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MAPUNGUBWE NATIONAL PARK AND WHS

**Heritage and Palaeontological Impact Assessment for the Park
Management Office Complex Development**

January 2020

Funded by SANParks

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CREDIT SHEET

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***Disclaimer:** Although all possible care is taken to identify all sites of cultural importance during the investigation of study areas, it is always possible that hidden or sub-surface sites could be overlooked during the study. G&A Heritage and its personnel will not be held liable for such oversights or for costs incurred as a result of such oversights.*

Statement of Independence

As the duly appointed representative of G&A Heritage, I Stephan Gaigher, hereby confirm my independence as a specialist and declare that neither I nor G&A Heritage have any interests, be it business or otherwise, in any proposed activity, application or appeal in respect of which the Environmental Consultant was appointed as Environmental Assessment Practitioner, other than fair remuneration for work performed on this project.

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Declaration of Independence

I, John E. Almond, declare that I am an independent consultant and have no business, financial, personal or other interest in the proposed development project, application or appeal in respect of which I was appointed other than fair remuneration for work performed in connection with the activity, application or appeal. There are no circumstances that compromise the objectivity of my performing such work.



Dr John E. Almond Palaeontologist *Natura Viva* cc

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ABBREVIATIONS

Abbreviation	Meaning
AD	Anno Domini
APM	Archaeological Paleontological and Meteorite
BP	Before Present
c.	circa
BCE	Before Common Era
CE	Common Era
DBSA	Development Bank of Southern Africa
DEA	Department of Environmental Affairs
EAP	Environmental Assessment Practitioner
EIA	Early Iron Age / Environmental Impact Assessment
ESA	Early Stone Age
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
ESMS	Environmental and Social Management System
ESSS	Environmental and Social Safeguard Standard
HIA	Heritage Impact Assessment
I & AP	Interested and Affected Parties
ICOMOS	International Council on Monuments and Sites
ICP	Informed Consultation and Participation
IFC	International Finance Corporation
IFLA	International Federation of Library Associations and Institutions
IMP	Integrated Management Plan
IPMP	Integrated Park Management Plan
LIA	Late Iron Age
LSA	Late Stone Age
MCL	Mapungubwe Cultural Landscape
MPNP	Mapungubwe National Park
MSA	Middle Stone Age
NEM: PAA	National Environmental Management: Protected Areas Act
NEMA	National Environmental Management Act
NHRA	National Heritage Resources Act
OUV	Outstanding Universal Value
PIA	Palaeontological Impact Assessment
PS	Performance Standard
SAHRA	South African Heritage Resource Agency
SANParks	South African National Parks
TFCA	Transfrontier Conservation Area
UN	United Nations
UNESCO	United Nations Education, Scientific and Cultural Organization
VIA	Visual Impact Assessment
WHS	World Heritage Site
ZAR	Zuid-Afrikaansche Republiek

GLOSSARY OF TERMS

A **'place'** is defined as:

A site, area or region;

A building or other structure (which may include equipment, furniture, fittings and articles associated with or connected with such building or other structure);

A group of buildings or other structures (which may include equipment, furniture, fittings and articles associated with or connected with such group of buildings or other structures); and (d) an open space, including a public square, street or park; and in relation to the management of a place, includes the immediate surroundings of a place.

'Archaeological' means:

Material remains resulting from human activity which are in a state of disuse and are in or on land and are older than 100 years, including artefacts, human and hominid remains and artificial features and structures;

Rock art, being a form of painting, engraving or other graphic representation on a fixed rock surface or loose rock or stone, which was executed by human agency and is older than 100 years including any area within 10 m of such representation; and

Wrecks, being any vessel or aircraft, or any part thereof, which was wrecked in South Africa, whether on land or in the maritime cultural zone referred to in section 5 of the Maritime Zones Act 1994 (Act 15 of 1994), and any cargo, debris or artefacts found or associated therewith, which are older than 60 years or which in terms of national legislation are considered to be worthy of conservation;

Features, structures and artefacts associated with military history which are older than 75 years and the sites on which they are found.

'Circa' is used in front of a particular year to indicate an approximate date.

'Grave' means a place of interment and includes the contents, headstone or other marker of and any other structures on or associated with such place.

'Paleontological' means any fossilised remains or fossil trace of animals or plants which lived in the geological past, other than fossil fuels or fossiliferous rock intended for industrial use, and any site which contains such fossilised remains or trace. **'Structure'** means any building, works, device, or other facility made by people and which is fixed to land and any fixtures, fittings and equipment associated therewith older than 60 years.

General

Technical Scope of HIA

The Heritage Impact Assessment is meant to deliver, evaluate and inform on the following aspects:

- (a) The identification and mapping of all heritage resources in the area affected;
- (b) An assessment of the significance of such resources in terms of the heritage assessment criteria set out in the relevant legal descriptions, development proponent requirements and as per international best practise approaches and charters;
- (c) An assessment of the impact of the development on such heritage resources;
- (d) An evaluation of the impact of the development on heritage resources relative to the sustainable social and economic benefits to be derived from the development;
- (e) The results of consultation with communities affected by the proposed development and other interested parties regarding the impact of the development on heritage resources;
- (f) If heritage resources will be adversely affected by the proposed development, the consideration of alternatives; and
- (g) Plans for mitigation of any adverse effects during and after the completion of the proposed development.

The following categories of heritage objects are considered.

Graves: A place of interment and includes the contents, headstone or other marker of and any other structures on or associated with such place. This may include any of the following:

- (1) Ancestral graves
- (2) Royal graves and graves of traditional leaders
- (3) Graves of victims of conflict i.e. graves of important individuals
- (4) Historical graves and cemeteries older than 60 years
- (5) Other human remains, buried or otherwise.

The removal of graves is subject to the following procedures:

- Notification of the impending removals (using local language media and notices at the grave site)
- Consultation with individuals or communities related or known to the deceased
- Satisfactory arrangements for the curation of human remains and / or headstones in a museum, where applicable
- Procurement of a permit from the relevant controlling body
- Appropriate arrangements for the exhumation (preferably by a suitably trained archaeologist) and re-interment (sometimes by a registered undertaker, in a formally proclaimed cemetery)
- Observation of rituals or ceremonies required by the families

Movable objects: this includes objects such as historic or rare books and manuscripts, paintings, drawings, sculptures, statuettes and carvings; modern or historic religious items; historic costumes, jewellery and textiles; fragments of monuments or historic buildings; archaeological material; and natural history collections such as shells, flora, or minerals. Discoveries and access resulting from a project may increase the vulnerability of cultural objects to theft, trafficking or abuse.

- (1) Objects recovered from the soil or water including archaeological and paleontological objects and material, meteorites and rare geological specimens
- (2) Ethnographic art and objects
- (3) Military objects
- (4) Objects of decorative art
- (5) Objects of fine art
- (6) Objects of scientific or technological interest
- (7) Books, records, documents, photographic positives and negatives, graphic, film or video material or sound recordings
- (8) Any other prescribed categories, but excluding any object made by a living person

Battlefields: Older than 75 years.

Heritage “Places”: A ‘place’ is defined as:

- (a) A site, area or region
- (b) A building or other structure (which may include equipment, furniture, fittings and articles associated with or connected with such building or other structure)
- (c) A group of buildings or other structures (which may include equipment, furniture, fittings and articles associated with or connected with such group of buildings or other structures)
- (d) An open space, including a public square, street or park; and in relation to the management of a place, includes the immediate surroundings of a place
- (e) Traditional buildings used in cultural ceremonies

Heritage Structures: Refers to single or groups of architectural works found in urban or rural settings providing evidence of a particular civilisation, a significant development or a historic event. It includes groups of buildings, structures and open spaces constituting past or contemporary human settlements that are recognised as cohesive and valuable from an architectural, aesthetic, spiritual or socio-cultural perspective.

Means any building, works, device, or other facility made by people and which is fixed to land and any fixtures, fittings and equipment associated therewith older than 60 years.

Archaeological Sites: any combination of structural remains, artefacts, human or ecological elements and may be located entirely beneath, partially above, or entirely above the land or water surface. Archaeological material may be found anywhere on the earth’s surface, singly or scattered over large areas. Such material includes burial areas, human remains, artefacts and fossils. Archaeological sites may include:

- (a) Material remains resulting from human activity which are in a state of disuse and are in or on land and are older than 100 years, including artefacts, human and hominid remains and artificial features and structures;

(b) Rock art, being a form of painting, engraving or other graphic representation on a fixed rock surface or loose rock or stone, which was executed by human agency and is older than 100 years including any area within 10 m of such representation; and

(c) Wrecks, being any vessel or aircraft, or any part thereof, which was wrecked, whether on land or in the maritime cultural zone, and any cargo, debris or artefacts found or associated therewith, which are older than 60 years or which in terms of national legislation are considered to be worthy of conservation;

(d) Features, structures and artefacts associated with military history which are older than 75 years and the sites on which they are found.

Paleontological resources: Refers to any fossilised remains or fossil trace of animals or plants which lived in the geological past, other than fossil fuels or fossiliferous rock intended for industrial use, and any site which contains such fossilised remains or trace.

Sacred or Spiritual Sites: Natural Features with cultural significance include sacred hills, mountains, landscapes, streams, rivers, waterfalls, caves and rocks; sacred trees or plants, groves and forests; carvings or paintings on exposed rock faces or in caves; and paleontological deposits of early human, animal or fossilised remains. This heritage may have significance to local community groups or minority populations.

Geographical / Spatial Scope of HIA

- The geographic and spatial scope of the HIA centres around the development completion of the partly finished Office Complex at Hamilton. This site lies within the Mapungubwe National Park and World Heritage Site (WHS), from hereon referred to as “The Park”.

The Park is located in the far North-Eastern part of South Africa within the Limpopo Province. The Park is located on the border between South Africa, Zimbabwe and Botswana. It is located on the South African side of the confluence between the Shashe and Limpopo Rivers. The Limpopo River forms the northern boundary and the R572 and R521 Provincial tar roads form the southern and western boundaries respectively. The Park stretches from the farm Rhodes Drift in the west for 35 km to the arm Riedel in the east, and from the Limpopo River in the north to the R572 tar road in the south.

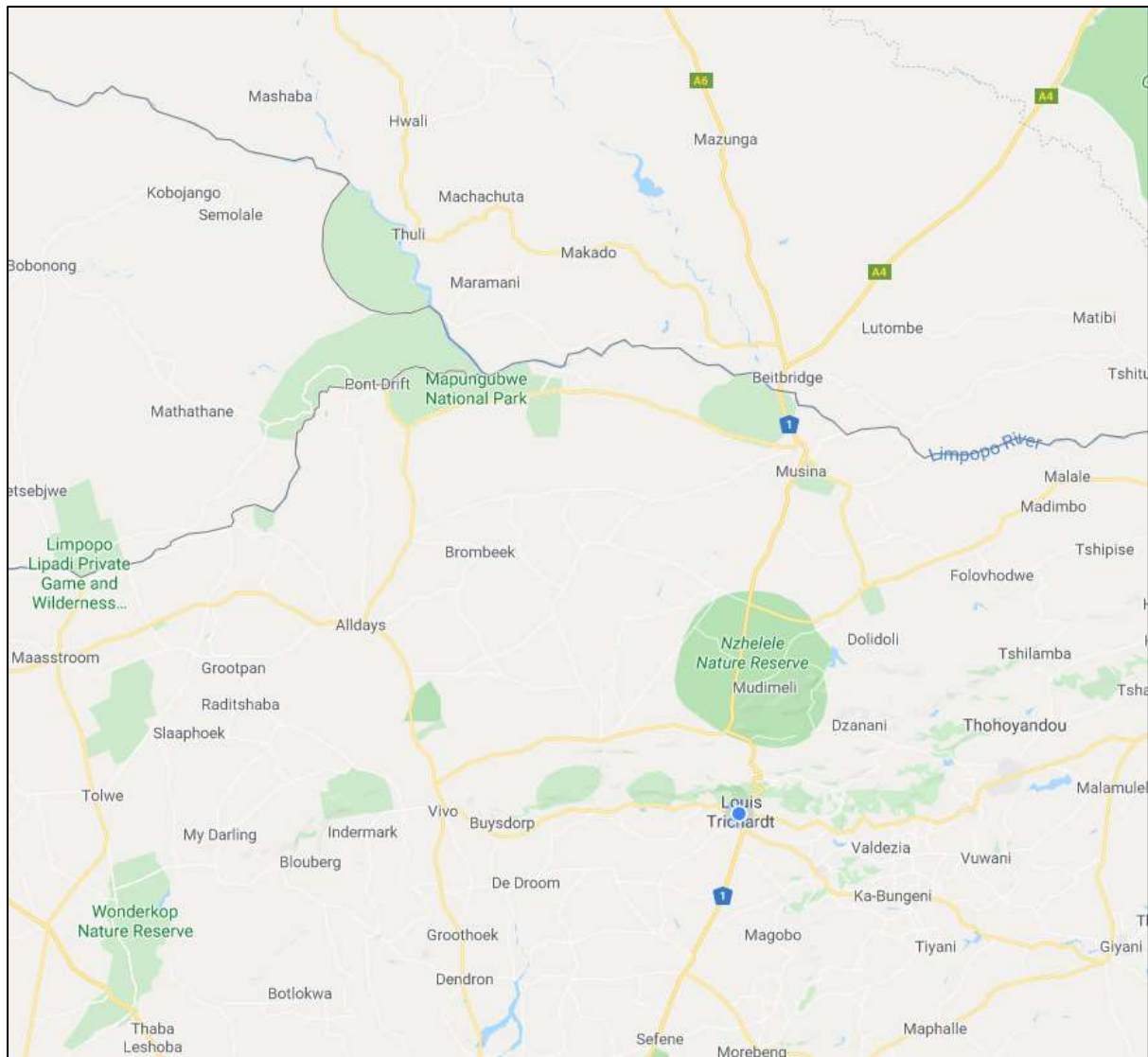


Figure 1. Location of The Park

Temporal Scope

The proposed project will consist of three phases:

- Construction
- Operation
- Decommissioning

Due to the nature of the proposed development impacts on heritage sites are only anticipated during the construction and operational phases of the proposed developments. There is no well-defined decommissioning phase as there is no intention to decommission the project.

Legislative Context

(As per the 2019 – 2028 Integrated Management Plan)

The Mapungubwe National Park and the buffer zone are legally protected through the National Heritage Resources Act (Act No. 25 of 1999), the World Heritage Convention Act (Act No. 49 of 1999) and the National Environmental Management Act (Act No. 73 of 1989).

The property is also recognised as a protected area in terms of the NEM: PAA and section 49(1) of the Mineral and Petroleum Resources Development Act (28 of 2002), implies that mining or prospecting will be completely prohibited from taking place within the property and the buffer zone. Furthermore, any development with a potential impact on the property will be subjected to an environmental impact assessment.

SANParks is the management authority for the property and provides overall management involving coordinating government and local community efforts to conserve the site. SANParks has been updated the Integrated Management Plan in 2019 and is valid until 2028. Regular consultative meetings with stakeholders and local communities take place on the site through the park forum and by other means of engagement.

A Trilateral Memorandum of Understanding is also being drawn up with the objective of establishing the Greater Mapungubwe Transfrontier Conservation Area (GMTFCA). This very extensive area of 5,040 km² will, when established, constitute an effective buffer zone. It is intended that each participating country will concentrate on one facet of protection: cultural heritage in South Africa; wildlife in Botswana; and living cultures in Zimbabwe.

To help guarantee long-term protection for the property, the Integrated Management Plan was completed and the boundaries of the buffer zone has been approved by the World Heritage Committee.

There is also a need to ensure that any consideration of mining licenses is in line with the recommendations of the Technical Workshop on World Heritage and Mining adopted at the 24th session of the World Heritage Committee, to ensure that mining does not constitute a threat to the property, its buffer zone or its wider setting.

National Legislation and Policies

- Department of Environmental Affairs Cultural Heritage Survey Guidelines and assessment tools for protected areas in South Africa
- ICOMOS International cultural tourism charter
- Mapungubwe National Park and World Heritage Site – Park Management Plan
- National Environmental Management: Protected Areas Act 57 of 2003 and its regulations
- National Heritage Resources Act 25 of 1999 and its regulations
- South African Heritage Resources Agency Conservation principles
- South African Heritage Resources Agency Guidelines for basic management plan format for rock art and other archaeological sites to be opened to the public
- South African Heritage Resources Agency Guidelines for the development of plans for the management of heritage sites or place

- South African Heritage Resources Agency Minimum standards for archaeological site museums and rock art sites open to the public
- SANParks Guidelines for the development and maintenance of heritage sites in South African National Parks
- SANParks Policy for the collection and management of heritage objects
- SANParks Policy on conservation, management and promotion of cultural heritage resources
- Tourism Act 3 of 2014
- UNESCO Operational guidelines for the implementation of the World Heritage Convention
- World Heritage Convention Act 49 of 1999

The National Heritage Resources Act (25 of 1999)

In terms of the National Heritage Resources Act, there are several implications for places that are declared National Heritage Sites.

Section 27 of the National Heritage Resources Act specifies that:

- (4) a written motivation for the declaration must be prepared and kept on record by SAHRA;
- (15) SAHRA is responsible for the protection of national heritage sites;
- (18) No person may destroy, damage, deface, excavate, alter, remove from its original position, subdivide or change the planning status of any national heritage site without a permit issued by SAHRA;
- (19) SAHRA may make regulations, with the consent of the owner, to safeguard the site, to specify conditions of use and development, and to regulate the admission of the public, including fees.
- (20) Any branch of the State or supported body which is the owner of a heritage site [in the case of Mapungubwe this would be SANParks must maintain it according to a minimum standard and according to a procedure prescribed by SAHRA after consultation with the relevant Department of Works.
- (21) SAHRA may, by agreement with the owner, conserve or improve any national heritage site, construct fences, walls or gates around it, acquire or construct and maintain an access road to a national heritage site, and erect signs on or near it.
- (22) No person other than the owner of a national heritage site may make reproductions in two or three dimensions of the site for profit without a permit issued by SAHRA and the agreement of the owner. SAHRA may prescribe the fees payable for these reproduction rights and must deposit such fees in a trust fund dedicated to the conservation of the site or of heritage resources in general.

Section 38 of the National Heritage Resources Act allows SAHRA to call for a heritage impact assessment report if certain activities, such as road or bridge building, subdivision or consolidation of erven, or re-zoning are likely to impact on heritage resources. This is done only if an impact assessment is not required under any other law, such as the Environment Conservation Act (No. 73 of 1989) or the National Environmental Management Act (Act No. 107 of 1998).

Section 44(2) of the National Heritage Resources Act states that when any person plans to present a national heritage site to the public, or erect a plaque or other permanent display or structure associated with the presentation, the contents of the interpretive material or programmes must be submitted to SAHRA at least 60 days in advance so that SAHRA may comment as part of the consultative process,

In terms of Section 47(2), SAHRA is responsible for adopting a plan for the management of each national heritage site in accordance with the best principles that can be applied. In addition, sub-section (3) states that a conservation management plan may at the discretion of SAHRA and for a period not exceeding 10 years, be operated solely by SAHRA or in conjunction with an environmental or tourism authority on such terms as SAHRA may determine. In terms of Section 42, the responsibility for implementing such a management plan can be delegated to the owner of the property, or to another authority or conservation body, if a formal heritage agreement is drawn up between SAHRA and that body with the agreement of the owner. SANParks must therefore enter into a formal heritage agreement with SAHRA and with the Minister of Environmental Affairs and Tourism when drawing up a management plan for the park.

In addition, all heritage resources in the country are legally protected by the general provisions for archaeology and palaeontology under Section 35. No person may destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site, and no person may remove from its original position, collect, own or export, any archaeological or palaeontological material or object that has come from a site that is more than 100 years old, without a permit issued by SAHRA.

UNESCO WHS CHARTER

On 9 June 1995 an agreement was signed between SANParks and what was then the Northern Province Government committing them to the development of a new national park in the Shashe / Limpopo River border area of South Africa. In terms of the agreement the Northern Province (re-named the Limpopo Province in 2002) would make the farm Greefswald, then part of the Vhembe Nature Reserve, available to SANParks, to be declared a national park in terms of the National Parks Act (Act No 57 of 1976 as amended). The Vhembe / Dongola National Park was declared in 1998. The park name was changed to Mapungubwe National Park (MPNP) on 30 July 2004 (GN 900 in GG 26602). The Park also forms the core of the Vhembe Biosphere Reserve. The MCL was gazetted as a National Heritage Site by the South African Heritage Resources Agency (SAHRA) in December 2001. The MCL which covers the boundary of the national park was subsequently inscribed on the United Nations Education, Scientific and Cultural Organization's (UNESCO) World Heritage List in 2003. In Government Notice No. 71 Government Gazette 31832 of 30 January 2009 the then Minister of Environmental Affairs and Tourism, Marthinus van Schalkwyk announced the MCL as a World Heritage Site in terms of the World Heritage Convention Act (Act No. 49 of 1999), and delegated specified powers of management to SANParks.

The status of the MPNP and MCL in terms of its National and World Heritage designation makes up an important component of international context, with the Department of Environmental Affairs and the SAHRA ensuring that the values supported by national legislation are met (*Mapungubwe Park Integrated Management Plan*).

Based on a strong appeal from national and local stakeholders, the 2030 Agenda adopted by the UN General Assembly integrates, for the first time, the role of culture, through cultural heritage and creativity, as an enabler of sustainable development across the Sustainable Development Goals. World Heritage may provide a platform to develop and test new approaches that demonstrate the relevance of heritage for sustainable development.

On 19 November 2015, the 20th General Assembly of the States Parties to the World Heritage Convention adopted a Policy on the integration of a sustainable development perspective into the processes of the World Heritage Convention. The overall goal of the policy is to assist States Parties, practitioners, institutions, communities and networks, through appropriate guidance, to harness the potential of World Heritage properties and heritage in general, to contribute to sustainable development and therefore increase the effectiveness and relevance of the Convention whilst respecting its primary purpose and mandate of protecting the Outstanding Universal Value of World Heritage properties. Its adoption represents a significant shift in the implementation of the Convention and an important step in its history.

The management of developments within the Mapungubwe WHS is dictated to some extent by the commitments made in the 2002 Mapungubwe Cultural Landscape, World Heritage Nomination Dossier submitted to the World Heritage Committee by the South African Department of Environmental Affairs and Tourism. Since 2002, there has however been several updated documents that reflects the changing views and priorities of UNESCO and ICOMOS. Central to these changing ideological approaches are the following two key documents;

- **Policy Document for the Integration of a Sustainable Development Perspective into the Processes of the World Heritage Convention**, as adopted by the General Assembly of State Parties to the World Heritage Convention at its 20th session (UNESCO, 2015).
- **Document 37 C/4 (2014-2021) Medium-Term Strategy** (As approved by the General Conference at its 37th session (General Conference resolution 37 C/Res. 1) and validated by the Executive Board at its 194th session (194 EX/Decision 18).

