



SEDEX MINERALS: ZANDKOPSDRIFT RARE EARTH MINE - ROAD UPGRADE, GARIES AREA, NORTHERN & WESTERN CAPE PROVINCES

Archaeological Impact Assessment Report

June 2014

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Compiled by N. Kruger



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ARCHAEOLOGICAL IMPACT ASSESSMENT ON PORTIONS OF THE FARMS BRUINTJESHOOGTE 40, MOORDENAARSKRAAL 41, STOFKRAAL 42 & ZANDKOPSDRIFT 375 FOR THE ZANDKOPSDRIFT ROAD UPGRADE PROJECT, NORTHERN AND WESTERN CAPE PROVINCES

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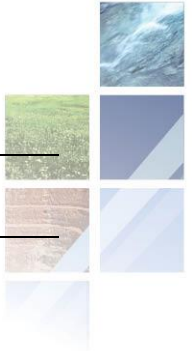


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AGES Gauteng promotes the conservation of sensitive archaeological and heritage resources and therefore uncompromisingly adheres to relevant Heritage Legislation (National Heritage Resources Act no. 25 of 1999, Human Tissue Act 65 of 1983 as amended, 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, AGES Gauteng 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).

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 Sedex Minerals (Pty) Ltd Zandkopsdrift Road Upgrade 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 expertise in conducting the specialist report relevant to this application, including knowledge of 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 and the CRM section of ASAPA), regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- 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: AGES Gauteng

Date: 6 June 2014

NOTATIONS AND TERMS

Absolute dating:

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

Archaeology:

The study of the human past through its material remains.

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 artifact 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.

¹⁴C or radiocarbon dating:

The ¹⁴C method determines the absolute age of organic material by studying the radioactivity of carbon. It is reliable for objects not older than 70 000 years by means of isotopic enrichment. The method becomes increasingly inaccurate for samples younger than ±250 years.

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.

Culture:

A contested term, "culture" could minimally be defined as the learned and shared things that people have, do and think.

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.

Ecofact:

Non artifactual material remains that has cultural relevance which provides information about past human activities. Examples would include remains or evidence of domesticated animals or plant species.

Excavation:

The principal method of data acquisition in archaeology, involving the systematic uncovering of archaeological remains through the removal of the deposits of soil and the other material covering and accompanying it.

Feature:

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

GIS:

Geographic Information Systems are computer software that allows layering of various types of data to produce complex maps; useful for predicting site location and for representing the analysis of collected data within sites and across regions.

Historical archaeology:

Primarily that aspect of archaeology which is complementary to history based on the study of written sources. In the South African context it concerns the recovery and interpretation of relics left in the ground in the course of Europe's discovery of South Africa, as well as the movements of the indigenous groups during, and after the "Great Scattering" of Bantu-speaking groups – known as the *mfecane* or *difaqane*.

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 in on archaeological sites.

Management / Management Actions: Actions – including planning and design changes - that enhance benefits associated with a proposed development, or that avoid, mitigate, restore, rehabilitate or compensate for the negative impacts.

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.

Megalith:

A large stone, often found in association with others and forming an alignment or monument, such as large stone statues.

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.

Oral Histories:

The historical narratives, stories and traditions passed from generation to generation by word of mouth.

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.



Prehistoric archaeology:

That aspect of archaeology which concerns itself with the development of humans and their culture before the invention of writing. In South Africa, prehistoric archaeology comprises the study of the Early Stone Age, the Middle Stone Age and the greater part of the Later Stone Age and the Iron Age.

Probabilistic Sampling:

A sampling strategy that is not biased by any person's judgment or opinion. Also known as statistical sampling, it includes systematic, random and stratified sampling strategies.

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.

Relative dating:

The process whereby the relative antiquity of sites and objects are determined by putting them in sequential order but not assigning specific dates.

Remote Sensing:

The small or large-scale acquisition of information of an object or phenomenon, by the use of either recording or real-time sensing device(s) that is not in physical or intimate contact with the object (such as by way of aircraft, spacecraft or satellite). Here, ground-based geophysical methods such as Ground Penetrating Radar and Magnetometry are often used for archaeological imaging.

Rock Art Research:

Rock art can be "decoded" in order to inform about cultural attributes of prehistoric societies, such as dress-code, hunting and food gathering, social behaviour, religious practice, gender issues and political issues.

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.

Sensitive:

Often refers to graves and burial sites although not necessarily a heritage place, as well as ideologically significant sites such as ritual / religious places. *Sensitive* may also refer to an entire landscape / area known for its significant heritage remains.

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,

Stone Age:

An archaeological term used to define a period of stone tool use and manufacture.

Stratigraphy:

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

Stratified Sampling:

A probabilistic sampling strategy whereby a study area is divided into appropriate zones – often based on the probable location of

archaeological areas, after which each zone is sampled at random.

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.

Tradition:

Artefact types, assemblages of tools, architectural styles, economic practices or art styles that last longer than a phase and even a horizon are describe by the term *tradition*. A common example of this is the early Iron Age tradition of Southern Africa that originated ± 200 AD and came to an end at about 900 AD.

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.

