AGES LIMPOPO: PROPOSED BELA-BELA POWER LINE BA PROJECT, WATERBERG DISTRICT MUNICIPALITY, LIMPOPO PROVINCE

Archaeological Impact Assessment

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ARCHAEOLOGICAL IMPACT ASSESSMENT (AIA) ON PORTIONS OF THE FARMS BUISKOP 464KR AND TWEEFONTEIN 462KR FOR THE PROPOSED BELA-BELA POWER LINE BA PROJECT, WATERBERG DISTRICT MUNICIPALITY, LIMPOPO PROVINCE

Conducted for:
AGES Limpopo

Compiled by:
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DOCUMENT DISTRIBUTION LIST

Name	Institution
Engela Grobler	AGES Limpopo

DOCUMENT HISTORY

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DECLARATION

I, Nelius Le Roux Kruger, declare that –

- I act as the independent specialist;
- I am conducting any work and activity relating to the proposed Bela-Bela Power Line BA Project in an objective manner, even if this results in views and findings that are not favourable to the client;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have the required expertise in conducting the specialist report and I will comply with legislation, including the relevant Heritage Legislation (National Heritage Resources Act no. 25 of 1999, Human Tissue Act 65 of 1983 as amended, Removal of Graves and Dead Bodies Ordinance no. 7 of 1925, Excavations Ordinance no. 12 of 1980), the Minimum Standards: Archaeological and Palaeontological Components of Impact Assessment (SAHRA, AMAFA and the CRM section of ASAPA), regulations and any guidelines that have relevance to the proposed activity;
- I have not, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this declaration are true and correct.

Disclosure of Vested Interest

I do not have and will not have any vested interest (either business, financial, personal or other) in the proposed activity proceeding other than remuneration for work performed in terms of the Regulations.

Signature of specialist
Company: Exigo Sustainability
Date: 25 September 2022

This Archaeological Impact Assessment report has been compiled considering the National Environmental Management Act 1998 (NEMA) and Environmental Impact Regulations 2014 as amended, requirements for specialist reports, Appendix 6, as indicated in the NEMA Table below.

Requirements of Appendix 6 – GN R326 EIA Regulations of 7 April 2017	Relevant section in report	Comment where not applicable.
1.(1) (a) (i) Details of the specialist who prepared the report	Page 4, Section 1.2 and Addendum 1 of Report.	-
(ii) The expertise of that person to compile a specialist report including a curriculum vita	Section 1.2 and Addendum 1 of Report.	-
(b) A declaration that the person is independent in a form as may be specified by the competent authority	Page 4 of the report	-
(c) An indication of the scope of, and the purpose for which, the report was prepared	Section 1.3 and Section 1.4: Project Brief and Terms of Reference	-
(cA) An indication of the quality and age of base data used for the specialist report	Section 4: Archaeo-Historical Context	-
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Section 9: Statement of Significance and Impact Rating	-
(d) The duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment	Section 3: Method of Enquiry	-
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used	Section 3: Method of Enquiry	-
(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;	Section 9: Statement of Significance and Impact Rating	-
(g) An identification of any areas to be avoided, including buffers	Section 5: Results Archaeological Survey	-
(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;	Section 9: Statement of Significance and Impact Rating	-
(i) A description of any assumptions made and any uncertainties or gaps in knowledge;	Section 3.2: Limitations and Constraints	-
(j) A description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives, on the environment	Section 9: Statement of Significance and Impact Rating	
(k) Any mitigation measures for inclusion in the EMPr	Section 6.3: Management Actions Section 7: Recommendations	
(l) Any conditions for inclusion in the environmental authorisation	N/A	None required
(m) Any monitoring requirements for inclusion in the EMPr or environmental authorisation	Section 6.3: Management Actions Section 7: Recommendations	
(n)(i) A reasoned opinion as to whether the proposed activity, activities or portions thereof should be authorised and	Section 1 & Section 7	
(n)(iA) A reasoned opinion regarding the acceptability of the proposed activity or activities; and		
(n)(ii) If the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan	Section 6.3: Management Actions Section 7: Recommendations	-
(o) A description of any consultation process that was undertaken during the course of carrying out the study	N/A	Not applicable. A public consultation process will be conducted as part of the EIA and EMPr process.
(p) A summary and copies if any comments that were received during any consultation process	N/A	Not applicable.
(q) Any other information requested by the competent authority.	N/A	Not applicable.
(2) Where a government notice by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	Section 1.5: CRM: Legislation, Conservation and Heritage Management	

EXECUTIVE SUMMARY

This report details the results of an Archaeological Impact Assessment (AIA) study subject to an Environmental Basic Assessment (BA) process for the proposed Bela-Bela Power Line BA Project on Portions of the Farms Buiskop 464KR and Tweefontein 462KR in the Waterberg District Municipality of the Limpopo Province. The proposed project entails the establishment of a power line connecting to the ESKOM Warmbaths Transmission Substation over a linear area of approximately **6.91km**. The report includes background information on the area's archaeology, its representation in Southern Africa, and the history of the larger area under investigation, survey methodology and results as well as heritage legislation and conservation policies. A copy of the report will be supplied to the South African Heritage Resources Agency (SAHRA) and recommendations contained in this document will be reviewed.

Project Title	Bela-Bela Power Line BA Project
Project Location	Eastern Offset: **S24.873405° E28.374585°** Western Offset: **S24.891848° E28.326722°**
1:50 000 Map Sheet	2428CD
Farm Portion / Parcel	Portions of the Farms Buiskop 464KR and Tweefontein 462KR
Magisterial District / Municipal Area	Waterberg District Municipality
Province	Limpopo Province

The history of the southern Limpopo Province and the Waterberg is reflected in a rich archaeological landscape. The interaction between the climate, geology, topography, and the fauna and flora in the Waterberg Biosphere over millions of years has established a milieu in which prehistoric and historic communities thrived. Stone Age habitation occurs in places, mostly in open air locales or in sediments alongside rivers or pans. Bantu-speaking groups moved into this area during the last millennia and these groups, who practiced herding, agriculture, metal working and trading, found a suitable living environment during the Earlier, Middle and Later Iron Age. It was here that their chiefdoms flourished. European farmers, settling in the area since the middle of the 19th century, divided up the landscape into a number of farms. Historical trade routes were well established before the period of Colonial expansion and these routes mainly existed as a direct consequence of mining. During the nineteenth century the Highveld was extensively settled by both Bantu and European groups that migrated into this area and the landscape saw intensive conflicts and war events towards the end of the 19th century. In recent years an urban element developed, expanding at a rapid rate, largely as a result of farming development in the region.

The farms subject to this assessment was portioned towards the end of the 19th century and no particular reference to archaeological sites or features of heritage potential were recorded during an examination of literature thematically or geographically related to the project impact zones. An examination of historical aerial imagery and archive maps indicate that the larger landscape had been utilized for agriculture and game faming during the last century. Portions of the project alignment have been altered and transformed in the last century – particularly where an existing ESKOM power line servitude had been cleared. In addition, urban development around Bela-Bela and in close vicinity of the project area transformed the landscape. This inference was confirmed during an archaeological site assessment which identified single receptors of heritage potential. The

following recommendations are made based on general observations in the proposed Bela-Bela Power Line BA Project in terms of heritage resources management.

- A potential religious meeting place, possibly associated with the ZCC (**Site EXIGO-BPL-FT01**) occurs within the project area and the site is of unknown heritage significance. It is recommended that the site and any activities in its surrounds be monitored in order to avoid the destruction of previously undetected heritage remains. It is suggested that local communities be consulted with regards to the religious meeting place in the project area and their possible social meanings. This could form part of the Public Participation (PP) and Stakeholder Engagement processes for the project.
- A small stone cairn feature (**Site EXIGO-BPL-FT02**) occurring in an eastern portion of the project area is of unknown provenience and function but the possibility of the cairn indicating a human burial should not be excluded. Should the feature prove to be a burial site, it is of high heritage significance and the site would require mitigation and / conservation measures. The careful monitoring if the site is essential during all phases of development and it is recommended that that placements of pylons and related infrastructure be designed as to avoid the site in its entirety. **Should impact on any human burial prove inevitable, full grave relocations are recommended for these burial grounds. This measure should be undertaken by a qualified archaeologist, and in accordance with relevant legislation, permitting, statutory permissions and subject to any local and regional provisions and laws and by-laws pertaining to human remains. A full social consultation process should occur in conjunction with the mitigation of cemeteries and burials (see Addendum B).**
- A fenced-off section of the project alignment of approximately 800m on the farm Tweefontein could not be accessed and this area was not surveyed. However, this section falls within the existing ESKOM power line servitude which is largely clear of surface vegetation and surface features and it is highly unlikely that heritage resources will be encountered in this section.
- Considering the localised nature of heritage remains, the general monitoring of the development progress by an ECO or by the heritage specialist is recommended for all stages of the project. Should any subsurface palaeontological, archaeological or historical material, or burials be exposed during construction activities, all activities should be suspended and the archaeological specialist should be notified immediately.
- It should be stated that it is likely that further undetected archaeological remains might occur elsewhere in the Study Area along water sources and drainage lines, fountains and pans would often have attracted human activity in the past. Also, since Stone Age material seems to originate from below present soil surfaces in eroded areas, the larger landscape should be regarded as potentially sensitive in terms of possible subsurface deposits. Burials and historically significant structures dating to the Colonial Period occur on farms in the area and these resources should be avoided during all phases of construction and development, including the operational phases of the development.

Potentially sensitive heritage resources occur inside areas proposed for the Bela-Bela Power Line BA development and the management of these resources are required for the duration of the development. In the opinion of the author of this Archaeological Impact Assessment Report, the proposed Bela-Bela Power Line BA Project may proceed from a culture resources management perspective, provided that management measures, endorsed by the relevant Heritage Resources authority, are implemented where applicable, and provided that no subsurface heritage remains are encountered during construction and operation.

Bela-Bela Power Line BA Project Sites Locations

Site Code	Coordinate S E	Short Description	Field Rating	Mitigation Action
Exigo-BPL-FT01	S24.892926° E28.328031°	Religious Meeting Place	**Unknown**	**Site Monitoring:** Site monitoring by the heritage consultant or an ECO familiar with the heritage occurrences of the site. **Social Consultation**: It is suggested that local communities be consulted with regards to the religious meeting place in the project area and their possible social meanings.
Exigo-BPL-FT02	S24.887957° E28.362917°	Stone Cairn	**Unknown**	**Site Monitoring:** Site monitoring by the heritage consultant or an ECO familiar with the heritage occurrences of the site. **Project Redesign:** It is recommended that placements of pylons and related infrastructure be designed as to avoid the site.

This report details the methodology, limitations and recommendations relevant to these heritage areas, as well as areas of proposed development. It should be noted that recommendations and possible mitigation measures are valid for the duration of the development process, and mitigation measures might have to be implemented on additional features of heritage importance not detected during this Phase 1 assessment (e.g. uncovered during the construction process).

NOTATIONS AND TERMS/TERMINOLOGY

Absolute dating: Absolute dating provides specific dates or range of dates expressed in years.

Archaeological record: The archaeological record minimally includes all the material remains documented by archaeologists. More comprehensive definitions also include the record of culture history and everything written about the past by archaeologists.

Artefact: Entities whose characteristics result or partially result from human activity. The shape and other characteristics of the artefact are not altered by removal of the surroundings in which they are discovered. In the Southern African context examples of artefacts include potsherds, iron objects, stone tools, beads and hut remains.

Assemblage: A group of artefacts recurring together at a particular time and place, and representing the sum of human activities.

Context: An artefact's context usually consists of its immediate *matrix*, its *provenience* and its *association* with other artefacts. When found in *primary context*, the original artefact or structure was undisturbed by natural or human factors until excavation and if in *secondary context,* disturbance or displacement by later ecological action or human activities occurred.

Cultural Heritage Resource: The broad generic term *Cultural Heritage Resources* refers to any physical and spiritual property associated with past and present human use or occupation of the environment, cultural activities and history. The term includes sites, structures, places, natural features and material of palaeontological, archaeological, historical, aesthetic, scientific, architectural, religious, symbolic or traditional importance to specific individuals or groups, traditional systems of cultural practice, belief or social interaction.

Cultural landscape: A cultural landscape refers to a distinctive geographic area with cultural significance.

Cultural Resource Management (CRM): A system of measures for safeguarding the archaeological heritage of a given area, generally applied within the framework of legislation designed to safeguard the past.

Feature: Non-portable artefacts, in other words artefacts that cannot be removed from their surroundings without destroying or altering their original form. Hearths, roads, and storage pits are examples of archaeological features

Impact: A description of the effect of an aspect of the development on a specified component of the biophysical, social or economic environment within a defined time and space.

Lithic: Stone tools or waste from stone tool manufacturing found on archaeological sites.

Matrix: The material in which an artefact is situated (sediments such as sand, ashy soil, mud, water, etcetera). The matrix may be of natural origin or human-made.

Midden: Refuse that accumulates in a concentrated heap.
Microlith: A small stone tool, typically knapped of flint or chert, usually about three centimetres long or less.
Monolith: A geological feature such as a large rock, consisting of a single massive stone or rock, or a single piece of rock placed as, or within, a monument or site.

Phase 1 CRM Assessment: An Impact Assessment which identifies archaeological and heritage sites, assesses their significance and comments on the impact of a given development on the sites. Recommendations for site mitigation or conservation are also made during this phase.

Phase 2 CRM Study: In-depth studies which could include major archaeological excavations, detailed site surveys and mapping / plans of sites, including historical / architectural structures and features. Alternatively, the sampling of sites by collecting material, small test pit excavations or auger sampling is required. Mitigation / Rescue involves planning the protection of significant sites or sampling through excavation or collection (in terms of a permit) at sites that may be lost as a result of a given development.

Phase 3 CRM Measure: A Heritage Site Management Plan (for heritage conservation), is required in rare cases where the site is so important that development will not be allowed and sometimes developers are encouraged to enhance the value of the sites retained on their properties with appropriate interpretive material or displays.

Provenience: Provenience is the three-dimensional (horizontal and vertical) position in which artefacts are found. Fundamental to ascertaining the provenience of an artefact is *association,* the co-occurrence of an artefact with other archaeological remains; and *superposition,* the principle whereby artefacts in lower levels of a matrix were deposited before the artefacts found in the layers above them, and are therefore older.

Random Sampling: A probabilistic sampling strategy whereby randomly selected sample blocks in an area are surveyed. These are fixed by drawing coordinates of the sample blocks from a table of random numbers.

Scoping Assessment: The process of determining the spatial and temporal boundaries (i.e. extent) and key issues to be addressed in an impact assessment. The main purpose is to focus the impact assessment on a manageable number of important questions on which decision making is expected to focus and to ensure that only key issues and reasonable alternatives are examined. The outcome of the scoping process is a Scoping Report that includes issues raised during the scoping process, appropriate responses and, where required, terms of reference for specialist involvement.

Site (Archaeological): A distinct spatial clustering of artefacts, features, structures, and organic and environmental remains, as the residue of human activity. These include surface sites, caves and rock shelters, larger open-air sites, sealed sites (deposits) and river deposits. Common functions of archaeological sites include living or habitation sites, kill sites, ceremonial sites, burial sites, trading, quarry, and art sites,

Stratigraphy: This principle examines and describes the observable layers of sediments and the arrangement of strata in deposits

Systematic Sampling: A probabilistic sampling strategy whereby a grid of sample blocks is set up over the survey area and each of these blocks is equally spaced and searched.