Both these documents indicate a shift towards promoting the sustainable development of cultural resources within WHS.

The integration of a sustainable development perspective into the World Heritage Convention will enable all stakeholders involved in its implementation, in particular at national level, to act with social responsibility. This process will enhance World Heritage as a global leader and standard-setter for best practice, also by helping to promote – through the over 1000 listed properties worldwide – innovative models of sustainable development. Furthermore, the introduction of this policy appears necessary since, ultimately, if the heritage sector does not fully embrace sustainable development and harness the reciprocal benefits for heritage and society, it will find itself a victim of, rather than a catalyst for, wider change.

As an integral part of the 37 C/4 document specific attention is given to Africa in terms of sustainable development and this principal is one of two main objectives for UNESCO in the 2014-2021 period.

The notion of sustainability entered the Operational Guidelines in 1994, with reference to the “sustainable use” of cultural landscapes, then introduced for the first time as a new category of heritage properties. At its 26th Session (Budapest, 2002), the World Heritage Committee adopted the so-called “Budapest Declaration”, which stressed the need to “ensure an appropriate and equitable balance between conservation, sustainability and development, so that World Heritage properties can be protected through appropriate activities contributing to the social and economic development and the quality of life of our communities”.

In 2005, furthermore, the notion of sustainable development was taken into account in the introductory part of the Operational Guidelines, which notes that “The protection and conservation of the natural and cultural heritage are a significant contribution to sustainable development” (paragraph 6). The Operational Guidelines further recognize (paragraph 119) that World Heritage properties “may support a variety of on-going and proposed uses that are ecologically and culturally sustainable”.

At its 31st Session (Christchurch 2007), the World Heritage Committee decided to add “Communities” to the previous four strategic objectives, “to enhance the role of communities in the implementation of the World Heritage Convention” (Decision 31 COM 13B).

At its 35th Session (Paris, 2011), the World Heritage Committee made several additions to the Operational Guidelines which refer to sustainable development, notably in paragraphs 112, 119, 132, as well as in Annex 5, points 4.b and 5.e. These amendments are aimed on one hand at ensuring that any use of World Heritage properties be sustainable with respect to the imperative of maintaining their Outstanding Universal Value (OUV), and on the other hand to affirm the idea that management systems of World Heritage properties “should integrate sustainable development principles”. Various paragraphs of the Operational Guidelines, moreover, call for a full participatory approach in the identification, protection and management of World Heritage properties (e.g. paragraphs 64, 111 and 123).

The recent “Strategic Action Plan for the Implementation of the Convention, 2012-2022”, adopted by the 18th General Assembly (Paris, 2011), also integrates a concern for sustainable development, notably in its “Vision for 2022”, which calls for the World Heritage Convention to “contribute to the sustainable development of the world’s communities and cultures”, as well as through its Goal N.3 which reads:

“Heritage protection and conservation considers present and future environmental, societal and economic needs”, which is to be achieved particularly through “connecting conservation to communities”.

All these developments should be seen in the larger context of UNESCO’s initiative to integrate culture within the international sustainable development agenda (see: <https://en.unesco.org/themes/culture-sustainable-development>). In this context, World Heritage sites could provide the testing ground where innovative approaches could be applied.

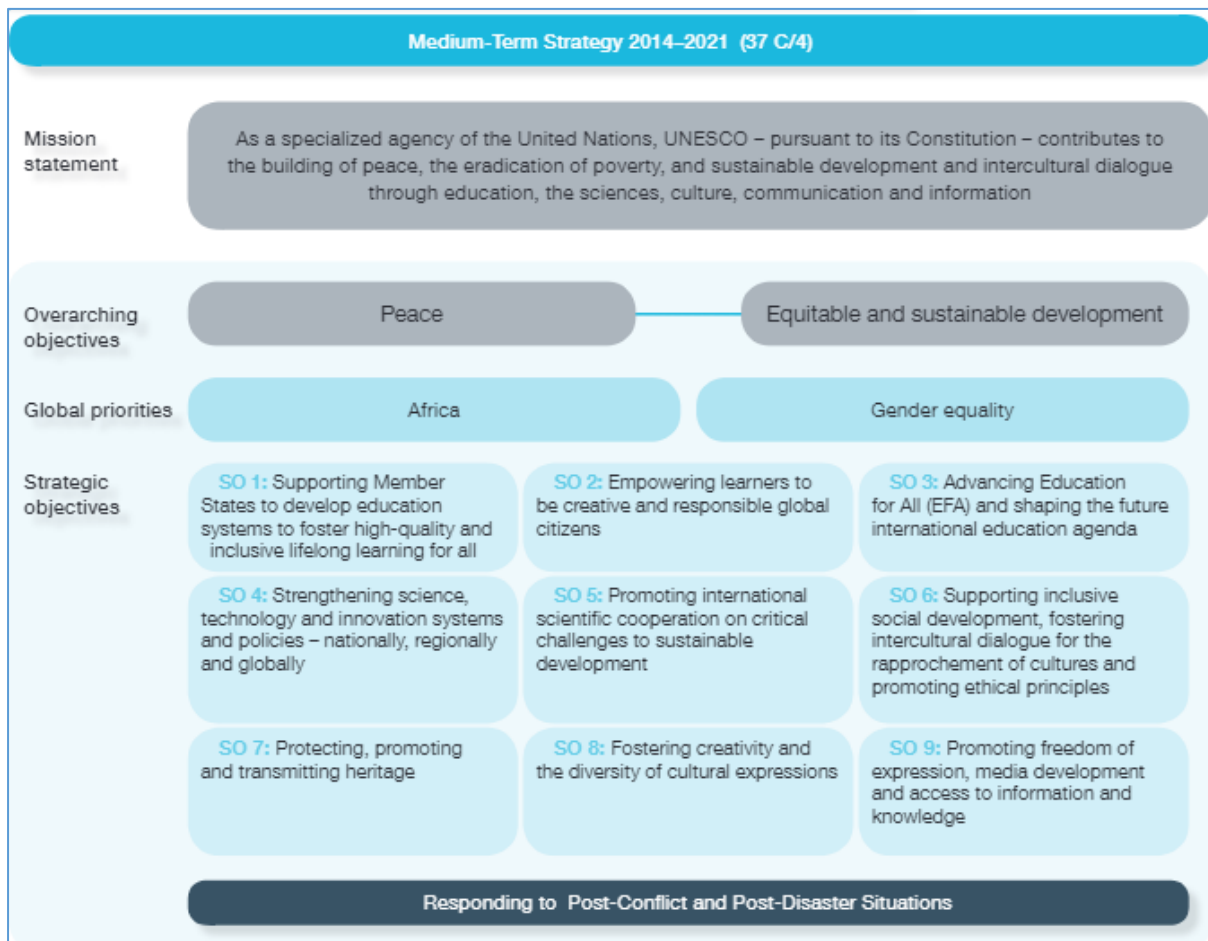


Figure 2. Medium-Term Strategy

World Heritage Convention Act

The World Heritage Convention Act (Act No. 49 of 1999) provides for the enforcement and implementation of the World Heritage Convention in South Africa. It allows, inter alia, for the establishment of Authorities to safeguard the integrity of World Heritage Sites and for integrated management plans and other controls.

The Minister of Environmental Affairs and Tourism is responsible for implementing the Act, but must consult with the Minister of Arts, Culture, Science and Technology and with interested parties [such as SANParks and SAHRA] when establishing an Authority. An Authority is a juristic person with a Board that may be appointed by the Minister to manage a world heritage site if the Minister deems it necessary. An existing organ of state that is already managing the site may be declared an Authority. The Act specifies the powers and duties that may be given to such an Authority and its executive staff component.

Every Authority must prepare and implement an integrated management plan for the world heritage site under its control (Section 21). The plan must be submitted to the Minister for approval within six months of the establishment of an Authority. Approval of the plan must also be sought from the Minister of Arts, Culture, Science and Technology and the Council of SAHRA. The plan must be reviewed and amended as and when necessary. Provision is made for the Minister to prepare model integrated management plans and norms and standards in consultation with the Minister of Arts, Culture, Science and Technology.

An Authority is required to submit an annual report to the Minister that includes an assessment of the implementation of the management plan and information about the extent to which the Authority succeeded or failed to meet its obligations in terms of the World Heritage Convention, the Operational Guidelines and the World Heritage Convention Act.

Principles of Cultural Resource Management (Nomination Document)

The principles of Cultural Resource Management in the Vhembe-Dongola National Park are to:

1. Maintain the significance, values and integrity of the physical and intangible remains of the rich and diverse cultural heritage of the park;
2. Accept responsibility for safeguarding, conserving and managing this heritage as an integral part of sustainable environmental management in the Park;
3. Incorporate and honour the needs and values of local and neighbouring communities in development programmes; and
4. Promote the MCL as a place of symbolic pilgrimage to instil national and international pride in the achievements of indigenous African people in pre-colonial times.

Objectives of cultural resource management (Nomination Document)

1. Develop a cultural resource management policy for the Vhembe-Dongola National Park as an extension of the newly developed national cultural resource management system.
2. Establish and manage a cultural resource management system which should incorporate as a matter of priority in its database:
 - An inventory of cultural resources in all parts of the Mapungubwe World Heritage Site Nomination 54
 - Relevant documentation
 - Status reports, and
 - Management priorities.
3. Formulate and implement a cultural resource management plan for the park as soon as inventorisation is completed. This process should again be participatory and consultative, involving internal and external stakeholders.
4. Include cultural resource management strategies, procedures, codes of practice, guidelines, norms and standards and mitigation techniques and methods. Design and implement a suitable and practical monitoring system for cultural resources in the national park in order to determine the state or condition of resources and enable decision-making in terms of conservation measures or improved management to be made.

5. Identify research needs and priorities as well as recommendations with regard to research contracts, partnerships or concessions to individuals or institutions.
6. Direct and co-ordinate research projects and ensure adherence to standards of practice and operational efficiency. Interpret and disseminate reports and results.
7. Manage an impact assessment system to aid developmental work in the national park with regard to the evaluation of heritage sites or structures.
8. Channel adequate funding to cultural resource management, to manage the cultural resource management budget according to appropriate standards, and to provide support and motivation for research and development.
9. Co-operate with other departments to register Mapungubwe as a World Heritage Site and develop it as a tourist destination and educational resources in the park in order to further enrich tourist experience and to promote cultural resources as an integral part of tourism.
10. Optimise the role and value of cultural resources in further improving relationships and stakeholdership with neighbouring communities.

The various proposed developments will be measured against the above principals, guidelines and priorities.

Mapungubwe National Park and World Heritage Site, Integrated Management Plan

SANParks is the management authority tasked with the responsibility to manage the Mapungubwe National Park and World Heritage Site.

In compliance with the NEM: PAA, SANParks is required to develop a management plan for each of its protected areas. The object of a management plan is to ensure the protection, conservation and management of the protected area concerned in a manner which is consistent with the objectives of the NEM: PAA and for the purpose for which it was declared. During the revision of the current management plan for the Mapungubwe National Park and World Heritage Site, SANParks has reviewed the biodiversity conservation, Responsible Tourism and socio-economic components that make up its core business, whilst ensuring increased emphasis on strengthening stakeholder relationships and communication, continual learning, adaptive management and good governance.

An important objective for SANParks is to promote responsible experiential opportunities and products for visitors to appreciate and value national parks. Whilst the primary mandate of SANParks is that of the conservation of biodiversity, it also recognises that Responsible Tourism also offers SANParks the best possible opportunity to supplement much needed funding for operational needs but also provides South Africa with an internationally recognised nature-based tourism destination of choice, further constituting an economically and culturally valuable asset to the region in which it occurs (Mapungubwe NP and WHS, IMP, 2018).

The Integrated Management Plan (IMP) identifies the following needs and development principles for the implementation period (2019-2028);

Long term development

Development is not considered lightly and is only embarked on in order to fulfil a real operational need or tourism opportunity. Although the Park is not financially sustainable, it has the potential to improve its occupancy and to offer additional products to visitors. The current development plan focuses on ways to attract additional visitors to the Park. The focus will be to develop and implement cultural heritage-based activities and orientation around different cultural sites including rock art trails. Entrance gates, tourism facilities and roads will be expanded to improve the flow of visitors and address visitor needs in and around the Park. Transfrontier events including the annual Tour de Tuli and Wildrun will be expanded on, as well as other events such as cross-border camping opportunities will have a definite impact on the range of local products that SANParks can offer.

Caution will be exercised when considering any development. All development and activities in the Park will be guided by the World Heritage Operational Guidelines and SANParks Guideline for development and maintenance of heritage sites in national parks. The zonation of the Park will dictate the location of any development and the implementation of identified projects is dependent on the availability of funds.

Although the IMP addresses several development nodes this report is mainly concerned with the section on Cultural Heritage Sites.

Cultural heritage sites

There is a need to enhance the interpretation of the cultural heritage sites in the Park. Additional sites have been identified for possible interpretation and orientation in Table 14 below.

Infrastructure	Status	Zone	Priority	Probability
Eastern section				
Guided trail linking major cultural sites	New	Primitive	High	High
K8 excavation pit profile upgrade			High	High
Orientation centre at Mapungubwe Hill			High	High
Orientation centre and pathways at Schroda / Zhizo		LIL	High	High
Possible guided tour to rock art sites		Various	High	High
Western section				
Guided tour to rock art sites	New	Various	High	High
Possible activities / interpretation at Leokwe Hill		Primitive	High	High

Figure 3. Proposed Cultural Heritage Product Development for the Park

Other International conventions and legal instruments

Several documents that assist in the management of cultural sites within the framework of developments have been formulated by National and International Institutions such as the International Finance Corporation and the Development Bank of South Africa. These guidelines are particularly well developed for projects of this nature (Mapungubwe Developments) and it would be unwise not to incorporate them in the current study seeing as they are particularly well designed to manage exactly the challenges that can be expected for this project. These principals have been applied globally on numerous projects and have been proven effective.

The following international best practice conventions and charters form part of the evaluation criteria and guides this HIA;

- UNESCO Charter on Cultural Tourism (1976)
- Tlaxcala Declaration on the Revitalisation of Small Settlements (1982)
- Burra Charter, The Australian ICOMOS Charter for the Conservation of Places of Cultural Significance (1982)
- The Appleton Charter for the Protection and Enhancement of the Built Environment (ICOMOS Canada, 1983)
- Charter for the Conservation of Places of Cultural Heritage Value (ICOMOS, New Zealand, 1992)
- Convention for the Protection of the World Culture and Natural Heritage (1972)
- Charter for the Protection and Management of Archaeological Heritage (ICOMOS, 1990)
- Charter on the Built Vernacular Heritage (ICOMOS, 1999)
- The Paris Declaration on Heritage as Driver of Development (2011)
- IFLA Principles Concerning Rural Landscapes as Heritage (ICOMOS, 2017)
- Salalah Guidelines for the Management of Public Archaeological Sites (2017)

IFC Performance Standards

WHS management can be strongly aligned with the IFC Performance Standards. Although this is not an IFC funded project, these standards will be a valuable tool to evaluate the effectiveness of impact management upon the cultural landscape of The Park.

International Finance Corporation (IFC) Performance Standard 8

Performance Standard (PS) 8 recognises the importance of cultural heritage for current and future generations. Consistent with the Convention Concerning the Protection of the World Cultural and Natural Heritage, this PS aims to ensure that clients protect cultural heritage in the course of their project activities. In addition, the requirements of this PS on a project's use of cultural heritage are based in part on standards set by the Convention on Biological Diversity.

Objectives

- To protect cultural heritage from the adverse impacts of project activities and support its preservation.
- To promote the equitable sharing of benefits from the use of cultural heritage.

Scope of Application

The applicability of this PS is established during the environmental and social risks and impacts identification process. The implementation of the actions necessary to meet the requirements of this PS is managed through the client's Environmental and Social Management System (ESMS), the elements of which are outlined in this PS. During the project life-cycle, the client will consider potential project impacts to cultural heritage and will apply the provisions of this PS.

For the purposes of this PS, cultural heritage refers to

- (i) tangible forms of cultural heritage, such as tangible moveable or immovable objects, property, sites, structures, or groups of structures, having archaeological (prehistoric), paleontological, historical, cultural, artistic, and religious values;
- (ii) unique natural features or tangible objects that embody cultural values, such as sacred graves, rocks, lakes, and waterfalls; and
- (iii) certain instances of intangible forms of culture that are proposed to be used for commercial purposes, such as cultural knowledge, innovations, and practices of communities embodying traditional lifestyles.

Requirements with respect to tangible forms of cultural heritage are contained in paragraphs 6–16. For requirements with respect to specific instances of intangible forms of cultural heritage described in paragraph 3 (iii) see paragraph 16.

The requirements of PS 8 apply to cultural heritage regardless of whether or not it has been legally protected or previously disturbed. The requirements of this PS do not apply to cultural heritage of Indigenous Peoples. PS 7 describes those requirements.

Requirements

Protection of Cultural Heritage in Project Design and Execution

In addition to complying with applicable law on the protection of cultural heritage, including national law implementing the host country's obligations under the Convention Concerning the Protection of the World Cultural and Natural Heritage, the client will identify and protect cultural heritage by ensuring that internationally recognized practices for the protection, field-based study, and documentation of cultural heritage are implemented.

Where the risk and identification process determine that there is a chance of impacts to cultural heritage, the client will retain competent professionals to assist in the identification and protection of cultural heritage. The removal of nonreplicable cultural heritage is subject to the additional requirements of paragraph 10 below. In the case of critical cultural heritage, the requirements of paragraphs 13–15 will apply.

Chance Find Procedures

The client is responsible for siting and designing a project to avoid significant adverse impacts to cultural heritage. The environmental and social risks and impacts identification process should determine whether the proposed location of a project is in areas where cultural heritage is expected to be found, either during construction or operations. In such cases, as part of the client's ESMS, the client will develop provisions for managing chance finds through a chance find procedure which will be applied in case cultural heritage is subsequently discovered. The client will not disturb any chance find further until an assessment by competent professionals is made and actions consistent with the requirements of this PS are identified.

Consultation

Where a project may affect cultural heritage, the client will consult with affected communities within the host country who use, or have used within living memory, the cultural heritage for long-standing cultural purposes. The client will consult with the affected communities to identify cultural heritage of importance, and to incorporate into the client's decision-making process the views of the affected communities on such cultural heritage. Consultation will also involve the relevant national or local regulatory agencies that are entrusted with the protection of cultural heritage.

Community Access

Where the client's project site contains cultural heritage or prevents access to previously accessible cultural heritage sites being used by, or that have been used by, Affected Communities within living memory for long-standing cultural purposes, the client will, based on consultations under paragraph 9, allow continued access to the cultural site or will provide an alternative access route, subject to overriding health, safety, and security considerations.

Removal of Replicable Cultural Heritage

Where the client has encountered tangible cultural heritage that is replicable and not critical, the client will apply mitigation measures that favour avoidance. Where avoidance is not feasible, the client will apply a mitigation hierarchy as follows:

- Minimize adverse impacts and implement restoration measures, in situ, that ensure maintenance of the value and functionality of the cultural heritage, including maintaining or restoring any ecosystem processes needed to support it.
- Where restoration in situ is not possible, restore the functionality of the cultural heritage, in a different location, including the ecosystem processes needed to support it.
- The permanent removal of historical and archaeological artefacts and structures is carried out according to the principles of paragraphs 6 and 7 above.
- Only where minimization of adverse impacts and restoration to ensure maintenance of the value and functionality of the cultural heritage are demonstrably not feasible, and where the affected communities are using the tangible cultural heritage for long-standing cultural purposes, compensate for loss of that tangible cultural heritage.

Removal of Non-Replicable Cultural Heritage

Most cultural heritage is best protected by preservation in its place, since removal is likely to result in irreparable damage or destruction of the cultural heritage. The client will not remove any non-replicable cultural heritage, unless all of the following conditions are met:

- There are no technically or financially feasible alternatives to removal.
- The overall benefits of the project conclusively outweigh the anticipated cultural heritage loss from removal.
- Any removal of cultural heritage is conducted using the best available technique.

Critical Cultural Heritage

Critical cultural heritage consists of one or both of the following types of cultural heritage:

- (i) the internationally recognized heritage of communities who use or have used within living memory the cultural heritage for long-standing cultural purposes; or
- (ii) legally protected cultural heritage areas, including those proposed by host governments for such designation.

The client should not remove, significantly alter, or damage critical cultural heritage. In exceptional circumstances when impacts on critical cultural heritage are unavoidable, the client will use a process of Informed Consultation and Participation (ICP) of the affected communities as described in PS 1 and which uses a good faith negotiation process that results in a documented outcome. The client will retain external experts to assist in the assessment and protection of critical cultural heritage.

Legally protected cultural heritage areas are important for the protection and conservation of cultural heritage, and additional measures are needed for any projects that would be permitted under the applicable national law in these areas. In circumstances where a proposed project is located within a legally protected area or a legally defined buffer zone, the client, in addition to the requirements for critical cultural heritage mentioned above, will meet the following requirements:

- Comply with defined national or local cultural heritage regulations or the protected area management plans;
- Consult the protected area sponsors and managers, local communities and other key stakeholders on the proposed project; and
- Implement additional programs, as appropriate, to promote and enhance the conservation aims of the protected area.

Cultural Heritage Project's Use of Cultural Heritage

Where a project proposes to use the cultural heritage, including knowledge, innovations, or practices of local communities for commercial purposes, the client will inform these communities of:

- (i) their rights under national law
- (ii) the scope and nature of the proposed commercial development
- (iii) the potential consequences of such development

The client will not proceed with such commercialization unless it:

- (i) enters into a process of ICP as described in PS 1 and which uses a good faith negotiation process that results in a documented outcome
- (ii) provides for fair and equitable sharing of benefits from commercialization of such knowledge, innovation, or practice, consistent with their customs and tradition.

Development Bank of South Africa (DBSA) Environmental and Social Safeguard Standards

DBSA Environmental and Social Safeguard Standard 8

The DBSA's ESSS8 sets out measures to protect cultural heritage throughout the project life cycle. This ESSS applies to cultural heritage regardless of whether it has been legally protected or previously identified or disturbed. ESSS 8 was prepared in compliance with the legal requirements as set out in the National Heritage Resources Act (NHRA) and the NEMA of South Africa.

This ESSS applies if a project:

- Involves excavations, demolition, movement of earth, flooding or other changes in the physical environment.
- Is located within a legally protected area or a legally defined buffer zone.
- Is located in, or in the vicinity of, a recognised cultural heritage site.
- Is designed to support cultural heritage conservation, management and use.
- Impacts materially on intangible cultural heritage or if a project intends to use such intangible cultural heritage for commercial purposes.
- Impacts on or depends on cultural heritage including manmade, natural capital or institutional capital.

Objectives

- To protect cultural heritage from the adverse impacts of project activities and support its preservation.
- To address cultural heritage as an integral aspect of sustainable development.

