhizo* ceramics on the left and *Leokwe* ceramics on the right (Adapted from Huffman 2007a).

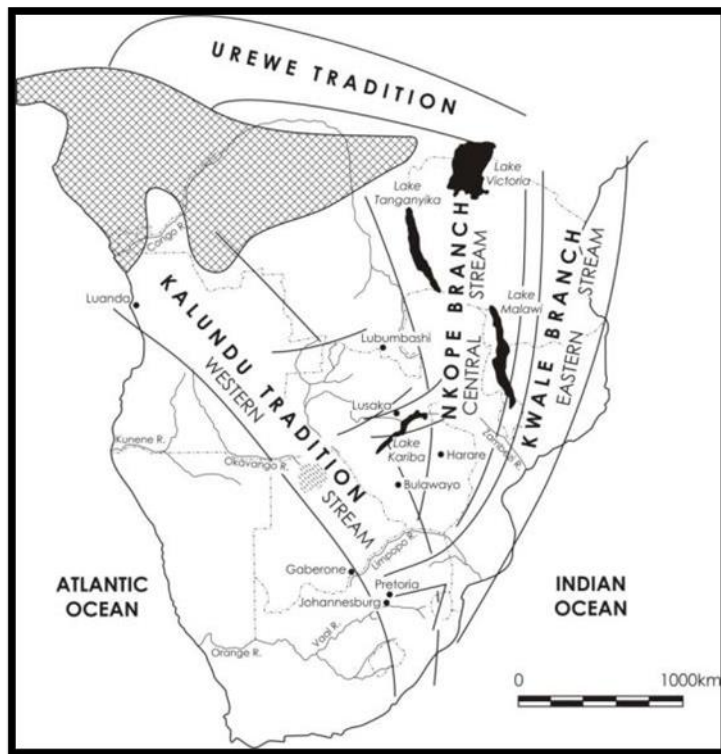


Figure 11: Map of southern Africa indicating migration routes of different Iron Age Traditions (Adapted from Huffman 2007a).

Middle Iron Age

After approximately 100 years, around AD 1010, the Zhizo political control over the area and coastal trade was terminated by the arrival of new agro-pastoralists that archaeologists refer to as Leopard's Kopje. Leopard's Kopje ceramics are derived from the *Doornkop* facies (formerly Lydenburg) to the south (Huffman 2007a), an Early Iron Age phase of the Kalundu Tradition (Figure 7-4).

After replacing the Zhizo chiefdom, Leopard's Kopje people established their capital at K2, located at the base of Bambandyanalo Hill (Fouché 1937; Gardner 1963). K2 was occupied between AD 1000 and 1220 (Vogel 2000). This period was marked by higher rainfall (Smith 2005), resulting in an emphasis on floodplain agriculture (Huffman 2000; Smith 2005) allowing for population growth.

Changes in world view are marked by a shift away from the Central Cattle Pattern (CCP) to the elite Zimbabwe Pattern (ZP). The new ideology of sacred leadership was materialised when Leopard's Kopje people abandoned K2 for Mapungubwe, less than a kilometre away.

During this period (AD 1200 to 1250) of transition the ceramic style also changed (Figure 7-5). This transitional ceramic *facies* are now termed *Transitional K2*, or *TK2*.

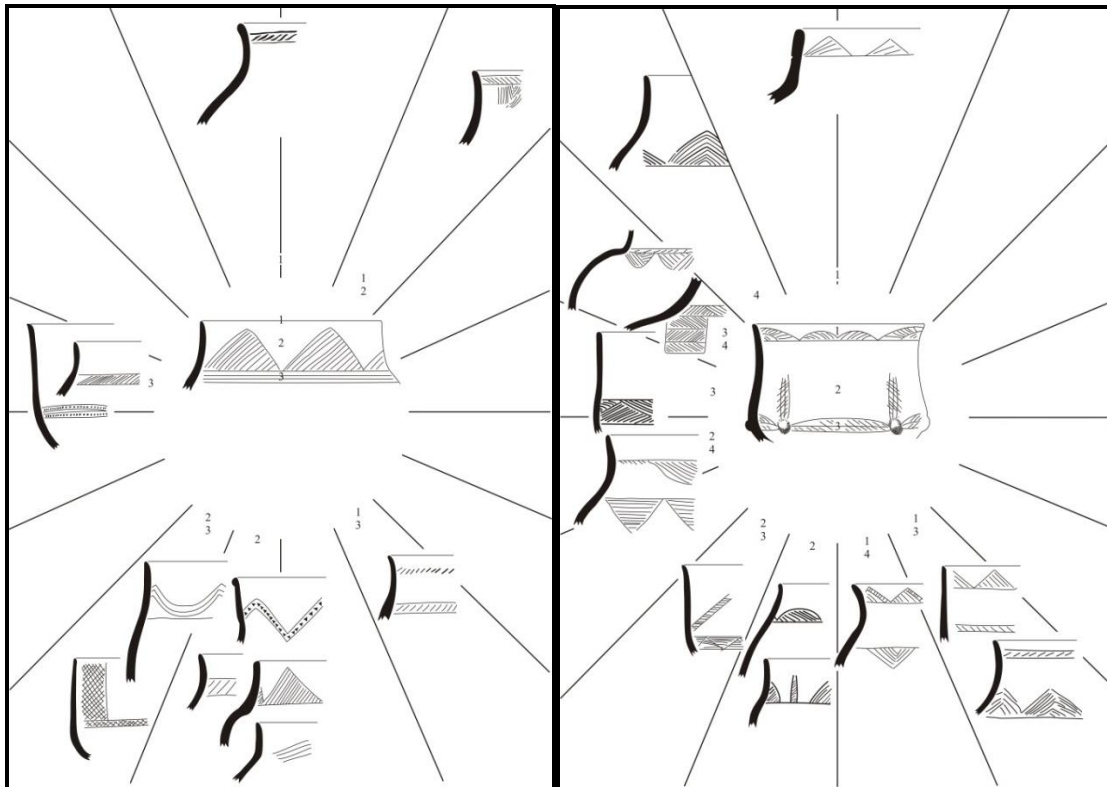


Figure 12: Definition of *K2* ceramics on the left and *TK2* ceramics on the right (Adapted from Huffman 2007a) Transitional occupation was equally divided between floodplain and escarpment where there is a clear distinction between cattle and agriculturally orientated settlements. By about AD 1250, the *TK2 facies* changed into classic Mapungubwe ceramics.

7.3 Historical Information

In 1903 the copper deposits in the Musina area were investigated by Colonel John P Grenfell. He also established the Messina (Transvaal) Development Company Limited to exploit the copper deposits. The town of Messina now referred to as Musina was founded in 1904 on the farm Berkenrode, as a result of the exploitation of the copper deposits. It was proclaimed as town in 1957 (Hammerbeck & Schoeman 1976).

7.3.1 Anglo-Boer War

No sites dating to the Anglo-Boer War are known close to the study area.

7.3.2 Cultural Landscape

Musina was occupied by pre-historic copper miners, before prospector John Pascoe Grenfell laid out claims in 1904 and the mining town of “Messina” developed from there (Bulpin, 1980). It is still a mining town, but a lot of attention is currently on the cross-border trade with Zimbabwe. Musina is the seat of the local municipality and is also the economic and commercial hub of the region.

The World Heritage site of Mapungubwe is located approximately 8km to the west of the development and the study area is located outside of the buffer zone (Figure 7-7). The Mapungubwe Cultural Landscape is comprised of:

- Remains of palaces – (Mapungubwe period);
- Archaeological remains testifying to Mapungubwe’s growth 900-1200 AD (Zhizo, Leopard’s Kopje);
- Remains of early settlement: Stone Age & Iron Age & rock art;
- ‘Natural’ landscape surrounding the built remains;
- Intangible heritage: Mapungubwe Hill associated with sacredness, beliefs, customs and traditions of local communities;
- Living heritage: continuing traditions and associations such as rain making, and participation by local communities in reburial ceremonies;
- Landscape sharing and interaction between farmers and hunter-gatherers.

Land use in the study area consist of intensive cultivation (Figure 7-8) but has been subjected to limited development from prior to 1967 (Figure 7-9) and successive historical topographic maps indicate the changes in the study area and surrounds (Figure 7-10 and Figure 7-11).