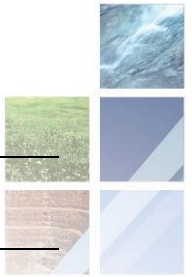
LIST OF ABBREVIATIONS

Abbreviation	Description
ASAPA	Association for South African Professional Archaeologists
AIA	Archaeological Impact Assessment
BP	Before Present
BCE	Before Common Era
EIA	Environmental Impact Assessment
ESA	Earlier Stone Age
GIS	Geographic Information Systems
HIA	Heritage Impact Assessment
LSA	Later Stone Age
MRA	Mining Rights Application
MSA	Middle Stone Age
NHRA	National Heritage Resources Act No.25 of 1999, Section 35
SAHRA	South African Heritage Resources Association
YCE	Years before Common Era (Present)

TABLE OF CONTENTS

1	EXECUTIVE SUMMARY	10
2	BACKGROUND.....	11
2.1	SCOPE AND MOTIVATION.....	11
2.2	PROJECT DIRECTION	11
2.3	TERMS OF REFERENCE	11
2.4	CRM: LEGISLATION, CONSERVATION AND HERITAGE MANAGEMENT	12
2.4.1	<i>Legislation regarding archaeology and heritage sites</i>	<i>12</i>
2.4.2	<i>Background to HIA and AIA Studies</i>	<i>13</i>
3	REGIONAL CONTEXT	16
3.1	AREA LOCATION.....	16
3.2	AREA DESCRIPTION: RECEIVING ENVIRONMENT	17
3.3	SITE & PROJECT DESCRIPTION	17
4	METHOD OF ENQUIRY	20
4.1	SOURCES OF INFORMATION	20
4.1.1	<i>Desktop Study</i>	<i>20</i>
4.1.2	<i>Aerial Representations and Survey</i>	<i>20</i>
4.1.3	<i>Field Survey</i>	<i>20</i>
4.1.4	<i>General Public Liaison.....</i>	<i>21</i>
4.2	LIMITATIONS	21
4.2.1	<i>Access.....</i>	<i>21</i>
4.2.2	<i>Visibility.....</i>	<i>21</i>
4.2.3	<i>Limitations and Constraints</i>	<i>23</i>
5	RESULTS: ARCHAEOLOGICAL SURVEY.....	24
5.1	THE STONE AGE	24
5.1.1	<i>Stone Age Area SA01 (S30.863441 E17.987321).....</i>	<i>24</i>
5.2	HISTORICAL / COLONIAL PERIOD AND RECENT TIMES.....	25
5.3	GRAVES	25
6	ARCHAEO-HISTORICAL CONTEXT.....	27
6.1	THE ARCHAEOLOGY OF SOUTHERN AFRICA.....	27
6.1.1	<i>The Stone Ages</i>	<i>27</i>
6.1.2	<i>Historical and Colonial Times and Recent History.....</i>	<i>28</i>
6.2	THE ZANDKOPSDRIFT ROAD UPGRADE PROJECT AREA: DISCUSSION	28
6.2.1	<i>Stone Age Occurrences in the Region</i>	<i>28</i>
6.2.2	<i>The Stone Age archaeology of Zandkopsdrift</i>	<i>28</i>
6.2.3	<i>Zandkopsdrift in Colonial times.</i>	<i>31</i>
7	RESULTS: STATEMENT OF SIGNIFICANCE AND IMPACT RATING.....	31
7.1	HERITAGE RESOURCES MANAGEMENT AND CONSERVATION.....	31

7.2	CATEGORIES OF SIGNIFICANCE	31
7.3	POTENTIAL IMPACTS AND SIGNIFICANCE RATINGS	33
7.3.1	<i>General assessment of impacts on resources</i>	33
7.3.2	<i>Direct impact rating</i>	35
7.3.3	<i>Management actions</i>	36
7.3.4	<i>Site significance and impact rating</i>	37
7.4	DISCUSSION: EVALUATION OF RESULTS AND IMPACTS	39
8	RECOMMENDATIONS.....	41
9	GENERAL COMMENTS AND CONDITIONS	41
10	BIBLIOGRAPHY.....	43



LIST OF FIGURES

Figure 3-1: 1:50 00 Map representation of the location of the proposed Zandkopsdrift Road Upgrade Project (3018CC). The preferred route for the road is indicated in red and an alternative is indicated in black.	16
Figure 3-2: Aerial image detailing the Zandkopsdrift Road Upgrade Project area in relation to the proposed Zandkopsdrift Mine.	18
Figure 3-3: Map indicating the Zandkopsdrift Road Upgrade Project area in terms of its regional context.	19
Figure 4-1: View of general surroundings at the eastern offset of the proposed road route near the N7, looking south.	21
Figure 4-2: The OP09810 provincial road towards the settlement of Stofkraal.	22
Figure 4-3: View of general surroundings at the settlement of Stofkraal.	22
Figure 4-4: View of general surroundings towards the western offset of the proposed road route at Zandkopsdrift.	23
Figure 5-1: Quartzite intrusion containing Middle and Later Stone Age material, documented at Stone Age area SA01 on the farm Zandkopsdrift.	24
Figure 5-2: Stone Age material recorded at Stone Age Area SA01 on Zandkopsdrift: MSA core (left), large retouched MSA Scraper (centre) and a retouched LSA scraper (right).	25
Figure 5-3: Selection of stone tools from Swartkop Hill at Zandkopsdrift, similar to those found during the road upgrade study.	25
Figure 5-4: Map indicating the locations of archaeological and historical occurrences discussed in the text.	26
Figure 6-1: A selection of blades from the Zandkopsdrift MSA assemblages.	30
Figure 6-2: Selection of awls from the Zandkopsdrift MSA assemblages.	30

LIST OF TABLES

Table 1 Chronological Periods across southern Africa	27
Table 2: Heritage Site Significance Ratings.....	32
Table 3: Impact Assessment Criteria.....	34
Table 4: Direct Impact Assessment Criteria	35
Table 5: Management and Mitigation Actions	36
Table 6: Stone Age Area SA01	37

1 EXECUTIVE SUMMARY

This report details the results of an Archaeological Impact Assessment (AIA) for a proposed upgrade of an access road for the proposed Zandkopsdrift rare earth mine in the Garies area of the Northern and Western Cape Provinces. The studies were requested by Sedex Minerals (Pty) Ltd for the Zandkopsdrift Road Upgrade Project. The report includes background information on the area's archaeology, its representation in southern Africa, and the history of the larger area under investigation, survey methodology and results as well as heritage legislation and conservation policies. A copy of the report will be supplied to the South African Heritage Resources Agency (SAHRA) and recommendations contained in this document will be reviewed in order to consider the conservation priority of sites located in the area.