Client responsibility to implement ESSS8

The Environmental and Social Assessment, as set out in ESSS1, requires that the client considers direct, indirect and cumulative project-specific risks and impacts on cultural heritage.

The client, in consultation with the DBSA, project affected parties and cultural heritage experts, will:

- Implement globally recognised practices to conduct field-based study, documentation and protection of cultural heritage related to the project.

- If the Environmental and Social Impact Assessment (ESIA) identifies potential significant cultural heritage risks and impacts during any project life cycle stage, the client will engage cultural heritage experts to identify, value, assess and protect cultural heritage.
- Where appropriate, develop a Cultural Heritage Management Plan to mitigate any risks to cultural heritage.
- Provide an implementation timeline, budget and costing of resource needs to implement each mitigation measure. This information may be provided in a stand-alone document or, depending on the project nature, scale, risks and impacts, incorporated into the ESMP.
- Where appropriate, develop a project-specific procedure to be followed if previously unknown cultural heritage is encountered during project activities. Include a “Chance Finds Procedure” in all project construction contracts, including excavations, demolition, earth movement, flooding or other potential changes in the physical environment. The “Chance Find Procedure” will:
 - Set out how chance finds associated with the project will be managed.
 - Commit to notify relevant authorities of found objects or sites by cultural heritage experts.
 - Fence off the area of finds or sites to avoid further disturbance.
 - Conduct an assessment of found objects or sites by cultural heritage experts.
 - Identify and implement actions consistent with the requirements of this Standard and national legislation.
 - Train project personnel and project workers on chance find procedures.
- Identify stakeholders that are relevant for the cultural heritage that are known to exist or is likely to be encountered during the project life cycle. Stakeholders will include, as relevant:
 - Project affected parties, including individuals and communities within the country who use or have used the cultural heritage within living memory.
 - Other interested parties, including national or local regulatory authorities entrusted with cultural heritage, nongovernmental organisations and cultural heritage experts, including national and international cultural heritage organisations.
- Carry out meaningful consultations with stakeholders to identify cultural heritage that may be affected by the potential project.
- Consider cultural heritage significance affected by the project.
- Determine whether information disclosure regarding cultural heritage would compromise or jeopardise cultural heritage safety or integrity or would endanger information sources. In such cases, sensitive information may be omitted from public disclosure.
- Treat with confidentiality the location, characteristics or traditional use of cultural sites that are considered confidential by the relevant affected stakeholders.
- Where the project site contains cultural heritage or prevents access to previously accessible cultural heritage sites, allow continued access to the cultural site, or provide an alternative access route, subject to overriding health, safety and security considerations, based on consultations with site users.

- Assess potential risks and impacts.
- Explore, avoid and mitigate options.
- A person or company that does not comply with the provisions of the National Heritage Resources Act may be liable to a fine or imprisonment.

Legally Protected Cultural Heritage Areas

The Client will, as part of the Environmental and Social Assessment, determine the presence of all project affected listed legally protected cultural heritage areas. If the proposed project will be located within a legally protected area or a legally defined buffer zone, the Client will:

- Comply with local, national, regional or international cultural heritage regulations and the applicable protected area management plans.
- Consult with protected area sponsors and managers, project affected parties and other interested parties regarding the proposed project.
- Implement additional programmes, to promote and enhance the protected areas conservation aims.

Provisions for Cultural Heritage Types

Archaeological sites comprise any combination of structural remains, artefacts, human or ecological elements and may be located entirely beneath, partially above, or entirely above the land or water surface. Archaeological material may be found anywhere on the earth's surface, singly or scattered over large areas. Such material includes burial areas, human remains, artefacts and fossils.

Built Heritage refers to single or groups of architectural works found in urban or rural settings providing evidence of a particular civilisation, a significant development or a historic event. It includes groups of buildings, structures and open spaces constituting past or contemporary human settlements that are recognised as cohesive and valuable from an architectural, aesthetic, spiritual or socio-cultural perspective.

Natural Features with Cultural Significance include sacred hills, mountains, landscapes, streams, rivers, waterfalls, caves and rocks; sacred trees or plants, groves and forests; carvings or paintings on exposed rock faces or in caves; and paleontological deposits of early human, animal or fossilised remains. This heritage may have significance to local community groups or minority populations.

Movable Cultural Heritage includes objects such as historic or rare books and manuscripts, paintings, drawings, sculptures, statuettes and carvings; modern or historic religious items; historic costumes, jewellery and textiles; fragments of monuments or historic buildings; archaeological material; and natural history collections such as shells, flora, or minerals. Discoveries and access resulting from a project may increase the vulnerability of cultural objects to theft, trafficking or abuse.

Where there is evidence or high probability of any form of cultural heritage in the project area, the client, in consultation with cultural heritage experts, will:

- Conduct desk-based research and field surveys to document, map and investigate cultural heritage.
- Document the location and characteristics of cultural heritage discovered during the project life-cycle and provide relevant documents to the national or subnational cultural heritage authorities.
- Determine how cultural heritage discovered during the project life-cycle should be managed and whether it should be documented, excavated and documented, or conserved on site.
- Determine, in accordance with national and subnational law, who owns and assumes custodial responsibility for cultural heritage.
- Until custody of cultural heritage is transferred, arrange to identify, conserve, label, store securely and enable accessibility for future study and analysis.
- Identify appropriate mitigation measures to address cultural heritage impacts, including documentation, conservation or rehabilitation on site, or relocation and conservation or rehabilitation.
- Maintain the authenticity of form, construction materials and techniques of cultural heritage structures when they are rehabilitated or restored.
- Preserve the physical and visual context of individual or groups of historic structures when planning project infrastructure.
- Identify natural features with cultural heritage significance affected by the project.
- Where necessary, protect and preserve natural features with cultural heritage significance on site.
- Where natural heritage artefacts must be transferred to another location, the client should consult project-affected parties, ensure that traditional cultural heritage practices are respected and that affected parties are able to continue performing cultural heritage practises.
- Take measures to guard against theft and illegal trafficking of movable cultural heritage items affected by the project and notify relevant authorities of any such activity.
- Identify movable cultural heritage objects that the project may endanger and provide for their protection throughout the project life-cycle.
- Inform any relevant authorities responsible for overseeing and protecting movable cultural heritage objects of the project activity schedule and alert them to the potential vulnerability of such items.

Commercial Use of Cultural Heritage

Where a project intends to use the cultural heritage of affected parties (including individuals and communities) for commercial purposes, the client will:

- Inform affected parties of their rights, and the proposed project scope, nature, potential impacts and consequences.
- Not proceed with commercial use of cultural heritage unless meaningful consultation with stakeholders has been carried out.

- Provide project affected parties with fair and equitable benefit sharing from commercial use of cultural heritage and implement appropriate mitigation measures consistent with customs and traditions.

8.4 Documentation Required from the Client

For high risk and medium risk projects the following documents are required, where applicable to the project:

- Cultural Heritage Management Plan.
- Chance Find Procedure.

Method

Heritage Management

This study defines the heritage component of the EIA process being undertaken for the proposed Mapungubwe Developments within The Park.

It is described as a first phase (HIA). This report attempts to evaluate both the accumulated heritage knowledge of the area as well as information derived from direct physical observations.

Site Visit / Fieldwork Details

Fieldwork was conducted in the week of the 5th of January 2020. The proposed development areas were indicated to investigators from G&A Heritage Properties (Pty) Ltd (hereafter referred to as G&A Heritage) by the Project Manager at The Park, Mr Louw de Bruin. Each site was located and demarcated where after the team returned to each for further detailed investigations. The study is limited to the areas indicated to the team by members of SANParks and The Park. Any changes to the footprints of the proposed projects will result in further fieldwork.

Field investigations were performed on foot. Where possible eroded trenches and animal burrows were investigated for deposits of heritage materials. Small scale trowel tests were done in some areas.

Consultations

Consultation was done with the Park management.

An Environmental Management Consultancy has been appointed by SANParks to perform a comprehensive Public Participation and Stakeholder Engagement processes for the 24(G) Rectification Application in terms of NEMA. G&A Heritage and Natura Viva provided heritage and palaeontological related inputs for this process, respectively.

Assumptions

It is assumed that the footprints as indicated to investigators by Park management are correct and comprehensive.

Gaps / Limitations / Uncertainty

This study resulted in comments published by SAHRA regarding a previous consolidated HIA performed for the development. The current study reassessed the site and included a palaeontological assessment.

The presence of large and dangerous animals restricted the movement of investigators to some extent; however, this did not impact on the comprehensiveness of the investigations.

Specialist specific Methodology

The scope of work includes the identification and assessment of archaeological, cultural, historic and built sites within the study area; interrogation of project-specific aerial imagery; archival study of existing data and information for the study area as well as site inspection and fieldwork. This site work includes communicating with local inhabitants to confirm possible locations of heritage and cultural sites.

Background to Current Study

The current HIA was commissioned by SANParks in response to various weaknesses identified with a previous study regarding the same developments. This study was titled.

- HIA STUDY FOR THE PROPOSED CONSTRUCTION OF VISITOR ORIENTATION INFRASTRUCTURE AND CONSERVATION AND ACCOMMODATION FACILITIES, MAPUNGUBWE CULTURAL LANDSCAPE WORLD HERITAGE SITE USING ICOMOS GUIDELINES (2011) – Siyathemba Trading cc. 2017. Chirikure, S.

The deficiencies of the previous report surfaced after evaluation by SAHRA (South African Heritage Resources Agency) APM (Archaeological Paleontological and Meteorite) Unit, as well as two professional peer reviews. The current study is not limited to rectifying these deficiencies but will address them as per the peer reviews and SAHRA comments to ensure that all the controlling body concerns are addressed sufficiently to ensure that the developments carry the approval of SAHRA.

Concerns Raised by SAHRA

SAHRA raised their concerns regarding the above study in a letter on the 21/02/2017 and in Final Comments on 20/10/2017 (CaseID: 10622). The comments, and how they are to be addressed by this report are as follow;

- **Consultation with the Department of Environmental Affairs (DEA) regarding a possible Environmental Authorisation Application for the project in terms of NEMA;**
 - o As agreed with SAHRA, this report will only focus on the Office Complex development and the other proposed developments mentioned in CaseID: 10622 has been dealt with separately and will be submitted to SAHRA as different basic assessments in terms of NEMA.
- **A Palaeontological Impact Assessment (PIA) inclusive of a field assessment must be conducted for the proposed development.**
 - o Dr John Almond has completed a field-based PIA for the developments, and is included in this HIA report.
- **A Visual Impact Assessment (VIA) must be conducted on the proposed development, inclusive of photo montages showing the viewshed of the proposed developments within the park;**
 - o A professional VIA company was retained by SANParks to complete a viewshed of the Park Management Offices, which has been conducted and will be submitted to SAHRA as a stand-alone report.

- **Detailed designs and layouts of the proposed dormitories, office complex/conservation facility, camping areas and visitor interpretation centre must be included in the submission and discussed in the HIA.**
 - o Detailed representations of the Office Complex be included in the study.
- **Motivation by means of a tourism study for the proposed dormitories, camping areas and visitor orientation centres must be supplied and discussed in the context of the HIA;**
 - o A Tourism Study was compiled for the afore-mentioned developments in their respective HIA & PIA reports, which will be submitted as an appendix to the basic assessment report.
- **A motivation for the need for the construction of the office complex/conservation facilities and the role they are intended for must be supplied;**
 - o The motivation for the Office Complex will be given and discussed in this report.
- **Proof of consultation with stakeholders such as affected communities, the World Heritage Unit at DEA, land claimants and other identified Interested and Affected Parties (I & APs); and**
 - o The appointed Environmental Assessment Practitioner (EAP) conducted a Public Participation and Stakeholder Engagement consultation which formed part of the 24(G) Rectification Application and proof thereof was included in the report which was submitted to the DFFE.
- **There must be a discussion regarding the existing Site Management Plans and Park Management Plan in the context of this development.**
 - o This will be provided within the development discussion. It should be noted that no stand-alone Site Management Plans exists for the Office Complex, however the guidelines given by the overarching Integrated Park Management Plan (IPMP) will be utilised. The IPMP which was approved by the Minister of Forestry, Fisheries & the Environment, lists the Office Complex development as discussed in this HIA.

The main point of concern that will therefore be addressed in this report (as opposed to those that will be addressed by separate specialists reports) are;

- Design layouts
- Motivations for the development (need for development)
- Discussions in terms of the current Integrated Park Management Plan

All other issues will be addressed by their specific specialists' reports.

Basic Assessment Application Project Description

Location Map

Park Management Office Complex

The proposed Office Complex is currently undergoing an S24G Rectification Application due to it having been initiated before environmental authorisation was received. The heritage study will be part of this application.

The total development footprint of the Office Complex and associated infrastructure will be approx. 4 550m² (0,45ha) (including office buildings, parking area, internal roads, central courtyard, landscaping and associated services provision infrastructure).

The Mapungubwe National Park Management Offices development consist of:

Development Component	Completed
Clearing of approximately 4 550m ² of indigenous vegetation.	Vegetation clearing completed.
Office Complex comprising of 2 buildings: 1. Office Block = 360m ² 2. Support Block = 275m ² Total m ² = 635m ²	Top structures and roofing completed. Finishes and exterior works to be completed.
Formalised undercover parking area with 16 demarcated bays.	Undercover parking structures completed. Road and paving to be completed.
Central courtyard.	Landscaping and exterior works to be completed.
Associated infrastructure, i.e. water, electricity and sewerage services. Access – The development will be served from the north via the existing access point from Road R572. An existing gravel road provides access to the new office development as well as to the existing Hamilton Staff Village. Civil works – New water installation will consist of a new booster pump set in the existing pump room where pressurised portable water will be pumped through a new 63mm diameter uPVC main line to the new Office Complex. New sewerage and grey water effluent generated by the new Office Complex will be diverted to the Hamilton Staff Village (Existing Manhole C4) by means of a gravity sewer system with pipe size of 110mm and slopes of 1:80. Electrical works – Bulk electricity for the Office Complex is obtained at the Hamilton Staff Village and cables are installed in a trench together with the bulk sewerage and water services.	Services to be completed.

The total development footprint of the Office Complex and associated infrastructure will be approx. 4 550m² (0,45ha) (including office buildings, parking area, internal roads, central courtyard, landscaping and associated services provision infrastructure).

An area of approximately 4 550m² (0,45ha) has been cleared of indigenous vegetation for the Office Complex and associated infrastructure. No additional vegetation clearance is required to complete the project; therefore this application will seek heritage authorisation for the already cleared area.

Location

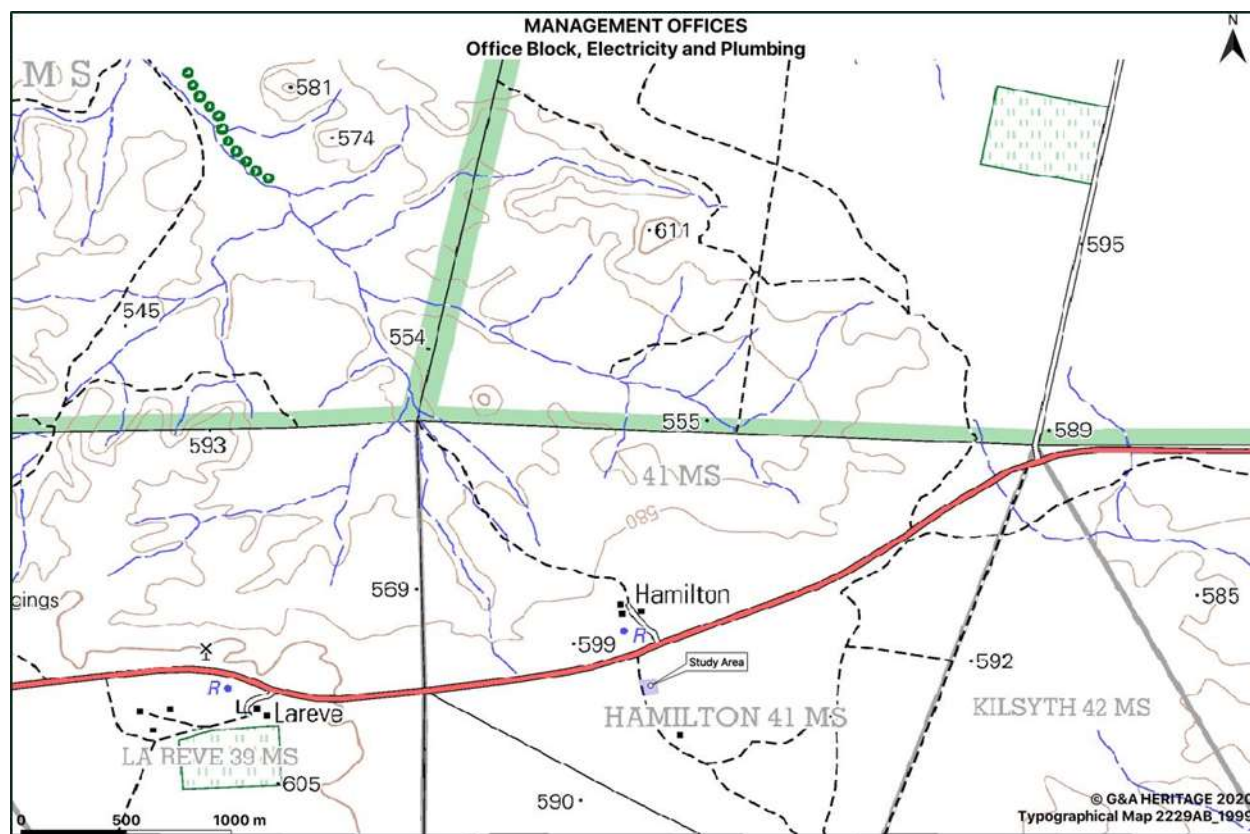


Figure 4. Proposed Location of Office Complex

Proposed Design Layout

The total development footprint of the Office Complex and associated infrastructure will be approx. 4 550m² (0,45ha) (including office buildings, parking area, internal roads, central courtyard, landscaping and associated services provision infrastructure).

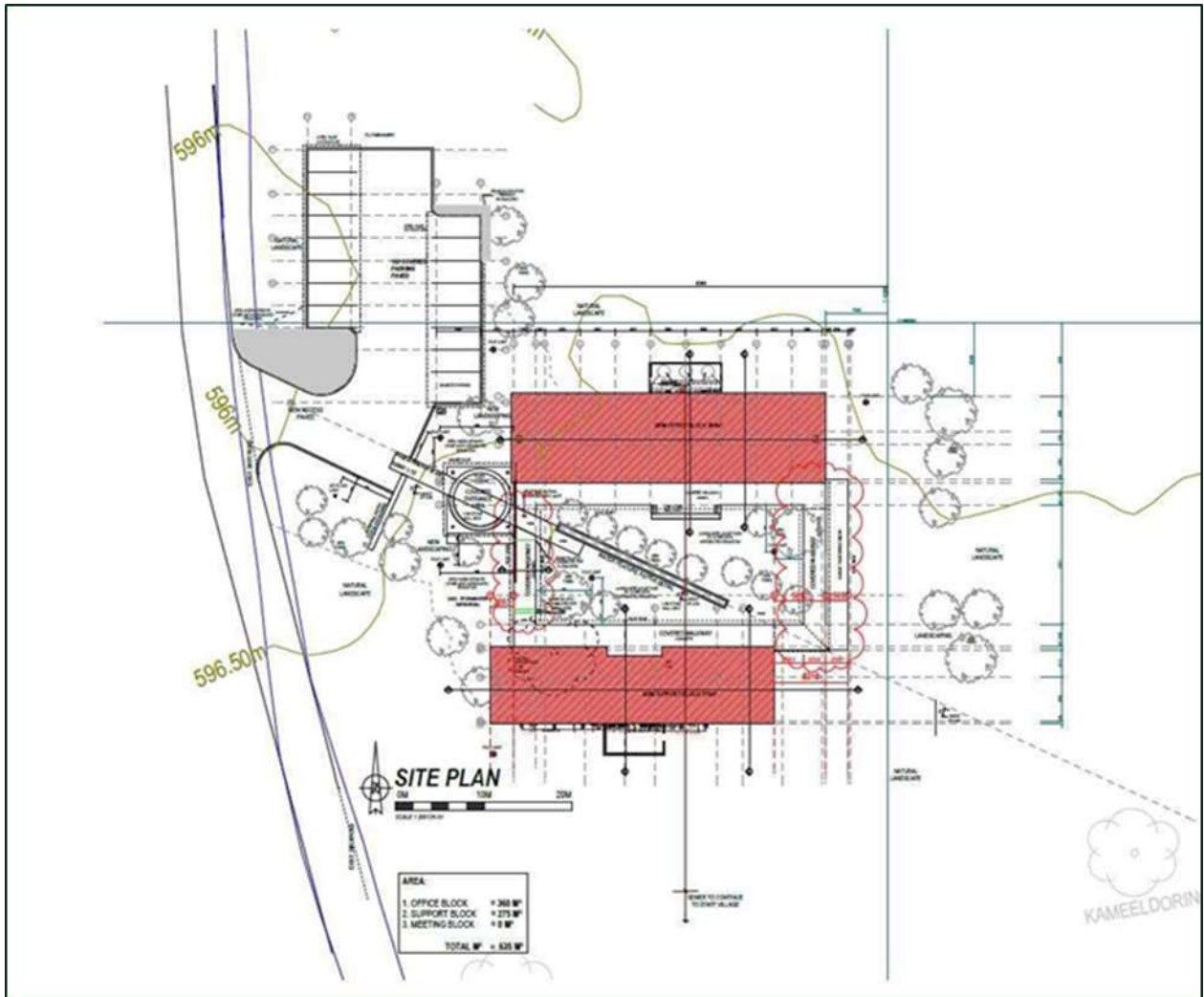


Figure 5. Proposed layout (Detailed drawings are appended in Appendix E)

Motivation for Development

The need for the project is to improve park management infrastructure. Infrastructure in the Park entails facilities in support of conservation (such as management roads and tracks, office facilities, staff housing, fences, bulk services, workshops and stores). These facilities enable staff to execute their respective duties towards achieving the Park's objectives and providing a tourism product at the highest possible standard.

Existing offices at the entrance gate and Mapungubwe Interpretation Centre are not sufficient to accommodate park management and all other operational staff and therefore the need for appropriate administrative structures housed in adequate facilities in the form of an Office complex. The development will provide office space for future archaeological and palaeontological research, and adequate storage space for artefacts, which were found in the Park.

Discussions in terms of the current Integrated Park Management Plan (IPMP)

The IPMP identifies the need for increased office space as a primary development objective for the effective functioning of The Park. It is also necessary to fulfil the legal mandate of The Park.