Trigger: A particular characteristic of either the receiving environment or the proposed project which indicates that there is likely to be an *issue* and/or potentially significant *impact* associated with that proposed development that may require specialist input. Legal requirements of existing and future legislation may also trigger the need for specialist involvement.

LIST OF ABBREVIATIONS

Abbreviation	Description
ASAPA	Association for South African Professional Archaeologists
AIA	Archaeological Impact Assessment
BP	Before Present
BCE	Before Common Era
BGG	Burial Grounds and Graves
CRM	Culture Resources Management
EIA	Early Iron Age (also Early Farmer Period)
EIA	Environmental Impact Assessment
EFP	Early Farmer Period (also Early Iron Age)
ESA	Earlier Stone Age
GIS	Geographic Information Systems
HIA	Heritage Impact Assessment
ICOMOS	International Council on Monuments and Sites
K2/Map	K2/Mapungubwe Period
LFP	Later Farmer Period (also Later Iron Age)
LIA	Later Iron Age (also Later Farmer Period)
LSA	Later Stone Age
MIA	Middle Iron Age (also Early later Farmer Period)
MRA	Mining Right Area
MSA	Middle Stone Age
NHRA	National Heritage Resources Act No.25 of 1999, Section 35
PFS	Pre-Feasibility Study
PHRA	Provincial Heritage Resources Authorities
SAFA	Society for Africanist Archaeologists
SAHRA	South African Heritage Resources Association
YCE	Years before Common Era (Present)

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1 BACKGROUND

1.1 Scope and Motivation

Exigo Sustainability (Pty) Ltd (Exigo) was commissioned by AGES Limpopo to conduct an Archaeological Impact Assessment (AIA) study subject to an Environmental Basic Assessment (BA) process for the proposed Bela-Bela Power Line BA Project in the Limpopo Province. The rationale of this AIA is to determine the presence of heritage resources such as archaeological and historical sites and features, graves and places of religious and cultural significance in previously unstudied areas; to consider the impact of the proposed project on such heritage resources, and to submit appropriate recommendations with regard to the cultural resources management measures that may be required at affected sites / features.

1.2 Project Direction

Exigo's expertise ensures that all projects be conducted to the highest international ethical and professional standards. As archaeological specialist for Exigo Sustainability, Mr Neels Kruger acted as field director for the project; responsible for the assimilation of all information, the compilation of the final consolidated AIA report and recommendations in terms of heritage resources on the demarcated project areas. Mr Kruger is an accredited archaeologist and Culture Resources Management (CRM) practitioner with the Association of South African Professional Archaeologists (ASAPA), a member of the Society for Africanist Archaeologists (SAFA) and the Pan African Archaeological Association (PAA).

1.3 Project Brief

AGES Limpopo (Pty) Ltd was appointed to undertake the environmental impact assessment (EIA) process for the proposed establishment of a power line over Portions of the Farms Buiskop 464KR and Tweefontein 462KR in the Waterberg District Municipality in the Limpopo Province (hereafter referred to as the "Bela-Bela Power Line BA Project").

The proposed project entails the establishment of a power line connecting to the ESKOM Warmbaths Transmission Substation over a linear area of approximately 6.91km. For the purposes of this assessment, a corridor of 100m (50m along ether sides of the proposed power line alignment) was investigated.

Figure 1-1: Map indicating the extent of the proposed Bela-Bela Power Line BA Project.

1.4 Terms of Reference

Heritage specialist input into the Environmental Impact Assessment (EIA) process is essential to ensure that, through the management of change, developments still conserve our heritage resources. It is also a legal requirement for certain development categories which may have an impact on heritage resources. Thus, EIAs should always include an assessment of heritage resources. The heritage component of the EIA is provided for in the **National Environmental Management Act, (Act 107 of 1998)** and endorsed by section 38 of the **National Heritage Resources Act (NHRA - Act 25 of 1999)**. In addition, the NHRA protects all structures and features older than 60 years, archaeological sites and material and graves as well as burial sites. The objective of this legislation is to ensure that developers implement measures to limit the potentially negative effects that the development could have on heritage resources. Based hereon, this project functioned according to the following **terms of reference for** heritage specialist input**:**

- *Provide a detailed description of all archaeological artefacts, structures (including graves) and settlements which may be affected, if any.*
- *Assess the nature and degree of significance of such resources within the area.*
- *Establish heritage informants/constraints to guide the development process through establishing thresholds of impact significance;*
- *Assess and rate any possible impact on the archaeological and historical remains within the area emanating from the proposed development activities.*
- *Propose possible heritage management measures provided that such action is necessitated by the development.*
- *Liaise and consult with the South African Heritage Resources Agency (SAHRA). A Notification of Intent to Develop (NID) will be submitted to SAHRA at the soonest opportunity.*

1.5 CRM: Legislation, Conservation and Heritage Management

The broad generic term *Cultural Heritage Resources* refers to any physical and spiritual property associated with past and present human use or occupation of the environment, cultural activities and history. The term includes sites, structures, places, natural features and material of palaeontological, archaeological, historical, aesthetic, scientific, architectural, religious, symbolic or traditional importance to specific individuals or groups, traditional systems of cultural practice, belief or social interaction.

1.5.1 Legislation regarding archaeology and heritage sites

The South African Heritage Resources Agency (SAHRA) and its provincial offices aim to conserve and control the management, research, alteration and destruction of cultural resources of South Africa. It is therefore vitally important to adhere to heritage resource legislation at all times.

a. National Heritage Resources Act No 25 of 1999, section 35

According to the National Heritage Resources Act No 25 of 1999 (section 35) the following features are protected as cultural heritage resources:

a. Archaeological artefacts, structures and sites older than 100 years

b. Ethnographic art objects (e.g. prehistoric rock art) and ethnography

c. Objects of decorative and visual arts

d. Military objects, structures and sites older than 75 years

e. Historical objects, structures and sites older than 60 years

f. Proclaimed heritage sites

g. Grave yards and graves older than 60 years

h. Meteorites and fossils

i. Objects, structures and sites of scientific or technological value.

In addition, the national estate includes the following:

a. Places, buildings, structures and equipment of cultural significance

b. Places to which oral traditions are attached or which are associated with living heritage

c. Historical settlements and townscapes

d. Landscapes and features of cultural significance

e. Geological sites of scientific or cultural importance

f. Archaeological and paleontological sites

g. Graves and burial grounds

h. Sites of significance relating to the history of slavery

i. Movable objects (e.g. archaeological, paleontological, meteorites, geological specimens, military, ethnographic, books etc.)

With regards to activities and work on archaeological and heritage sites this Act states that:

"No person may alter or demolish any structure or part of a structure which is older than 60 years without a permit by the relevant provincial heritage resources authority." (34. [1] 1999:58)

and

"No person may, without a permit issued by the responsible heritage resources authority-

(a) destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite;

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

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

(d) bring onto or use at an archaeological or palaeontological site any excavation equipment or any equipment which assist in the detection or recovery of metals or archaeological and palaeontological material or objects, or use such equipment for the recovery of meteorites. (35. [4] 1999:58)."

and

"No person may, without a permit issued by SAHRA or a provincial heritage resources agency-

(a) destroy, damage, alter, exhume or remove from its original position or otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves;

(b) destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority;

(c) bring onto or use at a burial ground or grave referred to in paragraph (a) or (b) and excavation equipment, or any equipment which assists in the detection or recovery of metals (36. [3] 1999:60)."

b. Human Tissue Act of 1983 and Ordinance on the Removal of Graves and Dead Bodies of 1925

Graves and burial grounds are commonly divided into the following subsets:

a. ancestral graves
b. royal graves and graves of traditional leaders
c. graves of victims of conflict
d. graves designated by the Minister
e. historical graves and cemeteries
f. human remains

Graves 60 years or older are heritage resources and fall under the jurisdiction of both the National Heritage Resources Act and the Human Tissues Act of 1983. However, graves younger than 60 years are specifically protected by the Human Tissues Act (Act 65 of 1983) and Ordinance on Excavations (Ordinance no. 12 of 1980) as well as any local and regional provisions, laws and by-laws. Such burial places also fall under the jurisdiction of the National Department of Health and the Provincial Health Departments.

c. National Heritage Resources Act No 25 of 1999, section 35

This act (Act 107 of 1998) states that a survey and evaluation of cultural resources must be done in areas where development projects, that will change the face of the environment, will be undertaken. The impact of the development on these resources should be determined and proposals for the mitigation thereof are made. Environmental management should also take the cultural and social needs of people into account. Any disturbance of landscapes and sites that constitute the nation's cultural heritage should be avoided as far as possible and where this is not possible the disturbance should be minimized and remedied.

1.5.2 Background to HIA and AIA Studies

South Africa's unique and non-renewable archaeological and palaeontological heritage sites are 'generally' protected in terms of the National Heritage Resources Act (Act No 25 of 1999, section 35) and may not be disturbed at all without a permit from the relevant heritage resources authority. Heritage sites are frequently threatened by development projects and both the environmental and heritage legislation require impact assessments (HIAs & AIAs) that identify all heritage resources in areas to be developed. Particularly, these assessments are required to make recommendations for protection or mitigation of the impact of the sites. HIAs and AIAs should be done by qualified professionals with adequate knowledge to (a) identify all heritage resources including archaeological and palaeontological sites that might occur in areas of developed and (b) make recommendations for protection or mitigation of the impact on the sites.

A detailed guideline of statutory terms and requirements is supplied in Addendum 1.

2 REGIONAL CONTEXT

2.1 Area Location

The proposed Bela-Bela Power Line BA Project occurs on Portions of the Farms Buiskop 464KR and Tweefontein 462KR in the Waterberg District Municipality, Limpopo Province. The project area is situated approximately 5km east of Bela-Bela along the expanding south-eastern outskirts of the town.

The project area appears on 1:50000 map sheets 2428CD (see Figure 2-1) and coordinates for key locations for the are as follows:

- **Eastern Offset: S24.873405° E28.374585°**
- **Western Offset: S24.891848° E28.326722°**

2.2 Area Description: Receiving Environment

The study area lies within the Savanna biome which is the largest biome in Southern Africa. It is characterized by a grassy ground layer and a distinct upper layer of woody plants (trees and shrubs). Fire and grazing also keep the grassy layer dominant. The most recent classification of the area by Mucina & Rutherford shows that the site is classified as Dwaalboom Thornveld. The project area is characterised by slightly undulating to flat plains with major drainage channels bisecting the area. The topography across the site is slightly undulating.

2.3 Site Description

The proposed project is situated along an expanding urban edge of Bela-Bela in on flat plains south of the Waterberg Mountain Range. Generally, the terrains consist of parcels of developable in a landscape that has, in places, been transformed by historical and more recent crop and livestock farming and urbanization. Other farm portions under study have remained relatively pristine in recent years. Indigenous grassland and Bushveld vegetation remain across much of the eastern section of the project area but site clearing and degradation is evident towards the west near residential zones. Portions of the project alignment have also been cleared of vegetation along the existing ESKOM powerline servitude routing eastwards.

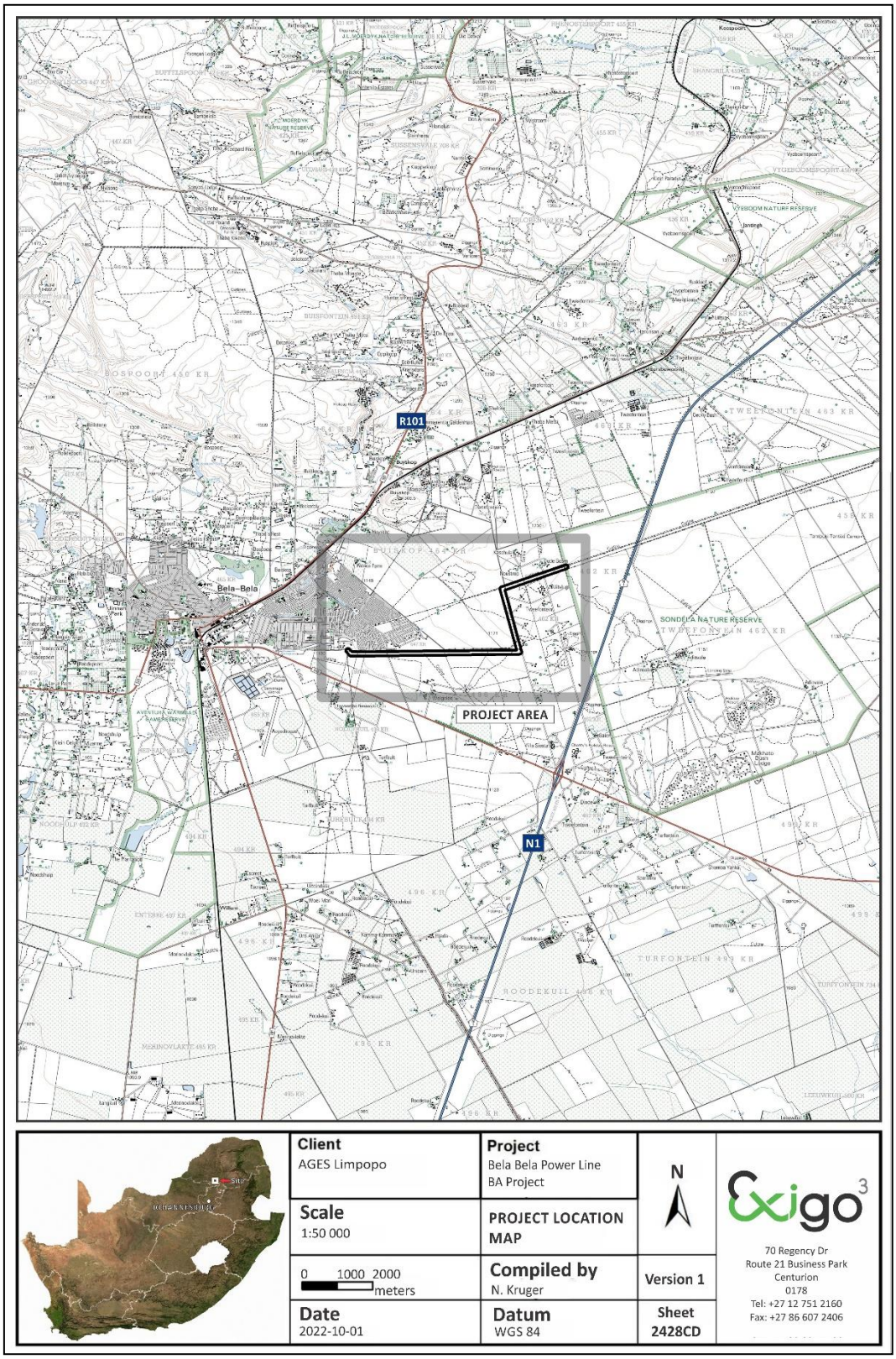

Figure 2-1: 1:50 00 Map representation of the location of the proposed Bela-Bela Power Line BA Project (sheet 2428CD).

Figure 2-2: Aerial map providing a regional context for the proposed Bela-Bela Power Line BA Project.

3 METHOD OF ENQUIRY

3.1 Sources of Information

Data from detailed desktop, aerial and field studies were employed in order to sample surface areas systematically and to ensure a high probability of heritage site recording.