During the survey, medium to low densities of Middle Stone Age (MSA) artefact scatters were observed in the study area along sections of the preferred and alternative routes for the proposed road upgrade, directly east of Swartkop Hill on the farm Zandkopsdrift. Such Stone Age occurrences are significant but they occur widely in the Zandkopsdrift area. These occurrences have been the subject of detailed heritage assessment and specialist studies as part of the separate EIA process currently being conducted for the proposed Zandkopsdrift Mine. Cognisant of the fact that SAHRA concluded that the Zandkopsdrift Stone Age horizon had been adequately studied and documented through these studies, and that a thorough and adequate representation of the Stone Age legacy of the area has been preserved, no further action in terms of the documentation / preservation of the sites is recommended. However the area should be monitored during construction of the road in order to avoid the destruction of previously undetected heritage remains. ***However, it should be noted that both route options will impact on Stone Age scatters but the preferred route option will have the least impact on these resources. Therefore the preferred option is considered most favourable in terms of heritage resources management.***

It is essential that cognisance be taken of the larger archaeological landscape of the area in order to avoid the destruction of previously undetected heritage sites. Here, care should be taken around rock faces and outcrops in the larger landscape, as rock art is known to occur on these outcrops. Water sources such as drainage lines and rivers should also be regarded as potentially sensitive in terms of possible Stone Age and Iron Age deposits. The possible existence of Historical Period resources deriving from the area's more recent history should also be considered. Graves and cemeteries generally occur around homesteads and utmost care should be taken not to disturb these high risk heritage resources as they involve complex intrinsic social and ritual attributes within the community. 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 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).

2 BACKGROUND

2.1 Scope and Motivation

Sedex Minerals (Pty) Ltd is planning the construction of an access road linking the N7 with the proposed Zandkopsdrift rare earth mine site, about 30km south of Garies on the border between the Northern and Western Cape. AGES Gauteng was commissioned to conduct an AIA study for the project. The rationale of the study was to determine the presence of heritage resources such as archaeological and historical sites and features, graves and places of religious and cultural significance; 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.

2.2 Project Direction

AGES's expertise ensures that all projects be conducted to the highest international ethical and professional standards. As archaeological specialist for AGES, Mr Neels Kruger acted as field director for the project; responsible for the assimilation of all information, the compilation of the final 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.

2.3 Terms of Reference

Heritage specialist input in Environmental Impact Assessment (EIA) processes is essential to ensure that through the management of change, development conserves our heritage. Heritage specialist input in EIA processes can play a positive role in the development process by enriching an understanding of the past and its contribution to the present. It is also a legal requirement for certain categories of development defined in the relevant heritage legislation, which may have an impact on heritage resources.

Thus, EIAs should, in all cases, include the 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 (see Section 34), archaeological sites and material (see Section 35) and graves as well as burial sites (see Section 36). The objective of this legislation is to enable and to facilitate developers to employ 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 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).

2.4 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.

2.4.1 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.

- *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-

- (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).”*

- *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.

2.4.2 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:

- (a) The identification and mapping of all heritage resources in the area affected;*
- (b) 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;*
- (c) an assessment of the impact of the development on such heritage resources;*
- (d) 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;*

- (e) *the results of consultation with communities affected by the proposed development and other interested parties regarding the impact of the development on heritage resources;*
- (f) *if heritage resources will be adversely affected by the proposed development, the consideration of alternatives; and*
- (g) *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.

3 REGIONAL CONTEXT

3.1 Area Location

The proposed Zandkopsdrift rare earth mining area is situated approximately 50 km inland from the west coast of South Africa and about 30km south of the town of Garies in the Namaqualand Area on the provincial border between the Northern and Western Cape. The N7 freeway passes some 20km east of the mining site and a smaller provincial dirt road, which forms part of the study area, connects the mine site to the N7. The area is located in the Sandveld below the foothills of the Kamiesberg Mountains on the southern banks of the Swart-Doring River, a tributary of the Groen River.

