



GLENCORE MERAPE VENTURE OPERATIONS: PROPOSED FOR THE PROPOSED GLENCORE KROONDAL MINE RESIDUE EXPANSION PROJECT, GLENCORE KROONDAL MINE, BOJANALA PLATINUM DISTRICT MUNICIPALITY, NORTH WEST PROVINCE

Archaeological Impact Assessment
Submitted subject to Section 38 of the NHRA

A 3D rendering of a globe with water splashing over it, set against a white background with a reflection below. A large, faint 'E' logo is visible in the background.

**Innovation in
Sustainability**

Prepared for: **Glencore Merafe Venture Operations**

Prepared by: **Exigo Sustainability**

Neels Kruger

neels@exigo3.com

ARCHAEOLOGICAL IMPACT ASSESSMENT (AIA) OF DEMARCTED AREAS ON A PORTION OF THE FARM KROONDAL 304JQ FOR THE PROPOSED GLENCORE KROONDAL MINE RESIDUE EXPANSION PROJECT AT THE GLENCORE KROONDAL MINE, NORTH WEST PROVINCE

Conducted for:

Glencore Merafe Venture Operations

Compiled by:

Nelius Kruger (BA, BA Hons. Archaeology Pret.)

Reviewed by:

Herman Gildenhuys (Exigo Sustainability)

DOCUMENT DISTRIBUTION LIST

Name	Institution
Herman Gildenhuys	Exigo Sustainability

DOCUMENT HISTORY

Date	Version	Status
15 June 2019	1.0	Draft
18 March 2021	2.0	Final Draft

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 Glencore Kroondal Mine Residue Expansion 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.



Signature of specialist
Company: Exigo Sustainability
Date: 26 May 2019

Although Exigo Sustainability exercises due care and diligence in rendering services and preparing documents, Exigo Sustainability accepts no liability, and the client, by receiving this document, indemnifies Exigo Sustainability and its directors, managers, agents and employees against all actions, claims, demands, losses, liabilities, costs, damages and expenses arising from or in connection with services rendered, directly or indirectly by Exigo Sustainability and by the use of the information contained in this document.

This document contains confidential and proprietary information equally shared between Exigo Sustainability and Glencore Merafe Venture Operations, and is protected by copyright in favour of these companies and may not be reproduced, or used without the written consent of these companies, which has been obtained beforehand. This document is prepared exclusively for Glencore Merafe Venture Operations and is subject to all confidentiality, copyright and trade secrets, rules, intellectual property law and practices of South Africa. Exigo Sustainability promotes the conservation of sensitive archaeological and heritage resources and therefore uncompromisingly adheres to 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). In order to ensure best practices and ethics in the examination, conservation and mitigation of archaeological and heritage resources, Exigo Sustainability follows the Minimum Standards: Archaeological and Palaeontological Components of Impact Assessment as set out by the South African Heritage Resources Agency (SAHRA) and the CRM section of the Association for South African Professional Archaeologists (ASAPA).

EXECUTIVE SUMMARY

This report details the results of an Archaeological Impact Assessment (AIA) study subject to an Environmental Impact Assessment (EIA) Amendment process for the proposed Glencore Kroondal Mine Residue Expansion Project on a portion of the farm Kroondal 304JQ in the Bojanala Platinum District Municipality, North West Province. The proposed project entails the establishment of infrastructure over a surface area of 10ha at the mine. 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	Glencore Kroondal Mine Residue Expansion Project
General Project Location	S25.715676° E27.319156°
1:50 000 Map Sheet	2527CB
Farm Portion / Parcel	A portion of the farm Kroondal 304JQ
Magisterial District / Municipal Area	Bojanala Platinum 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 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 development in the region.

The proposed Glencore Kroondal Mine Residue Expansion Project area is situated in environments that have been transformed and degraded as a result of urbanization and mining and as such, no archaeological objects or sites, or features of heritage potential were noted during the site survey of the development footprint. It might be assumed that these areas have largely been sterilized of heritage remains, especially those dating to prehistorical times. The following general recommendations are made based on general observations in the proposed project footprint area:

- A Palaeontological Impact Assessment should be considered where bedrock is to be impacted on and,

should fossil remains such as fossil fish, reptiles or vitrified wood be exposed during construction, these objects should be carefully safeguarded and the relevant heritage resources authority (SAHRA) should be notified immediately so that appropriate action can be taken by a professional palaeontologist.

- Kroondal and its surroundings have a long and extensive Colonial Period settlement history two Historical Period farmsteads occur in areas surrounding the proposed return water dam and tailings storage facility (**Exigo-GKI-HP01: Kroondal Farmstead** and **Exigo-GKI-HP02: Holsthausen Farmstead**). According to indications the sites are older than 60 years - and generally protected under the National Heritage Resource Act (NHRA 1999). However, the farmstead complexes area situated more than 100m from the proposed project footprints and no impact on these sites is foreseen. No specific action in terms of heritage site mitigation is required for these heritage resources.
- A general watching brief monitoring process is recommended for all stages of development of the proposed infrastructure expansion at the mine whereby an informed ECO inspects the construction sites on a regular basis in order to monitor possible impacts on heritage resources. Should any subsurface archaeological or historical material or heritage resources be exposed during construction activities, all activities should be suspended and the archaeological specialist should be notified immediately.

No heritage resources have been documented in the proposed Glencore Kroondal Mine Residue Expansion Project footprint areas. It is the opinion of the author of this Archaeological Impact Assessment Report that the proposed Glencore Kroondal Mine Residue Expansion Project will have no impact on archaeological resources, the built environment, the cultural landscape or human burials. The project should be allowed to proceed from a culture resources management perspective on the condition that the relevant Heritage Resources authority approves these findings and provided that no subsurface heritage remains are encountered during construction.

It is essential that cognizance be taken of the larger archaeological landscape of the North West region in order to avoid the destruction of previously undetected heritage sites. Should any previously undetected heritage resources be exposed or uncovered during construction phases of the proposed project, these should immediately be reported to the heritage consultant or SAHRA. Since the intrinsic heritage and social value of graves and cemeteries are highly significant, these resources require special management measures. This report details the methodology, limitations and recommendations relevant to these heritage areas, as well as areas of proposed development. It should be noted that recommendations and possible mitigation measures are valid for the duration of the development process, and mitigation measures might have to be implemented on additional features of heritage importance not detected during this Phase 1 assessment (e.g. uncovered during the construction process).

NOTATIONS AND TERMS/TERMINOLOGY

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

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

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

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

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

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

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

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

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

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

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

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

Midden: Refuse that accumulates in a concentrated heap.

Microlith: A small stone tool, typically knapped of flint or chert, usually about three centimetres long or less.

Monolith: A geological feature such as a large rock, consisting of a single massive stone or rock, or a single piece of rock placed as, or within, a monument or site.

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

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

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

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

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

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

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

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

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

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

LIST OF ABBREVIATIONS

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

TABLE OF CONTENTS

EXECUTIVE SUMMARY	5
1 BACKGROUND.....	12
1.1 SCOPE AND MOTIVATION	12
1.2 PROJECT DIRECTION	12
1.3 PROJECT BRIEF	12
1.4 TERMS OF REFERENCE	15
1.5 CRM: LEGISLATION, CONSERVATION AND HERITAGE MANAGEMENT.....	15
1.5.1 <i>Legislation regarding archaeology and heritage sites</i>	15
1.5.2 <i>Background to HIA and AIA Studies</i>	17
2 REGIONAL CONTEXT.....	18
2.1 AREA LOCATION	18
2.2 AREA DESCRIPTION: RECEIVING ENVIRONMENT	18
2.3 SITE DESCRIPTION	18
3 METHOD OF ENQUIRY.....	21
3.1 SOURCES OF INFORMATION	21
3.1.1 <i>Desktop Study</i>	21
3.1.2 <i>Aerial Survey</i>	23
3.1.3 <i>Mapping of sites</i>	24
3.1.4 <i>Field Survey</i>	24
3.2 LIMITATIONS.....	24
3.2.1 <i>Access</i>	24
3.2.2 <i>Visibility</i>	24
3.2.3 <i>Summary: Limitations and Constraints</i>	29
3.3 IMPACT ASSESSMENT	30
4 ARCHAEO-HISTORICAL CONTEXT.....	30
4.1 THE ARCHAEOLOGY OF SOUTHERN AFRICA	30
4.2 DISCUSSION: AN ARCHAEO-HISTORICAL BACKGROUND OF THE NORTH NORTH WEST REGION.....	31
4.2.1 <i>Early History and the Stone Ages</i>	31
4.2.2 <i>Iron Age / Farmer Period</i>	32
4.2.3 <i>Pastoralism and the last 2000 years</i>	34
4.2.4 <i>Later History</i>	35
5 RESULTS: ARCHAEOLOGICAL SURVEY	37
5.1 THE OFF-SITE DESKTOP SURVEY	37
5.2 THE ARCHAEOLOGICAL SITE SURVEY	40
6 RESULTS: STATEMENT OF SIGNIFICANCE AND IMPACT RATING	43
6.1 POTENTIAL IMPACTS AND SIGNIFICANCE RATINGS	43
6.1.1 <i>General assessment of impacts on resources</i>	43
6.1.2 <i>Direct impact rating</i>	43
6.2 EVALUATION IMPACTS	43
6.2.1 <i>Discussion: Evaluation of Results and Impacts</i>	43
6.2.2 <i>Archaeology</i>	43
6.2.3 <i>Built Environment</i>	44
6.2.4 <i>Cultural Landscape</i>	44
6.2.5 <i>Graves / Human Burials Sites</i>	44