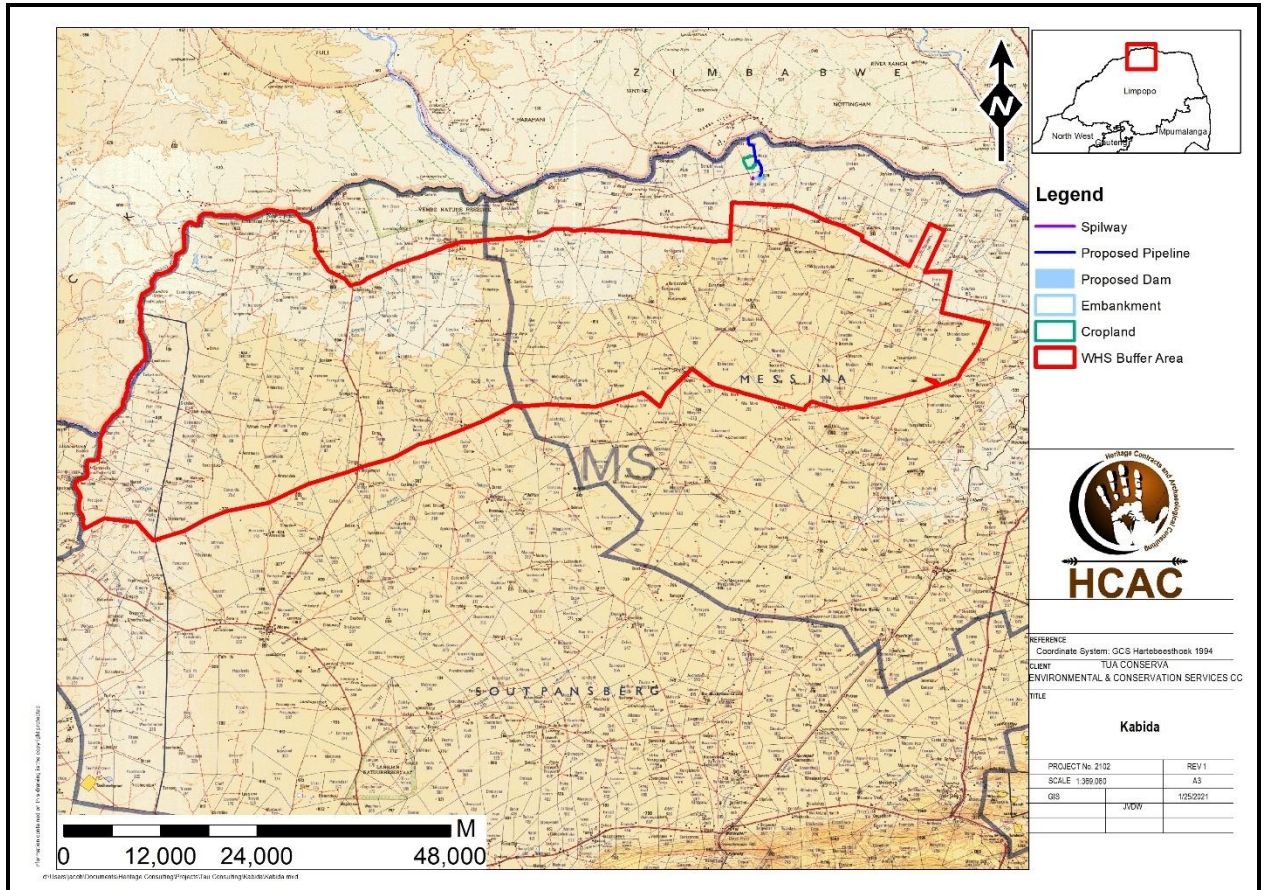


Figure 13: Study area in relation to the WHS of Mapungubwe and buffer zone.



Figure 14: Land use in the study area is characterised by extensive cultivation.

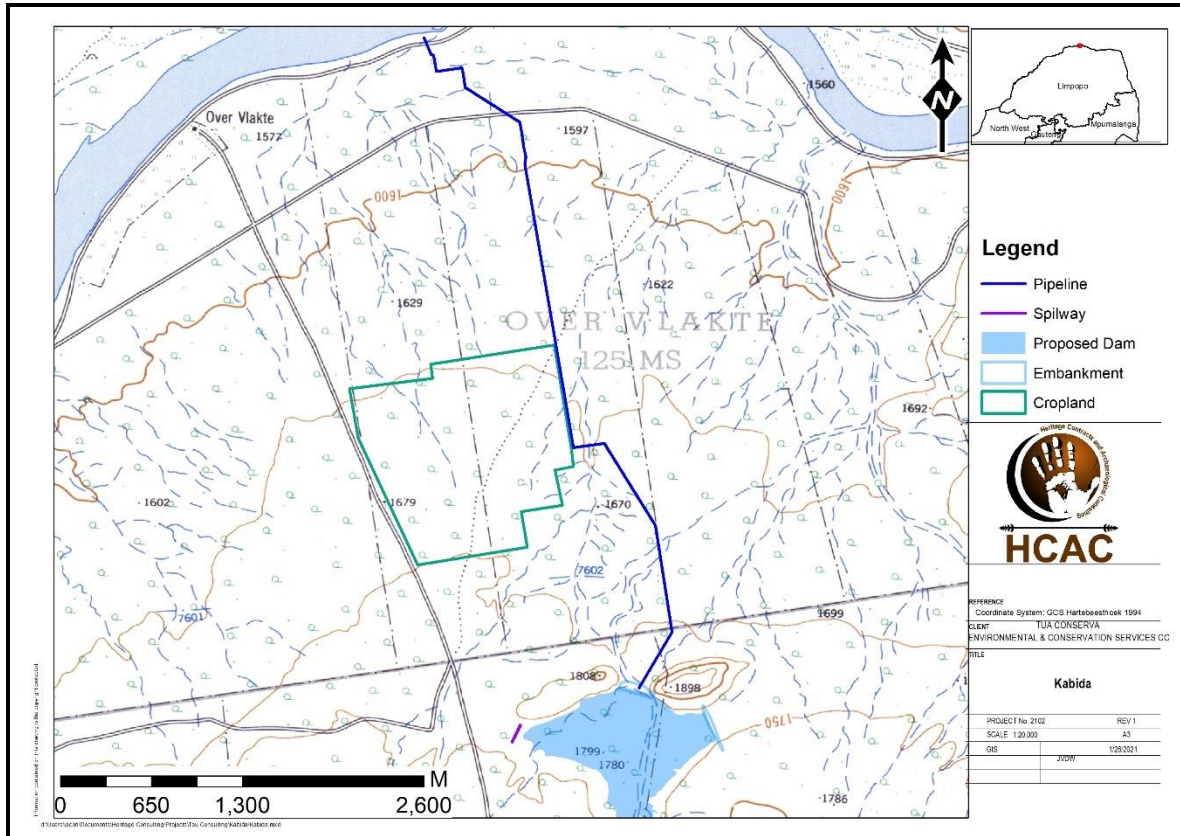


Figure 15. 1967 Topographical map of the study area. No developments are visible.

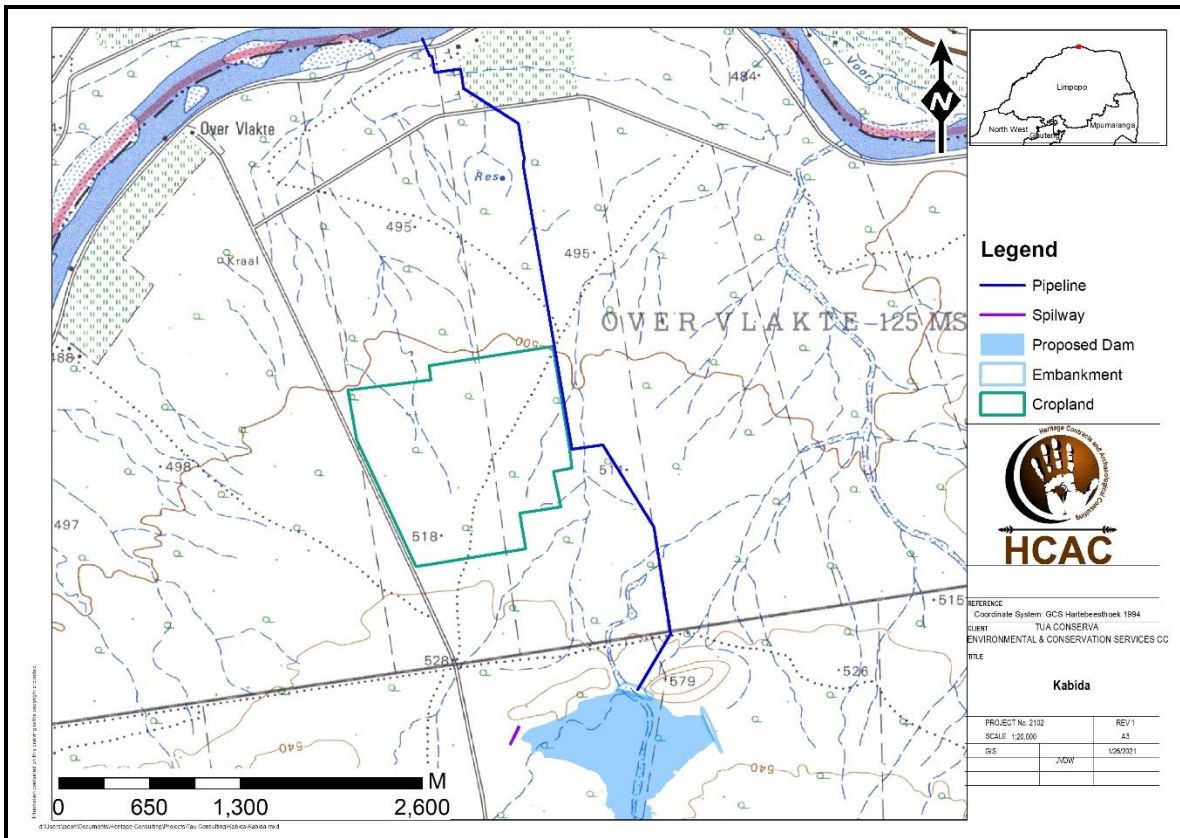


Figure 16. 1979 Topographical map of the study area. Limited cultivation is indicated along the Limpopo River.

