HIA TO ASSESS DIRECT, INDIRECT AND CUMULATIVE IMPACTS OF THE PROPOSED CONSTRUCTION OF VISITOR ORIENTATION FACILITIES AND CONSERVATION INFRASTRUCTURE ON ATTRIBUTES THAT CONVEY MAPUNGUBWE CULTURAL LANDSCAPE WORLD HERITAGE SITE OUTSTANDING UNIVERSAL VALUE USING ICOMOS GUIDELINES (2011)

siyathembana trading 293 PTY LTD

South African NATIONAL PARKS

Executive Brief

Listed in 2003, Mapungubwe Cultural Landscape World Heritage site is one of South Africa's eight World Heritage properties. Back then, a series of farms were purchased to create the World Heritage property such that numerous facilities pre-existed on the former farms at the time of listing. In addition, new facilities that include camp sites such as Leokwe were, after heritage impact assessments, established to enhance visitor experience. Furthermore, a now iconic and award winning Mapungubwe Interpretation Center was built on the southern border of the core of the listed property and narrates the history of Mapungubwe and exhibits some of the finds, mostly from recent rehabilitation exercises.

One of the major problems associated with Mapungubwe Cultural Landscape World Heritage site is that the cultural heritage currently does not have the same profile as biodiversity conservation. Visitors maybe forgiven for assuming that Mapungubwe is all about the Big 5 animals such as elephants. In fact, the existing management plan for Mapungubwe does very little to correct for this imbalance. In 2012, the UNESCO Reaction monitoring team toured the sites of Schroda, K2 and Mapungubwe in the core and noted that the sites were affected by massive conservation problems and that there was no information on the sites to orient visitors. This problem was magnified by the fact that most of the exciting objects from these sites are not being exhibited at the site but are either in Johannesburg or Pretoria. To the observant visitor, there is a huge disjuncture between what they read in original excavation reports such as Fouche (1937) and Gardner (1963) where a lot of material is illustrated and discussed and what is displayed at the site. This challenge was recognized at the time of nomination and it was suggested that the majority of the objects would be returned to the site when infrastructure for storing and adequately conserving them was constructed.

In order to correct for these historical challenges, some even predating the time of nomination, Sanparks an agency of the State Party (Department of Environmental Affairs), seeks to develop various facilities such as dormitories, conservation facilities and visitor information infrastructure within and outside the listed property as follows:

(1) Office Complex with bulk services like water, electricity and sewage outside the core area in the buffer zone (Plate 1).

Plate 1: Google Earth Image of the Proposed Office Complex site opposite the Mapungubwe Interpretation Centre (Courtesy: SanParks)

(2) Dormitories to accommodate visiting School groups with bulk services like water, electricity and sewage east of the Mapungubwe Interpretation Centre (Plate 2).

Plate 2: Proposed dormitories site (Courtesy: SanParks)

(3) Visitor Orientation area at Mapungubwe Hill which might include ablution facilities, small pathway, boardwalk crossing a water stream (Plate 3)

Plate 3: Proposed visitor orientation area at Mapungubwe (Courtesy: Sanparks)

(4) Orientation area with Pathways and Boardwalk at Schroda (Plate 4)

Plate 4: Proposed visitor orientation area with boardwalk at Schroda (Courtesy: Sanparks)

(5) Two camping areas at the Smuts house section which might include ablution facilities (Plates 5 and 6).

Plate 5: Proposed camping site 1 (Smuts section) (Courtesy: SanParks)

Plate 6: Proposed camping site 2 (Smuts Area) (Courtesy: SanParks)

Sanparks contracted Siyathembana Holdings, a diversified consulting group to assess the direct and indirect as well as the cumulative impact of these proposed developments on the attributes that convey Mapungubwe's Outstanding Universal Value (OUV). The assessment was guided by ICOMOS guidelines for assessing impact in and around World Heritage properties, the National Heritage Resources Act of 1999. It also considered the principles of ancillary legislation such as the National Environmental Management Act.

The assessment reached the following conclusions:

1. The proposed Office Complex and Hostel construction sites have already been previously disturbed by building and other activities. No sites were found on these areas.
2. No heritage sites were found on the proposed development footprint at the Smuts house section of the Limpopo River.
3. Schroda is a very sensitive site that contains a significant amount of middens and cultural material spread over a wide area. However, there is no detailed map that shows the deposit and there is no information to orient visitors.
4. The proposed Mapungubwe Visitor Information Centre does not have a visual impact on Mapungubwe Hill. However, there is cultural material on a small hill to the east, directly in front of the proposed site, across the river.
5. The proposed project will have direct and indirect impact on the attributes that convey the OUV of Schroda, Mapungubwe Hill and the Limpopo River.
6. If implemented, and robustly monitored, the project will enhance the profile of the cultural attributes of Mapungubwe Cultural Landscape World heritage site beyond the current biodiversity dominance.

Recommendations

1. The proposed facilities at Schroda must be preceded by the development of a risk sensitivity map of the site. Any ground disturbance must be authorized through a permit from the South African Heritage Resources Agency.
2. The installation of boardwalks either on the deposit or in a suspension system must be monitored by a qualified archaeologist.
3. The proposed Mapungubwe Hill Interpretation Centre must be preceded by the development of a risk sensitivity map to ensure that areas with cultural material on the eastern side are avoided.
4. There is need to develop a robust monitoring plan to ensure that opening up of Schroda, and Smuts section areas to visitors does not compromise the integrity of these sites. The impact of visitors in front of Mapungubwe Hill must also be monitored.
5. The dormitories and Office Complex have no direct or indirect impact on the attributes that convey Mapungubwe's OUV. In fact, they only enhance them.

1.1. Introduction

Any visitor to the UNESCO World Heritage listed component of the Mapungubwe Cultural Landscape World Heritage site (Fig 1 & 2) will observe that culture on which the nomination mostly rests on, is playing second fiddle to biodiversity conservation. Of course, it cannot be denied that culture and biodiversity are an element of the same and that the bifurcation of heritage into nature and culture is artificial but the fact remains that the cultural heritage components of the Mapungubwe Cultural Landscape are not being well profiled. This is the view of two independent UNESCO Reaction Monitoring visits to Mapungubwe, one in 2010 and another in 2012. During the visits, ICOMOS observed that apart from conservation challenges, the status of the most important sites of Schroda, K2 and Mapungubwe was compromised by a lack of information for the visitors. Furthermore, the integrity of the entire listed portion is compromised by the fact that most objects from the original excavations of the 20th century are currently not being curated on the landscape. The objects are either in Pretoria or Johannesburg where they have been housed without detailed studies since excavation. One of the recommendations in the nomination dossier was that adequate infrastructure must be constructed to make the repatriation of objects possible.

In response to these historical facts and the challenge of profiling cultural heritage within the listed portion of the Mapungubwe Cultural Landscape and World Heritage site, Sanparks proposes to construct visitor orientation facilities at Mapungubwe Hill, Schroda and Smuts House section of the Limpopo River and conservation facilities that include dedicated office space for archaeologists and conservators, as well as dedicated research and conservation laboratories and storage space in the area adjacent to the existing staff quarters just outside the boundary of the listed portion in the buffer zone. Sanparks further proposes to build hostels and a restaurant to house visitors including researchers and school children coming to experience the landscape. These facilities will hopefully attract more visitors who will stay for longer and enjoy the cultural landscape better.

The purpose of this HIA is to assess the direct, indirect and cumulative impact of these proposed developments on attributes that convey Mapungubwe's Outstanding Universal Value (OUV). The proposed development is located inside and outside the listed area of Mapungubwe. The proposed developments at Mapungubwe Hill, Schroda and the Smuts section of the Limpopo River are all in close proximity to attributes that convey Mapungubwe's OUV. The dormitories are on the southern boundary of the core, in an area that has been previously developed. The proposed office complex is however on the buffer zone, outside the core of the property. This HIA is informed by the ICOMOS Guidelines for Assessing Impact near World Heritage places (ICOMOS 2011) and the provisions of the National Heritage Resources Act of 1999.

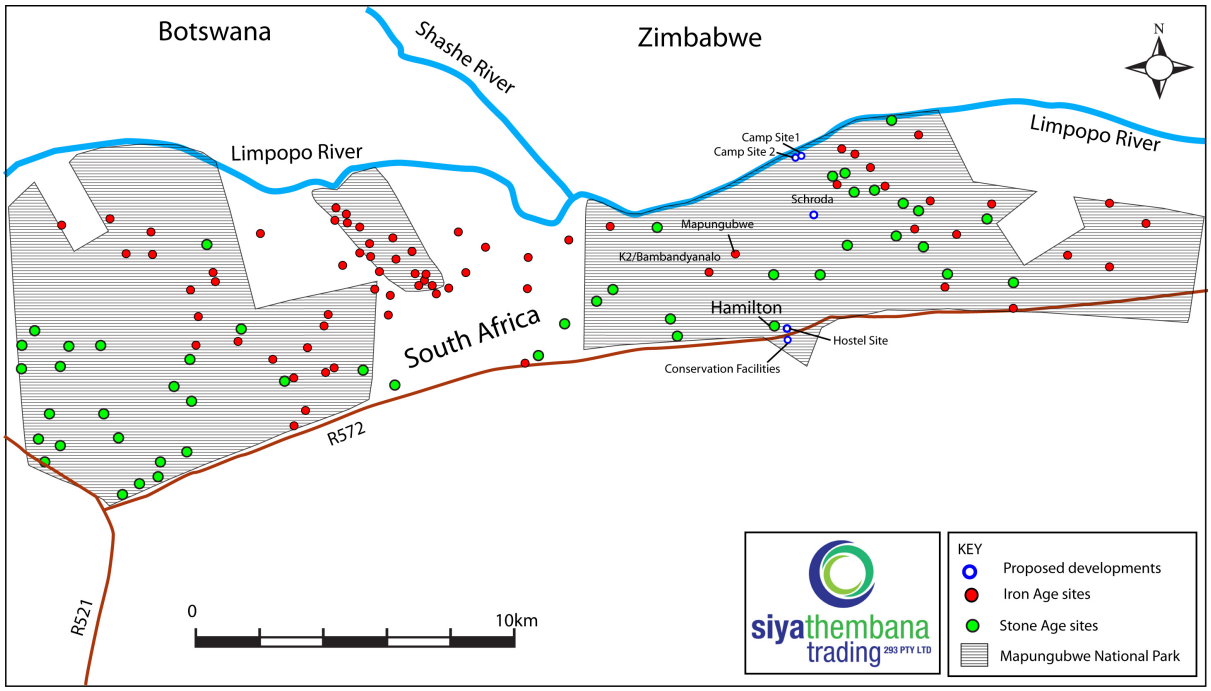

Fig 1 shows the location of the proposed developments in relation to Mapungubwe Hill

The Mapungubwe Cultural Landscape World Heritage Site is one of South Africa's eight World Heritage Sites (Fig 2). It was inscribed on the World Heritage List in June 2003 owing to its Outstanding Universal Value. Mapungubwe is situated in the north most part of Limpopo Province near the Shashi-Limpopo confluence area, the meeting point for the boundaries of the three countries of Botswana, South Africa and Zimbabwe (Fouche 1937; Pikirayi 2001;

Huffman 2007). However, the Mapungubwe cultural landscape is estimated to be 30 000 square kilometers in size and extended to parts of Botswana and Zimbabwe in an area that is proposed for a Trans frontier Conservation Area (TFCA). The core currently limited to the South African side, stretches eastwards from Pont Drift in the west for about 35km to Schroda in the east, and stretches southwards mostly less than 10 km from the Limpopo River in the north to the tarred road linking Pont Drift and Messina in the south (Deacon and Norton 2003). The 24 original farms, some of which have been subdivided over the years, comprise 28 168.66 ha but some of the farms are yet to be acquired (SANParks Management Plan 2012).