3.1.1 Desktop Study

The larger landscape of the eastern Limpopo province has been relatively well documented in terms of its archaeology and history. A desktop study was prepared in order to contextualize the proposed project within a larger historical milieu. Numerous academic papers and research articles supplied a historical context for the proposed project and archival sources, aerial photographs, historical maps and local histories were used to create a baseline of the landscape's heritage. In addition, the study drew on available unpublished Heritage Assessment reports to give a comprehensive representation of known sites in the study area. These included:

- Hutten, M. 2013c. HIA for the proposed solar park development on the farm Aapieskruil near Koedoeskop, Limpopo Province. Compiled for: Jonk Begin Omgewingsdienste.
- Fourie, W. 2012. Wachteenbietjesdraai 350 KQaAnd Kwaggashoek 345 KQ Heritage Impact Report on proposed mining activities of Project Phoenix. PGS Heritage Consultants
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- Van Vollenhoven, A. July 2013. A Report on a Cultural Heritage Impact Assessment for the Continental Limestone Mine, close to Thabazimbi, Limpopo Province.

3.1.2 Aerial Survey

Aerial photography is often employed to locate and study archaeological sites, particularly where larger scale area surveys are performed. The site assessment of the properties subject to this AIA relied heavily on this method to assist the challenging foot and automotive site survey. Here, depressions, variation in vegetation, soil marks and landmarks were examined and specific attention was given to shadow sites (shadows of walls or earthworks which are visible early or late in the day), crop mark sites (crop mark sites are visible because disturbances beneath crops cause variations in their height, vigour and type) and soil marks (e.g. differently coloured or textured soil (soil marks) might indicate ploughed-out burial mounds). Attention was also given to moisture differences, as prolonged dampening of soil as a result of precipitation frequently occurs over walls or embankments. In addition, historical aerial photos obtained during the archival search were scrutinized and features that were regarded as important in terms of heritage value were identified and if they were located within the boundaries of the project area, they were physically visited in an effort to determine whether they still exist and in order to assess their current condition and significance. By superimposing high frequency aerial photographs with images generated with Google Earth as well as historical aerial imagery, potential sensitive areas were subsequently identified, geo-referenced and

transferred to a handheld GPS device. These areas served as reference points from where further vehicular and pedestrian surveys were carried out.

3.1.3 Mapping of sites

Similar to the aerial survey, the site assessment of the powerline corridor relied heavily on archive and more recent map renderings of the property to assist the foot and automotive site survey where historical and current maps of the project area were examined. By merging data obtained from the desktop study and the aerial survey, sites and areas of possible heritage potential were plotted on these maps of the larger area using GIS software. These maps were then superimposed on high-definition aerial representations in order to graphically demonstrate the geographical locations and distribution of potentially sensitive landscapes.

3.1.4 Field Survey

Archaeological survey implies the systematic procedure of the identification of archaeological sites. An archaeological survey of the Bela-Bela Power Line BA Project area was conducted over a **1 day period in September 2022**. The process encompassed a field survey in accordance with standard archaeological practice by which heritage resources are observed and documented. Particular focus was placed on GPS reference points identified during the aerial and mapping survey. For the purposes of this assessment, a corridor of 100m (50m along ether sides of the proposed power line alignment) was investigated on foot and in a vehicle along with the entire power line alignment. Where possible, random spot checks were made and potentially sensitive heritage areas were investigated. Using a Garmin GPS, the survey was tracked and general surroundings were photographed with a Samsung Digital camera. Real time aerial orientation, by means of a mobile Google Earth application was also employed to investigate possible disturbed areas during the survey.

3.2 Limitations

3.2.1 Access

The study area is accessed via a number of local farm roads connecting to the R516 road as well as other roads to the ESKOM Warmbaths Transmission Substation. Generally, all project areas could be accessed except for a fenced-off section of approximately 800m on the farm Tweefontein for which access permissions could not be obtained (refer to Figure 5-11).

3.2.2 Visibility

The surrounding vegetation in the project area is mostly comprised out of grassland, Bushveld tree cover with dense pockets of pioneering species occurring to the west. The general visibility at the time of the AIA survey (September 2022) ranged from high to low and the archaeological observations on site was restricted in places by dense vegetation. In single cases during the survey sub-surface inspection was possible. Where applied, this revealed no archaeological deposits.

Figure 3-1: View of general surroundings in the project area with the ESKOM Warmbaths Transmission Substation (left) and the exiting ESKOM Powerline servitude (right) visible.

Figure 3-2: View of a western portion of the project along the existing Eskom servitude.

Figure 3-3: View of sections of the project corridor through more intact vegetation.

Figure 3-4: View of an eastern portion of the project corridor along the ESKOM servitude.

Figure 3-5: View of large stone and bedrock extrusions in the project area.

Figure 3-6: View of general surroundings in the powerline corridor area with a restricted section not surveyed visible (right).

Figure 3-7: View of general surroundings in the powerline corridor area – note dense vegetation (right).

3.2.3 Summary: Limitations and Constraints

The site survey for the Bela-Bela Power Line BA Project AIA proved to be somewhat constrained and the investigation primarily focused around areas tentatively identified as sensitive and of high heritage probability (i.e. those noted during the mapping and aerial survey) as well as areas of potential high human settlement catchment. In summary, the following constraints were encountered during the site survey:

- Visibility proved to be a constraint in certain portions of the project area – in particular to the west where dense pockets of pioneering species are prevalent.
- A fenced-off section of the project alignment of approximately 800m on the farm Tweefontein could not be accessed and this area was not surveyed. However, this section falls within the existing ESKOM power line servitude which is largely clear of surface vegetation and surface features and it is highly unlikely that heritage resources will be encountered in this section.

Cognisant of the constraints noted above, it should be stated that the possibility exists that individual sites could be missed due to the localised nature of some heritage remains as well as the possible presence of sub-surface archaeology. Therefore, maintaining due cognisance of the integrity and accuracy of the archaeological survey, it should be stated that the heritage resources identified during the study do not necessarily represent all the heritage resources present in the project area. The subterranean nature of some archaeological sites, dense vegetation cover and visibility constraints sometimes distort heritage representations and any additional heritage resources located during consequent development phases must be reported to the Heritage Resources Authority or an archaeological specialist.

3.3 Impact Assessment

For consistency among specialists, impact assessment ratings by Exigo Specialist are generally done using the Plomp[1] impact assessment matrix scale supplied by Exigo. According to this matrix scale, each heritage receptor in the study area is given an impact assessment.

[1] Plomp, H.,2004

4 ARCHAEO-HISTORICAL CONTEXT

4.1 The archaeology of Southern Africa

Archaeology in Southern Africa is typically divided into two main fields of study, the **Stone Age** and the **Iron Age** or **Farmer Period**. The following table provides a concise outline of the chronological sequence of periods, events, cultural groups and material expressions in Southern African pre-history and history.

Table 1 Chronological Periods across Southern Africa

Period	Epoch	Associated cultural groups	Typical Material Expressions
Early Stone Age 2.5m – 250 000 YCE	Pleistocene	Early Hominins: *Australopithecines* *Homo habilis* *Homo erectus*	Typically large stone tools such as hand axes, choppers and cleavers.
Middle Stone Age 250 000 – 25 000 YCE	Pleistocene	First *Homo sapiens* species	Typically smaller stone tools such as scrapers, blades and points.
Late Stone Age 20 000 BC – present	Pleistocene / Holocene	*Homo sapiens sapiens* including San people	Typically small to minute stone tools such as arrow heads, points and bladelets.
Early Iron Age / Early Farmer Period 300 – 900 AD **(commonly restricted to the interior and north-east coastal areas of Southern Africa)**	Holocene	First Bantu-speaking groups	Typically distinct ceramics, bead ware, iron objects, grinding stones.
Middle Iron Age (Mapungubwe / K2) / early Later Farmer Period 900 – 1350 AD **(commonly restricted to the interior and north-east coastal areas of Southern Africa)**	Holocene	Bantu-speaking groups, ancestors of present-day groups	Typically distinct ceramics, bead ware and iron / gold / copper objects, trade goods and grinding stones.
Late Iron Age / Later Farmer Period 1400 AD -1850 AD **(commonly restricted to the interior and north-east coastal areas of Southern Africa)**	Holocene	Various Bantu-speaking groups including Venda, Thonga, Sotho-Tswana and Zulu	Distinct ceramics, grinding stones, iron objects, trade objects, remains of iron smelting activities including iron smelting furnace, iron slag and residue as well as iron ore.
Historical / Colonial Period ±1850 AD – present	Holocene	Various Bantu-speaking groups as well as European farmers, settlers and explorers	Remains of historical structures e.g. homesteads, missionary schools etc. as well as, glass, porcelain, metal and ceramics.

4.2 Discussion: The Limpopo Heritage Landscape

The cultural landscape of the Waterberg encompasses a period of time that spans millions of years, covering human cultural development from the Stone Ages up to recent times. It depicts the interaction between the first humans and their adaptation and utilization to the environment, the migration of people, technological advances, warfare and contact and conflict. Resources, and in particular mineral resources, in what is now known as the Thabazimbi region have been extensively utilised by prehistoric and historic groups. The greater region has several important Stone Age localities with deep occupation deposits and importantly, a widespread occurrence of open-air sites. The shelter site of Olieboomspoort near Lephalale show a succession from the Earlier, Middle and Later Stone Ages (ESA, MSA and LSA) and up to historic times (van der Ryst 2006). Early Iron Age (EIA) localities such as Diamant are particular important. At this locality in the western Waterberg the EIA facies of Diamant was first identified at the eponymous locality (Huffman 1990). Diamant has also delivered the earliest evidence for glass trade beads and domesticated dogs in the Limpopo Province (van der Ryst 2006). The movement of African farmers into this region is documented by their ceramics and settlements (Huffman 2007b). The later occupations of agropastoralists groups are complex (Schapera 1942, 1965; Breutz 1953, 1989; Bergh 1998). The accounts of early travellers provide important data on the fauna, flora and inhabitants of the Waterberg. The observations of travellers, missionaries and

hunters who traversed the region throughout the 18th and the 19th centuries constitute a source of implicit ethnography on the late presence of hunting and gathering groups, the African farmers and inmoving colonists (Baines 1872, 1877; Smith 1836; Schlömann 1896; Wallis [Baines] 1946; Burke [Mauch's journals] 1969). The region is also rich in rock art (Eastwood and Eastwood 2006).

4.2.1 Early History and the Stone Ages

According to archaeological research, the earliest ancestors of modern humans emerged some two to three million years ago. The remains of Australopithecine and *Homo habilis* have been found in dolomite caves and underground dwellings in the Riverton Area at places such as Sterkfontein and Swartkrans near Krugersdorp. Homo habilis, one of the Early Stone Age hominids, is associated with Oldowan artefacts, which include crude implements manufactured from large pebbles. The Acheulian industrial complex replaced the Oldowan industrial complex during the Early Stone Age. This phase of human existence was widely distributed across South Africa and is associated with *Homo erectus*, who manufactured hand axes and cleavers from as early as one and a half million years ago. Middle Stone Age sites dating from as early as two hundred thousand years ago have been found all over South Africa. Middle Stone Age hunter-gatherer bands also lived and hunted in the Orange and Vaal River valleys. These people, who probably looked like modern humans, occupied campsites near water but also used caves as dwellings. They manufactured a wide range of stone tools, including blades and point s that may have had long wooden sticks as hafts and were used as spears. Excavations at Makapansgat near to Mokopane provided evidence of occupation by Australopithecus africanus from approximately 3.3 million years ago. There is evidence of long occupation from the Cave of Hearths with stone tools and associated debris from a date of 400,000 B.P while upper strata are characterised by Middle Stone Age assemblages of 110,000 to 50,000 B.P. and Late Stone Age assemblages dating from 10,000 to 5,000 years B.P. characterised by the Smithfield B industry. The site is one of the few to exhibit Acheulean assemblages in Southern Africa and also contains overlying Middle Stone Age Howiessonspoort industry tools and early evidence of fire use (Bergh, 1999; Mitchell, 2002). Both ESA and MSA sites are known from the Limpopo Valley as well as lithic industries that appear to be transitional between the two ages and with dates estimated at 300,000 years ago (Kuman et al. 2005).The presence of numerous rock art sites with associated stone tool assemblages in the Limpopo River basin, Blouberg, Makgabeng, Waterberg and Soutpansberg attests to the presence of Late Stone Age San/Bushman communities across the region (e.g. Pager, 1973: Eastwood et al., 2002). The Central Limpopo Basin, including the Soutpansberg, Limpopo Valley, the Blouberg-Makgabeng area and the Pafuri area, has over 700 documented rock art sites and is one of the few regions where paintings and engravings occur, sometimes at the same site (Eastwood and Hanisch 2003).

The cultural historical landscape of the Waterberg area spans million years with evidence of hominin occupation, Stone Age traditions, Iron Age farmers and historical events. Makapansgat, a deep limestone cave near Mokopane has yielded remains of *Australopithecus africanus* that dates to more than 3 million years BP and also *Homo erectus*, dating to approximately 1 million years BP. However, Earlier Stone Age (ESA) material is scarce on the Waterberg plateau. The Middle Stone Age (MSA) is abundantly represented in the Waterberg area and archaeological excavations at sites such as the Olieboomspoort Shelter in the north-western part of the Waterberg have yielded rich MSA deposits which display a large degree of specialisation and skill in stone working (Van der Ryst 1996). These groups occupied open camps which were situated in the proximity of water sources such as pans, lakes or rivers. There is a noticeable gap in the Waterberg between MSA assemblages and material form the Later Stone Age (LSA), suggesting that the Waterberg may not have seen dense human occupation for a long period of time. However, Later Stone Age groups, including the San hunter gatherers and Khoi herders frequented the area in the last few millennia, and numerous LSA sites have been discovered and excavated. Similarly, LSA evidence such as stone implements, ceramics and a wealth of rock paintings and markings are scattered over the plateau.

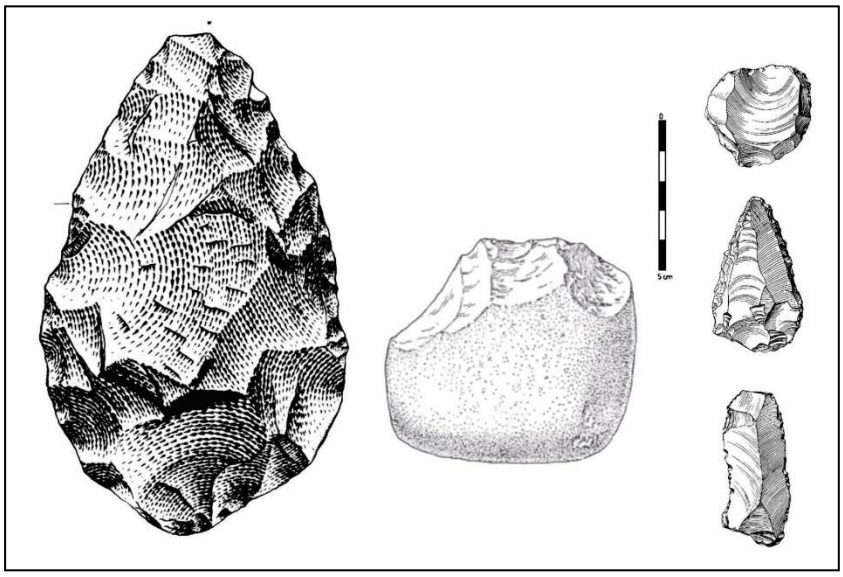


Figure 4-1: Typical ESA handaxe (left) and cleaver (center). To the right is a MSA scraper (right, top), point (right, middle) and blade (right, bottom).

