



**PROPOSED DEVELOPMENT OF THE MAPUNGUBWE NATIONAL
PARK VISITORS INTERPRETATION CENTRES AND OVERNIGHT
FACILITIES, LIMPOPO PROVINCE**

Visual Impact Assessment

February 2020

Prepared for:



Prepared by:

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Today's Impact | Tomorrow's Legacy

1 QUALITY AND REVISION RECORD

1.1 QUALITY APPROVAL

	Capacity	Name	Signature	Date
Author	Visual Specialist	Christoff du Plessis		21/03/2020
Reviewer	Quality Check Officer	Elbi Bredenkamp		22/03/2020

This report has been prepared in accordance with Enviroworks Quality Management System.

1.2 REVISION RECORD

Revision Number	Objective	Change	Date
Version 1	-	-	22/03/2020

2 EXECUTIVE SUMMARY

Enviroworks has been appointed by South African National Parks (SANParks) to compile the Visual Impact Assessment (VIA) for the proposed development of the Mapungubwe National Park Visitors Interpretation Centres and Overnight Facilities in order to determine the Visual Impact of the proposed development. This VIA Report was compiled in accordance with the Guidelines for involving a Visual and Aesthetic Specialist in the EIA process (DEA&DP, 2005). This Guideline was developed by the Western Cape Department of Environmental Affairs and Development Planning (DEA&DP) to be implemented as best practise.

2.1 PROJECT DESCRIPTION

SANParks wish to upgrade their facilities at Mapungubwe National Park in order to enhance visitor experience and provide adequate accommodation for educational tour groups. The proposed upgrades will include the following activities:

1. Mapungubwe Overnight Facilities:

The overnight facilities will include the construction of:

- Five (5) hostels inclusive of ablution facilities;
- Open Air Functions Space;
- Dining Block inclusive of a kitchen, pantry, reception and a general store;
- A teachers block;
- Adequate bus parking; and,
- Associated Infrastructure.

2. Orientation Centre at Mapungubwe Hill:

The orientation will include the construction of:

- Covered viewing deck;
- Resting areas;
- Mapungubwe exhibit;
- Bambanyanalo Exhibit;
- Serving Area; and,
- Ablution Facilities.

3. Boma:

The boma will consists of a roof and seating and will primarily be used as a venue from where tour guides can tell the story of Mapungubwe Hill.

4. Dig Site:

The Dig site will be formalised where a formal building will be constructed above the dig site to ensure adequate protection thereof. The development will include:

- Display boards of Mapungubwe;
- Exhibition and viewing area; and,
- Archaeological Dig Site Viewing area.

5. Schroda Interpretation Centre:

The Schroda Interpretation Centre will include the following:

- Interactive Exhibit of the shappingening of the blade, games and pottery;
- Covered viewing deck;
- Resting Area;
- Schroda/Zhizo Exhibit;
- Site model;
- Pre-History Exhibit;
- Serving Area; and,
- Ablution Facilities.

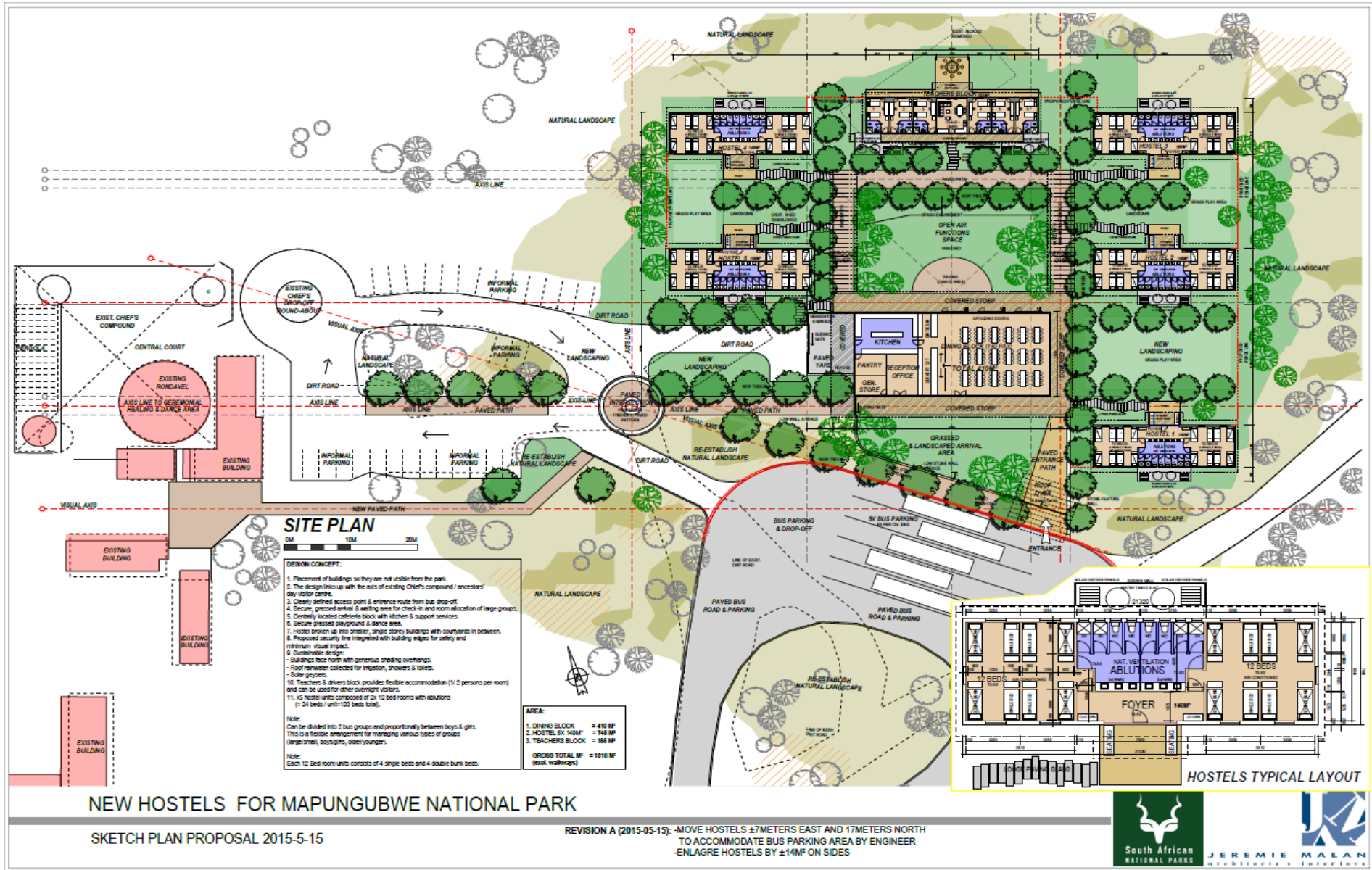


Figure 1: Building Plans for the proposed Hostels.

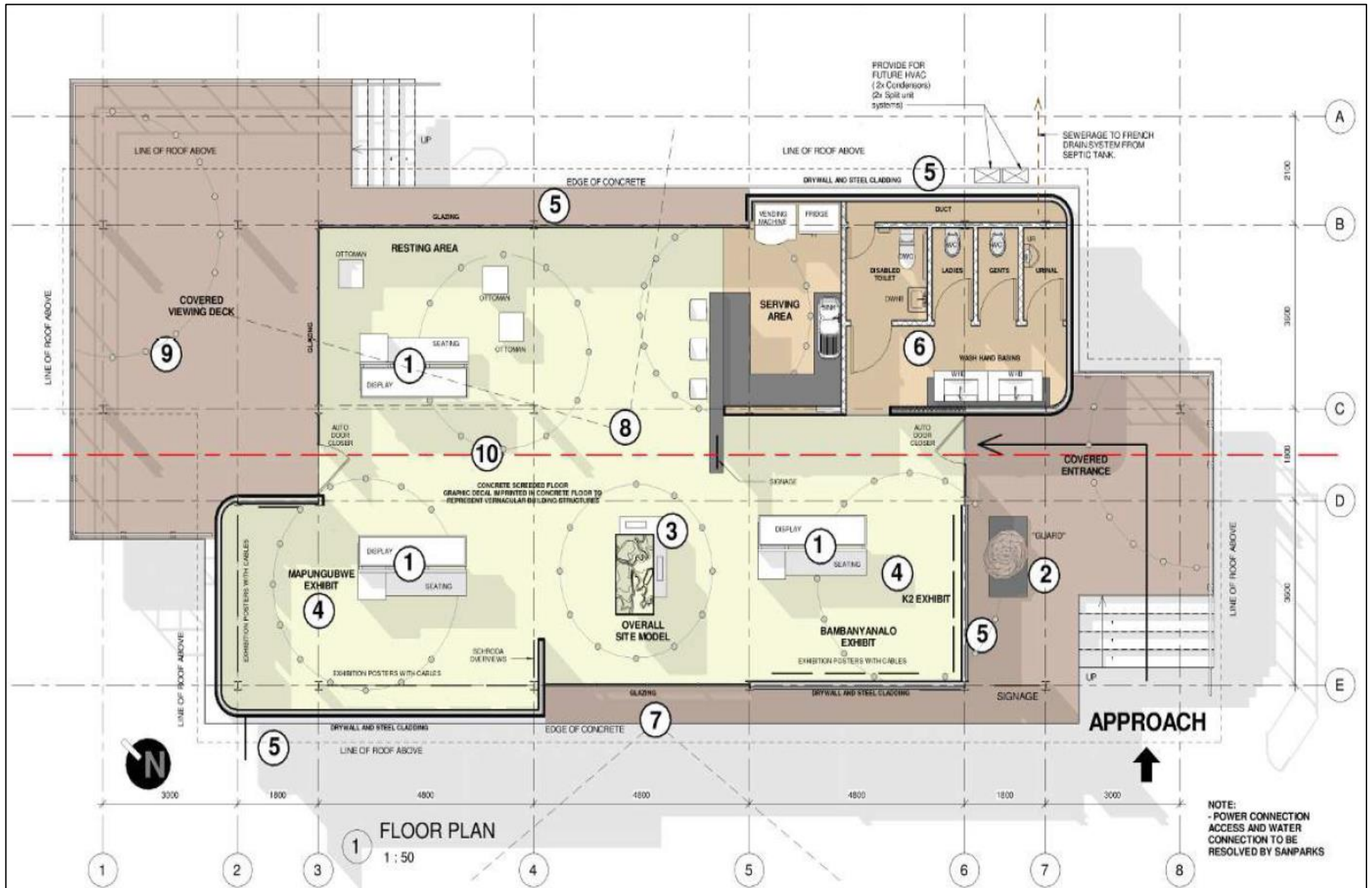


Figure 2: Building Plans for the Proposed Orientation Centres at Mapungubwe Hill and Schroda.

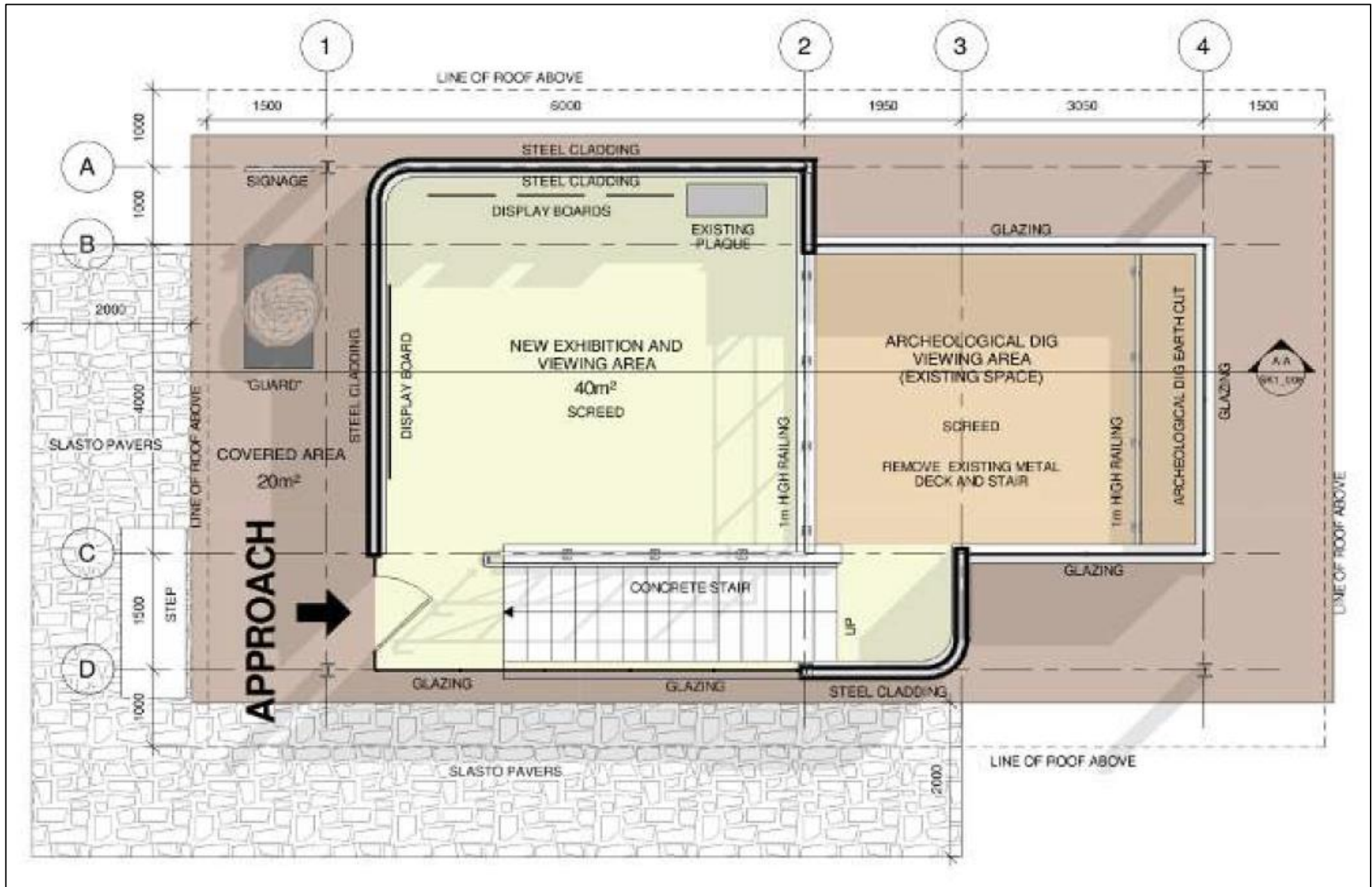


Figure 3: Building Plans for the proposed Dig Site.

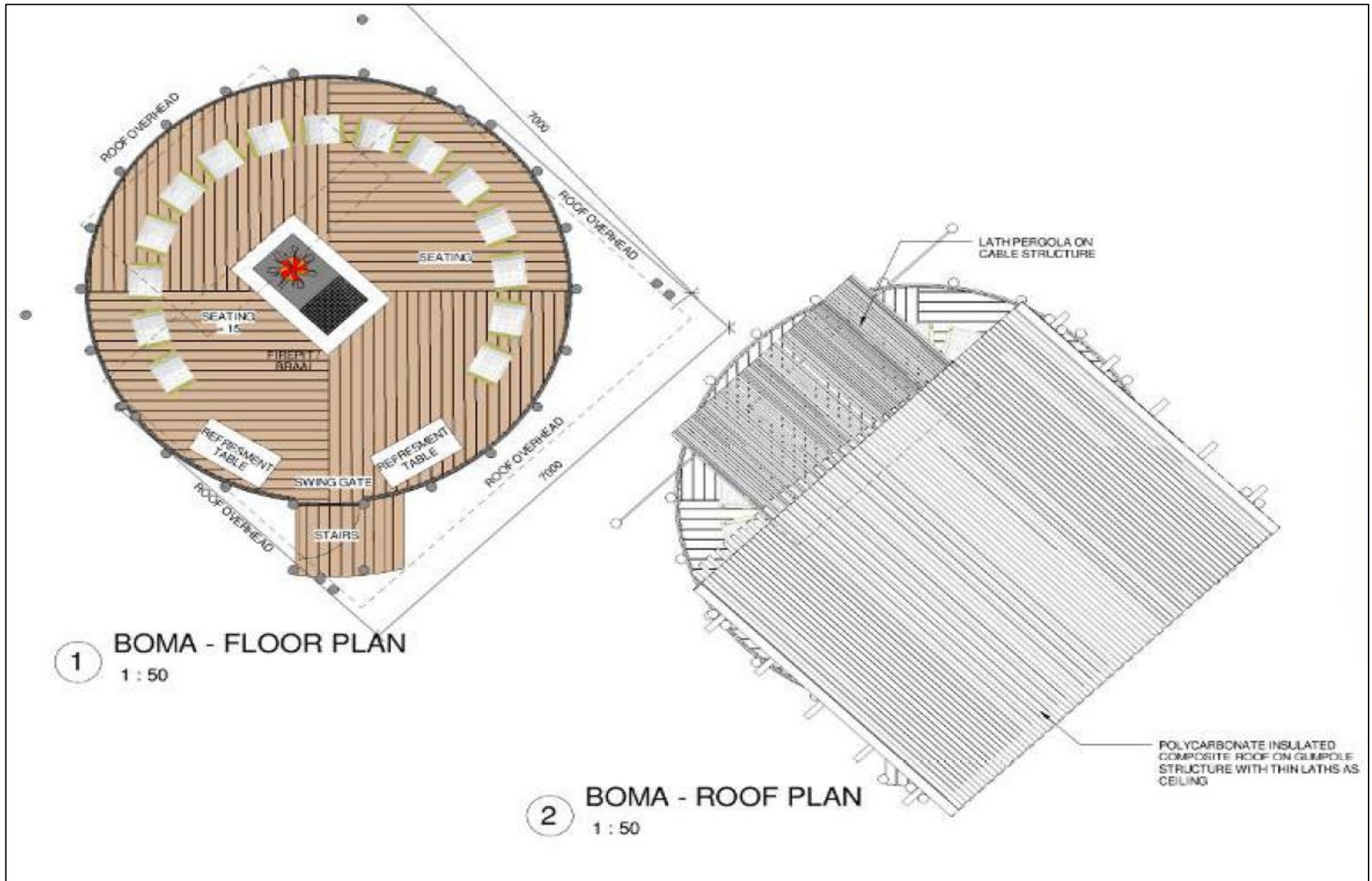


Figure 4: Building Plans for the proposed Boma to be developed.