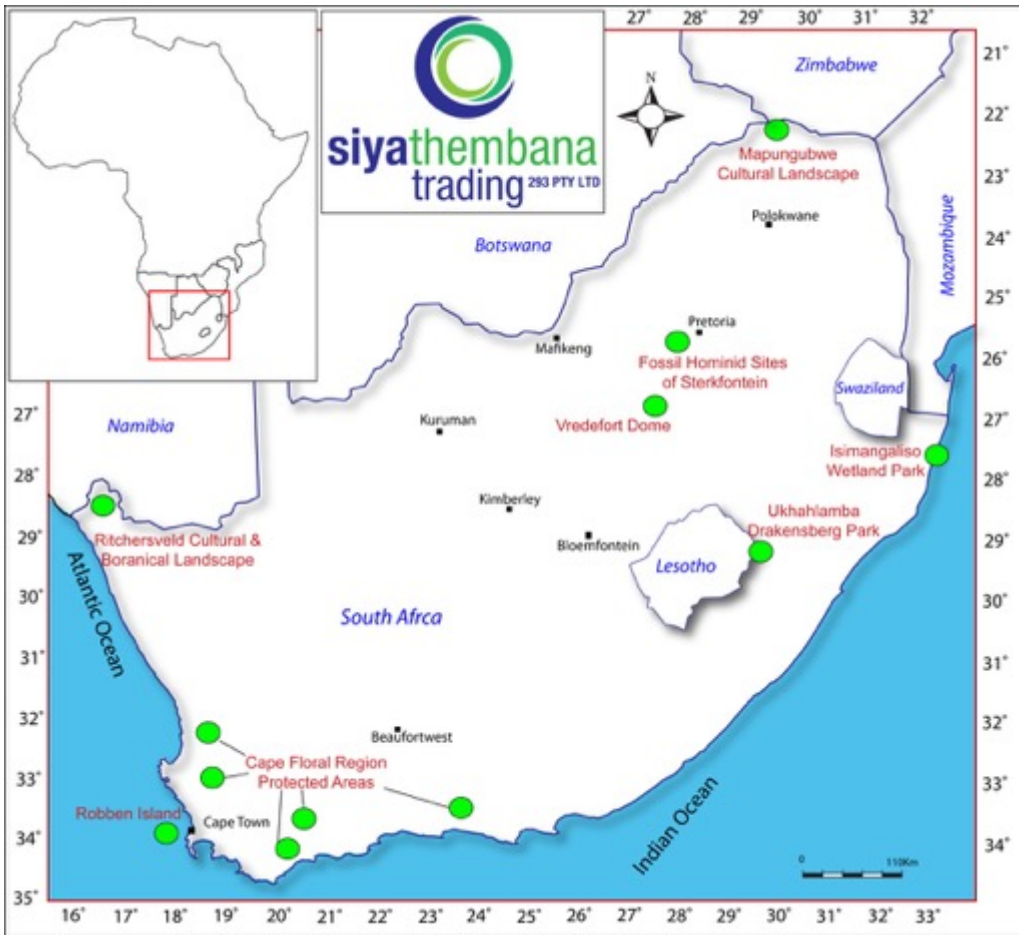

Fig 2 Location of Mapungubwe cultural Landscape World Heritage Site in relation to South Africa's other World Heritage Sites (Compiled by: Siyathembana Research)

Based on the nomination dossier, the coordinates for the core of Mapungubwe Cultural Landscape are the following:

NW corner 22°12'56"S 29°08'22"E

NE corner 22° 10'1 O"S 29°29'04"E

SE corner 22°14'15"S 29°31'35"E

SW corner 22°17'40"S 29°12'00"E

According to the Mapungubwe Retrospective Statement of Outstanding Universal Value (2011), the Mapungubwe Cultural Landscape demonstrates the rise and fall of the first indigenous kingdom in Southern Africa between 900 and 1300 AD. The core area hosts remains of three major capitals of Schroda (Zhizo, AD800-1000), K2 (Leopard's Kopje, AD1000- 1220) and Mapungubwe Hill (Leopard's Kopje, AD1220-1290) and surrounding settlements. There are also sites of hunter-gatherer and farmer interaction which demonstrate landscape sharing between the two groups (Deacon and Norton 2003). The remains of this famous kingdom, when viewed against the present day fauna and flora, and the geo-morphological formations of the Limpopo/Shashe confluence, create an impressive cultural landscape of universal significance (Mapungubwe Retrospective Statement of Outstanding Universal Value 2011). This OUV in the case of Mapungubwe formally encapsulated in the statement of significance, was fixed by the World Heritage Committee at the time of inscription. From 2007, the World Heritage Committee introduced the Statement of OUV thereby explaining why Mapungubwe has a Retrospective Statement of OUV. Either way, OUV defines the thinking at the time of inscription and is non-negotiable (ICOMOS 2011).

The Mapungubwe Cultural Landscape World Heritage site is legally protected through the National Heritage Resources Act (No 25 of 1999), the World Heritage Convention Act (No 43 of 1999) and the National Environmental Management Act (No 73 of 1989). The property is also recognized as a protected area in terms of the National Environmental Management Protected Areas, 2003 (Act 57 of 2003). The State Party represented by the Department of Environmental Affairs manages the site through SANParks. SANParks provides overall

management involving coordinating government and local community efforts to conserve the site.

Because of constant developmental pressures around World Heritage sites, ICOMOS established guidelines for assessing impact in a consistent and robust way (ICOMOS 2011). This standard of best practice is meant to ensure that the integrity of World Heritage properties, their buffer zones or their wider setting is adequately protected. In conformity with this international standard of best practice, the Department of Environmental Affairs requested Sanparks to commission an HIA to assess the potential direct, indirect and cumulative impact of its proposed construction of visitor orientation facilities, hostels and conservation infrastructure in the core and buffer zone of Mapungubwe. Sanparks in turn contracted Siyathembana Trading, an independent consulting company to assess impact in line with ICOMOS Guidelines.

1.2. Developments in World Heritage properties: the big challenge

Uncontrolled development poses a very strong risk to the integrity of attributes that convey OUV of World Heritage sites. However, controlled development enhances the same attributes and creates employment opportunities resulting in sustainable development. Within the context of sustainable development, such development must protect the integrity of the World Heritage property, maximise benefits and minimise adverse impacts, respect different value systems and among others considers the interest of various stakeholders (ICOMOS 2011).

1.3. The ICOMOS Guidance on Heritage Impact Assessments for Cultural World Heritage Properties (2011)

The International Council of Monuments and Sites (ICOMOS) has established guidelines for carrying out impact assessments to ensure that attributes that convey OUV of listed

properties is safeguarded. According to the guidelines, the statement of Outstanding Universal Value is the pedestal on which impacts – direct, indirect and cumulative can be assessed. However, professional judgment is required on a case-by-case basis. The ICOMOS Guidelines define direct, indirect and cumulative impacts. Direct impacts are those which result in the total destruction or altering of attributes that convey OUV of a World Heritage property. Indirect impacts are those whose impact is not clearly visible and quantifiable while cumulative impacts refer to the sum of direct and indirect impacts in the short and medium to long term (ICOMOS 2011). This assessment makes use of 2011 ICOMOS guidelines.

1.4 OUV Impact Assessment Methodology

The methodology employed in this study is based on the ICOMOS Guidance on Heritage Impact Assessments for Cultural World Heritage Properties (ICOMOS 2011). This guidance sets out a methodology to allow HIA to respond to the needs of World Heritage sites, through considering them as discrete entities and evaluating impact on the attributes of OUV in a systematic and coherent way. Importantly, ICOMOS states that any World Heritage property's OUV is fixed by the World Heritage Committee at the time of inscription and is non-negotiable. The methodology included desk based research, dedicated field evaluations, GIS mapping and plan viewing, spatial rendering, interviews with stakeholders and peer review. The literature search indicated that while international best practice is vital, ultimately, it is the local situation and local history that is important in determining risk profile, potential benefits to conservation and other potential impacts of any proposed development on heritage (UNESCO et al. 2011). The rest of the methodology is explained in the sections below.

1.4.1 Data sources

Objective and useful impact assessments depend on good quality data and are thus key to effective decision making. A stepped approach was developed to collect data for this study. To begin with, a desktop study was carried to search for information in both published and unpublished sources. Online databases such as Google Earth and Google Scholar were also consulted together with that hosted by SANParks. Interviews were also carried with the

manager for Mapungubwe World Heritage site and other officials responsible for cultural heritage management within Sanparks.

1.4.2 Published works

A number of published works on the archaeology, history and palaeontology of the Limpopo-Shashi confluence area where Mapungubwe is located were consulted extensively. This included dedicated works by archaeologists such as Manyanga (2001; 2007; 2009); Huffman (2000, 2007; 2010; 2012); Huffman & du Piesanie (2011) Schoeman (2006); Hall & Smith (2000); van Doornum (2006; 2007); Eastwood (1999, 2003, 2005); Eastwood & Blundell (1999); Eastwood & Cnoops (1994, 1999); Eastwood, Cnoops, Venter & Fish (1997); Murimbika 2006; Kuman, Gibbon & Le Baron 2005; Gibbon (2002) and Pollarolo et al (2010).; The geological map of Alldays was also consulted to understand the likely occurrence of palaeontological resources in the area (Brandl 2002). Historical works on the area consulted include Bonner and Caruthers (2003), Ralushai (2005), Huffman (2012), and Caruthers (2006). Furthermore, the study also drew heavily from published ICOMOS and UNESCO World Heritage Committee documents and publications. Finally, the Siyathembana team also consulted the recent publications on community participation in the management of World Heritage sites (Chirikure and Pwiti 2008; Chirikure et al. 2010; Meskell 2011; Pikirayi 2012). Finally, the Reports of the first and second UNESCO Reactive Monitoring Missions published on the World Heritage Centre website were also studied (Munjeri and Elandou-Assomo 2010; Elandou and Avango 2012). The published information assisted in the identification of individual attributes that convey Mapungubwe's OUV. Furthermore, they also contain significant information on threats posed to the Mapungubwe Cultural Landscape. Such a comprehensive overview was critical to meet one of the main recommendations by ICOMOS (2011) that the 'basis for management and decision making is a good understanding of the World Heritage Property, its significance and OUV, its attributes and its context'. This was also fundamental for laying a platform for objective impact assessment.

1.4.3 Unpublished reports

A wealth of unpublished reports was also consulted. These include previous archaeological impact assessment reports around the Mapungubwe Cultural Landscape World Heritage Site. The Integrated Management Plan for the Mapungubwe World Heritage Site formed a key component of our study. This is largely because it focuses on ensuring that the individual and collective attributes that convey OUV of Mapungubwe are effectively protected. It also contains information on the general types of threats. This made it easier to consider the proposed development by Sanparks in relation to the broader landscape thereby meeting a key requirement of the ICOMOS Guidelines.

1.4.4 Databases

Our team consulted SAHRIS database to understand the distribution and location of archaeological, historical and sacred sites within around the project receiving area (Fig 3). This area was plotted on a distribution map. Google Earth was also used to view the sites on the landscape and also to develop a qualitative feeling of the broader landscape. This is possible because Google Earth allows users to zoom into specific areas to view the detail on the ground.

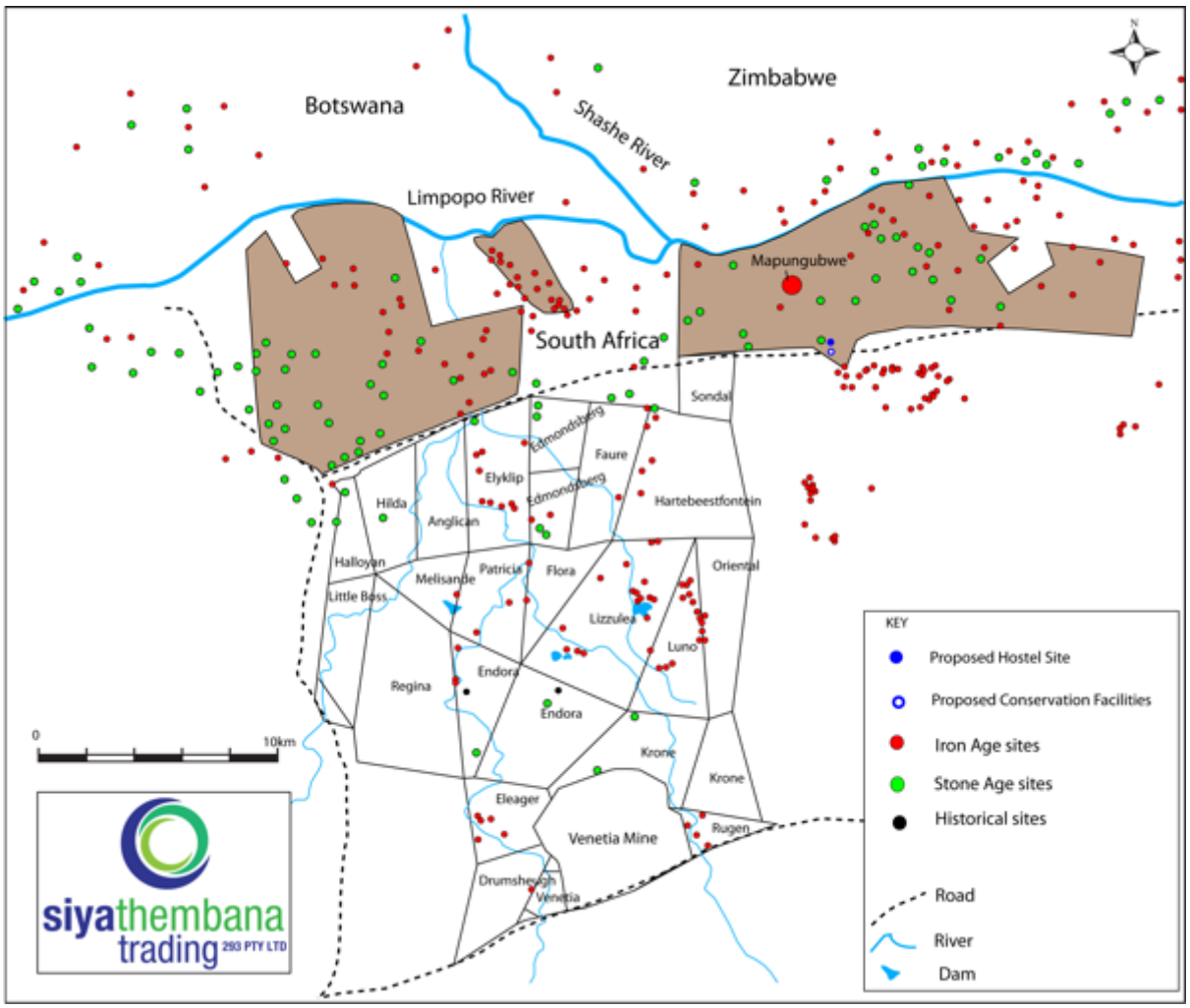

Fig 3 shows the different sites recorded on SAHRIS and by other researchers such as Huffman (2011).

1.4.5 Field Surveys

The process of the field survey was highly informed by the need to clearly and objectively assess impact on individual sites and collectively. Visits were made to the sites for proposed development as well as the key sites of Mapungubwe Hill, K2 and Schroda to assess the likely impact of the visitor orientation infrastructure and dormitories and conservation facilities. To record observations, a data capture sheet with ICOMOs Assessment Criteria was developed. Photography formed an important part of the documentation process.

