HERITAGE IMPACT ASSESSMENT REPORT FOR THE TSF3 WRD EXTENSION 1 PROJECT AT THE THARISA MINE, BOJANALA DISTRICT MUNICIPALITY, NORTH WEST PROVINCE

CES

ENVIRONMENTAL AND SOCIAL ADVISORY SERVICES

Heritage Impact Assessment Report for the Tharisa Mine TSF3 WRD Extension 1 Project, Bojanala District Municipality, North West Province

Prepared for:

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REVISIONS TRACKING TABLE

CES Report Revision and Tracking Schedule

Document Title:	Heritage Impact Assessment for the Tharisa Mine TSF3 WRD Extension 1 Project, Bojanala District Municipality, North West Province		
Client Name	OMI Solutions Silver Lakes, Lombardy Corporate Park Office B Block B Ground Floor Cnr Graham and 1 Cole Road Shere, Pretoria, 0084		
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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 Tharisa Mine TSF3 WRD Extension 1 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: CES
Date: 6 June 2023

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 3, Section 2 and Addendum 1 of Report.	-
(ii) The expertise of that person to compile a specialist report including a curriculum vita	Section 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 iii of the report	-
(c) An indication of the scope of, and the purpose for which, the report was prepared	Section 2: Introduction and Terms of Reference, Section 3: Description of the Project Activity	-
(cA) An indication of the quality and age of base data used for the specialist report	Section 7: The Heritage Baseline Environment	-
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Section 9: Expected Heritage Impacts of the Project	-
(d) The duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment	Section 6: Methodology	-
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used	Section 6: Methodology	-
(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: Expected Heritage Impacts of the Project	-
(g) An identification of any areas to be avoided, including buffers	Section 8: Findings and Results	-
(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 8: Findings and Results	-
(i) A description of any assumptions made and any uncertainties or gaps in knowledge;	Section 6.2: Assumptions and Limitations	-
(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 10: Heritage Management Section 11: Conclusion and 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 10: Heritage Management Section 11: Conclusion and Recommendations	
(n)(i) A reasoned opinion as to whether the proposed activity, activities or portions thereof should be authorised and	Section 1 & Section 9	
(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 10: Heritage Management Section 11: Conclusion and 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 4: CRM: Legislation, Conservation and Heritage Management	

1 EXECUTIVE SUMMARY

This report details the results of an Heritage Impact Assessment (HIA) study for the proposed extension of an existing Waste Rock Dump (West WRD 1) of the Tharisa Mine on Farm 342 in the Bojanala District Municipality of the North West Province. The project entails the extension of the Tharisa Mine Tailings Storage Facility (TSF) 3 WRD 1 over a surface area of approximately **22.7ha,** hereafter referred to as the TSF3 WRD Extension 1 Project. 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	Tharisa Mine TSF3 WRD Extension 1 Project
Project Location	S25.748211° E27.482649°
1:50 000 Map Sheet	2527CB
Farm Portion / Parcel	Farm 342
Magisterial District / Municipal Area	Bojanala District Municipality
Province	North West Province

The history of the western Northwest Province is reflected in a rich archaeological landscape. The interaction between the climate, geology, topography, and the fauna and flora in the Bankeveld 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 presumably Batswana groups, who practised herding, agriculture, metal working and trading, found a suitable living environment during the Late Iron Age times at around AD 1500-1800. It was here that their chiefdoms flourished. The settlements of these early Batswana chiefdoms are characterised by an impressive and elaborate stone-built tradition. Hundreds of sites were built along the bases of the granite hills. The accounts of early travellers provide important data on the fauna, flora and inhabitants of the Bankeveld and the larger 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 in moving colonists. The region is also rich in rock art. European farmers, settling in the area since the middle of the 19th century, divided up the landscape into a number of farms. In recent years an urban element developed, expanding at a rapid rate largely as a result of mining in the region.

The project landscape has been subject to a number of heritage impact assessments and HIAs by Pistorius (2009) and Pelser (2018) in particular noted Late Iron Age Stone walled settlements, Historical Period structures such as farm houses with outbuildings, agricultural infrastructure, the Van Rensburg School and graveyards within and around the Tharisa Mine area. The proposed Tharisa Mine TSF3 WRD Extension 1 Project area is situated in environments that have been transformed and degraded as a result of rural farming and mining and it might be assumed that these areas have largely been sterilized of heritage remains, especially those dating to prehistorical times. This inference was confirmed during an archaeological site assessment which identified poorly preserved heritage receptors. The following observations are made for the proposed Tharisa Mine TSF3 WRD Extension 1 Project in terms of heritage resources management:

- The remains of two Historical Period farmstead compounds (**TWRD-HP01, TWRD-HP02**) occur within the proposed project area and impact on the sites is likely. However, dwellings and buildings at the sites have been demolished and only foundations structures and building rubble remain and the sites are of low heritage significance even though they are generally protected under the National Heritage Resource Act (NHRA 1999). It is recommended that the sites be monitored throughout all phases of the project since human burials occur in the general vicinity of the farmsteads outside the project area.
- Pistorius documented a small "unmarked" cemetery in the project area (**TWRD-BP01, previously coded "GY05")** in an HIA for the Tharisa Mine conducted in 2007. The Tharisa Environmental Officer indicated that all graves within mining areas had previously been relocated and Site GY05 could not be located during the site survey subject to the current assessment. It is nonetheless recommended that the relocated status of the burials be confirmed during the preconstruction phase by means of the perusal of the necessary accompanying documents and heritage permits in order to ensure that human remains are not damaged or lost. Should it be established that this burial site was not relocated, it is primarily recommended that infrastructure be redesigned to avoid the cemetery where a 50m no-go buffer should be demarcated prior to the construction phase. Here, the site should be fenced or a permanent construction barricade should be erected to clearly indicate the site and the margins of the no-go buffer. Frequent monitoring will be required during all phases of the project by an informed Environmental Control Officer (ECO) in order to detect direct or indirect impact on the site. This should include a Site Management Plan (SMP), detailing conservation measures and indicating responsible parties in this regard. Should impact on the burial site (if present) prove inevitable, the graves should be relocated 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.
- As burials occur around the project area, it is recommended that the Environmental Impact Assessment (EIA) public participation and social consultative process address the possibility of further graves occurring in the project area.
- A partially intact concrete building foundation structure (**TWRD-FT01)** was noted in the project area. The structure remains are not of heritage significance and no further action in terms of heritage management or mitigation is required.
- Since cultural (archaeological) layers are usually superficial, subsoil layers that makes them easily vulnerable to destruction, the likelihood for encountering previously undetected cultural heritage or archaeological material sites as the land clearing process commences, or during construction of infrastructure should be considered. Graves and cemeteries are often scattered around archaeological and historical settlements in the rural areas of the North West Province and the probability of informal human burials encountered during the construction phase should thus not be excluded. Site monitoring by an informed appointed ECO will be required throughout the construction phase of the project in order to avoid the destruction of previously undetected heritage sites.

It is the opinion of the Specialist that the proposed Tharisa Mine TSF3 WRD Extension 1 Project will have a low to negligible negative cumulative impact on the heritage value of the area for the following reasons:

- The absence of significant archaeological resources documented in the project area and in its immediate surroundings implies low-severity short and long-term impacts on the heritage landscape.
- The transformed nature of much of the project landscapes and the presence of mines and agricultural fields in development areas means that the character and significance of the landscape in terms of its heritage is bound not to change during the course of construction, operation and decommissioning of the project.

- The heritage context and sensitivity of the proposed development zones points to a landscape of limited heritage significance on a local level.
- It should be noted that archaeological knowledge and the initiation of research projects into significant archaeological sites often result from Heritage Impact Assessments conducted for developments. Provided that significant archaeological sites are conserved and that appropriate heritage mitigation and management procedures are followed, the cumulative impact of development can be positive.

Heritage resources have been documented in the proposed Tharisa Mine TSF3 WRD Extension 1 Project footprint areas. It is the opinion of the author of this Archaeological Impact Assessment Report that the proposed Tharisa Mine TSF3 WRD Extension 1 Project will have no impact on archaeological resources, the built environment, the cultural landscape or human burials provided that no subsurface heritage remains are encountered during construction and on the condition that recommendations in this assessment are implemented. The project should be allowed to proceed from a culture resources management perspective subject to approval of findings and recommendations by the relevant Heritage Resources authority.

Tharisa Mine TSF3 WRD Extension 1 Heritage Sites

Site Code	Coordinate S E	Short Description	Field Rating	Mitigation Action	Project Phase
TWRD-BP01	S25.747182° E27.481989°	Burial Site	**4a. High Significance**	**CONFIRM SITE STATUS:** Confirm relocated status of the burial during the preconstruction phase by means of the perusal of the necessary accompanying documents and heritage permits.	**Pre-Construction**
				IF SITE HAS NOT BEEN RELOCATED **AND IT IS TO BE RETAINED:** **Avoidance:** Redesign project infrastructure to avoid impact, implement a development no-go buffer of 50m (if site is retained) **Site monitoring:** Weekly monitoring during initial site clearing and earth moving activities by an ECO familiar with the sensitivity of heritage receptors, or the Heritage Consultant. Monthly monitoring of the burial sites is recommended during subsequent stages of development. A Site Management Plan (SMP) and a 50m conservation buffer should be implemented.	**Pre-Construction Construction Operations Decommissioning**
				IF SITE HAS NOT BEEN RELOCATED **AND IMPACT IS TO OCCUR:** **Site Impact Mitigation:** Grave Relocation, permitting, social consultation (if impact is to occur).	**Pre-Construction**
				Close-Out Reporting: ECO review management procedures and ensure that effective measures were implemented.	**Decommissioning**
TWRD-HP01	S25.746796° E27.483875°	Historical Period Site	**2a. Low Significance**	**IF SITES ARE RETAINED AND IF IMPACT WILL OCCUR:** **General Site Monitoring** in order to detect the presence of and limit impact on previously undocumented heritage receptors during construction / site clearing / earth moving.	**Pre-Construction Construction Operations Decommissioning**
TWRD-HP02	S25.747504° E27.483681°	Historical Period Site	**2a. Low Significance**		
TWRD-FT01	S25.747449° E27.481805°	Built Environment Feature	**No Significance**	No action required.	**Pre-Construction Construction Operations Decommissioning**

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

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.

Collective Memory: The shared pool of information (stories, artefacts, symbols, traditions, images) held in the memories of two or more members of a group. As for individual memory, it is construed over time through the interpretation of past events (in the present case, interpreted by the group members). By the virtue of being shared among the group members, it creates a social group identity in the sense that it forms the ties that bind group members together.

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.

Intangible cultural heritage: UNESCO defines "intangible cultural heritage" as the practices, representations, expressions, knowledge and skills recognized by communities, groups and individuals as part of their cultural heritage. It is transmitted from generation to generation inconstant recreation, providing the communities with a sense of identity (Article 2).

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.
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.

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
ECO	Environmental Control Officer
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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2 INTRODUCTION AND TERMS OF REFERENCE

CES was commissioned to conduct a Heritage Impact Assessment (HIA) study for the proposed Tharisa Mine Tailing Storage Facility 3 Waste Rock Dump Extension 1 (hereafter referred to as TSF 3 WRD Extension 1) in the North West Province. The rationale of this HIA 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.

Heritage specialist input into the environmental assessment 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, Environmental Impact Assessments (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.

As archaeologist for CES, Mr Neels Kruger acted as field director and specialist for this project. He was responsible for the assimilation of all information, the compilation of the final consolidated Heritage Impact Assessment (HIA) 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). Please refer to Addendum 1 for a Specialist CV.

3 DESCRIPTION OF THE ACTIVITY

3.1 PROJECT DESCRIPTION

OMI Solutions requested the Heritage Unit of CES to conduct a Phase 1 Heritage Impact Assessments (HIA) for the extension of a Waste Rock Dump (WRD) at the Tharisa Mine on Farm 342 in the Bojanala District Municipality, North West Province (hereafter referred to as the "Tharisa Mine TSF3 WRD Extension 1 Project").

The project entails the extension of the existing Tharisa Mine TSF3 West WRD 1 over a surface area of approximately **22.7ha.**

Other project details for the proposed WRD are as follows:

- **Volume: 4.78 Mm^3**
- **Height: 68 m**

It has been indicated that the WRD will have toe drainage, access roads and stormwater diversions.

Please refer to Figure 3-1 for a proposed project layout map.