2.2 SITE ALTERNATIVES

Two site alternatives are proposed for the Mapungubwe Hill Orientation Centre, as detailed below.

2.2.1 Alternative 1: Construction of the Mapungubwe Hill Orientation Centre - Preferred option

The Mapungubwe Hill Orientation Centre will be developed at the following co-ordinates:

- 22° 13' 10.98'' S
29° 23' 19.08'' E

It was decided to move the Orientation Centre from its original position to ensure that it is not constructed within thirty two metres (32 m) of watercourses and to restrict the visual impact thereof.



Figure 5: Visual Impression of the Proposed Position.

2.2.2 Alternative 2: Construction of the Mapungubwe Hill Orientation Centre

The Alternative Mapungubwe Hill Orientation Centre will be developed at the following co-ordinates:

- 22° 13' 02.70'' S
29° 23' 16.13'' E

The alternative location was originally considered as it is situated adjacent to the road leading to Mapungubwe Hill and provide clear views of the surrounding area and drainage lines. However, the proposed development will be more visible from surrounding areas.



Figure 6: Visual Impression of Alternative 2 of the Orientation Centre.



Figure 7: Visual Impression of the Proposed Hostels.



Figure 8: Visual Impression of the Proposed Orientation Centre at Mapungubwe Hill.



Figure 9: Visual Impression of the Proposed Orientation Centre at Schroda.



Figure 10: Visual Impression of the Proposed Dig Site Upgrade.



Figure 11: Visual Impression of the Proposed Boma to be developed.

2.3 CONCLUSION AND RECOMMENDATIONS

The visual impact for the Overnight Facilities will be moderate within the short distance zone; however, given the existing Mapungubwe Hill Museum Complex the visual impact will be lower as disturbance have already occurred within the area. The developments planned at Mapungubwe Hill will have a low impact as it will only be visible over a distance of three hundred metres (300 m) due to the high vegetation cover and undulating topography of the study area. The highest visual exposure will occur from Schroda orientation Centre; however, the areas of high viewer incidence primarily consists of natural vegetation with limited observers within this area. The aforementioned will result in a low visual impact over a two kilometre (2 km) radius. As the proposed upgrades will result in a higher visitors experience and draw more visitors to the park. The upgrades will result in a positive visual impact if all mitigation measures are implemented.

Construction Phase:

- Access roads are to be kept clean;
- Site offices and structures should be limited to one location and carefully situated to reduce visual intrusions. Roofs should be grey and non-reflective;
- Adequate waste bins must be placed at each development site and waste need to be removed on a regular basis;
- No unnecessary cutting of trees and shrubs may take place except where needed for the construction of buildings;
- No open fires must be allowed on site;
- Batching activities must be conducted on impermeable surfaces to ensure no spillages are left behind once the construction has been finalised;
- Construction camps as well as development areas should be screened with netting;
- Lights within the construction camp should face directly down (angle of 90°);
- Vegetation clearance should be limited to the development footprint only;
- Litter should be strictly controlled, as the spread thereof through wind could have a very negative visual impact;
- A plan must be in place to ensure that the dig site is protected from construction activities and vandalism;
- Avoid shiny materials in structures. Where possible shiny metal structures should be darkened or screened to prevent glare;
- Rehabilitation measures include the following:
 - On completion of a section of works, the area must be rehabilitated by suitable landscaping, levelling, topsoil dressing, land preparation, alien plant eradication and where ascribed for by the ECO, vegetation establishment;
 - Clear and completely remove from site all construction structures and temporary infrastructure;
 - All permanent infrastructure must be returned to a suitable state;
 - Remove all inert waste and rubble, such as excess rock, any structural foundations and remaining aggregate. Only once this material has been removed, the site shall be re-instated and rehabilitated;
 - Domestic waste must be completely removed from site and disposed of at a landfill site;

- The reinstatement of disturbed areas must follow immediately after the removal of structures and temporary infrastructure;
- Topsoil backfilling must be undertaken when the soil is dry, and not following any recent rainfall events;
- All stockpiled topsoil together with herbaceous vegetation must be replaced and redistributed over a disturbed area such as temporary access roads;
- Any re-vegetation must be done using plant species in occurrence on site; and,
- Mitigation of visual impacts associated with the construction phase would entail proper planning, management and rehabilitation of the construction site. Mitigation measures include the following:
 - Reduce the time of construction through careful planning of logistics and ensure the productive implementation of resources;
 - Limit disturbance of the environment to the development footprint; and,
 - Limit construction activities to business hours (07:00 – 17:00).

Operation Phase:

- Avoid shiny materials in structures. Where possible shiny metal structures should be darkened or screened to prevent glare;
- Mitigation to minimise lighting impacts include the following:
 - Shielding the sources of light by physical barriers (walls, vegetation or structures itself);
 - Limit mounting heights of lighting fixtures, or alternatively using foot-lights or bollard level lights);
 - Make use of downward directional lighting fixtures;
 - Make use of minimum lumen or wattage in lights;
 - Ensure that no spot lights are on at night;
 - Use motion sensors to activate lighting ensuring light is available when needed.
- The colour scheme should be in line with the Mapungubwe National Park Museum Complex;
- The height of buildings must be kept as stipulated within the building plans;
- No open fires will be allowed on site;
- Adequate waste bins must be placed through-out the site;
- Waste collection areas must be properly screened by brick walls or similar materials;
- Rehabilitation and Post-closure measures:
 - All above-ground structures should be removed, safely disposed of or possibly recycled for use elsewhere; and,
- The affected area should be regarded to pre-development topographic conditions, unless the area is required for new specific uses.

3 DECLARATION OF THE SPECIALIST

I, Christoff du Plessis, ID 911126 5012 084, declare that I:

- am an Environmental Specialist at Enviroworks;
- act as an independent Specialist Consultant in the field of Visual Impacts;
- am assigned as Specialist Consultant by SANParks for this proposed project;
- I do not have or will not have any financial interest in the undertaking of the activity other than remuneration for work as stipulated in the terms of reference;
- remuneration for services by the proponent in relation to this proposal is not linked to approval by decision-making Authorities responsible for permitting this proposal;
- the consultancy has no interest in secondary or downstream developments as a result of the Authorisation of this project.
- have no and will not engage in conflicting interests in the undertaking of the Activity;
- undertake to disclose to the Client and the Competent Authority any material, information that have or may have the potential to influence the decision of the Competent Authority required in terms of the Environmental Impact Assessment Regulations 2017; and,
- will provide the Client and Competent Authority with access to all information at my disposal, regarding this project, whether favourable or not.

Christoff du Plessis

051 436 0793



4 SPECIALIST CV AND DETAILS

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Christoff du Plessis

Relevant Qualifications

Baccalaureus Scientiae (B.Sc) in Environmental Geography: University of the Free State (2014)

Work Experience

January 2015 – Present: Environmental Specialist at Enviroworks

Key Specialist Experience

Visual Impact Assessment (VIA):

- Phalaborwa Wildlife Activity Hub, Kruger National Park, Limpopo Province (SANParks).
- 4.9ha Sand Mine on Portion 5 of the Farm Doornekraal No. 830, Western Cape Province (Greenmined).
- Proposed development of the Harvard Powerline, Bloemfontein, Free State Province (Centlec).
- Proposed development of the 35 m Buffeljagsrivier Monopole Mast, Buffeljagsrivier, Western Cape Province (Coast to Coast Towers).
- Proposed development of the 25 m Robertson Monopole Mast, Robertson, Western Cape Province (Coast to Coast Towers).
- Proposed development of the Klein Mooimaak Rest Camp Facility, West Coast National Park (SANParks).
- Proposed development of a Sand Mine near Malmesbury, Western Cape Province (Greenmined).
- Proposed upgrade of the R27 Gate and Geelbek Restaurant, West Coast National Park, Western Cape Province (SANParks).
- Proposed development of the 25 m Roodekrans Monopole Mast, Krugersdorp, Gauteng Province (Coast to Coast Towers).

- Proposed development of a 25 m Monopole Mast on Portion 25 of the Farm Klein Bottelary No. 17, Brackenfell, Western Cape Province (Coast to Coast Towers).
- Proposed development of a Landfill Site on Portion 3 of the Farm Katbosch No. 93, Sasolburg, Free State Province (Metsimaholo Landfill).
- Proposed development of numerous visitor information centres at Schroda and Mapungubwe Hill, Mapungubwe National Park, Limpopo Province (SANParks).
- Proposed development of a 35 m Monopole Mast on Portion 13 of the Farm Van Aries Kraal No. 455, Grabouw, Western Cape Province (Coast to Coast Towers).
- Proposed development of a 25 m Monopole Mast on Erf 532, Gansbaai, Western Cape Province (Coast to Coast Towers).
- Proposed development of a 35 m Lattice Mast on Portion 7 of the Farm Jagersvlakte No. 292, Grabouw, Western Cape Province (Warren Petterson Planning).
- Proposed development of a 35 m Lattice Mast on Erf 532, Stanford, Western Cape Province (Warren Petterson Planning).
- Proposed development of a 15 m Lattice Mast on Portion 4 of the Farm No. 53, Genadendal, Western Cape Province (Warren Petterson Planning).
- Proposed development of a 25 m Monopole Mast on Portion 8 of the Farm Delta No. 1003, Groot Drakenstein, Western Cape Province (Coast to Coast Towers).
- Proposed development of a 30 m Tree Mast on Portion 87 of the Farm Langverwacht No. 241, Kuils River, Western Cape Province (Warren Petterson Planning).
- Proposed development of a 20 m Tree Mast on Erf 679, Gouda, Western Cape Province (Atlas Towers).
- Proposed development of an IPP 400kV Power Line from Grommis to Aggeneys, Northern Cape Province (Eskom).
- Proposed development of a 30 m Lattice Mast on Erf 2819, Caledon, Western Cape Province (Atlas Towers).
- Proposed development of a 54 m Lattice Mast on Portion 7 of the Farm Haane Kuil No. 335, Beaufort West, Western Cape Province (Star Towers).
- Proposed development of a 25 m Monopole Mast on Erf 1035, Caledon, Western Cape Province (Atlas Towers).
- Proposed development of a 25 m Tree Mast on Erf 47, Birkenhead, Western Cape Province (Atlas Towers).
- Proposed development of a 25 m Monopole Mast on Erf 1201, Van Dyks Bay, Western Cape Province (Atlas Towers).
- Proposed development of a 20 m Tree Mast on Erf 1671, Melkbosstrand, Western Cape Province (Atlas Towers).
- Proposed development of a 15 m Tree Mast on Erf 740, Klein Brak River, Western Cape Province (Atlas Towers).

- Proposed Upgrades to the Alpha 1 Recreational Lounge, Robben Island, Western Cape Province (Robben Island Museum).

Wetland Delineation Studies:

- Wetlands Delineation study for the development of 13 borrow pits along National Road 8, Ladybrand, Free State Province (SANRAL).
- Wetland Delineation study for the development of a 12.5ha cemetery on Erf 4233, Western Cape Province (Theewaterskloof Local Municipality).
- Wetland Delineation study for the proposed development of an Agri-Hub near Cederville, Eastern Cape Province (Femplan).
- Wetland Delineation study for the proposed development of an Agri-Hub near Lambasi, Eastern Cape Province (Femplan).
- Wetland Delineation study for the proposed development of the Blue Hills Curro Castle, Midrand, Gauteng Province (Curro Holdings).

Stormwater Management Plans:

- Stormwater Management Plan for the Agri-World Recycling Plant, Swellendam, Western Cape Province (Agri-World Recycling Plant).
- Stormwater Management Plan for the Klaasvoogds Granite Mine, Springbok, Northern Cape Province (Greenmined Environmental).
- Stormwater Management Plan for the Moreson Poultry Project, Brandfort, Free State Province (Moreson Poultry).
- Stormwater Management Plan for the Sintier Poultry Project, Bronkhorstspuit, Gauteng Province (Sintier Poultry).
- Stormwater Management Plan for the maintenance and extending of a canal near Karatera, Western Cape Province (Eden Municipality).

5 ABBREVIATIONS

CBA	-	Critical Biodiversity Area
DEA	-	Department of Environmental Affairs
DEA&DP	-	Department of Environmental Affairs & Development Planning
DEM	-	Digital Elevation Model
DTM	-	Digital Terrain Model
EIA	-	Environmental Impact Assessment
ESA	-	Ecological Support Area
GIS	-	Geographical Information System
Km	-	Kilometre
M	-	Metre
MAP	-	Mean Annual Precipitation
MAT	-	Mean Annual Temperature
NASA	-	National Aeronautic Space Administration
SANParks	-	South African National Parks
USGS	-	United States Geological Survey
UTM	-	Universal Transverse Mercator
VAC	-	Visual Absorption Capacity
VIA	-	Visual Impact Assessment

6 REQUIREMENTS OF A SPECIALIST REPORT

Appendix 6 of Government Notice Regulation 326 of 7 April 2017 outlines the basic requirements of a Specialist Report. Please refer to Table 1 below of all requirements.

Table 1: Requirements of a Specialist Report as set out in GN R. 326 of 07 April 2017.

REQUIREMENTS	YES/NO
A Specialist report prepared in terms of these Regulations must contain –	
a. Details of –	
i. The Specialist who prepared the report; and,	Yes
ii. The expertise of that Specialist to compile a specialist report including a curriculum vitae;	
b. A declaration that the Specialist is independent in a form as may be specified by the Competent Authority;	Yes
c. An indication of the scope of, and the purpose for which, the report was prepared;	
i. An indication of the quality and age of base data used for the Specialist Report;	Yes
ii. A description of existing impacts on site, cumulative impacts of the proposed development and levels of acceptable change;	
d. The duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Yes
e. A description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	Yes
f. Details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	Yes
g. An identification of any areas to be avoided, including buffers;	Yes
h. A map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	Yes
i. A description of any assumptions made and any uncertainties or gaps in knowledge;	Yes
j. A description of the findings and potential implications of such findings on the impact of the proposed activity or activities;	Yes
k. Any mitigation measures for inclusion in the EMP'r	Yes
l. Any conditions for inclusion in the Environmental Authorisation;	Yes
m. Any monitoring requirements for inclusion in the EMP'r or Environmental Authorisation;	Yes
n. A reasoned opinion –	
i. Whether the proposed activity, activities or portions thereof should be authorised;	Yes
ii. If the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMP'r, and where applicable, the closure plan;	
o. A description of any consultation process that was undertaken during the course of preparing the specialist report;	N/A
p. A summary and copies of any comments received during any consultation process and where applicable all responses thereto; and,	N/A
q. Any other information requested by the Competent Authority.	Yes

7 VISUAL IMPACT EVALUATION CRITERIA CHECKLIST

As per the Provincial Government of the Western Cape Guideline for involving Visual and Aesthetic Specialists in the EIA Process (DEA&DP, 2005), a high quality visual assessment should include the following criteria:

Table 2: Requirements of a Visual Impact Assessment.

REQUIREMENTS	YES/NO
Meet the minimum requirements for a visual assessment;	Yes
Is appropriate to the nature and scale of the proposed development;	Yes
Provides a full description of the environment and the project;	Yes
Considers the project within its wider context;	Yes
Provides a clear methodology using accepted conventions for visual assessment;	Yes
All sources of information and references are given;	Yes
Graphics, including maps and visual simulations, are clear;	Yes
Include both quantitative and qualitative criteria;	Yes
Cumulative visual impacts have been considered;	Yes
An evaluation of alternatives has been made;	Yes
An explanation of significance ratings, related to bench-marks, is given;	Yes
Recommendations for visual mitigation are sensible and practical;	Yes
Recommendations for monitoring programmes have been outlined;	Yes
The best practical environmental option has been considered;	Yes
All the visual issues raised in the scoping have been addressed;	Yes
A clear summary of mitigation measures, including essential and optional measures, is given.	Yes

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8 STUDY APPROACH

8.1 Methodology

The study was undertaken using Geographical Information System (GIS) software as a tool to generate a viewshed analyses and to apply relevant spatial criteria to the proposed development. A detailed Digital Elevation Model (DEM) for the study area (S23E29) was obtained from the National Aeronautic Space Administration (NASA). The methodology utilised to identify issues to the visual impact include the following activities:

- The creation of a detailed digital terrain model of the potentially affected environment;
- The identification of sensitive environments upon which the proposed interpretation centres and overnight facilities could have a potential impact on; and,
- The creation of viewshed analyses from the proposed interpretation centres and overnight facilities in order to determine the visual exposure and the topography's potential to absorb the potential visual impact. The viewshed analysis takes into account the dimension of the proposed buildings and was calculated at a height of five meters (5 m).