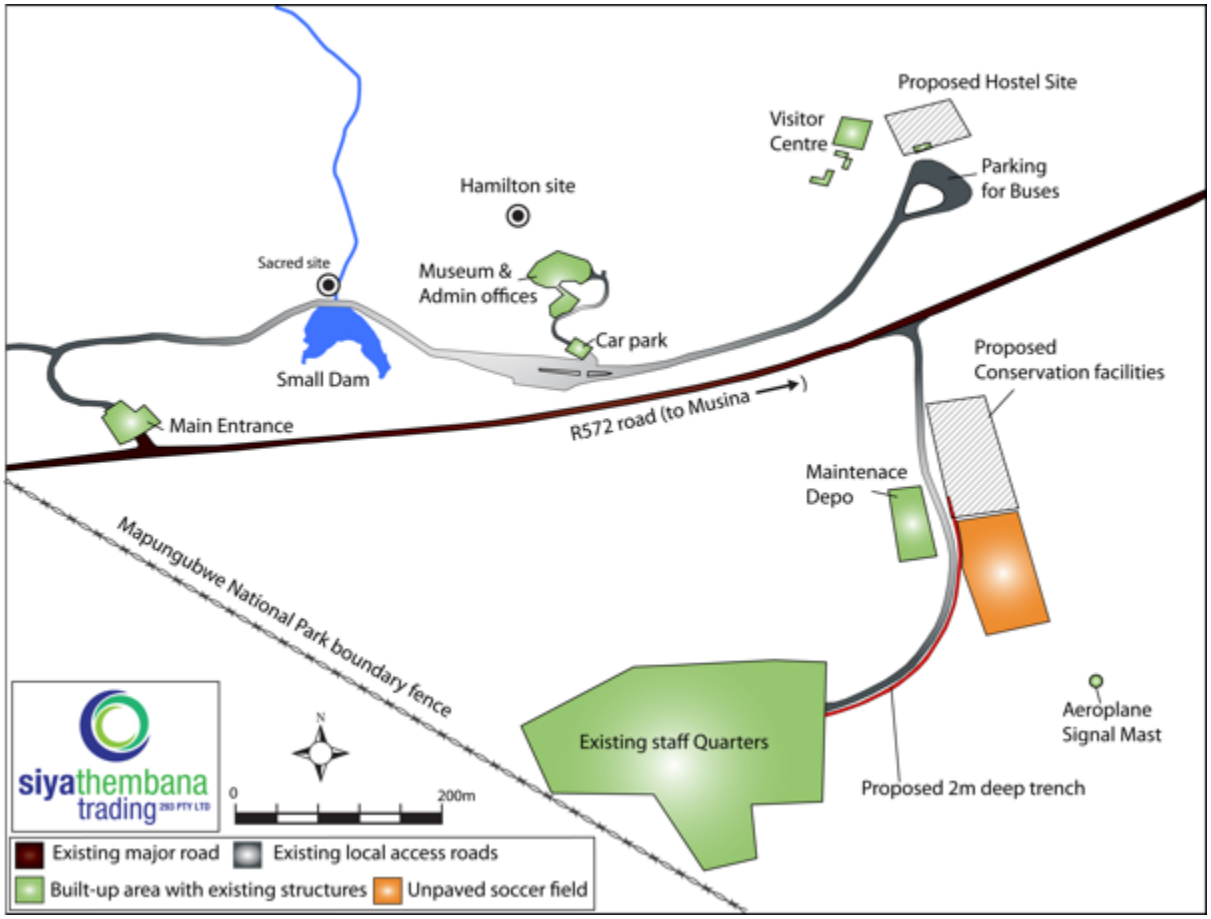

Fig 4 shows the proposed Office Complex and Dormitories sites in relation to Hamilton site

1.4.6 Assumptions and Limitations

Field work conducted for this HIA did not include any form of subsurface inspection beyond the inspection of burrows and the sections exposed by erosion or other forms of disturbances. Some assumptions were made as part of the study and therefore some limitations, uncertainties and gaps in information would apply. It should however, be noted that these do not invalidate the findings of this study in any significant way. No excavations or sampling were undertaken, since a permit from heritage authorities is required to disturb a heritage resource. As such the results herein discussed are based on surface indicators including the density and concentration of archaeological objects.

1.4.7 Site Description and History

The Mapungubwe Cultural Landscape World Heritage Site is situated in Limpopo Province, near the Shashe-Limpopo confluence area (Figs 1 & 2). It was inscribed on the World Heritage List in June 2003 owing to its Outstanding Universal Value. In the late 19th century, the area was a vibrant elephant hunting ground. A number of commercial hunters purchased farms in the area while local people were moved away after the establishment of colonialism to make way for European settlement. General Smuts had a vision for creating a Dongola national park but lost power before he achieved his vision. Research in and around the Mapungubwe Cultural Landscape began sporadically but gained impetus with the discovery of gold rich burials on top of Mapungubwe Hill in 1933. It has been argued that a local man by the name of Mowena led the van Graan family to the location of Mapungubwe Hill. A series of events resulted in the long term involvement of the University of Pretoria in and around Mapungubwe. The excavations were led by Fouche (1937) and exposed material culture rich burials of huge significance. Continued work in the area resulted in the excavations at the site of K2 by Gardiner (1963). Together K2 and Mapungubwe had abundant material culture of foreign and local provenance testifying to their importance. The two sites belonged to the Leopard's Kopje which was widely distributed in south-western Zimbabwe and adjacent areas (Robinson 1959). Continued work by Meyer (1998) resulted in the delineation of a robust chronology for Mapungubwe and K2. Hanisch (1981) excavated an archaeological site on the farm Schroda which yielded glass beads, metalworking evidence and a large cache of figurines. Huffman (1982, 2000) synthesized these important discoveries and concluded that the sites Schroda, K2 and Mapungubwe were very important because they are associated with the evolution of southern Africa's first state systems. Schroda (AD800-1000) was a Zhizo level 3 capital that was networked within the Indian Ocean trading network. After its decline, it was succeeded by K2 (AD1000-1200). While K2 was organized following the Central Cattle Pattern, a series of ideological transformations resulted in power shifting to the summit of Mapungubwe Hill, initiating the Zimbabwe culture pattern characterized by elite occupation of the hilltop while commoners resided on the flats. This made Mapungubwe the first Zimbabwe culture capital.

In the 1980s De Beers started prospecting on farms near the Shashi-Limpopo confluence and discovered diamonds. The mining started at Venetia in 1992. De Beers purchased a series of farms to create the Venetia Limpopo Nature Reserve. It also donated some of the land resulting in the creation of the Mapungubwe Dongola National Park. In 2003, more farms were added resulting in the creation of the Mapungubwe Cultural Landscape World Heritage Site. The individual sites of K2, Mapungubwe, Schroda and Leokwe are all National Heritage Sites as legislated by the National Heritage Resources Act of 1999 (Deacon and Norton 2003).

The broader Mapungubwe Cultural Landscape is characterized by the following archaeological (see Fig 3) and paleontological heritage resources:

- Remains of early settlement attributed to the Stone Age (Le Baron, Kuman & Grab 2010; Pollarolo & Kuman 2009; Van Doornum 2005; 2007; Wilkins, Pollarolo & Kuman 2010), the Early Iron Age (Huffman 2007; Manyanga 2007) and rock art traditions (Eastwood 1995; Eastwood & Cnoops 1999; Hall & Smith 2000).
- Archaeological remains testifying to the beginnings of Mapungubwe dating from AD 900 to AD 1200 AD, represented by Zhizo and Leopard's Kopje cultures or communities (Calabrese 2005; Hanisch 1980; Huffman 2007; Manyanga 2007; Tsheboeng 2001)
- Remains of palaces dating to the Mapungubwe period, AD 1200 to 1300 (Huffman 2007; Meyer 1998).
- 'Natural' landscape surrounding the built remains;
- Intangible heritage, which comprises Mapungubwe Hill itself that is associated with sacredness, beliefs, customs and traditions of local communities (Murimbika 2006; Schoeman 2006).
- Living and intangible heritage that is associated with continuing traditions of rain making, and participation by local communities in reburial ceremonies (Murimbika 2006; Schoeman 2006).
- Landscape sharing and interaction between farmers and hunter-gatherers (van Doornum 2005, 2007).

- Remains of recent homesteads of Venda and Tswana people displaced in the area to make way for farms.
- Remains of old farm houses associated with early Boer settlement in the area.
- Recent burials of farmers and farm labourers.
- Plant leaf imprints, stem fossils and coal from the lower part of the Karoo-age sedimentary succession (Middle Permian) and the dinosaur fossils from the upper part (Late Triassic to Early Jurassic) of the Karoo-age sedimentary succession (Durand 2009).

1.4.8 Retrospective Statement of Outstanding Universal Value

This retrospective statement was taken from the World Heritage website. The ICOMOS Guidelines state that the statement of outstanding universal value lies at the core of impact assessment so we reproduce in it full.

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.

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. The remains of this famous kingdom, when viewed against the present day fauna and flora, and the geo-morphological formations of the Limpopo/Shashe confluence, create an impressive cultural landscape of universal significance.

Criterion (ii): The Mapungubwe Cultural Landscape contains evidence for an important interchange of human values that led to far-reaching cultural and social changes in Southern Africa between AD 900 and 1300.

Criterion (iii): The remains in the Mapungubwe Cultural Landscape are a remarkably complete testimony to the growth and subsequent decline of the Mapungubwe State which at its height was the largest kingdom in the African subcontinent.

Criterion (iv): The establishment of Mapungubwe as a powerful state trading through the East African ports with Arabia and India was a significant stage in the history of the African sub-continent.

Criterion (v): The remains in the Mapungubwe cultural landscape graphically illustrate the impact of climate change and record the growth and then decline of the Kingdom of Mapungubwe as a clear record of a culture that became vulnerable to irreversible change.

Table 1 Attributes that convey Mapungubwe's OUV after (Pikirayi et al. 2012)

UNESCO Criterion	List of Attributes that convey OUV
ii). Mapungubwe cultural landscape has evidence of interchange of human values	- The Limpopo River was important for local and international trade - Individual Zhizo, K2, and Mapungubwe Iron Age sites. Collectively, this ensemble of sites demonstrate interactions that led to far reaching social and cultural developments - Rock art, hunter-gatherer and Iron Age sites that demonstrate landscape sharing between farmers and hunting and gathering peoples - Archaeological objects that are testimony of local, regional and international interaction - Intangible values and living traditions associated with contemporary communities
iii). MCL contain remains that are testimony to the growth and subsequent decline of Mapungubwe which at its height was largest kingdom in the African subcontinent	- Individual Zhizo, K2, and Mapungubwe Iron Age sites. Collectively, this ensemble of sites demonstrates interactions that led to the rise and decline of Mapungubwe - Floodplains of the Limpopo River anchored the agriculture that sustained the state - Individual Khami, Venda, Sotho-Tswana and recent sites that show cultural succession in the MCL area

UNESCO Criterion	List of Attributes that convey OUV
iv). Establishment of Mapungubwe as a powerful state trading through the East African ports with Arabia and India was a significant stage in the history of the sub-continent.	- The Limpopo River was significant for local and international trade - Individual local and exotic objects that are testimony to the local, regional and international trade. Examples include gold objects, ivory objects, Persian glass beads, and Chinese porcelain - The Limpopo flood plains hosted elephants which were hunted for ivory - Natural landscape, rivers, valleys, mountains.

These attributes that convey Mapungubwe's OUV are threatened directly and indirectly by lack of strong governance, the poorly rehabilitated excavation trenches, commercial agriculture, game ranching, tourism and mining (Deacon and Norton 2003; Pikirayi et al. 2012; Elandou and Avango 2012). As such any proposed developments in the area must contribute to enhancing and not eroding the OUV of this landscape of Outstanding Universal Value.

1.5 Scope of Assessment

The proposed addition of facilities by Sanparks will affect previously disturbed land adjacent to the Day Centre within the core and next to the Contractor's Site and Staff quarters in the buffer zone across the road (Fig 5). Sanparks proposes to build hostels to accommodate visitors that include school groups, ordinary visitors and researchers. A restaurant will also be constructed. It is envisaged that this development will create numerous jobs for the local community. Across the road, Sanparks proposes to develop state of the art conservation facilities that will have dedicated office space for heritage managers, archaeologists and other specialists. There will be a dedicated laboratory where researchers can work. Lastly, these conservation facilities will also have atmosphere controlled storerooms that are very secure.

Hopefully this will support the repatriation of objects from Pretoria and Johannesburg to the cultural landscape. The height of the proposed facilities is all regulated and only materials that blend with the natural environment will be used.

Other developments will consist of the construction of visitor orientation facilities at Mapungubwe Hill, Schroda and the Smuts section of the Limpopo river. The design of these facilities factored in the possible negative visual impacts that may arise from the conservation processes.