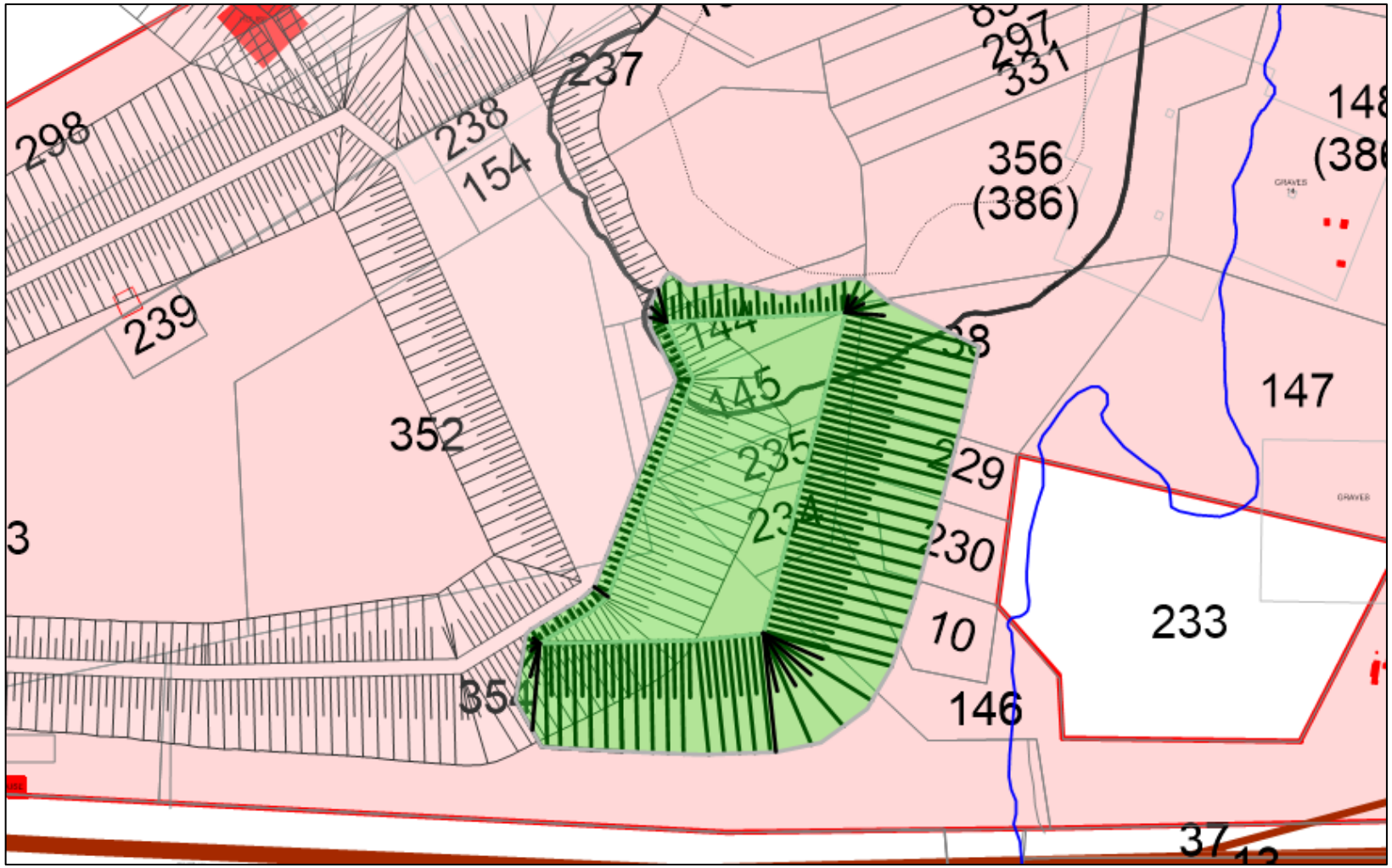

Figure 3-1: Map indicating the proposed position and layout of the Tharisa Mine TSF3 WRD Extension 1 Project (green shade).

4 LEGAL BASIS OF THE ACTIVITY

4.1 OVERVIEW

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.

4.2 LEGISLATION FOR THE PROTECTION OF 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.

4.3 BACKGROUND TO HERITAGE IMPACT ASSESSMENTS

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

.

5 REGIONAL CONTEXT

5.1 LOCATION

The proposed Tharisa Mine TSF3 WRD Extension 1 Project occurs on Farm 342 along the southern periphery of the Tharisa Mine in the Bojanala District Municipality, North West Province. The area is situated approximately 25km east of Rustenburg and 3km south of the town of Marikana, and it is bordered to the south by the N4 highway.

The study area appears on 1:50000 map sheet 2527CB (see Figure 5-7 and Figure 5-8 for regional locality) and coordinates for the project area are as follows:

- **Relative Midpoint**: S25.748211° E27.482649°

5.2 RECEIVING ENVIRONMENT

The project is located in the Bankeveld, a narrow strip of land between the Waterberg and the centrally situated Highveld. This area is roughly demarcated by Krugersdorp in the south, the Pienaars River to the north, Bronkhorstspruit in the east and the Pilanesberg to the west. This region can be divided into three parallel ecozones, running from east to west, namely the grassveld of the southern Highveld and the northern Bushveld, with the Magaliesberg valley forming a central ecozone. The central ecozone of the Bankeveld is covered by older gabbro penetrated by younger volcanic magma which formed a series of pyramid-shaped granite hills from the Pilanesberg in the north-west to Wonderboom near Pretoria in the east. These hills, as part of the Magaliesberg valley, represent a unique ecozone characterised by grassveld, savanna veld and near wooded valleys. The region has abundant surface water supplies, because the local Pienaar, the Moretele, the Hex and the Apies Rivers all drain their waters into the Crocodile River.

5.3 SITE DESCRIPTION

The study area is situated along the southern periphery of the current Tharisa mining operation where much of the project footprint has been transformed by early agriculture and current mining activities. Small pockets of level or undulating and undisturbed grassland remain in places under Bushveld trees and indicator species seem prevalent. A deep trench and a newly constructed fence bisect the project area from north to south and soil and stone mounds and spill heaps occur throughout the project area. A vast WRD is currently being established west of the project area extending east into the project footprint and a number of service roads have been constructed in the project footprint.

Figure 5-1: View of intact vegetation along the southern periphery of the project area.

Figure 5-2: View of service roads constructed within a section of the project area.

Figure 5-3: View of surface grasses and trees in a section of the project area.

Figure 5-4: View of general surroundings in the project area.

Figure 5-5: View of the project area looking south (left) and east (right).

Figure 5-6: View existing WRD along the northern and western borders of the project area.

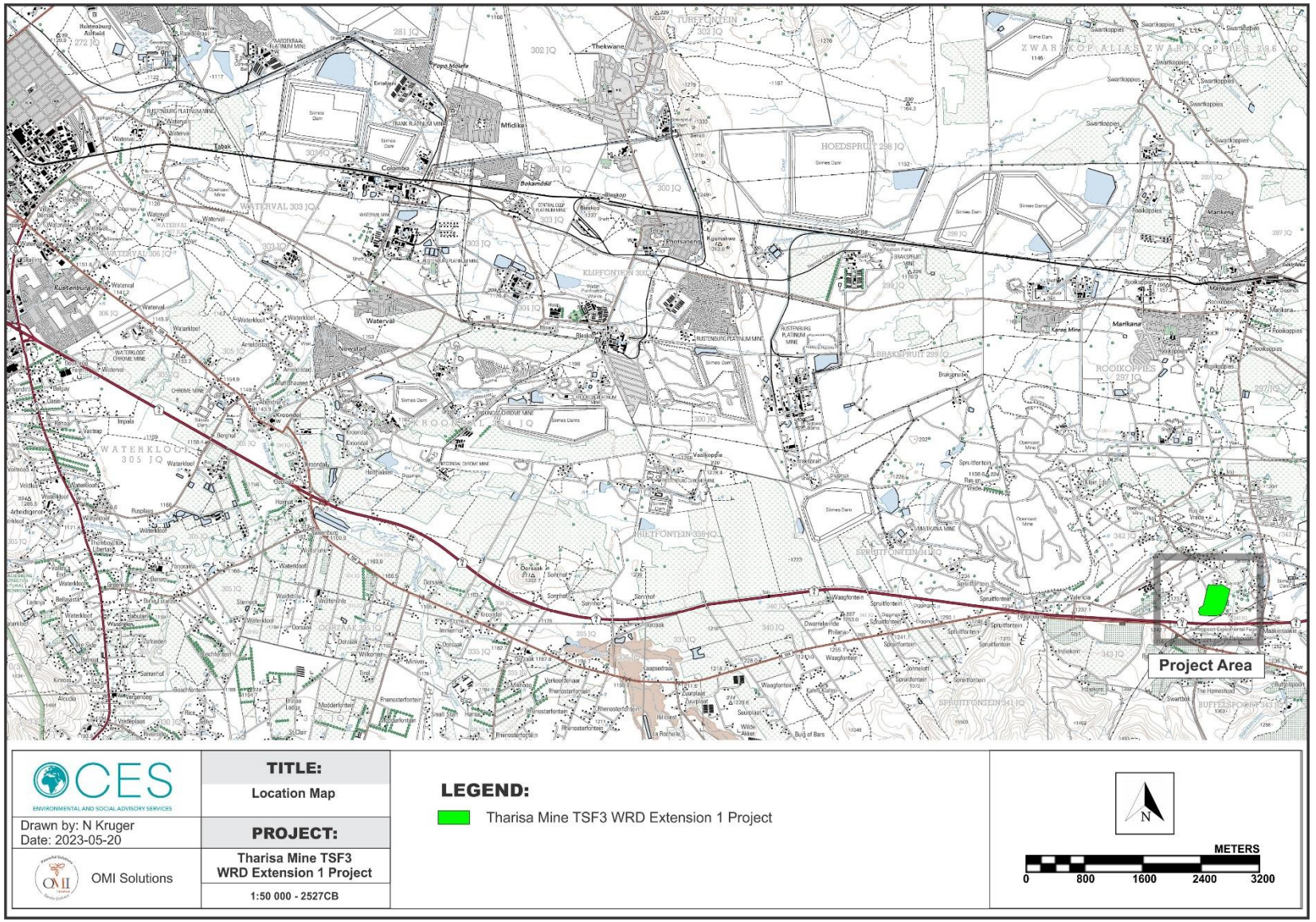

Figure 5-7: Topographical map providing a regional context for the proposed Tharisa Mine TSF3 WRD Extension 1 Project (sheet 2527CB).

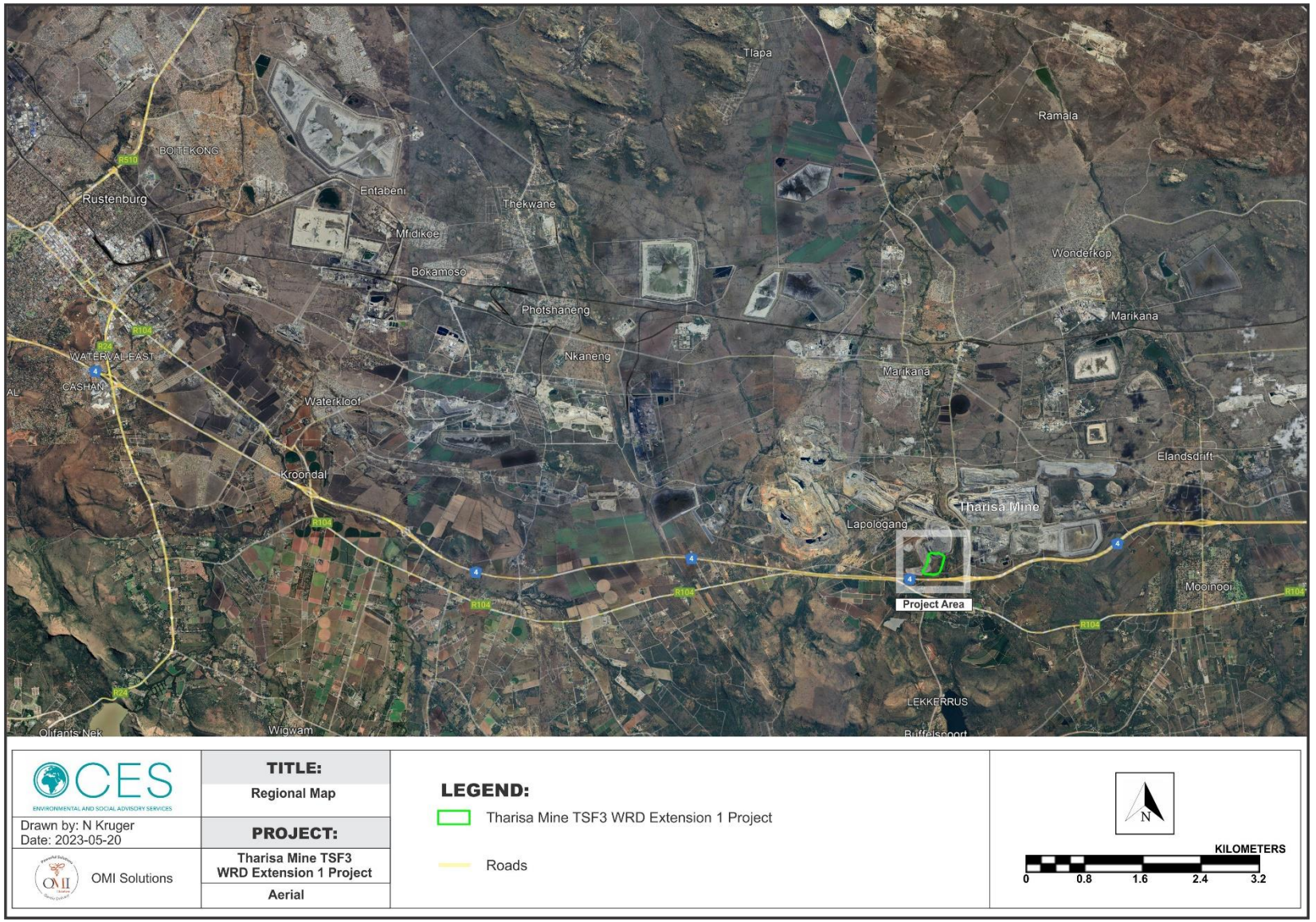

Figure 5-8: Aerial map providing a regional context for the proposed Tharisa Mine TSF3 WRD Extension 1 Project.