This Report (Visual Impact Assessment) sets out to identify and quantify the possible visual impacts related to the proposed interpretation centres and overnight facilities, as well as offer potential mitigation measures where required. The following methodology has been adopted for the assessment of the Visual Impact Assessment:

- **Determine the Potential Visual Exposure**
The visibility or visual exposure of any structure or activity is the point of departure for the VIA. It stands to reason that if the proposed infrastructure was not visible, no impact will occur. Viewshed analyses of the proposed structures indicate the potential visibility.
- **Determine Visual Distance/Observer Proximity to the facility**
In order to refine the visual exposure of the proposed development on surrounding areas/receptors, the principle of reduced impact over distance is applied in order to determine the core area of visual influence for the structures.

Proximity radii for the proposed facilities are created in order to indicate the scale and viewing distance of the structures and to determine the prominence of the structures in relation to their environment.

The visual distance theory and the observer's proximity to the interpretation centres and overnight facility are closely related, and especially relevant, when considered from areas with a high viewer incidence and a predominantly negative visual perception of the proposed infrastructure.
- **Determine Viewer Incidence/Viewer Perception**
The number of observers and their perception of a structure determine the concept of visual impact. If there are no observers, then there would be no visual impact. If the visual perception of the structure is favourable to all observers, the visual impact would be positive.

It is therefore necessary to identify areas of high viewer incidence and to classify certain areas according to the observer's visual sensitivity towards the proposed infrastructure. It would be

impossible not to generalise the viewer incidence and sensitivity to some degree, as there are many variables when trying to determine the perception of the observer; regularity of sighting, cultural background, state of mind, and purpose of sighting which would create a myriad of options.

➤ **Determine the Visual Absorption Capacity of the Natural Vegetation**

This is defined as the capacity of the receiving environment to absorb the potential visual impact of the proposed development. The VAC is primarily a function of the vegetation, and will be high if the vegetation is tall, dense and continuous. Conversely, low growing sparse and patchy vegetation will have a low VAC.

The VAC will also be high where the Environment can readily absorb the structure in terms of texture, colour, form and light/shade characteristics of the structure. On the other hand, the VAC for a structure contrasting markedly with one or more of the characteristics of the environment will be low. The VAC also generally increases with distance, where discernible detail in visual characteristics of both environment and structure decreases.

The Digital Terrain Model utilised in the calculation of the visual exposure of the proposed interpretation centres and overnight facility does not incorporate the potential VAC of the natural vegetation of the region. It is therefore necessary to determine the VAC by means of the interpretation of the vegetation cover, supplemented with field observation.

➤ **Determine the Visual Impact Index**

The results of the above analyses are merged in order to determine where the areas of likely visual impact would occur. These areas are further analysed in terms of the previously mentioned issues (related to the visual impact) and in order to judge the magnitude of each impact.

➤ **Determine the Impact Significance**

The potential visual impacts identified and described are quantified in their respective geographical locations in order to determine the significance of the anticipated impact. Significance is determined as a function of the extent, duration, magnitude and probability.

8.2 Projections

Projected coordinate systems are defined by ArcGIS Resource Centre (The developers) as *“a flat, two dimensional surface. Unlike a geographical coordinate system, a projected coordinate system has constant lengths, angles, and areas across the two dimensions. A projected coordinate system is always based on a geographic coordinate system that is based on a sphere or spheroid”*. Projected Coordinates systems are world based and thus the larger the area the larger the distortion. To minimise the distortion the Universal Transverse Mercator (UTM) coordinate reference system divides the Earth into 60 equal zones that are all 6 degrees wide in longitude from East to West. Mapungubwe is situated within the thirty five degree (35°) UTM Zone, thus the WGS84/UTM S35 (32735) was used as projection.

9 ASSUMPTIONS AND LIMITATIONS

- Information is assumed to be the latest available information.
- Visual impact studies and assessments depend, to some extent, on subjective judgements. The subjectivity, of the analysis relates to the value driven nature of VIA. However, to deal with subjectivity, the methodology of this VIA is explained and rating categories clearly defined.

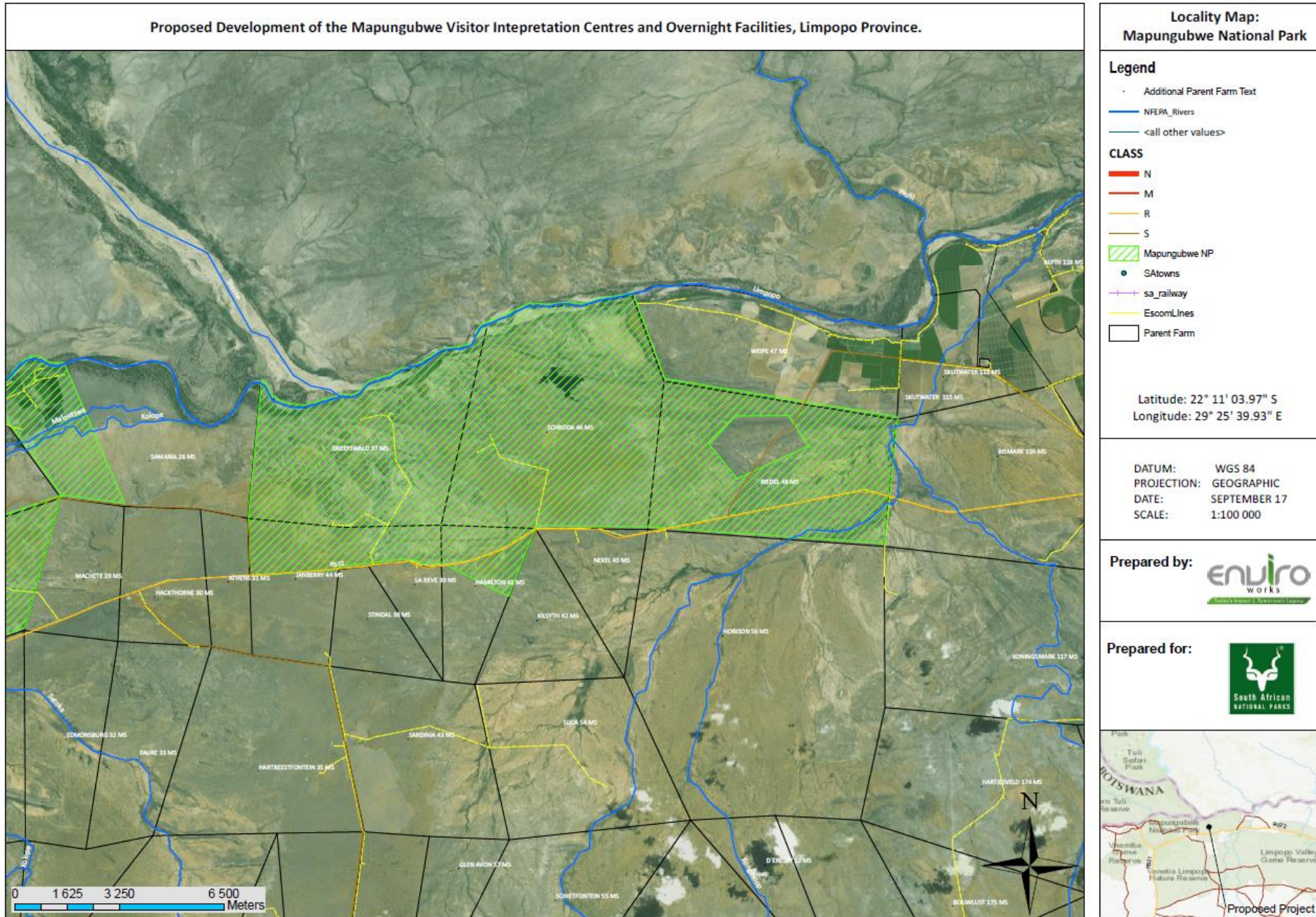


Figure 12: Locality Map of the Proposed Mapungubwe National Park Upgrades, Limpopo Province.

10 SCOPE OF WORK

The determination of the potential visual impacts is undertaken in terms of nature, extent, duration, magnitude, probability and significance of the construction and operation phases of the proposed project. The study area for the visual assessment encompasses a geographical area of 130 km² (extent of the maps) and includes a ten kilometre (10 km) buffer zone from the proposed interpretation centres and overnight facilities. The study area constitutes of local tourist attractions, the Limpopo River which serves as the border between South Africa and Zimbabwe, staff quarters, lodges and provincial roads. The proposed development will be situated towards the north west of Mucina.

Anticipated issues related to the potential visual impact of the proposed Mapungubwe Upgrades include the following:

- The visibility of the developments to, and potential visual impact on, observers travelling along the Internal Park Roads and the R572;
- The visibility of the facility to, and potential visual impacts on tourists visiting tourist attraction within and near Mapungubwe National Park (Schroda Dam, Mapungubwe Look-out Points, Mapungubwe Museum Complex, Mopane Bush Lodge, Mapesu Private Game Reserve, Mubuyu Safaris Guest Lodge and numerous 4 x 4 trails within the area);
- The visibility of the facilities to, and potential visual impact on observers residing within close proximity of Mapungubwe National Park;
- The visual absorption capacity of natural or planted vegetation as well as man-made topographical features;
- Potential visual impacts associated with the construction- and operational phase; and,
- The potential to mitigate visual impacts.

It is anticipated that the issues listed above may constitute a visual impact at a local scale.

11 THE AFFECTED ENVIRONMENT

The proposed development of the interpretation centres and overnight facilities will be situated within the Mapungubwe National Park, Limpopo Province. The study area constitutes of natural areas and recreational activities (Guest Lodges, Protected Areas and Game Farms).

11.1 Topography, vegetation and hydrology

11.1.1 Vegetation

The study area is described by Mucina & Rutherford, 2006, as extremely irregular plains with ridges and hills. Moderately open savanna with poorly developed ground layer. Umbrella-shape canopied *Kirkia acuminata* is prominent on some ridge skylines with the often enormous *Adansonia digitate* on shallow calcareous gravel; the shrub *Catophractes alexandri* is dominant on calc-silicate soils. These are particularly striking landscapes with rock walls and passages within areas of sandstone of the Clarens formation.

11.1.2 Geology

Mostly rocks of the Beit Bridge Complex as well as sediments (including sandstones of the Clarens formation) and Basalt (particularly in the east) of the Karoo Supergroup. Shallow gravel and sand (Glenrosa and Mispah soil forms) to calcareous clayey soil. Land types include mainly Fc, Fb and Ib.

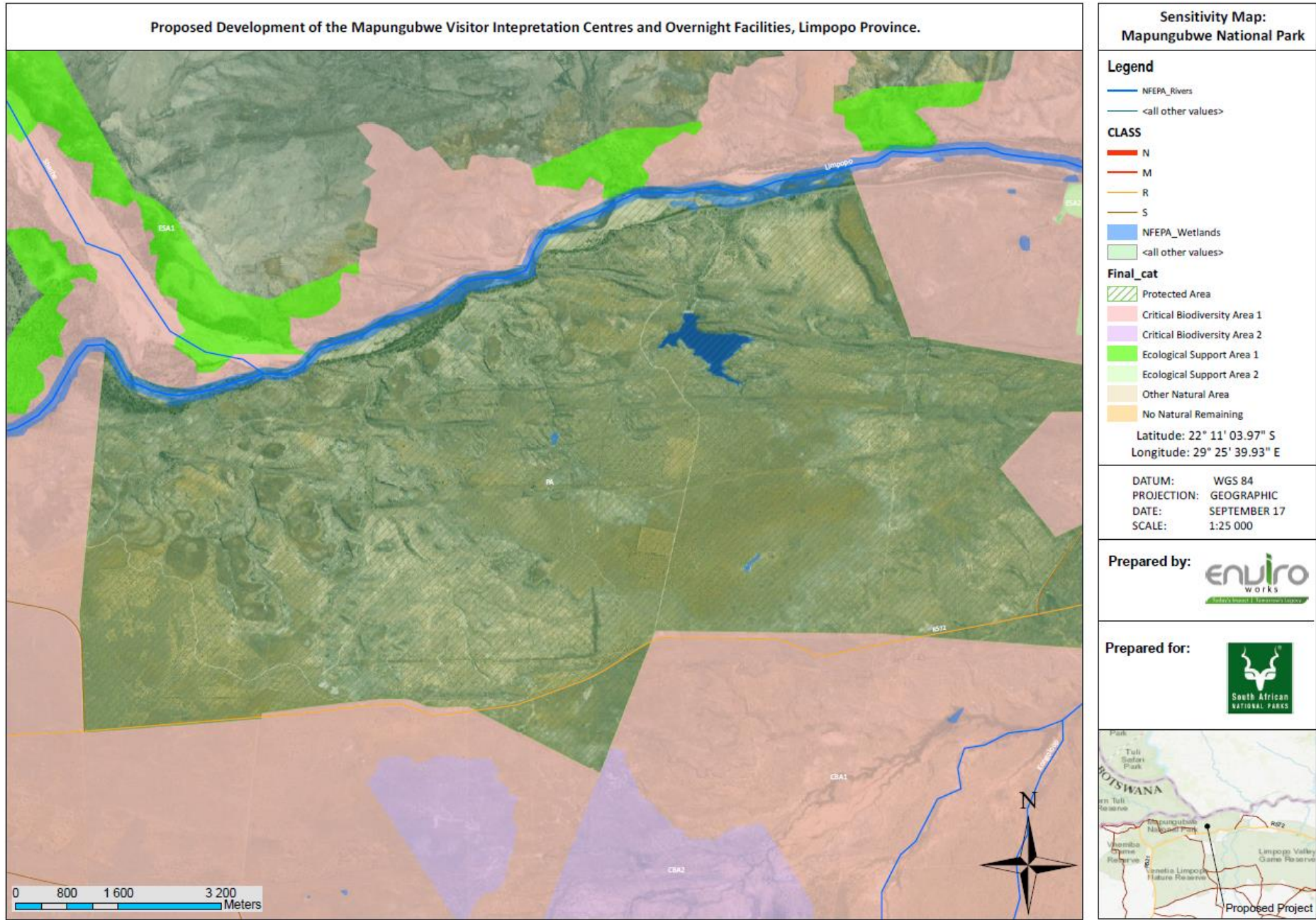


Figure 14: Sensitivity Map of the Study Area.

11.1.3 Climate

The proposed project will be situated within the Limpopo Ridge Bushveld bio-region. The Mean Annual Precipitation (MAP) of the study area is three hundred and eleven millimeters (311 mm) mostly occurring in the summer months with the highest rainfall measured during the months of December, January and February (Mucina & Rutherford, 2006). The Mean Annual Temperature (MAT) recorded for the study area is twenty one degrees Celsius (21.7° C) with summer temperatures averaging at thirty one degrees Celsius (31° C).

SVmp 2 Limpopo Ridge Bushveld

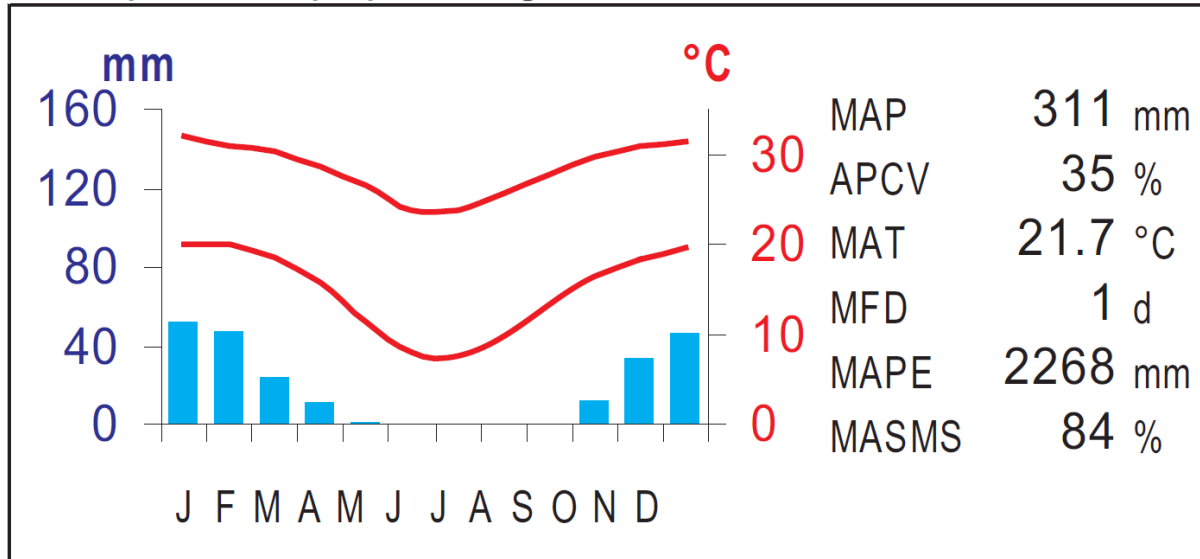


Figure 15: Climate Diagram for the Limpopo Ridge Bushveld.

12 RELEVANT LEGISLATION AND GUIDELINES

The following legislation and guidelines have been considered in the preparation of this report:

- This Visual Impact Assessment was undertaken in accordance with the Guidelines for Involving Visual and Aesthetic Specialists in EIA Processes, as issued by the Department of Environmental Affairs and Development Planning (DEA&DP).
- The Environmental Impact Assessment Regulation as outlined in Government Notice Regulation 326 of 7 April 2017.