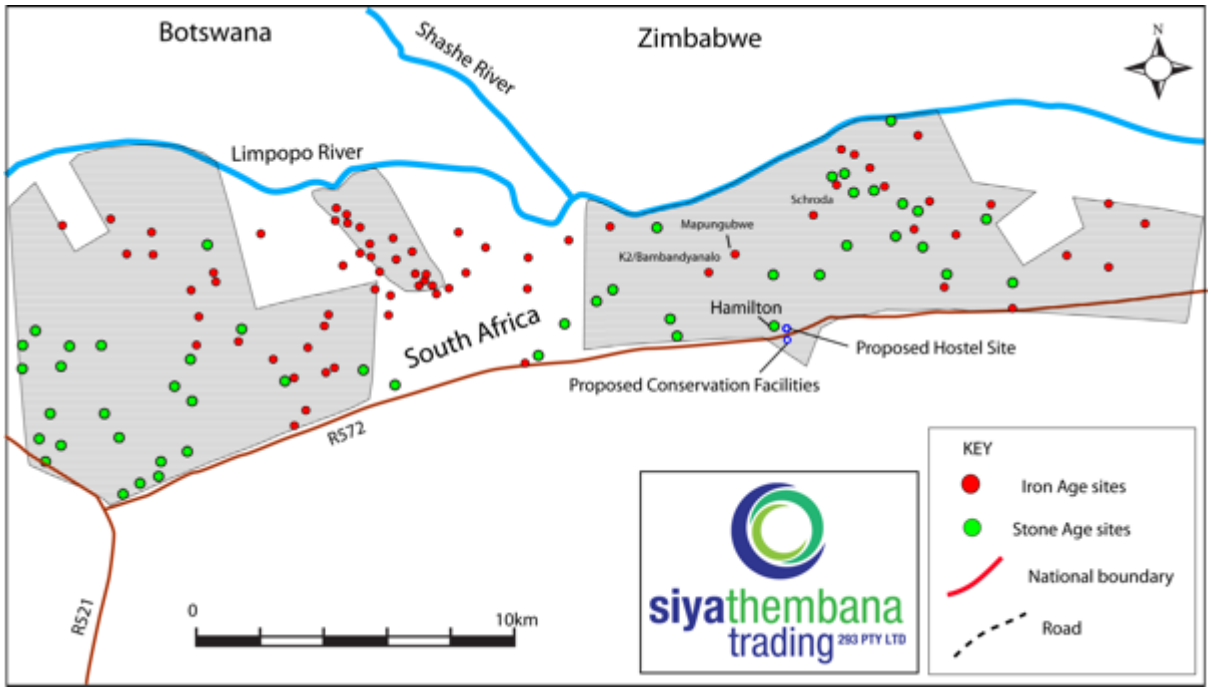

Fig 5 shows the proposed development sites

The following terms of reference were used to assess impact using ICOMOS Guidelines:

1) Identify heritage resources that make up the Mapungubwe Cultural Landscape World Heritage Site and its statement of OUV.
2) Assess the potential impact (both positive and negative as well as short and long term) of the proposed changes at the mine and its associated activities on the Statement of OUV for Mapungubwe Cultural Landscape World Heritage Site. Potential impact at all

stages of the mine lifespan (pre-mining, mining and closure stages) must be clearly indicated;

3) Generate mitigatory measures to enhance or curb the identified impact – this should include short and long term measures (clear indication of which ones are to run throughout the lifespan of the mine and its associated activities is critical);
4) Compile an HIA report in line with components of heritage that make up the Mapungubwe Cultural Landscape World Heritage Site and its Statement of OUV;
5) Make recommendations for beneficiation projects such as research, publications and community heritage projects, i.e. contribute to the knowledge of Mapungubwe for dissemination to the general public

1.6 Evaluation of Heritage Resource

According to ICOMOS, the core documentation in any impact assessment must be the statement of OUV and the identification of attributes that convey OUV individually and collectively. Based on the information from the ICOMOS Guidance and the South African Heritage Resources Agency standards of best practice, data capture forms were used to collect information from the field through condition surveys and observations. After the data was gathered from the field was combined with information from other sources it was deemed essential to assess all forms of impacts. The ICOMOS grading system was combined with that enshrined in the South African National Heritage Resources Act 25 of 1999. The following scale was used to assess significance:

Table 2: Classification Scale for Heritage sites significance

ICOMOS Ranking	South African Legislation (National Heritage Resources Act Ranking)
Very high (World Heritage Sites)	National Heritage Sites (Grade 1)
High (Nationally significant sites	National Heritage Sites (Grade 1), Grade 2 (Provincial Heritage Sites), burials
Medium (regionally significant sites)	Grade 3a
Low (locally significant sites)	Grade 3b
Negligible	Grade 3c
Unknown	Grade 3a

This scale was combined with data from desktop studies and stakeholder consultations to come up with objective impact evaluation systems.

1.7 Assessment of Scale of Specific Impact and Change

After valuing the resources, the next step was to look at the scale of specific impact and potential impact on the OUV. Positive and negative impacts on heritage resources take many forms: they maybe direct or indirect; cumulative, short term or long term, reversible or irreversible, visual, and physical. For these impacts to be relevant to the HIA study, they must be triggered by the proposed development (ICOMOS 2011).

Direct impacts are those that arise as a primary consequence of the proposed development or change of use. They can result in the physical loss of part or all of an attribute, and/or changes to its setting - the surroundings in which a place is experienced, its local context, embracing present and past relationships to the adjacent landscape (ICOMOS 2011). In the process of identifying direct impacts effort must be invested in considering cumulative impact because little impact on a few sites may cause extensive damage on a large scale. By their nature, direct impacts are associated with the development footprint and result in physical

loss such that they constitute a major threat to OUV. Direct impacts resulting in physical loss are usually permanent and irreversible.

Indirect impacts occur as a secondary consequence of construction or operation of the development, and can result in physical loss or changes to the setting of an asset beyond the development footprint.

The scale or severity of impacts or changes can be judged taking into account their direct and indirect effects and whether they are short or long term, reversible or irreversible. The cumulative effect of separate impacts should also be considered. The scale or severity of impact was ranked qualitatively without regard to the value of the asset as follows:

- No change
- Negligible change
- Minor change
- Moderate change
- Major change

NB: Major change refers to change that is irreversible and would result in the loss of physical integrity of the heritage resource (ICOMOS 2011).

The overall impact on an attribute is a function of the importance of the attribute and the scale of change as recorded on data capture forms. Following ICOMOS Guidelines this was summarized for individual attributes using the following nine descriptors from major beneficial on one end of the scale to major adverse on the other with neutral as its centre point.

- Major beneficial
- Moderate beneficial
- Minor beneficial
- Negligible beneficial
- Neutral
- Negligible adverse
- Minor adverse

- Moderate adverse
- Major adverse

NB. Beneficial refers to actions that enhance the value of heritage assets, while adverse refers to actions that result in the erosion of value.

International best practice indicates that every reasonable effort should be made to avoid, eliminate or minimise adverse impacts on attributes that convey OUV and other significant places. Ultimately, however, it may be necessary to balance the public benefit of the proposed change against the harm to the place (ICOMOS 2011; UNESCO et al. 2010). In the case of World Heritage properties this balance is crucial.

1.7 Evaluation of Overall Impact

The production of themed maps was important in the evaluation of overall impact. Spatial rendering exposed the disposition of attributes; the relationships between the attributes (which may be processes), and the association's attributes have such as visual, historical, religious, communal, aesthetic or evidential. The data captured on the forms was carefully studied to assess the overall impact. In the end, positive and negative as well as direct and indirect impacts of the proposed addition of facilities were measured based on the data collected through the methods outlined.

1.8 Definition of the Assessment Area

As required by the project brief, the area of the assessment was the core of the Mapungubwe Cultural Landscape, and the proposed development footprint on the southern portion of the core and the adjacent portion of the buffer zone (Figs 6 to 12).

1.9 Description of Changes or Developments Proposed

Sanparks proposes to add facilities to provide for conservation and research facilities and accommodation for visitors to the Mapungubwe Cultural Landscape World Heritage site (Fig 4). The proposed activities will involve the following:

.

- Office Complex with bulk services like water, electricity and sewage outside the core area but on the side opposite the Interpretation Centre (Fig 6).

Figure 6: Google Earth Image of Proposed Office Complex site (Courtesy: SanParks)

- Dormitories to accommodate visiting School groups with bulk services like water, electricity and sewage (Fig 7).

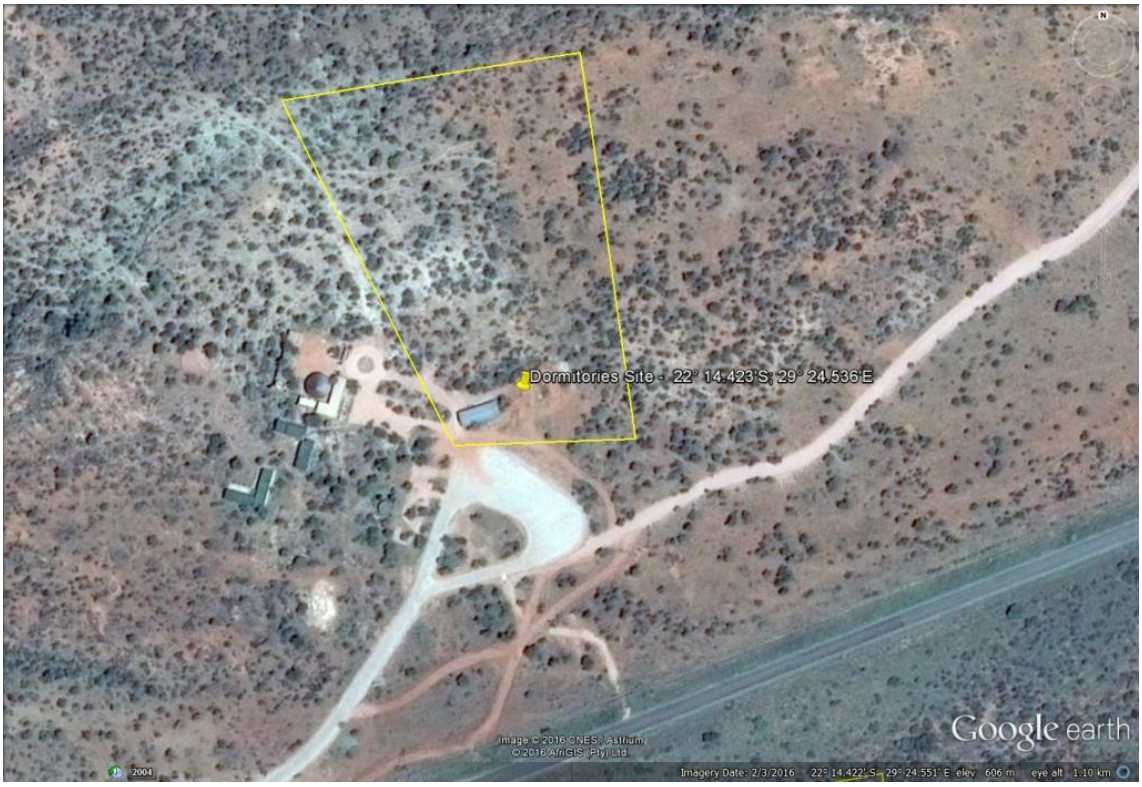

Figure 7: Proposed dormitories site (Courtesy: SanParks)

- Visitor Orientation area at Mapungubwe Hill which might include ablution facilities, small pathway, boardwalk crossing a water stream (Fig 8)

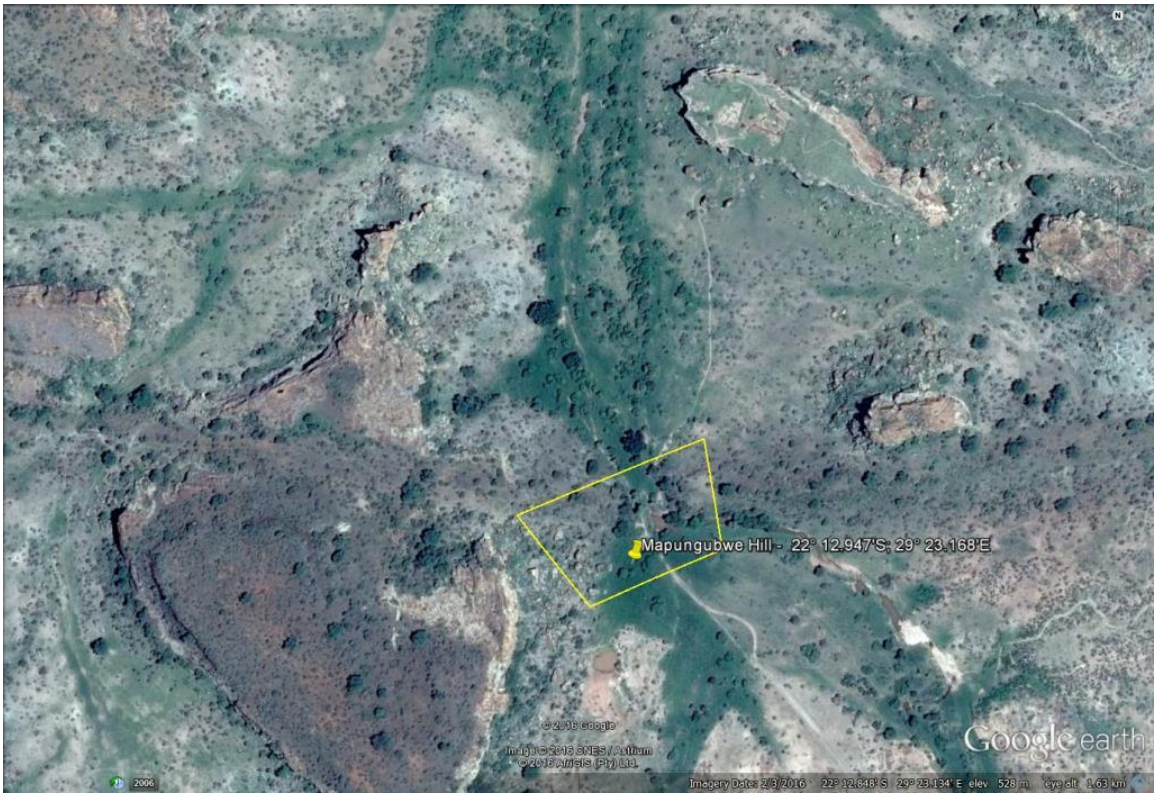

Figure 8: Proposed visitor orientation area at Mapungubwe (courtesy: Sanparks)

- Orientation area with Pathways and Boardwalk at Schroda (Fig 9)

Fig 9: Proposed visitor orientation area with boardwalk at Schroda (courtesy: SanParks). Note that the actual location of the boardwalk must be determined after the development of a sensitivity map.