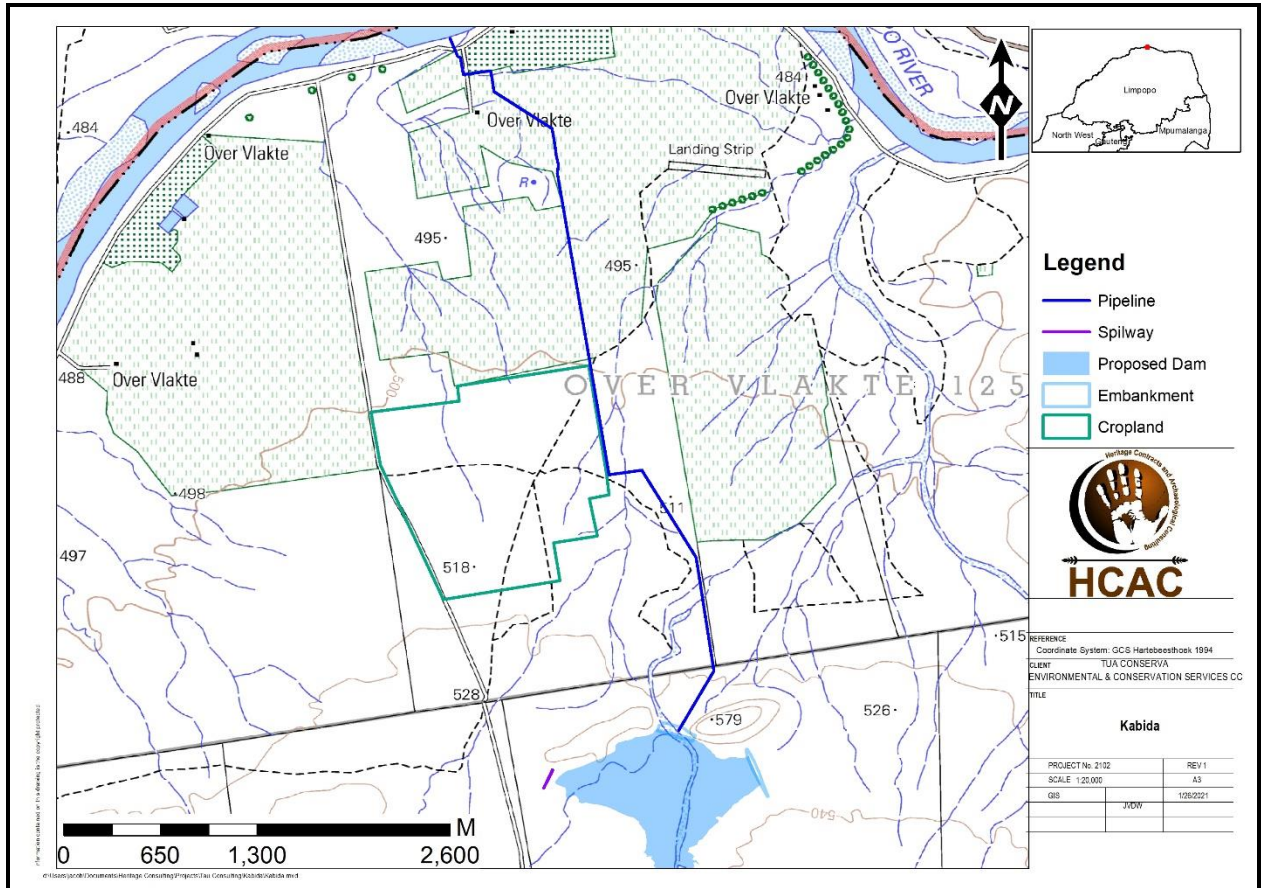


Figure 17. 1999 Topographical map of the study area indicating extensive cultivation.

8 Findings of the Survey

Several Iron Age sites are on record for the larger study area at the University of Johannesburg (Wits) and SAHRIS database (Figure 7-1). Two sites (Vele 14 & 15) are located within the proposed dam with a third site Vele 11 close to the proposed pipeline. In addition, several previously unknown sites were recorded during the current assessment including Iron Age sites (Kab 6 - 8), and a background scatter of MSA lithics referred to as findspots (Kab 1- 5). The abovementioned sites are illustrated in Figure 8-1.

The numbering system employed for the heritage sites in the study area used the original site name for previously known sites and newly discovered sites are numbered numerically with the abbreviation Kab for the Kabida project. Site significance for known sites were retained based on the evaluation of these sites by Pikirayi *et al* (2012). The recorded sites are briefly discussed under section 8.1 to 8.4 of this report.

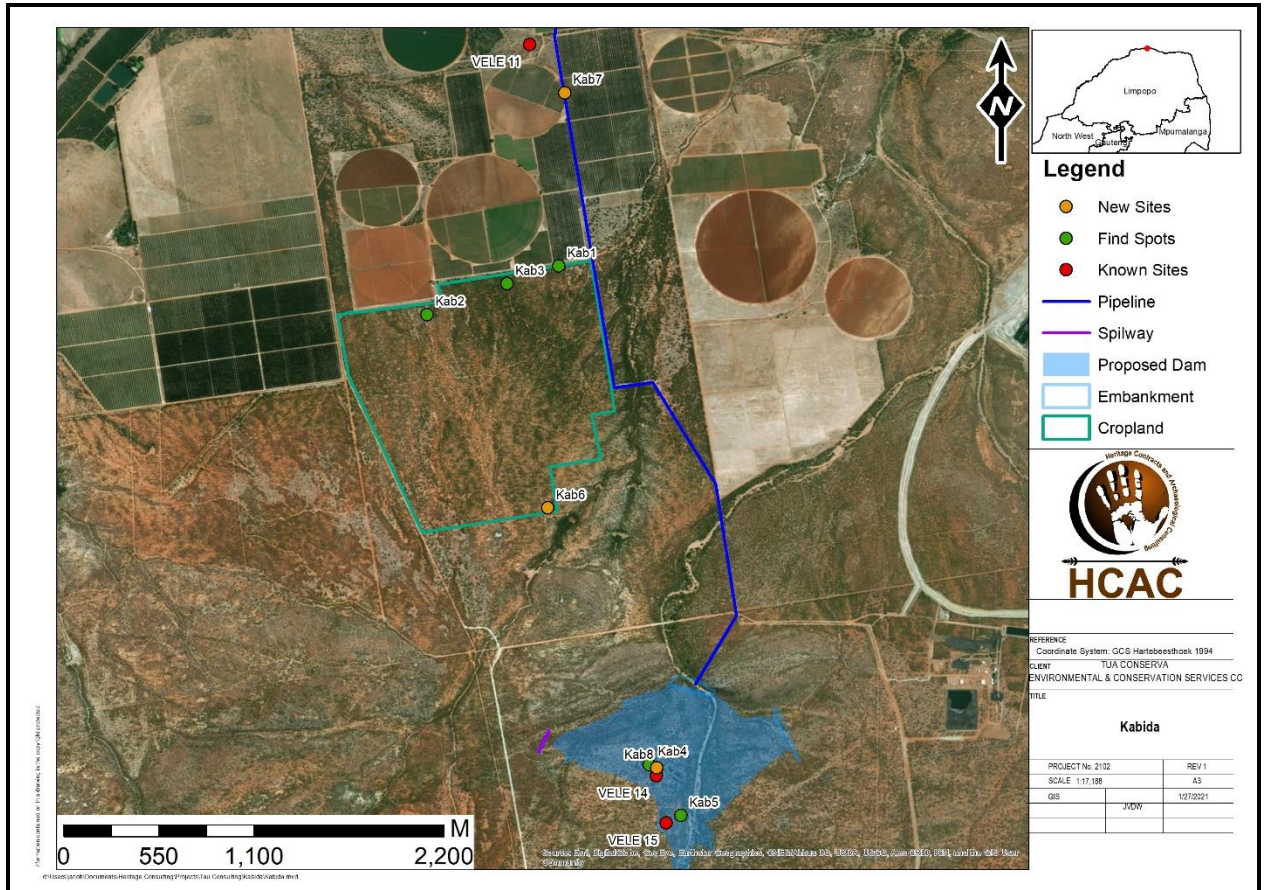


Figure 18. Site distribution map.

8.1 Stone Age Find Spot – Kab 1 to Kab 5

A Few isolated and widely scattered Stone Age artefacts were recorded, mostly located within the proposed crop land with two isolated finds in the dam area (Table 6). These artefacts occur in low density's of less than 2 artefacts per m². Very few diagnostic artefacts were recorded apart from triangular flakes with faceted platforms that is characteristic of the MSA and one core (Figure 8-2 to 8-4). These are all made from quartzite, often exposed within erosion gullies (Figure 8-5) and weathered. The isolated artefacts are washed and out of context, classified as background scatter (Orton 2006) and of low heritage significance - Field Rating GP C.

Table 6: Find Spots recorded in the study area.

Site	Description	Impact area	Significance	Longitude	Latitude
Kab 1	Four quartzite flakes with faceted platforms in small drainage	Cropland	Low	29° 39' 00.0792" E	22° 09' 08.7120" S
Kab 2	Low density and widely scattered artefacts located in a stream with MSA flakes with faceted platforms	Cropland	Low	29° 38' 35.3472" E	22° 09' 17.8200" S
Kab 3	Isolated MSA quartzite core	Cropland	Low	29° 38' 50.3339" E	22° 09' 12.0348" S
Kab 4	Single undiagnostic flake located on top of a small hill	Dam	Low	29° 39' 17.0712" E	22° 10' 42.1176" S
Kab 5	Low density scatter of undiagnostic flakes located on a sandy area exposed due to sheet erosion.	Dam	Low	29°39'23.01"E	22°10'51.62"S



Figure 19: Dorsal view of MSA triangular flake.