4.2.2 Rock Art of the Waterberg Landscape

The Waterberg Plateau is rich in rock art and rock markings and many such sites are still to be described and studied. At many sites “refined” San paintings occur with cruder depictions in red or white paint (sometimes black), painted directly with fingers by later Farmer groups. Numerous paintings of people in trance positions, dance scenes of men and women, men with hunting equipment, a large variety of antelope and other animals, imaginary rain animals, handprints, and geometric designs form part of the contents of the rock art of the Waterberg (Van der Ryst 1998). Two traditions of Rock Art occur in the Waterberg. First the more "naturalised" form of fine-line art, including skilled depictions of animals and people, attributed to San Hunter Gatherers. The second tradition, often called “Late White” art, is characterised by more geometric, schematic illustrations which includes a large amount of finger painting. This tradition is associated with Iron Age farmers.

4.2.3 Iron Age / Farmer Period

The beginnings of the Iron Age (Farmer Period) in Southern Africa are associated with the arrival of a new Bantu speaking population group at around the third century AD. These newcomers introduced a new way of life into areas that were occupied by Later Stone Age hunter-gatherers and Khoekhoe herders. Distinctive features of the Iron Age are a settled village life, food production (agriculture and animal husbandry), metallurgy (the mining, smelting and working of iron, copper and gold) and the manufacture of pottery. Iron Age people moved into Southern Africa by c. AD 200, entering the area either by moving down the coastal plains, or by using a more central route. From the coast they followed the various rivers inland. Being cultivators, they preferred rich alluvial soils. The Iron Age can be divided into three phases. The Early Iron Age includes the majority of the first millennium A.D. and is characterised by traditions such as Happy Rest and Silver Leaves. The Middle Iron Age spans the 10th to the 13th Centuries A.D. and includes such well known cultures as those at K2 and Mapungubwe. The Late Iron Age is taken to stretch from the 14th Century up to the colonial period and includes traditions such as Icon and Letaba.

Early Sotho-Tswana History

Within a larger archaeological context, Iron Age settlement representations in the form of stone walling in the Waterberg can undoubtedly be traced back to ancestral Sotho-Tswana occupation and developments from the sixteenth century AD onwards. Diagnostic pottery assemblages are commonly used in the South

African Iron Age to infer group identities and to trace movements across the landscape. Similarly, the migration of the Sotho-Tswana speakers in South Africa in the 16th century marked a new ceramic style, known as Moloko. The Moloko Tradition can be divided into two phases: an early phase (e.g. Icon) in which sites were usually located at the foot of hills and contained little or no stone walling; and a later phase characterised by extensive stone wall complexes which were often erected on hills. In the Waterberg area, this later phase manifested in the Madikwe ceramic facies with pottery typically displaying stab and fingernail impression decoration motives. At around the 17th century, Madikwe pottery developed into a tradition known as "Buispoort", sites of which display complex and elaborate stone walling. The stone walls were erected to construct stock byres and to demarcate residential units where pole-and-dagha (clay) huts were placed.

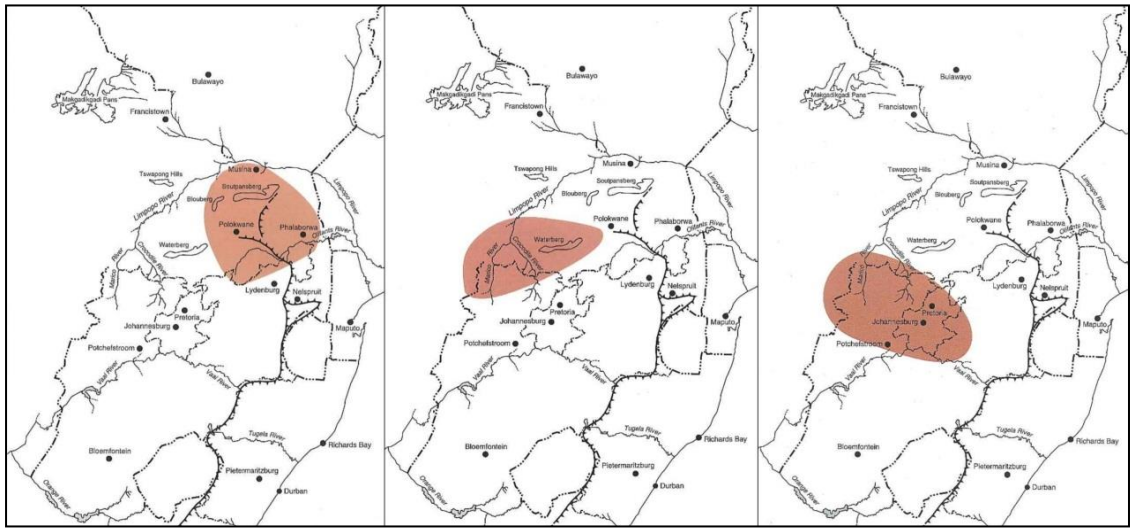


Figure 3-2: Map detailing the distribution of 16th century Maloko (left), 17th century Madikwe (centre) and 18th century Buispoort tradition sites (After Huffman 2007).

Figure 3-3: Ceramic decoration motives typical of 17th century Madikwe (left) and later Buispoort (right) facies (After Huffman 2007).

In addition, various Sotho-Tswana groups were found in the interior of the Highveld areas of South Africa by the end of the 18th century. These units occupied a large area, from present-day Botswana across large sections of the old Transvaal, the Free State Province into the Northern Cape. Based on Sotho-Tswana oral histories various groups acted as cores from which the Sotho-speaking communities sprouted.

4.2.4 Later History: Reorganization, Colonial Contact and living heritage.

The Historical period in Southern Africa encompass the course of Europe's discovery of South Africa and the spreading of European settlements along the East Coast and subsequently into the interior. In addition, the formation stages of this period are marked by the large-scale movements of various Bantu-speaking groups in the interior of South Africa, which profoundly influenced the course of European settlement. Finally, the final retreat of the San and Khoekhoen groups into their present-day living areas also occurred in the Historical period in Southern Africa.

The Waterberg was considered remote and inaccessible by early white migrants from the south and, with the exception of a few hunting and trading expeditions passing through, the area was one of the last regions in the former Transvaal to be permanently occupied by white farmers. Although the first Voortrekker farmers moved into the Waterberg during the 1850's, the region has been increasingly occupied on a regular basis only since the early part of the twentieth century. The early historical period of the area is dominated by the siege of Makapansgat where in September 1854, Chief Makapane and over 1 500 of his people died of hunger, dehydration and injuries after being besieged in the cave by a Boer commando in retaliation for an attack on a Voortrekker settlement. The majority of farms in the Waterberg area were surveyed in the late 1860's as part of the Transvaal government's strategy to settle white farmers in the Waterberg region. At that time, access to the Waterberg plateau was circuitous and difficult with the shortest route extending via Sandrivierspoort near present-day Vaalwater. After a railway line to Vaalwater was completed in the 1920's, maize became an economically viable crop but by the end of the 1960's, slumps in maize prices resulted in many farmers abandoning crop farming in favour of cattle. Large scale iron ore mining has emerged to become a primary economical enterprise in recent years. However, farming communities have settled in the landscape at the beginning of the 20th century.

The Voortrekker Carl Van Heerden established the first farm in what is now the town of Bela-Bela and called it Het Bad but prior to his arrival Tswana tribes first moved into the region in the 1800's and they discovered hot springs in the area. In 1873, President Burgers' Transvaal government bought the land and established a resort called Hartingsburg after the prominent Dutch biologist Pieter Harting. The British occupied the town during the Anglo Boer War, and renamed the post office Warm Baths in 1903, and proclaimed the boundaries of Warmbaths to be the entire farm of Het Bad. In 1920 Warmbaths was proclaimed a "township" and the township was designed by architect John Abraham Moffat in that year. In 1950, it became a magisterial district. In 1932 Warmbaths became a village town and was established as a town council in 1960. On 14 June 2002 the South African government officially renamed the town to Bela-Bela (meaning "boiling boiling").

4.2.5 Documented Heritage Sites and sensitive areas in the Project Landscape

During surveys for Rhino Minerals Andalusite Mine on the Farm Buffelsfontein 353 KQ, Huffman (2004, 2006a, 2007a, 2009a) recorded an EIA village on red colluvial/alluvial deposits and several grain bin stands. The LIA homesteads contained several burnt houses. He ascribed the burning to a severe drought (Huffman 2009b). He also noted MSA lithics but not of any significance. In a subsequent AIA no settlements were recorded but isolated fragments of pottery and slag suggest a buried occupation (Huffman 2009a). Van Schalkwyk (2007) in an assessment for cultural heritage resources on sections of the farms Amandelbult 383KQ and Elandsfontein 386KQ in the Thabazimbi District recorded surface MSA and LSA lithics. He also noted two possible EIA sites whereas most of the others that were identified are from the Late Iron Age/early Historical period, the latter features assigned Medium significance. A buffer zone is already in place following on previous recommendations on Iron Age remains within this general area (Van Schalkwyk 1994, 2001, 2003, 2004; Van Schalkwyk et al. 2004). Coetzee (2008) in a report for the PPC expansion project recorded

only a small Stone Age lithic scatter from the prehistoric period. However, 10 historical houses from the 1930s to 1940s have been documented as well as several graves. In the greater region Dreyer (2011) in an assessment for proposed chrome mining developments found no heritage remains at at Hartbeestkopje 367KQ, Schilpadnest 385KQ and Moddergat 389KQ, in the Northam District but recorded historical material at Zwartkop 369KQ. At Boikarabelo excavations of an extensive grain bin-site and surface collections of around 12 Iron Age settlements demonstrated Tswana settlement sequences that include a probable early Moloko (probably Icon) facies and at least one site had been identified to the Letsibogo facies. The relative age of the sites were therefore inferred to range from the late 17th to late 18th centuries (Digby Wells Environmental 2011). Hutten (2013a, 2013b, 2013c) in several assessments for solar developments noted that there was an absence of heritage resources on the farms Liverpool and Aapiesdraai near Koedoeskop, whereas a historic structure, outside the developments, was recorded at Grootkuil. Van Vollenhoven in an HIA for the proposed development of a limestone mine on Portion 1 of the farm Nooitgedacht 136 JQ, Portion 1 of the farm Buffelskraal 545 KQ and Portions 3, 4, 5, 6 and the Remainder of Krokodilkraal 545 KQ in the Thabazimbi District reported that no heritage resources have been identified and that the surveyed properties have been used for cattle farming and extensive agriculture. In a draft scoping report for the proposed township on Portion 20 and 22 of the farm Theunispan 293 LQ, Portion 1-4 and a portion of the remainder of the Farm Grootdoorn 292 LQ, portion 3 of the Farm Steenbokpan 295 seven heritage sites of significance or value were identified within the area proposed for the development of the Steenbokpan Extension 3 Township. These comprise five informal cemeteries, all on portions of Grootdoorn and two historic structures of the Harmse family homestead (Ila 2014; PGS 2014). In an extension of a mining licence for clay extraction on the farm Nooitgedacht 436 JR Portion 25 an informal cemetery with 15 graves was identified (African Heritage Consultants 2013). African Heritage Consultants (2011, 2014) in a Phase 1 AIA identified numerous stone-walled enclosures, a pre-colonial mine, graves, and historic structures that include a weir and bridge at the Sondagsriver. The scoping report on heritage for Project Infinity Sishen Iron Ore Thabazimbi Mine (Shangoni Management Services 2013) noted that MSA lithics were present in an area with sheet erosion.

The proposed mining on Wachsteenbietjesdraai 350 KQ and Kwaggashoek 345 KQ is in close proximity from the Mostert Tunnel Cave south of Thabazimbi that has significant geological formations. Gatkop Cave on the farm Randstephane 455 KQ ESE of Thabazimbi was also investigated. The locality lies within an area with rich iron ore deposits that are currently being explored by Aquila Resources in view of future extraction. It is an important heritage resource of high cultural significance that is still being used for ritual ceremonies and constitutes a contentious issue in view of the developments. Madimatle Mountain at Donkerpoort 448 KQ and Gatkop Cave on Randstephane 455 KQ hold significant spiritual, ancestral and cultural heritage importance to the local community, local traditional healers, local traditional leaders, persons that practice and belong to certain African Christian denominations. Kruger (2015) identified a large Iron Age occupation site was documented around the slopes of a prominent hill directly east of the R510 road. At the site, which (including the hill) measures approximately 500m x 400m, clear vegetation changes and the occurrence of *Euphorbia candelabrum* trees, dense stands of *Cenchrus ciliaris* (blue buffalo grass) and couch grass indicate middens, cattle dung accumulations and activity areas. *Cenchrus ciliaris* (blue buffalo grass) is often a good indication of the presence of Iron Age sites where these grass types are closely linked to nitrate-rich livestock enclosures (e.g. Denbow 1979). A number of collapsed stone wall structures, terraces and platforms occur at the site and considering the intensification of stone wall building in this landscape after the 17th century as well as the settlement of Sotho-Tswana groups, the walls are probably not older than 300 years. Based on observations derived from the aerial survey it is clear that the site is part of a larger complex of which the nucleus seems to centre around a large hill directly east of the site discussed. Here, large occupation areas and a number of stone wall structures are visible on aerial imagery.

5 RESULTS: ARCHAEOLOGICAL SURVEY

5.1 The Off-Site Desktop Survey

In terms of heritage resources, the general landscape around the project area is primarily well known for its Iron Age Farmer and Colonial / Historical Period archaeology related to farming, rural expansion and warfare of the past century. The farms subject to this assessment was surveyed towards the end of the 19th century and the beginning of the 29th century.

An analysis of historical aerial imagery and archive maps reveals the following (see Figure 5-1 to Figure 5-8):

- The farms Buiskop and Tweefontein are indicated on an early map of the Transvaal (Jeppe, 1899).
- The farms Buiskop and Tweefontein subject to this assessment are indicated on the South African War Map (1899-1902) of the Warmbaths area dating to 1900. Here, the farm Tweefontein is also named Zandfontein and a mission station as well as settlements attributed to Petrus and Letaba appear on the map on Tweefontein.
- A number of so-called “huts” appear on the farms Buiskop and Tweefontein on topographic maps dating to 1960, 1984 and 2004 but none of these features seem to occur within project areas subject to this assessment. These maps indicate vast cultivated fields occurring across the project properties and in the project areas.
- Van Warmelo (1935) indicates a number of BaMosethla and Bakgatla groups residing in and around Bela-Bela and the project area in 1935.
- Aerial imagery dating to 1939, 1960 and 1975 indicate that large portions of the project area have been altered by historical farming and agriculture but no man-made structures or features are legible of these images within the project area.