6 METHODOLOGY

6.1 SOURCES OF INFORMATION

6.1.1 Desktop Work (Literature Review, Remote Sensing)

The larger landscape of the eastern North West 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 KQ and Kwaggashoek 345 KQ Heritage Impact Report on proposed mining activities of Project Phoenix. PGS Heritage Consultants
- Fourie, W. 2014. Proposed Development of the Steenbokpan Extension 3 Township on the Remainder and Portions 1, 2, 3 and 4 of the Farm Grootdoorn 292 LQ, Portions 20, 22 and 25 of the Farm Theunispan 293 LQ and Portion 3 of the Farm Steenbokpan 295 LQ at Steenbokpan, Lephalale Local Municipality, Waterberg District, Limpopo Province. Client: Flexilor Properties (Pty) Ltd . PGS Heritage Consultants.
- Pistorius, J.C.C. 1993. 'n Argeologiese impakstudie van die beoogde trajek van roete K16 in die Britsdistrik van Transvaal. (Mede-outeur, F.P. Coetzee). Verslag voorberei vir Liebenberg & Jenkins, Siviele Ingenieurs: Pretoria.
- Pistorius, J.C.C. 1993. 'n Argeologiese ondersoek van 'n gedeelte van die plaas Elandsrand (570JQ) in die Britsdistrik van Transvaal. (Mede-outeur F.P. Coetzee). Verslag voorberei vir Wates, Meiring en Barnard, Siviele Ingenieurs: Johannesburg.
- Pistorius, J.C.C. 1994. 'n Verslag van argeologiese opgrawings op die plaas Zwartkopjes of Roodekopjes (427JG) in die Britsdistrik van Transvaal. (Medewerkers: P. Nortje, K. Lubbe, W. van der Merwe). Verslag voorberei vir Liebenberg & Jenkins, Siviele Ingenieurs: Pretoria.
- Pistorius, J.C.C. 1995. 'n Argeologiese verkenningsopname van 'n gedeelte van die beoogde Adis-Ikaros-Phoebus 400kV transmissielynkorridor tussen Garankuwa en Brits. Verslag voorberei vir die Transmissiegroep van Eskom: Megawattpark.
- Pistorius, J.C.C. 1996. 'n Fase 1 argeologiese ondersoek en evaluering van die voorkoms van argeologiese terreine binne die beoogde Noordsigwoonbuurt van Rustenburg. (Medewerkers M. Hutten en S. Gaigher). Verslag voorberei vir EVN Projektebestuur (Pretoria), die Oorgangsraad van Rustenburg en Fox Lake & Machouse Ontwikkelaars.
- Pistorius, J.C.C. 1996. Assessment of archaeological potential of land under the control of Rhombus Vanadium (Pty) Ltd. Report prepared for Stass Environmental.
- Pistorius, J.C.C. 1996. A Phase I archaeological investigation of land to be mined by Samco Tiles at Hornsnek, Pretoria, south of the Magaliesberg. Report prepared for Fritz Klöpfer Environmental.
- Pistorius, J.C.C. 1997. 'n Fase 2 argeologiese ondersoek van 'n negentiende eeuse Matabeledorp binne die beoogde Noordsigwoonbuurt van Rustenburg. (Medewerkers: M. Hutten, S. Gaigher, P. Birkholtz en W. Fourie). Verslag voorberei vir EVN Projektebestuur, die Oorgangsraad van Rustenburg en Fox Lake & Machouse Ontwikkelaars.

- Pistorius, J.C.C. 1997. Survey of Mmatshetshele on Tweedepoort (283JQ) in the Rustenburg district of the North West Province: Archaeological assessment for the Vaalkop Southern Regional Water Supply Scheme. Report prepared for Walmsley Environmental Consultants, EVN Consulting Engineers, Magalies Water & National Monuments Council.
- Pistorius, J.C.C. 1997. Mmatshetshele, a settlement from the difaqane or pre-difaqane period on the farm Tweedepoort (283JQ) in the Rustenburg district of the North-West Province: Results of a Phase II archaeological investigation for the Vaalkop Southern Regional Water Supply Scheme. Report prepared for EVN Consulting Engineers, Magalies Water & the National Monuments Council.
- Pistorius, J.C.C. 1997. Proposal for archaeological survey and assessment in the Bankeveld: new Buffelschrome/Modderspruit substations and 88/22/11Kv interconnections. Report prepared for the Network Services Manager, Eskom: Rustenburg. (24pp).
- Pistorius, J.C.C. 1997.A Phase I archaeological survey and assessment for Eskom's new Buffelschrome/Modderspruit substations and 88/22/11Kv interconnections. Report prepared for the Network Services Manager, Eskom: Rustenburg.
- Pistorius, J.C.C. 1997.The archaeological potential of Boschkoppie (104JQ) in the Rustenburg district of North West: An impact and assessment report for Amplats' platinum mine. Report prepared for North West Environmental Consultants and Amplats.
- Pistorius, J.C.C.1997. A Phase I archaeological survey on the farm Hartebeespoort B 410 JQ in the Brits district: establishing a cultural heritage management programme for Nyala Granite in collaboration with an archaeological enterprise. Unpublished report for North West Environmental Consultants and Nyala Granite.
- Pistorius, J.C.C. 1997. Results of a Phase I archaeological survey of the 88 kV transmission line corridor and stand for the Marikana substation in the Rustenburg district of the North West Province. Unpublished report for the Network Services Manager, Eskom: Rustenburg.
- Pistorius, J.C.C. 1998. Archaeological survey and assessment of the Taylor mining area on the farm Tweedepoort (283JQ) in the Rustenburg district. Addendum to the Environmental Management Programme Report done for Kudu Granite. Report prepared for Kudu Granite.
- Pistorius, J.C.C.1998. Archaeological survey and assessment of the Schaapkraal mining area in the Rustenburg district. Addendum to the Environmental Management Programme Report done for Kudu Granite. Report prepared for Kudu Granite.
- Pistorius, J.C.C.1998. A Phase I archaeological investigation of the PWV9 highway between Van Der Hoff Road and Church Street, Pretoria. Report prepared for Van Riet and Louw.
- Pistorius, J.C.C. 1998. A Phase I archaeological survey of the Eugene Marais Park in Groenkloof, Pretoria. Report prepared for Cave and Clapwijk.
- Pistorius, J.C.C. 1998. A Phase I archaeological survey for Eskom's 88kV transmission line upgrade from Ontgin substation (Rooikoppiesdam) to Vaalkop pump substation, North West Province. Unpublished report prepared for Eskom's Network Services Manager, Rustenburg
- Pistorius, J.C.C. 1998. A Phase I archaeological survey for Eskom's Adis powerstation, 132kV transmissionline corridor and transmission line corridor between Bighorn (Marikana) and Adis powerstation (Brits). Unpublished report prepared for Eskom's Transmission Group, Megawattpark.
- Van Schalkwyk, J.A. 1994. A survey of archaeological and cultural historical resources in the Amandelbult mining lease area. Unpublished report 94KH03. Pretoria: National Cultural History Museum.
- Van Schalkwyk, J.A. 2003. A survey of archaeological sites for the Amandelbult Platinum Mine Seismic exploration program. Unpublished report 2003KH16. Pretoria: National Cultural History Museum.

- Van Schalkwyk, J.A. 2004. Heritage impact report for the Amandelbult electricity sub-transmission lines, Amandelbult Platinum Mine, Limpopo Province. Unpublished report 2004KH32. Pretoria: National Cultural History Museum. Van Schalkwyk, J. 2007. Survey of heritage resources in the location of the proposed Merensky Mining Project, Amandelbult Section, Rustenburg Platinum Mine, Limpopo Province. Prepared For WSP Environmental.

Of particular interest to this assessment and findings are the following previous AIAs conducted for the Tharisa Mine in the and the surrounding regions:

- Pistorius, J.C.C. 2007. A Phase I Heritage Impact Assessment (HIA) on Kafferskraal 342 and Elandsdrift 467 near Marikana for the proposed new Tharisa Minerals Mine, North West Province. Unpublished report prepared for Tharisa Mine.
- Motswene, T. 2017. A Phase I Heritage Impact Assessment (HIA) for the proposed development of a crusher plant on Portion 233 of Kafferskraal 342, North West Province. Mandara Consulting. Unpublished report prepared for Tharisa Mine.
- CTS, 2022. Tharisa Minerals EMPr EA and WML Amendments – for the proposed increase of TSF storage capacity via self-raising the walls of TSF2 & TSF 2 extension; and conversion of West Waste Rock Dump 1 Extension into TSF3 at west mine. CTS Heritage. Unpublished report prepared for Tharisa Mine.

6.1.2 Remote Sensing

Aerial photography is often employed to locate and study archaeological sites, particularly where larger scale area surveys are performed. The site assessment of the project property 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. Similar to the aerial survey, the site assessment of the target farm relied heavily on archive and more recent map renderings of the property to assist the challenging 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.

6.1.3 Site Surveys

Archaeological survey implies the systematic procedure of the identification of archaeological sites. An archaeological survey of the Tharisa Mine TSF3 WRD Extension 1 Project area was conducted over a one-day period in April 2023. 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. 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.

6.2 ASSUMPTIONS AND LIMITATIONS

The site survey for the Tharisa Mine TSF3 WRD Extension 1 Project HIA proved to be 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:

- The surrounding vegetation in the project area mostly comprises occasional grassland, farmlands vegetated by occasional trees and mixed grasslands. Visibility and free movement as a result of dense surface cover proved to be a constraint in certain portions of the project area.
- 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.

7 THE HERITAGE BASELINE ENVIRONMENT

7.1 ARCHAEOLOGY AND THE CULTURAL LANDSCAPE

Archaeology in Southern and Central 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.

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 Central and 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	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, traders, settlers and explorers	Remains of historical structures e.g. homesteads, missionary schools etc. as well as, glass, porcelain, metal and ceramics.

The history of the western North West Province is reflected in a rich archaeological landscape. The interaction between the climate, geology, topography, and the fauna and flora in the Bankeveld 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 presumably Batswana groups, who practised herding, agriculture, metal working and trading, found a suitable living environment during the Late Iron Age times at around AD 1500-1800. It was here that their chiefdoms flourished. The settlements of these early Batswana chiefdoms are characterised by an impressive and elaborate stone-built tradition. Hundreds of sites were built along the bases of the granite hills. 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) European farmers, settling in the area since the middle of the 19th century, divided up the landscape into a number of farms. In recent years an urban element developed, expanding at a rapid rate, largely as a result of mining development in the region.

7.1.1 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 at 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. Oldowan and Acheulian artefacts were also found four to five decades ago in some of the older gravels (ancient river beds and terraces) of the Vaal River and the Klip River in Vereeniging. The earliest ancestors of modern man may therefore have roamed the Vaal valley at the same time that their contemporaries occupied some of the dolomite caves near Krugersdorp. 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. The Late Stone Age commenced twenty thousand years ago or somewhat earlier. The various types of Later Stone Age industries scattered across the country are associated with the historical San and Khoi-Khoi people. The San were renowned as formidable hunter-gatherers, while the Khoi-Khoi herded cattle and small stock during the last two thousand years. Late Stone Age people manufactured tools that were small but highly effective, such as arrow heads and knives.

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. Stone Age material generally occurs along drainage lines and exposed surfaces in the landscape. Stone Age communities well adapted to such climates and ecological niches proliferated into skilled hunter and gatherer bands and probably established themselves over large areas of the Central Bankeveld. Stone Age sites occur in rock shelters and in cave sites in the Magaliesberg.