Figure 20. Ventral view of MSA flake



Figure 21. Quartzite core.



Figure 22. Typical location where small drainage lines expose isolated artefacts.

8.2 Known Sites – Vele 11, Vele 14 & 15

HIA's by Roodt (2009) and Pikirayi *et al* (2012) covered the existing impact areas. Three sites recorded during these assessments have a bearing on the current project components (Table 7) and is briefly discussed below.

Table 7: Known sites within the study area.

Site	Description and Source	Impact	Significance	Longitude	Latitude
Vele 11	Site with K2 pottery recorded by both Roodt (2009) and Pikirayi et al (2012)	No direct impact	Medium	E29° 38' 54.6"	S22° 08' 27.2"
Vele 14	Upper grinder Recorded by both Roodt (2009) and Pikirayi et al (2012)	Dam	Low	E29° 39' 18.4"	S22° 10' 44.2"
Vele 15 and Site extent	Iron Age artefacts recorded by both Roodt (2009) and Pikirayi et al (2012)	Dam	Low	29° 39' 20.2284" E	22° 10' 53.0977" S
				29° 39' 20.7613" E	22° 10' 53.8608" S

8.2.1 Vele 11 – Iron Age

Roodt (2009) described the site as a small kopje containing ashy deposits and K2 pottery. Already disturbed by the construction of a reservoir. Pikirayi et al (2012) described the site as K2/Mapungubwe site with middens. The site was visited during the current assessment and the site is still intact. Several middens and vitrified dung deposits mark the cattle kraals (Figure 8-6 & 8-7). Bone (Bov 2 & 3), ceramics (Figure 8-8) and older, possibly LSA artefacts (Figure 8-9) are found throughout the site. The site will not be impacted on by the proposed project.

Heritage Significance – Medium because of the intact archaeological deposits. Field Rating GP B



Figure 23: General view of the site.



Figure 24. Vitrified dung deposit.



Figure 25. Mapungubwe type ceramics.



Figure 26. LSA artefacts.

8.2.2 Vele 14– Iron Age

Roodt (2009) described the site as being marked by an upper grinder. Pikirayi et al (2012) also mentions an Upper grinder and have given the site a negligible significance rating. During the current assessment the site was revisited and found no further evidence of a site of significance. Another newly discovered site was recorded to the north (Kab 8) that could be associated with the single find reported on by the previous HIA's.

Heritage Significance – Low. The site is of low significance since little in the form of material culture is visible on the surface. Field Rating GP C

8.2.3 Vele 15 – Iron Age

Roodt (2009) described the site as follows: “This site contained pottery fragments, metal working debris, a hammer head, Iron Bangle remains and a piece of woven copper wire. The pottery is identified as Khami – and it seems to be a metal working site and not a living site. Erosion has disturbed much of the site”

Pikirayi et al (2012) described the site as a highly eroded site with iron objects, pieces of slag. Integrity has been compromised and of low Significance.

During the current site investigation, it seems as if the site was further eroded and almost nothing is left (Figure 8-11 & 8-12). A few bone fragments and very weathered undecorated ceramics were recorded (Figure 8-13 & 8-14).

Heritage Significance – Low. The site is of low significance since little in the form of material culture is left with no visible features. Field Rating GP C



Figure 27. General site conditions.



Figure 28. General site conditions.



Figure 29. Undecorated ceramic fragments.



Figure 30. Bone fragments.

8.3 New Sites – Kab 6 to Kab 8

A few new Iron Age sites were recorded under the current assessment not reported on by the previous HIA's for the area. These sites are located in the proposed pipeline, cropland and dam (Table 8), and are briefly discussed below.

Table 8: Newly recorded sites

Site	Description	Impact	Significance	Longitude	Latitude
Kab 6	Iron Age Grain bins	Cropland	Medium	29° 38' 57.9624" E	22° 09' 53.9999" S
				29° 38' 59.0855" E	22° 09' 56.1203" S
Kab 7	Scatter of undecorated Iron Age Ceramics	Pipeline	Low	29° 39' 01.1555" E	22° 08' 36.2725" S
Kab 8	L shaped stone wall & undecorated ceramics	Dam	Low	29° 39' 18.4716" E	22° 10' 42.6575" S

8.3.1 Kab 6 – Iron Age Site

This is a small area subjected to sheet erosion, located on the northern bank of a small drainage line. Undecorated ceramics and circular stone packed features (possibly grain bins) mark the site (Figure 8-15 to 8-18). To the south of the stream several more stone packed features are located with ostrich eggshell fragments.

Heritage Significance – Low to Medium because of the lack of surface features and possible deposit apart from the stone structures. Field Rating – GP B



Figure 31. Grain bin foundations



Figure 32. Grain bin foundations



Figure 33. Grain bin foundations



Figure 34. General site conditions

8.3.2 Kab 7 – Iron Age Site

Iron Age ceramics are found widely scattered in a agricultural field and a dirt track (Figure 8-19 & 8-20). Ceramics are undecorated with some burnish and no other features like ash middens or vitrified kraal deposit is visible. The ceramic scatter is located close to the proposed pipeline and years of cultivation must have destroyed the site and scattered the ceramics to the extent that surface indication of the original site is lost.

Heritage Significance – Low. The site is of low significance since little in the form of cultural features is visible on the surface and the site is destroyed by existing activities. Field Rating GP C



Figure 35. Cropland and dirt track were artefacts was found.



Figure 36. Undecorated ceramics on site.

8.3.3 Kab 8 – Iron Age Site

This site is marked by a small stone packed wall in a L shape with very few undecorated ceramics (Figure 8.21 & 8-22). The site is located next to a rocky outcrop and possibly associated with Vele site 14 that is located less than 40 meters to the south.

Heritage Significance – Low. The site is of low significance since little in the form of archaeological deposit is visible on the surface. Field Rating GP C



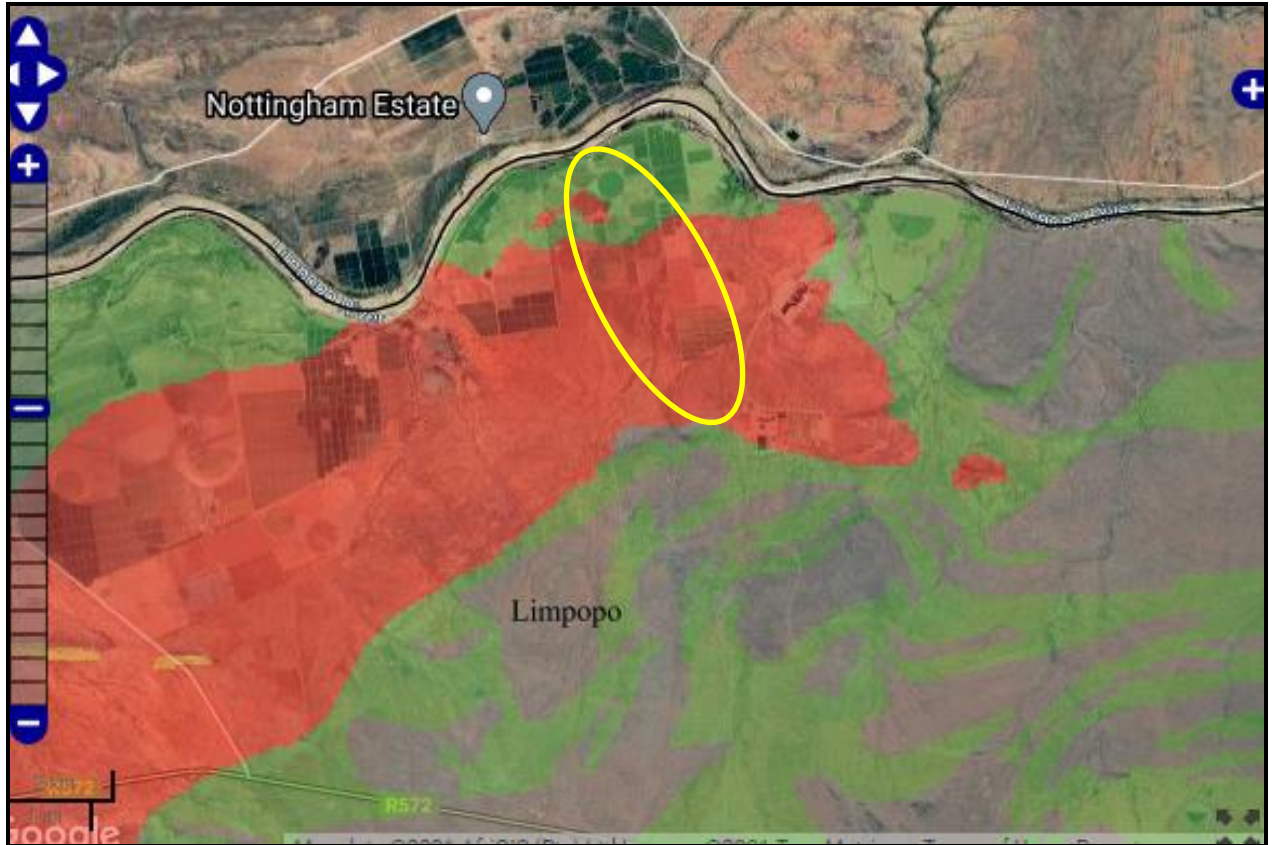
Figure 37. Stone packed feature.