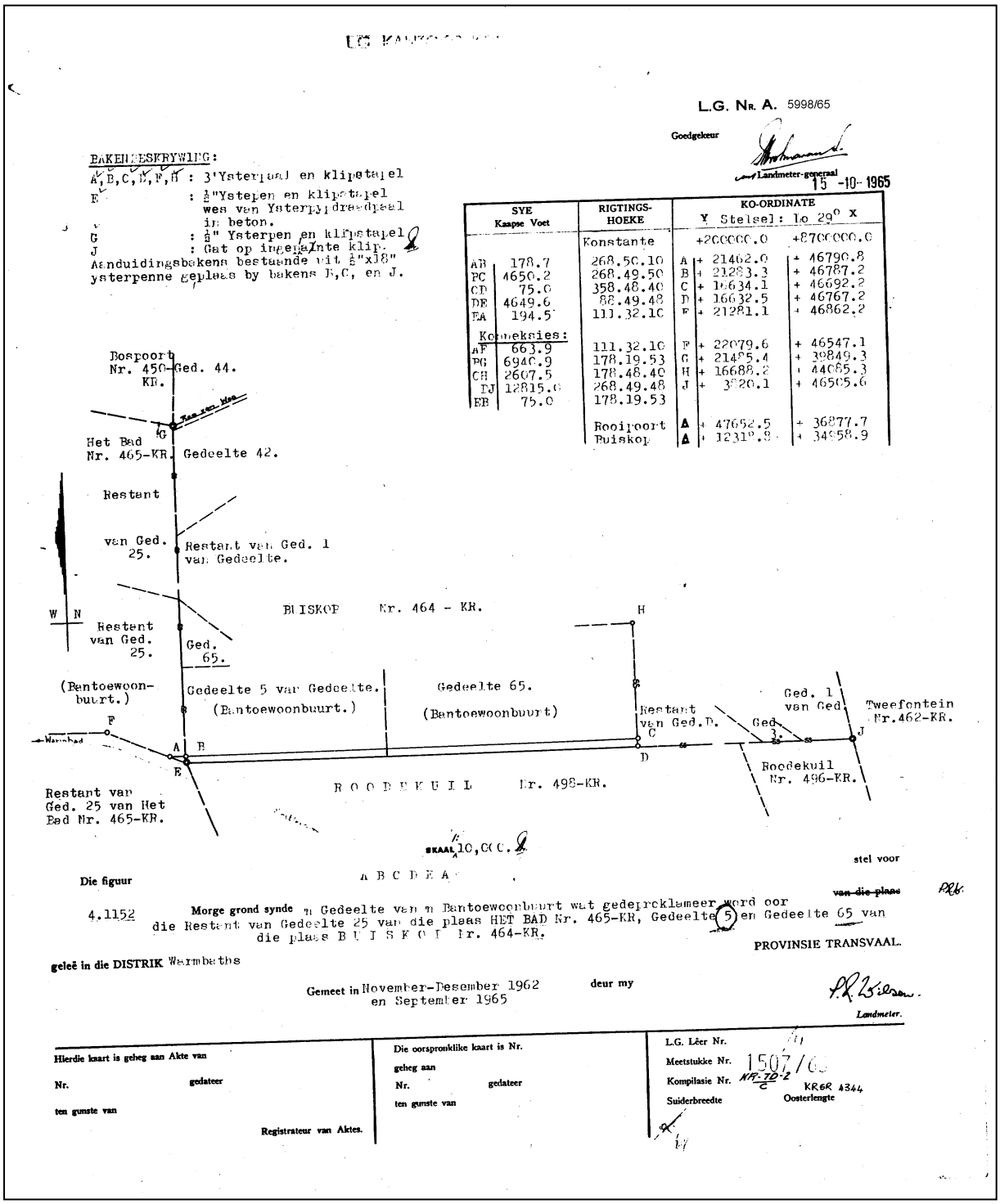


Figure 5-1: An updated title deed for the farm Buiskop, dating to 1965.

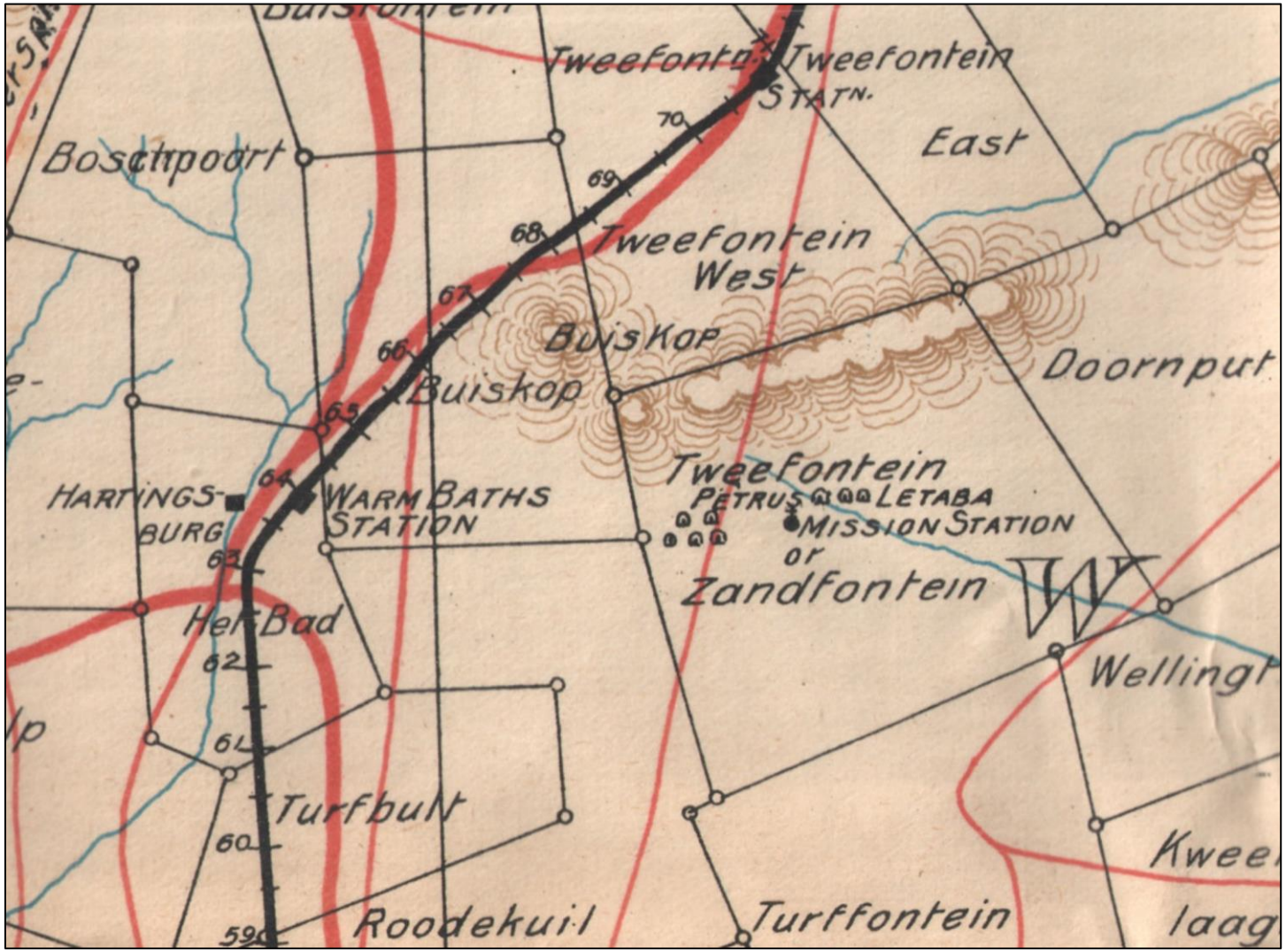


Figure 5-2: The South African War 1899-1902 Map of the Nylstroom Region dating to 1900. The farms Buiskop and Tweefontein are indicated, note the presence of a mission station and settlements attributed to Petrus and Letaba on the farm Tweefontein.

Figure 5-3: Historical map of the Waterberg region dating to 1899 (Jeppe) indicating the presence of the farms Buiskop and Tweefontein.

Figure 5-4: An excerpt of Van Warmelo's Map of the project landscape dating to 1935. Each red dot represents "10 taxpayers". Note that the project area was relatively sparsely populated by BaMosethla and Bakgatla groups at the time.

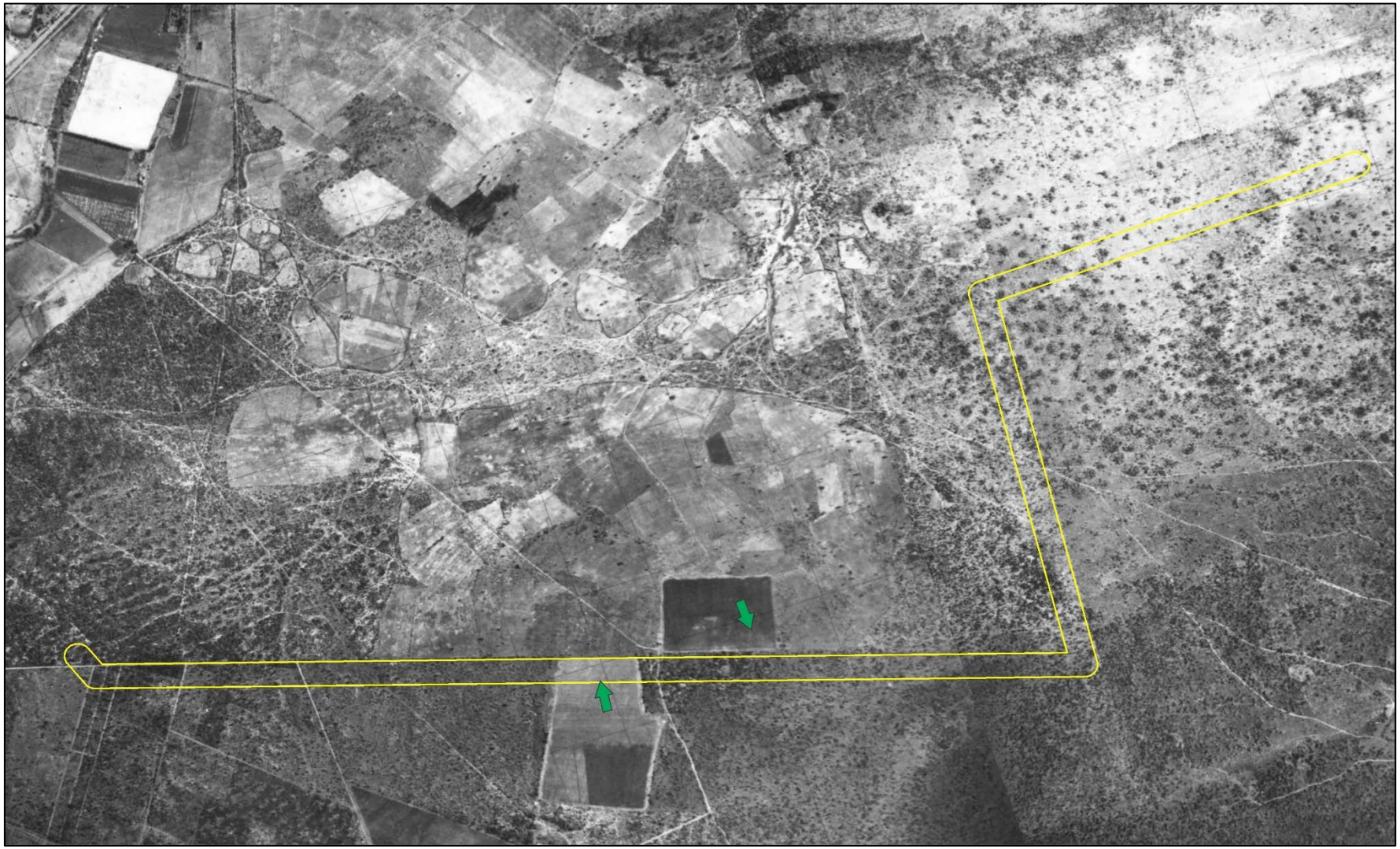


Figure 5-5: An aerial image of the project area dating to 1939 (yellow outline) indicating the presence of agriculture activities (green arrows) in the project buffer. No potential man-made structures or features of heritage potential seem to be legible on the image within the project area.

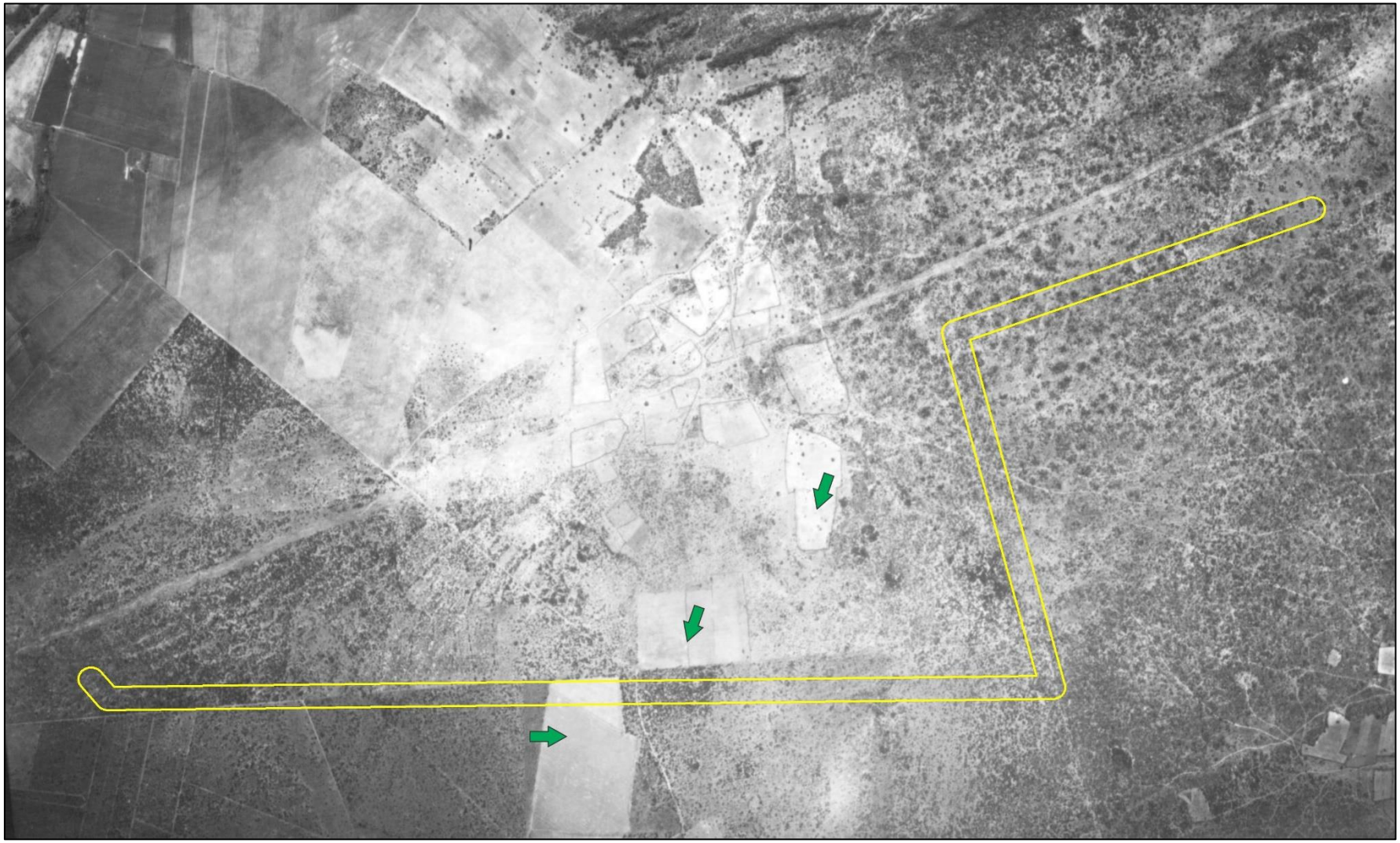
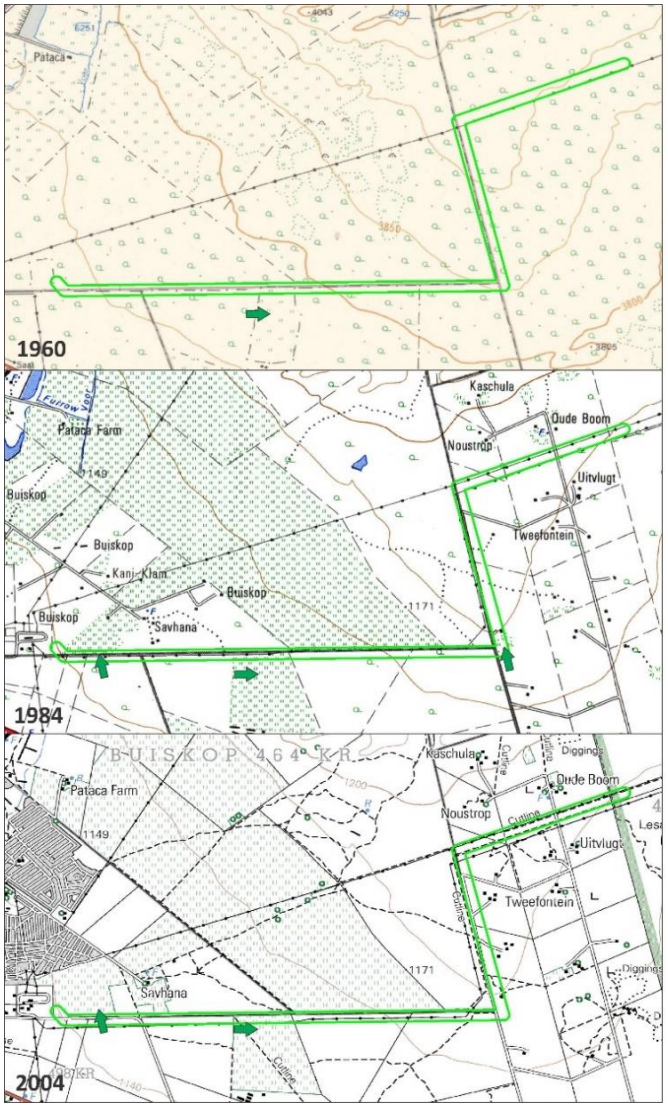
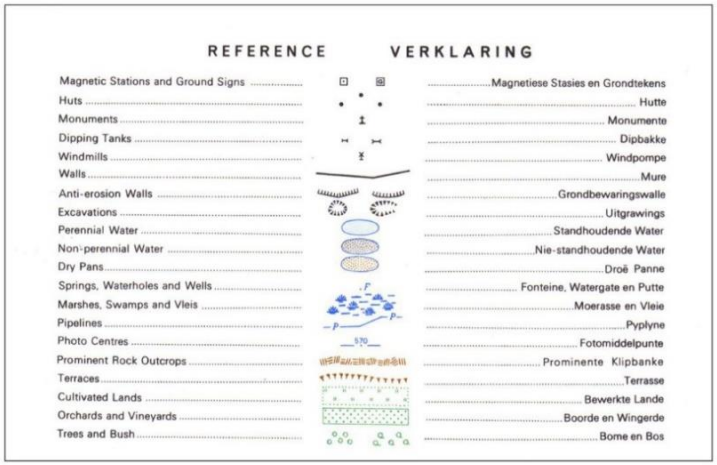