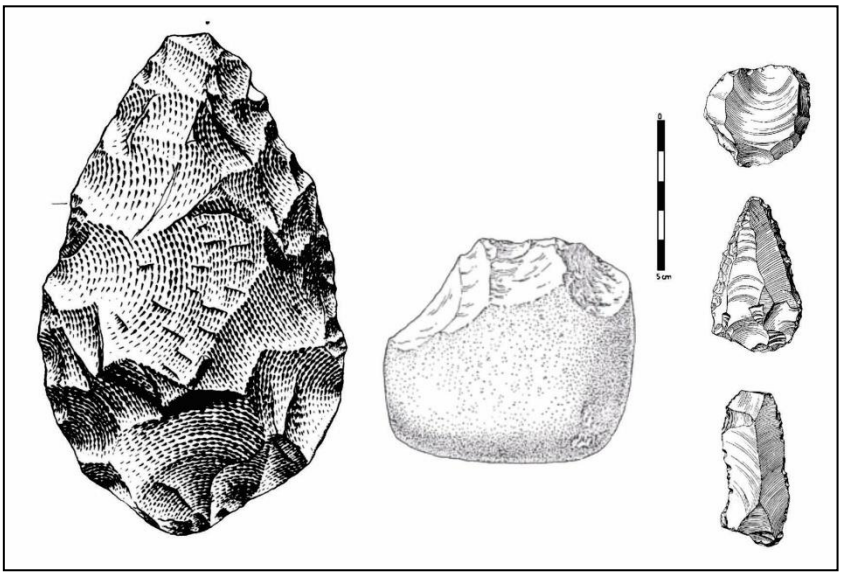

Figure 7-1: Typical ESA handaxe (left) and cleaver (center). To the right is a MSA scraper (right, top), point (right, middle) and blade (right, bottom).

7.1.2 Iron Age Farmers

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.

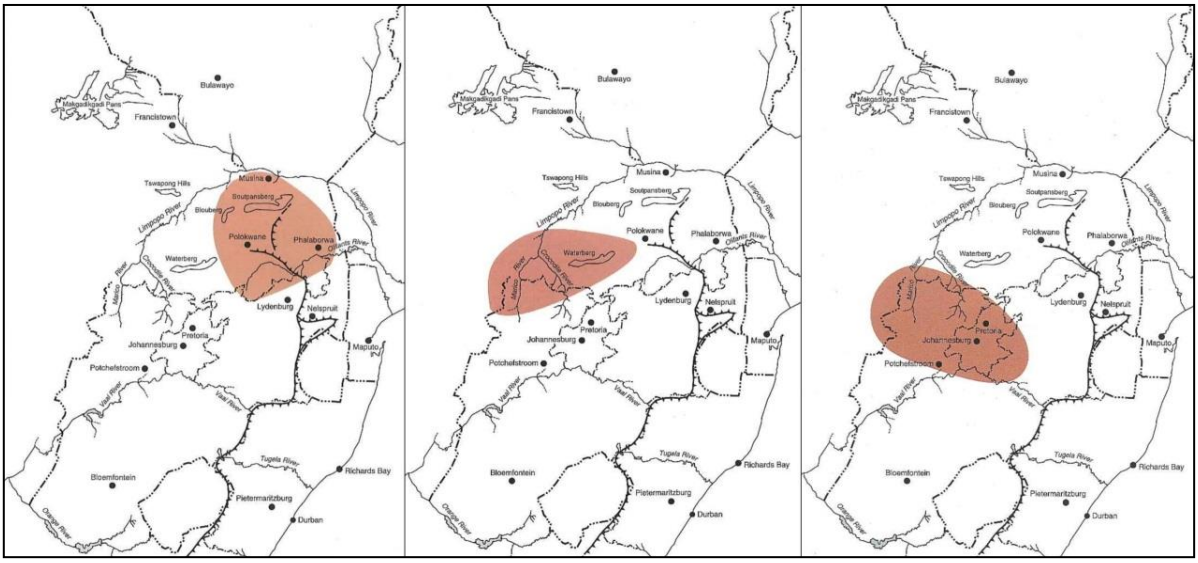

Figure 7-2: Map detailing the distribution of 16th century Moloko (left), 17th century Madikwe (centre) and 18th century Buispoort tradition sites (After Huffman 2007).

Figure 7-3: 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. The study areas fall within a sphere of influence that was occupied by the Bafokeng people who entered the area, according to oral tradition, during the early 17th century. The Bafokeng's royal lineage, however, settled south of Boschhoek at Phokeng. The Bafokeng gradually extended their influence and presence in this area as far north as the Elandsriver, south and west towards to the Magaliesberg and east towards the granite hills that separate Marikana from Rustenburg. Batswana clans such as the Batlokwa, Bakgatla and the Bathlako occupied the Pilanesberg further to the north while the Bakwena Bamodimosasa chiefdoms of Mmatau and Ramanamela occupied the mega stone walled complexes known as Molokwane and Bôitsemagano to the west of the Magaliesberg. Numerous pre-difaqane

and difaqane wars took place in the Central Bankeveld during the last quarter of the 18th century and the first three decades of the 19th century. These wars led to the displacement of large numbers of Batswana in the Bankeveld. Refugee sites occupied by displaced became a common sight. The Matabele of Mzilikazi caused chaos and havoc in the Bankeveld. The Matabele established several settlement complexes in this region from whence they maintained a grip on the indigenous population. One of these Zulu/Nguni residences (imisi) and military kraals (amakhanda) was discovered during an archaeological survey in 1997 in the newly developed Thlabane-West suburb, north of Rustenburg. The Matabele must have intermarried with the Bafokeng. One of Mzilikzazi's sons, Nkulumane, was buried in Phôkeng. His grave is today wrongly indicated as 'Mzilikazi's grave' in Phôkeng's main street. The Late Iron Age history of the Rustenburg and Boschhoek areas was complex and is not fully recorded in oral traditions or in any other records. This history can therefore only be unravelled by means of the methods and theory associated with archaeological research. The discontinuous nature of the northern tip of the Magaliesberg near the study area was important for the movement of people such as traders between the Western Bankeveld and the Central Bankeveld. During the first half of the 19th century and decades thereafter, this part of the mountain served as a trail through which wagons passed on their way to Rustenburg and the eastern parts of the Central Bankeveld. Traders such as Schoon and McLuckie (1829), who were the first white people to visit the area north of the Magaliesberg, missionaries such as Robert Moffat (1829), scientists such as Andrew Smith (1835) and the adventurer Cornwallis Harris (1836) trekked through the Magaliesberg (and over the farm Boschhoek) on their way to the eastern part of the Central Bankeveld, where some of them visited Mzilikazi of the Matabele (Ndebele), who occupied at least three villages complexes in the region. The largest and most important towns and villages close to SA Chrome's planned smelter site are the towns of Phôkeng, Rustenburg and Thlabane, located to the south of Boshoek. The towns of Bala and Chuane are located to the north-east of the planned smelter site. The town of Phôkeng came into being when the Bafokeng established themselves, according to oral tradition, at a place called 'Phôka' during the early decades of the 17th century. ('Phôka' is a type of wild grass the people ate during a time of famine). Later Bafokeng rulers reigned between the Magaliesberg in the west and the Thaba ea Maralla range of mountains to the east.

7.1.3 The Cultural Landscape

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. Rustenburg is the third oldest town established by Colonials or Voortrekkers in the former Transvaal area during the first half of the 19th century. The town was proclaimed by the governor of the Zuid-Afrikaanse Republiek in September 1851. The Transvaal Volksraad met in the town in 1852 and important decisions relating to the church and state were taken in the town. Rustenburg also served

as the seat for the Zuid-Afrikaanse Republiek before Pretoria became the capitol. Farming communities have settled in the landscape at the beginning of the 20th century.

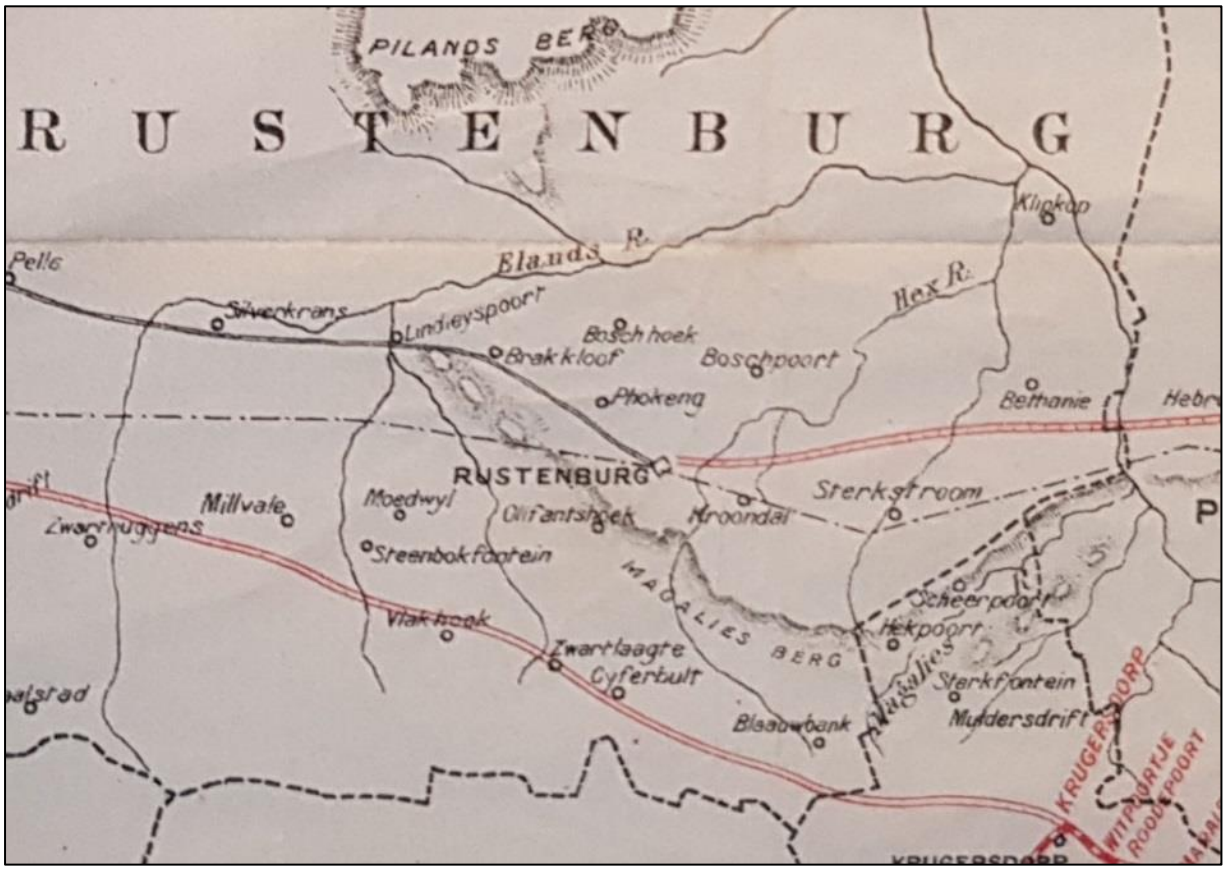

Figure 7-4: Troye's "New Railway and Postal Map" in the Transvaal Colony c. 1899 with Kroondal and the Marikana area encircled in yellow.

Kroondal, situated on a farm originally known as Kronendal, was one of 22 German Lutheran mission congregations established in the former Natal and Transvaal. Kronendal had been in existence since 1843 and the farm was first surveyed by riding 1 hour in each direction resulting in a farm of approximately 2500 hectare. In 1858 the farm was allocated as a 'pachtplaas' to Lutheran Missionary Pastor Christian Müller. Jan Michiel van Helsdingen registered the farm to his name. Pastor Christian established the church on the farm – then known as – Kronendal. The farm Kronendal was one of 22 German Lutheran mission congregations. The families du Plessis, Riekert and Malan who where relatives of van Helsdingen, occupied the farm until 1877 when they all moved to the Koster region where their descendants can still be found. It was in 1889, when the missionary was suffering financially, that the local Germans bought the Kronendal farm. This is when it became, as we in Rustenburg know it today, to be Kroondal. The farm was divided into residential plots and the typical German zing Kroondal has today, came to be. During 1878 a rift accrued in the Ramakoka tribe who lived in Phalane approximately 100 km north of Kroondal and missionary Christian Müller, who was with the Ramakoka tribe, arranged that a portion of the tribe bought Kroonendal for 5000 pounds and settled there. The Ramakoka tribe could not repay the debt or the interest and decided to sell the farm for 5100 pounds and move back to Phalane, as the inter-tribe problem had been settled. Concerned for the local people that were being forced off their land by the Boers, Pastor Ferdinand Zimmerman tried to purchase Kroondal under the name of the missionary as to provide a safe place where the locals could stay. The idea though was not met with political agreement and the lack of funds made it difficult for the attainment of the land. Georg Wilhelm Otterman was one of the German immigrants that came to Kroondal and began farming with tobacco, wheat and maize. It was in 1889 that Kroondal saw a mill taking shape on Otterman's farm. The mill was relocated to Sandspruit where the

Modderspruit's water could offer more power to the wheel. During the Boer War, Georg Otterman and his family were relocated to the concentration camp of Irene. It was during that time that the British took the bearing of the mill and by the time Otterman and his family returned to his farm in 1902, there wasn't anything left. Agriculture continued to be the central theme in Kroondal but many properties were consolidated or leased and today there are only 5 active farmers compared to the 15 active farmers 40 years ago.