Infrastructure	Status	Zone	Priority	Probability
Eastern section				
Boundary fence upgrade	In existence	Various	Medium	Low
Communication network at various sites	New		High	Medium
Hamilton office complex	In existence	LIL	High	High
Realignment of elephant exclosures		Various	High	Medium
Reception area / entrance gate infrastructure upgrade		HIL	High	Medium

Figure 6. Primary Development Objects for IPMP

Description of Affected Environment

(A previous study for this project was completed by Kruger, N in 2018 and the following information is taken from this report – with some edits- in an effort to avoid unnecessary duplication. Both that report and this current report is the property of the client, SANParks)

The Limpopo Heritage Landscape: Specific Themes

The landscape north of the Soutpansberg has always played an important ecological and cultural role in the history of South Africa. This section of the Limpopo valley, presenting the most important time periods in the history of South Africa, have been utilised and cultivated from the beginning of mankind, the signs of which are still visible today in the hundreds of archaeological sites scattered across the landscape. These signs range from 300 000 year old handaxes from the Earlier Stone Age, microlithic tools from the Later Stone Age, pot sherds, grinding stones and walling of previous Venda inhabitants to rock paintings and engravings.

Previous research

The Limpopo Valley was first formally documented by early travellers, explorer and missionaries that moved through areas surrounding the Limpopo River. Possibly the most valuable historical sources of information on the 19th century Limpopo Valley are maps of the Soutpansberg and surrounding, such as those compiled by Bertoud in 1903 (see Figure 28), Merensky in 1880 (see Figure 29), Raddatz in 1870 (see Figure 30), and Troye in 1892.

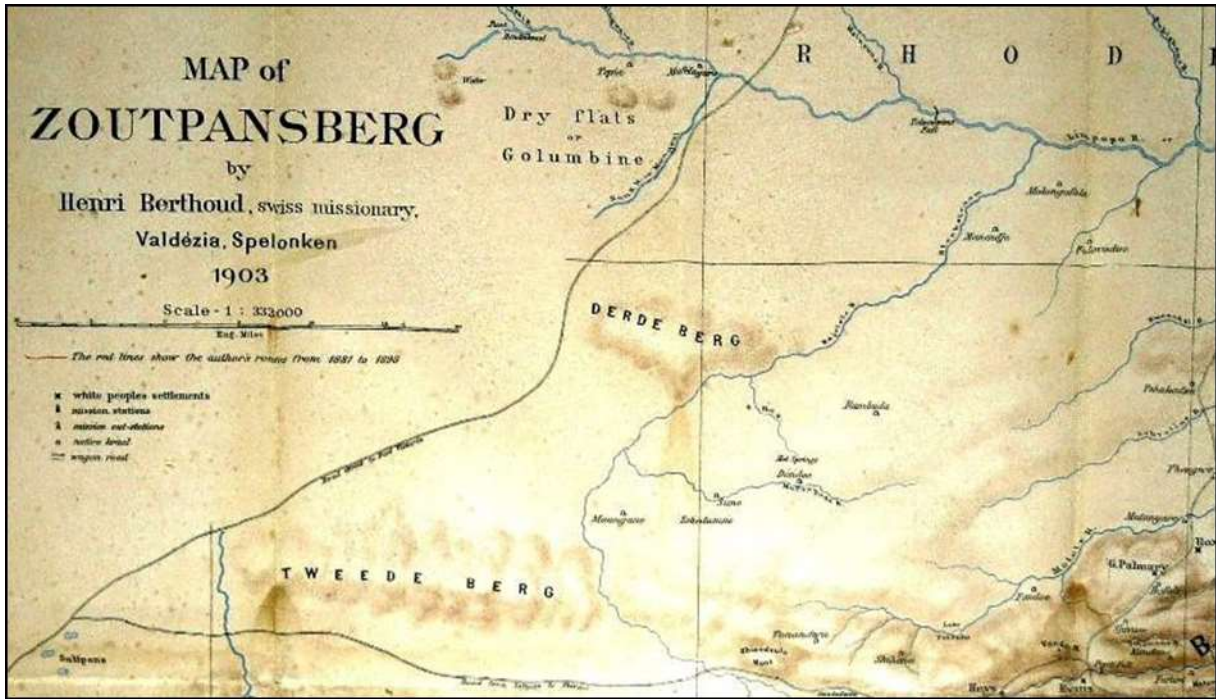


Figure 7. "Map of Zoutpansberg", compiled by the Swiss Missionary Henri Bertou c.1903



Figure 8. "Map of Transvaal", compiled by Alexander Merensky c.1880

blades and scrapers which date to more or less 125 000 years before present occur in large scatters around Musina and the Limpopo Valley. In the last two millennia the valley was occupied by the San hunter gatherers and Khoe herders/hunter gatherers and the later Stone Age is abundantly represented in the Limpopo River horizon in the form of rock shelters containing microlithic stone tools such as bladelets, scrapers, points and cores as well as rock markings and art. In addition, a rich Hunter-Gathered legacy, LSA groups such as the San displayed intricate relationships with herders and farming communities in the area in the past centuries LSA sites occur across the Limpopo Valley in hills and around farmer-period settlements. Material from the earlier, middle and later Stone Age occur in areas around Musina on the farms Skirbeek, Framton, Dawn, Bosbokpoort and Njelele's Drift as well as to the west of the town on the farm Newmark (Roodt 2008). Rock Art sites also occur in areas on these farms.

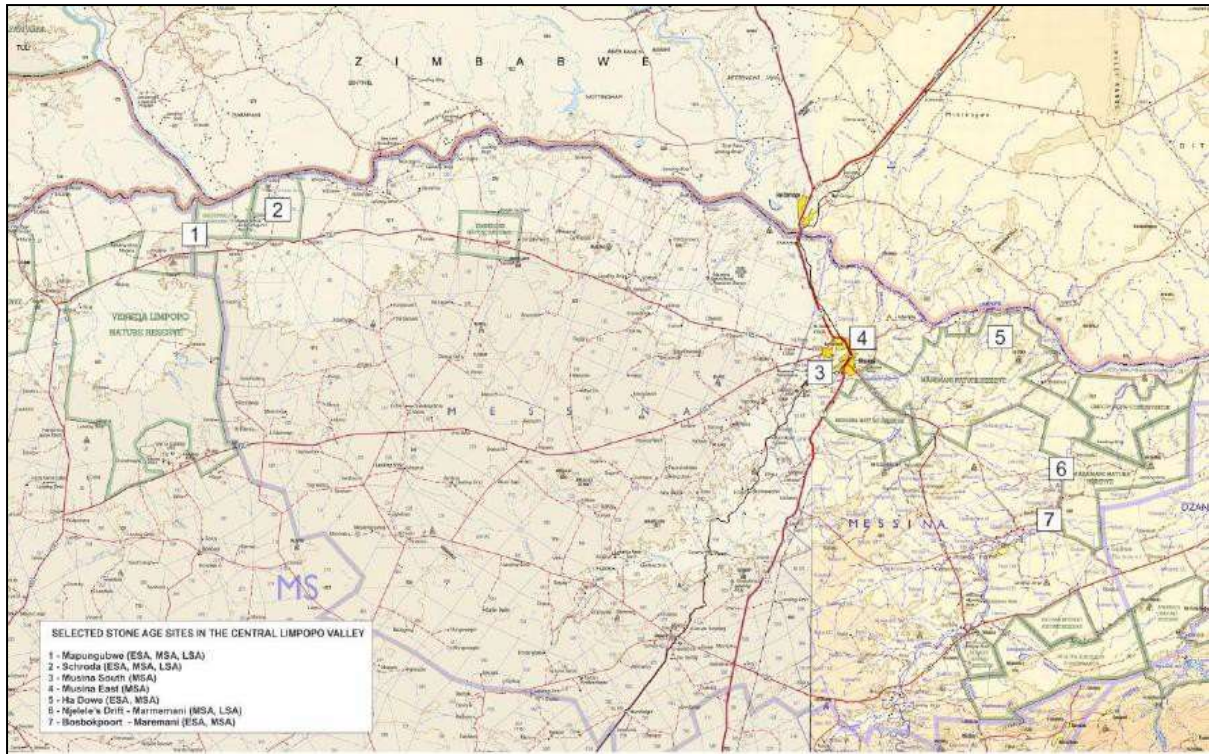


Figure 11. Map detailing the occurrence of Stone Age sites in the Limpopo Basin

Rock Markings

Rock paintings are mainly known from the mountainous areas of Botswana, Namibia, Zimbabwe and South Africa, while rock engravings are mainly confined to the Kalahari-fringe areas of Namibia, Botswana, Zimbabwe and the central and northern interior of South Africa. In the Limpopo Valley and Soutpansberg areas alone over 800 sites with paintings and engravings are known, and more are still being re-discovered. Most engravings were made by pecking, a technique that made use of a hammer stone and stone punch, or by direct percussion. Three painting traditions are present in the Limpopo Valley and Vhembe District; Hunter-Gatherer, Khoenkhoen and Bantu-speaker art.

- Hunter-Gatherer rock paintings

The delicate and frequently detailed San fine-line paintings were made using brushes made from twigs, quills, sticks or feathers. Red and yellow pigments applied in this way were made from various shades of ferric oxides or ochres; black pigments were prepared from charcoal and minerals like specularite, and white pigments from silicas and various riverine clays. The paintings of Vhembe-Dongola area are dominated by images of men and women. The most painted animal is the kudu, followed by giraffe,

tsessebe, impala and elephant. There are also images of San loincloths and aprons. In contrast, in Eastern Vhembe, human images are rare, and the main animals depicted are the giraffe and the zebra.

The Kaoxa Shelter situated west of Mapungubwe on the farm Machete is regarded as one of the most significant Rock Art sites in the Limpopo Valley. Paintings of at least 16 animal species are found in this shelter. This diversity suggests that many species of animals were important in the belief system of the Limpopo-Shashi San hunter-gatherers. There are 13 images of locusts painted - an unusual and unique subject for the San artists. These are the only known rock paintings of locusts in southern Africa. At least 5 San painting 'styles' occur here. In addition, there are geometric finger paintings. There are 4 complex panels in this site, an unusual feature in the LSCA. Explanatory lecterns have been set up below each set of paintings.

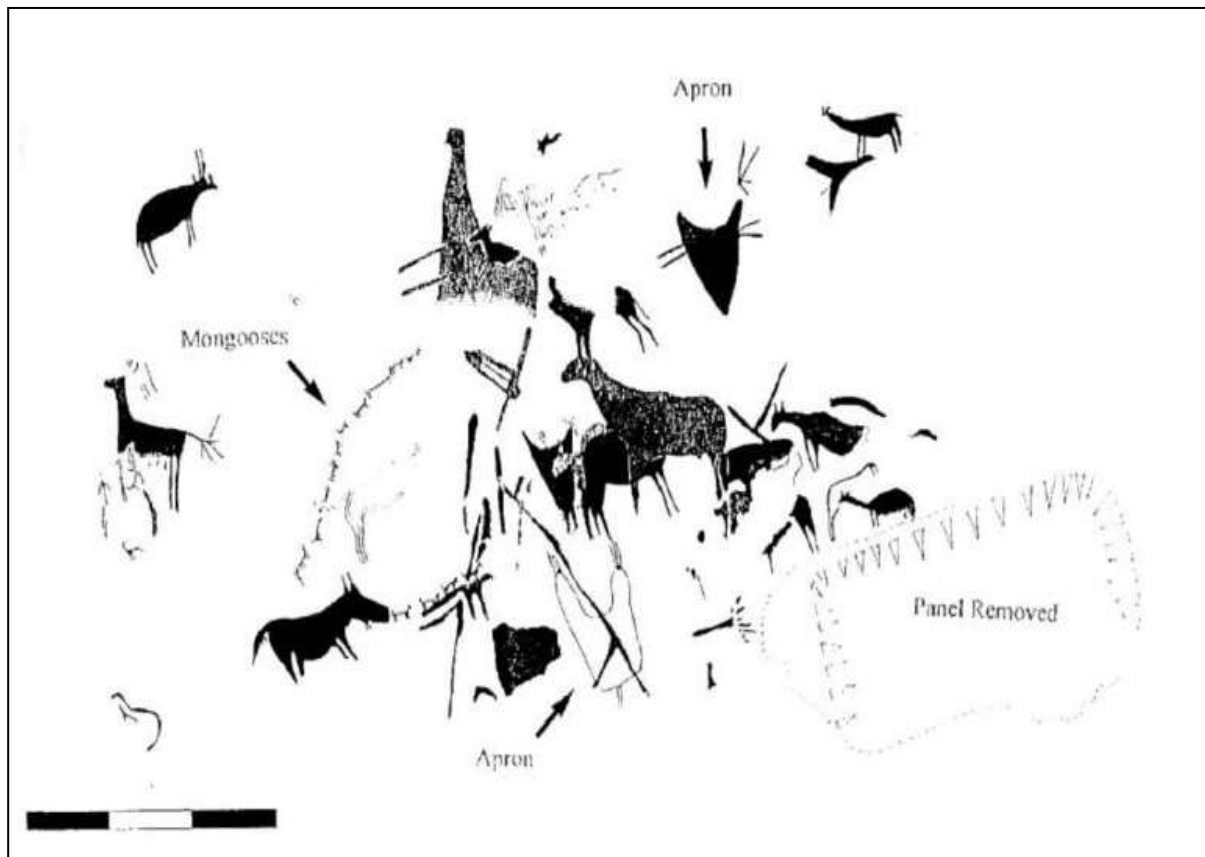


Figure 12. Tracing of a complex painted panel at Koaxa Shelter

Khoekhoe rock paintings

Khoekhoe rock art mainly comprises red and white finger paintings of dots, strokes, geometric forms, handprints and a component of representational motifs. This painting tradition extends from Central Africa to the southern parts of South Africa. In the Limpopo River Valley and its environs, Khoekhoe art comprises handprints, finger dots and strokes, variations of the circle motif, and images of fringed and unfringed women's aprons. The accompanying chart illustrates the image classes found in the Limpopo region. The paintings are large and bold, and were painted in red or white, applied by human fingers, unlike the more familiar San paintings which are fine and delicate, painted with sticks and bristles in a variety of colours, and depict things we can recognise: animals and people. Like the San paintings, however, Geometric Tradition pigments were carefully applied, albeit by finger, as evidenced by the crisp clear outlines and with no sign of splashing — images clearly made without haste and without a mess. Again, like the San paintings, Khoekhoe paintings are made with colourants like red ochres and white minerals that were finely ground and mixed with binders, judging from the way the paints penetrate and adhere to the rock and are not easily washed off by water seepage. Although the art is sometimes

found in the same rock shelters as engravings, San paintings, or Northern Sotho paintings, or various combinations of these techniques and traditions the Khoekhoe paintings are often found in small low-ceilinged shelters high up on the sides of hills or between tumbled rocks on the summits of hills — one has to bend down or even crawl in order to view the art where it is frequently placed on the ceiling. They are also frequently found in huge shelters with sharply sloping floors. All these locations are in stark contrast to San preferences for painting sites. The San generally used comfortable rock shelters at ground level, with horizontal, usually sandy floors — and preferred to paint on vertical rock faces.

The rock paintings of Bantu-speakers

Another tradition of painting known as “Late Whites” is found in the Soutpansberg and the Limpopo Valley. These finger-paintings consist of anthropomorphic, zoomorphic and geometric designs. These paintings were often daubed in several colours, but generally speaking the imagery is predominantly white. Recent research in south-central Africa suggests that the Late White tradition is at least partially explicable. Because the art is fairly recent; and the people who live near the sites are only a few generations removed from the painters, it has been possible to relate the symbolism depicted in the art to modern forms of ritual and the use of symbolism. In the Limpopo Province, at least some of the Late White tradition paintings can be linked to Sotho-speakers. It is likely that the imagery was linked to rites of passage.

Rock engravings: Utilitarian hollows, Mafuvha and Cupules

Utilitarian hollows are small pecked depressions usually about the size of a bottle cap and roughly 20 millimetres deep. These hollows are typically found on horizontal surfaces: pavements in the open, or on stone floors and on loose rocks within shelters. They may have been used as anvils for cracking open the seeds of the Marula or Sour Plum, for example, which both contain edible nuts, or as receptacles for holding ostrich-eggshell ‘blanks’ or ‘roughouts’ whilst the central hole was being drilled. Although the San may have made some of the hollows that were used as work surfaces, others were possibly also made and/or used by Khoekhoen and Bantu-speakers. Another type of hollow is that of the mafuvha board game. Used mainly as a form of recreation, the game also has a ritual function and is linked to rain and fertility throughout Africa. Although mainly associated with Khoekhoen and Bantu-speakers, this game, generally known as mankala, is also played by San people so it is quite possible that at least some of the game boards on stone pavements in the Limpopo River Valley were also made by San hunter-gatherers.

A final category of small hollows, called ‘cupules’, comprises groups of apparently randomly distributed depressions situated on sloping or vertical rock faces or on large boulders within rock shelters. In some shelters up to 1000 cupules are found on rounded free-standing boulders, and to a lesser extent, on vertical rock faces. Some of these rows or random arrangements of cupules are situated up to 3,5 metres above ground level, suggesting that the engravers built some sort of scaffold to laboriously peck some of these marks into the relatively hard and durable sandstone rock faces. Their situation on the rock also suggests that they were made for a specific ritual rather than a mundane purpose. Their position and planar orientation on big boulders similarly suggest a ritual and symbolic function. Some of the cupules, in contrast to the utilitarian hollows, have a silica skin over them, the result of a process of salt deposition that must have occurred over a very long period of time. The apparent age of these cupules alone suggests that they were probably made by hunter-gatherers.

Rock engravings: Grooves

Grooves are elongated, usually parallel, marks incised or abraded into the rock face. They generally range from the length of a matchstick to the length of an outstretched hand. Some have rounded profiles, while others are V-shaped. Grooves, like cupules discussed in the previous section, are divided into the utilitarian: those found on open, horizontal pavements or on loose rocks within shelters and the symbolic, those occurring on vertical or sloping rock faces in shelters. The utilitarian grooves may have been used for sharpening iron, bone or wooden points. They are situated in places in which it would

have been comfortable to sit at ease while executing such a task. These grooves might have been made by anyone, however, not necessarily the San. Symbolic grooves are situated on rock faces up to four metres above ground level. Their great height suggests that they also served some symbolic function. Like the symbolic cupules, some of the grooves are covered in a silica skin, a phenomenon that suggests some antiquity. More often than not, cupules and grooves are associated — their co-occurrence hints at a related, symbolic function.

Rock engravings: Engraved animals

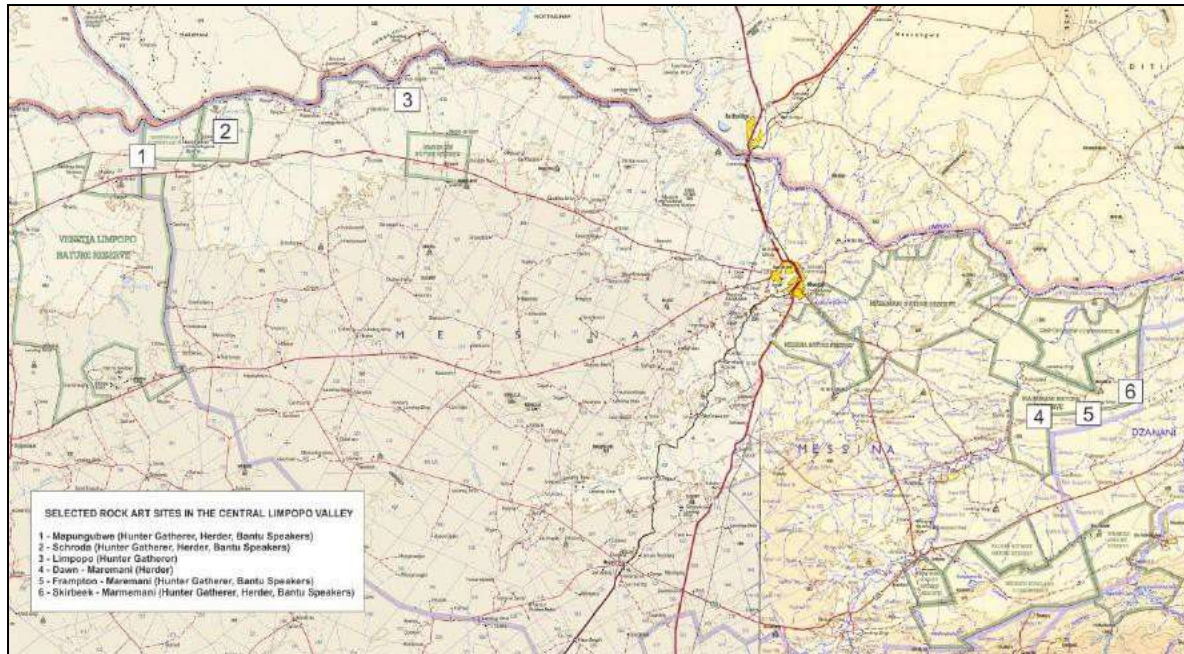


Figure 13. Map detailing the occurrence of Rock Art sites in the Limpopo Basin

San peoples or their ancestors undoubtedly made the engravings of animals, because similar engravings all over southern Africa have been shown to have San authorship. Like San paintings, these engravings have been shown to have their roots in a shamanistic cosmology. In most areas of the subcontinent engravings were associated with ideas about rainmaking or depict elements of the medicine dance and the supernaturally potent animals.

The Iron Age / Farmer Period

The Iron Age of the Limpopo Province is dominated by the Mapungubwe Cultural Landscape around the Shashe-Limpopo confluence. At the core of this horizon lay the Middle Iron Age sites of Mapungubwe and K2. However, early Iron Age farmers moved into the Limpopo valley centuries before the advent of the Mapungubwe Kingdom. These early Iron Age farmers, which formed part of the Kalundu Ceramic Tradition (the western stream of migration into South Africa); regionally known as Happy Rest, settled on the southern foot of the Soutpansberg between in the 5th century AD. Later, at around AD 900 the Zhizo capital at Schroda near the Limpopo Shashe confluence came into existence. Through this group, the Limpopo Valley interior was first integrated directly with the Indian Ocean trade network. According to the archaeological record, Schroda lost control of the interior portion of the trade network at about AD 1000 to a new group of people known as Leopard's Kopje. They established their capital at K2 on the present day farm Greefswald, while commoner K2 sites were established throughout the Basin. Large amounts of trade goods from K2 show that trade had enhanced the leader of K2's status which added to the intensification of social ranking. In turn, this contributed to the development of a bureaucratic class which materialized during the onset of the Mapungubwe period. At AD 1220 the K2 leader shifted the capital to the flat hill called Mapungubwe about 2 km from K2.