Figure 5-6: An aerial image of the project area dating to 1960 (yellow outline) indicating the presence of agriculture activities (green arrows) in the project buffer. No potential man-made structures or features of heritage potential seem to be legible on the image within the project area.

Figure 5-7: An aerial image of the project area dating to 1975 (yellow outline) indicating the presence of agriculture activities (green arrows) in the project buffer. No potential man-made structures or features of heritage potential seem to be legible on the image within the project area.





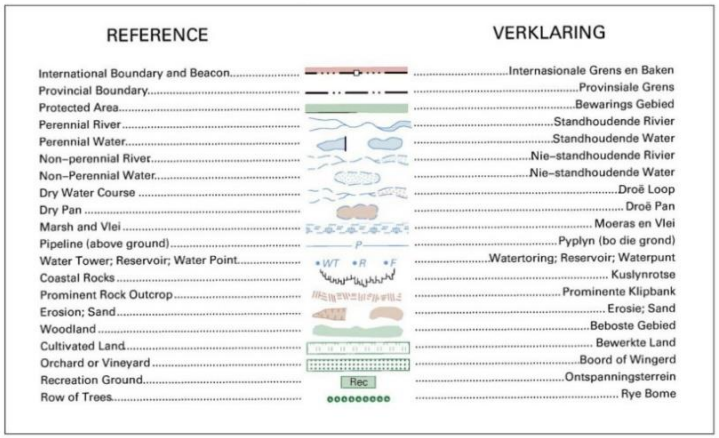


Figure 5-8: Historical topographic maps of the project area (green outline) in the past decades. Green arrows indicate agricultural fields but no man-made structures or features are indicated on these maps in the project area.

5.2 The Archaeological Site Survey

An analysis of historical aerial imagery and archive maps of areas subject to this assessment suggests a landscape which has been subjected to historical farming activities and more recent urbanization possibly sterilising the area of heritage remains. This inference was confirmed during an archaeological site assessment but *in situ* remains of heritage potential were encountered. The following observations were made during the site survey.

- **Exigo-BPL-FT01 Contemporary Period Feature**
  Farm Buiskop: S24.892926° E28.328031°
  Field Rating: Unknown

A potential activity area indicated by a site clearing, a large central ash pit and two wooden posts with cloth flags occurs in a western section of the project area. The site is probably used as a religious meeting place, assumedly by members of the Zionist Christian Church (ZCC). The feature is of recent age and context but the social value to local residents of the site should be considered even though it infers a low heritage significance rating. The site occurs within the Bela-Bela Power Line BA Project study area it might be impacted on by the project. It is suggested that the PP and Stakeholder Engagement Process include consultation with local communities on the potential heritage and cultural significance of the site.

Figure 5-9: View of the potential religious meeting place at Site Exigo-BPL-FT01. Note the large ash pit (left) and wooden posts with cloth (right).

- **Exigo-BPL-FT02 Stone Feature**
  Farm Buiskop: S24.887957° E28.362917°
  Field Rating: Unknown

A small stone cairn feature was noted in an eastern portion of the project area in an open field. Here, a heap of neatly packed stones measuring approximately 70cm circumference was noted. The provenience and function of the feature are not known but the possibility of the cairn indicating a human burial should not be excluded. Should the feature be a burial site, it is of high heritage significance and the site would require mitigation and / conservation measures. The careful monitoring if the site is essential during all phases of development and it would be advisable to design project infrastructure (pylons, support structures) as to avoid impact on the feature entirely.

Figure 5-10: The stone cairn feature at Site Exigo-BPL-FT02.

Figure 5-11: Aerial image indicating the location of heritage occurrences and landscape features discussed in the text.

6 RESULTS: STATEMENT OF SIGNIFICANCE AND IMPACT RATING

6.1 Potential Impacts and Significance Ratings[2]

The following section provides a background to the identification and assessment of possible impacts and alternatives, as well as a range of risk situations and scenarios commonly associated with heritage resources management. A guideline for the rating of impacts and recommendation of management actions for areas of heritage potential within the study area is supplied in Section 10.2 of Addendum 3.

6.1.1 General assessment of impacts on resources

Generally, the value and significance of archaeological and other heritage sites might be impacted on by any activity that would result immediately or in the future in the destruction, damage, excavation, alteration, removal or collection from its original position, of any archaeological material or object (as indicated in the National Heritage Resources Act (No 25 of 1999)). Thus, the destructive impacts that are possible in terms of heritage resources would tend to be direct, once-off events occurring during the initial construction period. However, in the long run, the proximity of operations in any given area could result in secondary indirect impacts. The EIA process therefore specifies impact assessment criteria which can be utilised from the perspective of a heritage specialist study which elucidates the overall extent of impacts.

6.1.2 Direct impact rating

Direct or primary effects on heritage resources occur at the same time and in the same space as the activity, e.g. loss of historical fabric through demolition work. **Indirect effects or secondary effects** on heritage resources occur later in time or at a different place from the causal activity, or as a result of a complex pathway, e.g. restriction of access to a heritage resource resulting in the gradual erosion of its significance, which is dependent on ritual patterns of access (refer to Section 10.3 in the Addendum for an outline of the relationship between the significance of a heritage context, the intensity of development and the significance of heritage impacts to be expected).

The following table summarizes impacts to the possible ceremonial site of unknown heritage significance site located in the proposed Bela-Bela Power Line BA Project area **(Site Exigo-BPL-FT01)**:

NATURE OF IMPACT: Impact could involve displacement or destruction of heritage material in the study area.		
	Without mitigation	**With mitigation**
EXTENT	Local	Local
DURATION	Permanent	Permanent
MAGINITUDE	Minor	Minor
PROBABILITY	Definite	Very improbable
SIGNIFICANCE	Unknown	Low
STATUS	Negative	Neutral
REVERSIBILITY	Non-reversible	Non-reversible
IRREPLACEABLE LOSS OF RESOURCES?	Yes	No
CAN IMPACTS BE MITIGATED?	Yes	
MITIGATION: Site monitoring, social consultation.		

[2] Based on: W inter, S. & Baumann, N. 2005. *Guideline for involving heritage specialists in EIA processes: Edition 1.*

CUMULATIVE IMPACTS: None.
RESIDUAL IMPACTS: n/a

The following table summarizes impacts to the stone feature of unknown heritage significance site located in the proposed Bela-Bela Power Line BA Project area **(Site Exigo-BPL-FT02)**. It should be noted that this impact rating will change should the feature be a human burial site.

NATURE OF IMPACT: Impact could involve displacement or destruction of heritage material in the study area.		
	Without mitigation	**With mitigation**
EXTENT	Local	Local
DURATION	Permanent	Permanent
MAGINITUDE	Minor	Minor
PROBABILITY	Definite	Very improbable
SIGNIFICANCE	Unknown	Low
STATUS	Negative	Neutral
REVERSIBILITY	Non-reversible	Non-reversible
IRREPLACEABLE LOSS OF RESOURCES?	Yes	No
CAN IMPACTS BE MITIGATED?	Yes	
MITIGATION: Site monitoring by ECO, project redesign.		
CUMULATIVE IMPACTS: None.		
RESIDUAL IMPACTS: n/a		

6.2 Evaluation Impacts

A number of archaeological and historical studies have been conducted in this section of the Limpopo Province which points to a rich and diverse archaeological landscape. The heritage legacy of this area is mostly dominated by Iron Age Farmer and Colonial / Historical Period archaeology primarily related to farming, rural expansion and warfare of the past century.

6.2.1 Archaeology

The landscape around the project area bears a rich later Iron Age occupation legacy with clusters of stone-walled sites occurring throughout. However, no archeological sites were located during the site assessment and no impact on the archaeological landscape is foreseen.

6.2.2 Built Environment

The study noted no Historical Period settlement remains or buildings within the powerline corridor. As for the rest of the project area, the general landscape holds varied significance in terms of the built environment as the area comprises historical farming remnants and relatively newly established settlements and townlands.

6.2.3 Cultural Landscape

The larger Bela-Bela area comprises a rich cultural landscape even though portions of the project area have been transformed by farming and human settlement. Of note is a religious meeting place in the project area might have social meaning to local residents and church groups and the site might be impacted on by the development. Further away from the project area, the landscape is typical of central Gauteng with large flat parcels with occasional undulating hills and flatter plains in-between.

6.2.4 Graves / Human Burials Sites

No human burials were located during the sites assessment but a stone cairn possibly indicating a human burial was documented. Impact on burial sites is nonetheless not anticipated. In the rural areas of the Limpopo Province, graves and cemeteries often occur around farmsteads in family burial grounds but they are also randomly scattered around archaeological and historical settlements. The probability of informal human burials encountered during development should thus not be excluded. In addition, human remains and burials are commonly found close to archaeological sites; they may be found in "lost" graveyards, or occur sporadically anywhere as a result of prehistoric activity, victims of conflict or crime. It is often difficult to detect the presence of archaeological human remains on the landscape as these burials, in most cases, are not marked at the surface. Human remains are usually observed when they are exposed through erosion. In some instances packed stones or rocks may indicate the presence of informal pre-colonial burials. If any human bones are found during the course of construction work then they should be reported to an archaeologist and work in the immediate vicinity should cease until the appropriate actions have been carried out by the archaeologist. Where human remains are part of a burial they would need to be exhumed under a permit from either SAHRA (for pre-colonial burials as well as burials later than about AD 1500). Should any unmarked human burials/remains be found during the course of construction, work in the immediate vicinity should cease and the find must immediately be reported to the archaeologist, or the South African Heritage Resources Agency (SAHRA). Under no circumstances may burials be disturbed or removed until such time as necessary statutory procedures required for grave relocation have been met.

Potentially sensitive heritage resources occur inside areas proposed for the Bela-Bela Power Line BA development and the management of these resources are required for the duration of the development. In the opinion of the author of this Archaeological Impact Assessment Report, the proposed Bela-Bela Power Line BA Project may proceed from a culture resources management perspective, provided that management measures, endorsed by the relevant Heritage Resources authority, are implemented where applicable, and provided that no subsurface heritage remains are encountered during construction and operation.

6.3 Management actions

Recommendations for relevant heritage resource management actions are vital to the conservation of heritage resources. A general guideline for recommended management actions is included in Section 10.4 of Addendum 3.

OBJECTIVE: ensure conservation of heritage resources of significance, prevent unnecessary disturbance and/or destruction of previously undetected heritage receptors.

*For the religious meeting place (**Site EXIGO-BPL-FT01**) within the project area the following are required in terms of heritage management and mitigation:*

PROJECT COMPONENT/S	All phases of construction and operation.
POTENTIAL IMPACT	Damage/destruction of sites.
ACTIVITY RISK/SOURCE	Digging foundations and trenches into sensitive deposits that are not visible at the surface.

MITIGATION: TARGET/OBJECTIVE	To locate previously undetected heritage remains / graves as soon as possible after disturbance so as to maximize the chances of successful rescue/mitigation work.		
MITIGATION: ACTION/CONTROL		**RESPONSIBILITY**	**TIMEFRAME**
Fixed Mitigation Procedure (**required**)			
Site Monitoring: Regular examination of trenches and excavations in order to detect and preserve previously undocumented heritage receptors. **Social Consultation:** It is suggested that local communities be consulted with regards to the religious meeting place in the project area and their possible social meanings. .		ECO, HERITAGE ASSESSMENT PRACTITIONER	Monitor as frequently as practically possible. Prior to the commencement of construction and earth-moving.
PERFORMANCE INDICATOR	Archaeological sites are discovered and mitigated with the minimum amount of unnecessary disturbance.		
MONITORING	Successful location of sites by person/s monitoring.		

*For the stone cairn feature (**Site EXIGO-BPL-FT02**) within the project area the following are required in terms of heritage management and mitigation:*

PROJECT COMPONENT/S	All phases of construction and operation.		
POTENTIAL IMPACT	Damage/destruction of sites.		
ACTIVITY RISK/SOURCE	Digging foundations and trenches into sensitive deposits that are not visible at the surface.		
MITIGATION: TARGET/OBJECTIVE	To locate previously undetected heritage remains / graves as soon as possible after disturbance so as to maximize the chances of successful rescue/mitigation work.		
MITIGATION: ACTION/CONTROL		**RESPONSIBILITY**	**TIMEFRAME**
Fixed Mitigation Procedure (**required**)			
Site Monitoring: Regular examination of trenches and excavations in order to detect and preserve previously undocumented heritage receptors. **Project Redesign:** It is recommended that placements of pylons and related infrastructure be designed as to avoid the site.		ECO, HERITAGE ASSESSMENT PRACTITIONER	Monitor as frequently as practically possible. Prior to the commencement of construction and earth-moving.
PERFORMANCE INDICATOR	Archaeological sites are discovered and mitigated with the minimum amount of unnecessary disturbance.		
MONITORING	Successful location of sites by person/s monitoring.		