- Two camping areas at the Smuts house section which might include ablution facilities (Figs 10 and 11).

Fig 10: Proposed camping site 1 (Smuts section) (Courtesy: SanParks)

Fig 11: Proposed camping site 2 (Smuts Area) (Courtesy: SanParks)

After construction, the developed area will be landscaped using techniques that will blend the area with the natural environment. Heights will be kept to a minimum. From a heritage point of view, any disturbance of the ground has potential to impact on sites, both known and unknown. For Schroda and Mapungubwe, permits are required before earth moving activities. However, if impacts are minimized or mitigated then the damage to the heritage is minimized.

1.10 Assessment and Evaluation of Overall Impact of the Proposed Changes

The proposed visitor orientation facilities will enhance the attributes that convey OUV of Mapungubwe and Schroda. However, the construction of the facilities may impact on cultural material and as such must be monitored and carefully managed. The proposed dormitories and office block will be restricted to an area, which has historical infrastructure whose impact on Mapungubwe's OUV was continuously assessed and monitored from the time of nomination up to the present (Deacon and Norton 2003). Therefore, the proposed addition of facilities neither directly nor indirectly affect individual attributes that convey Mapungubwe's OUV. The visual impact will be minimal and has been controlled for. However, the proposed development will greatly enhance the attributes that convey OUV in that more research on the core will generate more information that will educate the public. Apart from creating the much needed employment opportunities in line with sustainable development, the proposed development will address some of the concerns of organizations such as ICOMOS and UNESCO that cultural heritage is not being well profiled in the area.

Core and buffer areas

The proposed development will have a physical direct impact on Schroda, Mapungubwe Hill and the Limpopo River (Figs 11-12). However, the impact can be managed through the development of risk maps to ensure that facilities are sited on areas with minimal impact. The new facilities will however use existing infrastructure such as roads.

Fig 11 shows the Limpopo River which is an attribute that convey Mapungubwe's OUV. The impact of the proposed developments on Smuts House must be continuously monitored (Photo credit: Siyathembana Research)

Fig 12 Mapungubwe Hill has no interpretation centre. It is important to develop an interpretation facility.

1.11 Impact on the Cultural Setting of the Broader Mapungubwe Cultural Landscape

The Mapungubwe cultural landscape is much broader than the listed area. The proposed development aims to enhance the attributes that convey OUV of Mapungubwe. Given the small scale nature of the proposed facilities addition, the visual impact is very low together with the negative impact on the sense of place. In fact, the construction of research and conservation facilities will have a beneficial effect on Mapungubwe in that visitors will appreciate the cultural landscape better. The restaurant and hostels will also create additional employment opportunities. However, the boardwalk on Schroda must only be sited following the development of a sensitivity map to avoid cultural deposits. Any structures erected must have a low visual impact on the site too! All in all the proposed project has a positive impact

on the broader landscape and will profile cultural heritage to desired level as per recommendations from the UNESCO Reactive Monitoring Missions of 2010 and 2012.

1.12 Summary and Conclusions

Based on an interdisciplinary methodology, that combined ICOMOS methodology with several techniques from various disciplines, the impact of the proposed addition of facilities at Mapungubwe by Sanparks on the attributes that convey Mapungubwe's OUV was considered individually and cumulatively. The following conclusions were reached:

The assessment reached the following conclusions:

1. The proposed Office Complex and Hostel sites have already been previously disturbed by building and other activities. No sites were found on these areas.
2. No heritage sites were found on the proposed development footprint at the Smuts house section of the Limpopo River.
3. Schroda is a very sensitive site that contains a significant amount of middens and cultural material spread over a wide area. However, there is no information to orient visitors.
4. The proposed Mapungubwe Visitor Information Centre does not have a visual impact on Mapungubwe Hill. However, there is cultural material on a small hill to the east, directly in front of the proposed site, across the river.
5. The proposed project will have direct and indirect impact on the attributes that convey the OUV of Schroda, Mapungubwe Hill and the Limpopo River.
6. If implemented, the project will enhance the profile of the cultural attributes of Mapungubwe Cultural Landscape World heritage site beyond the current biodiversity dominance.

Recommendations

1. The proposed facilities at Schroda must be preceded by the development of a risk sensitivity map of the site. Any ground disturbance must be authorized through a permit from the South African Heritage Resources Agency.

2. The installation of boardwalks either on the deposit or in a suspension system must be monitored by a qualified archaeologist.
3. The proposed Mapungubwe Hill Interpretation Centre must be preceded by the development of a risk sensitivity map to ensure that areas with cultural material on the eastern side are avoided.
4. There is need to develop a robust monitoring plan to ensure that opening up of Schroda, and Smuts section areas to visitors does not compromise the integrity of these sites. The impact of visitors in front of Mapungubwe Hill must also be monitored.
5. The dormitories and Office Complex have no direct or indirect impact on the attributes that convey Mapungubwe's OUV. In fact, they only enhance them.

Chapter 2: Archaeological Impact Assessment of the proposed addition of conservation facilities and hostels at Mapungubwe Cultural Landscape World Heritage Site

2.1. Management Summary

The management of Mapungubwe Cultural Landscape World Heritage site, contracted Siyathembana Trading 293 (Pty) Ltd, a consolidated environmental and heritage risk management company to conduct an Archaeological Impact Assessment (AIA) of the potential direct, indirect and cumulative impacts of the proposed addition of visitor orientation infrastructure, conservation facilities and hostels in and outside the core area. Direct impacts are those that result in the destruction of archaeological resources while indirect impacts have potential to affect but are unquantifiable. Cumulative impacts are the sum of both direct and indirect in the short, and medium to long term. The proposed development is adjacent to a pre-existing facilities and will be conducted on previously disturbed ground.

More importantly, the proposed development is spread across various areas that include the southwestern side of Mapungubwe Hill, Schroda, Smuts House section of the Limpopo River, the area east of the Interpretation Centre and the area in front of the contractor's office in the buffer zone. Best practice in terms of heritage management now advocates for the co-existence of conservation and development provided that adequate assessment and mitigation strategies are carried out (Kristiansen 2009; Makuvaza 2014). Although the extent of the proposed development is small, the sensitivity of the Mapungubwe Cultural Landscape demands an Archaeological Impact Assessment in terms of Section 38 of the South African Heritage Resources Act (No. 25 of 1999). In order to assess impact, Siyathembana devised a multi- stepped methodology that combined desktop studies with scoping online databases such as Google Earth and Google Maps. This enabled a detailed understanding of the archaeological resources around the proposed development, particularly those making up the Mapungubwe Cultural Landscape. The major categories of identified sites within the broader Mapungubwe cultural landscape belong to the following periods: Early Stone Age (2.5 million to 200 000 years ago), Middle Stone Age (200 000 to 30 000 years ago), Later Stone Age (30 000 to 2000 years ago), Early Iron Age (AD300 to 900), Middle Iron Age (AD900 to 1300), Late Iron Age (AD1300 to 1850) and historical sites (1850 to 1960). All these sites are protected by the National Heritage Resources Act and may not be disturbed or altered without permission from the South African Heritage Resources Agency.

Based on the results of desktop studies, the areas proposed for field walking were surveyed with a hundred percent coverage. In the context of Europe, Kristiansen (2009) has observed that there is a tendency to assess parts of the same development separately, with the result of under assessing the impact. As such, he calls for cumulative impact assessment as a standard of best practice. Siyathembana felt it extremely important to assess the impact

cumulatively because separating the two areas may produce misleading impact assessment results. Given the sensitive nature of the Mapungubwe Cultural Landscape in general, Siyathembana adhered to this rigorous standard of best practice. Furthermore, the South African Heritage Resources Agency now encourages cumulative impact assessment of potential impacts because this allows for informed decision making and assists in the gestation of sustainable mitigation strategies.

Based on this study, the following conclusions were reached:

1. No archaeological sites of all periods were recovered during the impact assessment of the area proposed for dormitories and office blocks.

2. Only the site of Hamilton was identified during the impact assessment for the dormitories and Office Complex site but it is already known and is adequately protected.

3. No negative direct, indirect or cumulative impacts of the proposed project on heritage sites in the Mapungubwe National Park were noted.

4. Schroda is very rich in middens and other accumulations of cultural material. There is no consolidated map of the site showing such a sensitivity.

5. The visual impact of the proposed visitor orientation center at Schroda must be assessed when plans are available.

6. No archaeological sites were found on the proposed sites on the Smuts section of the Limpopo River.

7. There are numerous instances of archaeological material on a low kopje across the small stream in front of the proposed orientation area at Mapungubwe. This area is outside the official map of Mapungubwe.

Based on the above conclusions, the following recommendations were made:

i. For the dormitories site, development may proceed subject to monitoring of the excavation trenches by a qualified archaeologist.

ii. For Schroda, a sensitivity map must be developed to explicitly expose the concentration of archaeological material. The design and nature of the boardwalk must be informed by such a map.

iii. Any excavation of trenches associated with the visitor orientation center and the boardwalk must be authorized by a permit from SAHRA.

iv. For Mapungubwe, there is need to update the map of the site to include peripheral areas near the proposed orientation center.

v. For the Smuts section, the impact of visitors must be robustly monitored and managed.

vi. Should any grave or human remains be encountered during the development, work must be stopped immediately and the developer should alert SAHRA Limpopo or the SAHRA Head office.

vii. The direct, indirect and cumulative impacts of the proposed development are very low for the dormitories and office complex sites and very high for Schroda, Mapungubwe and the Smuts section.

viii. As such, the development must be authorized, subject to the development of a very tight monitoring plan for Mapungubwe Hill, Schroda and the Smuts section of the Limpopo.

2.2 Stakeholders and people responsible for decisions

The following stakeholders are collectively and individually responsible for implementing the recommendations of this study:

1. Developer – Sanparks must ensure that no heritage sites are destroyed without permission from the relevant authority and that all chance discoveries are reported to the relevant authorities.

2. Archaeologists – Archaeologists must carry out detailed salvage work in the event of chance finds

3. The South African Heritage Resources Agency must ensure that the developer produces periodic reports as a way of monitoring to ensure that no unknown heritage sites are destroyed.

4. The Department of Environmental Affairs must ensure that the activities of Sanparks do not compromise the integrity of the Mapungubwe Cultural Landscape as broadly defined through continuous monitoring.

In summary, the archaeological impact assessment indicated that the area proposed for development is situated on the very sensitive Mapungubwe Cultural Landscape, particularly that at Mapungubwe and Schroda. However, no sites were found on the proposed development footprint for dormitories and office blocks. The visual impact is very low. On the whole, the proposed development is largely beneficial and must be encouraged.

2.3 Terms of reference

Siyathembana Trading 293 (Pty) Ltd was contracted by Sanparks to carry out an Archaeological Impact Assessment of the proposed construction of the following facilities:

(1) Office Complex with bulk services like water, electricity and sewage.
(2) Dormitories to accommodate visiting School groups with bulk services like water, electricity and sewage.
(3) Visitor Orientation area at Mapungubwe Hill which might include ablution facilities, small pathway, boardwalk crossing a water stream.
(4) Orientation area with Pathways and Boardwalk at Schroda
(5) Two camping areas at the Smuts house section which might include ablution facilities.

According to the SAHRA minimum standards, a specialist archaeological impact assessment report must clearly describe the nature of the project and terms of reference for the developer and achieve the following:

a. Identify and map the sites;

b. Assess their significance in terms of Section 7;

c. Comment on the impact of the proposed development on identified archaeological resources individually and collectively

d. Make recommendations for their mitigation or conservation

e. Consider alternatives, if archaeological resources will be adversely impacted.

The study carried out a wide ranging desktop research involving published material, unpublished dissertations and impact assessment reports followed by a 100 percent survey coverage of the areas proposed for development.

2.4 Introduction

Nowadays, heritage's contribution to sustainable development is universally acknowledged. As such, governments and inter-governmental bodies such as the African Union and UNESCO have made heritage one of the pillars of sustainable development. This means that heritage assets such as Mapungubwe must be developed to ensure that they contribute to sustainable development within a framework of compliance and good standards of conservation. Nationally, the South African government established the National Development Plan (NDP) to ensure that it meets key objectives such as reducing unemployment through job creation. In line with these national and international strategic goals, Sanparks seeks to develop hostels and conservation facilities to enhance the attributes that convey Mapungubwe's OUV. This in turn will create job creation opportunities. Furthermore, the facilities will contribute towards profiling cultural heritage of the area through stimulating new research and locally developed conservation solutions.