Here the king moved to the hilltop while the majority of his people lived below. It is now known that the Zimbabwe culture evolved in the Shashe-Limpopo basin and that Mapungubwe was the first Zimbabwe capital. Consequently, archaeologists divide the culture into three chronological periods named after the important capitals:

- Mapungubwe (AD 1220-1290)
- Great Zimbabwe (AD 1290-1450)
- Khami (AD 1450-1820)

At the end of the 13th century the climate throughout Southern Africa appears to have been affected by the spread of the Little Ice Age and it became colder and drier in the interior. In some areas it was no longer possible to cultivate traditional grain crops. As a consequence, Mapungubwe was abandoned; the entire basin depopulated which resulted in the disintegration of the Mapungubwe State. Great Zimbabwe became Mapungubwe's economic, cultural and political successor. Shortly after the demise of Mapungubwe, the first Sotho/Tswana people moved into this part of the interior from East Africa. Khami, a later expression of the Great Zimbabwe culture occurred after AD 1450. Khami sites, during the Middle Iron Age followed the elite Zimbabwe pattern which incorporated stone walling within the settlement organisation. A large portion of early stone walled sites in the Limpopo Valley area dates to this period. Other identifiable features are ceramic scatters on the surface and visible kraals.

Venda-speaking communities belong to the most prevalent cultural entity in the Limpopo Valley and the Soutpansberg areas today. According to oral tradition, Venda history occurred in three layers of occupation. The first was Ngoni, followed by Lembethu, Mbedzi, Thavhastindi and others, and lastly Singo. The Lembethu, Mbedzi and Thavhastindi groups comprises various chiefdoms from Zimbabwe, each ruling Zimbabwe type settlements with typical stone walled palaces (Huffman 2008). We know that Shona- speaking chiefdoms (identified by the Khami facies) moved south of the Limpopo between AD 1400 and 1450, incorporating earlier Sotho-Tswana people. After approximately 100 years of cohabitation, these two independent groups created the Venda language, which is known to be associated with Letaba pottery (Huffman 2005). At present, the ruling Singo, are the descendants of the final occupation. Oral tradition indicate that the Singo moved south across the Limpopo river around AD 1690. They conquered the independent chiefdoms and united the Venda nation for the first time. Dzata, in the Nzhelele Valley, was the capital of Singo but was later abandoned during the reign of the legendary Thoho-ya-Ndou. As a result the Venda nation fragmented, and the present day three competing dynasties were established (Steyn 1968; Loubser 1991; Huffman 2008). A number of Iron Age (Farmer period) sites occur in the larger Musina area. During a survey of the Limpopo Valley 1935, Leo Fouché identified a number of K2/Mapungubwe type sites at Mapungubwe, Bambambandyallo and the farm Sibsey. He further documented Khami (or "Dhlo-Dhlo" as he terms it) stone-walled structures on the farms Maryland, Haddon, and Schroda. Finally he noted Venda (or "Dzata") type sites on the farms Verdun, Shirbeek, Beitbridge, Weipe, Haddon, Sibsey, Islet, Singalele, Ipidi, Kanjili, Armenia, and Verdun (Fouché 1935). Huffman and Hanisch also identified Later Iron Age stone walled sites on the farms Evelyn, Toynton, Verulam, Prinzenhagen, Machedema and again at Verdun (Huffman & Hanisch).

The Mapungubwe Cultural Landscape

The Mapungubwe Cultural Landscape demonstrates the rise and fall of the first indigenous kingdom in Southern Africa between 900 and 1,300 AD. The core area covers nearly 30,000 ha and is supported by a suggested buffer zone of around 100,000 ha. Within the collectively known Zhizo sites are the remains of three capitals - Schroda; Leopard's Kopje; and the final one located around Mapungubwe hill - and their satellite settlements and lands around the confluence of the Limpopo and the Shashe rivers whose fertility supported a large population within the kingdom. Mapungubwe's position at the crossing of the north/south and east/west routes in southern Africa also enabled it to control trade, through the East African ports to India and China, and throughout southern Africa. From its hinterland it harvested gold and ivory – commodities in scarce supply elsewhere – and this brought it great wealth

as displayed through imports such as Chinese porcelain and Persian glass beads. This international trade also created a society that was closely linked to ideological adjustments, and changes in architecture and settlement planning. Until its demise at the end of the 13th century AD, Mapungubwe was the most important inland settlement in the African subcontinent and the cultural landscape contains a wealth of information in archaeological sites that records its development. The evidence reveals how trade increased and developed in a pattern influenced by an elite class with a sacred leadership where the king was secluded from the commoners located in the surrounding settlements.



Figure 14. View of Mapungubwe Hill



Figure 15. Examples of typical K2 type ceramics (Huffman 2007:238)

Mapungubwe's demise was brought about by climatic change. During its final two millennia, periods of warmer and wetter conditions suitable for agriculture in the Limpopo/Shashe valley were interspersed with cooler and drier pulses. When rainfall decreased after 1300 AD, the land could no longer sustain a high population using traditional farming methods, and the inhabitants were obliged to disperse. Mapungubwe's position as a power base shifted north to Great Zimbabwe and, later, Khami.

After the discovery of Mapungubwe in 1932, the University of Pretoria established an Archaeological Committee, which from 1933 to 1947 oversaw research and excavations. Rev. Neville Jones from Zimbabwe and J.F. Schofield were appointed to undertake the first fieldwork in 1934 and 1935 and they were advised by Professor C. van Riet Lowe, Director of the Bureau of Archaeology. Their work focused on Mapungubwe Hill, the southern terrace and the midden there. They briefly surveyed other similar sites in the vicinity. From 1935-1940 six excavation seasons at K2 and Mapungubwe Hill were directed by Guy A. Gardner. The results of his work were published nearly 25 years later. Meyer (1998) describes the excavations on Greefswald between 1933 and 1940 as 'rapid, large scale excavations resulting in the recovery of valuable artefacts'. Research was hampered by 'the lack of professional archaeologists in South Africa, the lack of full-time supervision of the excavations by efficient, trained staff, the fact that adequate scientific methods for Iron Age research had not yet been developed and that the Iron Age in South Africa was virtually unknown to archaeologists. Consequently, many of the deposits on the sites were removed without the meticulous excavation and recording required. These problems inevitably resulted in a loss of irreplaceable deposits and eventually also of excavated materials and a lack of scientific data.



Figure 16. A plated golden rhino, one of many gold objects excavated from Mapungubwe Hill

The next phase of archaeological investigation, in 1953-1954 and in 1968-1970, under the direction initially of the Department of Anthropology, and then of Professor J. F. Eloff who was appointed as Head of the newly-formed Department of Archaeology at the University of Pretoria in 1970, was more systematic and focused mainly on the southern terrace. Over the next 25 years from 1970 to 1995, the Department of Archaeology at the University of Pretoria recognised that their first priority was to establish a firm database by testing, correcting and supplementing the earlier research, and concentrating on reconstructing the way of life of the site inhabitants. Between 1979 and 2002 reports have been published on the human and faunal remains, Chinese porcelain, gold objects, glass beads and radiocarbon dating. In addition, sites on neighbouring farms have been investigated by students of the University of Pretoria during the 1970s and 1980s. Griefswald has remained the property of the State since the 1930s. Management of the farm was taken over by the provincial Department of Nature Conservation in 1992, and control was transferred to SANParks in 1999. Since the 1990s, Wits archaeologists have worked in the Mapungubwe landscape investigating Stone Age, Rock Art and Iron Age sites. They concentrated on the last 2000 years. The systematic survey of the National Park and buffer zone, including Little Muck, Schroda and Venetia, has now recorded some 1000 Iron Age sites. Using this data, various graduate students have investigated ethnic stratification (Calabrese PhD 2005), glass beads and international trade (Wood MA 2005), the ethno- archaeology (Murimbika PhD 2006) and archaeology (Schoeman PhD 2006) of rainmaking, the relationship of settlements to the landscape (du Piesanie MSc 2008), faunal remains (Fatherley MSc 2009), agricultural production (Chandler Honours 2009) and spherulites in cattle dung. Current research includes settlements during the Khami Period (du Piesanie PhD) and herding strategies.

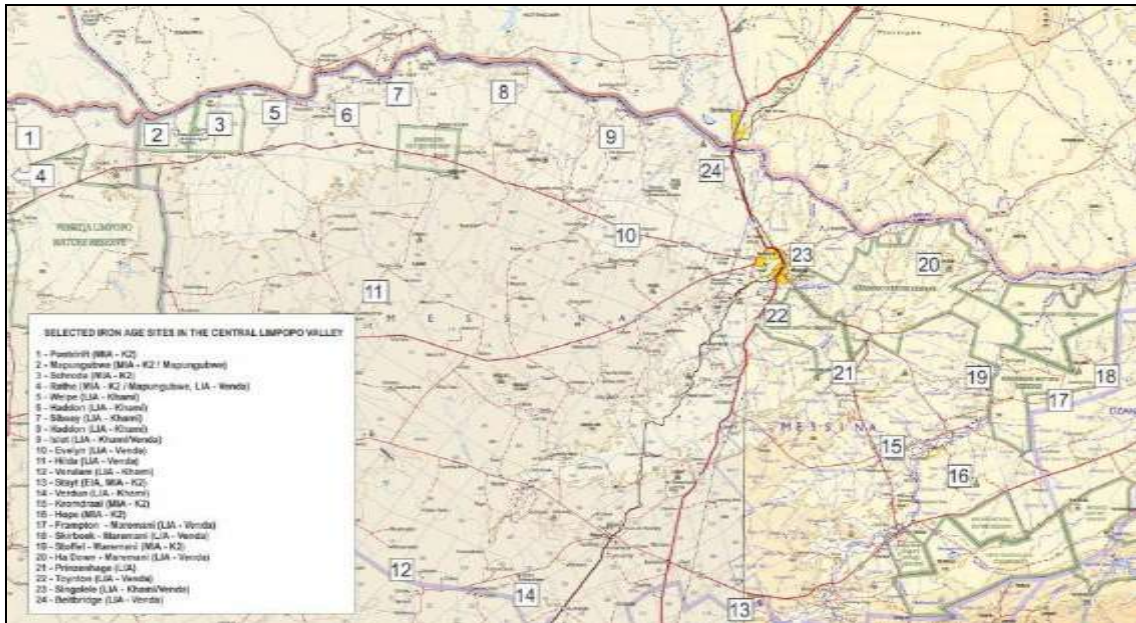


Figure 17. Map detailing the occurrence of Iron Age sites in the Limpopo Basin



Figure 18. Vanda-type stone walled site east of Musina at Maremani

Later History: Trade, Exploration and Colonial Times

The historic timeframe sometimes intermingles with the later parts of the Stone and Iron Age, and can loosely be regarded as times when written and oral recounts of incidents became available. The first Europeans to trek through the interior of South Africa north of the Vaal River were the expedition party of Dr. Andrew Cowan who travelled from the Cape to the border of Botswana and from there eastwards to Delagoa Bay. The party however disappeared and was never heard of after a final report written by Cowan in 1808. The Voortrekkers crossed the Vaal River in 1836, and within a few years, began to spread north. Much of the Limpopo Province contained tsetse fly, and so early Boer farmers didn't settle immediately in the area. Rather the area was used primarily for hunting. The first contact between Venda-speaking groups and white pioneers occurred during 1836 when the trek of Louis Trichardt entered the Soutpansberg.

In 1850 the town of Schoemansdal was founded, which led to increased contact between the two groups. At this time European traders also entered the area, which led to the circulation of western goods in the Limpopo Valley. After the establishment of the Zuid-Afrikaansche Republiek (ZAR) in 1857, White farmers settled throughout the Soutpansberg area. Missionary activity also increased during this period, which affected and changed many indigenous customs. The town of Messina was only founded in the beginning of the 20th century where after mines and mainly cattle farms emerged around the town. The town soon became a bustling copper mining and agricultural centre in the Limpopo Valley. The magisterial district known as Messina was proclaimed in 1963 and after recent name changes the town is now also known as Musina, a name given to the area by pre-historic copper miners.

Archaeo-metallurgy

Musina owes its origin and development to the presence of rich copper deposits in the area. The largest copper deposits in South African can be found here, as well as at Phalaborwa and in the Dwarsberge. According to archaeological and ethnographical indications large amounts of copper were mined around the Musina area in previous centuries. During the late Iron Age copper was a valuable and relatively easily workable commodity. After it was mined and worked it was distributed via intercontinental trade routes and also used as local article of trade for buying, bartering and lobola (compensation to a family for marrying a female member of that family). Venda ethnography suggests that the Lemba, a Venda-speaking group with clear Semitic associations although no clear cultural affiliation, were in many cases responsible for iron and copper working.

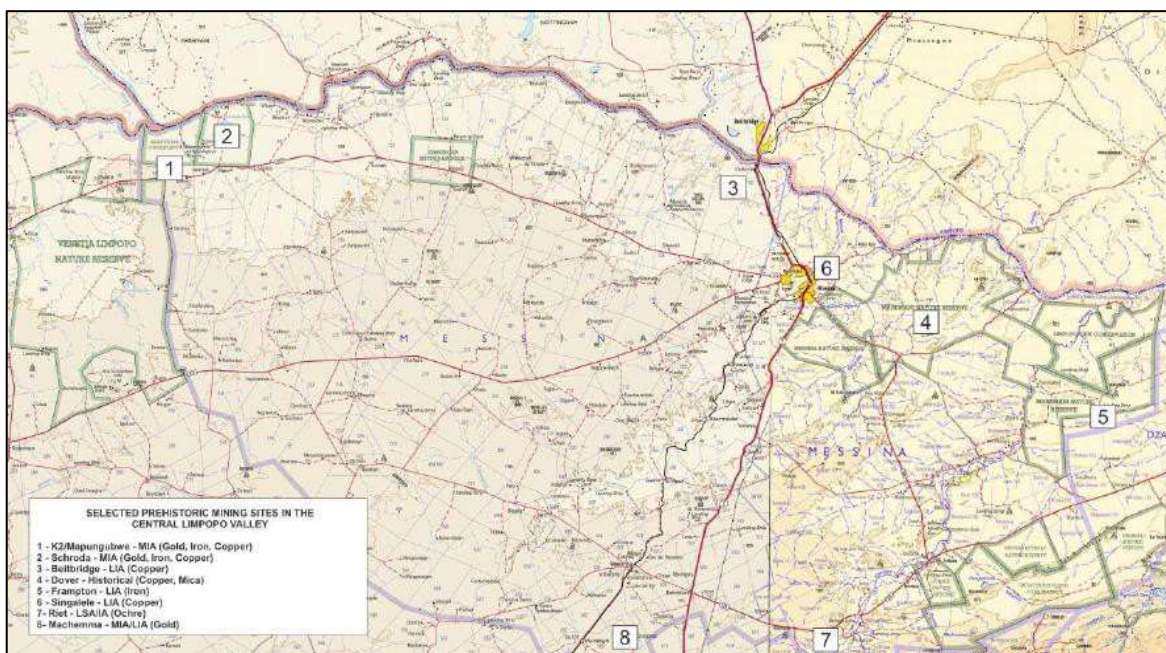


Figure 19. Map detailing archaeo-metallurgy sites in the Limpopo Basin

Fieldwork Findings

Fieldwork performed during January 2020 provided the following information. Each proposed development will be discussed separately. A sensitivity map based on the fieldwork findings will also be provided for each of the individual proposed developments.

Park Management Office Complex

Finds

No finds of heritage value could be made within the proposed study area as indicated by SANParks personnel. This development should be seen in the light of the fact that most of the groundworks and construction activities have already been completed. As such any possible impacts have already occurred. The areas were investigated for any sites of heritage importance that might be secondarily affected by the development. No archaeological deposits could be identified within the proposed development footprint.



Figure 20. Largely finished Office Complex structures



Figure 21. Foundations of structures still to be finished



Figure 22. Sub-surface inspections for deposits of heritage significance



Figure 23. Finished foundation excavations

Heritage Sensitivity Map

No heritage related finds or deposits were visible; therefore, a sensitivity map would be redundant.

Potential Heritage Impacts and Proposed Mitigation

Each site will be discussed individually. Attention will be given to the Development (Construction) and Operational Phases. A decommissioning phase will not be applicable as there is no intention to decommission the project. Where impacts are anticipated relevant mitigation measures are given. A short discussion will also be given as to how the specific development relates to the given legislative measures and the overall IPMP.

Assessment Matrix (Determining Archaeological Significance)

In addition to guidelines provided by the National Heritage Resources Act (Act No. 25 of 1999), a set of criteria based on Deacon (J) and Whitelaw (1997) for assessing archaeological significance has been developed for Eastern Cape settings (Morris 2007a). These criteria include estimation of landform potential (in terms of its capacity to contain archaeological traces) and assessing the value to any archaeological traces (in terms of their attributes or their capacity to be construed as evidence, given that evidence is not given but constructed by the investigator).

Estimating site potential

Table 1 (below) is a classification of landforms and visible archaeological traces used for estimating the potential of archaeological sites (after J. Deacon and, National Monuments Council). Type 3 sites tend to be those with higher archaeological potential, but there are notable exceptions to this rule, for example the renowned rock engravings site Driekopseiland near Kimberley which is on landform L1 Type 1 – normally a setting of lowest expected potential. It should also be noted that, generally, the older a site the poorer the preservation, so that sometimes any trace, even of only Type 1 quality, could be of exceptional significance. In light of this, estimation of potential will always be a matter for archaeological observation and interpretation.

Table 1: Classification of landforms and visible archaeological traces for estimating the potential for archaeological sites (after J. Deacon, NMC as used in Morris)

Class	Landform	Type 1	Type 2	Type 3
L1	Rocky Surface	Bedrock exposed	Some soil patches	Sandy/grassy patches
L2	Ploughed land	Far from water	In floodplain	On old river terrace
L3	Sandy ground, inland	Far from water	In floodplain or near features such as hill/dune	On old river terrace
L4	Sandy ground, coastal	>1 km from sea	Inland of dune cordon	Near rocky shore
L5	Water-logged deposit	Heavily vegetated	Running water	Sedimentary basin
L6	Developed urban	Heavily built-up with no known record of early settlement	Known early settlement, but buildings have basements	Buildings without extensive basements over known historical sites
L7	Lime/dolomite	>5 myrs	<5000 yrs	Between 5000 yrs and 5 myrs
L8	Rock shelter	Rocky floor	Loping floor or small area	Flat floor, high ceiling

Class	Archaeological traces	Type 1	Type 2	Type 3
A1	Area previously excavated	Little deposit remaining	More than half deposit remaining	High profile site
A2	Shell of bones visible	Dispersed scatter	Deposit <0.5 m thick	Deposit >0.5 m thick; shell and bone dense
A3	Stone artefacts or stone walling or other feature visible	Dispersed scatter	Deposit <0.5m thick	Deposit >0.5 m thick

Table 2: Site attributes and value assessment (adopted from Whitelaw 1997 as used in Morris)

Class	Landforms	Type 1	Type 2	Type 3
1	Length of sequence /context	No sequence Poor context Dispersed distribution	Limited sequence	Long sequence Favourable context High density of arte / ecofacts
2	Presence of exceptional items (incl. regional rarity)	Absent	Present	Major element
3	Organic preservation	Absent	Present	Major element
4	Potential for future archaeological investigation	Low	Medium	High
5	Potential for public display	Low	Medium	High
6	Aesthetic appeal	Low	Medium	High
7	Potential for implementation of a long-term management plan	Low	Medium	High

Assessing site value by attribute

Table 2 is adapted from Whitelaw (1997), who developed an approach for selecting sites meriting heritage recognition status in KwaZulu Natal. It is a means of judging a site's archaeological value by ranking the relative strengths of a range of attributes (given in the second column of the table). While aspects of this matrix remain qualitative, attribute assessment is a good indicator of the general archaeological significance of a site, with Type 3 attributes being those of highest significance.

Impact Statement (Assessment of Impacts)

A heritage resource impact may be broadly defined as the net change between the integrity of a heritage site with and without the proposed development. This change may be either beneficial or adverse.

Beneficial impacts occur wherever a proposed development actively protects, preserves or enhances a heritage resource. For example, development may have a beneficial effect by preventing or lessening natural site erosion. Similarly, an action may serve to preserve a site for future investigation by covering it with a protective layer of fill. In other cases, the public or economic significance of an archaeological site may be enhanced by actions, which facilitate non-destructive public use. Although beneficial impacts are unlikely to occur frequently, they should be included in the assessment.

More commonly, the effects of a project on heritage sites are of an adverse nature. Adverse impacts occur under conditions that include:

- (a) destruction or alteration of all or part of a heritage site;
- (b) isolation of a site from its natural setting; and
- (c) introduction of physical, chemical or visual elements that are out-of-character with the heritage resource and its setting.

Adverse effects can be more specifically defined as direct or indirect impacts. Direct impacts are the immediately demonstrable effects of a project which can be attributed to particular land modifying actions. They are directly caused by a project or its ancillary facilities and occur at the same time and place. The immediate consequences of a project action, such as slope failure following reservoir inundation, are also considered direct impacts.

Indirect impacts result from activities other than actual project actions. Nevertheless, they are clearly induced by a project and would not occur without it. For example, project development may induce changes in land use or population density, such as increased urban and recreational development, which may indirectly impact upon heritage sites. Increased vandalism of heritage sites, resulting from improved or newly introduced access, is also considered an indirect impact. Indirect impacts are much more difficult to assess and quantify than impacts of a direct nature.

Once all project related impacts are identified, it is necessary to determine their individual level-of-effect on heritage resources. This assessment is aimed at determining the extent or degree to which future opportunities for scientific research, preservation, or public appreciation are foreclosed or otherwise adversely affected by a proposed action. Therefore, the assessment provides a reasonable indication of the relative significance or importance of a particular impact. Normally, the assessment should follow site evaluation since it is important to know what heritage values may be adversely affected.

The assessment should include careful consideration of the following level-of-effect indicators, which are defined below:

- magnitude
- severity
- duration
- range
- frequency
- diversity
- cumulative effect
- rate of change

Indicators of Impact Severity

Magnitude

The amount of physical alteration or destruction, which can be expected. The resultant loss of heritage value is measured either in amount or degree of disturbance.

Severity

The irreversibility of an impact. Adverse impacts, which result in a totally irreversible and irretrievable loss of heritage value, are of the highest severity.

Duration

The length of time an adverse impact persists. Impacts may have short-term or temporary effects, or conversely, more persistent, long-term effects on heritage sites.

Range

The spatial distribution, whether widespread or site-specific, of an adverse impact.

Frequency

The number of times an impact can be expected. For example, an adverse impact of variable magnitude and severity may occur only once. An impact such as that resulting from cultivation may be of recurring or on-going nature.

Diversity

The number of different kinds of project-related actions expected to affect a heritage site.

Cumulative Effect

A progressive alteration or destruction of a site owing to the repetitive nature of one or more impacts.

Rate of Change

The rate at which an impact will effectively alter the integrity or physical condition of a heritage site. Although an important level-of-effect indicator, it is often difficult to estimate. Rate of change is normally assessed during or following project construction.