7 RECOMMENDATIONS

The larger landscape around the project area indicates a rich heritage horizon encompassing Iron Age Farmer and Colonial / Historical Period archaeology primarily related to farming, rural expansion and warfare of the past century. Locally, the project area has seen transformation by agriculture activities and rapid urbanization potentially sterilising surface and subsurface of heritage remains, especially those dating to pre-colonial and prehistorical times. Cognisance should nonetheless be taken of archaeological material that might be present in surface and sub-surface deposits along drainage lines and in pristine areas. The following recommendations are made based on general observations in the proposed Bela-Bela Power Line BA Project area:

- A potential religious meeting place possibly associated with the ZCC (**Site EXIGO-BPL-FT01**) occur within the project area and the site is of unknown heritage significance. It is recommended that the site and any activities in its surrounds be monitored in order to avoid the destruction of previously undetected heritage remains. It is suggested that local communities be consulted with regards to the religious meeting place in the project area and their possible social meanings. This could form part of the Public Participation (PP) and Stakeholder Engagement processes for the project.

- A small stone cairn feature (**Site EXIGO-BPL-FT02**) occurring in an eastern portion of the project area is of unknown provenience and function but the possibility of the cairn indicating a human burial should not be excluded. Should the feature prove to be a burial site, it is of high heritage significance and the site would require mitigation and / conservation measures. The careful monitoring if the site is essential during all phases of development and it is recommended that that placements of pylons and related infrastructure be designed as to avoid the site in its entirety. **Should impact on any human burial prove inevitable, full grave relocations are recommended for these burial grounds. This measure should be undertaken by a qualified archaeologist, and in accordance with relevant legislation, permitting, statutory permissions and subject to any local and regional provisions and laws and by-laws pertaining to human remains. A full social consultation process should occur in conjunction with the mitigation of cemeteries and burials (see Addendum B).**
- A fenced-off section of the project alignment of approximately 800m on the farm Tweefontein could not be accessed and this area was not surveyed. However, this section falls within the existing ESKOM power line servitude which is largely clear of surface vegetation and surface features and it is highly unlikely that heritage resources will be encountered in this section
- Considering the localised nature of heritage remains, the general monitoring of the development progress by an ECO or by the heritage specialist is recommended for all stages of the project. Should any subsurface palaeontological, archaeological or historical material, or burials be exposed during construction activities, all activities should be suspended and the archaeological specialist should be notified immediately.
- It should be stated that it is likely that further undetected archaeological remains might occur elsewhere in the Study Area along water sources and drainage lines, fountains and pans would often have attracted human activity in the past. Also, since Stone Age material seems to originate from below present soil surfaces in eroded areas, the larger landscape should be regarded as potentially sensitive in terms of possible subsurface deposits. Burials and historically significant structures dating to the Colonial Period occur on farms in the area and these resources should be avoided during all phases of construction and development, including the operational phases of the development.

In addition to these site-specific recommendations, careful cognizance should be taken of the following:

- As Palaeontological remains occur where bedrock has been exposed, all geological features should be regarded as sensitive.
- Water sources such as drainage lines, fountains and pans would often have attracted human activity in the past. As Stone Age material occur in the larger landscape, such resources should be regarded as potentially sensitive in terms of possible subsurface deposits.

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9 ADDENDUM 1: SPECIALIST CV

NELIUS LE ROUX KRUGER

BHCS Hons. (Archaeology)

(Date compiled: 2022/01/10)

PERSONAL DETAILS

Nationality:	South African
Date of Birth:	3 April 1979
Postal Address:	Postnet Suite 74, Private Bag x04, Menlo Park, 0102
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Languages:	English, Afrikaans, Sepedi (Basic)

HIGHER EDUCATION

University Attended:	University of the Pretoria
Degree Obtained:	BA Archaeology *(Cum Laude)* 2002
Major Subjects:	Anthropology, Archaeology, English, Afrikaans
University Attended:	University of the Pretoria
Degree Obtained:	BHCS Hons. Archaeology (*Cum Laude)* 2004

PROFESSIONAL AFFILIATIONS

Member of the Association for South African Professional Archaeologists (ASAPA).

Member of the Council of the Association for South African Professional Archaeologists (ASAPA): CRM Portfolio

Member of the CRM Section of the Association for South African Professional Archaeologists (ASAPA).

Member of the Society of Africanist Archaeologists (SAFA).

Member of the South African Museums Association (SAMA).

Accredited Professional Archaeologist & CRM Practitioner by the Association for South African Professional Archaeologists (ASAPA) & Heritage Natal (AMAFA).

HONOURS AND AWARDS

Aage V. Jensen Development Foundation (Denmark) grant for participation in the joint SAFA/PAA Congress, Dakar, Senegal (2010).

Five Hundred Years Initiative (NRF) Research Grant (2008 – 2009).

University of Pretoria post-graduate Merit Grant for MA studies in Archaeology (2004 – 2008).

University of Pretoria (CINDEK) bursary for post-graduate studies awarded by the Centre of Indigenous Knowledge (2003).

South African Archaeological Society's Hanisch Award for best graduate student in the Department of Anthropology and Archaeology at the University of Pretoria (2003).

University of Pretoria Academic Honorary Colours (2002).

University of Pretoria Graduate Merit Grant (2002).

University of Pretoria honorarium for archaeological collections management at the Department of Archaeology and Anthropology (2001).

CURRENT STATUS

Heritage Resources Manager for Exigo Sustainability

SPECIALITY FIELDS

- Integrated Heritage and Archaeological Impact Assessment (Phase 1, 2 & 3), complying to SAHRA, PHRA and industry standards for heritage impact assessments.

- Industry standard Heritage Resources Management Plans, complying to SAHRA & PHRA standards for heritage impact assessments.

- Heritage destruction / alteration / excavation permitting facilitation and associated research.

- General facilitation in consultation and negotiation with heritage resources authorities (SAHRA, PHRA's).

- Heritage-related social consultation and focus group facilitation (for example, with Interested and Affected parties).

- Historical and anthropological studies.

- Heritage and Social Spatial Development Frameworks & Strategic Development Area Frameworks for municipalities.

- Socio-cultural baseline studies and research.

- GIS and geo-spatial referencing and data analysis, heritage and social mapping.

PROFESSIONAL SKILLS & EXPERIENCE

Nelius Le Roux Kruger is an accredited ASAPA (Association of Southern African Professional Archaeologists) archaeologist and Culture Resources Management (CRM) Practitioner with over 15 years' experience in the fields of heritage resources assessment, conservation management and social studies. In addition, he is involved in various aspects of social research and social impact assessment. He holds a BHCS (Hons) Archaeology degree from the University of Pretoria specializing in the Iron Age Farmer and Colonial Periods of South Africa. He has worked extensively on archaeological and heritage sites of the time periods and cultural contexts present in Southern Africa, both in the commercial and academics spheres and he holds vast experience in human remains relocation and related social consultation. Nelius has conducted social research projects across Southern Africa involving Social Impact Assessments as well as the compilation and monitoring of mining social and labor plans, public meeting facilitation and socio-cultural studies. His experience is not limited to South Africa and he has worked on archaeological and socio-cultural research projects across Africa and the Middle East. His publication record includes a number of academic publications in peer reviewed journals and books as well as a vast number of Heritage Management Reports. Nelius' expertise includes CRM assessment and management, applications in heritage legislation, Social Impact Assessment, social consulting as well as geospacing and Geographical Information Systems (GIS) applications in archaeology and CRM. Nelius is a conscientious and committed archaeologist and social scientist who is dedicated to the professionalism of the discipline of archaeology and social studies. He approaches all aspects of his specialst fields with enthusiasm, maintaining best practise at all times. When working with people, he strives to manage interpersonal communication and group dynamics with dedication, promoting positive group cohesion.

SELECTED PUBLICATIONS

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SELECTED PROJECTS

NATIONAL

- Phase 1 Heritage Impact Assessment (HIA) and further heritage management for the upgrading of the Warrenton Anglo Boer War blockhouse, Warrenton, Northern Cape Province

- Phase 1 Heritage Impact Assessment (HIA) and Phase 2 Site Investigation for the restoration of the old Johannesburg Fort, Constitution Hill, Johannesburg, Gauteng Province

- Phase 1 Heritage Impact Assessment (HIA) and further heritage management for the upgrading/refurbishment of the Burgershoop MPCC, Mogale City, Gauteng Province

- Phase 1 Heritage Impact Assessment (HIA) of historical period heritage sites on the farm Roodekrans, Dullstroom area, Mpumalanga Province

- Phase 1 Heritage Impact Assessment (HIA) of a historical bridge on the farm Pienaarspoort 339jr at Delfsand, Gauteng Province

- Phase 1 Heritage Impact Basements (HIAs) for 20 PV Solar Parks on location at Upington, Kimberley, Vryburg, Kuruman, Kathu, Hotazel, Douglas, Groblershoop and Prieska, Northern Cape Province, South Africa.

- Phase 1 Heritage Impact Assessments (HIAs) for 18 large scale water supply projects on location at East London, Mthatha, Ngcobo, Barley East, Elliot, Cathcart, King Williams Town and Mdantsane, Eastern Cape Province, South Africa.

- Phase 1 Heritage Impact Assessments (HIAs) for more than 40 residential infrastructure developments across South Africa.

INTERNATIONAL

- Heritage Impact Assessment for the Kitumba Copper-Gold Project (KCGP), Zambia

- Heritage Scoping Study for the BTR Kitumba Project, Mumbwa, Zambia

- Heritage Scoping Study for the Buckreef Gold Project, Geita, Tanzania

- Phase 2 mitigation and heritage assessment of the Koidu Monkey Hill Iron Age metallurgy site, Koidu Diamond Mine, Sierra Leone

- Phase 2 heritage site mitigation of the Sessenge archaeological site, Kibali Gold Mine,Democratic Republic of the Congo

10 ADDENDUM 2: HERITAGE LEGISLATION BACKGROUND

10.1 CRM: Legislation, Conservation and Heritage Management

The broad generic term Cultural Heritage Resources refers to any physical and spiritual property associated with past and present human use or occupation of the environment, cultural activities and history. The term includes sites, structures, places, natural features and material of palaeontological, archaeological, historical, aesthetic, scientific, architectural, religious, symbolic or traditional importance to specific individuals or groups, traditional systems of cultural practice, belief or social interaction.

10.1.1 Legislation regarding archaeology and heritage sites

The South African Heritage Resources Agency (SAHRA) and their provincial offices aim to conserve and control the management, research, alteration and destruction of cultural resources of South Africa. It is therefore vitally important to adhere to heritage resource legislation at all times.

d. National Heritage Resources Act No 25 of 1999, section 35

According to the National Heritage Resources Act of 1999 a historical site is any identifiable building or part thereof, marker, milestone, gravestone, landmark or tell older than 60 years. This clause is commonly known as the "60-years clause". Buildings are amongst the most enduring features of human occupation, and this definition therefore includes all buildings older than 60 years, modern architecture as well as ruins, fortifications and Iron Age settlements. "Tell" refers to the evidence of human existence which is no longer above ground level, such as building foundations and buried remains of settlements (including artefacts).

The Act identifies heritage objects as:

- objects recovered from the soil or waters of South Africa including archaeological and palaeontological objects, meteorites and rare geological specimens
- visual art objects
- military objects
- numismatic objects
- objects of cultural and historical significance
- objects to which oral traditions are attached and which are associated with living heritage
- objects of scientific or technological interest
- any other prescribed category

With regards to activities and work on archaeological and heritage sites this Act states that:

"No person may alter or demolish any structure or part of a structure which is older than 60 years without a permit by the relevant provincial heritage resources authority." (34. [1] 1999:58)

and

"No person may, without a permit issued by the responsible heritage resources authority-

(d) destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite;

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

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

(g) bring onto or use at an archaeological or palaeontological site any excavation equipment or any equipment which assist in the detection or recovery of metals or archaeological and palaeontological material or objects, or use such equipment for the recovery of meteorites. (35. [4] 1999:58)."

and

"No person may, without a permit issued by SAHRA or a provincial heritage resources agency-

(h) destroy, damage, alter, exhume or remove from its original position or otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves;

(i) destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority;

(j) bring onto or use at a burial ground or grave referred to in paragraph (a) or (b) and excavation equipment, or any equipment which assists in the detection or recovery of metals (36. [3] 1999:60)."

e. Human Tissue Act of 1983 and Ordinance on the Removal of Graves and Dead Bodies of 1925

Graves 60 years or older are heritage resources and fall under the jurisdiction of both the National Heritage Resources Act and the Human Tissues Act of 1983. However, graves younger than 60 years are specifically protected by the Human Tissues Act (Act 65 of 1983) and the Ordinance on the Removal of Graves and Dead Bodies (Ordinance 7 of 1925) as well as any local and regional provisions, laws and by-laws. Such burial places also fall under the jurisdiction of the National Department of Health and the Provincial Health Departments. Approval for the exhumation and re-burial must be obtained from the relevant Provincial MEC as well as the relevant Local Authorities.

10.1.2 Background to HIA and AIA Studies

South Africa's unique and non-renewable archaeological and palaeontological heritage sites are 'generally' protected in terms of the National Heritage Resources Act (Act No 25 of 1999, section 35) and may not be disturbed at all without a permit from the relevant heritage resources authority. Heritage sites are frequently threatened by development projects and both the environmental and heritage legislation require impact assessments (HIAs & AIAs) that identify all heritage resources in areas to be developed. Particularly, these assessments are required to make recommendations for protection or mitigation of the impact of the sites. HIAs and AIAs should be done by qualified professionals with adequate knowledge to (a) identify all heritage resources including archaeological and palaeontological sites that might occur in areas of developed and (b) make recommendations for protection or mitigation of the impact on the sites.

The National Heritage Resources Act (Act No. 25 of 1999, section 38) provides guidelines for Cultural Resources Management and prospective developments:

***"38.** (1) Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a*

development categorised as:

(a) the construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;

(b) the construction of a bridge or similar structure exceeding 50m in length;

(c) any development or other activity which will change the character of a site:

(i) exceeding 5 000 m^2 in extent; or

(ii) involving three or more existing erven or subdivisions thereof; or

(iii) involving three or more erven or divisions thereof which have been consolidated within the past five years; or

(iv) the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;

(d) the re-zoning of a site exceeding 10 000 m^2 in extent; or

(e) any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority,

must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development."

And:

"The responsible heritage resources authority must specify the information to be provided in a report required in terms of subsection (2)(a): Provided that the following must be included:

(k) The identification and mapping of all heritage resources in the area affected;

(l) an assessment of the significance of such resources in terms of the heritage assessment criteria set out in section 6(2) or prescribed under section 7;

(m) an assessment of the impact of the development on such heritage resources;

(n) an evaluation of the impact of the development on heritage resources relative to the sustainable social and economic benefits to be derived from the development;

(o) the results of consultation with communities affected by the proposed development and other interested parties regarding the impact of the development on heritage resources;

(p) if heritage resources will be adversely affected by the proposed development, the consideration of alternatives; and

(q) plans for mitigation of any adverse effects during and after the completion of the proposed development (38. [3] 1999:64)."