6.3	MANAGEMENT ACTIONS	44
7	RECOMMENDATIONS.....	45
8	GENERAL COMMENTS AND CONDITIONS	46
9	BIBLIOGRAPHY	47
9.1	PUBLISHED LITERATURE.....	47
9.2	UNPUBLISHED SOURCES AND REPORTS	48
9.3	ARCHIVE SOURCES AND MAPS.....	51
9.4	WEB SOURCES AND LEGISLATION.....	51
10	ADDENDUM 1: HERITAGE LEGISLATION BACKGROUND.....	52
10.1	CRM: LEGISLATION, CONSERVATION AND HERITAGE MANAGEMENT.....	52
10.1.1	<i>Legislation regarding archaeology and heritage sites</i>	<i>52</i>
10.1.2	<i>Background to HIA and AIA Studies</i>	<i>53</i>
10.2	ASSESSING THE SIGNIFICANCE OF HERITAGE RESOURCES.....	55
	- CATEGORIES OF SIGNIFICANCE	55
11	ADDENDUM 2: CONVENTIONS USED TO ASSESS THE SIGNIFICANCE OF HERITAGE.....	58
11.1	SITE SIGNIFICANCE MATRIX	58
11.2	IMPACT ASSESSMENT CRITERIA.....	59
11.3	DIRECT IMPACT ASSESSMENT CRITERIA	60
11.4	MANAGEMENT AND MITIGATION ACTIONS.....	61

LIST OF FIGURES

Figure 1-1: Aerial map indicating infrastructure components proposed for the proposed Glencore Kroondal Mine Residue Expansion Project.	13
Figure 1-2: Design plan detailing infrastructure components proposed for the proposed Glencore Kroondal Mine Residue Expansion Project.	14
Figure 2-1: 1:50 00 Map representation of the location of the proposed Glencore Kroondal Mine Residue Expansion Project (sheet 2527CB).	19
Figure 2-2: Aerial map providing a regional context for the proposed Glencore Kroondal Mine Residue Expansion Project.	20
Figure 3-1: View of an old agricultural field in the project area.	25
Figure 3-2: View of tall grasses in old agricultural fields in the project area.	25
Figure 3-3: Stone piles where rocks have been cleared from old agricultural fields in the project area.	25
Figure 3-4: View of old agricultural fields in the project area. The Kroondal Mine is visible in the distance.	26
Figure 3-5: Soil mounds and spill heaps in the project area.	26
Figure 3-6: View of disused agricultural surfaces in the project area.	26
Figure 3-7: General surrounding in the project area, looking north towards the Kroondal Mine.	27
Figure 3-8: View of a deserted crocodile farm, west of the project area.	27
Figure 3-9: Indicator species are prevalent throughout the project footprint areas.	27
Figure 3-10: View of deserted crocodile farm infrastructure, west of the project area.	28
Figure 3-11: A deep quarry southwest of the project area.	28
Figure 3-12: View of transformed surfaces at the site of the proposed waste rock dump extension.	28
Figure 3-13: Another view of transformed surfaces at the site of the proposed waste rock dump extension.	29
Figure 3-14: A panorama view of transformed surfaces at the site of the proposed waste rock dump extension.	29
Figure 4-1: Typical ESA handaxe (left) and cleaver (center). To the right is a MSA scraper (right, top), point (right, middle) and blade (right, bottom).	32
Figure 4-2: Map detailing the distribution of 16 th century Mloko (left), 17 th century Madikwe (centre) and 18 th century Buispoort tradition sites (After Huffman 2007).	33
Figure 4-3: Ceramic decoration motives typical of 17 th century Madikwe (left) and later Buispoort (right) facies (After Huffman 2007).	33
Figure 4-4: Troye’s “New Railway and Postal Map” in the Transvaal Colony c. 1899 with Kroondal encircled in yellow.	36
Figure 4-5: The German Lutheran mission church shortly after its construction in 1896.	36
Figure 5-1: An aerial image of Kroondal dating to 1955 indicating the presence of an old “kraal” settlement as well as the Kroondal and Holtshausen farmsteads (orange arrows) and agricultural fields (green arrows).	38
Figure 5-2: Historical topographic maps of Kroondal dating to 1968 (left), 1982 (centre) and 19960 (right), indicating the location of the project area (green outlines) during the mid to later 20 th century. Note the presence of an old “kraal” settlement as well as the Kroondal and Holtshausen farmsteads (orange arrows) and agricultural fields (green arrows) on the maps.	39
Figure 5-3: A Historical Period building at the Kroondal Farmstead complex.	40
Figure 5-4: A Historical Period building converted into modern offices at the Kroondal Farmstead complex.	41
Figure 5-5: A Historical Period building at the Holtshausen Farmstead complex.	41
Figure 5-6: Aerial image indicating the location of heritage occurrences discussed in the text.	42

1 BACKGROUND

1.1 Scope and Motivation

This report details the results of an Archaeological Impact Assessment (AIA) study subject to an Environmental Impact Assessment (EIA) Amendment process for the proposed Glencore Kroondal Mine Residue Expansion Project on a portion of the farm Kroondal 304JQ in the Bojanala Platinum District Municipality, North West Province. The rationale of this AIA is to determine the presence of heritage resources such as archaeological and historical sites and features, graves and places of religious and cultural significance in previously unstudied areas; to consider the impact of the proposed project on such heritage resources, and to submit appropriate recommendations with regard to the cultural resources management measures that may be required at affected sites / features.

1.2 Project Direction

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

1.3 Project Brief

The author was contracted to undertake a heritage assessment at the Glencore Kroondal Mine on portions of the farm Kroondal 304JQ in the North-West Province. Kroondal Mine needs additional tailings and waste rock storage capacity to allow for continued production and a new Co-Disposal Facility will need to be sited and designed. The Co-Disposal Facility design is summarised as follows:

- Maximum final height of CDF: 54m
- Footprint area of facility: 12.5 Ha
- Total capacity: 6 724 354 tons
- Total deposition time: 6.3 years

At closure, the Co-Disposal Facility outer slopes will be cut back. The flatter outer slope will allow for sufficient vegetation growth after topsoiling and will prevent erosion of the outer slopes after closure. The excess material removed from the Co-Disposal Facility for closure will be deposited at the present Kroondal TSF site once the existing TSF has been removed. The present Kroondal TSF site provides adequate capacity for the excess material.

Infrastructure components include:

- Codisposal Facilities.
- Pollution Control Dam.
- Silt trap.
- Topsoil Stockpiles.
- Conveyor and Service Road.
- Process Water Tank and Desilting Facility.

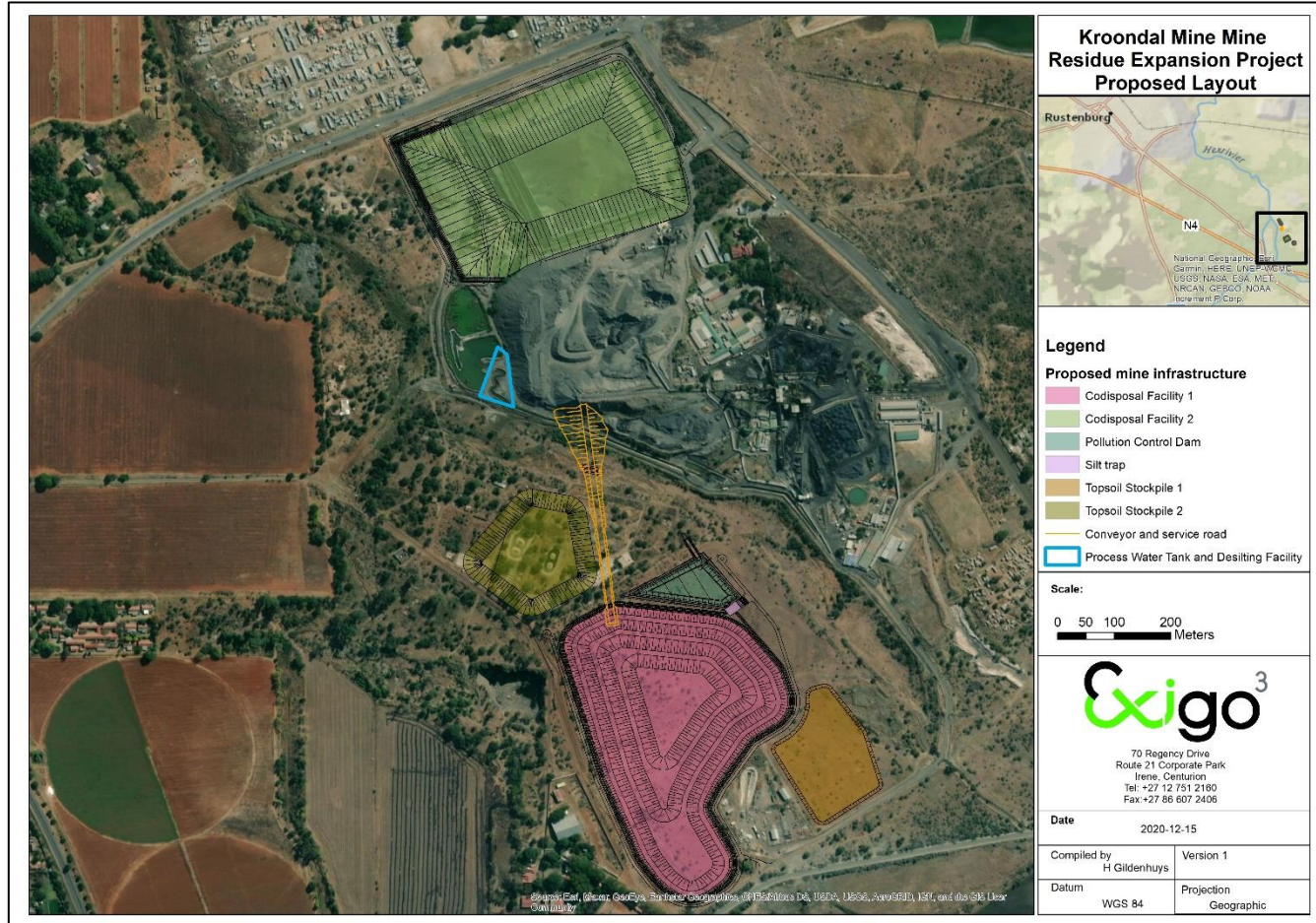


Figure 1-1: Aerial map indicating infrastructure components proposed for the proposed Glencore Kroondal Mine Residue Expansion Project.