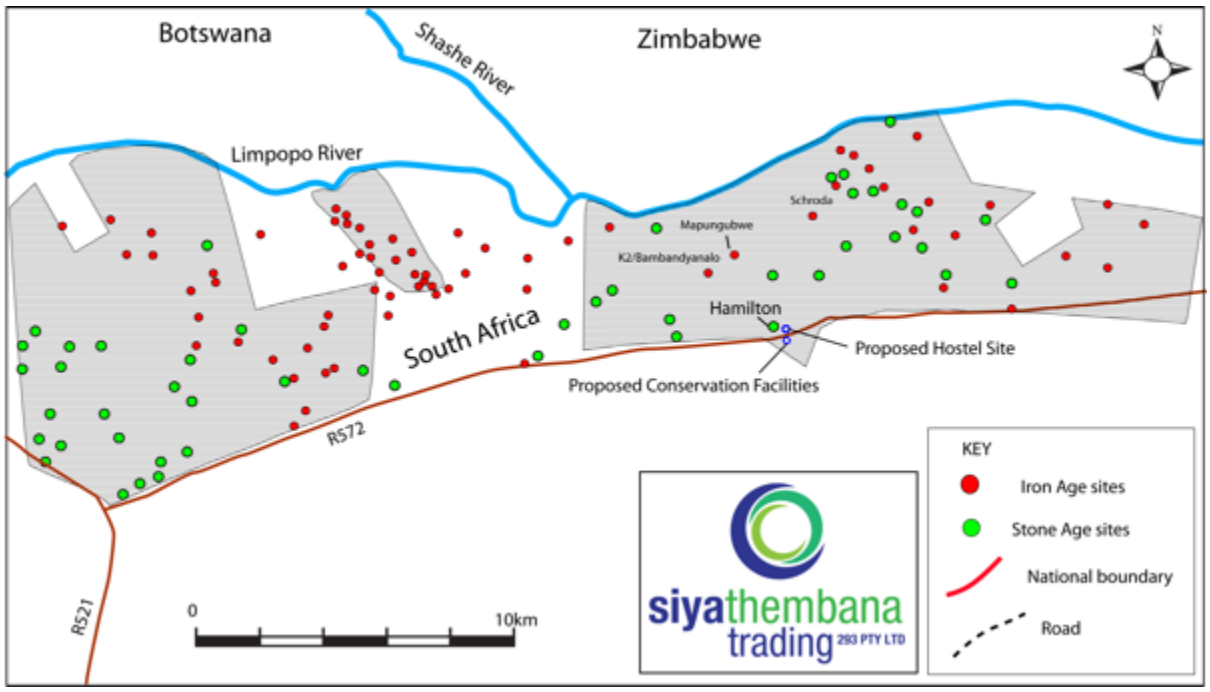

Figure 2.1: Map showing the location of proposed developments in and outside the core (Complied by Siyathembana Research)

Heritage resources are important in promoting social cohesion and hold significant scientific and cultural values (MacEachern 2010; AWHF & DEA 2013; Makuvaza and Chiwaura 2014). As such, the National Heritage Resources Act of 1999 mandates within a value based framework that as part of the national estate, heritage must be protected for present and

future generations. The act calls for impact assessments to be carried out to mitigate the potential impact of proposed developments on the heritage. The Mapungubwe Cultural Landscape, where the proposed development is situated, is highly significant. Part of this landscape was listed as a UNESCO World Heritage site in 2003 and hosts individual sites such as Leokwe Hill, Mapungubwe Hill and Schroda which are all National and Provincial Heritage sites in terms of the National Heritage Resources Act of 1999. As such, extra care must be taken to consider the potential impact of proposed developments on the attributes that convey the value of this landscape singly and in combination (Elandou and Avango 2012). The purpose of this study is to establish the archaeological sensitivity of the proposed development footprint in order to avoid or mitigate the potential impact that the development may have on archaeological sites. Additionally, the study also seeks to inform the developer about relevant legislative requirements and steps that should be followed before and or during the development process. To achieve the above objectives, the study combined desk based research with reconnaissance surveys.

The Mapungubwe Cultural Landscape is archaeologically layered (Deacon and Norton 2003). It consists of various layers of human occupation dating back millions of years. The earliest layer belongs to the Early Stone Age (ESA) (2.6 million – 200 000 BP) which is followed by the Middle Stone Age (MSA) (300 000 – 20 000 BP) and the Later Stone Age (LSA) (20 000 -to the recent historical time (last 2000 years) (Sampson 1974; 1984; Sadr 2008; Barham & Mitchell 2008). Then, there is the layer corresponding to Early Iron Age farmers in the first millennium AD (Huffman 2007). This layer is followed by Middle Iron Age peoples who are associated with the state capitals at Schroda, K2 and Mapungubwe. Subsequent to this various Late Iron Age peoples settled in the area. The last layers relate to colonial history and the early history of the twentieth century. The material signatures for all these cultural periods have been identified in the area under study and should be taken cognizance of.

2.5 Legislative context

The identification, evaluation and assessment of any cultural heritage sites, artifacts or finds in the South African context is required and governed by the following national and provincial legislations:

(a) National Heritage Resources Act (NHRA) Act 25 of 1999

(i). Protection of Heritage Resources – Sections 34 to 36; and

(ii). Heritage Resources Management – Section 38 (b) National Environmental Management Act (NEMA) Act 107 of 1998 - Sections 24(5), 24M and 44

(i). Basic Environmental Assessment (BEA) – EIA Regulation 22 (ii). Environmental Scoping Report (ESR) – – EIA Regulation 28 (iii). Environmental Impacts Assessment (EIA) – EIA Regulation 31

The NHRA of 1999 stipulates that cultural heritage resources may not be disturbed without authorization from the relevant heritage authority. Section 34 (1) of the NHRA states that "no person may alter or demolish any structure or part of a structure which is older than 60 years without permission from the relevant authority. Subsection 35(4) of the same act states that: No person may, without a permit issued by the responsible heritage resources authority-

• (a) destroy, damage, excavate or alter without permission any archaeological, palaeontological or meteorites;

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

The purpose of Chapter 5 in NEMA is to promote the application of appropriate environmental management tools in order to ensure the integrated environmental management of activities. To give effect to the general objectives of integrated environmental management laid down in Chapter 5, the potential consequences for or impacts on the environment of listed activities or specified activities must be considered, investigated, assessed and reported on. NEMA defines Environment as " the surroundings within which humans exist and that are made up of-

(i) the land, water and atmosphere of the earth;
(ii) micro-organisms, plant and animal life;
(iii) any part or combination of (i) and (ii) and the interrelationships among and between them; and
(iv) the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being

This Archaeological Impact Assessment report is meant to assist the developer to comply with the relevant South African legislations noted above and to ensure that development is done in a sustainable way. The legislation also provides useful working definitions on what constitute heritage resources, archaeological resources, cultural significance and development. The following definitions are adopted in this archaeological impact assessment report:

Heritage resources

This means any place or object of cultural significance

Cultural significance

This means aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance

Archaeological resources

This includes:

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

ii. rock art, being any 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 which is older than 100 years, including any area within 10m of such representation;

iii. wrecks, being any vessel or aircraft, or any part thereof which was wrecked in South Africa, whether on land, in the internal waters, the territorial waters or in the maritime culture zone of the republic as defined in the Maritimes Zones Act, and any cargo, debris or artifacts found or associated therewith, which is older than 60 years or which SAHRA considers to be worthy of conservation;

iv. features, structures and artifacts associated with military history which are older than 75 years and the site on which they are found.

Development

This means any physical intervention, excavation, or action, other than those caused by natural forces, which may in the opinion of the heritage authority in any way result in the change to the nature, appearance or physical nature of a place or influence its stability and future well-being, including:

i. construction, alteration, demolition, removal or change in use of a place or a structure at a place;
ii. carrying out any works on or over or under a place;

iii. subdivision or consolidation of land comprising a place, including the structures or airspace of a place;
iv. constructing or putting up for display signs or boards;
v. any change to the natural or existing condition or topography of land; and
vi. any removal or destruction of trees, or removal of vegetation or topsoil

2.6 Description of the project and the project area

When listed as a World Heritage site and National Park, a radical change of land use occurred on the farms that were consolidated to form the new protected area. Previously, the Limpopo Valley had been divided into various farms such as Greefswald, Schroda, Samaria and many others. The nomination for UNESCO World Heritage status resulted in the amalgamation of different landholdings under Sanparks. This also means that a lot of historical structures were also inherited. One of the major challenges related to the development of infrastructure to support cultural and natural heritage conservation. The South African government invested significant amounts of money into rehabilitating the sites of K2, Mapungubwe and Schroda and also in the construction of tourism support infrastructure such as the Interpretation Centre.

The Interpretation Centre consists of an exhibition hall but has no facilities for research and or conservation. The associated office blocks are not sufficient to accommodate the numbers of cultural heritage officers, archaeologists and among others biodiversity conservation experts. While school children visit Mapungubwe, they cannot stay for more than a day because there are no facilities. Neither can researchers visit the site for long term research visits because there are no laboratories and storage facilities for finds. To address these problems, Sanparks proposes to construct hostels on already disturbed ground on the area adjacent to the Day Centre. The four blocks of hostels will be kept to a minimum height to avoid a negative visual impact. Across the road, Sanparks proposes to build conservation facilities and offices for research on an area adjacent to staff quarters. In addition, Sanparks seeks to develop visitor orientation facilities at Mapungubwe Hill, and Schroda and two camping sites near the Smuts House section of the Limpopo River. The proposed development is as follows:

- Office Complex with bulk services like water, electricity and sewage (Fig 2.2).

Fig 2.2 : Google Earth Image of Proposed Office Complex site (Courtesy: SanParks)

- Dormitories to accommodate visiting School groups with bulk services like water, electricity and sewage (Fig 2.3).

Fig 2.3 Proposed dormitories site (Courtesy: SanParks)

- Visitor Orientation area at Mapungubwe Hill which might include ablution facilities, small pathway, boardwalk crossing a water stream (Figure 2.4)

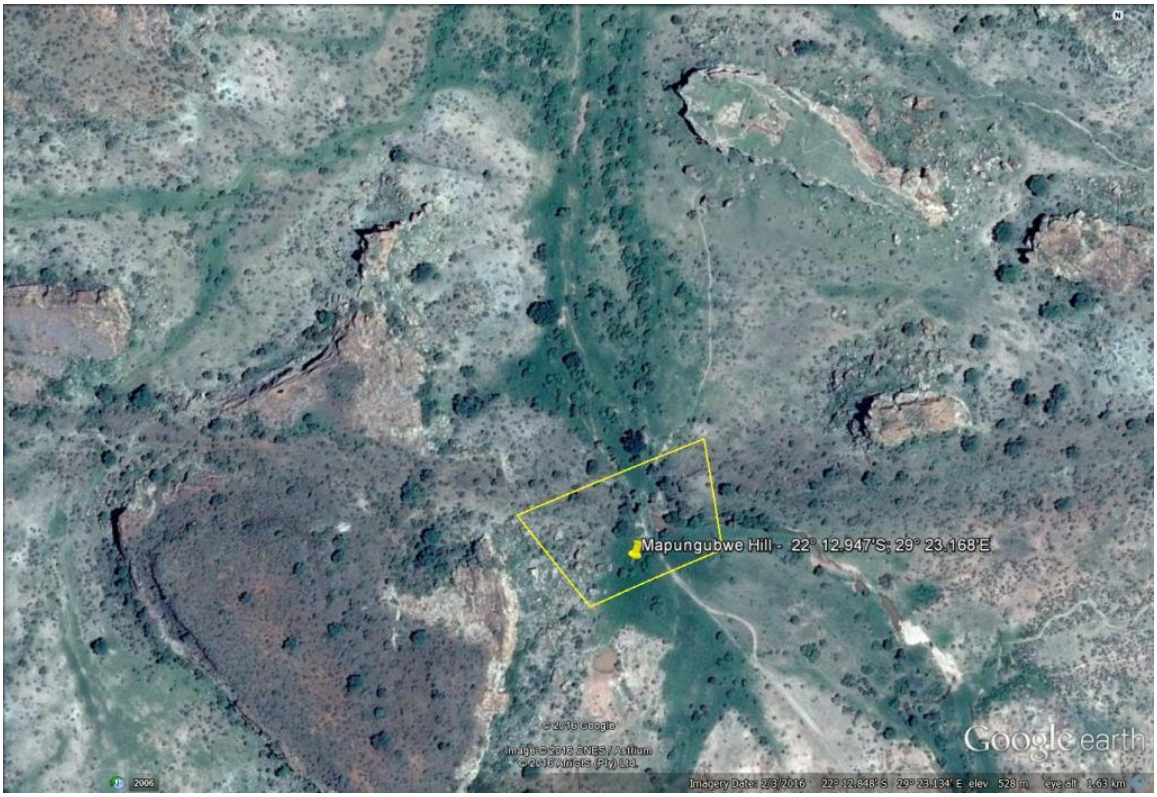

Fig 2.4 Proposed visitor orientation area at Mapungubwe

- Orientation area with Pathways and Boardwalk at Schroda (Fig 2.5)

Fig 2.5 Proposed visitor orientation area with boardwalk at Schroda

- Two camping areas at the Smuts house section which might include ablution facilities (Fig 2.6 and 2.7).

Fig 2.6: Proposed camping site 1 (Smuts section) (Courtesy: SanParks)

Fig 2.7: Proposed camping site 2 (Smuts Area) (Courtesy: SanParks)

2.7. Methodology and limitations

The study was based on a combination of desktop research of the available literature and databases, and reconnaissance surveys on the proposed development. The literature consulted includes both published and unpublished archaeological, historical and anthropological works. The reports of previous archaeological impact assessments carried out in the area formed a key component of this research. In addition, SAHRA databases were also consulted together with the database hosted by the Chief Directorate of Surveys and Mapping in Mowbray.

2.8 Description of the archaeology of the project area

Based on the literature and reconnaissance surveys, it was noted that the area under study has a substantial number of archaeological sites belonging to the Stone and Iron Ages as well as the historical period.