Figure 38. Undecorated ceramics.

8.4 Palaeontology

Based on the SAHRA Paleontological Sensitivity map the area is of moderate to high significance (Figure 8-22). Previous studies in the area have been conducted by Du Rand (2009) and Millstedt (2014). Millstedt (2014) conducted a field-based assessment for the COAL of Africa project and concluded that the project may proceed with the correct mitigation measures in place.



Colour	Sensitivity	Required Action
RED	VERY HIGH	Field assessment and protocol for finds is required
ORANGE/YELLOW	HIGH	Desktop study is required and based on the outcome of the desktop study, a field assessment is likely
GREEN	MODERATE	Desktop study is required
BLUE	LOW	No palaeontological studies are required however a protocol for finds is required
GREY	INSIGNIFICANT/ZERO	No palaeontological studies are required
WHITE/CLEAR	UNKNOWN	These areas will require a minimum of a desktop study. As more information comes to light, SAHRA will continue to populate the map.

Figure 39. Paleontological sensitivity of the study area as indicated on the SAHRA Paleontological sensitivity map.

8.5 Cultural Landscape

The layered cultural landscape of the Mapungubwe area has many facets and projects such as this one highlights the multiple components that form part of human history in the area. The site attests to occupation from the Stone Age through to Farming community settlement and the surrounding land use to a continuation of agricultural and associated activities in modern times. Through synergy and balancing the valuable contribution of our understanding of the heritage of the area as well as the scientific contribution of the study of recorded heritage sites and the important role that modern-day agricultural activities play in food security, projects such as these enhance the cultural landscape. The long-term impact on the cultural landscape can be mitigated to an acceptable level as the proposed project is in line with the surrounding land use. Visual impacts to scenic routes and sense of place are also considered to be low as the proposed project is in line with the current land use and not visible from major tourist routes.

9 Potential Impact

Although close to the Mapungubwe World Heritage Site, the proposed project is located outside of the buffer zone of the World Heritage Site (Figure 7-6) and will not impact on the Outstanding Universal Value of the WHS.

Impacts to heritage resources without mitigation within the project footprint will be permanent and negative and occur during the vegetation clearing, initial cultivation and construction phase. Impacts would be of low significance but can be mitigated to an acceptable level as outlined in Section 10 of this report.

Cumulative impacts considered as an effect caused by the proposed action that results from the incremental impact of an action when added to other past, present, or reasonably foreseeable future actions. (Cornell Law School Information Institute, 2020). Cumulative impacts occur from the combination of effects of various impacts on heritage resources. The importance of identifying and assessing cumulative impacts is that the whole is greater than the sum of its parts. In the case of this project, impacts can be mitigated to an acceptable level. However, this and other projects in the area have a negative impact on Iron Age sites in the area especially on the floodplain, but the impact can be mitigated to an acceptable level through preservation of sites of medium significance and by documentation of sites of low significance (Table 9 as well as impact assessment in Table 10 and 11).

Table 9. Impact, Heritage Significance and proposed mitigation of heritage sites

Site	Impact	Mitigation	Significance
Kab 1	Cropland	No Mitigation	Low
Kab 2	Cropland	No Mitigation	Low
Kab 3	Cropland	No Mitigation	Low
Kab 4	Dam	No Mitigation	Low
Kab 5	Dam	No Mitigation	Low
Kab 6 and Site extent	Cropland	Preservation of site <i>in situ</i> by adjusting the cropland	Medium
Kab 7	Pipeline	Monitoring during excavations for the pipeline.	Low
Kab 8	Dam	Map the site and apply for a destruction permit.	Low
Vele 15 and Site extent	Dam	Test excavation and apply for a destruction permit	Low
Vele 11	No direct impact	Preservation <i>in situ</i>	Medium

Vele 14	Dam	No Mitigation	Low
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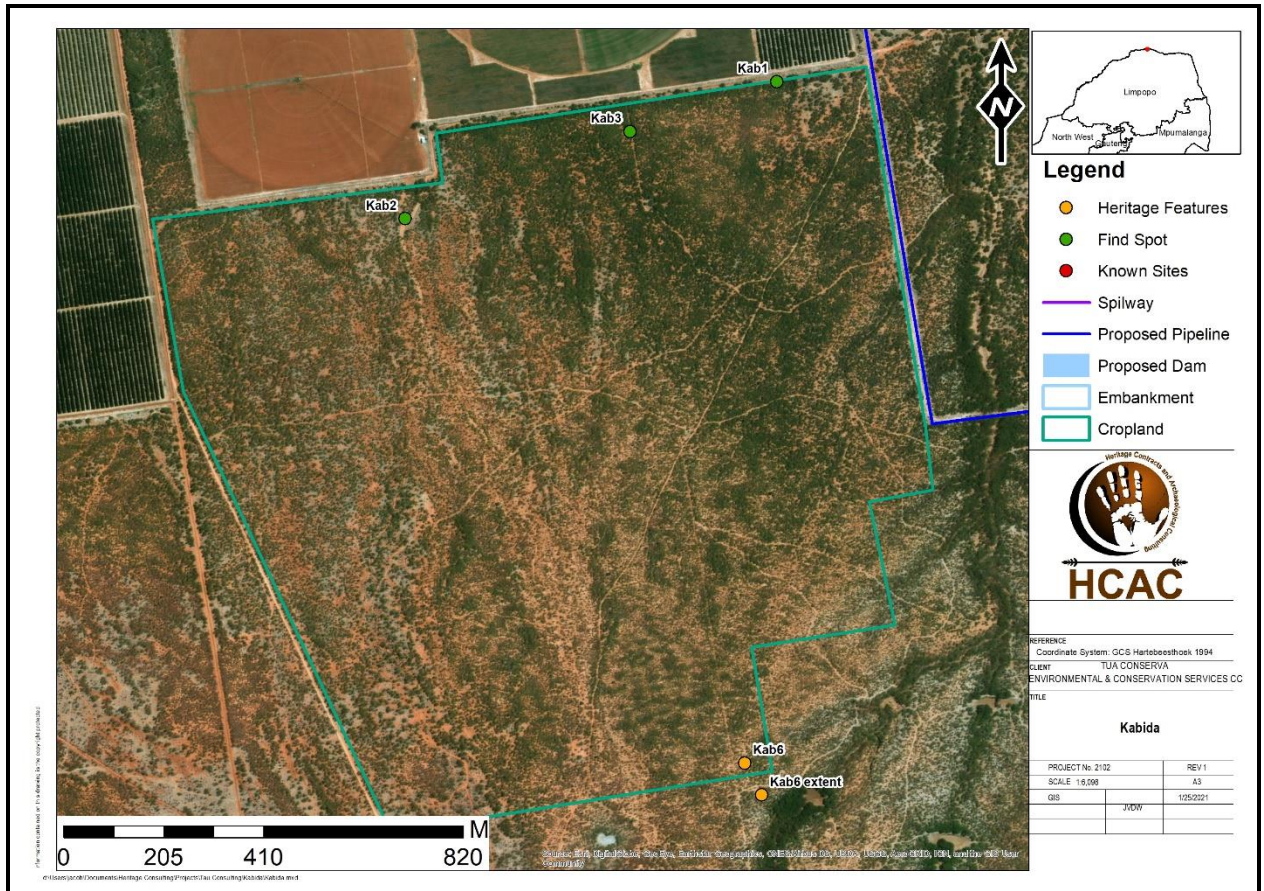


Figure 40. Recorded heritage features in relation to the proposed cropland. Kab 6 is located on the periphery and can be preserved *in situ* by a slight adjustment in the cropland footprint.