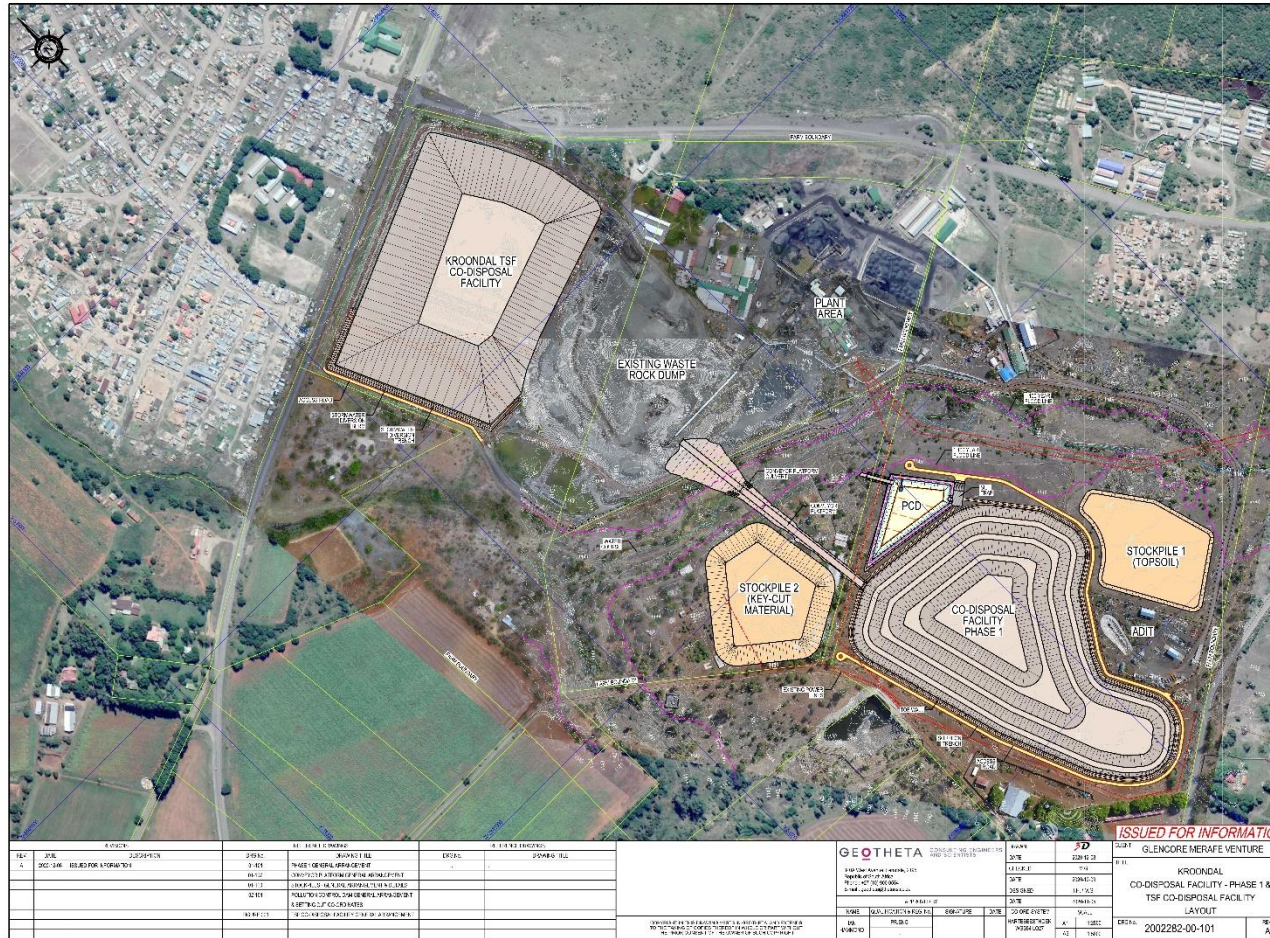


Figure 1-2: Design plan detailing infrastructure components proposed for the proposed Glencore Kroondal Mine Residue Expansion Project.

1.4 Terms of Reference

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

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

1.5 CRM: Legislation, Conservation and Heritage Management

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

1.5.1 Legislation regarding archaeology and heritage sites

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

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

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

- a. Archaeological artefacts, structures and sites older than 100 years
- b. Ethnographic art objects (e.g. prehistoric rock art) and ethnography

- c. Objects of decorative and visual arts
- d. Military objects, structures and sites older than 75 years
- e. Historical objects, structures and sites older than 60 years
- f. Proclaimed heritage sites
- g. Grave yards and graves older than 60 years
- h. Meteorites and fossils
- i. Objects, structures and sites of scientific or technological value.

In addition, the national estate includes the following:

- a. Places, buildings, structures and equipment of cultural significance
- b. Places to which oral traditions are attached or which are associated with living heritage
- c. Historical settlements and townscapes
- d. Landscapes and features of cultural significance
- e. Geological sites of scientific or cultural importance
- f. Archaeological and paleontological sites
- g. Graves and burial grounds
- h. Sites of significance relating to the history of slavery
- i. Movable objects (e.g. archaeological, paleontological, meteorites, geological specimens, military, ethnographic, books etc.)

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

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

and

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

- (a) destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite;*
- (b) destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or object or any meteorite;*
- (c) trade in, sell for private gain, export or attempt to export from the Republic any category of archaeological or palaeontological material or object, or any meteorite; or*
- (d) bring onto or use at an archaeological or palaeontological site any excavation equipment or any equipment which assist in the detection or recovery of metals or archaeological and palaeontological material or objects, or use such equipment for the recovery of meteorites. (35. [4] 1999:58).”*

and

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

- (a) *destroy, damage, alter, exhume or remove from its original position or otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves;*
- (b) *destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority;*
- (c) *bring onto or use at a burial ground or grave referred to in paragraph (a) or (b) and excavation equipment, or any equipment which assists in the detection or recovery of metals (36. [3] 1999:60)."*

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

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

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

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

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

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

1.5.2 Background to HIA and AIA Studies

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

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

2 REGIONAL CONTEXT

2.1 Area Location

The Glencore Kroondal Mine Residue Expansion Project occurs at the Glencore Kroondal Mine on Kroondal 304JQ in the Bojanala Platinum District Municipality, Northwest Province. Glencore Kroondal Chrome Mine is located approximately 10km east of Rustenburg and 2km east of the Kroondal Township on portions of the farm Kroondal 304JQ in the North-West Province. Key geographical points for infrastructure components area:

- **Codisposal Facilities:** S25.711198° E27.316298°, S25.719725° E27.318438°
- **Pollution Control Dam:** S25.717797° E27.318652°
- **Topsoil Stockpiles:** S25.717261° E27.316274°, S25.720603° E27.320840°
- **Process Water Tank and Desilting Facility:** S25.714390° E27.315632°

The study areas appear on 1:50000 map sheet 2527CB (see Figure 2-1):

2.2 Area Description: Receiving Environment

The Bankeveld is a narrow strip of land between the northern part of South Africa and the centrally situated Highveld. This area is roughly demarcated by Krugersdorp in the south, the Pienaars River to the north, Bronkhorstspuit 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.

2.3 Site Description

The study area is situated southwest and west of the current Kronwall Mine where much of the respective footprints have been transformed by mining and agriculture. Small pockets of level or undulating and undisturbed grassland remain in places under large Eucalyptus Trees but for the largest part, areas have been cleared of stones and rocks for crop fields. In addition, large soil mounds and spill heaps occur throughout the project area. An access tunnel to underground mining areas occurs to the south adjacent to one of the planned Codisposal Facilities and a deserted crocodile farm complex occurs along the western periphery of the project area where one of the Topsoil Stockpiles is planned. A large deep quarry appears to the south-west of the project area.