The next section describes the archaeology of the area according to relevant phases.

i. Earlier Stone Age, Middle and Later Stone Ages

Material dating to the three Stone Ages – Earlier (2.6 million to 200 000 years BP), Middle (200 000 – 30 000 BP) and Later Stone Ages (30 000 – 2 000BP) (Deacon and Deacon 1999; Phillipson 2005) has been repeatedly found on archaeological sites within the Mapungubwe Cultural Landscape and adjacent areas. A team led by Professor Kathy Kuman of the University of the Witwatersrand identified important sites that have enhanced our understanding of the Stone Age sequence of the Limpopo Valley and surrounding areas (e.g. Sutton 2003; Pollarolo 2004; Kuman et al. 2005a, b; Kempson 2007; Le Baron 2007; Pollarolo et al. 2010; Wilkins et al. 2010). Most of the sites in the area are open-air sites that experienced episodic deflation during the arid periods of the Pleistocene (Kuman et al 2005b). For example, due to the deflation, the stratigraphy of sites such as Hackthorne and Keratic Koppie was destroyed, thus reducing them to single component sites. However, the stratigraphy at Kudu Koppie remained intact (Kuman et al. 2005a, b). Based on a preliminary assessment of th s sit s' su f c coll ctions of ston t f cts, th t includ simpl co types, bifaces, occasional unifaces as well as pieces typical of MSA tools such as retouched points, Kuman and colleagues (2005a) suggested that the earliest occupation of the sites was during the ESA, either in the Acheulean or the post-Acheaulean Sangoan Industry. Further, they indicated that the sites bear resemblance to industries that are transitional between the ESA and Middle Stone Age (MSA), especially those

found north of the Limpopo in Zimbabwe.

Lithic analyses indicated that Hackthorne is primarily a late ESA site with a mix of MSA tools. The site however, had a very low proportion of formal tools and a high proportion of flakes indicating that it may have been a manufacturing site (Kempson 2007). Hackthorne tools were produced from locally sourced rocks such as quartzite, quartz, chert and dolerite. The other important site is that of Keratic Koppie which is dominated by a Middle Stone Age assemblage. Formal tools form a small component of the assemblage and include heavy-duty tools such as picks, core axes, a uniface and a denticulate. Light-duty tools include some utilised flakes and some denticulated/notched scrapers. In addition, the site has the highest numbersofi gul co s(K mpson2007).B s donth s tools,th sit ’sESAis gu dto be the final-post Acheulean with a major component of woodworking tools, suggesting it may be a local variant of the Sangoan Industry (Kuman et al. 2005b; Kempson 2007). The MSA sites are dominated by scrapers and points (Lombard et al. 2012).

Kudu Koppie has the longest occupation period of the Stone Age sites studied in the Limpopo Valley, with assemblages spanning from the ESA to the Later Stone Age (LSA). It is the first open-air site in the northernmost part of South Africa with a late ESA assemblage overlain by an MSA industry in a stratified context (Pollarolo & Kuman 2009). The site was excavated in layers, the first containing highly weathered ESA tools (Kuman et al. 2005b), while Layer 2 contains ESA material at the base and some MSA tools higher up. Layer 3 contains MSA artefacts, while Layer 4 represents the uppermost MSA horizon and the overlying Layer 4 contains LSA tools. Kudu Koppie like the other two sites has high frequencies of small flaking debris, hence knapping could have taken place here too (Kuman et al. 2005b). The site has a variety of heavy-duty and light-duty tools such as picks, choppers, core-axes, denticulated/notched scrapers, retouched flakes and cutting tools and some miscellaneous retouch, as well as prepared cores and radial cores typical of MSA assemblages (Kempson 2007). It does not appear as if there was a rock type preference at this side as a wide variety of rock types available locally were used as was the case at the other two sites.

These sites demonstrate the potential information value of Stone Age sites appearing in open air contexts and suggest that the Limpopo Valley is important for enhancing our understanding of the Stone Age (see, for example, Volman 1984; Kuman 2007; Mitchell 2002; Lombard et al. 2012). Outmost care should therefore be excised to protect the Stone Age sites because they contribute an important layer of information.

ii. Rock Art of the Mapungubwe Cultural Landscape

The Mapungubwe Cultural Landscape hosts important rock art which the beliefs and

experiences of the people who made it; predominantly the hunter-gatherers, early farming communities and Khoi herders. Different traditions are demonstrated in this area, among them; pictographs (drawings or paintings); petroglyphs (carvings or inscriptions), engravings (incised motifs), and rarely petroforms (rocks laid out in patterns), and geoglyphs (ground drawings) (Schoonraad 1960). In general, both paintings and engravings have similar themes and images, but the engravings tend to include less detail and fewer human figures (Deacon 2002). The first three rock-art traditions occur in Limpopo valley with distinctive styles and content that is largely a result of differences in the cosmology and beliefs of Stone Age hunter-gatherers, of Stone Age herders, and of Iron Age agriculturists. The Venetia Limpopo Nature Reserve (VLNR) contains rock art at places such as Hilda and Edmondsburg (Eastwood and Fish 1995). For example, the site of Hilda 1 contains red paintings depicting giraffe, baboon, fish, fat-tailed sheep and geometric abstracts (mainly Y-shapes). The paintings of a fat-tailed sheep are painted in the same style of as those of those at other sites in the area such as sheep shelter. The male figures at this site appear to be holding hands together or the Y-shapes between them. The style of the painted giraffe is very unusual (Eastwood 1995). Any proposed development must therefore consider potential impacts on this important resource.

iii. The Iron Age and historical period

The Limpopo Valley where the Mapungubwe Cultural Landscape is situated hosts a crucial history of the settlement of southern Africa by agriculturalists that made pottery, worked metal, practised crop agriculture, kept livestock and settled permanently in villages. The earliest evidence of occupation by farmers belongs to the Early Iron Age (AD200 – 900). The first farmers in the area made Happy Rest pottery and their remains were found at places such as Mapungubwe. These were followed by Zhizo farmers who had more extensive villages along rivers such as Limpopo. Schroda and Ratho are some of the best examples of this group. During the time of Schroda, the farmers were hunting ivory and exchanging it for exotic commodities such as glass beads. Because of its size and wealth of material, it is believed that Schroda was an important capital of a chiefdom based in the Limpopo valley.

Around AD 1000 (beginning of the Middle Iron Age), a new group of people archaeologically known as the Leopard's Kopje settled at K2 and other places. K2 was an important capital which also participated in long distance trade and elephant hunting. Around AD1220, power shifted from K2 to Mapungubwe Hill, which became an important capital controlling a territory that is approximately 30 000 square kilometres in extent. Mapungubwe participated in long distance trade and worked gold and bronze, a prestige metal and alloy respectively. There are many Zhizo, (EIA) and Leopard'Kopje (MIA) sit s in and around Mapungubwe. The

sites of Schroda, K2, Leokwe, and Mapungubwe are very important because apart from being National Heritage Sites, they are part of attributes that convey Mapungubwe's Outstanding Universal Value (Huffman 2007, Fatherley 2009). Not surprisingly, they are in the core of the listed property. Any proposed developments inside and outside the listed areas must not in any way affect the integrity of these sites.

Around AD1300, when Mapungubwe declined, settlement continued in the area with new groups coming in. A new group made ceramics that have been designated as Icon appeared on the landscape. The first site was recovered on the farm Icon which is adjacent to Regina 66MS. According to Huffman (2007), Icon people represent ancestral Sotho-Tswana peoples. By AD1450, Khami people established their settlements in the Limpopo valley and adjacent areas. As such Khami sites were found along the Limpopo and Kolope Rivers on farms such as Icon and Venetia 104MS. Khami people made platforms where houses were built. These Khami people are also ancestral Venda people. Settlement continued into the historical period such that by the 19th century, ancestral Bobirwa, Venda and Sotho-Tswana people were occupying the Mapungubwe cultural landscape as broadly defined. A number of settlements around Machete are testimony to this history (Huffman 2011). In the late 19th century, the Limpopo Valley was a great elephant hunting country which attracted European traders and hunters. After colonisation and with more European settlement, European sites became abundant for example there are also Anglo-Boer War sites. In the 20th century, the farm Greefswald was also used by the South African military.

A detailed archaeological survey conducted by Professor Huffman from the late 1990s onwards on the South African side of the Shashi-Limpopo valley and by Professor Munyaradzi Manyanga on the Zimbabwean side (Manyanga 2007) and Dr Sarah Mothulatsipi (Mothulatshipi 2009) on the Botswana side yielded important information just as that by Professor Huffman on the Venetia Limpopo Nature Reserve (Huffman 2011).

In conclusion, our current knowledge suggests that the Limpopo Valley has attracted farming communities who were also interacting with hunter-gatherers. Some of the sites of interaction were used for rain making and rain control. This landscape therefore is associated with scientific, historical, cultural, scientific and aesthetic values. This has been recognised through the declaration of important capitals and surrounding landscapes as National and World Heritage places. This means that extra care must be taken to ensure that any proposed development does not affect attributes that convey the value of the landscape.

1.9. Impact assessment results

In the first instance, all the information from the databases and published and unpublished sources was collated to produce a map showing the known distribution of archaeological resources in the area (Fig 2.8).

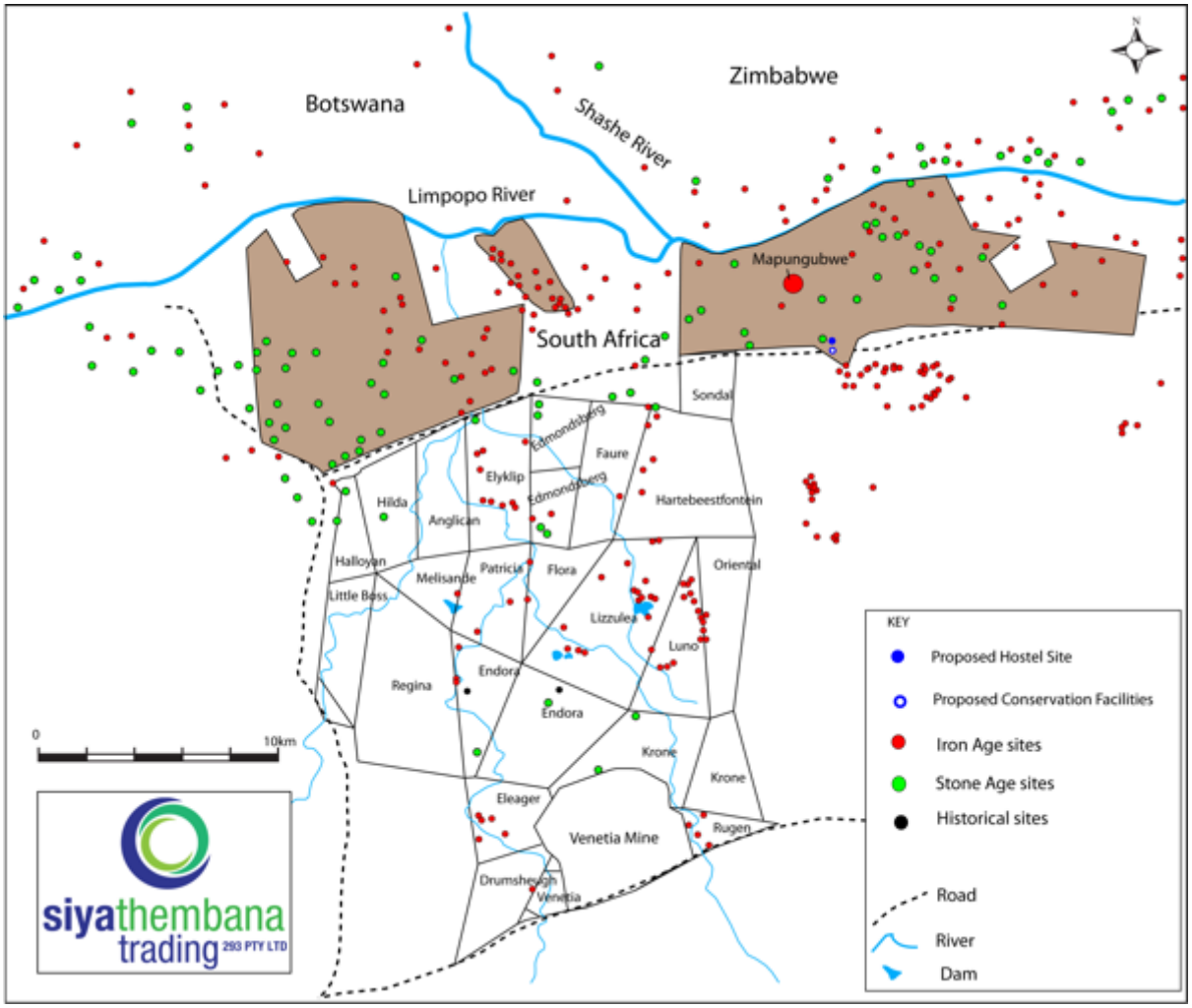

Figure 2.8 shows the distribution of sites around the proposed area for development.

Subsequently, a detailed walking was carried out in the area where the additional facilities will be built. No sites were found on the proposed development footprint for dormitories and office blocks but only the site of Hamilton was found and is already well protected (Fig 2.9).