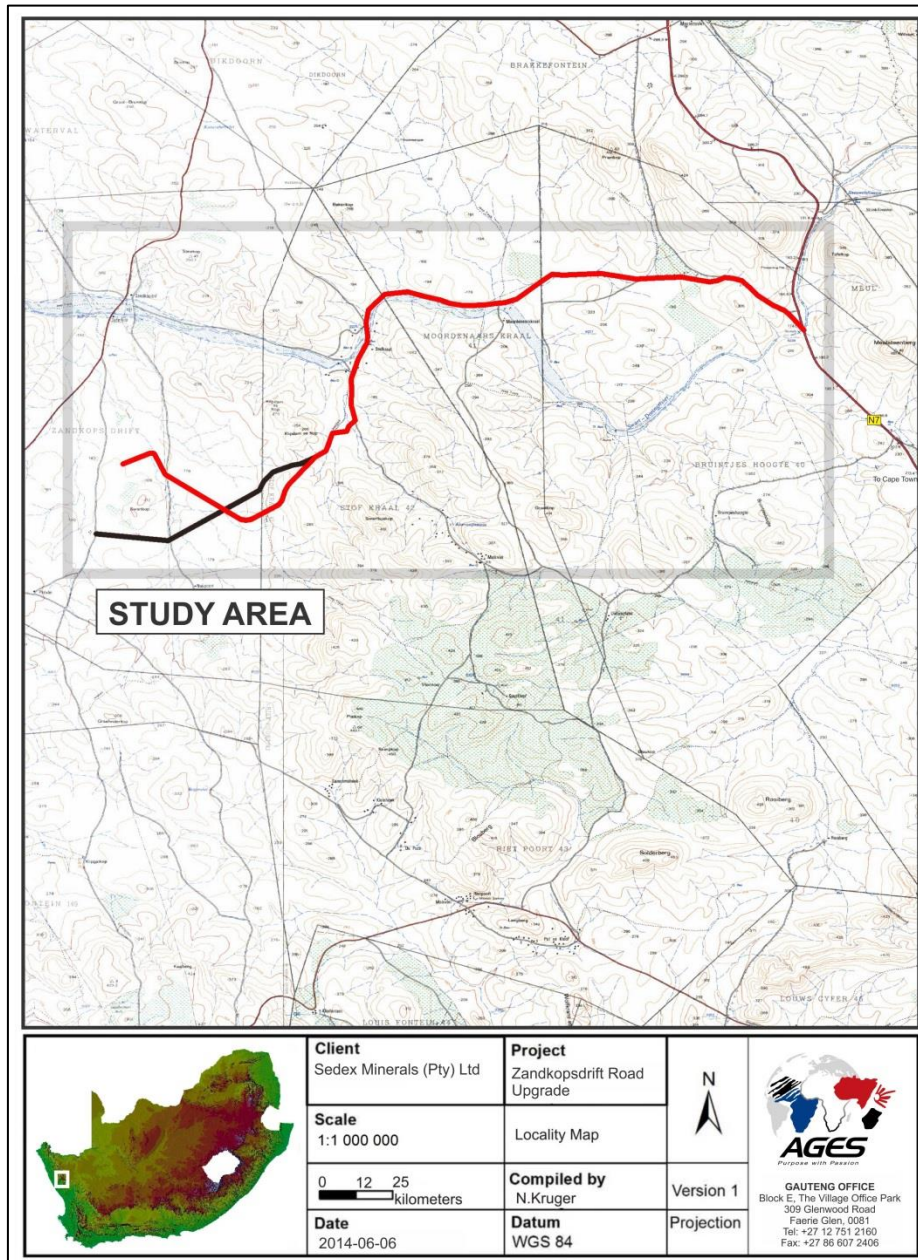


Figure 3-1: 1:50 00 Map representation of the location of the proposed Zandkopsdrift Road Upgrade Project (3018CC). The preferred route for the road is indicated in red and an alternative is indicated in black.

3.2 Area Description: Receiving Environment

The Namaqualand region has a semi-arid climate with an annual precipitation index of less than 115 mm per year. Zandkopsdrift is characterised by gently rolling hills dissected by broad alluvial areas that support small seasonal streams, in an area that is generally known as the Hardeveld. The area is situated in the Succulent Karoo, which is characterised by an abundance of dwarf leaf succulents (Helme 2011). Numerous seasonal drainage lines are evident, which flow only after heavy rains. The aridity of the site means that the area is not suitable for cultivation, and like large parts of Namaqualand the primary land-use is sheep farming. The basic soils in the area are loamy, alkaline silts in the alluvial areas, which may be replaced or overlain by granitic sands, and the target carbonatites of the main rocky outcrop and small outliers, which range from brown to black to grey.

3.3 Site & Project Description

The proposed Sedex Minerals (Pty) Ltd Zandkopsdrift rare earth mine includes infrastructure such as a tailings dam, mine production plant and stockpile area as well as the resource mining area on Swartkop Hill. This report deals with two suggested routes for the proposed access road, which will connect the N7 national road with the proposed mine site. The proposed routes for the access road predominantly follows smaller provincial roads (Road OP09810 for 10.7km and Road OP09811 for 2.55km) to the small settlement of Stofkraal, but from there sections of smaller farm roads are traversed for 6.79km to the proposed mine site. The routes cover sections of the farms Bruintjeshoogte 40, Moordenaarskraal 41, Stofkraal 42 in the Western Cape Province, and the farm Zandkopsdrift 375 in the Northern Cape Province. The preferred route links to the north of the proposed Zandkopsdrift mine and the alternative connects to the mine site in the south (see Image 3-2).

The road will mainly be utilised as a mine haul road for the transportation of the mined product and chemical reagents to the mine site and south to Saldanha. The proposed route alignment follows the Swart-Doring River for a large part and crosses the river at Stofpoort.