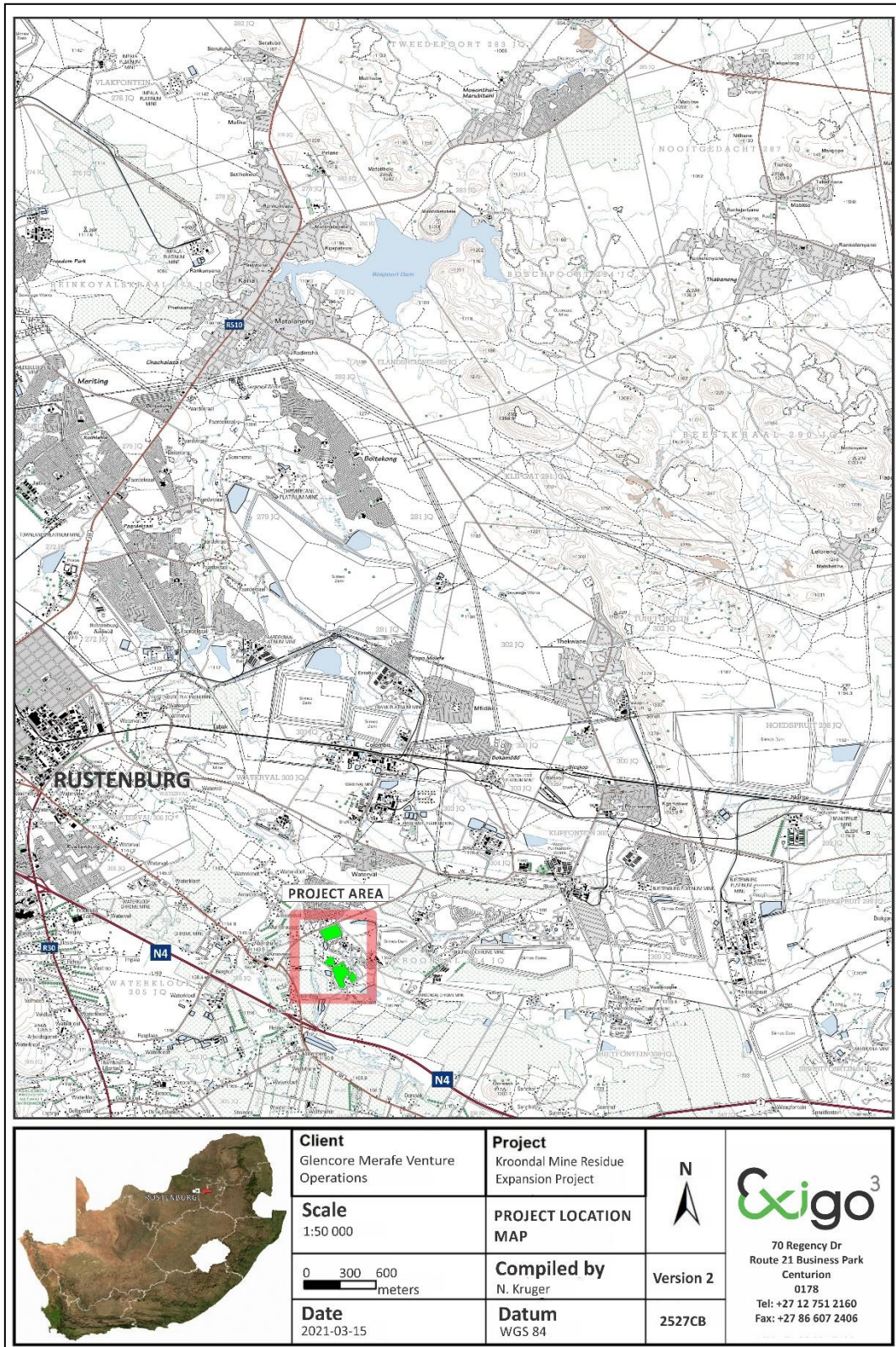


Figure 2-1: 1:50 00 Map representation of the location of the proposed Glencore Kroondal Mine Residue Expansion Project (sheet 2527CB).



Figure 2-2: Aerial map providing a regional context for the proposed Glencore Kroondal Mine Residue Expansion Project.

3 METHOD OF ENQUIRY

3.1 Sources of Information

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

3.1.1 Desktop Study

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

Hutten, M. 2013c. HIA for the proposed solar park development on the farm Aapieskruil near Koedoeskop, Limpopo Province. Compiled for: Jonk Begin Omgewingsdienste.

Fourie, W. 2012. Wachteenbietjesdraai 350 KQaAnd Kwaggashoek 345 KQ Heritage Impact Report on proposed mining activities of Project Phoenix. PGS Heritage Consultants

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 Projekbestuur (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 Mmatshetshela 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. Mmatshetshela, 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 Buffelschroem/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 Buffelschroem/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.

3.1.2 Aerial Survey

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

Google Earth as well as historical aerial imagery, potential sensitive areas were subsequently identified, geo-referenced and transferred to a handheld GPS device. These areas served as reference points from where further vehicular and pedestrian surveys were carried out.

3.1.3 Mapping of sites

Historical and current maps of the project area were examined (see Figure 3-1). 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 Kroondal 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. Historical and more recent maps indicate the presence of large number of Eucalyptus Trees in the project area and it seems as though no man-made structures were present on this portion of Olifantsfontein around the project area prior to the establishment of factories in the 1960's.

3.1.4 Field Survey

Archaeological survey implies the systematic procedure of the identification of archaeological sites. Archaeological surveys of the Glencore Kroondal Mine Residue Expansion Project areas were conducted over two periods in December 2018 and in July 2019. The processes encompassed systematic field surveys in accordance with standard archaeological practice by which heritage resources are observed and documented. In order to sample surface areas systematically and to ensure a high probability of site recording, the proposed project areas were surveyed on foot. Particular focus was placed on proposed infrastructure footprint areas provided to the specialist. GPS reference points identified during the aerial survey were also visited and random spot checks were made (see detail in previous section). Using a Garmin GPS, the survey was tracked and general surroundings were photographed with a Samsung Digital camera. Real time aerial orientation, by means of a mobile Google Earth application was also employed to investigate possible disturbed areas during the survey.

3.2 Limitations

3.2.1 Access

The study areas are accessed directly via internal and external mine service roads. Strict access control is applied to the project areas but no restrictions were encountered during the site visit in terms of access as the author of this report was accompanied by mining officials at all times.

3.2.2 Visibility

The surrounding vegetation in the larger landscape around Kroondal is mostly comprised out of grasslands with scattered trees and bushes. The general visibility at the time of the AIA surveys (December 2018 and March 2019) ranged from high in transformed areas, to moderate in more pristine and overgrown zones. In single cases during the survey sub-surface inspection was possible. Where applied, this revealed no archaeological deposits.



Figure 3-1: View of an old agricultural field in the project area.



Figure 3-2: View of tall grasses in old agricultural fields in the project area.



Figure 3-3: Stone piles where rocks have been cleared from old agricultural fields in the project area.



Figure 3-4: View of old agricultural fields in the project area. The Kroondal Mine is visible in the distance.



Figure 3-5: Soil mounds and spill heaps in the project area.



Figure 3-6: View of disused agricultural surfaces in the project area.



Figure 3-7: General surrounding in the project area, looking north towards the Kroondal Mine.



Figure 3-8: View of a deserted crocodile farm, west of the project area.



Figure 3-9: Indicator species are prevalent throughout the project footprint areas.



Figure 3-10: View of deserted crocodile farm infrastructure, west of the project area.



Figure 3-11: A deep quarry southwest of the project area.



Figure 3-12: View of transformed surfaces at the site of the proposed waste rock dump extension.



Figure 3-13: Another view of transformed surfaces at the site of the proposed waste rock dump extension.



Figure 3-14: A panorama view of transformed surfaces at the site of the proposed waste rock dump extension.

3.2.3 Summary: Limitations and Constraints

The foot and vehicular site survey for the Glencore Kroondal Mine Residue Expansion Project AIA primarily focused around areas tentatively identified as sensitive and of high heritage probability (i.e. those noted during the aerial survey) as well as areas of high human settlement catchment. In summary, the following constraints were encountered:

- **Visibility:** Visibility proved to be a constraint in areas with denser surface cover, as well as portions where vegetation is more pristine.

It should be noted that, even though it might be assumed that survey findings are representative of the heritage landscape of the project area, it should be stated that the possibility exists that individual sites could be missed due to the localised nature of some heritage remains as well as the possible presence of sub-surface archaeology. Therefore, maintaining due cognisance of the integrity and accuracy of the archaeological survey, it should be stated that the heritage resources identified during the study do not necessarily represent all the heritage resources present in the project area. The subterranean nature of some archaeological sites, dense vegetation cover and visibility constraints sometimes distort heritage

representations and any additional heritage resources located during consequent development phases must be reported to the Heritage Resources Authority or an archaeological specialist.

3.3 Impact Assessment

For consistency among specialists, impact assessment ratings by Exigo Specialist are generally done using the Plomp¹ impact assessment matrix scale supplied by Exigo. According to this matrix scale, each heritage receptor in the study area is given an impact assessment. The significances of the impacts were determined through a synthesis of the criteria below:

4 ARCHAEO-HISTORICAL CONTEXT

4.1 The archaeology of Southern Africa

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

Table 1 Chronological Periods across Southern Africa

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

¹ Plomp, H.,2004

Africa)			
Historical / Colonial Period ±1850 AD – present	Holocene	Various Bantu-speaking groups as well as European farmers, settlers and explorers	Remains of historical structures e.g. homesteads, missionary schools etc. as well as, glass, porcelain, metal and ceramics.

4.2 Discussion: An archaeo-historical background of the North North West Region

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 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 incoming 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.

4.2.1 Early History and the Stone Ages

According to archaeological research, the earliest ancestors of modern humans emerged some two to three million years ago. The remains of Australopithecine and *Homo habilis* have been found in dolomite caves and underground dwellings in the Bankeveld at places such as Sterkfontein and Swartkrans near Krugersdorp. *Homo habilis*, one of the Early Stone Age hominids, is associated with Oldowan artefacts, which include crude implements manufactured from large pebbles. The Acheulian industrial complex replaced the Oldowan industrial complex during the Early Stone Age. This phase of human existence was widely distributed across South Africa and is associated with *Homo erectus*, who manufactured hand axes and cleavers from as early as one and a half million years ago. 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 points 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.