The level-of-effect assessment should be conducted and reported in a quantitative and objective fashion. The methodological approach, particularly the system of ranking level-of-effect indicators, must be rigorously documented and recommendations should be made with respect to managing uncertainties in the assessment. (*Zubrow, Ezra B.A., 1984*).

Impact Evaluation

This HIA Methodology assists in evaluating the overall effect of a proposed activity on the heritage environment. The determination of the effect of a heritage impact on a heritage parameter is determined through a systematic analysis of the various components of the impact. This is undertaken using information that is available to the heritage practitioner through the process of heritage impact assessment. The impact evaluation of predicted impacts was undertaken through an assessment of the significance of the impacts.

Determination of Significance of Impacts

Significance is determined through a synthesis of impact characteristics, which include context and intensity of an impact. Context refers to the geographical scale i.e. site, local, national or global whereas intensity is defined by the severity of the impact e.g. the magnitude of deviation from background conditions, the size of the area affected, the duration of the impact and the overall probability of occurrence.

Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The total number of points scored for each impact indicates the level of significance of the impact.

Impact Rating System

Impact assessment must take account of the nature, scale and duration of effects on the heritage environment whether such effects are positive (beneficial) or negative (detrimental). Each issue / impact is also assessed according to the project stages:

- planning
- construction
- operation

Where necessary, the proposal for mitigation or optimisation of an impact will be detailed. A brief discussion of the impact and the rationale behind the assessment of its significance has also been included.

Rating System Used to Classify Impacts

The rating system is applied to the potential impact on the receiving environment and includes an objective evaluation of the mitigation of the impact. Impacts have been consolidated into one rating. In assessing the significance of each issue, the following criteria (including an allocated point system) is used:

NATURE
Including a brief description of the impact of the heritage parameter being assessed in the context of the project. This criterion includes a brief written statement of the heritage aspect being impacted upon by a particular action or activity.
GEOGRAPHICAL EXTENT
This is defined as the area over which the impact will be expressed. Typically, the severity and significance of an impact have different scales and as such bracketing ranges are often required. This is often useful during the detailed assessment of a project in terms of further defining the determined.

1	Site	The impact will only affect the site.
2	Local/district	Will affect the local area or district.
3	Province/region	Will affect the entire province or region.
4	International and National	Will affect the entire country.
PROBABILITY		
This describes the chance of occurrence of an impact		
1	Unlikely	The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence).
2	Possible	The impact may occur (Between a 25% to 50% chance of occurrence).
3	Probable	The impact will likely occur (Between a 50% to 75% chance of occurrence).
4	Definite	Impact will certainly occur (Greater than a 75% chance of occurrence).
REVERSIBILITY		
This describes the degree to which an impact on a heritage parameter can be successfully reversed upon completion of the proposed activity.		
1	Completely reversible	The impact is reversible with implementation of minor mitigation measures.
2	Partly reversible	The impact is partly reversible but more intense mitigation measures are required.
3	Barely reversible	The impact is unlikely to be reversed even with intense mitigation measures.
4	Irreversible	The impact is irreversible and no mitigation measures exist.
IRREPLACEABLE LOSS OF RESOURCES		
This describes the degree to which heritage resources will be irreplaceably lost as a result of a proposed activity.		
1	No loss of resource.	The impact will not result in the loss of any resources.
2	Marginal loss of resource	The impact will result in marginal loss of resources.
3	Significant loss of resources	The impact will result in significant loss of resources.
4	Complete loss of resources	The impact is result in a complete loss of all resources.
DURATION		
This describes the duration of the impacts on the heritage parameter. Duration indicates the lifetime of the impact as a result of the proposed activity.		

1	Short term	The impact and its effects will either disappear with mitigation or will be mitigated through natural process in a span shorter than the construction phase (0 – 1 years), or the impact and its effects will last for the period of a relatively short construction period and a limited recovery time after construction, thereafter it will be entirely negated (0 – 2 years).
2	Medium term	The impact and its effects will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).
3	Long term	The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 50 years).
4	Permanent	The only class of impact that will be non-transitory. Mitigation either by man or natural process will not occur in such a way or such a time span that the impact can be considered transient (Indefinite).
CUMULATIVE EFFECT		
This describes the cumulative effect of the impacts on the heritage parameter. A cumulative effect/impact is an effect, which in itself may not be significant but may become significant if added to other existing or potential impacts emanating from other similar or diverse activities as a result of the project activity in question.		
1	Negligible Cumulative Impact	The impact would result in negligible to no cumulative effects.
2	Low Cumulative Impact	The impact would result in insignificant cumulative effects.
3	Medium Cumulative impact	The impact would result in minor cumulative effects.
4	High Cumulative Impact	The impact would result in significant cumulative effects.
INTENSITY / MAGNITUDE		
Describes the severity of an impact.		
1	Low	Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible.
2	Medium	Impact alters the quality, use and integrity of the system/component but system/ component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).
3	High	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component is severely

		impaired and may temporarily cease. High costs of rehabilitation and remediation.
4	Very high	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component permanently ceases and is irreversibly impaired (system collapse). Rehabilitation and remediation often impossible. If possible rehabilitation and remediation often unfeasible due to extremely high costs of rehabilitation and remediation.

SIGNIFICANCE

Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. This describes the significance of the impact on the heritage parameter. The calculation of the significance of an impact uses the following formula:

(Extent + probability + reversibility + irreplaceability + duration + cumulative effect) x magnitude/intensity.

The summation of the different criteria will produce a non-weighted value. By multiplying this value with the magnitude/intensity, the resultant value acquires a weighted characteristic which can be measured and assigned a significance rating.

Points	Impact Significance Rating	Description
6 to 28	Negative Low impact	The anticipated impact will have negligible negative effects and will require little to no mitigation.
6 to 28	Positive Low impact	The anticipated impact will have minor positive effects.
29 to 50	Negative Medium impact	The anticipated impact will have moderate negative effects and will require moderate mitigation measures.
29 to 50	Positive Medium impact	The anticipated impact will have moderate positive effects.
51 to 73	Negative High impact	The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact.
51 to 73	Positive High impact	The anticipated impact will have significant positive effects.
74 to 96	Negative Very high impact	The anticipated impact will have highly significant effects and are unlikely to be able to be mitigated adequately. These impacts could be considered "fatal flaws".
74 to 96	Positive Very high impact	The anticipated impact will have highly significant positive effects.

Anticipated Impact of the Developments

Park Management Office Complex

No deposits, sites or features of heritage significance could be identified within the indicated study area. The fact that the largest extent of the planned alterations has already been performed should also be taken into consideration.

Although all due care was taken to determine if the heavy local alluvial deposits might be obscuring lower lying sub-surface deposits (trowel tests) there is still a slight possibility (due to the overall rich heritage of the area) that these might still be encountered during any further earthmoving activities. It is therefore recommended that a suitably qualified heritage practitioner monitors any such activity.

Subterranean or Unmarked Sites

IMPACT TABLE FORMAT		
Issue/Impact/Heritage Impact/Nature	<i>Unmarked or buried heritage sites.</i>	
<i>Extent</i>	<i>Provincial (3)</i>	
<i>Probability</i>	<i>Possible (2)</i>	
<i>Reversibility</i>	<i>Partly Reversible (2)</i>	
<i>Irreplaceable loss of resources</i>	<i>Significant loss of resources (3)</i>	
<i>Duration</i>	<i>Medium term (2)</i>	
<i>Cumulative effect</i>	<i>Medium cumulative effect (3)</i>	
<i>Intensity/magnitude</i>	<i>Medium (2)</i>	
<i>Significance Rating of Potential Impact</i>	<i>30 points. The impact will have a medium negative impact rating.</i>	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	3	2
Probability	2	1
Reversibility	2	2
Irreplaceable loss	3	1
Duration	2	2
Cumulative effect	3	1
Intensity/magnitude	2	1
Significance rating	30 (medium negative)	8 (low negative)
Mitigation measure	<i>A suitably qualified heritage practitioner should monitor any earthmoving activities. Should any unmarked sites or subterranean sites be encountered, the chance finds protocol contained in this report should be followed.</i>	

Adherence to Legislation and Management Reports

NHRA 25 of 1999

The current report and management guidelines will fulfil the requirements of the NHRA no 25 of 1999. This is in terms of the Construction Phase of the proposed development.

UNESCO WHS Charter

It is not expected that this development will have any impact on the Outstanding Universal Value (OUV) of the Mapungubwe Cultural Landscape (MCL).

Integrated Park Management Plan

This development will fulfil the development requirements as stated in the IPMP analysis of needs for administration. This will be fulfilled during the Operational Phase of this project.

Chance Finds Protocol

(for Park Management Office Complex)

Although unlikely, sub-surface remains of heritage sites could still be encountered during the construction activities associated with the project. Such sites would offer no surface indication of their presence due to the high state of alterations in some areas as well as heavy plant cover in other areas. The following indicators of unmarked sub-surface sites could be encountered:

- Ash deposits (unnaturally grey appearance of soil compared to the surrounding substrate);
- Bone concentrations, either animal or human;
- Ceramic fragments such as pottery shards either historic or pre-contact;
- Stone concentrations of any formal nature.

The following recommendations are given should any sub-surface remains of heritage sites be identified as indicated above:

- All operators of excavation equipment should be made aware of the possibility of the occurrence of sub-surface heritage features and the following procedures should they be encountered.
- All construction in the immediate vicinity (50m radius of the site) should cease.
- The heritage practitioner should be informed as soon as possible.
- In the event of obvious human remains the South African Police Services (SAPS) should be notified.
- Mitigation measures (such as refilling etc.) should not be attempted.
- The area in a 50m radius of the find should be cordoned off with hazard tape.
- Public access should be limited.
- The area should be placed under guard.
- No media statements should be released until such time as the heritage practitioner has had sufficient time to analyse the finds.

Conclusions and Recommendations

This study looked at the development of structures within the Mapungubwe National Park and World Heritage Site and surrounds. No archaeological deposits were noted here and are also not likely to occur sub-surface.

The Park Management Office Complex has already been partially completed and is subject to a S24G Correction Process as per the National Environmental Management Act (NEMA). As a result, the impact to the locality has already been suffered. No further impacts are expected although any further groundworks will need to be monitored.

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PALAEONTOLOGICAL HERITAGE SPECIALIST ASSESSMENT: COMBINED FIELD-BASED & DESKTOP STUDY

Proposed infrastructure in the Mapungubwe National Park near Messina, Vhembe District, Limpopo Province

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Executive Summary

South African National Parks (SANParks) is proposing to develop a number of small sites within the Mapungubwe National Park near Messina, Limpopo Province for tourism, educational and administrative purposes. The National Park is underlain by continental sediments of the Karoo Supergroup (Stormberg Subgroup) of Late Triassic to Early Jurassic age that are correlated with the Elliot and Clarens Formations of the Main Karoo Basin. Previous palaeontological studies have demonstrated that the fluvial Elliot redbeds here contain abundant vertebrate fossils – principally of sauropodomorph dinosaurs - as well as rare vertebrate trackways. While most of the fossil material exposed at surface is highly-weathered and of limited scientific value, some specimens may represent undescribed new dinosaur taxa. Other fossil groups represented within the overlying Clarens Formation in the region include petrified logs and various burrows, including putative termitaria and vertebrate burrows, while vertebrate body fossils are rare.

A summary of the geological and palaeontological heritage findings for six proposed development sites within the Mapungubwe National Park, together with recommendations concerning mitigation, is provided in Table 3 of this report. Albeit that all the proposed developments for the Park are listed, this report will focus on the Park Management Offices as highlighted in yellow in Table 3. The Park Management Offices site is highly disturbed at surface and overlies fossil-poor Clarens sandstones mantled with calcretised Late Caenozoic superficial deposits. Late Caenozoic colluvial rubble, alluvial sands, gravely soils and downwasted gravels encountered at the study site away from the Limpopo River are generally of low palaeontological sensitivity. It is concluded that, given the low palaeontological sensitivity of the study area and small development footprints envisaged, the impact significance of the proposed development within the Mapungubwe National Park under consideration here is Very Low. There are no objections on palaeontological heritage grounds to the authorisation of the development. No further specialist palaeontological studies or mitigation is recommended at the Office Complex site, as the development is partially completed.

It should be noted that any new fossil finds made within the Mapungubwe National Park would be of geotourism as well as scientific research interest and the Chance Fossil Finds Protocol appended to this report should be applied by the responsible ECO during construction. If any substantial fossil remains (e.g. vertebrate bones, teeth, petrified wood) are found during construction SAHRA should be notified immediately (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Phone: +27 (0)21 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za). This is so that appropriate mitigation (i.e. recording, sampling or collection) by a palaeontological specialist can be considered and implemented, at the developer's expense. These recommendations must be incorporated into the Environmental Management Programme for the proposed developments. The palaeontologist concerned with mitigation work will need a valid collection permit from SAHRA. All work would have to conform to international best practice for palaeontological fieldwork and the study (e.g. data recording fossil collection and curation, final report) should adhere to the minimum standards for Phase 2 palaeontological studies published by SAHRA (2013).

Introduction

Project outline and brief

South African National Parks (SANParks) is proposing to develop a number of small sites within the Mapungubwe National Park for tourism, educational and administrative purposes. The park is situated in Limpopo Province along the northern border of the RSA with Zimbabwe and Botswana, between Pont Drift and Messina. The six proposed development sites are listed below in Table 3 and their approximate locations within the National Park are shown on the satellite image Figure 24. This report will specifically focus on the Park Management Office Complex development.

The Mapungubwe National Park is underlain by sedimentary rocks of the Karoo Supergroup (Stormberg Subgroup) that are known to be fossiliferous (e.g. Bordy & Catuneanu 2001, Bordy & Catuneanu 2002, Brandl 2002, palaeontological field data of Prof. J. Choiniere, Wits University, Johannesburg). A desktop palaeontological assessment of the proposed new development sites, supplemented by brief field observations, was originally submitted by Chirikure and Bandama (2011) of Siyathembana Trading 293 (Pty) Ltd as part of a broad-based HIA study. According to these authors the “*Palaeontological assessment was limited to a desktop study since based on the geo-morphology, the distribution of fossil bearing rocks in and around Mapungubwe is well known*”. In practice, the available 1: 250 000 geological maps and limited palaeontological field data available are mostly at reconnaissance level and do not provide the detail required for detailed impact studies of small sites. In their recommendations, Chirikure and Bandama (2011) suggest that “*Sanparks may consider developing a palaeontological map of the core of the listed property*”.

However, this might be a waste of resources given that the distribution of fossil bearing Ecca deposits is well known (see Brandl 2000)”. The Ecca Group is not, in fact, mapped within the National Park, although it does crop out further to the south (cf Bordy & Catuneanu 2002a, Durand 2009, 2012). The South African Heritage Resources Agency rejected the HIA report since it did not satisfy the requirements as per section 38(3) of the NHRA (SAHRA Letter of 21/2/2017). Following a site visit by the SAHRA APM Unit, SAHRA required that “*A Palaeontological Impact Assessment (PIA) inclusive of a field assessment must be conducted for the proposed development*” (SAHRA Final Comment, Case ID: 10622, dated Friday October 20, 2017). Siyathembana Trading 293 (Pty) Ltd subsequently argued that “*The appointed archaeologist has experience with training in geology and earth sciences, therefore a separate PIA is not necessary*” (ibid.).

The present combined desktop and field-based palaeontological assessment report has been commissioned by SANParks in accordance with SAHRA’s Final Comment. It forms part of a broad-based HIA study that is being co-ordinated on behalf of the proponent by G&A Heritage (Pty) Ltd (Contact details: Mr Stephan Gaigher. G&A Heritage (Pty) Ltd. 38A Vorster Street, Louis Trichardt 0920. Cell: 073 752 6583. Tel: 015 516 1561. E-mail: stephan@gaheritage.co.za).

Table 3: Proposed tourism-related development sites within the Mapungubwe National Park near Messina, Limpopo Province (focussing on No. 5 – Park Management Offices)

No	Infrastructure	Approx. Site location	Geology	Fossils	Recommended Mitigation
1	Rhodesdrift Staff Housing	22 12 07.65 S 29 10 31.42 E	Late Caenozoic sandy to gravelly alluvium of Limpopo River.	None recorded	Chance fossil finds procedure
2	Mazhou Camp Site	22 11 14.63 S 29 12 04.81 E	Late Caenozoic sandy to gravelly alluvium of Limpopo River.	None recorded	Chance fossil finds procedure
3	Mapungubwe Valley Orientation Centre	22 13 10.92 S 29 23 19.10 E	Elliot Formation bedrocks (sandstone but no mudrock exposure) largely mantled by Late Caenozoic colluvial and alluvial gravels and soils.	None recorded	Chance fossil finds procedure
4	Youth Centre Dormitories	22 14 24.76 E 29 24 33.20 E	Sandy soils and calcrete hardpans, probably overlying Clarens Formation bedrocks at depth.	None recorded	Chance fossil finds procedure
5	Park Management Offices	22 14 40.40 S 29 24 33.44 E	Calcretised, reddish-brown, gravelly soils, probably overlying Clarens Formation bedrocks at depth.	None recorded	Chance fossil finds procedure
6	Schroda Orientation Centre	22 11 03.54 S 29 25 39.61 E	Clarens Formation sandstone bedrocks largely mantled by downwasted gravels and gravelly soils, sands. Karstified sandstone bedrocks on N margins of study area.	None recorded within study area. Probable fossil casts and moulds within sandstones of low escarpment just N of study area (outside footprint) (Fig. 42)	Chance fossil finds procedure

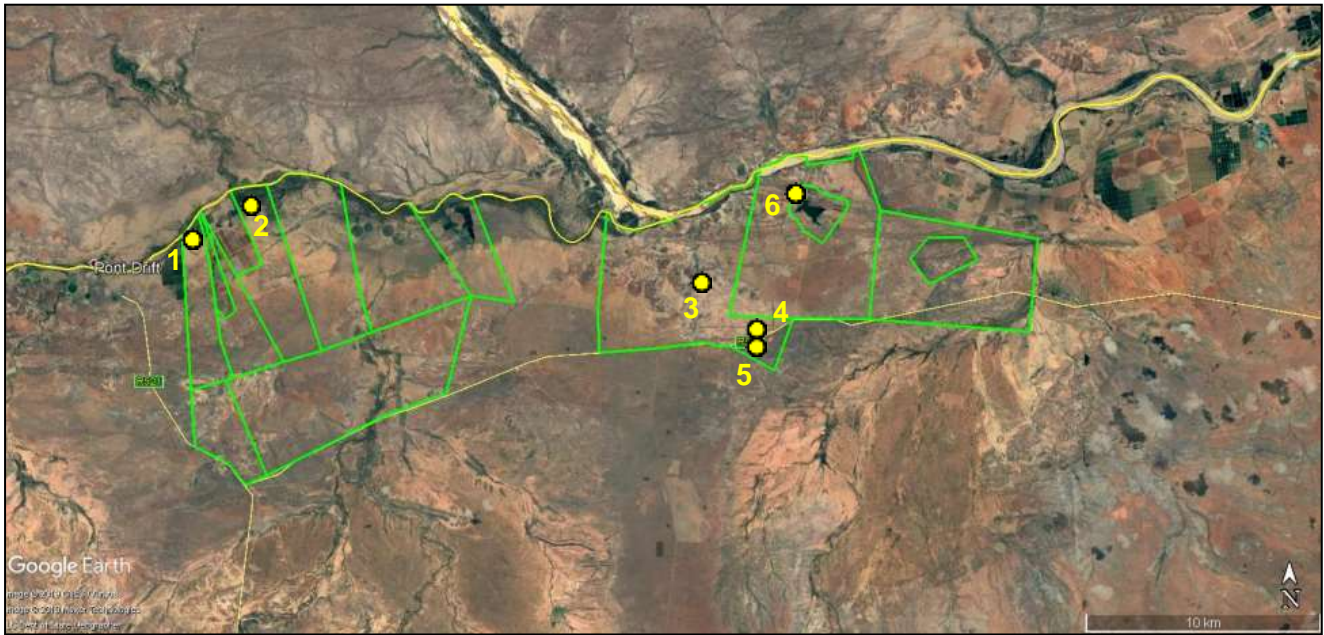


Figure 24. Google Earth© satellite image of the Mapungubwe National Park region, Vhembe District, situated between Pont Drift and Messina on the border between the Limpopo Province of the RSA with Zimbabwe and Botswana. The green polygons indicate the various land portions making up the National Park. The approximate locations of 6 proposed development sites are indicated, with specific reference to the Park Management Office Complex (No.5) in the present report. (Please refer to site numbers in Table 3).

Legislative context for palaeontological assessment studies

The various categories of heritage resources recognised as part of the National Estate in Section 3 of the National Heritage Resources Act (Act 25 of 1999) include, among others:

- geological sites of scientific or cultural importance;
- palaeontological sites;
- palaeontological objects and material, meteorites and rare geological specimens.

According to Section 35 of the National Heritage Resources Act, dealing with archaeology, palaeontology and meteorites:

- (1) The protection of archaeological and palaeontological sites and material and meteorites is the responsibility of a provincial heritage resources authority.
- (2) All archaeological objects, palaeontological material and meteorites are the property of the State.
- (3) Any person who discovers archaeological or palaeontological objects or material or a meteorite in the course of development or agricultural activity must immediately report the find to the responsible heritage resources authority, or to the nearest local authority offices or museum, which must immediately notify such heritage resources authority.
- (4) No person may, without a permit issued by the responsible heritage resources authority—
 - (a) destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite;

(b) destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or object or any meteorite;

(c) trade in, sell for private gain, export or attempt to export from the Republic any category of archaeological or palaeontological material or object, or any meteorite; or

(d) bring onto or use at an archaeological or palaeontological site any excavation equipment or any equipment which assist in the detection or recovery of metals or archaeological and palaeontological material or objects, or use such equipment for the recovery of meteorites.

(5) When the responsible heritage resources authority has reasonable cause to believe that any activity or development which will destroy, damage or alter any archaeological or palaeontological site is under way, and where no application for a permit has been submitted and no heritage resources management procedure in terms of section 38 has been followed, it may—

(a) serve on the owner or occupier of the site or on the person undertaking such development an order for the development to cease immediately for such period as is specified in the order;

(b) carry out an investigation for the purpose of obtaining information on whether or not an archaeological or palaeontological site exists and whether mitigation is necessary;

(c) if mitigation is deemed by the heritage resources authority to be necessary, assist the person on whom the order has been served under paragraph (a) to apply for a permit as required in subsection (4); and

(d) recover the costs of such investigation from the owner or occupier of the land on which it is believed an archaeological or palaeontological site is located or from the person proposing to undertake the development if no application for a permit is received within two weeks of the order being served. Minimum standards for the palaeontological component of heritage impact assessment reports (PIAs) have been published by SAHRA (2013).