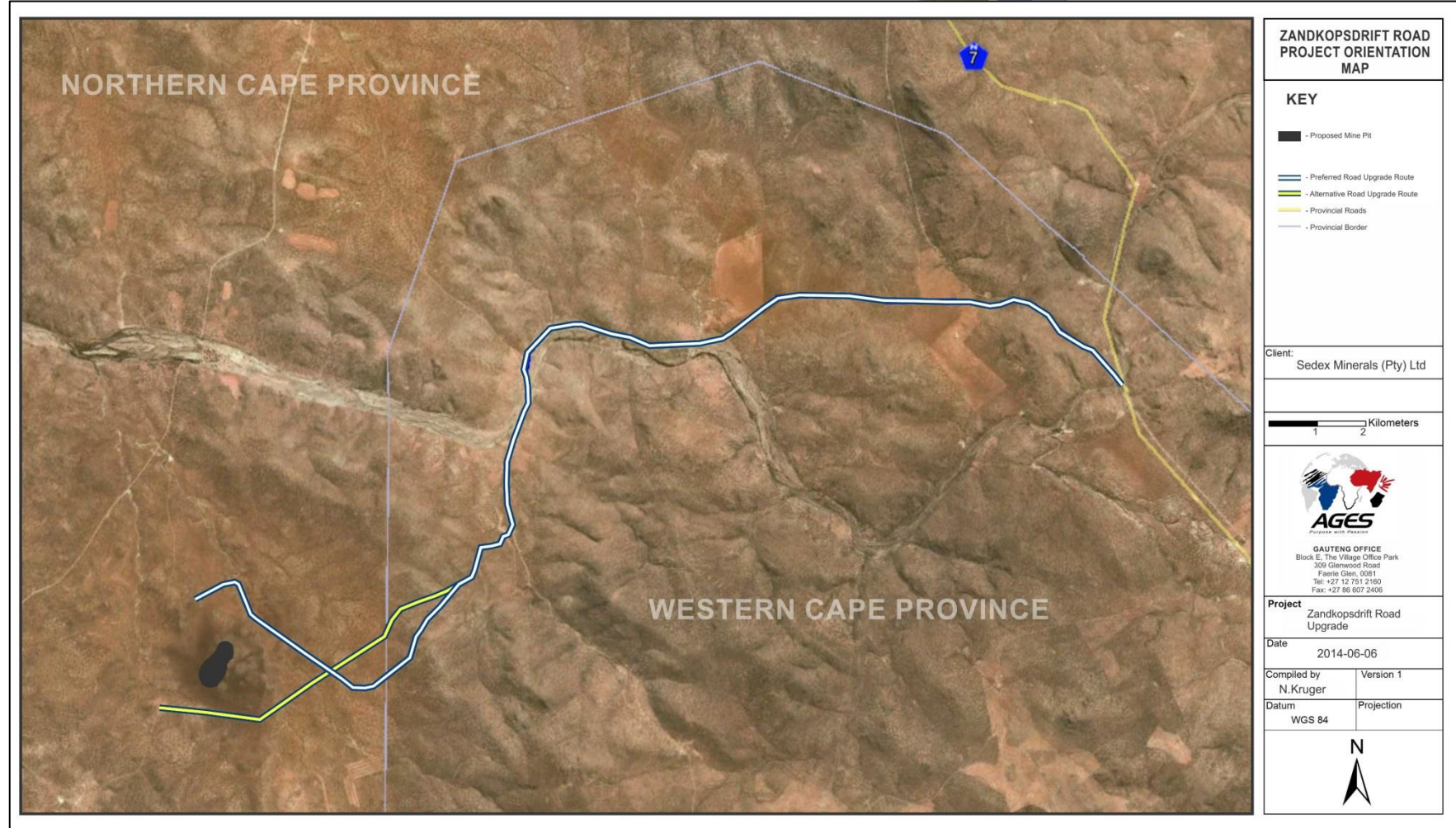


Figure 3-2: Aerial image detailing the Zandkopsdrift Road Upgrade Project area in relation to the proposed Zandkopsdrift Mine.