The town of Marikana was laid out in 1870 on the farm Rooikoppes, and the settlement later expanded into seven white-owned farms. In 1933, the Buffelspoort Dam was built, allowing the local farmers to irrigate their crops. The farming community grew in the 1960s on the back of lucrative tobacco farming, but other diversified farming practices i.e. cattle, maize, chillies, paprika, soya, lusern and sunflower amongst the main groups was the main economic driver of the area. In the 1970s mining was introduced and grew to become the main industry in the region.

8 FINDINGS AND RESULTS

8.1 ARCHAEOLOGY AND THE CULTURAL LANDSCAPE

8.1.1 Desktop Appraisal

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 as well as Industrialization of the past century. An HIA conducted by Pistorius (2007)[1] for the proposed Tharisa Mine development documented the following heritage resources:

- Stone walled settlements which date from the Late Iron Age.
- Historical structures such as farm houses with outbuildings, agricultural infrastructure and the van Rensburg School (now called the Retief Primary School).
- At least six graveyards.
- Objects with heritage significance such as outdated and discarded agricultural implements.

One of the graveyards documented by Pistorius is indicated to occur in the Tharisa Mine TSF3 WRD Extension 1 Project site (see discussion in Section 8.1.2).

Figure 8-1: View of a cemetery and building remains noted by Pistorius (2007) outside the project area in the larger landscape.

[1] Pistorius, J.C.C. 2007. A Phase I Heritage Impact Assessment (HIA) on Kafferskraal 342 and Elandsdrift 467 near Marikana for the proposed new Tharisa Minerals Mine, North West Province. Unpublished report prepared for Tharisa Mine

An analysis of historical aerial imagery and archive maps of the project area reveals the following (see Figure 5-2 to Figure 5-6):

- Farm 342, originally known as “Kafferskraal” is indicated on the South African War Map (1899-1902) of the Rustenburg area dating to 1900 as well as Jeppe’s Map of the Transvaal (1899).
- Historical farming and agriculture fields as well as dwellings and man-made structures are legible on aerial imagery dating to 1932, 1949 and 1970 in areas subject to this assessment.
- Large portions of the project area seem to have been used as agricultural lands as indicated on topographic maps dating to 1969, 1985 and 1996.
- A number of buildings, presumably farmsteads and so-called “huts” are indicated on topographic maps of the project area dating to 1969, 1985 and 1996.
- Two farmsteads in the project area were demolished in the past decade as is evident from Google Earth imagery.

8.1.2 Site Survey Findings

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 possibly sterilising the area of heritage remains. This inference was confirmed during an archaeological site assessment but *in situ* heritage remains were encountered. The following observations were made during the site survey.

TWRD-HP01 (Built Environment Remains)

S25.746796° E27.483875°

TWRD-HP02 (Built Environment Remains)

S25.747504° E27.483681°

Farm 342

Field Rating: 2a. Low Significance

The ruined remains of two Historical Period farmsteads consisting of a number of concrete and brick foundation structures, building rubble and material culture such as glass, metal, plastic were noted in the project area. An absolute temporal context for the farmsteads could not be ascertained but they seem to appear on archive aerial photographs (1932, 1949 and 1970 as well as 2005) and historical topographical maps (1968, 1985 and 1996). The sites are older than 60 years - and generally protected under the National Heritage Resource Act (NHRA 1999) but building structures and features are either lost or poorly preserved and no notable heritage or historical association could be established. The site occurs within the proposed project and impact is likely where potential direct impacts to the site should be monitored.

Figure 8-2: View of building rubble and general surroundings at site TWRD-HP01.

Figure 8-3: View of an old access road and foundation structures at site TWRD-HP02.

TWRD-BP01 (Burial Site) (Site GY05 – Pistorius 2007)

S25.747182° E27.481989°

Farm 342

Field Rating: 4b. High significance (to be confirmed)

Pistorius documented a small "unmarked" cemetery in the project area (coded "GY05") in an HIA for the Tharisa Mine conducted in 2007. No photographs are provided and he described the cemetery as follows:

> "Graveyard 05 contains the remains of four members of the van Rensburg family. One grave is fitted with a simple headstone made from bricks while two others graves are fitted with small slate headstones. These head stones contain no inscriptions. All four graves are covered with stones."

This burial site could not be located during the site survey subject to the current assessment. Upon enquiry, the Tharisa Environmental Officer indicated that all graves within mining areas had previously been relocated. However, confirmation of the relocation of the cemetery will be required in order to ensure that human remains are not damaged or lost. Should it be established that the burials were not relocated, potential direct impacts to the site should be mitigated and monitored (see Section 10).

Figure 8-4: View of site where Pistorius documented a cemetery in 2007 (TWRD-BP01).

TWRD-FT01 (Built Environment Remains)

S25.747449° E27.481805°

Farm 342

Field Rating: No significance

A partially intact concrete building foundation structure was noted in the project area. An absolute age for the structure could not be ascertained but the buildings do not appear on historical topographical maps and aerial photographs and the site is probably of more recent age. The structure remains are therefore not of heritage significance.

Figure 8-5: View of a building floor and foundation structure in the project area at TWRD-FT01.

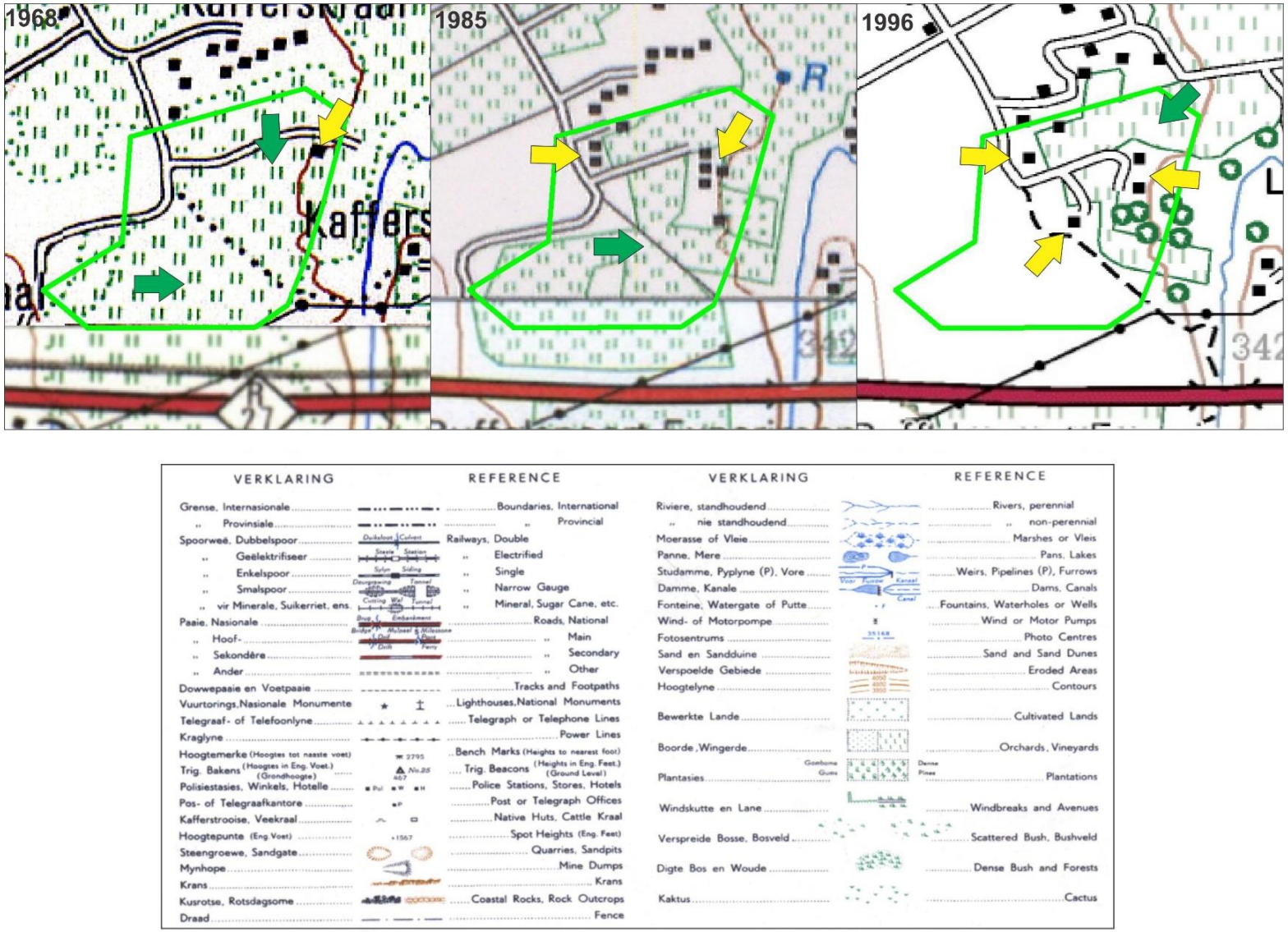

Figure 8-6: Historical topographic maps of the project area (green outline). Farmsteads and so-called "huts" are indicated by the yellow arrows and cultivated land is indicated with the green arrows.

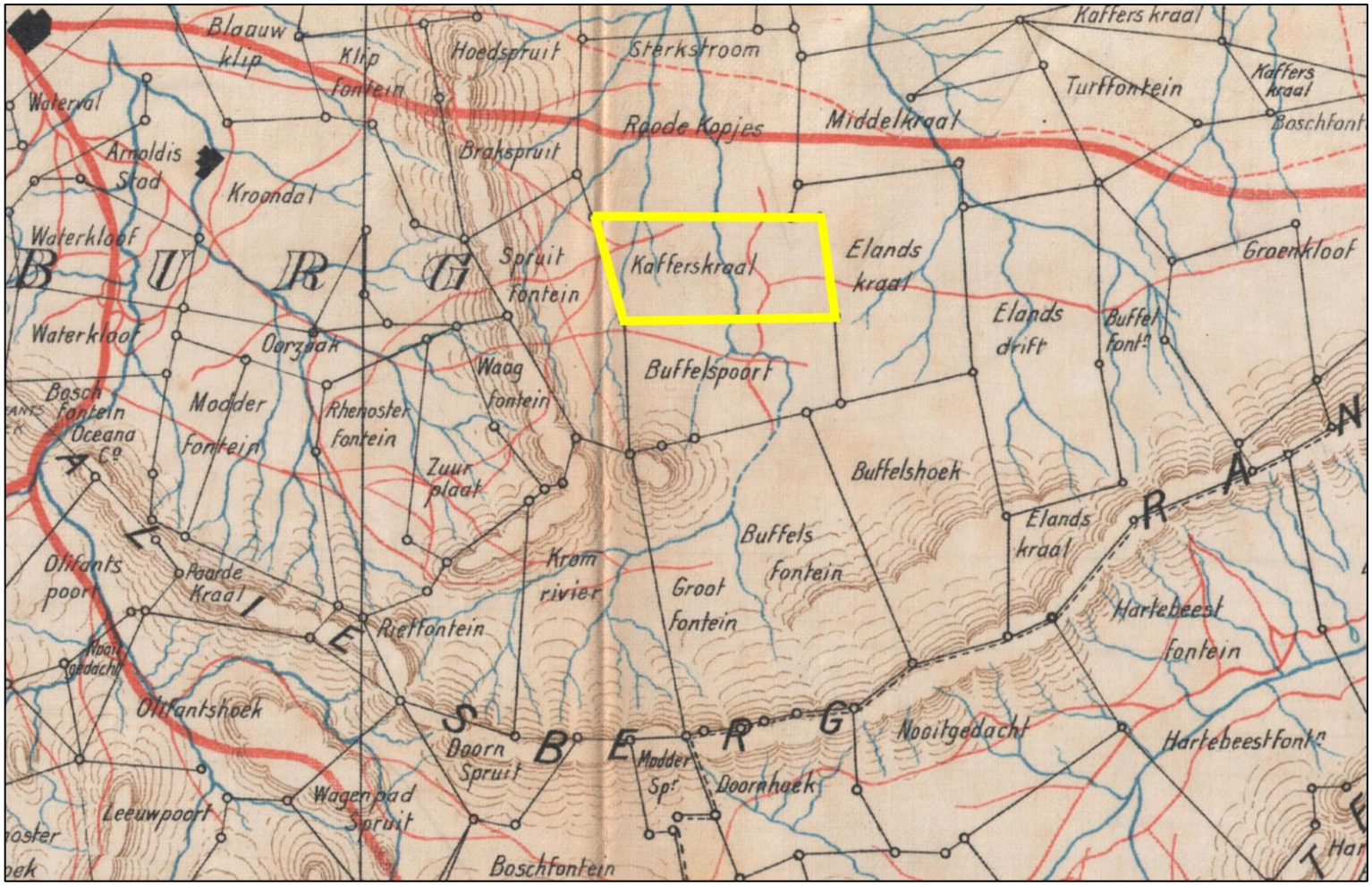

Figure 8-7: The South African War Map (1899-1902) of the Rustenburg area dating to 1900. The then farm "Kafferskraal" is indicated by the yellow polygon.