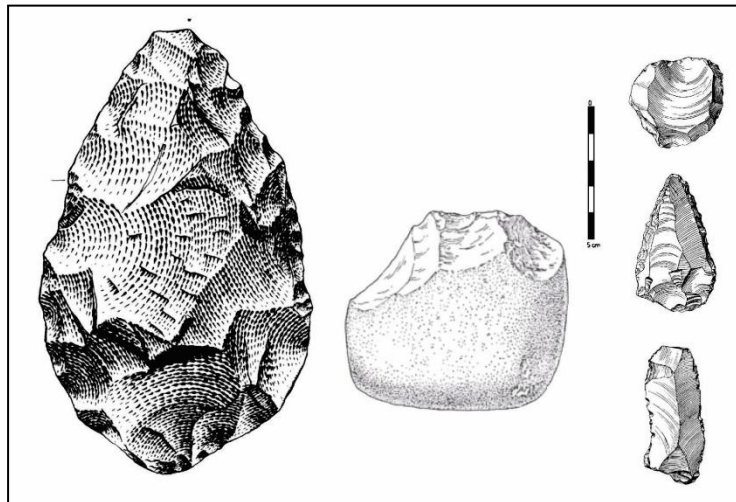


Figure 4-1: Typical ESA handaxe (left) and cleaver (center). To the right is a MSA scraper (right, top), point (right, middle) and blade (right, bottom).

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 Olieboomspoor 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 from 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.

4.2.2 Iron Age / Farmer Period

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

period and includes traditions such as Icon and Letaba.

Early Sotho-Tswana History

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

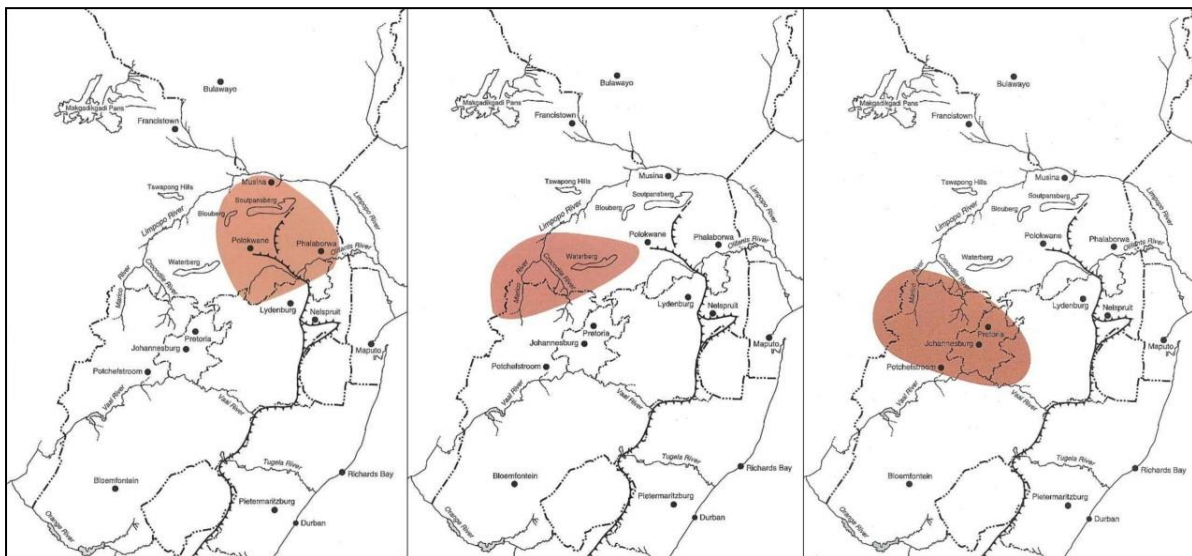


Figure 4-2: Map detailing the distribution of 16th century Mloko (left), 17th century Madikwe (centre) and 18th century Buispoort tradition sites (After Huffman 2007).



Figure 4-3: 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 dislocados 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 (amakhandu) 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 Mzilikazi's sons, Nkulumane, was buried in Phokeng. His grave is today wrongly indicated as 'Mzilikazi's grave' in Phokeng'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 Phokeng, Rustenburg and Thlabane, located to the south of Boshhoek. The towns of Bala and Chuane are located to the north-east of the planned smelter site. The town of Phokeng 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.

4.2.3 Pastoralism and the last 2000 years

Until 2000 years ago, hunter-gatherer communities traded, exchanged goods, encountered and interacted with other hunter-gatherer communities. From about 2000 years ago the social dynamics of the Southern African landscape started changing with the immigration of two 'other' groups of people, different in physique, political, economic and social systems, beliefs and rituals. One of these groups, the Khoekhoen pastoralists or herders entered Southern Africa with domestic animals, namely fat-tailed sheep and goats, travelling through

the south towards the coast. They also introduced thin-walled pottery common in the interior and along the coastal regions of Southern Africa. Their economic systems were directed by the accumulation of wealth in domestic stock numbers and their political make-up was more hierarchical than that of the hunter-gatherers.

4.2.4 Later History

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.

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 accured 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.

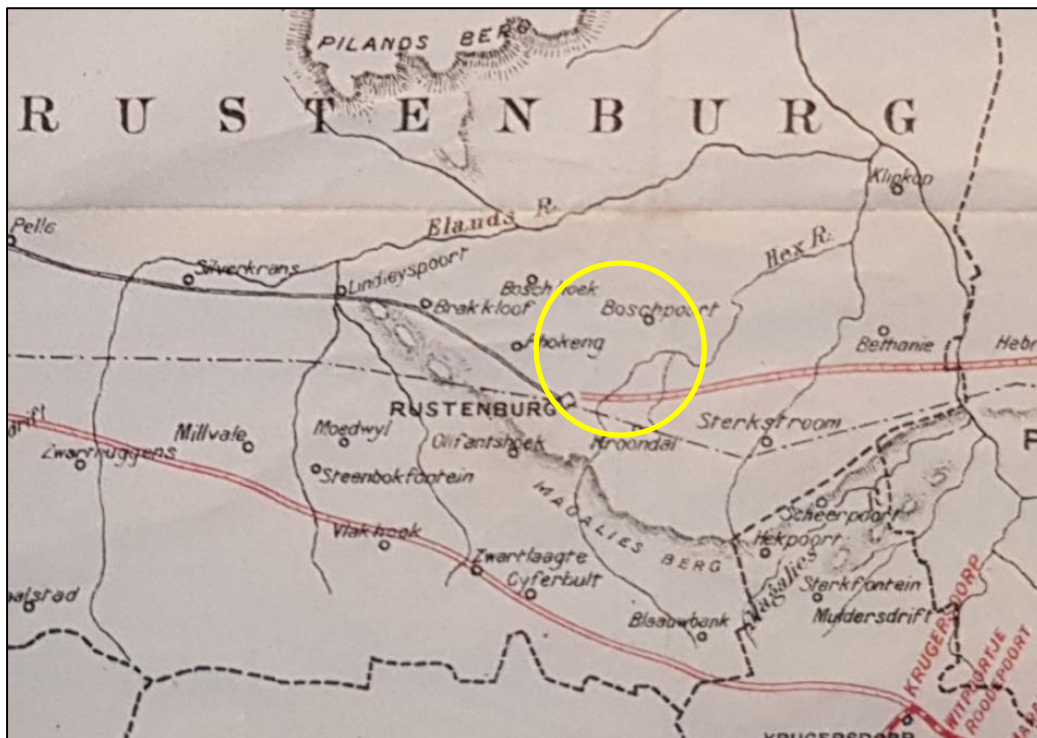


Figure 4-4: Troye's "New Railway and Postal Map" in the Transvaal Colony c. 1899 with Kroondal encircled in yellow.



Figure 4-5: The German Lutheran mission church shortly after its construction in 1896.

5 RESULTS: ARCHAEOLOGICAL SURVEY

5.1 The Off-Site Desktop Survey

In terms of heritage resources, the general landscape around the project area is primarily well known for its Iron Age Farmer and Colonial / Historical Period archaeology primarily related to farming and the expansion of Rustenburg. Adjacent to the Glencore Kroondal Mine, the Kroondal settlement holds a rich history (see previous section) but no particular reference to archaeological sites or features of heritage potential were recorded during an examination of literature specifically related to the project area.

A careful analysis of historical aerial imagery and archive maps reveals the following (see Figure 5-1 and Figure 5-2):

- Portions of Kroondal – and particularly areas subject to this assessment have been altered extensively by recent and historical farming and mining activities, particularly towards the end of the 20th century.
- A large settlement or “kraal”, consisting of a number of homesteads or “huts” was present in the landscape at around 1955, north-east of the project area at the site of the present-day Kroondal Mine complex.
- Two farmsteads, indicated as “Kroondal” and “Holtshausen” occurred in the landscape west and south of the project footprints.
- No man-made structures appear to have been present within the project area on historical aerial imagery and archive maps but the existence of large agricultural fields is apparent across much of the project landscape.



Figure 5-1: An aerial image of Kroondal dating to 1955 indicating the presence of an old “kraal” settlement as well as the Kroondal and Holtshausen farmsteads (orange arrows) and agricultural fields (green arrows).