13 DEVELOPMENT CATEGORY

As per the Guidelines for Involving Visual and Aesthetic Specialists in EIA Processes, the development categories are as follow:

Table 3: Development Categories.

Category 1	Items listed in this category include: <ul style="list-style-type: none"> ➤ Nature reserves; ➤ Nature related recreation; ➤ Camping; ➤ Picnicking; and, ➤ Trails and minimal visitor facilities.
Category 2	Items listed in this category include: <ul style="list-style-type: none"> ➤ Low-key recreation/resort/residential type developments;

	<ul style="list-style-type: none"> ➤ Small scale agriculture/nurseries/narrow roads; and, ➤ Small scale infrastructure
Category 3	<p>Items listed in this category include:</p> <ul style="list-style-type: none"> ➤ Low density residential/resort type development; ➤ Golf or polo estates; and, ➤ Low to medium-scale infrastructure.
Category 4	<p>These include:</p> <ul style="list-style-type: none"> ➤ Medium density residential development; ➤ Sport facilities; ➤ Small-scale commercial facilities/office parks; ➤ One-stop petrol stations; ➤ Light industry; ➤ Medium scale infrastructure.
Category 5	<p>These include:</p> <ul style="list-style-type: none"> ➤ High density township/residential developments; ➤ Retail and office complexes; ➤ Industrial facilities; ➤ Refineries; ➤ Treatment plants; ➤ Power stations; ➤ Wind energy farms; ➤ Powerlines; ➤ Freeways; ➤ Toll roads; ➤ Large scale infrastructure generally; ➤ Large scale development of agriculture land and commercial tree plantations; ➤ Quarrying and mining activities with related processing plants.

Derived from Table 5, the proposed project falls within Category 1 (Trails and minimal visitor facilities). From the aforementioned Table 6 was compiled in order to determine the Visual Impact of any proposed development.

Table 4: Expected Visual Impact of the Proposed Development.

Type of Environment	Type of Development				
	Category 1	Category 2	Category 3	Category 4	Category 5
Protected/wild areas of international or regional significance.	Moderate visual impact expected	High visual impact expected	High visual impact expected	Very high visual impact expected	Very high visual impact expected
Areas or routes of high scenic, cultural, historical significance.	Minimal visual impact expected.	Moderate visual impact expected	High visual impact expected	High visual impact expected	Very high visual impact expected

Areas or routes of medium scenic, cultural or historical significance.	Little or no visual impact expected	Minimal visual impact expected.	Moderate visual impact expected	High visual impact expected	High visual impact expected
Areas or routes of low scenic, cultural or historical significance/disturbed.	Little or no visual impact expected	Little or no visual impact expected	Minimal visual impact expected.	Moderate visual impact expected	High visual impact expected
Disturbed or degraded sites/run-down urban areas/wasteland.	Little or no visual impact expected	Little or no visual impact expected	Little or no visual impact expected	Minimal visual impact expected.	Moderate visual impact expected

From the table above, it is anticipated that the proposed interpretation centres and overnight facilities will have a moderate visual impact on the surrounding areas.

14 DESCRIPTION OF THE RECEIVING ENVIRONMENT

Landscape character is defined by the U.K Institute of Environmental Management and Assessment (IEMA) as the “*distinct and recognizable pattern of elements that occurs consistently in a particular type of landscape, and how this is perceived by people. It reflects particular combinations of geology, land form, soil, vegetation, land use and human settlement*” (GLVIA, 2002). According to DEA&DP Guideline Section 9.2, information describing the current state of the affected environment, as well as trends in the area, is required for visual input into the EIA process. The receiving environment was determined using the 2013-2014 South African National Land-Cover data as provided by the National Department of Environmental Affairs (DEA) and field observation conducted on 09 September 2017.

14.1 Sense of Place

The term sense of place captures the identity of places we recognize. It embraces natural and cultural features, the distinctive sights, sounds and experiences to the people residing in or nearby that place. Places with a strong sense of place have a clear identity and character that is recognisable by inhabitants and visitors alike.

Sense of place differs from place attachment by considering the social geographical context of place bonds and the sensing of place, such as aesthetic and a feeling of dwelling. An impact on the sense of place is one that alters the visual landscape to such an extent that the user experiences the environment differently, and more specifically, in a less appealing or less positive light.

The process of identifying Mapungubwe National Park as a place of natural and cultural significance began in 1922 when nine farms were set aside as a botanical reserve and, following much controversy, were declared as a wildlife sanctuary in 1947. A change of governing party led to this declaration being repealed the next year, with settlement by white farmers then taking place. By 1967 there was a renewed lobby for park status, now also including the important archaeological values. As a consequence, the site known as K2 was declared a national monument on 9 September 1983 and Mapungubwe Hill and its southern terrace were declared on 17 August 1984 in terms of the former National Monuments Act (Act No. 28 of 1969). During the later apartheid years, the region had a significant military presence on the farm Greefswald which left a legacy of fences and other infrastructure, much of which has been removed as it did not compliment the aesthetics of the

landscape. After the small provincial Vhembe nature reserve consisting of three farms was declared in 1967, there was renewed interest in investigating national status of the park as a larger area intended for a tourism hub in the late 1980s, a move later supported by De Beers following establishment of Venetia diamond mine to the south in 1990 (Spies, 2019).

In 2003, the MCL, synonymous with the Mapungubwe National Park and National Heritage Site was the first of South Africa's national parks to be inscribed on the World Stage. On 9 June 1995 an agreement was signed between SANParks and what was then the Northern Province government committing them to the development of a new national park in the Shashe/Limpopo River border area of South Africa. This ambitious development for a major national park in the area, provisionally known as the Vhembe/Dongola National Park, was not only a spur to the development of the eco-tourism industry in Limpopo Province, but has served as a regional growth point for tourism and conservation because of the positioning of the park on the international borders between Botswana, Zimbabwe and South Africa. The ultimate objective stated at the time of its official declaration as a national park on 9 April 1998 was that the park should become a major component of a Transfrontier conservation area shared by the three countries (Spies, 2019).

The wealth of Mapungubwe was realised in the 1930s when extensive archaeological research uncovered valuable artefacts on the sacred hill. More recent research at several related sites has uncovered the extensive historical importance of the wider region. However, very limited oral history exists to understand the social and historical relationship of the people occupying the areas next to Mapungubwe before colonial occupation began (Spies, 2019).

Pre-colonial land-use included usage of different landscape positions in the Earlier Stone Age, Middle Stone Age and Later Stone Age by hunter-gatherers, and within the last 2000 years by Khoi herders. Early Bantu-speaking farmers kept livestock and grew crops on lower-lying ground with better soils, while hilltops were favoured by the elite and were considered important for rain-making. White farmers in the 20th century tended to occupy land near the river for irrigation, or farm in the areas away from the river with cattle and/or game-based ventures on the extensive semi-arid range. Military, mining and conservation land usage has added to the mix over the past century (Spies, 2019).

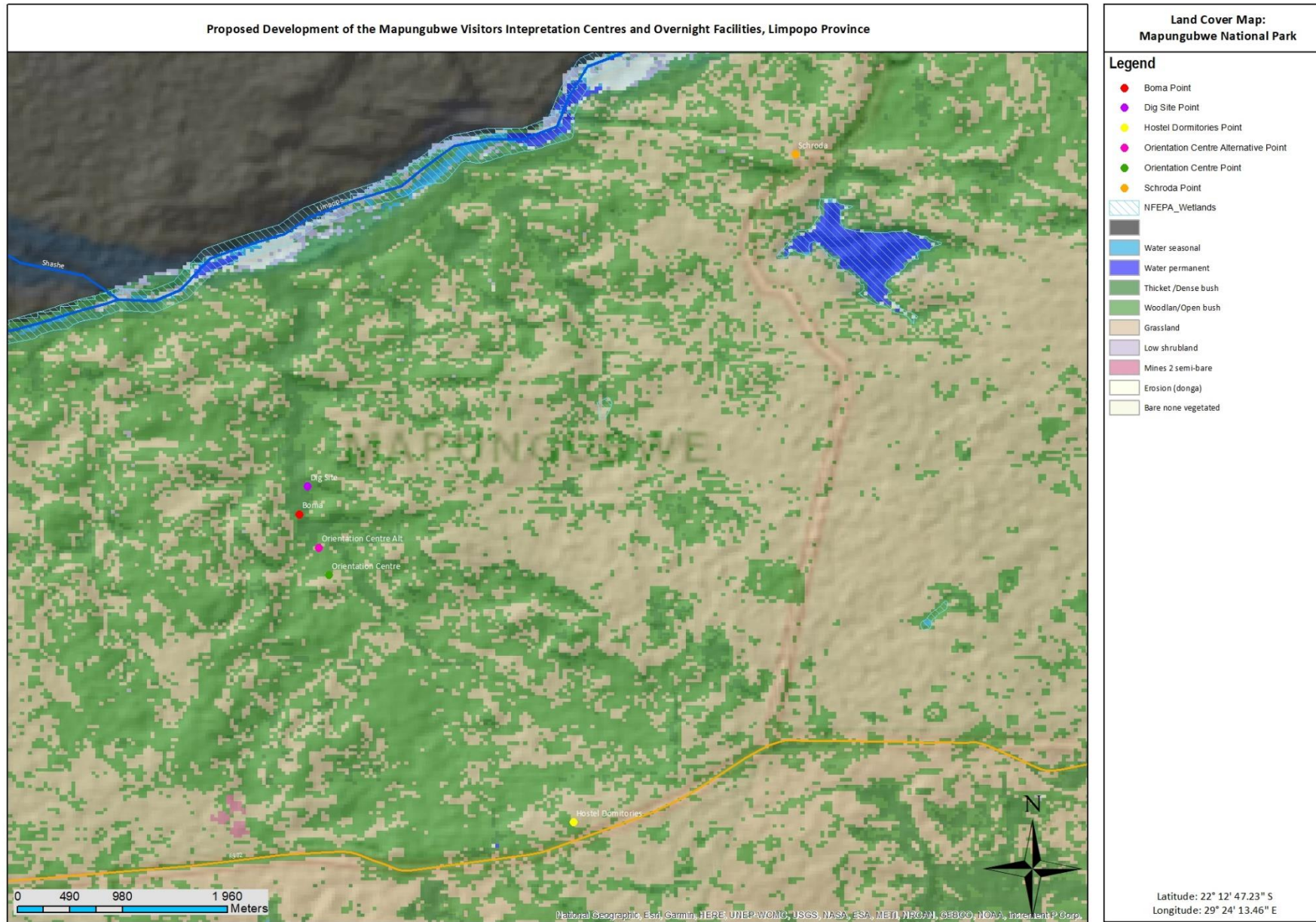


Figure 16: Land Cover Map of the Area.

15 RESULTS

15.1 Potential Visual Exposure (Preferred Mast Position)

The combined result of the viewshed analysis for the proposed upgrade of the Mapungubwe Interpretation Centres and Overnight Facilities are displayed on the map below (Figure 29). The visibility analysis was undertaken at the height of the buildings measuring in at five metres (5 m), in order to simulate the view from the buildings and to indicate prominence of the structures within the landscape. Furthermore; Figure 29 indicates proximity radii from the proposed upgrades as a reference to determine the Visual Absorption Capacity. It must be noted that the Digital Terrain Model (DTM) utilised from the viewshed analysis does not include the effect of vegetation cover and built structures. These features may influence the visual exposure to some degree.

15.2 Proposed Development of Interpretation Centres and Overnight Facilities

15.2.1 0-1km (short distance)

As per Figure 29 the overnight facilities will have a moderate visual impact within the short distance zone as it will be situated within close proximity to the R572 (177 m); however, it must be noted that the visual impact will be temporary as motorists will only pass through the area. Although the VAC can be described as moderate the visual impact will be permanent to the staff members residing towards the south and south east of the proposed development resulting in a moderate visual impact. It is anticipated that the Mapungubwe Hill Complex will have a low visual impact beyond three hundred metres (300 m) of the proposed upgrades due to the high visual absorption capacity as a result of the high vegetation cover and the undulating topography of the study area. As for the Schroda Orientation Centre the visual impact is considered to be high within the short distance zone towards the north west, north and north east. The visual impact is lowered to some degree due to the undulating topography of the study area coupled with the moderate vegetation cover.

15.2.2 1-2km (short to medium distance)

Starting with the overnight facilities the proposed development will be visible from the south east and east; however the visual impact will be low to none due to the distance between the observer and the development; furthermore, the visual impact will be restricted by the dense vegetation cover predominantly consisting of shrubland and trees. As mentioned before the Mapungubwe Hill Complex will have no visual impact beyond three hundred metres (300 m) due to the high visual absorption capacity of the study area. The highest visual impact within the short to medium distance will be experienced from the Schroda Orientation Centre. It must be noted that the visual impact will be low due to the moderate vegetation cover of the study area. It must be noted that limited observers are present within the area as it predominantly consist of natural areas.

15.2.3 2-5km (medium to long distance)

Visibility beyond two kilometres (2 km) from the proposed developments is expected to be negligible and low due to the distance between the object and the observer. As per the viewshed analysis the proposed development will be visible within the medium to long distance zone from certain elevated vantage points situated towards the south and south east of the Mapungubwe Hill Complex. Due to the aforementioned

coupled with the high VAC of the study area and the limited observers within these mountainous terrains the visual impact is considered to be very low.

15.2.4 Conclusion

The visual impact for the Overnight Facilities will be moderate within the short distance zone; however, given the existing Mapungubwe Hill Museum Complex the visual impact will be lower as disturbance have already occurred within the area. The developments planned at Mapungubwe Hill will have a low impact as it will only be visible over a distance of three hundred metres (300 m) due to the high vegetation cover and undulating topography of the study area. The highest visual exposure will occur from Schroda orientation Centre; however, the areas of high viewer incidence primarily consists of natural vegetation with limited observers within this area. The aforementioned will result in a low visual impact over a two kilometre (2 km) radius. As the proposed upgrades will result in a higher visitors experience and draw more visitors to the park the upgrades will result in a positive visual impact if all mitigation measures are implemented.

15.3 Elevation of the Area

Section 15.3 and Section 16 must be read in conjunction with Section 15.2. The graphs illustrated below provide a visual reference of the capability of the landscape to absorb the visual impact associated with the proposed development of the Overnight Facilities and Interpretation Centres. The graphs have been compiled within a five kilometer (5 km) radius in the four major wind directions from the proposed developments with the Staff Accommodation within the park taken as the central point.

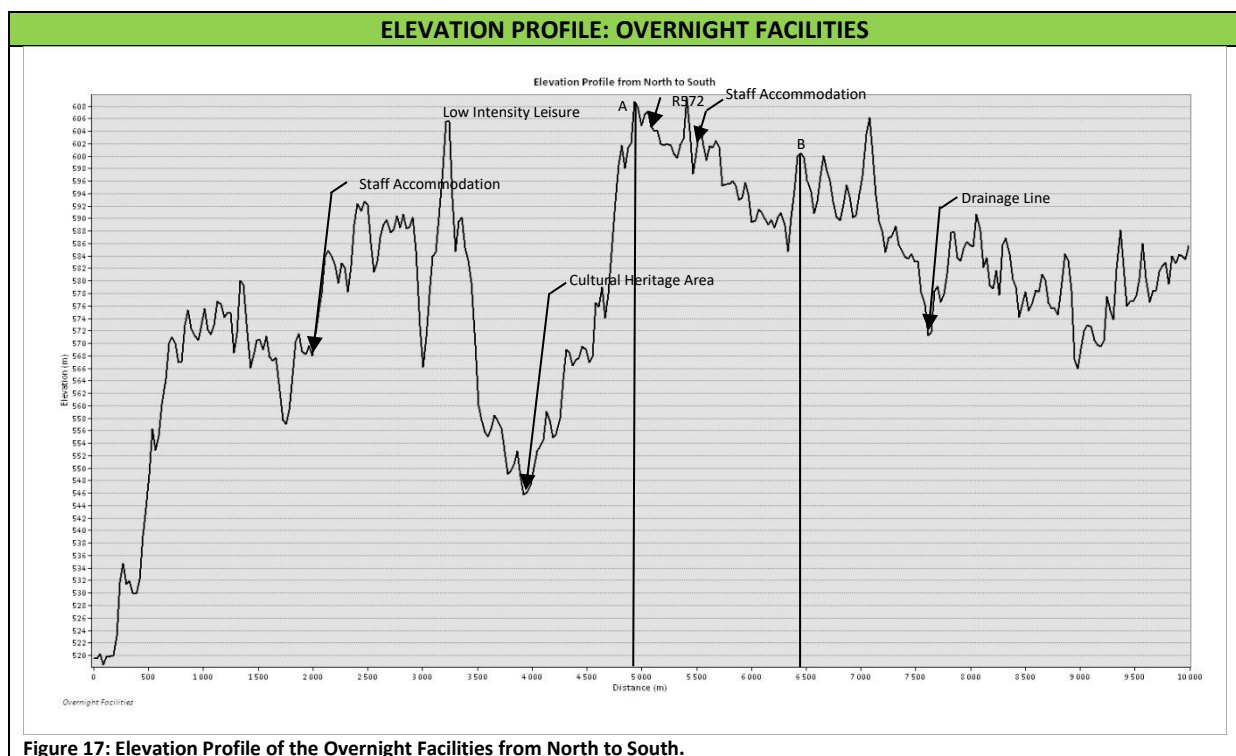


Figure 17: Elevation Profile of the Overnight Facilities from North to South.