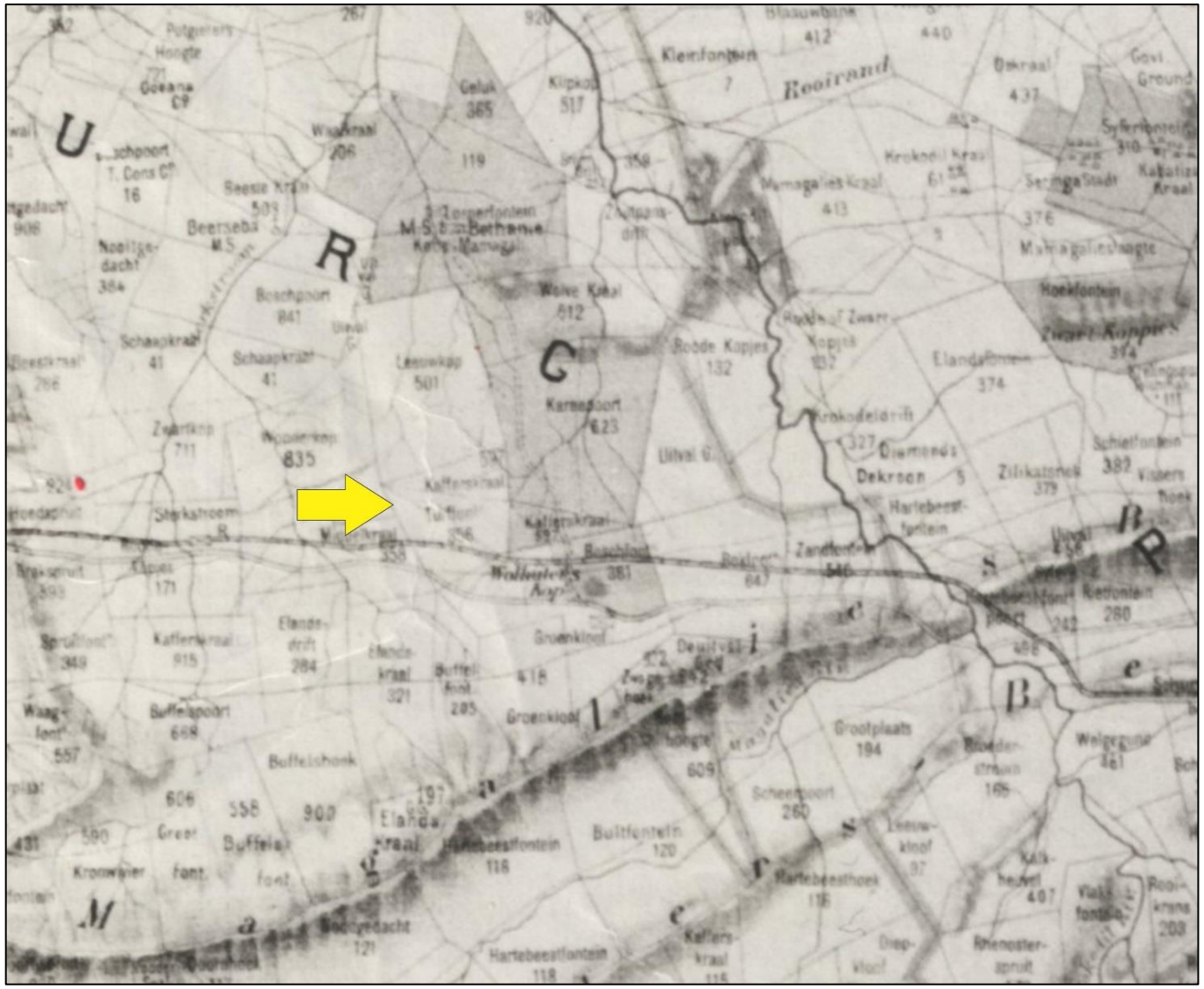

Figure 8-8: Jeppe's Map of the Transvaal dating to 1899 with the location of the then farm "Kafferskraal" indicated by the yellow arrow.

Figure 8-9: An aerial image of the project area (yellow polygon) dating to 1932 indicating the presence of agriculture activities (green arrow) and potential man-made structures or features of heritage potential (yellow arrow).

Figure 8-10: An aerial image of the project area (yellow polygon) dating to 1949 indicating the presence of extensive agriculture activities (green arrows) and potential man-made structures or features of heritage potential (yellow arrow).

Figure 8-11: An aerial image of the project area (yellow polygon) dating to 1970 indicating the presence of extensive agriculture activities (green arrows) and potential man-made structures or features of heritage potential (yellow arrow).

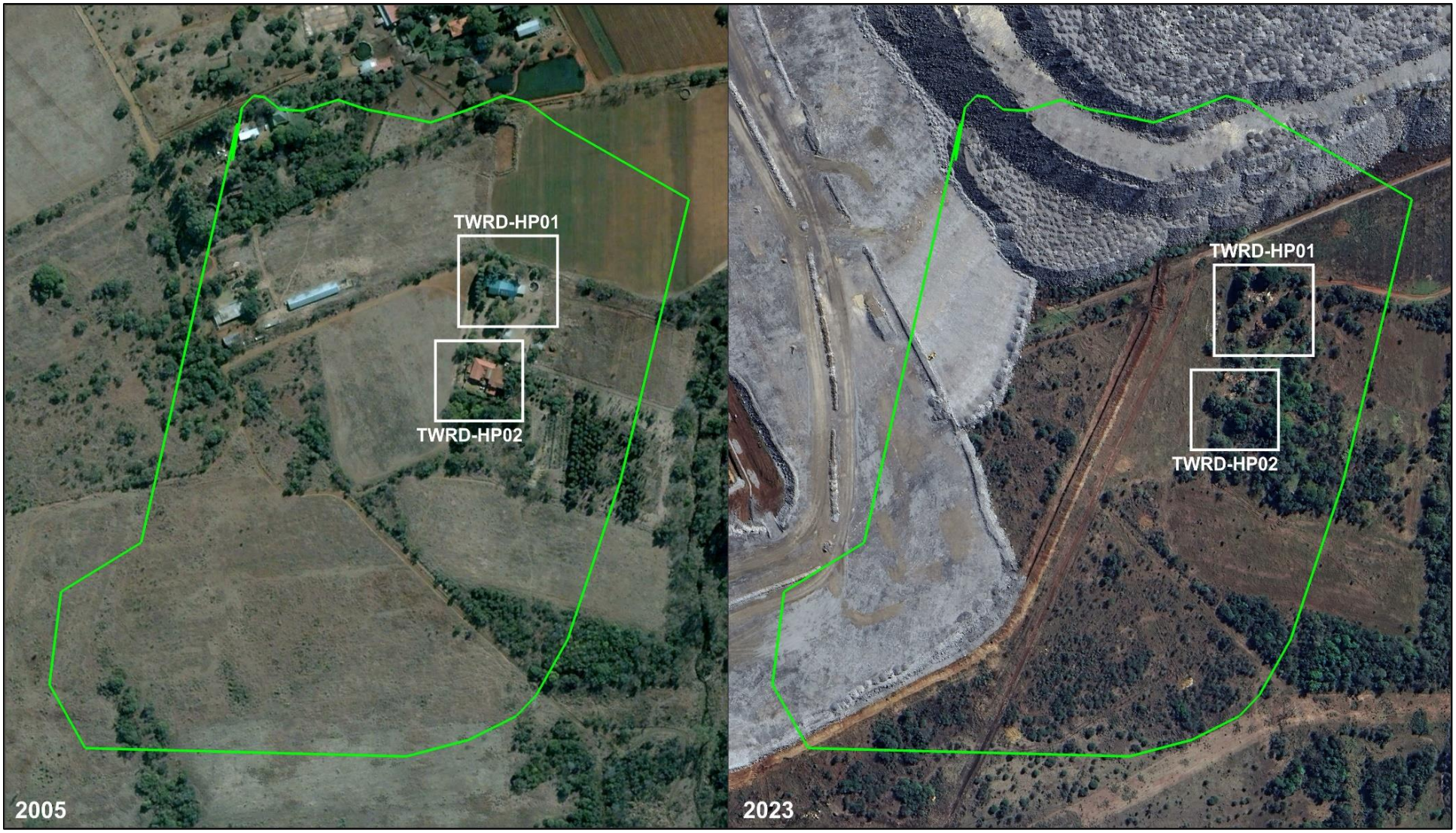

Figure 8-12: Google Earth imagery indicating transformation of the project area by mining in the last decade. Note the disappearance of the farmstead buildings at TWRD-HP01 and TWRD-HP02.

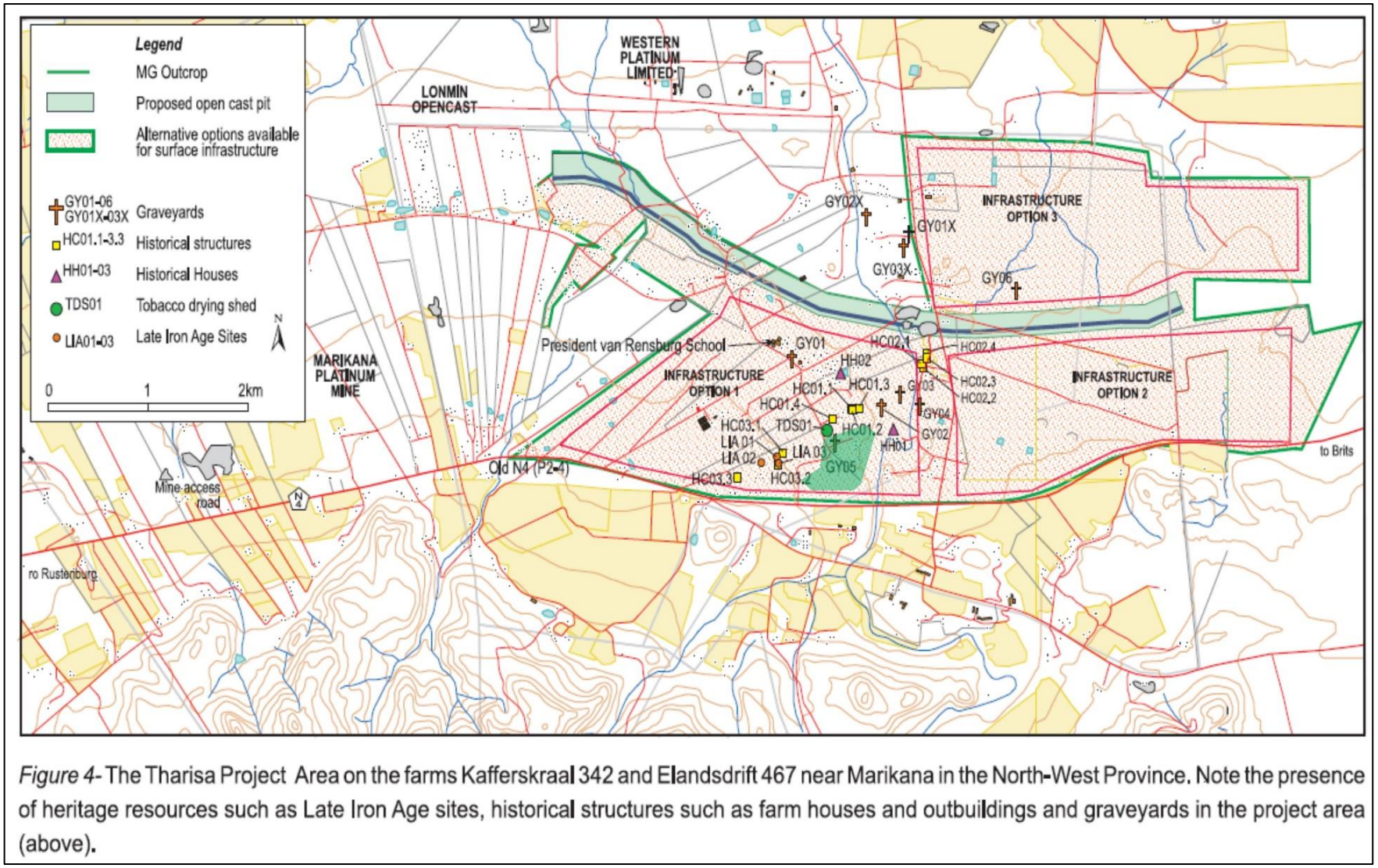

Figure 4- The Tharisa Project Area on the farms Kafferskraal 342 and Elandsdrift 467 near Marikana in the North-West Province. Note the presence of heritage resources such as Late Iron Age sites, historical structures such as farm houses and outbuildings and graveyards in the project area (above).