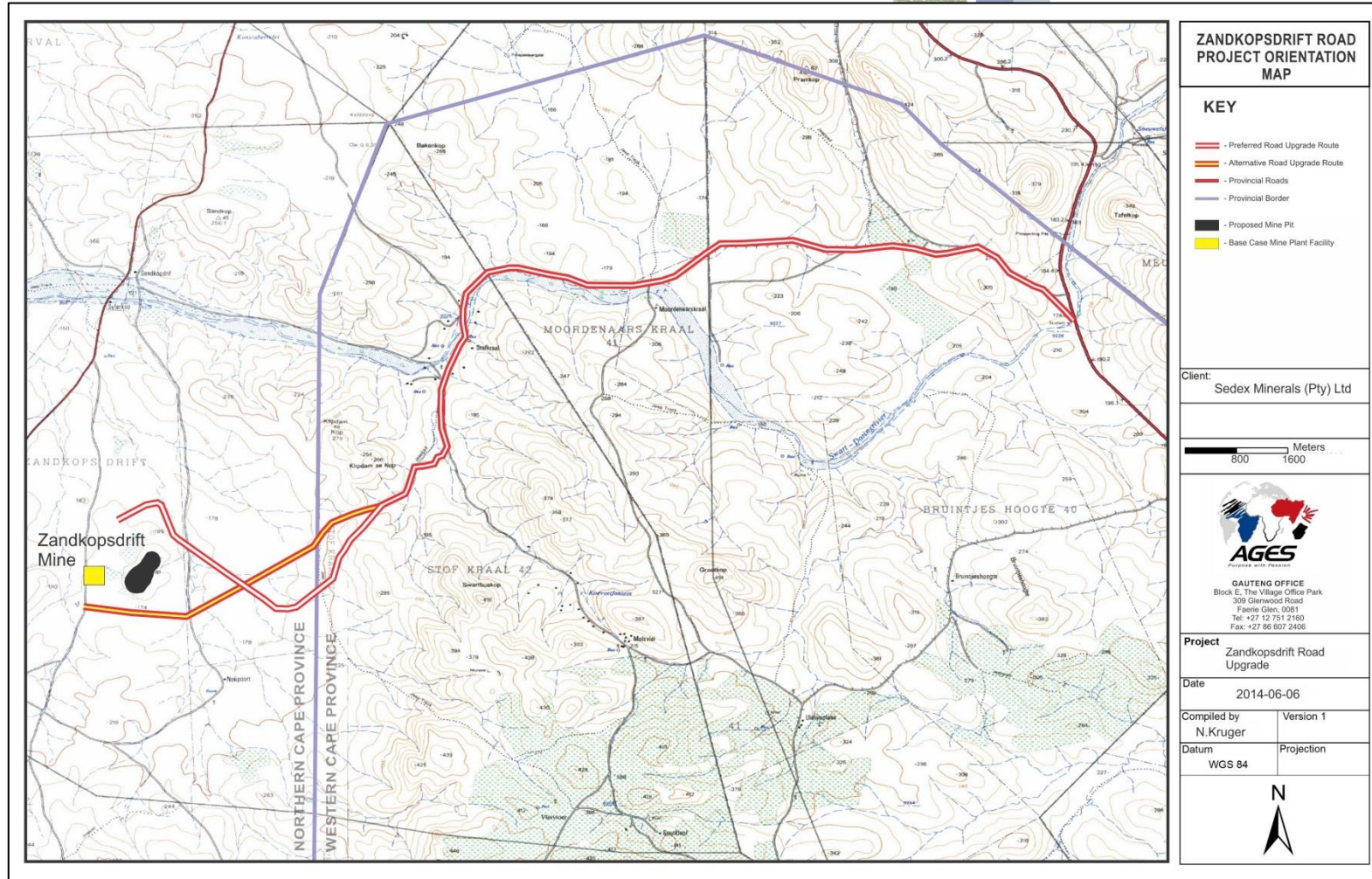


Figure 3-3: Map indicating the Zandkopsdrift Road Upgrade Project area in terms of its regional context.

4 METHOD OF ENQUIRY

4.1 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.

4.1.1 Desktop Study

A desktop study was prepared in order to contextualize the proposed project within a larger historical milieu. The study focused on relevant previous studies, archaeological and archival sources, Heritage Impact Assessment Reports, aerial photographs, historical maps and local histories, all pertaining to the Zandkopsdrift area and the larger landscape of this section of the Namaqualand.

4.1.2 Aerial Representations and 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 great success in the pedestrian and vehicular survey at Zandkopsdrift, where contour lines of elevations, 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. By superimposing high frequency aerial photographs with images generated with Google Earth, potential sensitive areas were subsequently identified, geo-referenced and transferred to a handheld GPS device. In addition, based on existing knowledge of the local heritage landscape, the farms were divided into smaller survey zones centred around areas of higher site catchment probability (where human activity was likely to occur in prehistoric and historic times e.g. around water sources, near soils fit for agriculture, on ridges). These survey zones were then transferred to a handheld GPS device. These areas served as referenced points from where further vehicular and pedestrian surveys were carried out

4.1.3 Field Survey

Archaeological survey implies the systematic procedure of the identification of archaeological sites. An archaeological survey of areas to be impacted by the proposed Zandkopsdrift Road Upgrade Project was conducted in April 2013. The process encompassed a systematic field survey 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 farms were systematically surveyed, GPS reference points were visited and random spot checks were made (see detail in previous section). Using a Garmin E-trex Legend GPS; objects and structures of archaeological / heritage value were recorded and photographed with a Canon 450D 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. As most archaeological material occur in single or multiple stratified layers beneath the soil surface, special attention was given to disturbances, both man-made such as roads and clearings, as well as those made by natural agents such as burrowing animals and erosion.

4.1.4 General Public Liaison

Consultation with Sedex employees provided information on the general history of the area, possible locations of heritage resources and brief commentaries on the recent history of the area.

4.2 Limitations

4.2.1 Access

Access to the route of the proposed access road covering the farms Brintjeshoogte, Moordenaarskraal and Stofkraal in the Western Cape section of the study area, is obtained via the OP09810 and OP09811 provincial roads through the Stofkraal settlement. Proposed road sections on the farm Zandkopsdrift in the Northern Cape extending to the mine site is accessed via a regional road from Garies connecting to the Zandkopsdrift farm entrance and the site office. On site, smaller farm service roads provided access to the survey areas and no access constraints were encountered.

4.2.2 Visibility

The surrounding vegetation in this portion of the Namaqualand is mostly comprised out of mixed dwarf leaf succulents and small shrubs. The general visibility at the time of the AIA survey (April 2013) was high across the entire terrain (see Figures 4-1 to 4-4). In single cases during the survey sub-surface inspection was possible where surface excavations have taken place. Where applied, this revealed no archaeological deposits.



Figure 4-1: View of general surroundings at the eastern offset of the proposed road route near the N7, looking south.

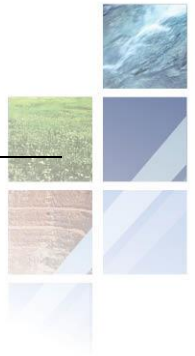


Figure 4-2: The OP09810 provincial road towards the settlement of Stofkraal.



Figure 4-3: View of general surroundings at the settlement of Stofkraal



Figure 4-4: View of general surroundings towards the western offset of the proposed road route at Zandkopsdrift.

4.2.3 Limitations and Constraints

The pedestrian and vehicular survey of the project area 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. However, the following constraints were encountered:

- **Visibility:** Visibility proved to be a minor constraint in more pristine areas where documented sites proved to be somewhat overgrown and obstructed by surface vegetation.

Thus, even though it might be assumed that survey findings are representative of the heritage landscape of the study 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 on the property. 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.

5 RESULTS: ARCHAEOLOGICAL SURVEY

5.1 The Stone Age

5.1.1 Stone Age Area SA01 (S30.863441 E17.987321)

During the survey, medium to low densities of Middle Stone Age (MSA) artefact scatters were observed in the study area along sections of the preferred and alternative routes for the proposed road upgrade, directly east of Swartkop Hill on the farm Zandkopsdrift. These occurrences are located within the context of large quartzite exposures in a large drainage line, a tributary of the Swart-Doring River. In most instances, the MSA material occur in open contexts. Some of the flakes could also be attributed to the Later Stone Age (LSA), as secondary retouching of the artefacts was noted.