Figure 7 illustrates the elevation profile of the overnight facilities from the north to south. Towards the north the proposed development will be visible over the first seventy three metres (73 m) from where it will be restricted as illustrated by Point A. The landscape between the proposed development and Point A consist of natural vegetation. Towards the south the proposed development will be visible over the first two point one kilometres (2.1 km) where it will be restricted by the undulating topography as illustrated by Point B. The R572

is situated one hundred and seventy five metres (175 m) towards the south of the proposed development from where the visual impact will be temporary as motorists will only pass through the area. The Mapungubwe National Park Staff Quarters are situated six hundred and twenty two metres (622 m) from the Overnight Facilities; however, it must be noted that the staff quarters are situated at a lower elevation than that of the overnight facilities. It must be said that visual intrusion has already occurred within the area as the proposed overnight facilities will be situated adjacent to the Mapungubwe National Park Museum Complex.

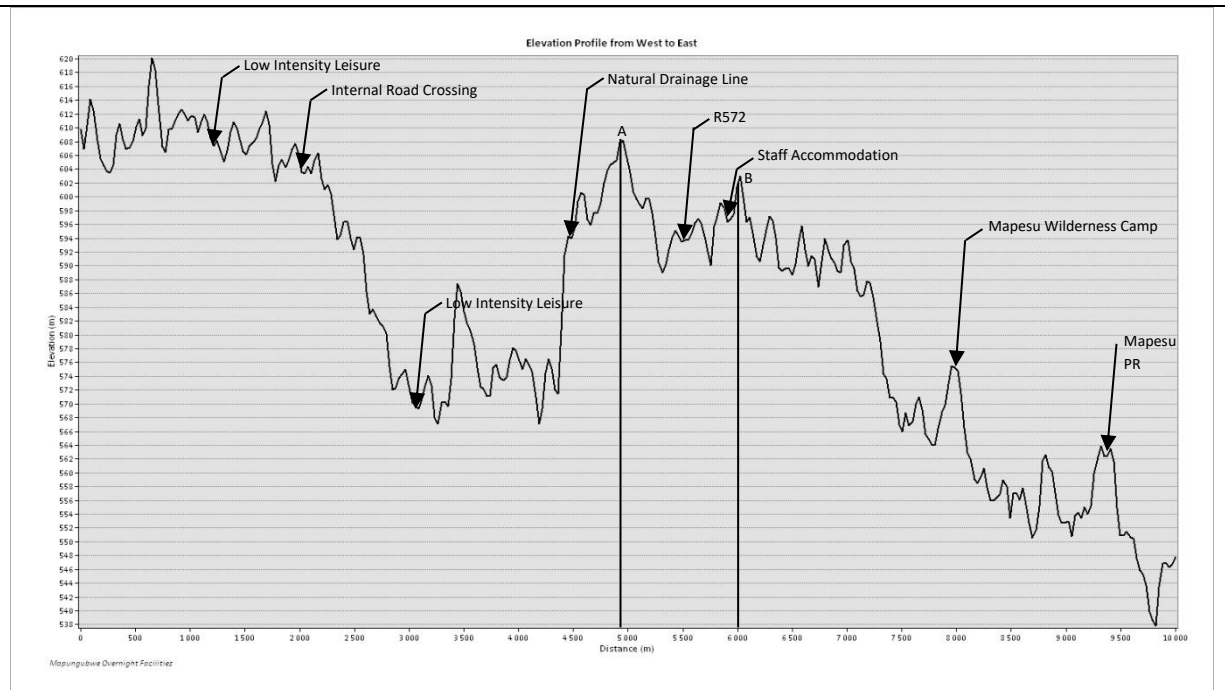


Figure 18: Elevation Profile of the Overnight Facilities from West to East.

The elevation of the landscape from west to east can be described as undulating topography varying between five hundred and thirty eight metres (538 m) and six hundred and twenty meters (620 m) above sea level. As per Figure 29 (Viewshed Analysis) the visual impact towards the west will be restricted to one hundred and eleven metres (111 m) as illustrated by Point A. The only visual exposure towards the west will be observed from the Mapungubwe National Park Museum Complex. Towards the east the visual impact will be restricted to one kilometre (1 km) as illustrated by Point B due to the undulating topography of the study area. Within the one kilometre (1 km) distance a temporary visual impact will occur from the R572 situated four hundred and eighty three metres (483 m) from the proposed development with the staff quarters situated seven hundred and ninety four metres (794 m) towards the east from where the visual impact will be permanent.

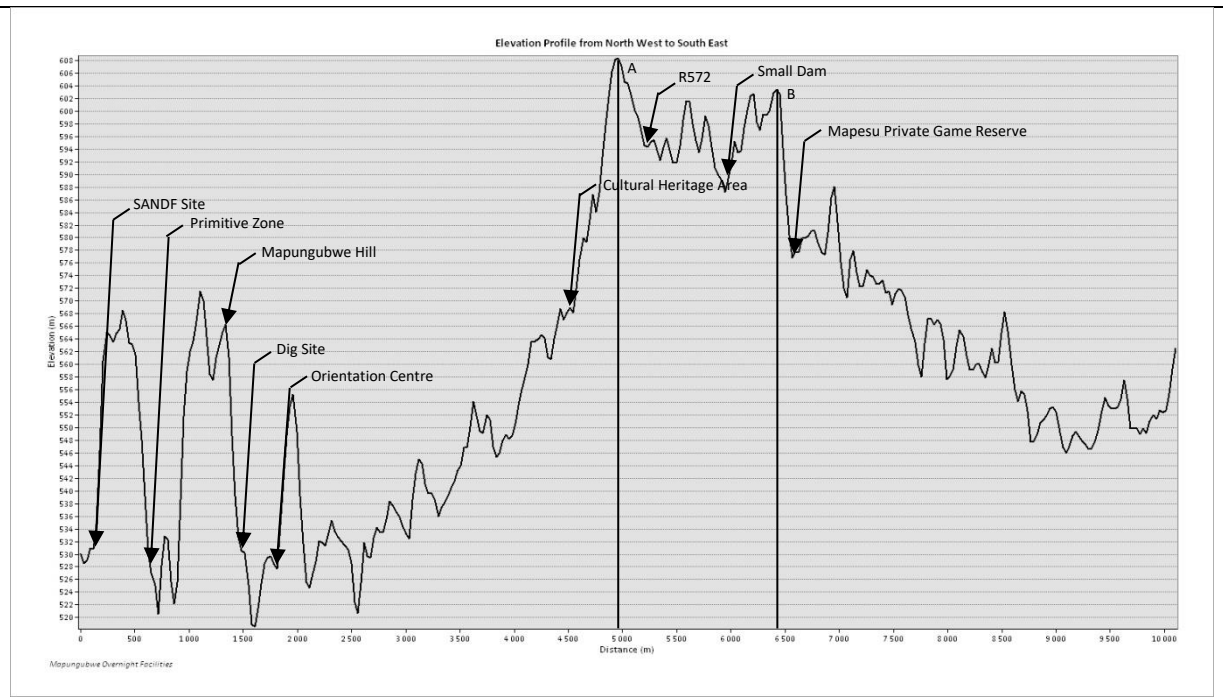


Figure 19: Elevation Profile of the Overnight Facilities from North West to South East.

Figure 9 illustrates the elevation profile from north west to south east. The visual impact towards the north west will be restricted to one hundred and twenty nine metres (129 m) as illustrated by Point A. Within this vantage point no visual receptors are anticipated as the study area comprises of natural veld. Towards the south east the proposed development will be visible over a distance of one point two kilometres (1.2 km) from where it will be visible from the R572 situated one hundred and sixty five metres (165 m) from where the visual impact will be temporary. The study area towards the south east consist entirely of natural vegetation with a small dam/pan situated nine hundred and forty nine metres (949 m) from the overnight facilities. Except for the R572 no visual impact is expected to occur within this wind direction.

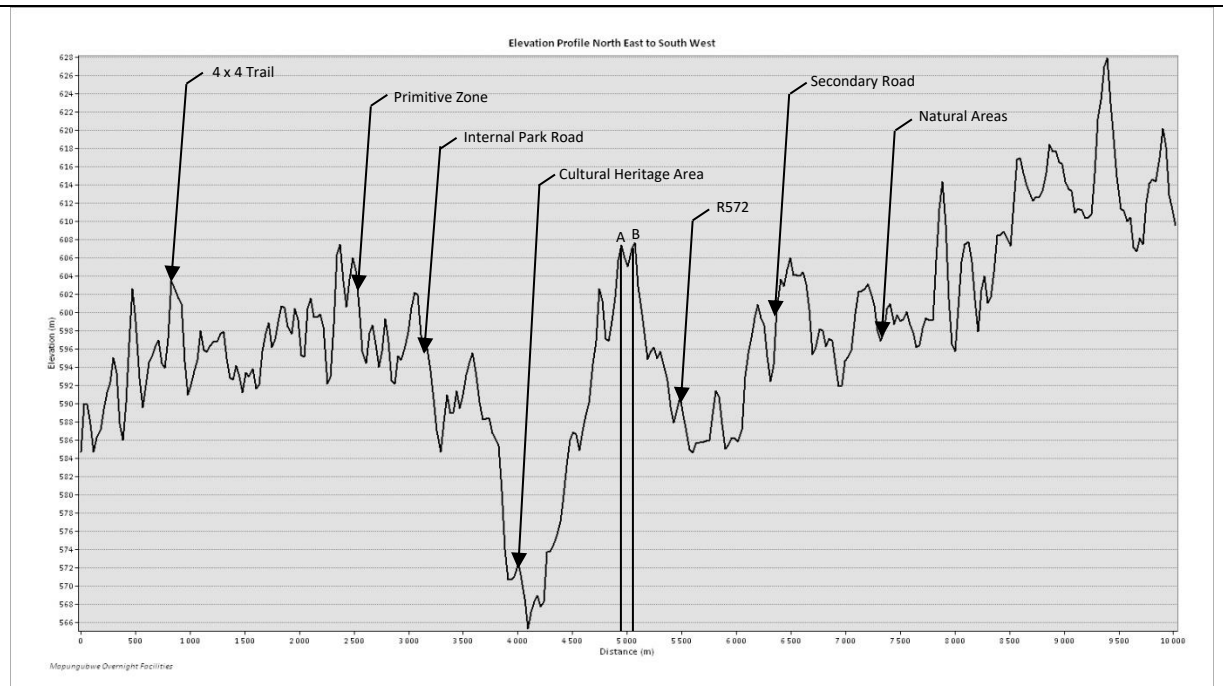


Figure 20: Elevation Profile of the Overnight Facilities from North East to South West.

Figure 10 illustrates the elevation of the study area from north east to south west. The lowest visual impact will occur within these wind directions as the visual exposure will be restricted to ninety six metres (96 m)

towards the north east and one hundred and thirteen metres (113 m) towards the south west. Thus the visual impact will be restricted to the development compound and the boundaries of the Mapungubwe National Park.

ELEVATION PROFILE: MAPUNGUBWE HILL

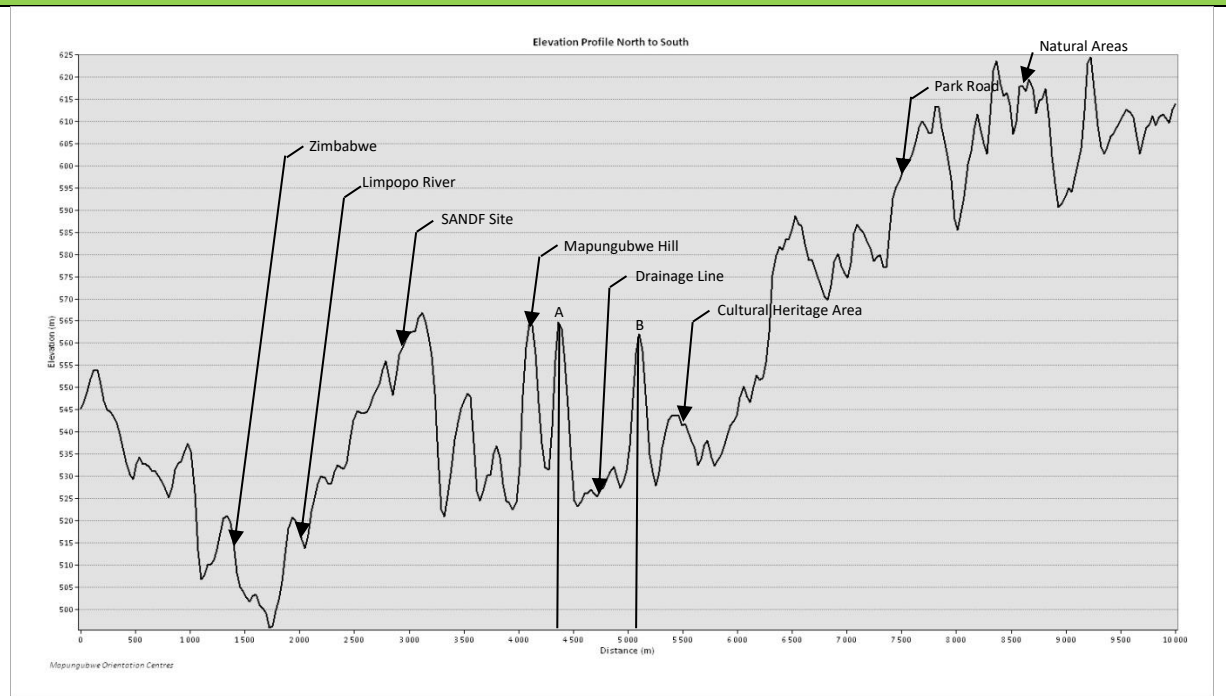


Figure 21: Elevation Profile of the Mapungubwe Hill Developments from North to South.

Figure 21 illustrates the elevation profile of the study from north to south of the Mapungubwe Hill complex development within a five kilometre (5 km) radius. Towards the north the visual exposure will be restricted to six hundred and ninety three metres (693 m) as illustrated by Point A. The area entirely consist of natural vegetation with a drainage line situated two hundred and sixty seven metres (267 m) from the proposed orientation centre. Towards the south the visual impact will be restricted to one hundred and thirty two metres (132 m) as illustrated by Point B due to the undulating topography of the study area. Towards the south the area consists entirely of untransformed natural vegetation.

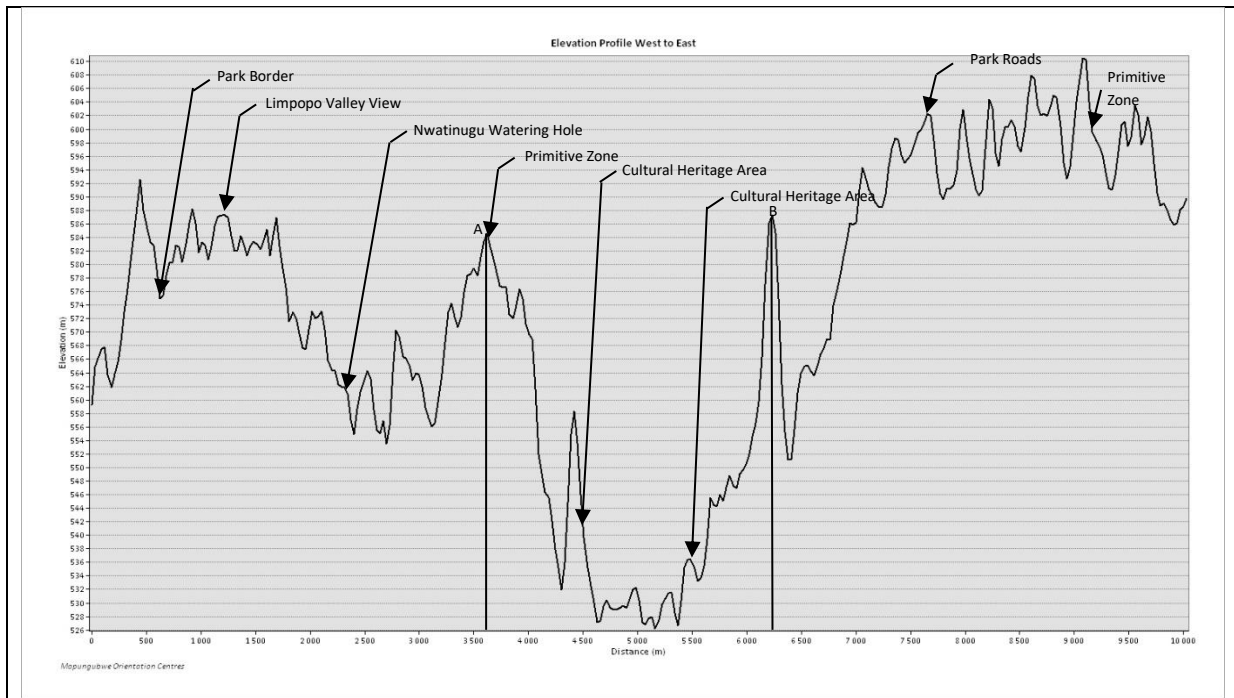


Figure 22: Elevation Profile of the Mapungubwe Hill Developments from West to East.