Figure 8-13: Map of heritage sites documented by Pistorius (2007). The footprint area of the Tharisa Mine TSF3 WRD Extension 1 Project is shaded in green. Note the presence of burial site "GY05" within the project area.

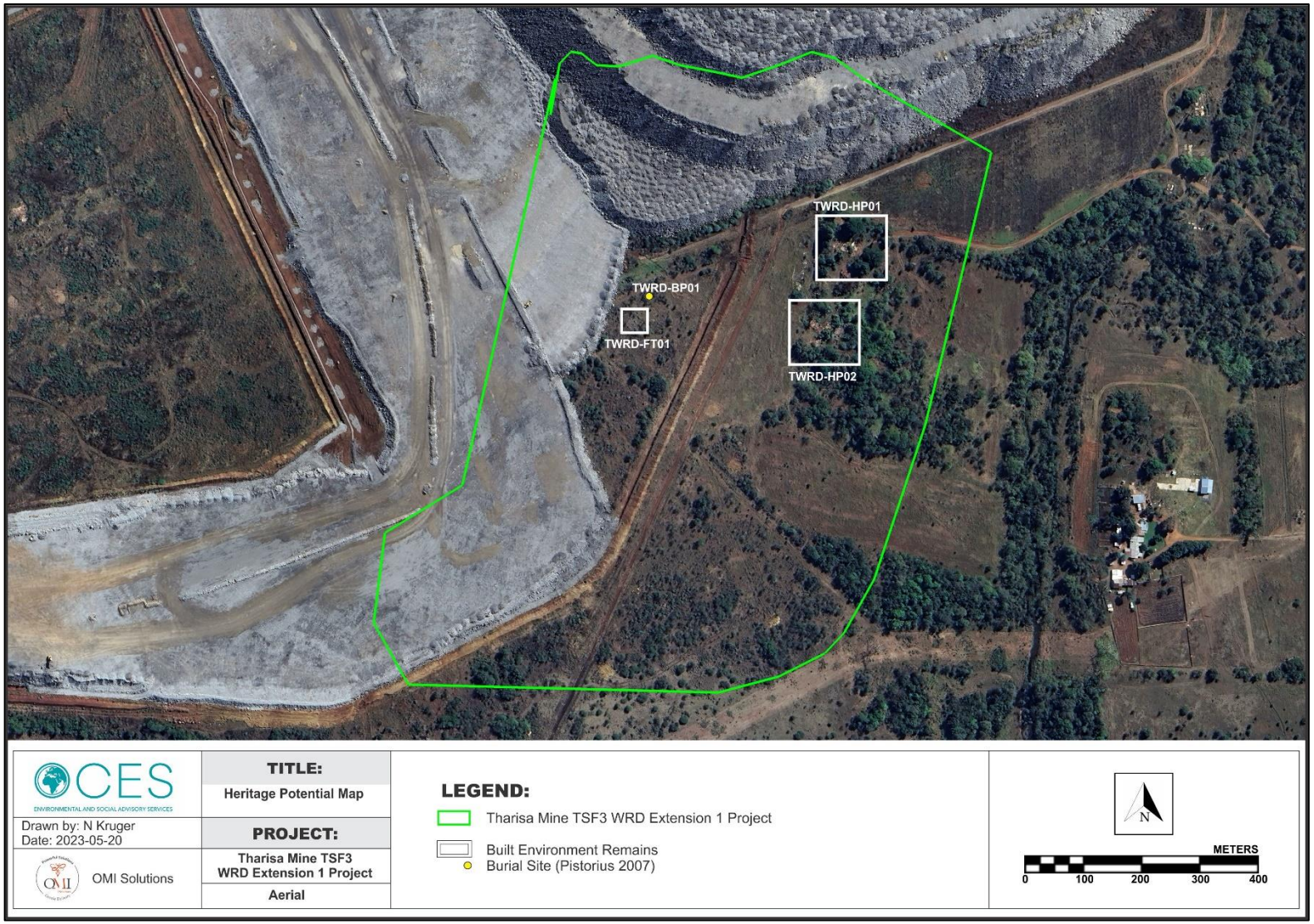

Figure 8-14: An aerial image of indicating the locations of heritage sites and features discussed in the text.

9 EXPECTED HERITAGE IMPACTS OF THE PROJECT

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. 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 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. The following section provides a background to the identification and assessment of possible direct and indirect 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 Addendum 3.

9.1 PRECONSTRUCTION PHASE

Heritage risks and impacts are commonly associated with construction activities and no impact on archaeological sites, built environment features, human burials and the cultural landscape is foreseen during the preconstruction phase. However, some management actions will require actioning during this phase, particularly the confirmation of the relocation status of the burial site (TWRD-BP01) prior to the commencement of construction. Should it be established that the burial sites were not relocated, site management measures or full grave relocation procedures should be initiated during the preconstruction phase.

9.2 CONSTRUCTION PHASE

Construction activities pose the greatest threat to tangible heritage resources within the cultural landscape and it is often during this Phase that heritage sites are lost. Large portions of the project area and the baseline environment have been affected by historical, recent and ongoing farming and mining activities which possibly sterilized the landscape from prehistorical archaeological and other remnants. However, previously undetected cultural (archaeological) layers are usually superficial, subsoil layers and that makes them easily vulnerable to destruction and the likelihood for encountering additional cultural heritage sites as the land clearing process commences, or during construction of infrastructure should be considered. The remains of two Historical Period farmsteads (TWRD-HP01, TWRD-HP02) noted in the proposed project area will probably be impacted and the site will require monitoring during the construction phase. The cemetery at TWRD-BP01 - **if present** – will be impacted on by the project and a probable high impact on the site should be mitigated during the construction phase by means of a no-go development buffer (of the site is not relocated). It should be noted that graves and cemeteries do not only occur around farmsteads in family burial grounds but they are also randomly scattered around archaeological and historical settlements in the rural areas of the North West Province. The probability of informal human burials encountered during the construction phase should thus not be excluded. Generally,

Environmental Control Officer monitoring activities will be required throughout the construction phase of the project in order to avoid the destruction of previously undetected heritage sites and human burials.

9.3 Operations Phase

It is understood that no new areas will be disturbed and/or impacted during the operations phase of the project and the risk and severity of heritage impacts should decrease once the projects activate. Furthermore, the majority of sites of archaeological and heritage significance would have been recorded and/or assessed in preceding phases. However, impact on previously undetected arkeological sites, human burials and the cultural landscape might occur as a result of operational activities (site access, movement, maintenance, trespassing, natural elements, hazards etc). During the Operations Phase, the implementation of mitigation and management measures for the cemetery at TWRD-BP01 - **if present** – should be tracked and continuous ECO site monitoring will be required (should these site/s be retained).

9.4 Decommissioning and Post-closure Phase

The decommissioning phase will see the progressive downscaling and termination of operations. Similar to the Operations Phase, no new areas are expected to be disturbed and/or impacted and no additional sites of archaeological and heritage significance are expected to be impacted on during decommissioning. During the decommissioning and closure phase, it may be recommended that the ECO review management procedures (and particularly those recommended for sites TWRD-BP01, TWRD-HP01 and TWRD-HP01) and ensure that required measures were implemented.

9.5 Cumulative Impacts

It is the opinion of the Specialist that the proposed Tharisa Mine TSF3 WRD Extension 1 Project will have a little to negligible negative cumulative impact on the heritage value of the area for the following reasons:

- The absence of significant archaeological resources documented in the project area and in its immediate surroundings implies low-severity short and long-term impacts on the heritage landscape.
- The transformed nature of much of the project landscapes and the presence of mines and agricultural fields in development areas means that the character and significance of the landscape in terms of its heritage is bound not to change during the course of construction, operation and decommissioning of the project.
- The heritage context and sensitivity of the proposed development zones points to a landscape of limited heritage significance on a local level.
- It should be noted that archaeological knowledge and the initiation of research projects into significant archaeological sites often result from Heritage Impact Assessments conducted for developments. Provided that significant archaeological sites are conserved and that appropriate heritage mitigation and management procedures are followed, the cumulative impact of development can be positive.

9.6 Heritage Impact Assessment Matrix

The following table (Table 1) summarises impacts to the heritage landscape of the study area:

Table 1 Impact Assessment Matrix

Activity	Environmental Aspect	Potential Impact	Without or With Mitigation	Nature (Negative or Positive Impact)	Probability		Duration		Scale		Magnitude/ Severity		Significance		Management Measures	Management objective	Mitigation Effect	Potential for residual risk	Compliance with Standards (where applicable)
					Magnitude	Score	Magnitude	Score	Magnitude	Score	Magnitude	Score	Score	Magnitude					
Construction Phase																			
Surface alteration activities associated with the project development.	Buirial Sites / Graves (TWRD-BP01) **if site was not previously relocated.**	Damage/destruction of sites, potential loss of human burial sites.	WOM	Negative	Definite	5	Permanent	5	Local	1	High	8	70	High	**CONFIRM SITE STATUS:** Confirm relocated status of the burials during the preconstruction phase by means of the perusal of the necessary accompanying documents and heritage permits. **IF SITE HAS NOT BEEN RELOCATED AND IT IS TO BE RETAINED:** Avoidance: Redesign project infrastructure to avoid impact, implement a development no-go buffer of 50m (if site is retained) Site monitoring: Weekly monitoring during initial site clearing and earth moving activities by an ECO familiar with the sensitivity of receptors, or the Heritage Consultant. Monthly monitoring of the burial sites is recommended during subsequent stages of development. A Site Management Plan (SMP) and a 50m conservation buffer should be implemented. **IF SITE HAS NOT BEEN RELOCATED AND IMPACT IS TO OCCUR:** Site Impact Mitigation: Grave Relocation, permitting, social consultation (if impact is to occur).	Maintain and monitor impact on burial sites.	May cause irreplaceable loss of resources	No	National Heritage Resource Act No.25 of 1999, Government Gazette, Cape Town SAHRA, 2005. Minimum Standards for the Archaeological and the Palaeontological Components of Impact Assessment Reports, Draft version 1.4.
			WM	Negative	Definite	5	Permanent	5	Local	1	Low	2	40	Low			Can be avoided, managed or mitigated	No	National Heritage Resource Act No.25 of 1999, Government Gazette, Cape Town SAHRA, 2005. Minimum Standards for the Archaeological and the Palaeontological Components of Impact Assessment Reports, Draft version 1.4.

Surface alteration activities associated with the project development.	Built Environment Heritage Features (TWRD-HP01, TWRD-HP02)	Damage/destruction of sites.	WOM	Negative	Highly Probable	4	Short term	1	Local	1	Low	2	16	Negligible	General Site Monitoring in order to detect the presence of and limit impact on previously undocumented heritage receptors during construction / site clearing / earth moving.	Monitor potential destruction of previously undocumented heritage resources / burial sites,.	Can be avoided, managed or mitigated	No	National Heritage Resource Act No.25 of 1999, Government Gazette, Cape Town SAHRA, 2005. Minimum Standards for the Archaeological and the Palaeontological Components of Impact Assessment Reports, Draft version 1.4.
			WM	Negative	Probable	2	Short term	1	Local	1	Low	2	8	Negligible			Can be avoided, managed or mitigated	No	
Operational Phase																			
All activities associated with operations and mining.	Buirial Sites / Graves (TWRD-BP01) **if site was not previously relocated.**	Damage/destruction of sites, potential loss of human burial sites.	WOM	Negative	Improbable	1	Long term	4	Site	2	Low	2	8	Negligible	**IF SITE HAS NOT BEEN RELOCATED AND IT IS TO BE RETAINED:** Avoidance: Redesign project infrastructure to avoid impact, implement a development no-go buffer of 50m (if site is retained) Site monitoring: Weekly monitoring during initial site clearing and earth moving activities by an ECO familiar with the sensitivity of receptors, or the Heritage Consultant. Monthly monitoring of the burial sites is recommended during subsequent stages of development. A Site Management Plan (SMP) and a 50m conservation	Maintain and monitor impact on burial sites.	Can be avoided, managed or mitigated	No	National Heritage Resource Act No.25 of 1999, Government Gazette, Cape Town SAHRA, 2005. Minimum Standards for the Archaeological and the Palaeontological Components of Impact Assessment Reports, Draft version 1.4.