Approach to the palaeontological heritage study

The approach to this desktop palaeontological heritage study is briefly as follows. Fossil bearing rock units occurring within the broader study area are determined from geological maps and satellite images. Known fossil heritage in each rock unit is inventoried from scientific literature, previous assessments of the broader study region, and the author's field experience and palaeontological database. Based on this data as well as field examination of representative exposures of all major sedimentary rock units present, the impact significance of the proposed development is assessed and recommendations for any necessary further studies or mitigation are made.

In preparing a palaeontological desktop study the potentially fossiliferous rock units (groups, formations *etc.*) represented within the study area are determined from geological maps and satellite images. The known fossil heritage within each rock unit is inventoried from the published scientific literature, previous palaeontological impact studies in the same region, and the author's field experience (consultation with professional colleagues as well as examination of institutional fossil collections may play a role here, or later following field assessment during the compilation of the final report). This data is then used to assess the palaeontological sensitivity of each

rock unit to a development (Provisional tabulations of palaeontological sensitivity of all formations in the Limpopo Province have already been compiled by J. Almond and colleagues; cf also Groenewald & Groenewald 2014).

The likely impact of the proposed development on local fossil heritage is then determined on the basis of (1) the palaeontological sensitivity of the rock units concerned, and (2) the nature and scale of the development itself, most significantly the extent of fresh bedrock excavation envisaged. When rock units of moderate to high palaeontological sensitivity are present within the development footprint, a Phase 1 field assessment study by a professional palaeontologist is usually warranted to identify any palaeontological hotspots and make specific recommendations for any mitigation required before or during the construction phase of the development.

On the basis of the desktop and Phase 1 field assessment studies, the likely impact of the proposed development on local fossil heritage and any need for specialist mitigation are then determined. Adverse palaeontological impacts normally occur during the construction rather than the operational phase. Phase 2 mitigation by a professional palaeontologist – normally involving the recording and sampling of fossil material and associated geological information (e.g. sedimentological data) may be required (a) in the pre-construction phase where important fossils are already exposed at or near the land surface and / or (b) during the construction phase when fresh fossiliferous bedrock has been exposed by excavations. To carry out mitigation, the palaeontologist involved will need to apply for a palaeontological collection permit from the relevant heritage management authority (e.g. SAHRA for Limpopo Province). It should be emphasized that, *provided that appropriate mitigation is carried out*, the majority of developments involving bedrock excavation can make a *positive* contribution to our understanding of local palaeontological heritage.

Assumptions & limitations

The accuracy and reliability of palaeontological specialist studies as components of heritage impact assessments are generally limited by the following constraints:

Inadequate database for fossil heritage for much of the RSA, given the large size of the country and the small number of professional palaeontologists carrying out fieldwork here. Most development study areas have never been surveyed by a palaeontologist.

1. Variable accuracy of geological maps which underpin these desktop studies. For large areas of terrain these maps are largely based on aerial photographs alone, without ground-truthing. The maps generally depict only significant (“mappable”) bedrock units as well as major areas of superficial “drift” deposits (alluvium, colluvium) but for most regions give little or no idea of the level of bedrock outcrop, depth of superficial cover (soil *etc.*), degree of bedrock weathering or levels of small-scale tectonic deformation, such as cleavage. All of these factors may have a major influence on the impact significance of a given development on fossil heritage and can only be reliably assessed in the field.
2. Inadequate sheet explanations for geological maps, with little or no attention paid to palaeontological issues in many cases, including poor locality information.

3. The extensive relevant palaeontological “grey literature” - in the form of unpublished university theses, impact studies and other reports (e.g. of commercial mining companies) - that is not readily available for desktop studies.
4. Absence of a comprehensive computerized database of fossil collections in major RSA institutions which can be consulted for impact studies. A Karoo fossil vertebrate database is now accessible for impact study work.

In the case of palaeontological desktop studies without supporting Phase 1 field assessments these limitations may variously lead to either:

underestimation of the palaeontological significance of a given study area due to ignorance of significant recorded or unrecorded fossils preserved there, or

overestimation of the palaeontological sensitivity of a study area, for example when originally rich fossil assemblages inferred from geological maps have in fact been destroyed by tectonism or weathering, or are buried beneath a thick mantle of unfossiliferous “drift” (soil, alluvium *etc.*).

Since most areas of the RSA have not been studied paleontologically, a palaeontological desktop study usually entails *inferring* the presence of buried fossil heritage within the study area from relevant fossil data collected from similar or the same rock units elsewhere, sometimes at localities far away. Where substantial exposures of bedrocks or potentially fossiliferous superficial sediments are present in the study area, the reliability of a palaeontological impact assessment may be significantly enhanced through field assessment by a professional palaeontologist. In the present case, site visits to the various loop and borrow pit study areas in some cases considerably modified our understanding of the rock units (and hence potential fossil heritage) represented there.

In the case of the Mapungubwe National Park project area near Messina, Limpopo Province, the main limitation for fossil heritage studies is the paucity of previous field-based specialist palaeontological studies in the Tuli Basin, and indeed in the Limpopo Province as a whole (Better field data is available for the Zimbabwean portion of the basin; *cf* Rogers *et al.* 2004 as well as unpublished Wits University research on Sentinel Ranch, for example).

Information sources

The information used in this combined field-based and desktop study was based on the following:

1. Project outlines, kmz files and maps provided by SANParks as well as the original HIA report by Chirikure and Bandama (2011) of Siyathembana Trading 293 (Pty) Ltd;
2. A review of the relevant scientific literature, including published geological maps and accompanying sheet explanations (e.g. Brandl 1981, Brandl 2002,);
3. Examination of relevant 1: 250 000 topographical maps and Google Earth© satellite images;
4. Short visits to all of the development sites by the author and an assistant, accompanied by SANParks staff, on 6 and 7 January 2020 with several additional days spent in the National Park photographing features of geological interest;
5. The author's previous field experience with the formations concerned and their palaeontological heritage (e.g. Almond 2019).
6. Unpublished palaeontological field data and reports for the Mapungubwe National Park that were very kindly made available by Professor Jonah Choiniere of Wits University, Johannesburg.

Geological context

The Mapungubwe National Park, situated along the northern border of the RSA with Botswana and Zimbabwe, lies within the 1: 250 000 scale geological map sheet 2228 Alldays published by the Council for Geoscience, Pretoria (Fig. 30) with an informative sheet explanation by Brandl (2002). A well-illustrated, accessible account of geological highlights of the National Park has been presented by Whitfield and Viljoen (2016).

The National Park is underlain by continental (fluvial / lacustrine / aeolian) sedimentary rocks of the Karoo Supergroup of Late Triassic to Early Jurassic age. These bedrocks were deposited within the small, east- west trending, fault-bound Tuli Basin which also extends into the southern parts of Botswana and Zimbabwe (Johnson *et al.* 2006) (Fig. 25). The Karoo Supergroup succession within the Tuli Basin broadly youngs from south to north and is transected by several west-east trending normal faults. The sediments within the National Park are assigned to, or correlated with, the Elliot and Clarens Formations of the Karoo Supergroup (Stormberg Group) (Fig. 3). Detailed accounts of these rock units in the Tuli Basin have been published by Bordy and Catuneanu (2001) and Bordy and Catuneanu (2002) respectively.



Figure 25. Karoo Supergroup basins in southern Africa (from Johnson *et al.* 2006). The Mapungubwe National Park is located within the southern extension of the Tuli Basin which is mainly represented in neighbouring Zimbabwe and Botswana.

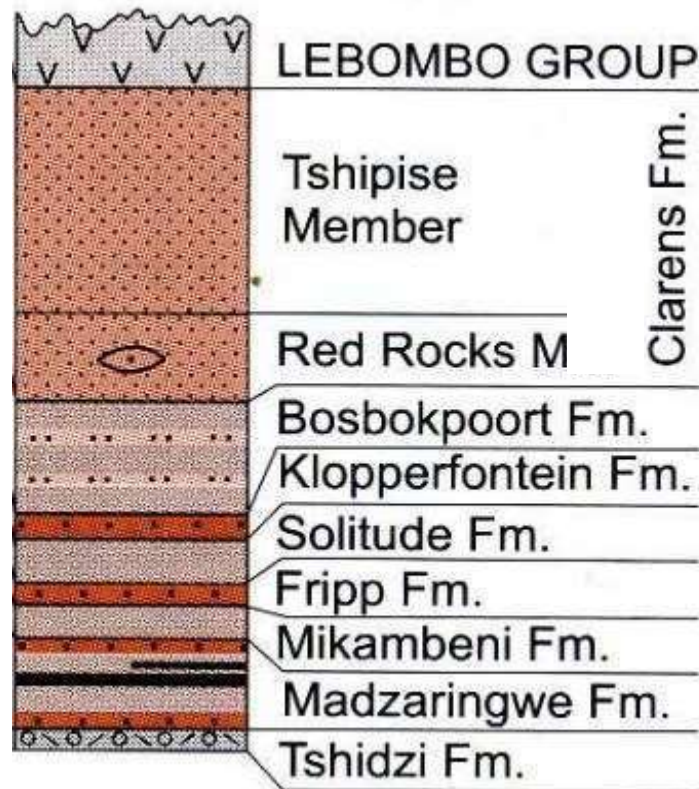


Figure 26. Stratigraphy of the Karoo Supergroup within the Tuli Basin (from Johnson *et al.* 2006). Rock units represented within the Mapungubwe National Park are indicated by the vertical red line. Recent studies suggest that the Red Rocks Member and Tshipise Member can be correlated with the Elliot and Clarens Formations of the Main Karoo Basin respectively.

The Late Triassic to Early Jurassic **Elliot Formation** “red beds” mainly comprise maroon to purple-grey overbank mudrocks and subordinate channel sandstones with minor pedocretes and conglomerates that were laid down in a range of fluvial, lacustrine and aeolian (loessic) settings experiencing seasonally arid climates (Johnson *et al.* 2006, Bordy & Catuneanu 2001b, Bordy & Eriksson 2015). They were previously included as the Red Rocks Member within the Clarens Formation and have a thickness of *c.* 40 m in the Alldays sheet area (Brandl 2002). A widely-occurring pedogenic horizon or zone at the top of the Elliot succession is associated with cherty siliceous concretions and lenses. Within the National Park the Elliot redbeds are best exposed along the lower slopes and foothills of sandstone escarpments (Fig. 27); in lower-lying areas they are largely submerged beneath Late Cenozoic superficial deposits.

The Early Jurassic **Clarens Formation** – previously referred to the Tshipise Member – largely comprises honey-coloured, fine-grained sandstones that build the numerous spectacular rugged cliffs and *koppies* within the Mapungubwe National Park (*e.g.* Figs. 27 & 28). The sandstones often appear massive but locally display large-scale cross-sets typical of desert dunes whose migration reflects the prevailing westerly winds in this part of southern Pangaea during Early Jurassic times (Johnson *et al.* 2006, Bordy & Catuneanu 2002, Bordy & Head 2018) (Fig. 28). The thickness of the sandstone succession varies markedly, from 5 to 140 m.

Several of the sandstone *koppies* in the National Park, notably on Greefswald 37 MS, are capped by very dark, thin flows of olivine-rich basaltic lava assigned to the **Letaba Formation** (Fig. 29). Numerous, predominantly west-east trending **doleritic dykes** transecting the Karoo Supergroup country rocks represent the feeders for the Letaba lavas as well as possible sills (Figs. 28 & 30).

A striking feature of the porphyritic Mapungubwe dolerites is the presence of large lath-shaped phenocrysts of pale plagioclase feldspar within a much darker, fine-grained matrix (Figs. 30 & 31).

The Karoo Supergroup succession within the Mapungubwe National Park has been extensively dissected in post-Cretaceous times by numerous incised tributaries of the Limpopo drainage system, creating numerous flat-topped, steep-sided mesas and buttes. The strikingly rugged appearance of the Clarens sandstone outcrops here, often obscuring the primary sedimentological features, is attributable in part to Late Cenozoic karstic (solution) weathering (*cf* Grab *et al.* 2011) (Figs. 29, 33 & 34). **Late Cenozoic superficial sediments** include rubbly colluvial deposits (*e.g.* scree, rock fall debris), downwasted surface gravels, sandy to gravelly stream and river alluvium - notably along the banks of the Limpopo River where abandoned meander systems are evident (*e.g.* Maloutswa wetland) (Figs. 31 & 32) – as well as calcrete hardpans.



Figure 27. Good hillslope exposures of purple-grey mudrocks of the Elliot Formation beneath the cliff-forming Clarens sandstones on Little Muck 134 MS. This area has yielded important fossil vertebrate remains, especially from the paler palaeosol zone underlying the unconformable Elliot / Clarens contact.



Figure 28. Small isolated, steep-sided koppie or butte of Clarens sandstone some 400 m NE of the study area flanked on the near side by a darker, W-E orientated dolerite dyke.



Figure 29. Honey-coloured, karstic-weathered Clarens Formation sandstones showing large scale aeolian cross-bedding and overlain by dark olivine-rich basalts of the Letaba Formation, c. 350m NW of Leokwe Camp, Greefswald 37 MS



Figure 30. West-east Karoo dolerite dyke c. 1 km WNW of the main park entrance (Janberry 44 MS), showing rubbly corestone weathering as well as coarse pale feldspar phenocrysts (foreground).



Figure 31. Thick, well-bedded, semi-consolidated Late Caenozoic alluvium exposed along the banks of the Limpopo River just NW of the Rhodes Drift Staff Village.



Figure 32. Google Earth© satellite image showing the location of the Mazhou Campsite (yellow dot) in a densely wooded area between the present course of the Limpopo River and an ancient abandoned meander of the river, now occupied by the Maloutswa wetland area. Note the series of arcuate scroll bars on the inner side of the abandoned meander showing progressive migration of the river bend towards the SW.



Figure 33. Steep-sided rock basin or gnamma etched by solution weathering into the Clarens sandstone bedrocks on the NE margins of the study area (Hammer = 30 cm).



Figure 34. Typical karstic polygonal or "crocodile" weathering on Clarens bedrocks, northern margins of the study area.

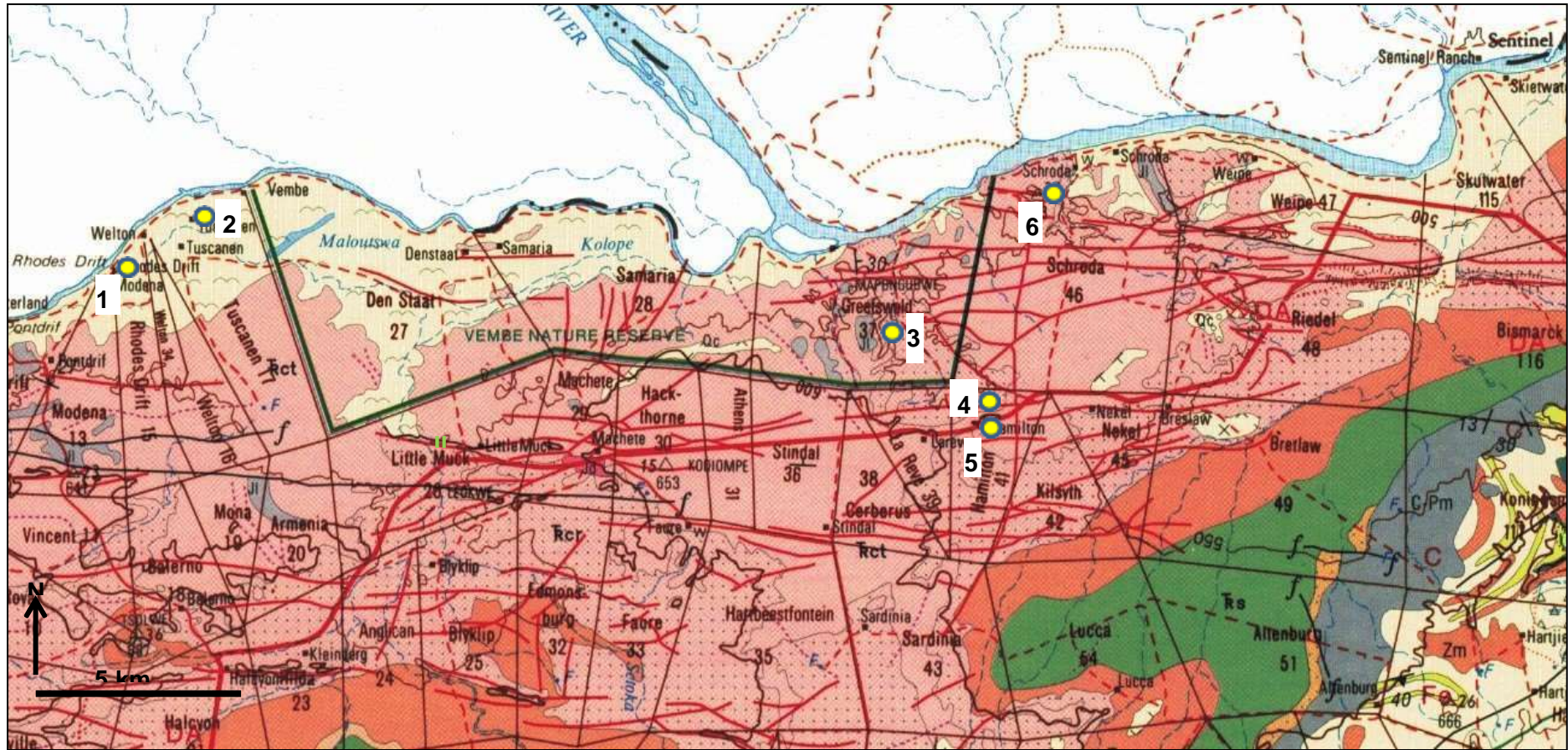


Figure 35. Extract from 1: 250 000 geology sheet 2228 Alldays (Council for Geoscience, Pretoria) showing the geology of the Mapungubwe National Park region on the border of Limpopo Province with Botswana and Zimbabwe. The six study sites for proposed or ongoing tourism-related developments in the park covered by this report are indicated by the numbered yellow circles, focussing on No.5 (See Table 3 for key). Key rock units represented within the park include: Elliot Formation ("Red Rocks Member, TRcr, pink with stipple); Clarens Formation ("Tshipise Member" TRct, pink); Letaba Formation basalts (Jl, grey); Karoo Dolerite suite intrusions (Jd, red lines); Late Caenozoic alluvium (pale yellow with flying bird symbol); Quaternary calcrete hardpans (Qc, pale yellow). Other younger superficial deposits such as High Level terrace gravels are not mapped at this scale.

Palaeontological context

The main focus of palaeontological research in the Mapungubwe National Park has been on the Late Triassic to Early Jurassic redbeds of the Elliot Formation (Red Rocks Member). This unit has yielded a rich variety of continental vertebrate remains in the Main Karoo Basin – notably a range of sauropodomorph and other dinosaurs, advanced therapsids, crocodylians and amphibians, vertebrate trackways and petrified wood (e.g. Kitching & Raath 1984, Olsen & Galton 1984, MacRae 1999, Knoll 2004, Knoll 2005, Bordy & Catuneanu 2001b, Bordy & Eriksson 2015 and refs. therein). These fossil assemblages have been assigned to the “*Euskelesaurus*” and *Massospondylus* Range Zones (Kitching & Raath 1984).

Within the Tuli Basin, several isolated bones and disarticulated bony material within conglomeratic bone beds are reported from mudrock facies by Brandl (2002) and Bordy and Catuneanu (2001b). The last authors also record trace fossils – including silicified plant roots and small, 4-toed tetrapod tracks (their fig. 10, Farm Schroda) – from both mudrock and sandstone packages. Brandl (2002, p. 36) also mentions fragmentary material of land shells (gastropods) within the Red Rocks Member. Several fragmentary dinosaurian bones are currently displayed in the Mapungubwe Interpretive Centre (Fig. 36). Rare articulated vertebrate remains were once recorded within the Park by Professor Bruce Rubidge of Wits University but this locality could not be subsequently relocated (Professor Jonah Choiniere, Wits University, pers. comm., 2020). A number of fossil bone localities – including disarticulated dinosaurian material (non-sauropodan sauropodomorphs) - were recorded from the Lower and Upper Elliot Formation by Prof. Choiniere and Professor James Clark (George Washington University) during a 2016 field season. Most of the sites lie on the farms Greefswald 37, Schroda 47 MS and Little Muck 134 (Fig. 37). The most fossiliferous beds are the red / green mudrocks of the uppermost Elliot succession, just below the contact with the Clarens Formation (cf Fig. 27). While the majority of the vertebrate fossils recorded in the National Park are weathered and of limited scientific value, some of the new material and display specimens probably represent undescribed new species of sauropodomorph dinosaur (Prof. Choiniere, pers. comm., 2020). Dinosaur-rich beds are better known from equivalent Elliot beds of the Tuli Basin in Zimbabwe (e.g. Rogers *et al.* 2004).

Compared with the underlying Elliot Formation redbeds, the predominantly aeolian and lacustrine “wet desert” deposits of the Clarens Formation have a relatively impoverished fossil record within the Main Karoo Basin and elsewhere. Key vertebrate fossil groups represented – especially within the more accessible lower parts of the succession – include various dinosaur subgroups, crocodylomorphs, palaeoniscoid fish and tetrapod trackways (Kitching & Raath 1984, Olsen & Galton 1984, MacRae 1999, Bordy & Head 2018). Fossil plant material comprises petrified wood, compressions and thin coals. Putative fossil termitaria have been described from Clarens sandstones of the Tuli Basin, including the Mapungubwe National Park (Bordy & Catuneanu 2002, Knoll 2005, Bordy *et al.* 2004, 2009), while a small range of freshwater invertebrates (crustaceans, insects) are found within lacustrine mudrock facies. Fossil occurrences within the Clarens Formation of the Tuli Basin – including petrified logs, dinosaur trackways, possible vertebrate burrows and various invertebrate burrows – have been described by Bordy and Catuneanu (2002, their map fig. 2) (See also Van Eeden & Keyser 1971 and Brandl 2002 for dinosaur tracks near Pont Drift and De Villiers 1967 for equivocal vertebrate burrows).

Late Caenozoic superficial deposits

The fossil record of the various Late Caenozoic superficial deposits represented within the Mapungubwe National Park is poorly understood but is likely to be sparse; no records are listed by Brandl (2002), for example. Alluvial sediments may contain fossil teeth, bones and horncores of mammals as well as non-marine molluscs (e.g. gastropods, freshwater clams), plant material and trace fossils. Calcrete hardpans may likewise be rich in trace fossils (e.g. rhizoliths, termitaria). Unconsolidated aeolian sands, surface gravels and soils are generally fossil-poor.



Figure 36. Isolated post-cranial bones of dinosaurs collected from the Elliot Formation in the Mapungubwe National Park and displayed in the Park's new Interpretative Centre. Some of this material might represent new undescribed taxa (J. Choiniere, pers. comm., 2020).