Figure 22 illustrates the Mapungubwe Hill Development elevation profile from west to east. The proposed developments will be visible over a distance of six hundred and twenty metres (620 m); however, it will be visible from a vantage point situated one point four kilometres (1.4 km) towards the west from where the visual exposure will be restricted. The area towards the west is zoned as a cultural heritage area and primitive resulting in limited observers within this area. Towards the east the proposed development will be visible over a distance of one point three kilometres (1.3 km) from where it will be restricted by the undulating topography of the study area. The highest visual impact within this area will occur from the park road situated twenty six metres (26 m) towards the east; however, the visual impact will be temporary as it is not a permanent road. The area beyond the road is zoned as a cultural heritage zone from where the impact will be low to negligent as limited observers will visit the area.

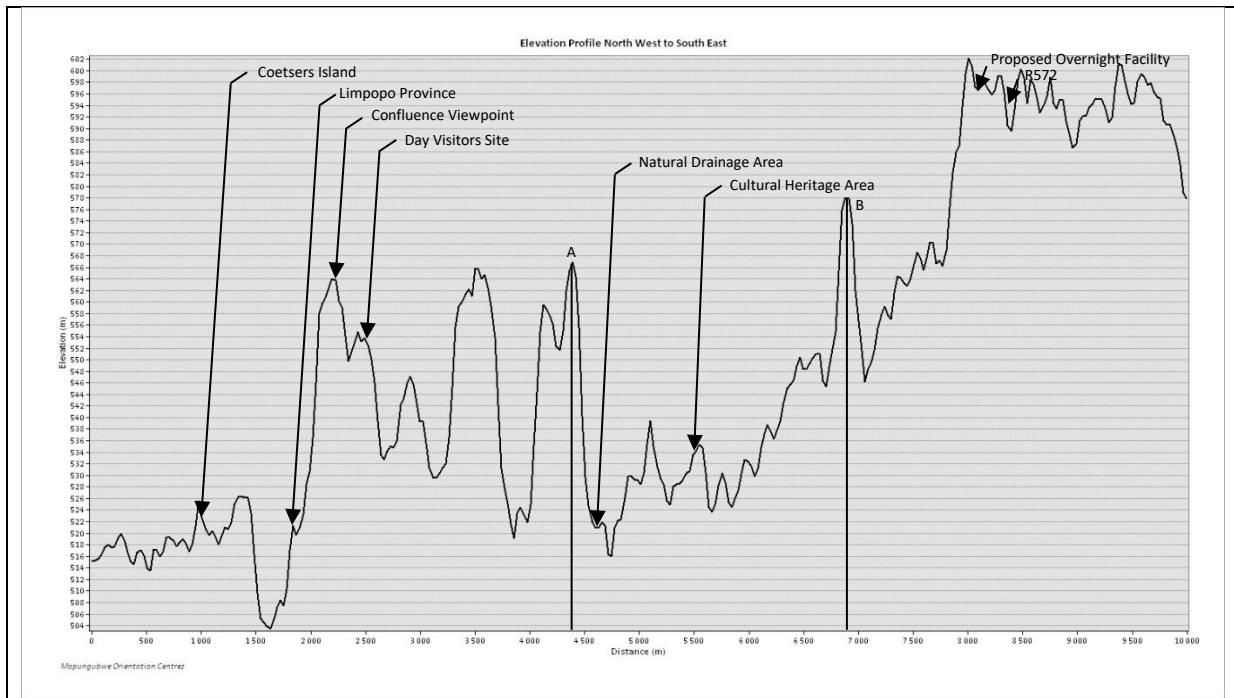


Figure 23: Elevation Profile of the Mapungubwe Hill Developments from North West to South East.

The highest visual exposure will occur from north west to south east from the Mapungubwe Hill Developments. Towards the north west the proposed developments will be visible over a distance of six hundred and eighty metres (680 m) from where it will be restricted by the hill as illustrated by Point A. The natural drainage line is situated one hundred and four metres (104 m) from the proposed development from where a walking trail leads to Mapungubwe Hill. Towards the south west the highest visual impact will occur from the access road situated sixty four metres (64 m) from the Orientation Centre. The visual impact will be moderate and temporary from the access road as visitors will only reside within the area for a limited time. The visual exposure will be restricted to one point eight kilometres (1.8 km) as illustrated by Point B. The area towards the south west is zoned as a cultural heritage area which will allow minimal visitors resulting in no observers within this area.

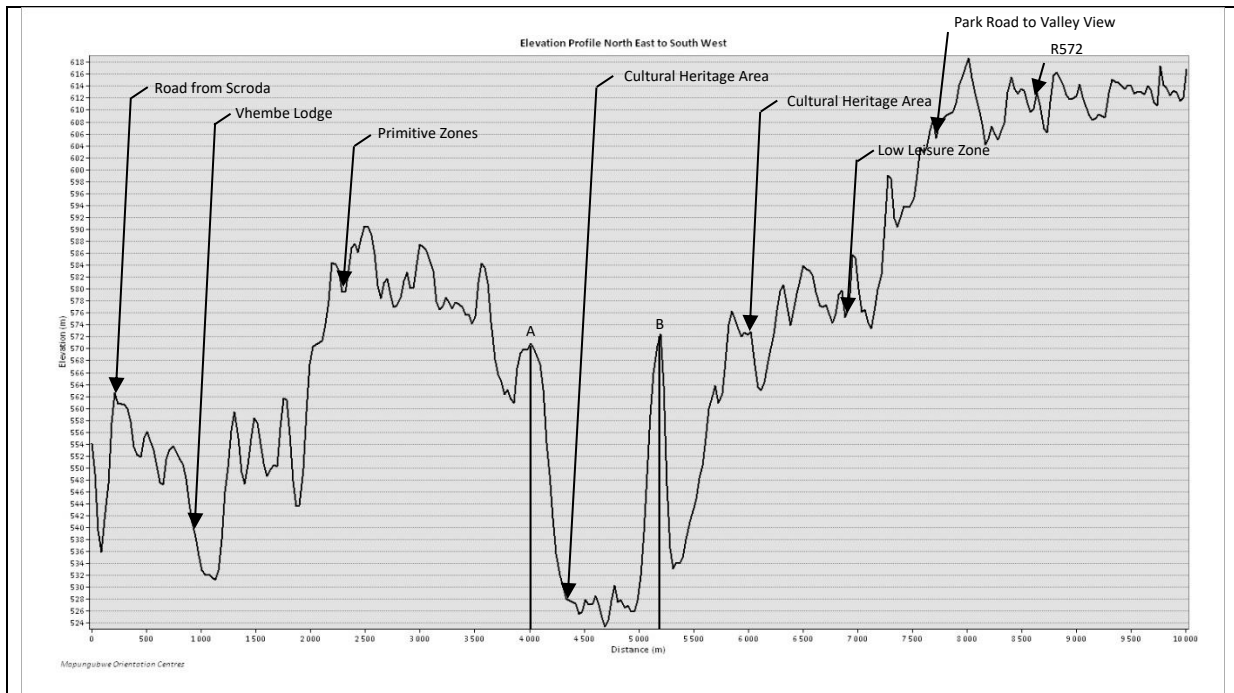


Figure 24: Elevation Profile of the Mapungubwe Hill Developments from North East to South West.

Figure 24 illustrates the elevation profile from the Mapungubwe Hill Complex from north east to south west. Towards the north east the proposed development will be visible over a distance of one kilometre (1 km) from where it will be restricted as illustrated by Point A. The access road is situated twenty three metres (23 m) from the Orientation Centre from where it will be highly visible; however, it must be noted that the visual impact will be temporary as it will only be visited by tourists. Towards the south west the visual impact will be restricted to three hundred metres (300 m) due to the undulating topography of the study area as illustrated by Point B. Towards the south west no access roads or walking trails occur, resulting in no visual impact from this wind direction.

ELEVATION PROFILE: SCRODA

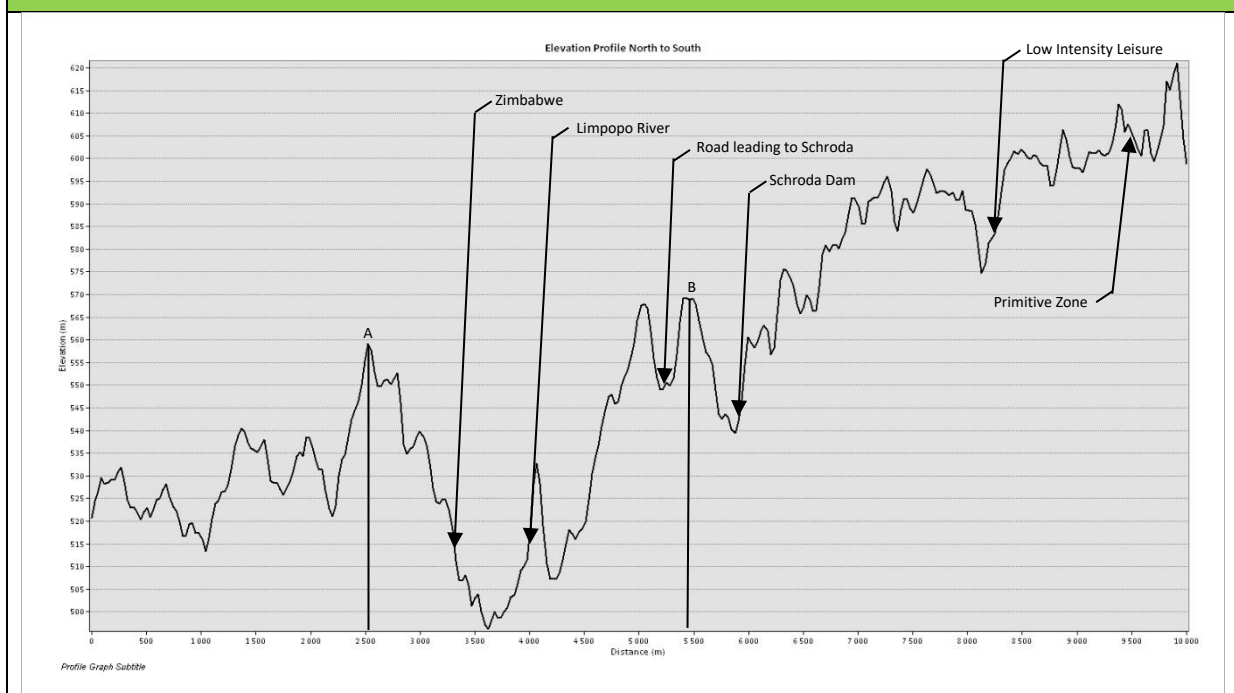


Figure 25: Elevation Profile of the Schroda Orientation Centre from North to South.

Figure 25 illustrates the elevation profile from north to south from the proposed Schroda Orientation Centre.

Towards the north the proposed development will be visible over the first two and a half kilometres (2.5 km) where it will be restricted by the undulating topography as illustrated by Point A. The area consists of untransformed natural vegetation with the Limpopo River situated one point one kilometres (1.1 km) from the proposed development which serves as the border between South Africa and Zimbabwe. However, it must be noted that the proposed development will not be visible from the Limpopo River or its banks. Towards the south the visual impact will be restricted to four hundred and twenty nine metres (429 m); however, from ground level it will be restricted to ninety nine metres (99 m). No place of interest is situated within the area.

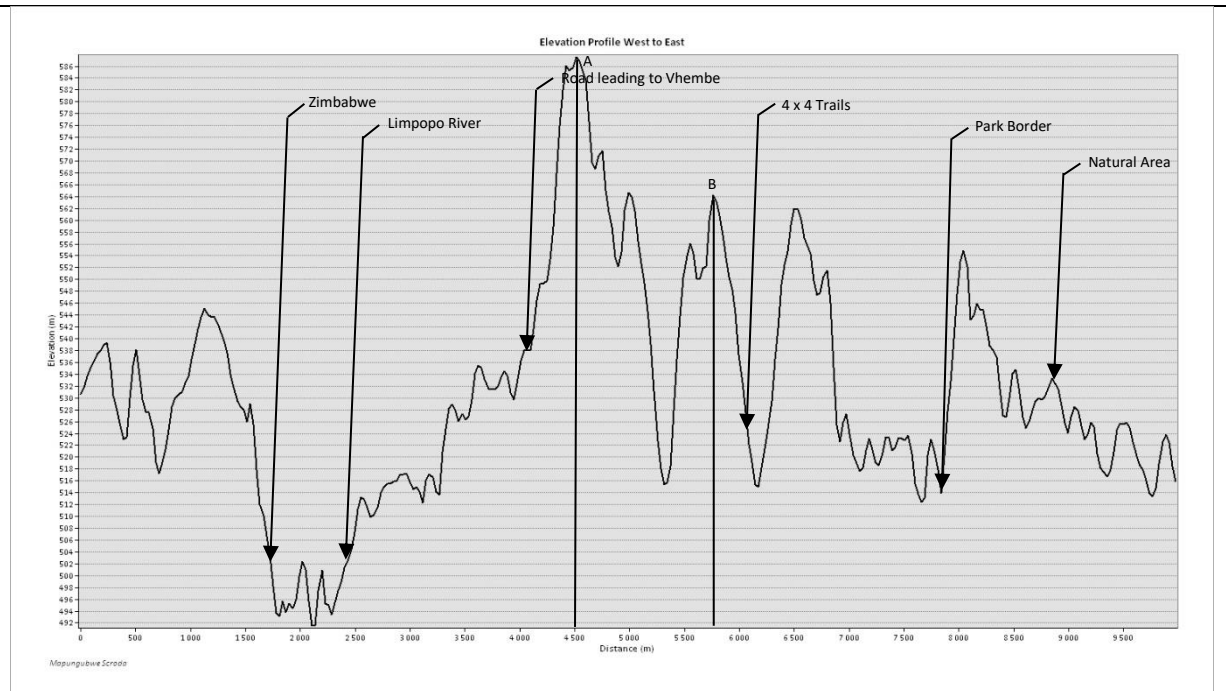


Figure 26: Elevation Profile of the Schroda Orientation Centre from West to East.

The elevation of the landscape from west to east can be described as undulating topography varying between four hundred and ninety two metres (492 m) and five hundred and eighty six meters (586 m) above sea level. Towards the west the visual exposure will be restricted to five hundred and ninety metres (590 m) as illustrated by Point A due to the undulating topography of the study area. Towards the east the proposed development will be visible over a distance of eight hundred and thirty seven metres (837 m) from where it will be restricted by Point B with an elevation of five hundred and sixty four metres (564 m) above sea level. It must be noted that the proposed development will be visible from park roads situated towards the east.

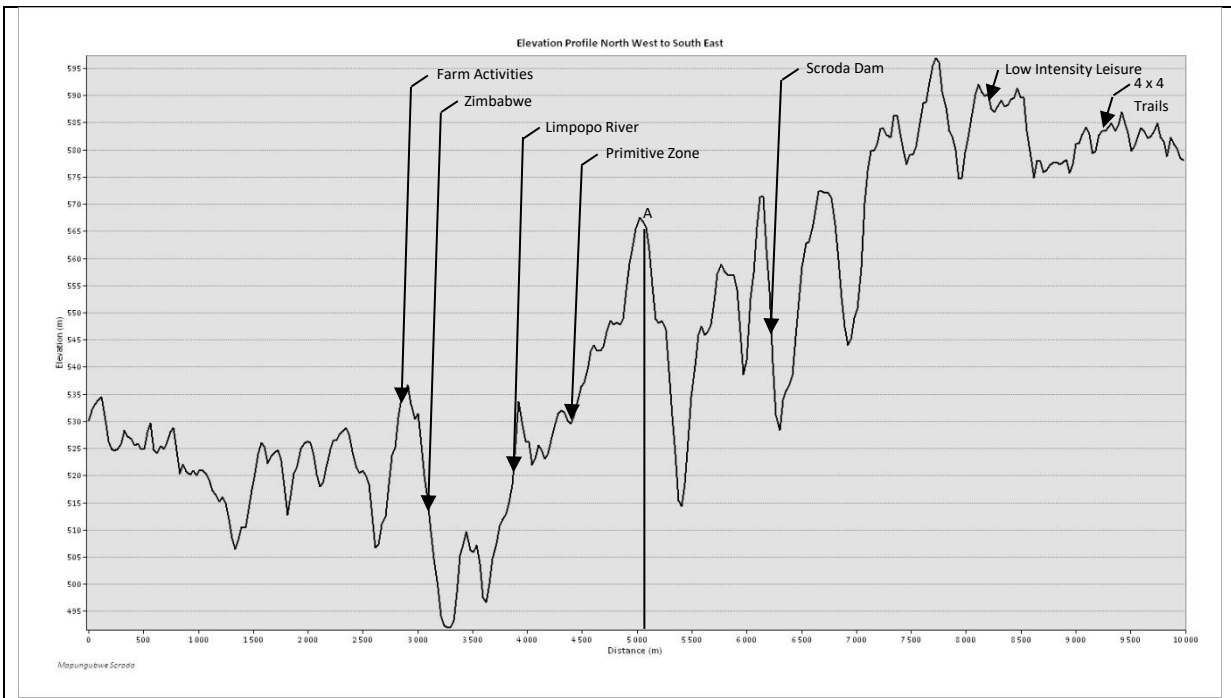


Figure 27: Elevation Profile of the Schroda Orientation Centre from North West to South East.

Figure 27 illustrates the elevation profile from north west to south east. Towards the north west the proposed development will be visible from the landscape of Zimbabwe; however, it must be noted that the proposed development will not be visible from the Limpopo River situated one point one kilometres (1.1 km) thereof due to the change in elevation. The area towards the north west of the development is classified as a primitive zone; which don't allow for any developments with minimal access thereto resulting in a temporary visual impact. Towards the south no visual impact is expected as the visual impact will be restricted to ninety two metres (92 m) as illustrated by Point A.