														buffer should be implemented.				
All activities associated with operations and mining.	Built Environment Heritage Features (TWRD-HP01, TWRD-HP02)	Damage/destruction of sites.	WOM	Negative	Probable	1	Long term	4	Site	2	Low	2	16	Negligible	General Site Monitoring in order to detect the presence of and limit impact on previously undocumented heritage receptors during construction / site clearing / earth moving.	Monitor potential destruction of previously undocumented heritage resources / burial sites,.	May cause irreplaceable loss of resources	No	National Heritage Resource Act No.25 of 1999, Government Gazette, Cape Town SAHRA, 2005. Minimum Standards for the Archaeological and the Palaeontological Components of Impact Assessment Reports, Draft version 1.4.
			WM	Negative	Improbable	2	Long term	4	Site	2	Low	2	8	Negligible			Can be avoided, managed or mitigated	No	
Closure and Post closure																			
All activities associated with closire and post closure of the mine.	Buirial Sites / Graves (TWRD-BP01) **if site was not previously relocated.**	Damage/destruction of sites, potential loss of human burial sites.	WOM	Negative	Improbable	1	Long term	4	Site	2	Medium	6	12	Negligible	**IF SITE HAS NOT BEEN RELOCATED AND IT IS TO BE RETAINED:** Avoidance: Redesign project infrastructure to avoid impact, implement a development no-go buffer of 50m (if site is retained) Site monitoring: Weekly monitoring during initial site clearing and earth moving activities by an ECO familiar with the sensitivity of receptors, or the Heritage Consultant. Monthly monitoring of the burial sites is recommended during subsequent stages of development. A Site Management Plan (SMP)	Maintain and monitor impact on burial sites.	Can be avoided, managed or mitigated	No	National Heritage Resource Act No.25 of 1999, Government Gazette, Cape Town SAHRA, 2005. Minimum Standards for the Archaeological and the Palaeontological Components of Impact Assessment Reports, Draft version 1.4.
			WM	Negative	Improbable	1	Long term	4	Site	2	Medium	6	12	Negligible			Can be avoided, managed or mitigated	No	

														and a 50m conservation buffer should be implemented.					
All activities associated with closire and post closure of the mine.	Built Environment Heritage Features (TWRD-HP01, TWRD-HP02)	Damage/destruction of sites.	WOM	Negative	Probable	2	Long term	4	Regional	3	Low	2	18	Negligible	General Site Monitoring in order to detect the presence of and limit impact on previously undocumented heritage receptors during construction / site clearing / earth moving.	Monitor potential destruction of previously undocumented heritage resources / burial sites,.	Can be avoided, managed or mitigated	Yes	National Heritage Resource Act No.25 of 1999, Government Gazette, Cape Town SAHRA, 2005. Minimum Standards for the Archaeological and the Palaeontological Components of Impact Assessment Reports, Draft version 1.4.
			WOM	Negative	Probable	2	Long term	4	Regional	3	Low	2	18	Negligible			Can be avoided, managed or mitigated	No	

10 HERITAGE MANAGEMENT

10.1 HERITAGE SITE MANAGEMENT

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 Burial Site of high significance **(TWRD-BP01)** the following are required in terms of heritage management and mitigation:*

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**	**PROJECT COMPONENT/S**
CONFIRM SITE STATUS: Confirm relocated status of the burials during the preconstruction phase by means of the perusal of the necessary accompanying documents and heritage permits.	CLIENT, ECO	**Pre-Construction**
IF SITE HAS NOT BEEN RELOCATED AND IT IS TO BE RETAINED: **Conservation:** Demarcate a 50m no-go development buffer with a fence or permanent construction barricade. Redesign placement of monopoles, pylons, service roads and other infrastructure to avoid the burial site and the no-go buffer.	ECO, HERITAGE ASSESSMENT PRACTITIONER	**Pre-Construction**
IF SITE HAS NOT BEEN RELOCATED AND IMPACT IS TO OCCUR: **Site Impact Mitigation:** Grave Relocation, permitting, social consultation (if impact is to occur).	HERITAGE ASSESSMENT PRACTITIONER	**Pre-Construction**
IF SITE HAS NOT BEEN RELOCATED AND IT IS TO BE RETAINED: **Site Monitoring:** Monitor the 50m no-go development buffer in order to detect potential impact on the site at the earliest opportunity. ***General Site Monitoring in order to detect the presence of and limit impact on previously undocumented heritage receptors during construction / site clearing / earth moving.***	ECO	**Construction**
IF SITE HAS NOT BEEN RELOCATED AND IT IS TO BE RETAINED: **Site Monitoring:** Monitor the 50m no-go development buffer in order to detect potential impact on the site at the earliest opportunity. ***General Site Monitoring***	ECO	**Operation**

Site Monitoring: Monitor the 50m no-go development buffer in order to detect potential impact on the site at the earliest opportunity. **Close-Out Reporting:** ECO review management procedures and ensure that effective measures were implemented.	ECO, HERITAGE ASSESSMENT PRACTITIONER	**Closure / Decommissioning**
PERFORMANCE INDICATOR	Archaeological sites are discovered and mitigated with the minimum amount of unnecessary disturbance.	

*For the Historical Period sites of low significance **(TWRD-HP01, TWRD-HP02)** within the project area the following are required in terms of heritage management and mitigation:*

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**	**PROJECT COMPONENT/S**
General Site Monitoring in order to detect the presence of and limit impact on previously undocumented heritage receptors during construction / site clearing / earth moving.		ECO	**Construction**
General Site Monitoring		ECO	**Operation**
Close-Out Reporting: ECO review management procedures and ensure that effective measures were implemented.		ECO, HERITAGE ASSESSMENT PRACTITIONER	**Closure / Decommissioning**
PERFORMANCE INDICATOR	Archaeological sites are discovered and mitigated with the minimum amount of unnecessary disturbance.		

11 CONCLUSION AND 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. The following observations are made for the proposed Tharisa Mine TSF3 WRD Extension 1 Project:

- The remains of two Historical Period farmstead compounds (**TWRD-HP01, TWRD-HP02**) occur within the proposed project area and impact on the sites is likely. However, dwellings and buildings at the sites have been demolished and only foundations structures and building rubble remain and the sites are of low heritage significance, even though they are generally protected under the National Heritage Resource Act (NHRA 1999). It is recommended that the sites be monitored throughout all phases of the project since human burials occur in the general vicinity of the farmsteads outside the project area.
- Pistorius documented a small "unmarked" cemetery in the project area (**TWRD-BP01, previously coded "GY05")** in an HIA for the Tharisa Mine conducted in 2007. The Tharisa Environmental Officer indicated that all graves within mining areas had previously been relocated and Site GY05 could not be located during the site survey subject to the current assessment. It is nonetheless recommended that the relocated status of the burials be confirmed during the preconstruction phase by means of the perusal of the necessary accompanying documents and heritage permits in order to ensure that human remains are not damaged or lost. Should it be established that the burial sites were not relocated, it is primarily recommended that infrastructure be redesigned to avoid the burial site where a 50m no-go buffer should be demarcated prior to the construction phase. Here, the site should be fenced or a permanent construction barricade should be erected to clearly indicate the site and the margins of the no-go buffer. Frequent monitoring will be required during all phases of the project by an informed ECO in order to detect direct or indirect impact on the site. This should include a Site Management Plan (SMP) should be implemented, detailing these conservation measures and indicating responsible parties in this regard. Should impact on the burial site (if present) prove inevitable, the graves should be relocated 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.
- As burials have been located on the project property, it is recommended that the EIA public participation and social consultative process address the possibility of further graves occurring in the project area.
- A partially intact concrete building foundation structure (**TWRD-FT01)** was noted in the project area. The structure remains are not of heritage significance and no further action in terms of heritage management or mitigation is required.
- Since cultural (archaeological) layers are usually superficial, subsoil layers and that makes them easily vulnerable to destruction, the likelihood for encountering previously undetected cultural heritage or archaeological material sites as the land clearing process commences, or during construction of infrastructure should be considered. Graves and cemeteries are often scattered around archaeological and historical settlements in the rural areas of the North West Province and the probability of informal human burials encountered during the construction phase should thus not be excluded. Site monitoring by an informed appointed ECO will be required throughout the construction phase of the project in order to avoid the destruction of previously undetected heritage sites.

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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13 ADDENDUM 1: SPECIALIST CV

NELIUS LE ROUX KRUGER

BHCS Hons. (Archaeology)

(Date compiled: 2023/01/10)

PERSONAL DETAILS

Nationality:	South African
Date of Birth:	3 April 1979
Postal Address:	Postnet Suite 74, Private Bag x04, Menlo Park, 0102
Work Address:	70 Regency Dr, Route 21 Business Park, Centurion, 0178
Telephone numbers:	W: +27 12 751 2160 C: +27 82 967 2131
Identity number:	790403 5029 087
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 CES

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.

- Industry standard and compliant Social Impact Assessments (SIA's).

- Mine Social and Labour Plans (SLP's)and social facilitation.

- 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

Kruger, N. In Prep. Living the frontier: Ritual and Conflict in Ha-Tshirundu.
Kruger, N. 2016. Forthcoming. The Crocodile in his Pool: Notes on a significant find in the Ha-Tshirundu area, Limpopo Valley, South Africa. Nyame Akuma Bulletin of the Association of Africanist Archaeologists.
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Mathers, K. & Kruger, N. 2008. The Past is another Country: Archaeology in the Limpopo Province in Smith, A. & Gazin-Schwartz, A (Eds.). 2008. Landscapes of Clearance: Archaeological and Anthropological Perspectives. California: Left Coast Press

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.

14 ADDENDUM 2: HERITAGE LEGISLATION

14.1 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.

14.1.1 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.

a. 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)."

b. 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.

14.1.2 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.

14.2 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.

15 ADDENDUM 2: IMPACT ASSESSMENT METHODOLOGY

15.1 PLOMP IMPACT ASSESSMENT

The EIA 2014 Regulations (as amended) promulgated in terms of Sections 24 (5), 24(m) and 44 of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (as amended) (NEMA), require that all identified potential impacts associated with a project be assessed in terms of their overall potential significance on the natural, social and economic environments. The criteria identified in the EIA Regulations include the following:

- Nature of the impact;
- Extent of the impact;
- Duration of the impact
- Probability of the impact occurring;
- Degree to which impact can be reversed;
- Degree to which impact may cause irreplaceable loss of resources;
- Degree to which the impact can be mitigated; and
- Cumulative impacts.

The significance of the aspects/impacts of the process will be rated by using a matrix derived from Plomp (2004) and adapted to some extent to fit this process. These matrixes use the consequence and the likelihood of the different aspects and associated impacts to determine the significance of the impacts.

Aspect	Description	Weight
Probability. This describes the likelihood of the impact actually occurring.		
Improbable:	The possibility of the impact occurring is very low, due to the circumstances, design or experience.	1
Probable:	There is a probability that the impact will occur to the extent that provision must be made therefore.	2
Highly Probable:	It is most likely that the impact will occur at some stage of the development.	4
Definite:	The impact will take place regardless of any prevention plans, and there can only be relied on mitigatory actions or contingency plans to contain the effect.	5
Duration. The lifetime of the impact		
Short term:	The impact will either disappear with mitigation or will be mitigated through natural processes in a time span shorter than any of the phases.	1
Medium term:	The impact will last up to the end of the phases, where after it will be negated.	3
Long term:	The impact will last for the entire operational phase of the project but will be mitigated by direct human action or by natural processes thereafter.	4
Permanent:	Impact that will be non-transitory. Mitigation either by man or natural processes will not occur in such a way or in such a time span that the impact can be considered transient.	5
Scale. The physical and spatial size of the impact		
Local:	The impacted area extends only as far as the activity, e.g., footprint	1
Site:	The impact could affect the whole, or a measurable portion of the above-mentioned properties.	2
Regional:	The impact could affect the area including the neighbouring residential areas.	3
Magnitude/ Severity. Does the impact destroy the environment or alter its function.		
Low:	The impact alters the affected environment in such a way that natural processes are not affected.	2
Medium:	The affected environment is altered, but functions and processes continue in a modified way.	6
High:	Function or process of the affected environment is disturbed to the extent where it temporarily or permanently ceases.	8
Significance. This is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. **Sum (Duration, Scale, Magnitude) x Probability**		
Negligible:	The impact is non-existent or unsubstantial and is of no or little importance to any stakeholder and can be ignored.	<20
Low:	The impact is limited in extent, has low to medium intensity; whatever its probability of occurrence is, the impact will not have a material effect on the decision and is likely to require management intervention with increased costs.	<40

Moderate:	The impact is of importance to one or more stakeholders, and its intensity will be medium or high; therefore, the impact may materially affect the decision, and management intervention will be required.	<60
High:	The impact could render development options controversial or the project unacceptable if it cannot be reduced to acceptable levels; and/or the cost of management intervention will be a significant factor in mitigation.	>60

15.2 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 an 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.