Figure 5-1: Quartzite intrusion containing Middle and Later Stone Age material, documented at Stone Age area SA01 on the farm Zandkopsdrift

Stone Age occurrences such as those noted above are significant, but they occur widely in the Zandkopsdrift area. These occurrences have been the subject of detailed studies, specifically the Zandkopsdrift Mine Phase 1 Heritage Impact Assessment Study¹ and the consequent Phase 2 Stone Age Specialist Study². These studies identified high densities of Middle Stone Age (MSA) artefact scatters along drainage lines and in particular around outcrops of rocks sourced for lithic material on Swartkop Hill. The Phase 2 Specialist Study included detailed typological artefact analyses and elaborate landscape and lithic interpretations. The study concluded

¹ Kruger, N. 2011. *Sedex Minerals: Zandkopsdrift 357, Garies, Northern Cape Province. Consolidated Phase 1 Archaeological Impact Assessment Report.* Ages (Pty) Ltd.

² Van der Ryst, M & Küsel, S. 2012. *Phase 2 Report on Middle Stone Age localities on the farm Zandkopsdrift 357, Garies district, Northern Cape Province.* Habitat Landscape Architects

that Zandkopsdrift provided a unique landscape-use pattern, centred on the procurement of raw materials that were eminently suitable material for the manufacture of stone tools. It also linked aspects such as prehistoric trade, subsistence and stone tool industry to the rich MSA assemblages at Zandkopsdrift. Following the Phase 2 Specialist Study, SAHRA concluded that the Zandkopsdrift Stone Age horizon had been adequately studied and documented. In their opinion, the Phase 2 report provided a thorough and adequate representation of the Stone Age legacy of the area and a destruction permit for the site was issued.



Figure 5-2: Stone Age material recorded at Stone Age Area SA01 on Zandkopsdrift: MSA core (left), large retouched MSA Scraper (centre) and a retouched LSA scraper (right).



Figure 5-3: Selection of stone tools from Swartkop Hill at Zandkopsdrift, similar to those found during the road upgrade study.

5.2 Historical / Colonial Period and recent times

A number of Historical Period structures, specifically a farmstead and outbuildings as well as a graveyard were noted on the farm Brintjeshoogte. However, these resources occur away from the route for the proposed provincial road upgrade and as such no impact is foreseen.

5.3 Graves

In this area, graves and family cemeteries are generally to be found in association with farmsteads, crop fields and historical buildings; and burials will in all probability occur around these locations. However, no graves or burials were documented in the survey area.