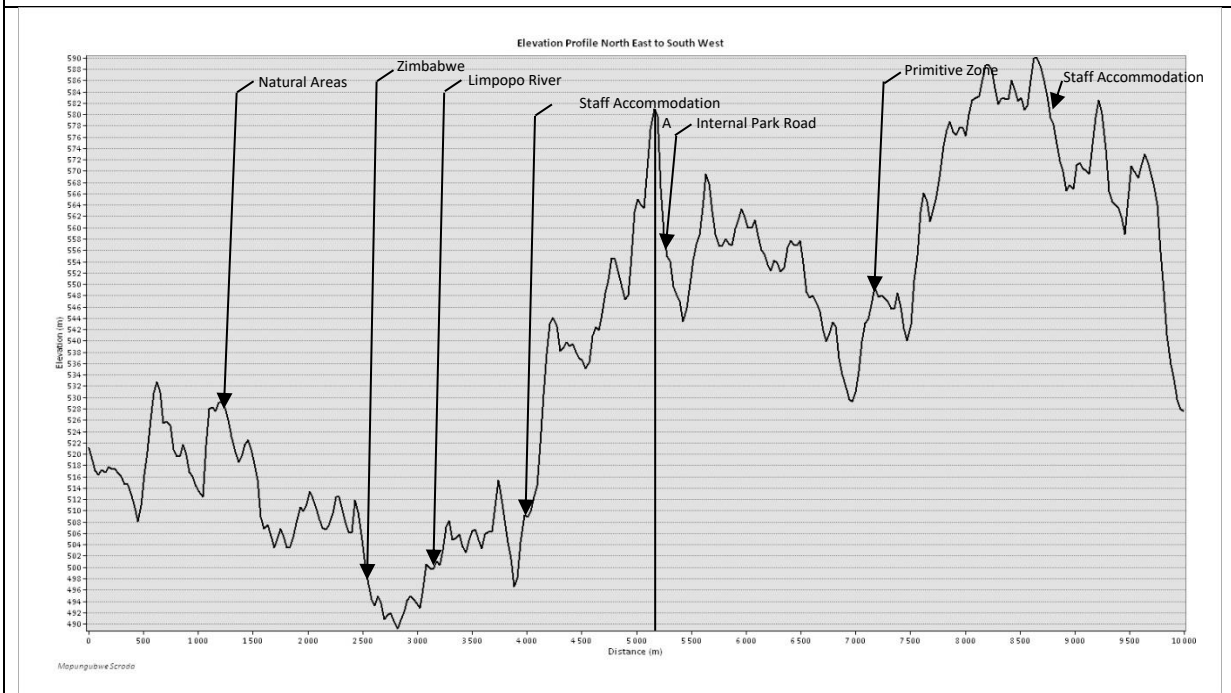


Figure 28: Elevation Profile of the Schroda Orientation Centres from North East to South West.

The elevation from north east to south west can be described as undulating topography varying between four hundred and eighty eight metres (488 m) and five hundred and ninety metres (590 m). Towards the north east the proposed development will be visible from certain vantage points within Zimbabwe; however, the

proposed development will not be visible from the Limpopo River. It must be noted that the study area towards the north east predominantly consists of natural vegetation resulting in a temporary visual impact. Towards the south west no visual impact is expected as it will be restricted to one hundred and eighty seven metres (187 m) with no point of interest situated within this area.

16 VISUAL ABSORPTION CAPACITY

The following section provides a description of the viewshed analysis via photographic evidence taken at a height of one point eight metres (1.8m). This will enable the reader to understand the Visual Absorption Capacity (VAC) of the area and provide a visual reference. The Visual Absorption Capacity of the surrounding area is considered to be high within five kilometers (5 km) of the proposed developments due to the high vegetation cover of the study area coupled with the undulating topography thereof.

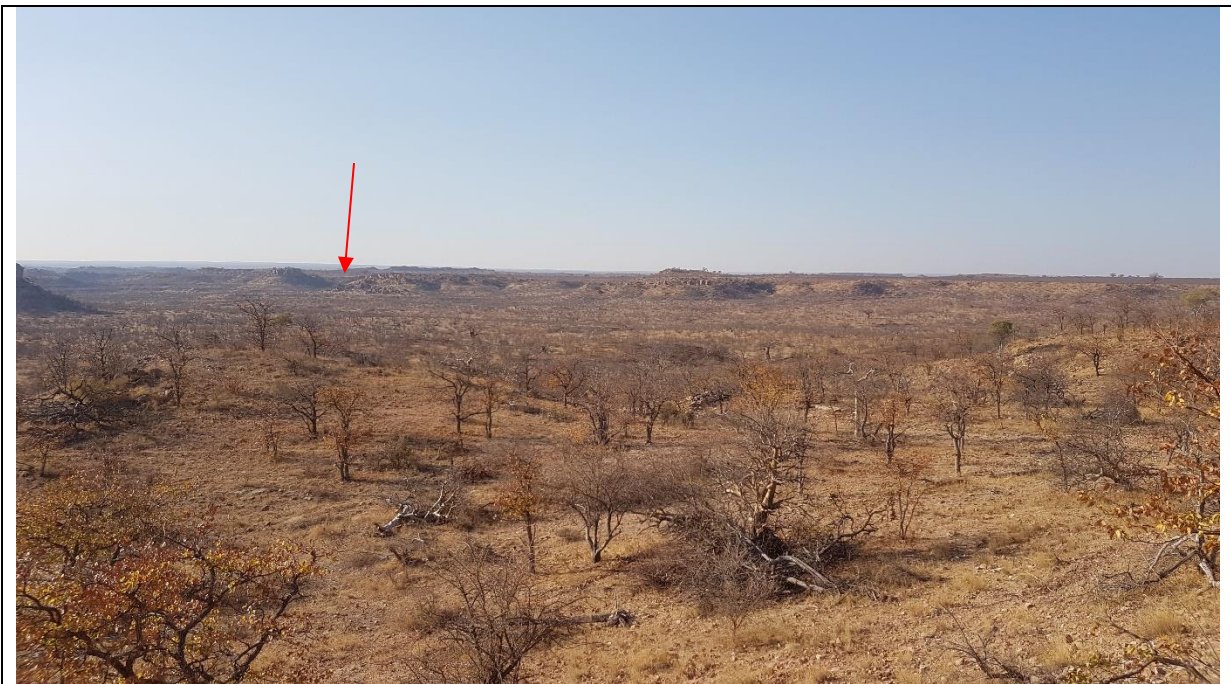


Figure 30: Photo Position 1 towards the south east of the Dig Site, Orientation Centres and the Boma.

Figure 12 was taken three point two kilometres (3.2 km) towards the south east of the Mapungubwe Hill Complex at the Mapungubwe National Park Museum Complex. The proposed developments will not be visible from this vantage point due to the undulating topography evident within the background and the high vegetation cover situated within the fore- and back-ground.



Figure 31: Photo Position 2 taken towards the south of the Dig Site, Alternative Orientation Centre and Boma.

Photo Position 2 was taken from the Orientation Centre situated seven hundred and ninety six metres (796 m) towards the south of the Dig Site. The proposed developments (Boma and Dig Site) will not be visible from this vantage point due to the high vegetation cover situated within the foreground and the undulating topography as evident within the background.



Figure 32: Photo Position 3 taken towards the north of the Orientation Centre.

Figure 32 was taken from the access road situated two hundred and twenty four metres (224 m) towards the north of the proposed orientation centre. The proposed development will be visible from this vantage point due to the short distance between the observer and the proposed development. The visual impact will be moderate due to the moderate vegetation cover situated within the foreground and the high visual absorption capacity of the study area evident within the background.



Figure 33: Photo Position 4 taken towards the north west of the Orientation Centres.

Photo Position 4 was taken five hundred and ninety seven metres (597 m) towards the north west of the proposed Orientation Centre adjacent to the Boma Site. The proposed development will not be visible from

this vantage point due to the high vegetation cover as evident within the foreground.



Figure 34: Photo Position 5 taken towards the south west of the Dig Site.

Photo 5 was taken two hundred and eighty eight metres (288 m) towards the south west of the Mapungubwe Hill Complex. The proposed upgrade will not be visible from this vantage point due to the high vegetation cover within the foreground and the undulating topography of the study area within the background.



Figure 35: Photo Position 6 taken towards the north of the Dig Site, Boma and Orientation Centres and towards the north west of the Hostels.

Figure 35 was taken from Mapungubwe Hill from where the Dig Site and Orientation Centre will be visible. The proposed Boma will not be visible from this vantage point due to the high vegetation cover as evident within the background. The visual impact from this area will be moderate as the aesthetics of the buildings will blend in with the background of the study area.



Figure 36: Photo Position 7 taken towards the north of the Orientation Centres and towards the north west of the Hostels.

Photo Position 7 was taken three point eight kilometres (3.8 km) from Mapungubwe Hill towards the north west of the proposed overnight facilities. The proposed development will not be visible from this vantage point due to the distance between the observer and the development coupled with the undulating topography of the study area within the foreground and the moderate vegetation cover within the background.



Figure 37: Photo Position 8 taken from Schroda towards the north.

Figure 37 was taken from the Schroda Orientation Centre site over looking Zimbabwe. As evident within the Photo the Limpopo River will not be visible from this vantage point; however, the landscape from Zimbabwe's side will be visible. It must be noted that the visual impact will be low due to the distance between the observer and the proposed development. The visual impact is further restricted by the undulating topography and low vegetation cover as evident within the foreground.



Figure 38: Photo Position 9 taken from Schroda towards the south of the proposed overnight facilities.

Photo Position 9 was taken six and a half kilometres (6.5 km) towards the south of the overnight facilities. The proposed development will not be visible from this vantage point due to the undulating topography situated within the foreground restricting the visual impact completely.

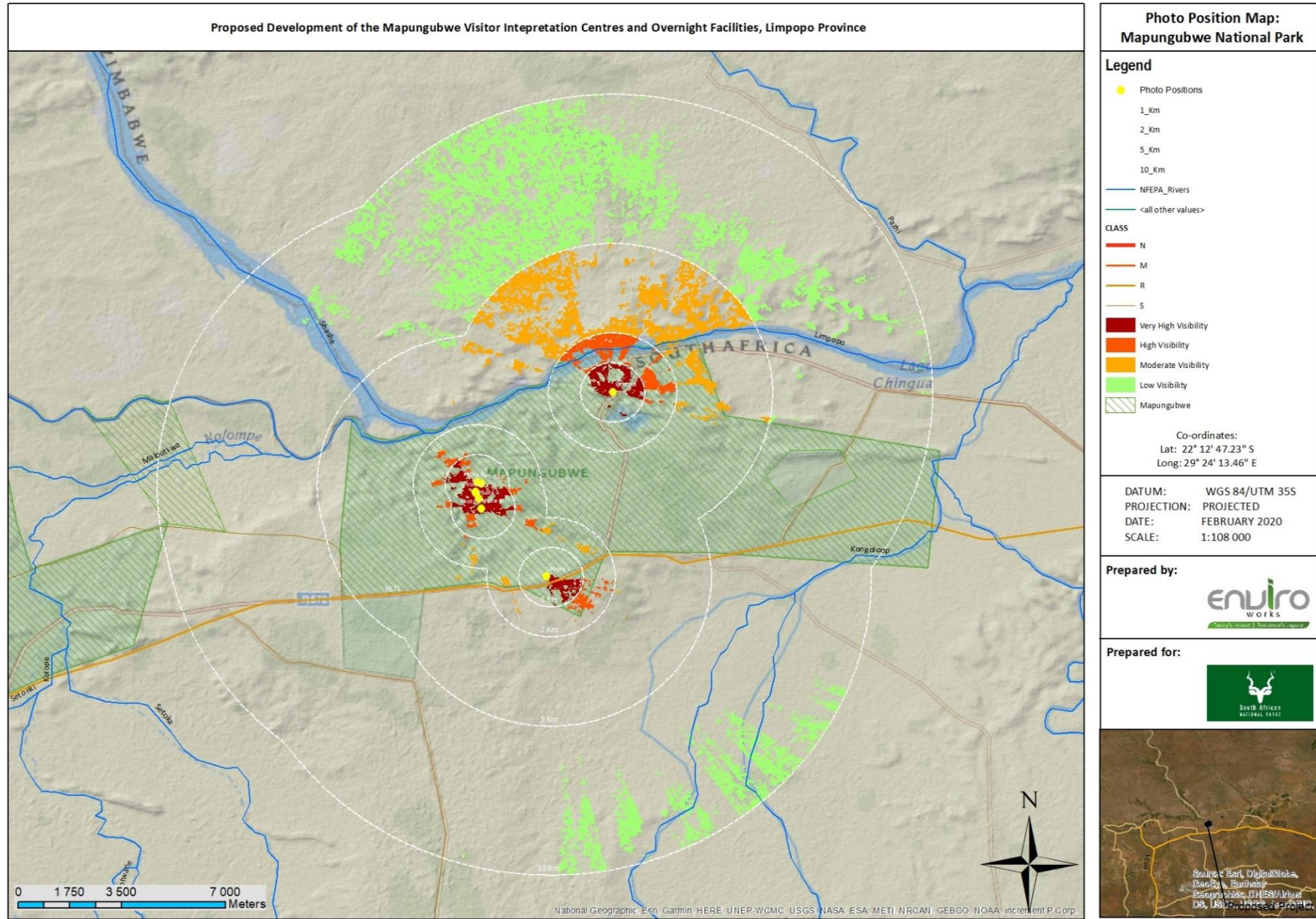


Figure 39: Locations from where the photos have been taken.

17 VISUAL IMPACT ASSESSMENT: IMPACT RATING METHODOLOGY

The previous section outlines all areas visible from the De Hollandsche Lattice Mast (viewshed analysis). This section will attempt to quantify these potential visual impacts in their respective geographical locations and in terms of the identified issues related to the visual impact. The methodology for the assessment of potential visual impacts states the nature of the potential visual impact (e.g. the visual impact on individuals who travel along the R572, staff members who reside within close proximity to the park and tourists visiting the project extent) and includes a table quantifying the potential significance of visual impact according to the following criteria:

- Duration of the impact (time scale);
- Extent of the impact (spatial scale);
- Degree to which the impact may cause irreplaceable loss of resources;
- Degree to which the impact can be reversed;
- Magnitude (or nature) of negative or positive impacts;
- Probability of the impact occurring;
- Cumulative Impacts; and the,
- Degree to which the impact can be mitigated.

The scales to be used to assess these variables and to define the rating categories are tabulated in the tables below.

Table 5: Evaluation components, ranking scales and descriptions (criteria).

Evaluation component	Ranking scale and description (criteria)
DURATION	<p>5 - Permanent</p> <p>4 - Long term: Impact ceases after operational phase/life of the activity (> 20 years).</p> <p>3 - Medium term: Impact might occur during the operational phase/life of the activity (5 to 20 years).</p> <p>2 - Short term: Impact might occur during the construction phase (< 5 years).</p> <p>1 - Immediate</p>
EXTENT (or spatial scale / influence of impact)	<p>0 - None</p> <p>5 - International: Beyond National boundaries.</p> <p>4 - National: Beyond Provincial boundaries and within National boundaries.</p> <p>3 - Regional: Beyond 5 km of the proposed development and within Provincial boundaries.</p> <p>2 - Local: Within 5 km of the proposed development.</p> <p>1 - Site-specific: On site or within 100 m of the site boundary.</p>
IRREPLACEABLE loss of resources	<p>5 - Definite loss of irreplaceable resources.</p> <p>4 - High potential for loss of irreplaceable resources.</p> <p>3 - Moderate potential for loss of irreplaceable resources.</p> <p>2 - Low potential for loss of irreplaceable resources.</p> <p>1 - Very low potential for loss of irreplaceable resources.</p> <p>0 - None</p>

Evaluation component	Ranking scale and description (criteria)
REVERSIBILITY of impact	<p>5 - Impact cannot be reversed.</p> <p>4 - Low potential that impact might be reversed.</p> <p>3 - Moderate potential that impact might be reversed.</p> <p>2 - High potential that impact might be reversed.</p> <p>1 - Impact will be reversible.</p> <p>0 - No impact.</p>
MAGNITUDE of <u>negative</u> impact (at the indicated spatial scale)	<p>10 - Very high: Bio-physical and/or social functions and/or processes might be <i>severely</i> altered.</p> <p>8 - High: Bio-physical and/or social functions and/or processes might be <i>considerably</i> altered.</p> <p>6 - Medium: Bio-physical and/or social functions and/or processes might be <i>notably</i> altered.</p> <p>4 - Low : Bio-physical and/or social functions and/or processes might be <i>slightly</i> altered.</p> <p>2 - Very Low: Bio-physical and/or social functions and/or processes might be <i>negligibly</i> altered.</p> <p>0 - Zero: Bio-physical and/or social functions and/or processes will remain <i>unaltered</i>.</p>
MAGNITUDE of <u>POSITIVE</u> IMPACT (at the indicated spatial scale)	<p>10 - Very high (positive): Bio-physical and/or social functions and/or processes might be <i>substantially</i> enhanced.</p> <p>8 - High (positive): Bio-physical and/or social functions and/or processes might be <i>considerably</i> enhanced.</p> <p>6 - Medium (positive): Bio-physical and/or social functions and/or processes might be <i>notably</i> enhanced.</p> <p>4 - Low (positive): Bio-physical and/or social functions and/or processes might be <i>slightly</i> enhanced.</p> <p>2 - Very Low (positive): Bio-physical and/or social functions and/or processes might be <i>negligibly</i> enhanced.</p> <p>0 - Zero (positive): Bio-physical and/or social functions and/or processes will remain <i>unaltered</i>.</p>
PROBABILITY (of occurrence)	<p>5 - Definite: >95% chance of the potential impact occurring.</p> <p>4 - High probability: 75% - 95% chance of the potential impact occurring.</p> <p>3 - Medium probability: 25% - 75% chance of the potential impact occurring</p> <p>2 - Low probability: 5% - 25% chance of the potential impact occurring.</p> <p>1 - Improbable: <5% chance of the potential impact occurring.</p>
CUMULATIVE impacts	<p>High: The activity is one of several similar past, present or future activities in the same geographical area, and might contribute to a very significant combined impact on the natural, cultural, and/or socio-economic resources of local, regional or national concern.</p> <p>Medium: The activity is one of a few similar past, present or future activities in the same geographical area, and might have a combined impact of moderate significance on the natural, cultural, and/or socio-economic resources of local, regional or national concern.</p> <p>Low: The activity is localised and might have a negligible cumulative impact.</p> <p>None: No cumulative impact on the environment.</p>

Once the evaluation components have been ranked for each potential impact, the significance of each potential impact will be assessed (or calculated) using the following formula:

SP (Significance Points) = (Duration + Extent + Irreplaceability + Reversibility + Magnitude) x Probability
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The maximum value is 150 significance points (SP). The unmitigated and mitigated scenarios for each potential environmental impact should be rated as per the table below.