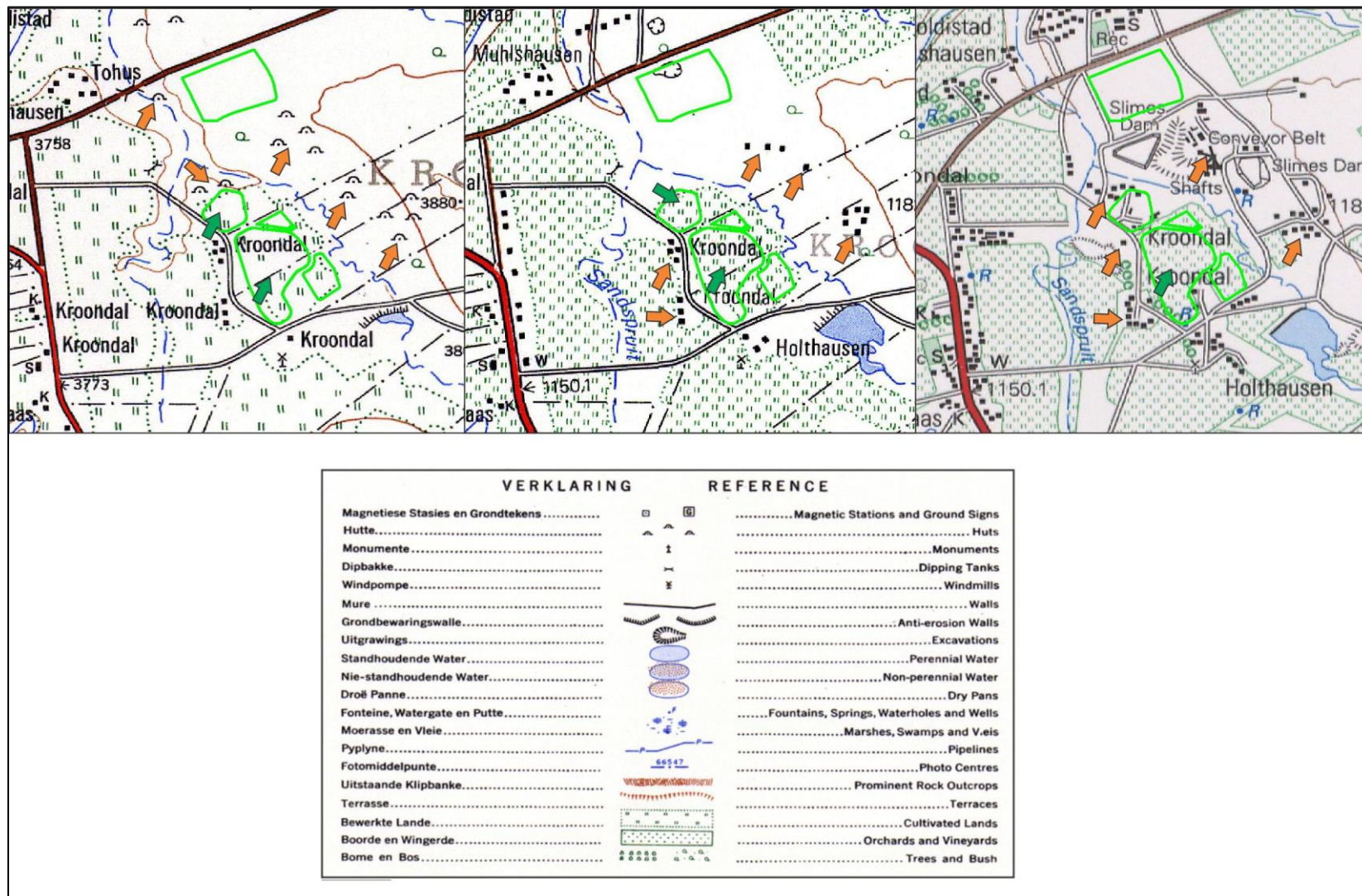


Figure 5-2: Historical topographic maps of Kroondal dating to 1968 (left), 1982 (centre) and 1996 (right), indicating the location of the project area (green outlines) during the mid to later 20th century. Note the presence of an old “kraal” settlement as well as the Kroondal and Holtshausen farmsteads (orange arrows) and agricultural fields (green arrows) on the maps.

5.2 The Archaeological Site Survey

An analysis of historical aerial imagery and archive maps of areas subject to this assessment suggests a landscape which has been subjected to historical farming activities and recent mining potentially sterilizing the area of heritage remains. This inference was confirmed during an archaeological site assessment during which no *in situ* archaeological or heritage remains were encountered. The following observations were made.

- **Exigo-GKI-HP01 Kroondal Farmstead (S25.721951° E27.316723°)**
- **Exigo-GKI-HP02 Holtshausen Farmstead (S25.723482° E27.319379°)**

Kroondal and its surroundings have a long and extensive **Colonial Period** settlement history. From around the first half of the 19th century, the area was frequented by explorers, missionaries and farmers who all contributed to a recent history of contact, farming and later mining. Similarly, two Historical Period farmsteads occur in areas surrounding the proposed return water dam and tailings storage facility. The first farmstead, indicated on topographic maps as “Kroondal”, consist out of at least two large dwellings constructed out of red face brick and plastered up walls with pitched corrugated iron roofs, metal window frames and wooden doors. The structures are currently occupied where one of the buildings has been converted into modern offices for the Kroondal mine. The second farmstead, indicated on topographic maps as “Holtshausen”, consist out of a farmhouse and outbuildings similarly constructed out of red face brick and plastered up walls with pitched corrugated iron roofs, metal window frames and wooden doors. The dwelling, which seems to have been used as offices until recently, are deserted and has been vandalized. An analysis of historical topographical maps and aerial photographs indicate the presence of the complexes of buildings by at least 1955 and it might be assumed that the building structures are older than 60 years - and generally protected under the National Heritage Resource Act (NHRA 1999). Buildings and houses in the Kroondal landscape afford a better understanding of architectural, industrial and social developments in the larger Rustenburg landscape and the sites are generally of heritage significance. ***The Kroondal and Holtshausen farmstead complexes area situated more than 100m from the proposed project footprints and no impact on these sites is foreseen.***



Figure 5-3: A Historical Period building at the Kroondal Farmstead complex.



Figure 5-4: A Historical Period building converted into modern offices at the Kroondal Farmstead complex.



Figure 5-5: A Historical Period building at the Holtshausen Farmstead complex.

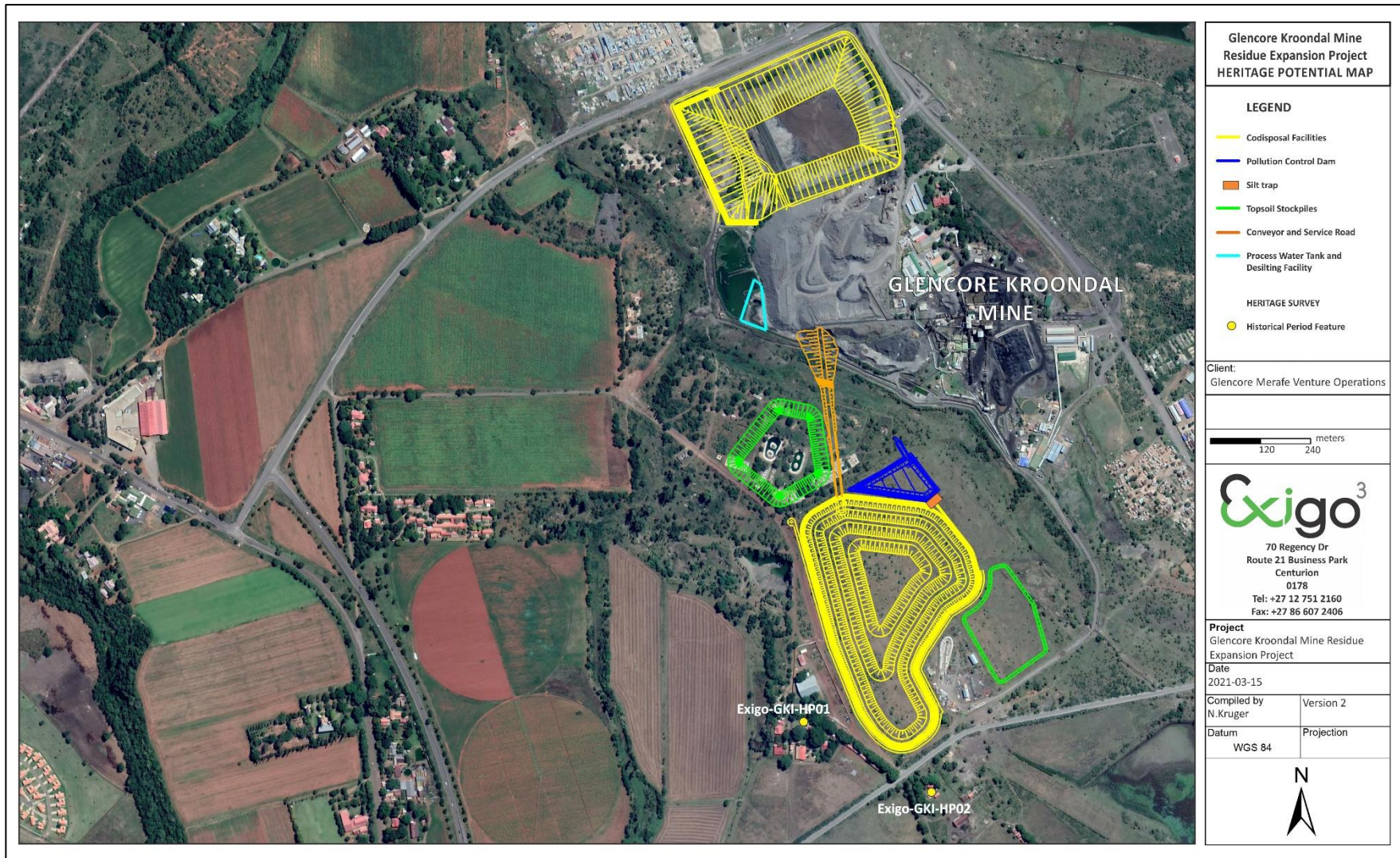


Figure 5-6: Aerial image indicating the location of heritage occurrences discussed in the text

6 RESULTS: STATEMENT OF SIGNIFICANCE AND IMPACT RATING

6.1 Potential Impacts and Significance Ratings²

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

6.1.1 General assessment of impacts on resources

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

6.1.2 Direct impact rating

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

Heritage receptors occur outside proposed project footprints zones in the surrounding landscape and no short- or long-term impact to heritage resources is foreseen.