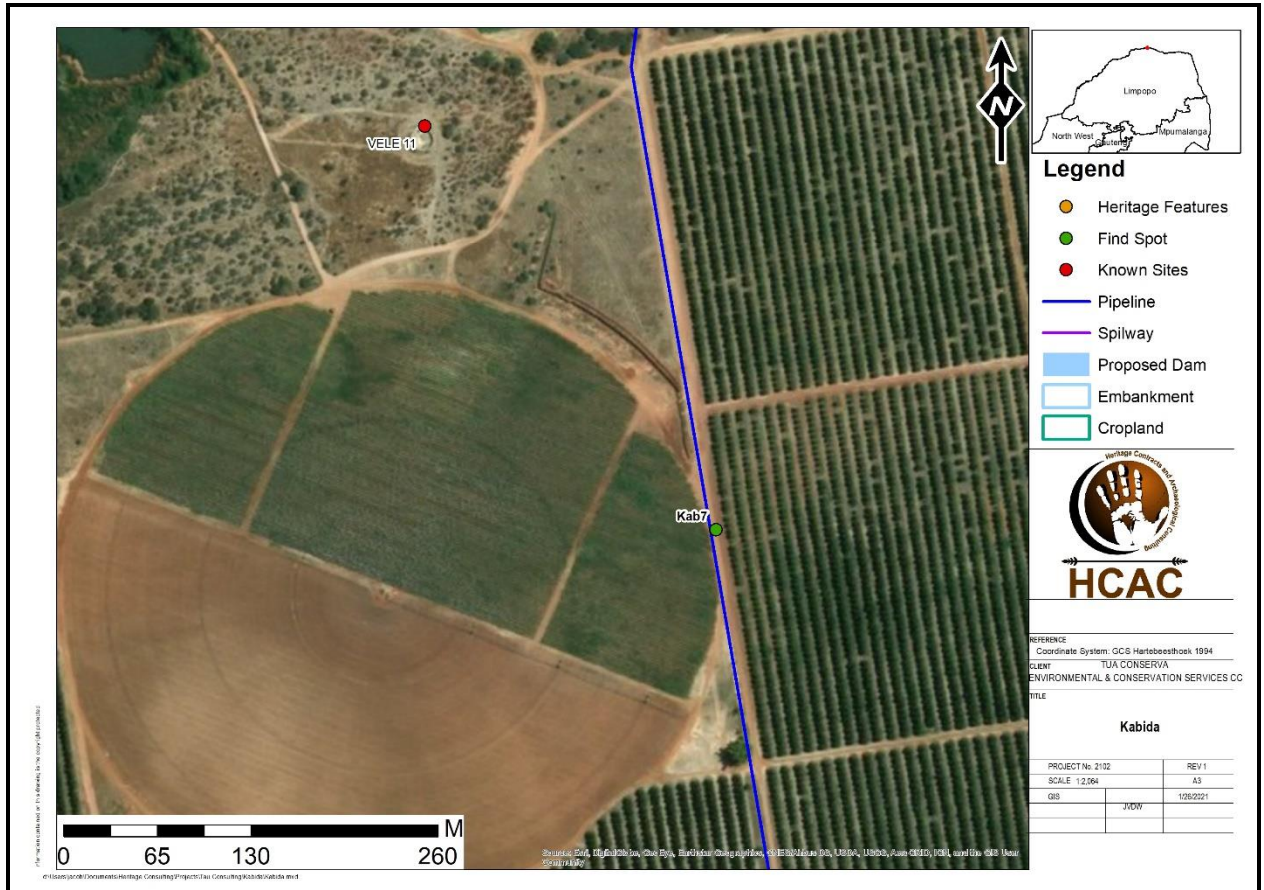


Figure 41. Recorded features in relation to the pipeline. Sites of significance is located well away from the impact area.

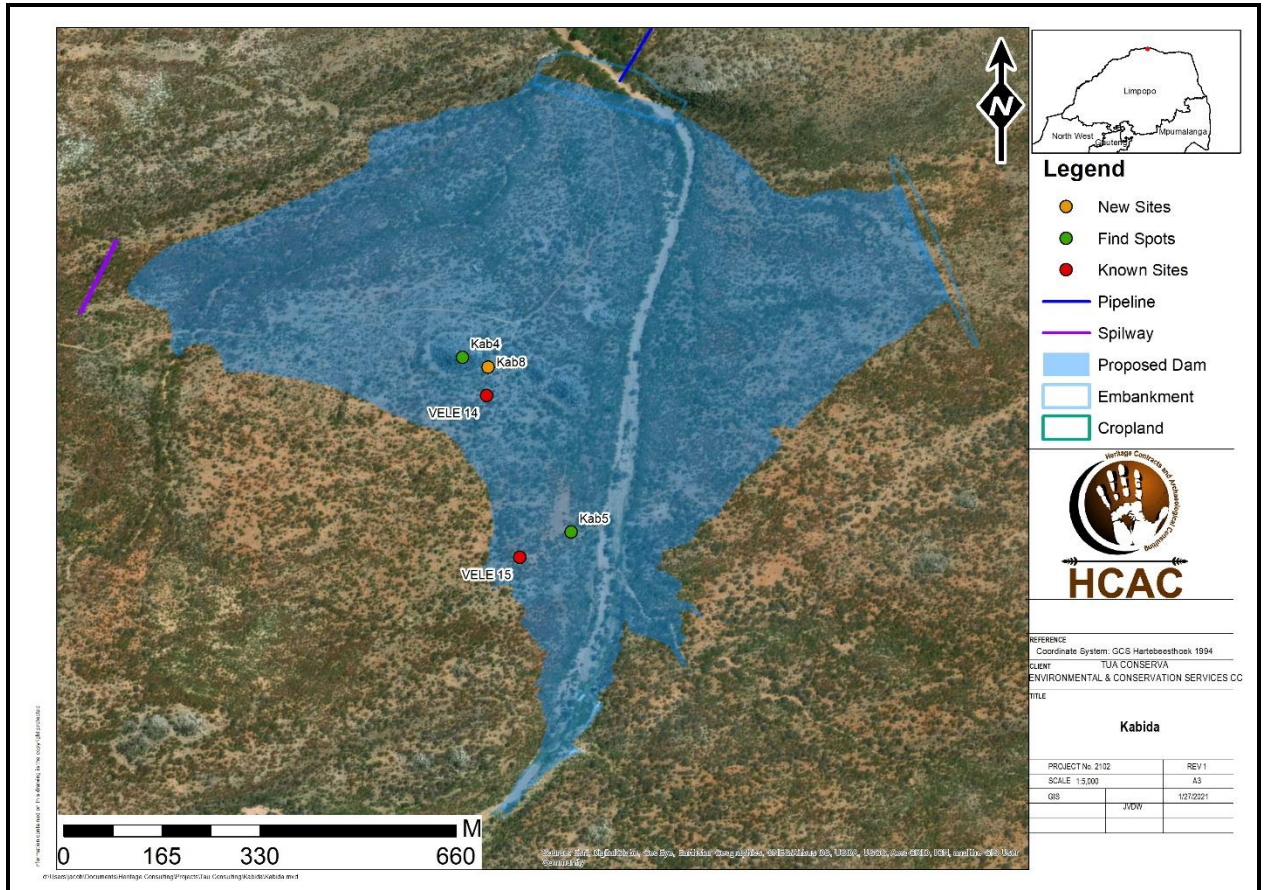


Figure 42. Features in relation to the proposed dam.

Table 10. Impact assessment on Find Spots (Kab 1 – 5)

Nature: During the construction phase activities resulting in disturbance of surfaces and/or sub-surfaces may destroy, damage, alter, or remove from its original position archaeological and paleontological material or objects.		
	Without mitigation	With mitigation (Preservation/ excavation of site)
Extent	Local (2)	Local (2)
Duration	Permanent (5)	Permanent (5)
Magnitude	Minor (2)	Minor (2)
Probability	Probable (3)	Probable (3)
Significance	27 (Low)	27 (Low)
Status (positive or negative)	Negative	Negative
Reversibility	Not reversible	Not reversible
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	NA	NA
Mitigation:		
<ul style="list-style-type: none"> Stone Age find spots (Sites Kab 1 to Kab 5) are made up of sparsely scattered Stone Age artefacts, the artefacts are out of context and of no significance apart from mentioning it in this report. Implementation of a chance find procedure for the project. 		
Cumulative impacts:		
Other authorised projects (e.g., mining and agricultural projects) in the area could have a cumulative impact on the heritage landscape. The added impact of the Kabida project is seen as low to medium as the developments are in line with surrounding land use, therefore minimising additional impacts on the cultural landscape. The impact on Stone Age background scatter is also minimal.		
Residual Impacts:		
Although surface sites can be avoided or mitigated, there is a chance that completely buried sites would still be impacted on but this cannot be quantified.		

Table 11. Impact Assessment Iron Age Sites (Kab 6 -8, Vele 11, 14 & 15)

Nature: During the construction phase activities resulting in disturbance of surfaces and/or sub-surfaces may destroy, damage, alter, or remove from its original position archaeological and paleontological material or objects.		
	Without mitigation	With mitigation (Preservation/ excavation of site)
Extent	Local (3)	Local (3)
Duration	Permanent (5)	Permanent (5)
Magnitude	Moderate (6)	Low (4)
Probability	Very Probable (4)	Not probable (2)
Significance	56 (Medium)	24 (Low)
Status (positive or negative)	Negative	Negative
Reversibility	Not reversible	Not reversible
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes, a chance find procedure should be implemented.	Yes
Mitigation:		
<ul style="list-style-type: none"> • It is recommended that the Iron Age grain bin site Kab 6 should be retained <i>in situ</i> with a buffer zone of 30 meters. This is a feasible option as the site is located on the periphery of the proposed crop land and preservation can be easily facilitated; • The scatter of Iron Age ceramics in an agricultural field Site Kab 7 must be monitored during excavation of the pipeline; • The stone packed wall at Site Kab 8 must be documented (mapped) and a destruction permit applied for from SAHRA. • Vele 11 is well outside (100 m to the west of the proposed pipeline) of the impact area and no further action is required; • Vele 14 was identified as of negligible significance and a destruction permit can be applied for; • It is recommended that Vele 15 is test excavated to mitigate the complete loss of the resource; • Implementation of a chance find procedure for the project. 		
Cumulative impacts:		
Other authorised projects (e.g., mining and agricultural projects) in the area could have a cumulative impact on the heritage landscape. The added impact of the Kabida project is seen as low to medium as the developments are in line with surrounding land use, therefore minimising additional impacts on the cultural landscape. The impact on physical heritage sites can also be mitigated through preservation or phase 2 mitigation of the sites.		
Residual Impacts:		
Although surface sites can be avoided or mitigated, there is a chance that completely buried sites would still be impacted on but this cannot be quantified.		

9.1. Impact assessment – World Heritage Site

The proposed project will not impact on any of the heritage attributes of the Mapungubwe WH property. Although the development area contains cultural heritage sites of low to medium significance (Figure 8-1 – Figure 8-3) these sites can be mitigated. Following the Icomos Impact Assessment table the impact of the proposed development on the WH property with the implementation of the mitigation measures as recommended in this report is Neutral/ Slight (Table 12).