Table 6: Definition of significance ratings (positive and negative).

Significance Points	Environmental Significance	Description

125 – 150	Very high (VH)	An impact of very high significance will mean that the project cannot proceed, and that impacts are irreversible, regardless of available mitigation options.
100 – 124	High (H)	An impact of high significance which could influence a decision about whether or not to proceed with the proposed project, regardless of available mitigation options.
75 – 99	Medium-high (MH)	If left unmanaged, an impact of medium-high significance could influence a decision about whether or not to proceed with a proposed project. Mitigation options should be relooked.
40 – 74	Medium (M)	If left unmanaged, an impact of moderate significance could influence a decision about whether or not to proceed with a proposed project.
<40	Low (L)	An impact of low is likely to contribute to positive decisions about whether or not to proceed with the project. It will have little real effect and is unlikely to have an influence on project design or alternative motivation.
+	Positive impact (+)	A positive impact is likely to result in a positive consequence/effect, and is likely to contribute to positive decisions about whether or not to proceed with the project.

18 VISUAL IMPACT ASSESSMENT

The primary visual impacts of the proposed developments are further assessed as follow:

18.1 Potential visual impact on sensitive visual receptors, located within a 2 km radii of the Mapungubwe National Park Upgrades.

The Operational Phase of the Mapungubwe National Park Upgrades could have a moderate visual impact (significance rating= 68) on observers within a two kilometer (2 km) radius should mitigation measures not be implemented.

Table 7: Impact Ratings of the Construction Phase within a 2 km radius.

Planning, design and construction phase	Design Alternative		No-Go Alternative
	Before Mitigation	After Mitigation	
POTENTIAL VISUAL IMPACTS: OVERNIGHT FACILITIES			
Nature of impact: Impact on the sense of place for surrounding users.	Activity: The movement of construction vehicles, machinery and personnel on site shall result in a visual impact on surrounding users. Furthermore to this, the storage of materials and excavation shall result in disturbance and an unsightly character.		No construction phase impacts are associated with the no-go alternative thus no assessment has been undertaken.
Magnitude:	6	4	-
Duration:	2	2	-
Extent:	2	2	-
Irreplaceable:	3	2	-
Reversibility:	3	3	-
Probability:	4	3	-
Total SP:	64	39	-
Significance Rating:	M	L	-
Cumulative Impacts:	M	L	-
Proposed Mitigation:	<ul style="list-style-type: none"> • Access roads are to be kept clean; • Site offices and structures should be limited to one location and carefully situated to reduce visual intrusions. Roofs should be grey and non-reflective; • Adequate waste bins must be placed at each development site and waste need to be removed on a regular basis; • No unnecessary cutting of trees and shrubs may take place except where needed for the construction of buildings; • Batching activities must be conducted on impermeable surfaces to ensure no spillages are left behind once the construction has been finalised; • Construction camps as well as development areas should be screened with netting; 		N/A

- Lights within the construction camp should face directly down (angle of 90°);
- Vegetation clearance should be limited to the development footprint only;
- Litter should be strictly controlled, as the spread thereof through wind could have a very negative visual impact;
- No open fires must be allowed on site at any time;
- A plan must be in place to ensure that the dig site is protected from construction activities and vandalism;
- Avoid shiny materials in structures. Where possible shiny metal structures should be darkened or screened to prevent glare;
- Rehabilitation measures include the following:
 - On completion of a section of works, the area must be rehabilitated by suitable landscaping, levelling, topsoil dressing, land preparation, alien plant eradication and where ascribed for by the ECO, vegetation establishment;
 - Clear and completely remove from site all construction structures and temporary infrastructure;
 - All permanent infrastructure must be returned to a suitable state;
 - Remove all inert waste and rubble, such as excess rock, any structural foundations and remaining aggregate. Only once this material has been removed, the site shall be re-instated and rehabilitated;
 - Domestic waste must be completely removed from site and disposed of at a landfill site;
 - The reinstatement of disturbed areas must follow immediately after the removal of structures and temporary infrastructure;
 - Topsoil backfilling must be undertaken when the soil is dry, and not following any recent rainfall events;
 - All stockpiled topsoil together with herbaceous vegetation must be replaced and redistributed over a disturbed area such as temporary access roads;
 - Any re-vegetation must be done using plant species in occurrence on site; and,
- Mitigation of visual impacts associated with the construction phase would entail proper planning, management and rehabilitation of the construction site. Mitigation measures include the following:

	<ul style="list-style-type: none"> • Reduce the time of construction through careful planning of logistics and ensure the productive implementation of resources; • Limit disturbance of the environment to the development footprint; and, • Limit construction activities to business hours (07:00 – 17:00). 	
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Table 8: Impact Ratings of the Operational Phase of the Overnight Facilities within a 2 km radius.

Planning, design and construction phase	Design Alternative		No-Go Alternative
	Before Mitigation	After Mitigation	
POTENTIAL VISUAL IMPACTS: OVERNIGHT FACILITIES			
Nature of impact: Impact on the sense of place for surrounding users.	Activity: The development of the Overnight Facilities can cause a visual intrusion to observers within a two kilometre (2 km) radius from the proposed development.		No operational phase impacts are associated with the no-go alternative; however, the area will remain in pristine condition.
Magnitude:	6	4	0
Duration:	3	3	5
Extent:	2	2	0
Irreplaceable:	2	1	0
Reversibility:	4	4	0
Probability:	4	3	5
Total SP:	68	42	25
Significance Rating:	M	M	L +
Cumulative Impacts:	L	L	-
Proposed Mitigation:	<ul style="list-style-type: none"> • Avoid shiny materials in structures. Where possible shiny metal structures should be darkened or screened to prevent glare; • Mitigation to minimise lighting impacts include the following: <ul style="list-style-type: none"> • Shielding the sources of light by physical barriers (walls, vegetation or structures itself); • Limit mounting heights of lighting fixtures, or alternatively using foot-lights or bollard level lights); • Make use of downward directional lighting fixtures; • Make use of minimum lumen or wattage in lights; • Ensure that no spot lights are on at night; 		N/A

	<ul style="list-style-type: none"> • Use motion sensors to activate lighting ensuring light is available when needed. • The colour scheme should be in line with the Mapungubwe National Park Museum Complex; • The height of buildings must be kept as stipulated within the building plans; • No open fires will be allowed on site; • Adequate waste bins must be placed through-out the site; • Waste collection areas must be properly screened by brick walls or similar materials; • Rehabilitation and Post-closure measures: <ul style="list-style-type: none"> • All above-ground structures should be removed, safely disposed of or possibly recycled for use elsewhere; and, • The affected area should be regarded to pre-development topographic conditions, unless the area is required for new specific uses. 	
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Table 9: Impact Ratings of the Operational Phase of the Mapungubwe Hill Complex within a 2 km radius.

Planning, design and construction phase	Design Alternative 1		Design Alternative 2		No-Go Alternative
	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation	
POTENTIAL VISUAL IMPACTS: MAPUNGUBWE HILL COMPLEX					
Nature of impact: Impact on the sense of place for surrounding users.	Activity: The development of the Mapungubwe Hill Facilities can cause a visual intrusion to observers within a two kilometre (2 km) radius from the proposed development.				No operational phase impacts are associated with the no-go alternative; however, the area will remain in pristine condition.
Magnitude:	4	2	6	4	-
Duration:	3	3	3	3	5
Extent:	2	1	2	1	-
Irreplaceable:	3	2	3	2	-
Reversibility:	2	2	2	2	-
Probability:	3	2	3	2	5
Total SP:	42	20	48	24	25
Significance rating:	M	L	M	L	L +
Cumulative impact:	L	-	L	-	-
Proposed Mitigation:	<ul style="list-style-type: none"> • Avoid shiny materials in structures. Where possible shiny metal structures should be darkened or screened to 				N/A

Planning, design and construction phase	Design Alternative 1		Design Alternative 2		No-Go Alternative
	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation	
	prevent glare; <ul style="list-style-type: none"> Mitigation to minimise lighting impacts include the following: <ul style="list-style-type: none"> Shielding the sources of light by physical barriers (walls, vegetation or structures itself); Limit mounting heights of lighting fixtures, or alternatively using foot-lights or bollard level lights); Make use of downward directional lighting fixtures; Make use of minimum lumen or wattage in lights; Ensure that no spot lights are on at night; Use motion sensors to activate lighting ensuring light is available when needed. The aesthetic value should not be changed from those as illustrated within the building plans; The height of buildings must be kept as stipulated within the building plans; No open fires will be allowed on site; Adequate waste bins must be placed through-out the site; Should formal footpaths be developed it must be constructed from materials found within the study area; Rehabilitation and Post-closure measures: <ul style="list-style-type: none"> All above-ground structures should be removed, safely disposed of or possibly recycled for use elsewhere; and, The affected area should be regarded to pre-development topographic conditions, unless the area is required for new specific uses. 				

Table 10: Impact Ratings of the Operational Phase of the Schroda Orientation Centre within a 2 km radius.

Planning, design and construction phase	Design Alternative		No-Go Alternative
	Before Mitigation	After Mitigation	
POTENTIAL VISUAL IMPACTS: SCHRODA ORIENTATION CENTRE			
Nature of impact: Impact on the sense of place for surrounding	Activity: The development of the Schroda Orientation Centre can cause a visual intrusion to observers within a two kilometre (2 km) radius from the proposed development.		No operational phase impacts are associated with the no-go alternative; however, the area

users.			will remain in pristine condition.
Magnitude:	4	2	-
Duration:	3	3	5
Extent:	2	2	-
Irreplaceable:	3	2	-
Reversibility:	3	3	-
Probability:	4	3	5
Total SP:	60	36	25
Significance Rating:	M	L	L +
Cumulative Impacts:	-	-	-
Proposed Mitigation:	<ul style="list-style-type: none"> Avoid shiny materials in structures. Where possible shiny metal structures should be darkened or screened to prevent glare; Mitigation to minimise lighting impacts include the following: <ul style="list-style-type: none"> Shielding the sources of light by physical barriers (walls, vegetation or structures itself); Limit mounting heights of lighting fixtures, or alternatively using foot-lights or bollard level lights); Make use of downward directional lighting fixtures; Make use of minimum lumen or wattage in lights; Ensure that no spot lights are on at night; Use motion sensors to activate lighting ensuring light is available when needed. The aesthetic value should not be changed from those as illustrated within the building plans; The height of buildings must be kept as stipulated within the building plans; No open fires will be allowed on site; Adequate waste bins must be placed through-out the site; Should formal footpaths be developed it must be constructed from materials found within the study area; Rehabilitation and Post-closure measures: <ul style="list-style-type: none"> All above-ground structures should be removed, safely disposed of or possibly recycled for use elsewhere; <p>The affected area should be regarded to pre-development topographic conditions, unless the area is required for</p>		N/A

	new specific uses.	
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19 CONCLUSION AND RECOMMENDATIONS

The visual impact for the Overnight Facilities will be moderate within the short distance zone; however, given the existing Mapungubwe Hill Museum Complex the visual impact will be lower as disturbance have already occurred within the area. The developments planned at Mapungubwe Hill will have a low impact as it will only be visible over a distance of three hundred metres (300 m) due to the high vegetation cover and undulating topography of the study area. The highest visual exposure will occur from Schroda orientation Centre; however, the areas of high viewer incidence primarily consists of natural vegetation with limited observers within this area. The aforementioned will result in a low visual impact over a two kilometre (2 km) radius. As the proposed upgrades will result in a higher visitors experience and draw more visitors to the park. The upgrades will result in a positive visual impact if all mitigation measures are implemented.

Construction Phase:

- Access roads are to be kept clean;
- Site offices and structures should be limited to one location and carefully situated to reduce visual intrusions. Roofs should be grey and non-reflective;
- Adequate waste bins must be placed at each development site and waste need to be removed on a regular basis;
- No unnecessary cutting of trees and shrubs may take place except where needed for the construction of buildings;
- No open fires must be allowed on site;
- Batching activities must be conducted on impermeable surfaces to ensure no spillages are left behind once the construction has been finalised;
- Construction camps as well as development areas should be screened with netting;
- Lights within the construction camp should face directly down (angle of 90°);
- Vegetation clearance should be limited to the development footprint only;
- Litter should be strictly controlled, as the spread thereof through wind could have a very negative visual impact;
- A plan must be in place to ensure that the dig site is protected from construction activities and vandalism;
- Avoid shiny materials in structures. Where possible shiny metal structures should be darkened or screened to prevent glare;
- Rehabilitation measures include the following:
 - On completion of a section of works, the area must be rehabilitated by suitable landscaping, levelling, topsoil dressing, land preparation, alien plant eradication and where ascribed for by the ECO, vegetation establishment;
 - Clear and completely remove from site all construction structures and temporary infrastructure;
 - All permanent infrastructure must be returned to a suitable state;
 - Remove all inert waste and rubble, such as excess rock, any structural foundations and remaining aggregate. Only once this material has been removed, the site shall be re-instated and rehabilitated;

- Domestic waste must be completely removed from site and disposed of at a landfill site;
- The reinstatement of disturbed areas must follow immediately after the removal of structures and temporary infrastructure;
- Topsoil backfilling must be undertaken when the soil is dry, and not following any recent rainfall events;
- All stockpiled topsoil together with herbaceous vegetation must be replaced and redistributed over a disturbed area such as temporary access roads;
- Any re-vegetation must be done using plant species in occurrence on site; and,
- Mitigation of visual impacts associated with the construction phase would entail proper planning, management and rehabilitation of the construction site. Mitigation measures include the following:
 - Reduce the time of construction through careful planning of logistics and ensure the productive implementation of resources;
 - Limit disturbance of the environment to the development footprint; and,
 - Limit construction activities to business hours (07:00 – 17:00).

Operation Phase:

- Avoid shiny materials in structures. Where possible shiny metal structures should be darkened or screened to prevent glare;
- Mitigation to minimise lighting impacts include the following:
 - Shielding the sources of light by physical barriers (walls, vegetation or structures itself);
 - Limit mounting heights of lighting fixtures, or alternatively using foot-lights or bollard level lights);
 - Make use of downward directional lighting fixtures;
 - Make use of minimum lumen or wattage in lights;
 - Ensure that no spot lights are on at night;
 - Use motion sensors to activate lighting ensuring light is available when needed.
- The colour scheme should be in line with the Mapungubwe National Park Museum Complex;
- The height of buildings must be kept as stipulated within the building plans;
- No open fires will be allowed on site;
- Adequate waste bins must be placed through-out the site;
- Waste collection areas must be properly screened by brick walls or similar materials;
- Rehabilitation and Post-closure measures:
 - All above-ground structures should be removed, safely disposed of or possibly recycled for use elsewhere; and,
- The affected area should be regarded to pre-development topographic conditions, unless the area is required for new specific uses.

20 REFERENCES

Council for Geosciences. 2016. Geology Map of South Africa [web: <http://sageoscience.maps.arcgis.com/home/index.html> (Date accessed: 14 November 2018)].

Department of Environmental Affairs. 2013-14. SA National Land-cover Map Projection.

Department of Environmental Affairs and Development Planning. 2005. Guidelines for involving a Visual and Aesthetics Specialist as part of the EIA process. Western Cape Government.

Earth Data. 2014. DEM ASTGTM2_S23E029_dem. National Aeronautic Space Administration.

MetroGIS (PTY)Ltd. 2016. Proposed Metsimatala Concentrating Solar Power (CSP) Project, Northern Cape Province.

Mucina and Rutherford. 2006. The vegetation map of South Africa, Lesotho and Swaziland. SANBI, Pretoria.

Spies, A. 2019. Mapungubwe National Park and World Heritage Site Integrated Management Plan for the Period 2019 – 2028. South African National Park.