6.2 Evaluation Impacts

6.2.1 Discussion: Evaluation of Results and Impacts

Previous studies conducted in the greater Rustenburg region suggest a rich and diverse archaeological landscape but the surroundings of the proposed for the Glencore Kroondal Mine Residue Expansion Project have been transformed by urbanization and industrialization. Cognisance should nonetheless be taken of previously undetected archaeological material that might be present in sub-surface deposits.

6.2.2 Archaeology

No archaeological objects or sites were noted in the proposed project footprint area. No impact on archaeological material is anticipated.

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

6.2.3 Built Environment

The study has not identified any buildings or structures which will be impacted by the proposed project and no impact on built environment sites is therefore anticipated. The Kroondal and Holtshausen farmstead complexes area situated more than 100m from the proposed project footprints and no impact on these sites is foreseen.

6.2.4 Cultural Landscape

Adjacent to the Glencore Kroondal Mine, the Kroondal settlement holds a rich history but the proposed project area has been transformed and degraded by urbanization and mining development. Further away from the project area, the landscape is typical of the urban and mining of North West with the Magaliesberg Mountain Range to the south and undulating hills to the south with flatter built-up plains in-between. This landscape stretches over many kilometres and the proposed project is unlikely to result in a significant impact on the landscape.

6.2.5 Graves / Human Burials Sites

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

6.3 Management actions

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

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

No specific action in terms of heritage site mitigation is required for the proposed Glencore Kroondal Mine Residue Expansion Project.

However, the following general procedure is proposed for the project area:

PROJECT COMPONENT/S	All phases of construction and operation.		
POTENTIAL IMPACT	Damage/destruction of sites.		
ACTIVITY RISK/SOURCE	Digging foundations and trenches into sensitive deposits that are not visible at the surface.		
MITIGATION: TARGET/OBJECTIVE	To locate previously undetected heritage remains / graves as soon as possible after disturbance so as to maximize the chances of successful rescue/mitigation work.		
MITIGATION: ACTION/CONTROL	RESPONSIBILITY	TIMEFRAME	
Fixed Mitigation Procedure (required)			
Site Monitoring: Regular examination of trenches and excavations.	ECO	Monitor as frequently as practically possible.	
PERFORMANCE INDICATOR	Archaeological sites are discovered and mitigated with the minimum amount of unnecessary disturbance.		
MONITORING	Successful location of sites by person/s monitoring.		

7 RECOMMENDATIONS

The proposed Glencore Kroondal Mine Residue Expansion Project area is situated in environments that have been transformed and degraded as a result of urbanization and mining and as such, no archaeological objects or sites, or features of heritage potential were noted during the site survey of the development footprint. It might be assumed that these areas have largely been sterilized of heritage remains, especially those dating to prehistorical times. The following general recommendations are made based on general observations in the proposed project footprint area:

- A Palaeontological Impact Assessment should be considered where bedrock is to be impacted on and, should fossil remains such as fossil fish, reptiles or vitrified wood be exposed during construction, these objects should be carefully safeguarded and the relevant heritage resources authority (SAHRA) should be notified immediately so that appropriate action can be taken by a professional palaeontologist.
- Kroondal and its surroundings have a long and extensive Colonial Period settlement history two Historical Period farmsteads occur in areas surrounding the proposed return water dam and tailings storage facility (**Exigo-GKI-HP01: Kroondal Farmstead** and **Exigo-GKI-HP02: Holsthausen Farmstead**). According to indications the sites are older than 60 years - and generally protected under the National Heritage Resource Act (NHRA 1999). However, the farmstead complexes area situated more than 100m from the proposed project footprints and no impact on these sites is foreseen. No specific action in terms of heritage site mitigation is required for these heritage resources.
- A general watching brief monitoring process is recommended for all stages of development of the proposed infrastructure expansion at the mine whereby an informed ECO inspects the construction sites on a regular basis in order to monitor possible impacts on heritage resources. Should any subsurface archaeological or historical material or heritage resources be exposed during construction activities, all activities should be suspended and the archaeological specialist should be notified immediately.
-

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.

8 GENERAL COMMENTS AND CONDITIONS

This AIA report serves to confirm the extent and significance of the heritage landscape of the proposed Glencore Kroondal Mine Residue Expansion Project area. The larger heritage horizon encompasses rich and diverse archaeological landscapes and cognizance should be taken of heritage resources and archaeological material that might be present in surface and sub-surface deposits. If, during construction, any possible archaeological material culture discoveries are made, the operations must be stopped and a qualified archaeologist be contacted for an assessment of the find. Such material culture might include:

- Formal Earlier Stone Age stone tools.
- Formal MSA stone tools.
- Formal LSA stone tools.
- Potsherds
- Iron objects.
- Beads made from ostrich eggshell and glass.
- Ash middens and cattle dung deposits and accumulations.
- Faunal remains.
- Human remains/graves.
- Stone walling or any sub-surface structures.
- Historical glass, tin or ceramics.
- Fossils.

If such sites were to be encountered or impacted by any proposed developments, recommendations contained in this report, as well as endorsement of mitigation measures as set out by AMAFA, SAHRA, the National Resources Act and the CRM section of ASAPA will be required.

It must be emphasised that the conclusions and recommendations expressed in this archaeological heritage sensitivity investigation are based on the visibility of archaeological sites/features and may not therefore, represent the area's complete archaeological legacy. Many sites/features may be covered by soil and vegetation and might only be located during sub-surface investigations. If subsurface archaeological deposits, artefacts or skeletal material were to be recovered in the area during construction activities, all activities should be suspended and the archaeological specialist should be notified immediately (**cf. NHRA (Act No. 25 of 1999), Section 36 (6)**). It must also be clear that Archaeological Specialist Reports will be assessed by the relevant heritage resources authority (SAHRA).

9 BIBLIOGRAPHY

9.1 Published Literature

- Acocks, J.P.H. 1988. Veld types of South Africa (3rd edition). Memoirs of the Botanical Survey of South Africa 57: 1-146
- Bergh, J.S. 1992. Die vestiging van die Voortrekkers noord van die Vaalrivier tot 1840. *Historia*, 37(2):38-42.
- Bergh, J.S. 1999. Geskiedenisatlas van Suid-Afrika: die vier noordelike provinsies. Pretoria: J.L. van Schaik.
- Breutz, P.L. 1953. The tribes of Rustenburg and the Pilanesberg districts. Pretoria: Government Printer.
- Breutz, P.L. 1986. A History of the Batswana and Origin of Bophuthatswana. Thumbprint: Margate.
- Burrow, J. 1971. Travels in the Wilds of Africa, being the diary of a young scientific assistant who accompanied Sir Andrew Smith in the expedition of 1834-1836. Edited by Kirby, P.R. Balkema: Cape Town.
- Chase, J.C. 1830. Substance of the Journal of two Trading Travellers, and of the Communications of a Missionary, regarding their recent visits to the Countries in the rear of the Portuguese Settlement at De la Goa Bay. South African Literary and Scientific Institution: 402-407.
- De Beer, B.K. 1975. Agter die Magalies. Postma Publikasies: Fontainebleau.
- Deacon, H.J. 1970. The Acheulian Occupation at Amanzi Springs Uitenhage District, Cape Province. Cape provincial museums at the Albany Museum
- Deacon, J. 1996. Archaeology for Planners, Developers and Local Authorities. National Monuments Council. Publication no. P021E.
- Deacon, J. 1997. Report: Workshop on Standards for the Assessment of Significance and Research Priorities for Contract Archaeology. In: Newsletter No 49, Sept 1998. Association for Southern African Archaeologists.
- Denbow, J.R. 1979. *Cenchrus ciliaris*: an ecological indicator of Iron Age middens using aerial photography in eastern Botswana. *South African Journal of Science* 75:405-408
- Esterhuysen, A., 2007. The Earlier Stone Age. In Bonner, P., Esterhuysen, A., Jenkins, T. (eds.): *A Search for Origins: Science, History and South Africa's 'Cradle of Humankind'*. Johannesburg: Wits University Press. Pg 110 -121.
- Evers, T.M. 1988. The recognition of Groups in the Iron Age of Southern Africa. PhD thesis. Johannesburg: University of the Witwatersrand.
- Hall, M. 1987. *The Changing Past: Farmers, Kings & Traders in Southern Africa 200 – 1860* Cape Town, Johannesburg: David Philip
- Hamilton, C. (Ed.) 1995. *The Mfecane Aftermath*. Johannesburg: Wits U.P.
- Harris, W.C. 1839. *The Wild Sports of Southern Africa*. London: John Murray.

Horn, A.C. 1996. Okkupasie van die Bankeveld voor 1840 n.C.: 'n sintese. Suid- Afrikaanse Tydskrif vir Etnologie, 19(1): 17-27.

Huffman, T.N. 2007. Handbook to the Iron Age. Pietermaritzburg: University of Kwazulu-Natal Press

Kirby, P.R. 1940. The Diary of Dr. Andrew Smith, director of the "Expedition for Exploring Central Africa," 1834-1836. The Van Riebeeck Society: Cape Town.

Lye, W.F. (ed.) 1975. Andrew Smith's Journal of his expedition into the interior of South Africa 1834-36. Cape Town: Balkema.

Maggs, T.M.O. 1976. Iron Age Communities of the Southern Highveld. Pietermaritzburg: University of Natal Press.

Mason, R.J. 1968. Iron Age settlement in the Transvaal and Natal revealed by aerial photography and excavation. African Studies, 27(4).

Mason, R.J. 1973. Iron Age research in the Western Transvaal. Current Anthropology, 14: 485-487.

Mason, R.J. 1974. Background to the Transvaal Iron Age - new discoveries at Olifantspoort and Broederstroom. Journal of the South African Institute of Metallurgy and Mining, 74(6): 211-216.