Table 12. ICOMOS System for assessing/ evaluating Impact.

VALUE OF HERITAGE ASSET	SCALE & SEVERITY OF CHANGE/IMPACT				
	Neutral	Slight	Moderate/ Large	Large/ Very Large	Very Large
For WH properties Very High – attributes which Convey OUV	SIGNIFICANCE OF EFFECT OR OVERALL IMPACT (EITHER ADVERSE OR BENEFICIAL)				
	Neutral	Slight	Moderate/ Large	Large/ Very Large	Very Large
FOR OTHER HERITAGE ASSETS OR ATTRIBUTES	SIGNIFICANCE OF IMPACT (EITHER ADVERSE OR BENEFICIAL)				
Very High	Neutral	Slight	Moderate/ Large	Large/ Very Large	Very Large
High	Neutral	Slight	Moderate/ Slight	Moderate/ Large	Large/ Very Large
Medium	Neutral	Neutral/Slight Kabida Dam en Lande development	Slight	Moderate	Moderate/ Large
Low	Neutral	Neutral/ Slight	Neutral/ Slight	Slight	Slight/ Moderate
Negligible	Neutral	Neutral	Neutral/ Slight	Neutral/ Slight	Slight

10 Conclusion and recommendations

It is important to note that the survey was concentrated on the project components outlined under Table 3 and illustrated in Figure 1-3 and not the entire farm. In terms of the national estate as defined by the NHRA the following key findings apply:

- In terms of the built environment of the area (Section 34 of the NHRA Act 25 of 1999), no standing structures older than 60 years occur within the impact area;
- Regarding the archaeological component of Section 35 several features have been identified of which many have been disturbed by natural factors including erosion and previous developments in the area. The Stone Age find spots (Sites Kab 1 to Kab 5) are made up of sparsely scattered Stone Age artefacts, the artefacts are out of context and of no significance apart from mentioning it in this report. No further action is recommended. The Mapungubwe period site Vele 11 is well outside (100 m to the west of the proposed pipeline) of the impact area and no further action is required;
- A PIA (Millstead 2014) conducted on the property concluded there is no palaeontological reason to prejudice the progression of development subject to adequate mitigation programs being put in place;
- In terms of Section 36 of the Act no formal burial sites were recorded;
- The World Heritage Site of Mapungubwe is located to the West of the study area. The area under investigation is located outside of the WHS and the buffer zone and in line with current land use and will not impact significantly on cultural landscapes or views.
- During the public participation process conducted for the project no heritage concerns were raised.

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

- It is recommended that the project adheres to all paleontological recommendations included in the PIA report (Millstead 2014) conducted on the study area;
- It is recommended that the Iron Age grain bin site Kab 6 should be retained *in situ* with a buffer zone of 30 meters. This is a feasible option as the site is located on the periphery of the proposed crop land and preservation can be easily facilitated;
- The scatter of Iron Age ceramics in an agricultural field Site Kab 7 must be monitored during excavation of the pipeline as outlined under 10.5 of this report;
- The stone packed wall at Site Kab 8 must be documented and a destruction permit applied for from SAHRA.
- Vele 14 was identified as of negligible significance (Pikirayi *et al* 2012) and a destruction permit can be applied for the site;
- It is recommended that Vele 15 is test excavated to mitigate the complete loss of the resource;
- Implementation of a chance find procedure for the project as outlined under Section 10.1.

10.1 Chance Find Procedures - Heritage Resources

The possibility of the occurrence of subsurface finds cannot be excluded. Therefore, if during construction any possible finds such as stone tool scatters, artefacts or bone and fossil remains are made, the operations must be stopped and a qualified archaeologist must be contacted for an assessment of the find and therefor chance find procedures should be put in place as part of the EMP. A short summary of chance find procedures is discussed below.

This procedure applies to the developer's permanent employees, its subsidiaries, contractors and subcontractors, and service providers. The aim of this procedure is to establish monitoring and reporting procedures to ensure compliance with this policy and its associated procedures. Construction crews must be properly inducted to ensure they are fully aware of the procedures regarding chance finds as discussed below.

- If during the pre-construction phase, construction, operations or closure phases of this project, any person employed by the developer, one of its subsidiaries, contractors and subcontractors, or service provider, finds any artefact of cultural significance or heritage site, this person must cease work at the site of the find and report this find to their immediate supervisor or the ECO.
- It is the responsibility of the applicant to make an initial assessment of the extent of the find and confirm the extent of the work stoppage in that area.
- The applicant will inform the ECO of the chance find and its immediate impact on operations. The ECO will then contact a professional archaeologist for an assessment of the finds who will notify the SAHRA.

10.2 Reasoned Opinion

The impact of the proposed project on heritage resources can be mitigated to an acceptable level based on approval from SAHRA. Furthermore, the socio-economic benefits also outweigh the possible impacts of the development if the correct mitigation measures are implemented for the project.

10.3 Potential risk

Potential risks to the proposed project are the occurrence of subterranean archaeological deposit and unrecorded or unmarked graves. These risks can be mitigated to an acceptable level with monitoring and the implementation of a chance find procedure as outlined in Section 10.1.

10.4 Management Measures for inclusion in the EMPr

Table 13 - Heritage Management Plan for EMPr implementation

Area and site no.	Mitigation measures	Phase	Timeframe	Responsible party for implementation	Monitoring Party (frequency)	Target	Performance indicators (monitoring tool)
General project area	Implement chance find procedures in case where possible heritage finds are uncovered	Ground clearance, excavations as well as initial cultivation.	Throughout the project	Applicant EAP	ECO (when required)	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 35, 36 and 38 of NHRA	ECO Checklist/Report
Iron Age Sites	<ul style="list-style-type: none"> It is recommended that the Iron Age grain bin site Kab 6 should be retained <i>in situ</i> with a buffer zone of 30 meters. This is a feasible option as the site is located on the periphery of the proposed crop land and preservation can be easily facilitated; The scatter of Iron Age ceramics in an agricultural field Site Kab 7 must be monitored during excavation of the pipeline; The stone packed wall at Site Kab 8 must be documented and a destruction permit applied for from SAHRA. A destruction permit can be applied for the Iron Age sites Kab 8, after 	Prior to ground clearance and cultivation	Prior to ground clearance and cultivation	Applicant ECO	Applicant ECO	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 35 and 38 of NHRA	ECO Checklist/Report

Area and site no.	Mitigation measures	Phase	Timeframe	Responsible party for implementation	Monitoring Party (frequency)	Target	Performance indicators (monitoring tool)
	<p>which the site should be monitored during initial cultivation;</p> <ul style="list-style-type: none"> • Vele 11 is well outside (100 m to the west of the proposed pipeline) of the impact area and no further action is required; • Vele 14 was identified as of negligible significance and a destruction permit can be applied for; • It is recommended that Vele 15 is test excavated to mitigate the complete loss of the resource this will include <ul style="list-style-type: none"> ○ Exposing the feature through archaeological excavation ○ Analysis of any artefacts recovered during the excavations ○ If it is found that after mitigation the site is not conservation worthy an application for destruction must be lodged under S35 of the NHRA. • Implementation of a chance find procedure for 						

Area and site no.	Mitigation measures	Phase	Timeframe	Responsible party for implementation	Monitoring Party (frequency)	Target	Performance indicators (monitoring tool)
	the project.						

10.5 Monitoring requirements

Monitoring of sensitive areas can be conducted by the Environmental Officers (ECO). The ECO or other responsible persons should be trained along the following lines:

- *Induction training:* Responsible staff identified by the developer should attend a short course on heritage management and identification of heritage resources.
- *Site monitoring and watching brief:* As most heritage resources occur below surface, all earth-moving activities need to be routinely monitored in case of accidental discoveries. The greatest potential impacts are the initial soil removal and subsequent earthworks during construction. The EO should monitor all such activities regularly. If any heritage resources are found, the chance finds procedure must be followed as outlined above.

Monitoring requirements for the project are outlined in Table 14.

Table 14. Monitoring requirements for the project.

Heritage Monitoring					
Aspect	Area	Responsible for monitoring and measuring	Frequency	Proactive or reactive measurement	Method
Clearing activities and Excavations	Project area	ECO	Regularly during construction phase	Proactively	<ul style="list-style-type: none"> • If risks are manifested (accidental discovery of heritage resources) the chance find procedure should be implemented: <ol style="list-style-type: none"> 1. Cease all works immediately; 2. Report incident to the applicantr; 3. Contact an archaeologist to inspect the site; 4. Report incident to the competent authority; and 5. Employ reasonable mitigation measures in accordance with the requirements of the relevant authorities. • Only recommence operations once impacts have been mitigated.
Iron Age Site Kab 7	Pipeline	ECO	Daily – During Construction	Proactively	<ul style="list-style-type: none"> • If risks are manifested (accidental discovery of heritage resources) the chance find procedure should be implemented: <ol style="list-style-type: none"> 1. Cease all works immediately; 2. Report incident to the applicantr; 3. Contact an archaeologist to inspect the site; 4. Report incident to the competent authority; and 5. Employ reasonable mitigation

Heritage Monitoring					
Aspect	Area	Responsible for monitoring and measuring	Frequency	Proactive or reactive measurement	Method
					measures in accordance with the requirements of the relevant authorities. Only recommence operations once impacts have been mitigated.