Consequently, section 35 of the Act requires Heritage Impact Assessments (HIAs) or Archaeological Impact Assessments (AIAs) to be done for such developments in order for all heritage resources, that is, all places or objects of aesthetics, architectural, historic, scientific, social, spiritual, linguistic or technological value or significance to be protected. Thus any assessment should make provision for the protection of all these heritage components, including archaeology, shipwrecks, battlefields, graves, and structures older than 60

years, living heritage, historical settlements, landscapes, geological sites, palaeontological sites and objects. Heritage resources management and conservation.

10.2 Assessing the Significance of Heritage Resources

Archaeological sites, as previously defined in the National Heritage Resources Act (Act 25 of 1999) are places in the landscape where people have lived in the past – generally more than 60 years ago – and have left traces of their presence behind. In South Africa, archaeological sites include hominid fossil sites, places where people of the Earlier, Middle and Later Stone Age lived in open sites, river gravels, rock shelters and caves, Iron Age sites, graves, and a variety of historical sites and structures in rural areas, towns and cities. Palaeontological sites are those with fossil remains of plants and animals where people were not involved in the accumulation of the deposits. The basic principle of cultural heritage conservation is that archaeological and other heritage sites are valuable, scarce and *non-renewable.* Many such sites are unfortunately lost on a daily basis through development for housing, roads and infrastructure and once archaeological sites are damaged, they cannot be re-created as site integrity and authenticity is permanently lost. Archaeological sites have the potential to contribute to our understanding of the history of the region and of our country and continent. By preserving links with our past, we may not be able to revive lost cultural traditions, but it enables us to appreciate the role they have played in the history of our country.

- Categories of significance

Rating the significance of archaeological sites, and consequently grading the potential impact on the resources is linked to the significance of the site itself. The significance of an archaeological site is based on the amount of deposit, the integrity of the context, the kind of deposit and the potential to help answer present research questions. Historical structures are defined by Section 34 of the National Heritage Resources Act, 1999, while other historical and cultural significant sites, places and features, are generally determined by community preferences. The guidelines as provided by the NHRA (Act No. 25 of 1999) in Section 3, with special reference to subsection 3 are used when determining the cultural significance or other special value of archaeological or historical sites. In addition, ICOMOS (the Australian Committee of the International Council on Monuments and Sites) highlights four cultural attributes, which are valuable to any given culture:

- *Aesthetic value:*

Aesthetic value includes aspects of sensory perception for which criteria can and should be stated. Such criteria include consideration of the form, scale, colour, texture and material of the fabric, the general atmosphere associated with the place and its uses and also the aesthetic values commonly assessed in the analysis of landscapes and townscape.

- *Historic value:*

Historic value encompasses the history of aesthetics, science and society and therefore to a large extent underlies all of the attributes discussed here. Usually a place has historical value because of some kind of influence by an event, person, phase or activity.

- *Scientific value:*

The scientific or research value of a place will depend upon the importance of the data involved, on its rarity, quality and on the degree to which the place may contribute further substantial information.

- *Social value:*

Social value includes the qualities for which a place has become a focus of spiritual, political, national or other cultural sentiment to a certain group.

It is important for heritage specialist input in the EIA process to take into account the heritage management structure set up by the NHR Act. It makes provision for a 3-tier system of management including the South Africa Heritage Resources Agency (SAHRA) at a national level, Provincial Heritage Resources Authorities (PHRAs) at a provincial and the local authority. The Act makes provision for two types or forms of protection of heritage resources; i.e. formally protected and generally protected sites:

Formally protected sites:

- Grade 1 or national heritage sites, which are managed by SAHRA
- Grade 2 or provincial heritage sites, which are managed by the provincial HRA (MP-PHRA).
- Grade 3 or local heritage sites.

Generally protected sites:

- Human burials older than 60 years.
- Archaeological and palaeontological sites.
- Shipwrecks and associated remains older than 60 years.
- Structures older than 60 years.

With reference to the evaluation of sites, the certainty of prediction is definite, unless stated otherwise and if the significance of the site is rated high, the significance of the impact will also result in a high rating. The same rule applies if the significance rating of the site is low. The significance of archaeological sites is generally
ranked into the following categories.

Significance	Rating Action
No significance: sites that do not require mitigation.	None
Low significance: sites, which may require mitigation.	2a. Recording and documentation (Phase 1) of site; no further action required 2b. Controlled sampling (shovel test pits, auguring), mapping and documentation (Phase 2 investigation); permit required for sampling and destruction
Medium significance: sites, which require mitigation.	3. Excavation of representative sample, C14 dating, mapping and documentation (Phase 2 investigation); permit required for sampling and destruction [including 2a & 2b]
High significance: sites, where disturbance should be avoided.	4a. Nomination for listing on Heritage Register (National, Provincial or Local) (Phase 2 & 3 investigation); site management plan; permit required if utilised for education or tourism
High significance: Graves and burial places	4b. Locate demonstrable descendants through social consulting; obtain permits from applicable legislation, ordinances and regional by-laws; exhumation and reinternment [including 2a, 2b & 3]

Furthermore, the significance of archaeological sites was based on six main criteria:

- Site integrity (i.e. primary vs. secondary context),
- Amount of deposit, range of features (e.g., stonewalling, stone tools and enclosures),
- Density of scatter (dispersed scatter),
- Social value,
- Uniqueness, and
- Potential to answer current and future research questions.

11 ADDENDUM 3: CONVENTIONS USED TO ASSESS THE SIGNIFICANCE OF HERITAGE

11.1 Site Significance Matrix

According to the NHRA, Section 2(vi) the **significance** of heritage sites and artefacts is determined by it aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technical value in relation to the uniqueness, condition of preservation and research potential. It must be kept in mind that the various aspects are not mutually exclusive, and that the evaluation of any site is done with reference to any number of these. The following matrix is used for assessing the significance of each identified site/feature.

2. SITE EVALUATION			
2.1 Heritage Value (NHRA, section 2 [3])	High	Medium	Low
It has importance to the community or pattern of South Africa's history or pre-colonial history.			
It possesses unique, uncommon, rare or endangered aspects of South Africa's natural or cultural heritage.			
It has potential to yield information that will contribute to an understanding of South Africa's natural and cultural heritage.			
It is of importance in demonstrating the principle characteristics of a particular class of South Africa's natural or cultural places or objects.			
It has importance in exhibiting particular aesthetic characteristics valued by a particular community or cultural group.			
It has importance in demonstrating a high degree of creative or technical achievement at a particular period.			
It has marked or special association with a particular community or cultural group for social, cultural or spiritual reasons (sense of place).			
It has strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa.			
It has significance through contributing towards the promotion of a local sociocultural identity and can be developed as a tourist destination.			
It has significance relating to the history of slavery in South Africa.			
It has importance to the wider understanding of temporal changes within cultural landscapes, settlement patterns and human occupation.			
2.2 Field Register Rating			
National/Grade 1 [should be registered, retained]			
Provincial/Grade 2 [should be registered, retained]			
Local/Grade 3A [should be registered, mitigation not advised]			
Local/Grade 3B [High significance; mitigation, partly retained]			
Generally Protected A [High/Medium significance, mitigation]			
Generally protected B [Medium significance, to be recorded]			
Generally Protected C [Low significance, no further action]			
2.3 Sphere of Significance	High	Medium	Low
International			
National			
Provincial			
Local			
Specific community			

11.2 Impact Assessment Criteria

The following table provides a guideline for the rating of impacts and recommendation of management actions for sites of heritage potential.

Significance of the heritage resource

This is a statement of the nature and degree of significance of the heritage resource being affected by the activity. From a heritage management perspective, it is useful to distinguish between whether the significance is embedded in the physical fabric or in associations with events or persons or in the experience of a place; i.e. its visual and non-visual qualities. This statement is a primary informant to the nature and degree of significance of an impact and thus needs to be thoroughly considered. Consideration needs to be given to the significance of a heritage resource at different scales (i.e. site-specific, local, regional, national or international) and the relationship between the heritage resource, its setting and its associations.

Nature of the impact

This is an assessment of the nature of the impact of the activity on a heritage resource, with some indication of its positive and/or negative effect/s. It is strongly informed by the statement of resource significance. In other words, the nature of the impact may be historical, aesthetic, social, scientific, linguistic or architectural, intrinsic, associational or contextual (visual or non-visual). In many cases, the nature of the impact will include more than one value.

Extent

Here it should be indicated whether the impact will be experienced:

- On a site scale, i.e. extend only as far as the activity;
- Within the immediate context of a heritage resource;
- On a local scale, e.g. town or suburb
- On a metropolitan or regional scale; or
- On a national/international scale.

Duration

Here it should be indicated whether the lifespan of the impact will be:

- Short term, (needs to be defined in context)
- Medium term, (needs to be defined in context)
- Long term where the impact will persist indefinitely, possibly beyond the operational life of the activity, either because of natural processes or by human intervention; or
- Permanent where mitigation either by natural process or by human intervention will not occur in such a way or in such a time span that the impact can be considered transient.

Of relevance to the duration of an impact are the following considerations:

- Reversibility of the impact; and
- Renewability of the heritage resource.

Intensity

Here it should be established whether the impact should be indicated as:

- Low, where the impact affects the resource in such a way that its heritage value is not affected;
- Medium, where the affected resource is altered but its heritage value continues to exist albeit in a modified way; and
- High, where heritage value is altered to the extent that it will temporarily or permanently be damaged or destroyed.

Probability

This should describe the likelihood of the impact actually occurring indicated as:

- Improbable, where the possibility of the impact to materialize is very low either because of design or historic experience;
- Probable, where there is a distinct possibility that the impact will occur;
- Highly probable, where it is most likely that the impact will occur; or
- Definite, where the impact will definitely occur regardless of any mitigation measures

Confidence

This should relate to the level of confidence that the specialist has in establishing the nature and degree of impacts. It relates to the level and reliability of information, the nature and degree of consultation with I&AP's and the dynamic of the broader socio-political context.

- High, where the information is comprehensive and accurate, where there has been a high degree of consultation and the socio-political context is relatively stable.
- Medium, where the information is sufficient but is based mainly on secondary sources, where there has been a limited targeted consultation and socio-political context is fluid.
- Low, where the information is poor, a high degree of contestation is evident and there is a state of socio-political flux.

Impact Significance

The significance of impacts can be determined through a synthesis of the aspects produced in terms of the nature and degree of heritage significance and the nature, duration, intensity, extent, probability and confidence of impacts and can be described as:

- Low; where it would have a negligible effect on heritage and on the decision
- Medium, where it would have a moderate effect on heritage and should influence the decision.
- High, where it would have, or there would be a high risk of, a big effect on heritage. Impacts of high significance should have a major influence on the decision;
- Very high, where it would have, or there would be high risk of, an irreversible and possibly irreplaceable negative impact on heritage. Impacts of very high significance should be a central factor in decision-making.

11.3 Direct Impact Assessment Criteria

The following table provides an outline of the relationship between the significance of a heritage context, the intensity of development and the significance of heritage impacts to be expected

	TYPE OF DEVELOPMENT			
HERITAGE CONTEXT	**CATEGORY A**	**CATEGORY B**	**CATEGORY C**	**CATEGORY D**
CONTEXT 1 High heritage Value	Moderate heritage impact expected	High heritage impact expected	Very high heritage impact expected	Very high heritage impact expected
CONTEXT 2 Medium to high heritage value	Minimal heritage impact expected	Moderate heritage impact expected	High heritage impact expected	Very high heritage impact expected
CONTEXT 3 Medium to low heritage value	Little or no heritage impact expected	Minimal heritage impact expected	Moderate heritage impact expected	High heritage impact expected
CONTEXT 4 Low to no heritage value	Little or no heritage impact expected	Little or no heritage impact expected	Minimal heritage value expected	Moderate heritage impact expected
NOTE: A DEFAULT "LITTLE OR NO HERITAGE IMPACT EXPECTED" VALUE APPLIES WHERE A HERITAGE RESOURCE OCCURS OUTSIDE THE IMPACT ZONE OF THE DEVELOPMENT.				

HERITAGE CONTEXTS	CATEGORIES OF DEVELOPMENT
Context 1: Of high intrinsic, associational and contextual heritage value within a national, provincial and local context, i.e. formally declared or potential Grade 1, 2 or 3A heritage resources **Context 2:** Of moderate to high intrinsic, associational and contextual value within a local context, i.e. potential Grade 3B heritage resources. **Context 3:**	**Category A: Minimal intensity development** - No rezoning involved; within existing use rights. - No subdivision involved. - Upgrading of existing infrastructure within existing envelopes - Minor internal changes to existing structures - New building footprints limited to less than 1000m2. **Category B: Low-key intensity development** - Spot rezoning with no change to overall zoning of a site. - Linear development less than 100m

Of medium to low intrinsic, associational or contextual heritage value within a national, provincial and local context, i.e. potential Grade 3C heritage resources **Context 4:** Of little or no intrinsic, associational or contextual heritage value due to disturbed, degraded conditions or extent of irreversible damage.	- Building footprints between 1000m2-2000m2 - Minor changes to external envelop of existing structures (less than 25%) - Minor changes in relation to bulk and height of immediately adjacent structures (less than 25%). **Category C: Moderate intensity development** - Rezoning of a site between 5000m2-10 000m2. - Linear development between 100m and 300m. - Building footprints between 2000m2 and 5000m2 - Substantial changes to external envelop of existing structures (more than 50%) - Substantial increase in bulk and height in relation to immediately adjacent buildings (more than 50%) **Category D: High intensity development** - Rezoning of a site in excess of 10 000m2 - Linear development in excess of 300m. - Any development changing the character of a site exceeding 5000m2 or involving the subdivision of a site into three or more erven. - Substantial increase in bulk and height in relation to immediately adjacent buildings (more than 100%)

11.4 Management and Mitigation Actions

The following table provides a guideline of relevant heritage resources management actions is vital to the conservation of heritage resources.

No further action / Monitoring

Where no heritage resources have been documented, heritage resources occur well outside the impact zone of any development or the primary context of the surroundings at a development footprint has been largely destroyed or altered, no further immediate action is required. Site monitoring during development, by an ECO or the heritage specialist are often added to this recommendation in order to ensure that no undetected heritage\ remains are destroyed.

Avoidance

This is appropriate where any type of development occurs within a formally protected or significant or sensitive heritage context and is likely to have a high negative impact. Mitigation is not acceptable or not possible. This measure often includes the change / alteration of development planning and therefore impact zones in order not to impact on resources.

Mitigation

This is appropriate where development occurs in a context of heritage significance and where the impact is such that it can be mitigated to a degree of medium to low significance, e.g. the high to medium impact of a development on an archaeological site could be mitigated through sampling/excavation of the remains. Not all negative impacts can be mitigated.

Compensation

Compensation is generally not an appropriate heritage management action. The main function of management actions should be to conserve the resource for the benefit of future generations. Once lost it cannot be renewed. The circumstances around the potential public or heritage benefits would need to be exceptional to warrant this type of action, especially in the case of where the impact was high.

Rehabilitation

Rehabilitation is considered in heritage management terms as a intervention typically involving the adding of a new heritage layer to enable a new sustainable use. It is not appropriate when the process necessitates the removal of previous historical layers, i.e. restoration of a building or place to the previous state/period. It is an appropriate heritage management action in the following cases:

- The heritage resource is degraded or in the process of degradation and would benefit from rehabilitation.
- Where rehabilitation implies appropriate conservation interventions, i.e. adaptive reuse, repair and maintenance, consolidation and minimal loss of historical fabric.
- Where the rehabilitation process will not result in a negative impact on the intrinsic value of the resource.

Enhancement