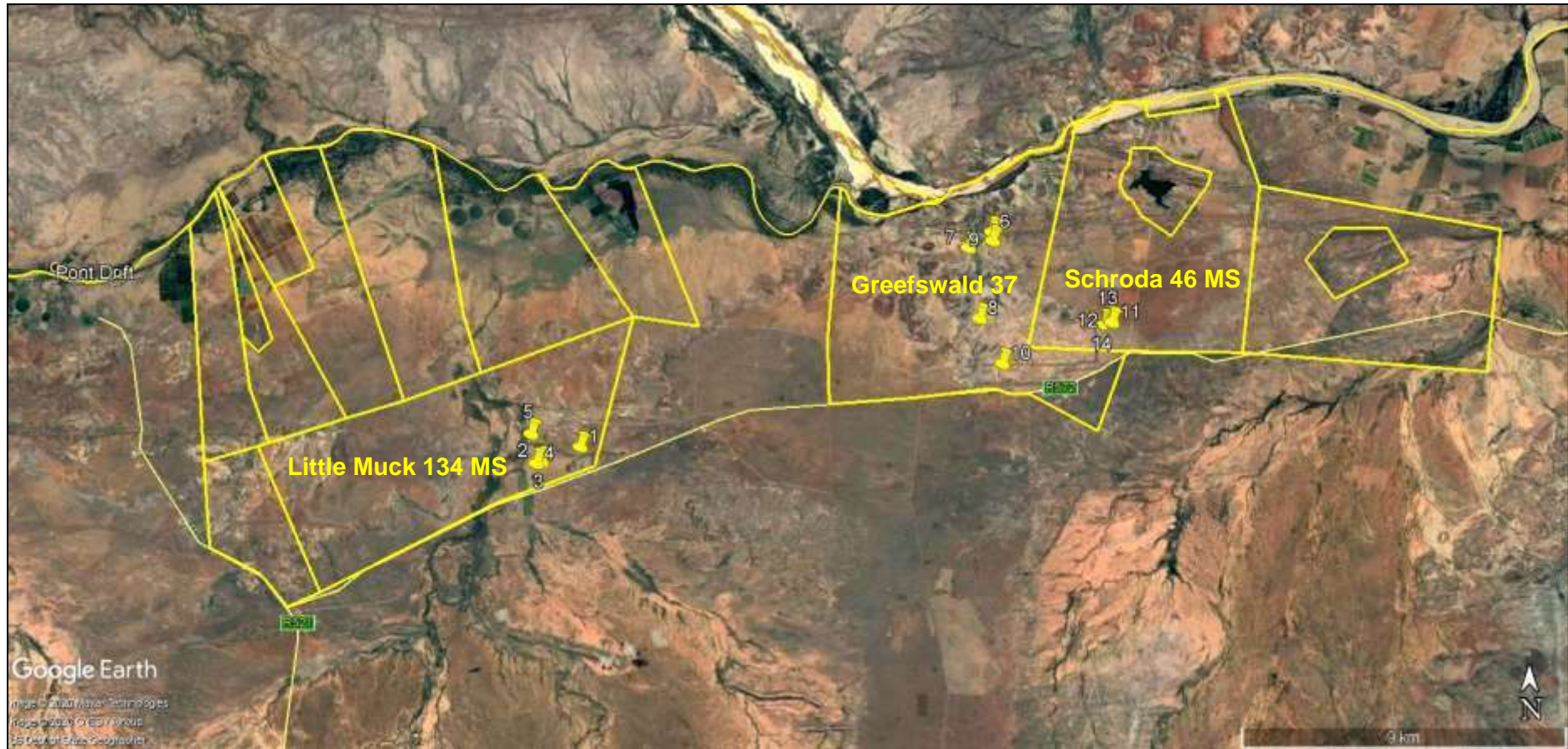


Figure 37. Vertebrate fossil sites within the Elliot Formation of the Mapungubwe National Park recorded in 2016 by Professor Jonah Choiniere (Evolutionary Studies Institute, University of the Witwatersrand). Data used with kind permission of the author.

Field observations

A short, illustrated account of the geological setting of the Park Management Offices development site within the Mapungubwe National Park (See Table 3 & Fig. 24 for overview), together with any new palaeontological data, is given in this section of the report.

Park Management Offices

The project area for the Park Management Offices, situated some 150 m south of the R572 Musina tar road on land parcel Hamilton 41MS, lies in flat terrain at c. 600 m amsl. which has already been highly disturbed by recent building activities as well as previous agricultural lands (Fig. 38). Pale brownish gravelly to rubbly soils are seen at surface while heavily calcretised, reddish-brown soils or regolith are exposed in several shallow (< 2m deep) excavations (Figs. 38 & 39). The area lies within the Clarens Formation outcrop area as mapped (Fig. 35) but no good bedrock exposures are available to confirm this. No fossil remains were recorded in the project area during the short site visit. The Late Caenozoic superficial sediments here are of low palaeontological sensitivity.



Figure 38. Google Earth© satellite image showing the location of the project area for the partially-constructed Park Management Offices (5), situated in highly- disturbed terrain either side of the R572 Musina tar road and just east of the Mapungube National Park Interpretive Centre (IC).



Figure 39. Sandy, well-consolidated soils with embedded rubbly calcrete gravel clasts, trench exposure at the Park Management Offices site (Hammer = 30 cm).



Figure 40. Shallow recent excavation into calcretised soils and / or regolith at the Park Management Offices site (Hammer = 30 cm).

Conclusions and recommendations

The Mapungubwe National Park is underlain by continental sediments of the Karoo Supergroup (Stormberg Subgroup) of Late Triassic to Early Jurassic age that are correlated with the Elliot and Clarens Formations of the Main Karoo Basin. Previous palaeontological studies have demonstrated that the fluvial Elliot redbeds here contain abundant vertebrate fossils – principally of sauropodomorph dinosaurs - as well as rare vertebrate trackways (Bordy & Catuneanu 2001, Brandl 2002). While most of the fossil material exposed at surface is highly-weathered and of limited scientific value, some specimens may represent undescribed new dinosaur taxa (Prof. J. Choniere, Wits University). Other fossil groups represented within the overlying Clarens Formation in the region include petrified logs and various burrows, including putative termitaria and vertebrate burrows (Bordy & Catuneanu 2002), while vertebrate body fossils are rare.

A summary of the geological and palaeontological heritage findings for each of the six proposed development sites within the Mapungubwe National Park, together with recommendations concerning mitigation is provided in Table 3 of this report, focussing on the Park Management Offices. The site is highly disturbed at surface, are mantled by palaeontologically insensitive superficial deposits and overlie fossil-poor Clarens sandstones. Late Caenozoic colluvial rubble, alluvial sands, gravelly soils and downwasted gravels encountered at many of the study sites away from the Limpopo River are generally of low palaeontological sensitivity.

It is concluded that, given the low palaeontological sensitivity of the study areas and small development footprints envisaged, the impact significance of all the proposed developments within the Mapungubwe National Park under consideration here is Very Low. There are no objections on palaeontological heritage grounds to the authorisation of the developments. Pending the discovery of significant new fossils during construction, no further specialist palaeontological studies or mitigation are therefore recommended, especially considering that the Park Management Offices site is already extensively disturbed.

It should be noted that any new fossil finds made within the Mapungubwe National Park would be of geotourism as well as scientific research interest and the Chance Fossil Finds Protocol appended to this report should be applied by the responsible ECO during construction. If any substantial fossil remains (e.g. vertebrate bones, teeth, petrified wood) are found during construction SAHRA should be notified immediately (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Phone: +27 (0)21 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za). This is so that appropriate mitigation (i.e. recording, sampling or collection) by a palaeontological specialist can be considered and implemented, at the developer's expense (See Chance Fossil Finds Protocol appended to this report).

These recommendations must be incorporated into the Environmental Management Programme for the proposed development. The palaeontologist concerned with mitigation work will need a valid collection permit from SAHRA. All work would have to conform to international best practice for palaeontological fieldwork and the study (e.g. data recording fossil collection and curation, final report) should adhere to the minimum standards for Phase 2 palaeontological studies published by SAHRA (2013).

Acknowledgements

Ms Esther Howard of SANParks and Mr Stephan Gaigher of G&A Heritage (Pty) Ltd, Louis Trichardt, are both thanked for commissioning this study, for providing the relevant background information and for facilitating the fieldwork. The Park Manager Mr Conrad Strauss and his colleague Mr Louw de Bruin, kindly spent time contextualizing the palaeontological heritage study, as well as guiding us to the development sites in the Park. We are grateful to the SANParks Ranger David Malatji for accompanying us during one of the days in the field. Professor Jonah Choiniere of the Evolutionary Studies Institute, Wits University, Johannesburg very generously shared his unpublished palaeontological field data and reports for the Mapungubwe National Park. Finally, as always I am very grateful to Ms Madelon Tusenius for logistical support and companionship in the field.

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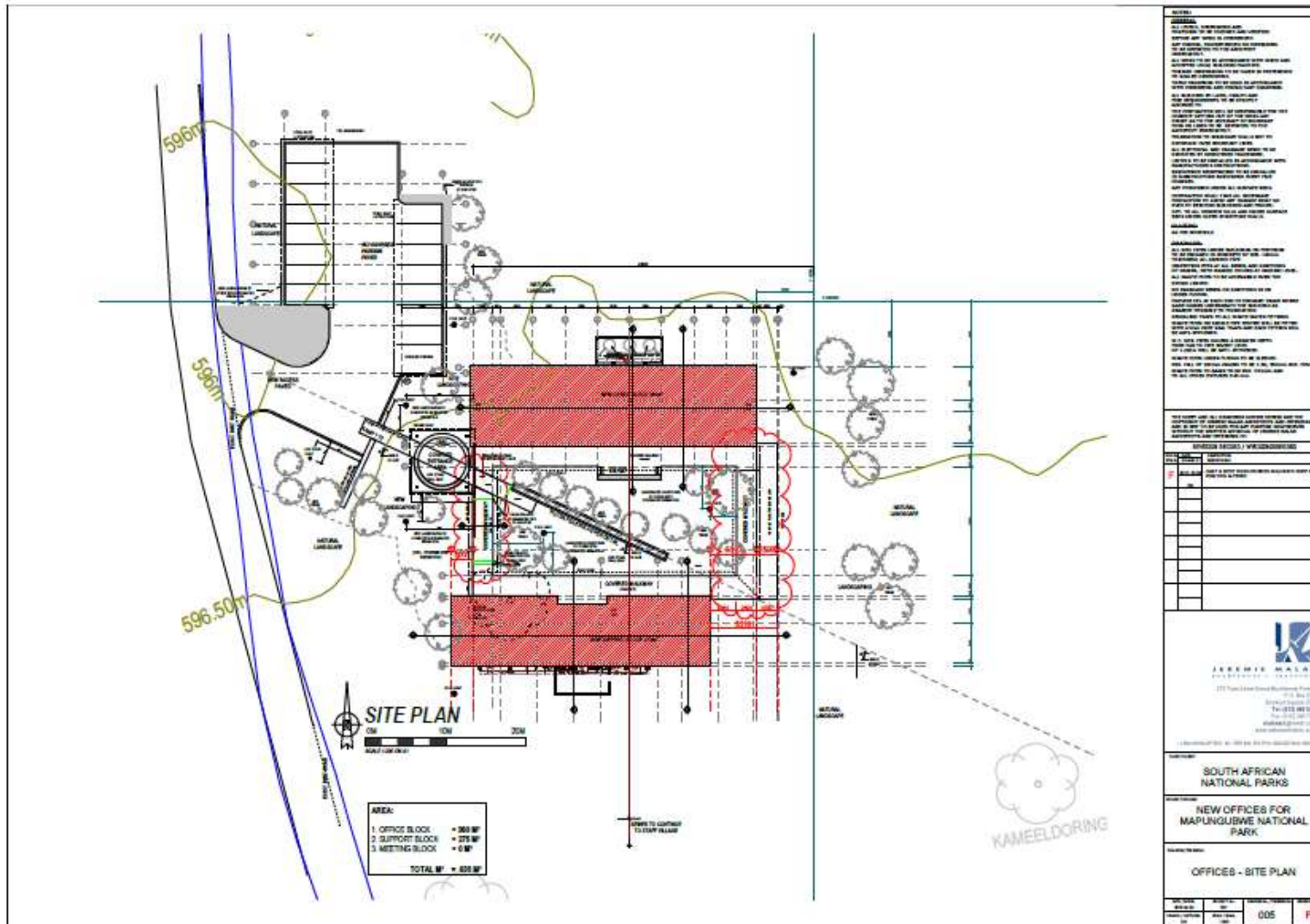
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APPENDIX: CHANCE FOSSIL FINDS PROCEDURE: Mapungubwe National Park near Messina		
Province & region:	LIMPOPO PROVINCE, Vhembe District	
Responsible Heritage Resources Authority	SAHRA (Contact details: Dr Ragna Redelstorff, SAHRA, P.O. Box 4637, Cape Town 8000. Tel: 021 202 8651. Email: rredelstorff@sahra.org.za or Ms Natasha Higgitt. Tel: 021 462 4502. Email: nhiggitt@sahra.org.za)	
Rock unit(s)	Elliot & Clarens Formation (Karoo Supergroup, Stormberg Subgroup), Late Caenozoic alluvium, calcrete	
Potential fossils	Vertebrate (especially dinosaur) bones, teeth, trackways, petrified wood or other plant material, trace fossils within Elliot and Clarens Formations. Mammalian bones, teeth & horn cores, non-marine molluscs, trace fossils within Late Caenozoic alluvium, calcretes.	
ECO protocol	1. Once alerted to fossil occurrence(s): alert site foreman, stop work in area immediately (<i>N.B.</i> safety first!), safeguard site with security tape / fence / sand bags if necessary.	
	2. Record key data while fossil remains are still <i>in situ</i> : <ul style="list-style-type: none"> • Accurate geographic location – describe and mark on site map / 1: 50 000 map / satellite image / aerial photo • Context – describe position of fossils within stratigraphy (rock layering), depth below surface • Photograph fossil(s) <i>in situ</i> with scale, from different angles, including images showing context (<i>e.g.</i> rock layering) 	
	<table border="1"> <tr> <td>3. If feasible to leave fossils <i>in situ</i>: <ul style="list-style-type: none"> • Alert Heritage Resources Authority and project palaeontologist (if any) who will advise on any necessary mitigation • Ensure fossil site remains safeguarded until clearance is given by the Heritage Resources Authority for work </td> <td>3. If <i>not</i> feasible to leave fossils <i>in situ</i> (emergency procedure only): <ul style="list-style-type: none"> • <i>Carefully</i> remove fossils, as far as possible still enclosed within the original sedimentary matrix (<i>e.g.</i> entire block of fossiliferous rock) • Photograph fossils against a plain, level background, with scale • Carefully wrap fossils in several layers of newspaper / tissue paper / plastic bags • Safeguard fossils together with locality and collection data (including collector and date) in a box in a safe place for examination by a palaeontologist • Alert Heritage Resources Authority and project palaeontologist (if any) who will advise on any necessary mitigation </td> </tr> </table>	3. If feasible to leave fossils <i>in situ</i> : <ul style="list-style-type: none"> • Alert Heritage Resources Authority and project palaeontologist (if any) who will advise on any necessary mitigation • Ensure fossil site remains safeguarded until clearance is given by the Heritage Resources Authority for work
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	to resume	
	4. If required by Heritage Resources Authority, ensure that a suitably-qualified specialist palaeontologist is appointed as soon as possible by the developer.	
	5. Implement any further mitigation measures proposed by the palaeontologist and Heritage Resources Authority	
Specialist palaeontologist	Record, describe and judiciously sample fossil remains together with relevant contextual data (stratigraphy / sedimentology / taphonomy). Ensure that fossils are curated in an approved repository (e.g. museum / university / Council for Geoscience collection) together with full collection data. Submit Palaeontological Mitigation report to Heritage Resources Authority. Adhere to best international practice for palaeontological fieldwork and Heritage Resources Authority minimum standards.	

Appendix A – Park Management Offices Detailed Drawings



NOTES:

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE NATIONAL BUILDING REGULATIONS AND THE NATIONAL ELECTRICAL REGULATIONS.
2. ALL WORK SHALL BE IN ACCORDANCE WITH THE NATIONAL WATER SUPPLY REGULATIONS AND THE NATIONAL SANITATION REGULATIONS.
3. ALL WORK SHALL BE IN ACCORDANCE WITH THE NATIONAL ENVIRONMENTAL REGULATIONS AND THE NATIONAL LAND USE REGULATIONS.
4. ALL WORK SHALL BE IN ACCORDANCE WITH THE NATIONAL FIRE REGULATIONS AND THE NATIONAL SAFETY REGULATIONS.
5. ALL WORK SHALL BE IN ACCORDANCE WITH THE NATIONAL HEALTH REGULATIONS AND THE NATIONAL WASTE REGULATIONS.
6. ALL WORK SHALL BE IN ACCORDANCE WITH THE NATIONAL PLANNING REGULATIONS AND THE NATIONAL ZONING REGULATIONS.
7. ALL WORK SHALL BE IN ACCORDANCE WITH THE NATIONAL TRANSPORT REGULATIONS AND THE NATIONAL ROAD REGULATIONS.
8. ALL WORK SHALL BE IN ACCORDANCE WITH THE NATIONAL UTILITIES REGULATIONS AND THE NATIONAL SERVICES REGULATIONS.
9. ALL WORK SHALL BE IN ACCORDANCE WITH THE NATIONAL CONSTRUCTION REGULATIONS AND THE NATIONAL MATERIALS REGULATIONS.
10. ALL WORK SHALL BE IN ACCORDANCE WITH THE NATIONAL FINANCIAL REGULATIONS AND THE NATIONAL TAX REGULATIONS.

REVISIONS:

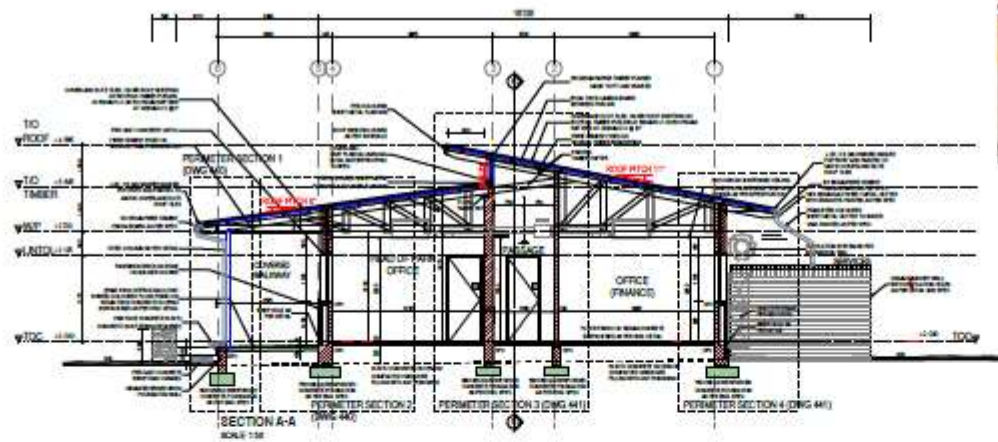
NO.	DESCRIPTION	DATE
1	ISSUED FOR TENDER	2024-10-27

PROJECT INFORMATION:

PROJECT NAME: NEW OFFICES FOR MAPUNGBWE NATIONAL PARK
 CLIENT: SOUTH AFRICAN NATIONAL PARKS
 PROJECT NO: 005
 DRAWING NO: OFFICES - SITE PLAN

DESIGNER: KAMEELDORING



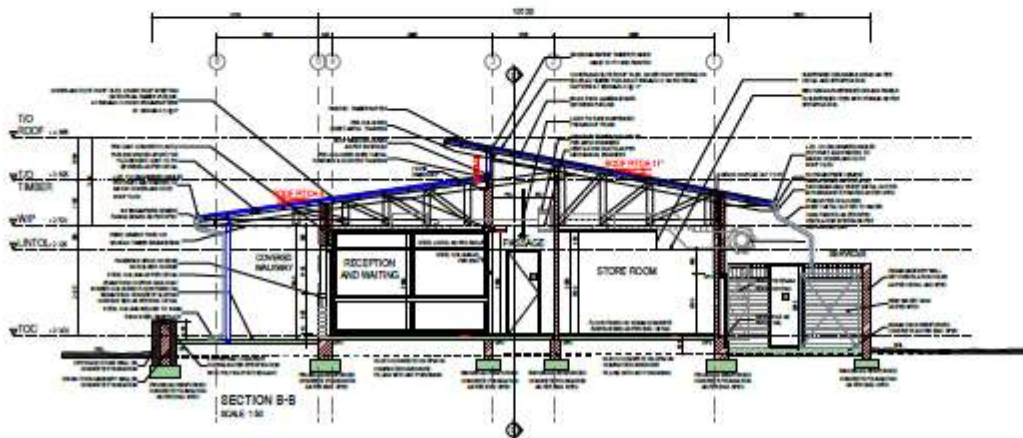


COVERLAND ELITE TILES (THROUGH COLOUR, BLACK)
ON 50x50x50mm ROOF ANGLE IRG
ON 50x50mm TRUSS PURLINS AT 50mm C/C ON 50x50mm
SAP TILES AT 100mm C/C



NOTES:

1. ALL WORK TO BE DONE IN ACCORDANCE WITH THE SPECIFICATIONS AND STANDARDS OF THE SOUTH AFRICAN BUREAU OF STANDARDS (SABS).
2. ALL MATERIALS TO BE USED MUST BE OF THE HIGHEST QUALITY AND MUST BE APPROVED BY THE ARCHITECT.
3. ALL WORK TO BE DONE IN ACCORDANCE WITH THE SPECIFICATIONS AND STANDARDS OF THE SOUTH AFRICAN BUREAU OF STANDARDS (SABS).
4. ALL WORK TO BE DONE IN ACCORDANCE WITH THE SPECIFICATIONS AND STANDARDS OF THE SOUTH AFRICAN BUREAU OF STANDARDS (SABS).
5. ALL WORK TO BE DONE IN ACCORDANCE WITH THE SPECIFICATIONS AND STANDARDS OF THE SOUTH AFRICAN BUREAU OF STANDARDS (SABS).



NO.	REVISION	DATE
1	ISSUED FOR TENDER	2024-08-15
2	REVISED FOR COMMENTS	2024-08-20
3	REVISED FOR COMMENTS	2024-08-25
4	REVISED FOR COMMENTS	2024-09-01
5	REVISED FOR COMMENTS	2024-09-05
6	REVISED FOR COMMENTS	2024-09-10
7	REVISED FOR COMMENTS	2024-09-15
8	REVISED FOR COMMENTS	2024-09-20
9	REVISED FOR COMMENTS	2024-09-25
10	REVISED FOR COMMENTS	2024-10-01

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SOUTH AFRICAN NATIONAL PARKS

NEW OFFICES FOR MAPUNGUBWE NATIONAL PARK

OFFICE BLOCK SECTIONS

NO.	DATE	BY	CHKD.	APP.
340				