11 References

- Eastwood, E.B. & Cnoops, C. 1999. Results of the Limpopo-Shashi Confluence area rock art study. 2 Vols. Louis Trichardt: Palaeo-Art Field Services.
- Fouché, L. (Ed) 1937. Mapungubwe: Ancient Bantu civilization on the Limpopo. Cambridge: Cambridge University Press.
- Gaigher, S. 2000. Preliminary Archaeological Assessment. Proposed shopping centre in rural Messina
- Gardner, G. A. 1963. Mapungubwe: Volume II. Pretoria: J.L. Van Schaik.
- Huffman, T.N. 2000. Mapungubwe and the origins of the Zimbabwe culture. In M. Leslie & T. Maggs (Eds), African Naissance: The Limpopo Valley 1 000 Years Ago. (South African Archaeological Society Goodwin Series 8), pp. 14-29.
- Kuman, K, Gibbon, R, Kempson, H, Langejans, G, Le Baron, J, Pollarolo, L & Suttin, M. 2005. Stone Age signatures in northernmost South Africa: early archaeology in the Mapungubwe National Park and vicinity. In d'Errico, F. & Backwell, L. (eds.) 2005. From tools to symbols: from Early Hominids to Modern Humans. Johannesburg: Witwatersrand University Press.
- Kusimba, C.M. 1999. The Rise and Fall of Swahili States. Walnut Creek: AltaMira.
- Mason, R. J., 1962. Prehistory of the Transvaal. Johannesburg: Witwatersrand University Press.
- National Heritage Resources Act NHRA of 1999 (Act 25 of 1999)
- Pistorius, J. 2016. A Scoping Heritage Study for the Proposed Musina Copper Project near Musina in the Limpopo Province.
- Wood, M. 2005. Glass Beads and Pre-European Trade in the Shashe-Limpopo Region. Masters Dissertation, University of the Witwatersrand, Johannesburg.
- SAHRIS South African Heritage Resource Information System (viewed November 2017)
- Sumner, T.A. 2013. A refitting study of late Early to Middle Stone Age lithic assemblages from the site of Kudu Koppie, Limpopo Province, South Africa. *Journal of African Archaeology* 11: 133–153.
- Van Ewyk, J.F. 1987. *The Prehistory of an Iron Age Site on Skutwater*. Master's dissertation, University of Pretoria
- van Schalkwyk, J. 2015. Cultural Heritage Impact Assessment For The Proposed Expansion Of The Existing Waste Disposal Site In Musina, Limpopo Province.

12 Appendices:

Curriculum Vitae of Specialist

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Archaeologist

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Education:

Particulars of degrees/diplomas and/or other qualifications:

Name of University or Institution: University of Pretoria
Degree obtained : BA Heritage Tourism & Archaeology
Year of graduation : 2001

Name of University or Institution: University of the Witwatersrand
Degree obtained : BA Hons Archaeology
Year of graduation : 2002

Name of University or Institution : University of the Witwatersrand
Degree Obtained : MA (Archaeology)
Year of Graduation : 2012

Name of University or Institution : University of Johannesburg
Degree : PhD
Year : Currently Enrolled

EMPLOYMENT HISTORY:

2011 – Present: **Owner – HCAC (Heritage Contracts and Archaeological Consulting CC).**
 2007 – 2010 : **CRM Archaeologist**, Managed the Heritage Contracts Unit at the University of the Witwatersrand.
 2005 - 2007: **CRM Archaeologist**, Director of Matakoma Heritage Consultants
 2004: **Technical Assistant**, Department of Anatomy University of Pretoria
 2003: **Archaeologist**, Mapungubwe World Heritage Site
 2001 - 2002: **CRM Archaeologists**, For R & R Cultural Resource Consultants, Polokwane
 2000: **Museum Assistant**, Fort Klapperkop.

Countries of work experience include:

Republic of South Africa, Botswana, Zimbabwe, Mozambique, Tanzania, The Democratic Republic of the Congo, Lesotho and Zambia.

SELECTED PROJECTS INCLUDE:

Archaeological Impact Assessments (Phase 1)

Heritage Impact Assessment Proposed Discharge Of Treated Mine Water Via The Wonderfontein Spruit Receiving Water Body Specialist as part of team conducting an Archaeological Assessment for the Mmamabula mining project and power supply, Botswana
Archaeological Impact Assessment Mmamethlake Landfill
Archaeological Impact Assessment Libangeni Landfill

Linear Developments

Archaeological Impact Assessment Link Northern Waterline Project At The Suikerbosrand Nature Reserve
Archaeological Impact Assessment Medupi – Spitskop Power Line,
Archaeological Impact Assessment Nelspruit Road Development

Renewable Energy developments

Archaeological Impact Assessment Karoshoek Solar Project

Grave Relocation Projects

Relocation of graves and site monitoring at Chlookop as well as permit application and liaison with local authorities and social processes with local stakeholders, Gauteng Province.
Relocation of the grave of Rifle Man Maritz as well as permit application and liaison with local authorities and social processes with local stakeholders, Ndumo, Kwa Zulu Natal.
Relocation of the Magolwane graves for the office of the premier, Kwa Zulu Natal
Relocation of the OSuthu Royal Graves office of the premier, Kwa Zulu Natal

Phase 2 Mitigation Projects

Field Director for the Archaeological Mitigation For Booyensdal Platinum Mine, Steelpoort, Limpopo Province.
Principle investigator Prof. T. Huffman
Monitoring of heritage sites affected by the ARUP Transnet Multipurpose Pipeline under directorship of Gavin Anderson.
Field Director for the Phase 2 mapping of a late Iron Age site located on the farm Kameelbult, Zeerust, North West Province. Under directorship of Prof T. Huffman.
Field Director for the Phase 2 surface sampling of Stone Age sites effected by the Medupi – Spitskop Power Line, Limpopo Province

Heritage management projects

Platreef Mitigation project – mitigation of heritage sites and compilation of conservation management plan.

MEMBERSHIP OF PROFESSIONAL ASSOCIATIONS:

- Association of Southern African Professional Archaeologists. Member number 159
Accreditation:
 - Field Director Iron Age Archaeology
 - Field Supervisor Colonial Period Archaeology, Stone Age
Archaeology and Grave Relocation
- Accredited CRM Archaeologist with SAHRA
- Accredited CRM Archaeologist with AMAFA
- Co-opted council member for the CRM Section of the Association of Southern African Association Professional Archaeologists (2011 – 2012)

PUBLICATIONS AND PRESENTATIONS

- A Culture Historical Interpretation, Aimed at Site Visitors, of the Exposed Eastern Profile of K8 on the Southern terrace at Mapungubwe.
 - J van der Walt, A Meyer, WC Nienaber
 - Poster presented at Faculty day, Faculty of Medicine University of Pretoria 2003
- 'n Reddingsondersoek na Anglo-Boereoorlog-ammunisie, gevind by Ifafi, Noordwes-Provinsie. South-African Journal for Cultural History 16(1) June 2002, with A. van Vollenhoven as co-writer.
- Fieldwork Report: Mapungubwe Stabilization Project.
 - WC Nienaber, M Hutten, S Gaigher, J van der Walt
 - Paper read at the Southern African Association of Archaeologists Biennial Conference 2004
- A War Uncovered: Human Remains from Thabantšho Hill (South Africa), 10 May 1864.
 - M. Steyn, WS Boshoff, WC Nienaber, J van der Walt
 - Paper read at the 12th Congress of the Pan-African Archaeological Association for Prehistory and Related Studies 2005
- Field Report on the mitigation measures conducted on the farm Bokfontein, Brits, North West Province .
 - J van der Walt, P Birkholtz, W. Fourie
 - Paper read at the Southern African Association of Archaeologists Biennial Conference 2007
- Field report on the mitigation measures employed at Early Farmer sites threatened by development in the Greater Sekhukhune area, Limpopo Province. J van der Walt
 - Paper read at the Southern African Association of Archaeologists Biennial Conference 2008
- Ceramic
-]jnanalysis of an Early Iron Age Site with vitrified dung, Limpopo Province South Africa.

- J van der Walt. Poster presented at SAFA, Frankfurt Germany 2008

- Bantu Speaker Rock Engravings in the Schoemanskloof Valley, Lydenburg District, Mpumalanga (*In Prep*)
 - J van der Walt and J.P Celliers

- Sterkspruit: Micro-layout of late Iron Age stone walling, Lydenburg, Mpumalanga. W. Fourie and J van der Walt. A Poster presented at the Southern African Association of Archaeologists Biennial Conference 2011

- Detailed mapping of LIA stone-walled settlements' in Lydenburg, Mpumalanga. J van der Walt and J.P Celliers
 - Paper read at the Southern African Association of Archaeologists Biennial Conference 2011

- Bantu-Speaker Rock engravings in the Schoemanskloof Valley, Lydenburg District, Mpumalanga. J.P Celliers and J van der Walt
 - Paper read at the Southern African Association of Archaeologists Biennial Conference 2011

- Pleistocene hominin land use on the western trans-Vaal Highveld ecoregion, South Africa, Jaco van der Walt.
 - J van der Walt. Poster presented at SAFA, Toulouse, France. Biennial Conference 2016

REFERENCES:

1. Prof Marlize Lombard Senior Lecturer, University of Johannesburg, South Africa
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3. Alex Schoeman University of the Witwatersrand
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