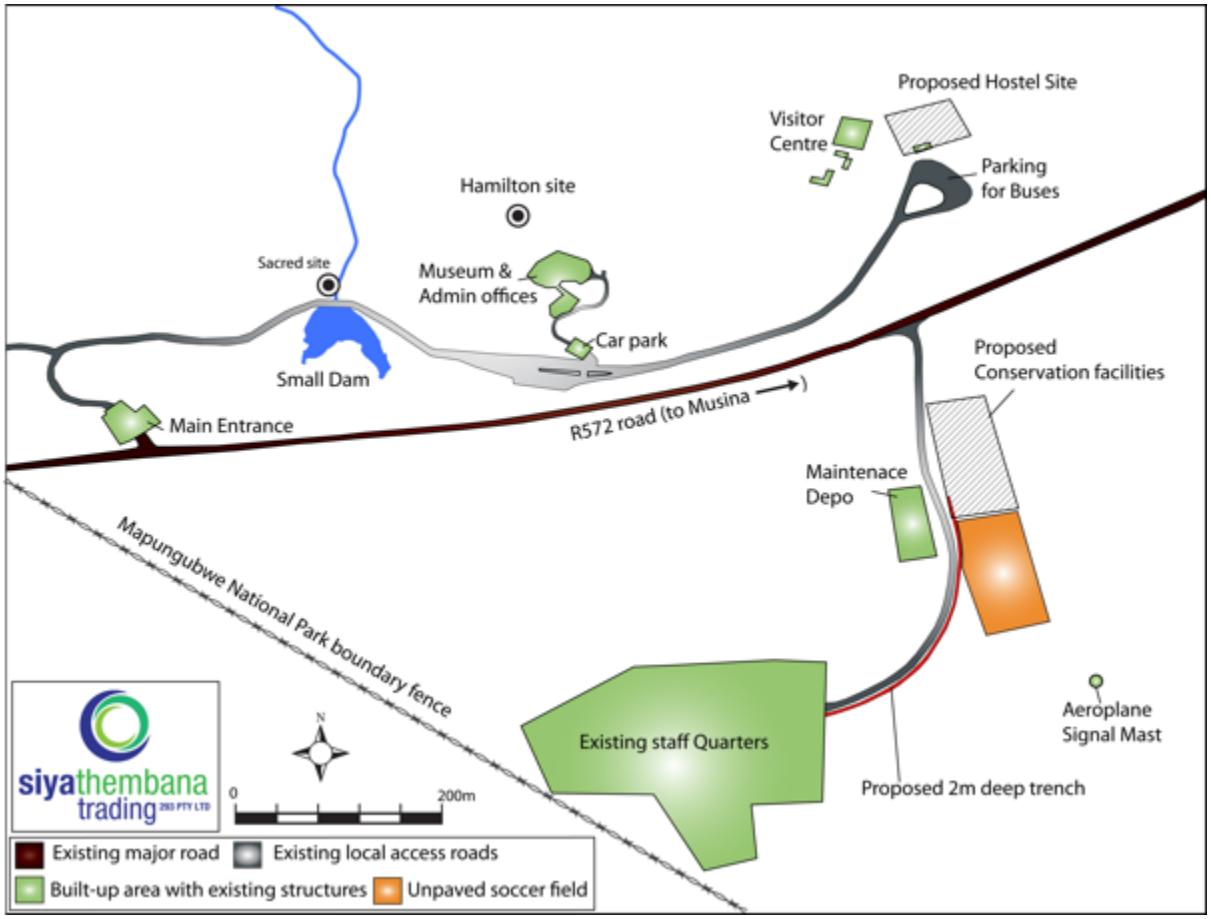

Fig 2.9 shows the proposed Dormitories and Office Complex sites in relation to Hamilton site

However, there are a series of middens at Schroda that cover a huge area. It is clear that any boardwalk will impact on this deposit thereby calling for the development of a sensitivity map of the site. The survey at Mapungubwe Hill identified pottery scatters on a small hill across the proposed visitor orientation site. It is also important to develop a sensitive map of the site to monitor and manage potential impacts from visitors. No sites were identified in the Smuts section area but its proximity to the Limpopo river requires adequate monitoring plans to be developed.

2.10 Statement of significance

The general landscape on which the proposed development will be situated is associated with archaeological and heritage sites associated with numerous values ranging from cultural, scientific, spiritual, aesthetic and historical. As a result of sustained research and impact assessments, the archaeology and history of the area is now well known. Mapungubwe, Schroda and the Limpopo River are essential attributes that convey the OUV of Mapungubwe.

Any proposed development must have a low impact impact. Although the proposed development is meant to enhance the attributes that convey the value of these sites, robust monitoring is required. However, no archaeological sites of all periods were identified on the proposed development footprint for the dormitory and office complex.

2.11 Conclusion and recommendation

In conclusion, a comprehensive desktop survey when combined to mapping and field walking considered the cumulative impact, of the development on the ensemble of sites on the landscape. No sites were reported in the proposed development footprint. Neither are there any provincial sites or burials. The following conclusions and recommendations apply:

Based on this study, the following conclusions were reached:

1. No archaeological sites of all periods were recovered during the impact assessment of the area proposed for dormitories and office blocks.

8. Only the site of Hamilton was identified during the impact assessment for the dormitories and Office Complex site but it is already known and is adequately protected.

9. No negative direct, indirect or cumulative impacts of the proposed project on heritage sites in the Mapungubwe National Park were noted.

10. Schroda is very rich in middens and other accumulations of cultural material. There is no consolidated map of the site showing such a sensitivity.

11. The visual impact of the proposed visitor orientation center at Schroda must be assessed when plans are available.

12. No archaeological sites were found on the proposed sites on the Smuts section of the Limpopo River.

13. There are numerous instances of archaeological material on a low kopje across the small stream in front of the proposed orientation area at Mapungubwe. This area is outside the official map of Mapungubwe.

Based on the above conclusions, the following recommendations were made:

ix. For the dormitories site, development may proceed subject to monitoring of the excavation trenches by a qualified archaeologist.

x. For Schroda, a sensitivity map must be developed to explicitly expose the concentration of archaeological material. The design and nature of the boardwalk must be informed by such a map.

xi. Any excavation of trenches associated with the visitor orientation center and the boardwalk must be authorized by a permit from SAHRA.

xii. For Mapungubwe, there is need to update the map of the site to include peripheral areas near the proposed orientation center.

xiii. For the Smuts section, the impact of visitors must be robustly monitored and managed.

xiv. Should any grave or human remains be encountered during the development, work must be stopped immediately and the developer should alert SAHRA Limpopo or the SAHRA Head office.

xv. The direct, indirect and cumulative impacts of the proposed development are very low for the dormitories and office complex sites and very high for Schroda, Mapungubwe and the Smuts section.

xvi. As such, the development must be authorized, subject to the development of a very tight monitoring plan for Mapungubwe Hill, Schroda and the Smuts section of the Limpopo.

2.11. Bibliography

AWHF & DEA 2013. World heritage and impacts in Africa. Johannesburg: AWHF & DEA Barham, L. & Mitchell, P. 2008. The first Africans: African archaeology from the earliest toolmakers to most recent foragers. Cambridge: Cambridge university press.

Davies-Mostert, W. 2012. Venetia-Limpopo Nature Reserve Management Plan. De Beers Ecology

Deacon, J. 2002 Southern African Rock Art Sites. Southern African Rock Art Project (SARAP)-a paper submitted to UNESCO-World Heritage Centre.

Deacon, H.J. and Deacon, J. 1999. Human beginnings in South Africa: Uncovering the secrets

of the Stone Age. Cape Town: David Philip

Deacon, J. & Norton, P. 2003. Mapungubwe Cultural Landscape, South Africa. Site Management Plans. Pretoria: Department of Environmental Affairs and Tourism

Durand, F. 2012. Proposed diamond mine adjacent to Venetia Mine, Limpopo Province: Scoping Palaeontological Report. Unpublished report

Eastwood. ED. 1995. Sheep paintings in the Soutpansberg. Digging Stick 12 (3). Eastwood. E.D. & Fish, W.S. 1995. The Rock Art of the Venetia Limpopo Nature Reserve: A

preliminary survey. Unpublished report for De Beers Consolidated Mines Ltd.

EcoPartners, 2012. Environmental Management Plan for proposed Krone-Endora Diamond Mine. Unpublished report

Elandou, L. & Avango, D. 2012. Report on second UNESCO-ICOMOS reactive monitoring mission to Mapungubwe. Paris: World Heritage Centre

Fatherley, K. 2009. Sociopolitical Status of Leokwe People in the Shashe-Limpopo Basin during the Middle Iron Age through Faunal Analysis. Unpublished Masters thesis, University of the Witwatersrand, Johannesburg.

Huffman, T.N. 2007 Handbook to the Iron Age: The archaeology of pre-colonial farming societies in southern Africa. Scottville: University of KwaZulu Natal Press

Huffman, T.N. 2009. Mapungubwe and Great Zimbabwe: The origin and spread of social complexity in southern Africa. Journal of Anthropological Archaeology 28: 37-54

Huffman, T.N. 2011. Origins of Mapungubwe Project: progress Report. Unpublished Report prepared for De Beers, the NRF, SAHRA and SANParks.

Kempson, H. 2007. Late Earlier Stone Age Sites in the Mapungubwe National Park, South Africa: a Technological Study. Unpublished MSc thesis. Johannesburg: University of the Witwatersrand.

Kristiansen, K. Contract archaeology in Europe: an experiment in diversity. World Archaeology 41.4 (2009): 641-648.

Kuman, K. 2007. The Earlier Stone Age in South Africa: site context and the influence of cave studies. In Pickering, T.D., Schick, K. and Toth, N. (eds): Breathing Life into Fossils: Taphonomic

Studies in Honor of C.K. (Bob) Brain: 181-198. Bloomigton (Indiana): Stone Age Institute Press.

Kuman, K., Le Baron, J.C. & Gibbon, R. 2005a. Earlier Stone Age archaeology of the Vhembe-Dongola National Park (South Africa) and vicinity. Quaternary International 129: 23-32.

Kuman, K., Gibbon, R., Kempson, H., Langejans, G., Le Baron, J.C., Pollarolo, L. & Sutton, M. 2005b. Stone Age signatures in northernmost South Africa: archaeology of the Vhembe-Dongol NtionlP k ndvicinity.InF.D'E ico ndL.Blckwll(ds):FromToolsto Symbols: From Early Hominids to Modern Humans (Roundtable sponsored by the French Embassy in South Africa and the Palaeoanthropology Scientific Trust) April 2003, Wits: 163- 182. Johannesburg: Wits University Press.

Le Baron, J.C. 2007. The Geoarchaeology of the Hackthorne I site, Limpopo River Valley, South Africa. Unpublished Ph.D dissertation. Johannesburg: University of the Witwatersrand.

Lombard, M, Wadley, L., Deacon, J., Wurz, S., Parsons, I., Mohapi, M., Swart, J & Mitchell , P. 2012. South African and Lesotho Stone Age Sequence Updated (1). South African Archaeological Bulletin 67: 123-44.

MacEachern, S. 2010. S ing lik n oil comp ny's CHM p og mm : Exxon nd archaeology on the Chad Export Project. Journal of Social Archaeology 10 (3): 457-476.

Makuvaza, S. 2014. The Management of Cultural World Heritage Sites and development in Africa. New York: Springer

Makuvaza, S., & Chiwaura, H. 2014. African States Parties, Support, Constraints, Challenges and Opportunities for Managing Cultural World Heritage Sites in Africa. The Management of Cultural World Heritage Sites and development in Africa. New York: Springer, pp. 45-53.

Manyanga, M. 2007. Resilient landscapes: socio-environmetal dynamics in the Shashe-Limpopo Basin, southern Zimbabwe c. AD 800 to the present. Uppsala. Societas Archaeologica Uppsaliensis

Mitchell, P.J. 2002. The Archaeology of Southern Africa. Cambridge: Cambridge University Press.

Mothulatshipi, S. M. 2009. Landscape Archaeology of the Later Farming Communities of the Shashe-Limpopo Basin, Eastern Botwsana: Land Use Diversity and Human Behaviour. Unpublished PhD. Thesis, University of Edinburgh

Pikirayi, I. 2001. The Zimbabwe Culture: Origins and Decline of Southern Zambezian States.

Walnut Creek: AltaMira

Phillipson, D.W. 2005. African Archaeology. Cambridge: Cambridge University Press Pollarolo, L. 2004. Archaeological Investigation at Kudu Koppie, a Stone Age Site in

Limpopo Province, South Africa. Unpublished Ph.D thesis, University of Florence. 29 | P a g e

Pollarolo, L. & Kuman, K. 2009. Excavation at Kudu Kopje site, Limpopo Province, South Africa. South African Archaeological Bulletin 64: 69-74.

Pollarolo, L, Wilkins, J, Kuman, K & Galletti, L. 2010. Site formation at Kudu Kopjie: A late Earlier and Middle Stone Age site in northern Limpopo Province, South Africa. Quartenary International 216: 151-161.

Sadr, K. 2008. An ageless view of Firts Millenium AD Southern African Ceramics. Journal of African Archaeology 6 (1): 103-129

Sampson, C. G. 1974. The Stone Age Archaeology of Southern Africa. Academic Press, New York and London.

Sampson, C.G. 1984. Site cluster in the Smithfield Settlement pattern. South African Archaeological Bulletin 39: 5-23

Schoonraad. M. 1960. Preliminary survey of the Rock Art of the Limpopo Valley. South African Archaeological Bulletin 15:10-13

Smith, A, Malherbe, C, Guenther, M, Berens, P. 2000. The Bushmen of Southern Africa: a foraging society in transition. Clyson Printers: Cape Town

Sutton, M. 2003. Survey for Middle Stone Age sites in the Limpopo River Valley, South Africa. MSc research report. Johannesburg: University of the Witwatersrand.

Volman, T. 1984. Early prehistory of southern Africa. In Klein, R.G. (ed.): Southern African Prehistory and Palaeoenvironments: 169-220. Rotterdam: Balkema.

Wilkins, J, Pollarolo, L, and Kuman, K (2010). Prepared core reduction at the site of Kudu Koppie in northern South Africa: temporal patterns across the Earlier and Middle Stone Age boundary. Journal of Archaeological Science 37: 1279–1292.