Mason, R.J. 1986. Origins of black people of Johannesburg and the Southern Western Central Transvaal AD 350-1880. Archaeological Research Unit, Occasional paper No 16. University of the Witwatersrand.

Moffat, R. 1842. Missionary Labours and Scenes in Southern Africa. London: John Snow.

Raper, P.E. 2004. South African place names. Johannesburg: Jonathan Ball Publishers

Swanepoel, N. et al (Eds.) 2008. Five hundred years rediscovered. Johannesburg: Wits University Press

Van der Ryst, M.M. 2006. 'Seeking Shelter: Hunter-Gatherer-Fishers of Olieboomspoort, Limpopo, South Africa.' PhD diss., University of the Witwatersrand.

Van Warmelo, N.J. 1935. A Preliminary Survey of the Bantu Tribes of South Africa. Ethnographic Publications No. 5. Pretoria: Government Printer.

9.2 Unpublished Sources and Reports

Fourie, W. 2012. Wachteenbietjesdraai 350 KQaAnd Kwaggashoek 345 KQ Heritage Impact Report on proposed mining activities of Project Phoenix. PGS Heritage Consultants

Fourie, W. 2014. Steenbokpan Township Development. 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, west of Lephalale in the Lephalale Local Municipality, Waterberg District, Limpopo Province. Client: Flexilor Properties (Pty) Ltd . PGS Heritage Consultants

Hutten, M. 2010. Heritage Impact Assessment for the proposed De Put Residential Township Development south of Northam, Limpopo Province

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 Projekbestuur (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 Projekbestuur, die Oorgangsraad van Rustenburg en Fox Lake & Machouse Ontwikkelaars.

Pistorius, J.C.C. 1997. Survey of Mmatshetshela 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. Mmatshetshela, 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 Buffelschroem/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 Buffelschroem/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 Tweedevoort (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.
- Pistorius, J.C.C. 2010. A Phase I Heritage Impact Assessment (HIA) study for X Strata Alloy's Kroondal Chrome Mine on the farm Kroondal 304JQ near Rustenburg in the Central Bankeveld of the North-West Province
- 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. 2001. A survey of cultural resources in two development areas, Amandelbult, Northern Province. Unpublished report 2001KH13. 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.

Van Vollenhoven, A. July 2013. A Report on a Cultural Heritage Impact Assessment for the Continental Limestone Mine, close to Thabazimbi, Limpopo Province.

9.3 Archive Sources and Maps

Troye 1899: New Railway and Postal Map of the Transvaal Colony

Jeppe 1899: Map of the Transvaal or SA Republic and Surrounding Territories

9.4 Web Sources and Legislation

Human Tissue Act and Ordinance 7 of 1925, Government Gazette, Cape Town

National 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.

www.sahra.org.za/sahris

Accessed 2019-06-20

<http://csq.dla.gov.za/index.html>

Accessed 2019-06-20

<https://ruralexploration.co.za/Kroondal.html>

Accessed 2019-06-20

10 ADDENDUM 1: HERITAGE LEGISLATION BACKGROUND

10.1 CRM: Legislation, Conservation and Heritage Management

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

10.1.1 Legislation regarding archaeology and heritage sites

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

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

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

The Act identifies heritage objects as:

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

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

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

and

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

- (d) *destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite;*
- (e) *destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or object or any meteorite;*

- (f) *trade in, sell for private gain, export or attempt to export from the Republic any category of archaeological or palaeontological material or object, or any meteorite; or*
- (g) *bring onto or use at an archaeological or palaeontological site any excavation equipment or any equipment which assist in the detection or recovery of metals or archaeological and palaeontological material or objects, or use such equipment for the recovery of meteorites. (35. [4] 1999:58)."*

and

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

- (h) *destroy, damage, alter, exhume or remove from its original position or otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves;*
- (i) *destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority;*
- (j) *bring onto or use at a burial ground or grave referred to in paragraph (a) or (b) and excavation equipment, or any equipment which assists in the detection or recovery of metals (36. [3] 1999:60)."*

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

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

10.1.2 Background to HIA and AIA Studies

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

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

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

development categorised as:

- (a) the construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;
- (b) the construction of a bridge or similar structure exceeding 50m in length;
- (c) any development or other activity which will change the character of a site:
 - (i) exceeding 5 000 m² 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 m² in extent; or
- (e) any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority,

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

And:

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

- (k) The identification and mapping of all heritage resources in the area affected;
- (l) an assessment of the significance of such resources in terms of the heritage assessment criteria set out in section 6(2) or prescribed under section 7;
- (m) an assessment of the impact of the development on such heritage resources;
- (n) an evaluation of the impact of the development on heritage resources relative to the sustainable social and economic benefits to be derived from the development;
- (o) the results of consultation with communities affected by the proposed development and other interested parties regarding the impact of the development on heritage resources;
- (p) if heritage resources will be adversely affected by the proposed development, the consideration of alternatives; and
- (q) plans for mitigation of any adverse effects during and after the completion of the proposed development (38. [3] 1999:64).”

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

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

10.2 Assessing the Significance of Heritage Resources

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

- Categories of significance

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

- *Aesthetic value:*

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

- *Historic value:*

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

- *Scientific value:*

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

- *Social value:*

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

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

Formally protected sites:

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

Generally protected sites:

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

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

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

A fundamental aspect in assessing the significance and protection status of a heritage resource is often

whether or not the sustainable social and economic benefits of a proposed development outweigh the conservation issues at stake. When, for whatever reason the protection of a heritage site is not deemed necessary or practical, its research potential must be assessed and mitigated in order to gain data / information, which would otherwise be lost.

11 ADDENDUM 2: CONVENTIONS USED TO ASSESS THE SIGNIFICANCE OF HERITAGE

11.1 Site Significance Matrix

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

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

11.2 Impact Assessment Criteria

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

Significance of the heritage resource

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

Nature of the impact

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

Extent

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

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

Duration

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

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

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

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

Intensity

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

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

Probability

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

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

Confidence

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

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

Impact Significance

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

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

11.3 Direct Impact Assessment Criteria

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

HERITAGE CONTEXT	TYPE OF DEVELOPMENT			
	CATEGORY A	CATEGORY B	CATEGORY C	CATEGORY D
CONTEXT 1 High heritage Value	Moderate heritage impact expected	High heritage impact expected	Very high heritage impact expected	Very high heritage impact expected
CONTEXT 2 Medium to high heritage value	Minimal heritage impact expected	Moderate heritage impact expected	High heritage impact expected	Very high heritage impact expected
CONTEXT 3 Medium to low heritage value	Little or no heritage impact expected	Minimal heritage impact expected	Moderate heritage impact expected	High heritage impact expected
CONTEXT 4 Low to no heritage value	Little or no heritage impact expected	Little or no heritage impact expected	Minimal heritage value expected	Moderate heritage impact expected

NOTE: A DEFAULT "LITTLE OR NO HERITAGE IMPACT EXPECTED" VALUE APPLIES WHERE A HERITAGE RESOURCE OCCURS OUTSIDE THE IMPACT ZONE OF THE DEVELOPMENT.

HERITAGE CONTEXTS	CATEGORIES OF DEVELOPMENT
<p>Context 1: Of high intrinsic, associational and contextual heritage value within a national, provincial and local context, i.e. formally declared or potential Grade 1, 2 or 3A heritage resources</p> <p>Context 2: Of moderate to high intrinsic, associational and contextual value within a local context, i.e. potential Grade 3B heritage resources.</p> <p>Context 3:</p>	<p>Category A: Minimal intensity development</p> <ul style="list-style-type: none"> - No rezoning involved; within existing use rights. - No subdivision involved. - Upgrading of existing infrastructure within existing envelopes - Minor internal changes to existing structures - New building footprints limited to less than 1000m². <p>Category B: Low-key intensity development</p> <ul style="list-style-type: none"> - Spot rezoning with no change to overall zoning of a site. - Linear development less than 100m

<p>Of medium to low intrinsic, associational or contextual heritage value within a national, provincial and local context, i.e. potential Grade 3C heritage resources</p> <p>Context 4: Of little or no intrinsic, associational or contextual heritage value due to disturbed, degraded conditions or extent of irreversible damage.</p>	<ul style="list-style-type: none"> - Building footprints between 1000m2-2000m2 - Minor changes to external envelop of existing structures (less than 25%) - Minor changes in relation to bulk and height of immediately adjacent structures (less than 25%). <p>Category C: Moderate intensity development</p> <ul style="list-style-type: none"> - Rezoning of a site between 5000m2-10 000m2. - Linear development between 100m and 300m. - Building footprints between 2000m2 and 5000m2 - Substantial changes to external envelop of existing structures (more than 50%) - Substantial increase in bulk and height in relation to immediately adjacent buildings (more than 50%) <p>Category D: High intensity development</p> <ul style="list-style-type: none"> - Rezoning of a site in excess of 10 000m2 - Linear development in excess of 300m. - Any development changing the character of a site exceeding 5000m2 or involving the subdivision of a site into three or more erven. - Substantial increase in bulk and height in relation to immediately adjacent buildings (more than 100%)
--	--

11.4 Management and Mitigation Actions

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

<p>No further action / Monitoring</p> <p>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.</p> <p>Avoidance</p> <p>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.</p> <p>Mitigation</p> <p>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.</p> <p>Compensation</p> <p>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.</p> <p>Rehabilitation</p> <p>Rehabilitation is considered in heritage management terms as a intervention typically involving the adding of a new heritage layer to enable a new sustainable use. It is not appropriate when the process necessitates the removal of previous historical layers, i.e. restoration of a building or place to the previous state/period. It is an appropriate heritage management action in the following cases:</p> <ul style="list-style-type: none"> - 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. <p>Enhancement</p>
--