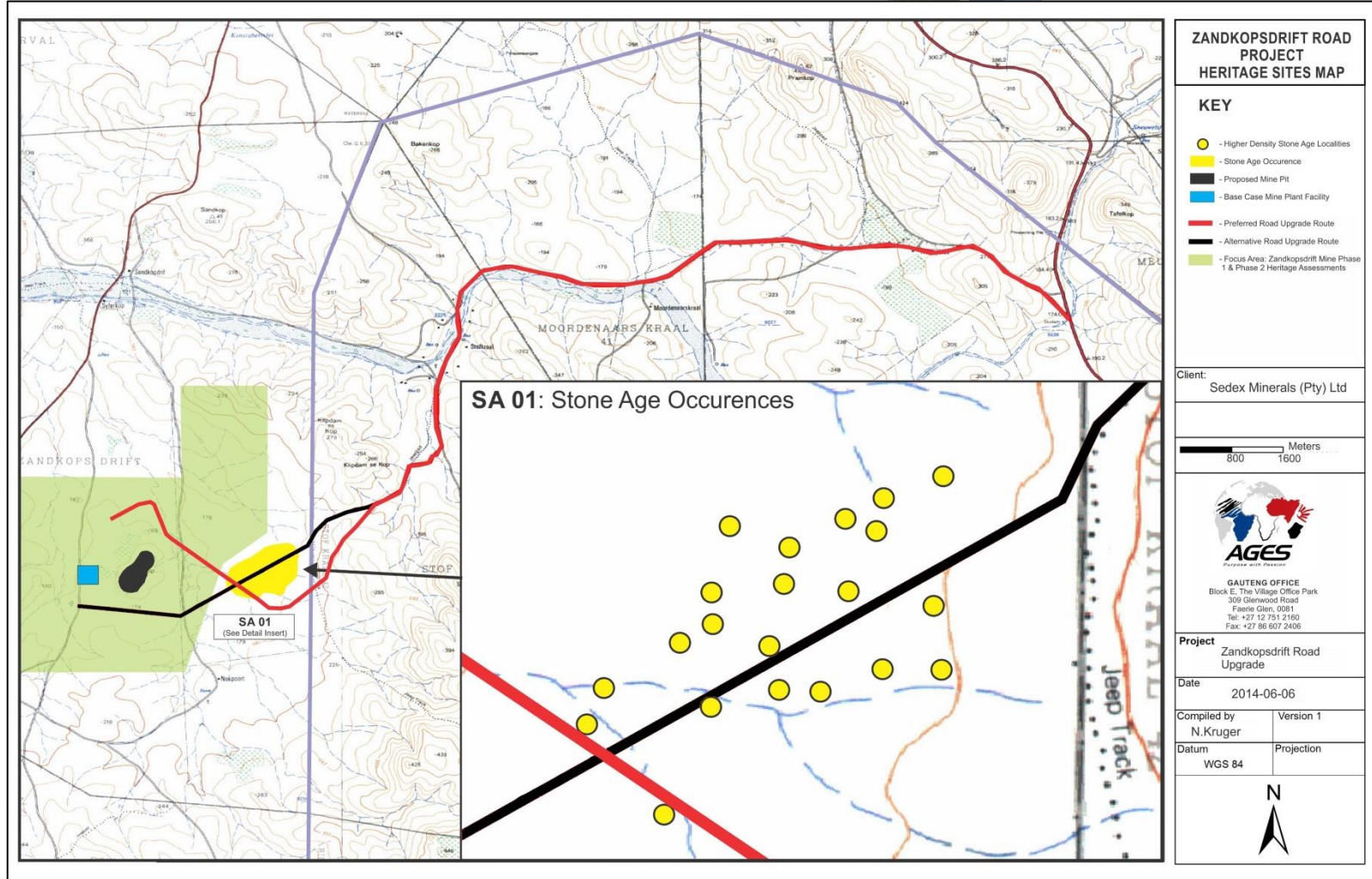


Figure 5-4: Map indicating the locations of archaeological and historical occurrences discussed in the text.

6 ARCHAEO-HISTORICAL CONTEXT

6.1 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	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	Holocene	Bantu-speaking groups, ancestors of present-day groups	Typically distinct ceramics, bead ware and iron / gold / copper objects, trade goods and grinding stones.
Late Iron Age / Later Farmer Period 1400 AD -1850 AD	Holocene	Various Bantu-speaking groups including Venda, Thonga, Sotho-Tswana and Zulu	Distinct ceramics, grinding stones, iron objects, trade objects, remains of iron smelting activities including iron smelting furnace, iron slag and residue as well as iron ore.
Historical / Colonial Period ±1850 AD – present	Holocene	Various Bantu-speaking groups as well as European farmers, settlers and explorers	Remains of historical structures e.g. homesteads, missionary schools etc. as well as, glass, porcelain, metal and ceramics.

6.1.1 The Stone Ages

- The Earlier Stone Age (ESA)

Earlier Stone Age deposits typically occur on the flood-plains of perennial rivers and may date to between 2 million and 250 000 years ago. These ESA open sites sometimes contain stone tool scatters and manufacturing debris ranging from pebble tool choppers to core tools such as handaxes and cleavers. These stone tools were made by the earliest hominins. These groups seldom actively hunted and relied heavily on the opportunistic scavenging of meat from carnivore kill sites.

- The Middle Stone Age (MSA)

The majority of Middle Stone Age (MSA) sites occur on flood plains and sometimes in caves and rock shelters. Sites usually consist of large concentrations of knapped stone flakes such as scrapers, points and blades and associated manufacturing debris. Tools may have been hafted but organic materials, such as those used in hafting, seldom remain preserved in the archaeological record. Limited drive-hunting activities are also associated with the MSA.

- The Later Stone Age (LSA)

Sites dating to the Later Stone Age (LSA) are better preserved in rock shelters, although open sites with scatters of mainly stone tools can occur. Well-protected deposits in shelters allow for stable conditions that result in the preservation of organic materials such as wood, bone, hearths, ostrich eggshell beads and even bedding material. By using San (Bushman) ethnographic data a better understanding of this period is possible. South African rock art is also associated with the LSA.

6.1.2 Historical and Colonial Times and Recent 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.

6.2 The Zandkopsdrift Road Upgrade Project Area: Discussion

6.2.1 Stone Age Occurrences in the Region

No systematic archaeological research has been undertaken in the larger landscape around the Zandkopsdrift area. However, artefacts of both the Early and Middle Stone Age occur in the Northern Cape and the Namaqualand. Large scatters of Early Stone Age handaxes occur around pans in the Namaqua National Park between Kamieskroon and the Atlantic Ocean (Morris & Webley 2004). In addition, MSA artefacts occur at Keurbos Cave some 15 km north-east of Garies (Webley 1992). According to Webley (1984), MSA implements also occur in a small rock shelter at Wolfkraal close to Kharkams in the Kamiesberg. More intensive hunter-gatherer occupation of the Namaqualand started around 4000 years ago during the Later Stone Age but most of our information comes from the coastal zone (Webley 1992; Dewar 2007). Archaeological sites with pottery, post-dating 2000 years ago are reported from a number of sites in Namaqualand. These ceramic LSA sites are believed to be associated with the introduction of pastoralism to the region some 2000 years ago. Webley (2001) has dates for sheep from Spoegrivier Cave of 1900 years ago. These early dates for sheep from Namaqualand suggest that pastoralist groups may have travelled into the south-western Cape along the west coast. There is evidence for pastoralist settlement at Bethelsklip, just north of Kharkams, dating to 800 years ago (Webley 1984). Complete ceramic pots have also been recovered from a number of farms in the Kamiesberg area (Webley 1992). The archaeology supports the historic information that pastoralist groups (the ancestors of the Little Namaqua Khoekhoen) were occupying this area at the time of colonial contact.

6.2.2 The Stone Age archaeology of Zandkopsdrift

The Stone Age horizon of Zandkopsdrift has been the subject of detailed heritage assessments and specialist studies during the EIA Phase for the proposed Zandkopsdrift mine. Specifically, a Stone Age specialist study by Van Der Ryst & Kusel (2012) examined the Stone Age expressions of the area and found that the characteristics of the Zandkopsdrift assemblages point to a long period of procurement of flakeable stone tool material sourced from surface outcrops containing chalcedoneous deposits. All major outcrops at Zandkopsdrift were evidently investigated by prehistoric people as is apparent from knapping activities but only specific localities were targeted to take advantage of deposits and pockets of more fine-grained stone. The full chain of operation (chain opératoire) was carried out including sourcing, knapping of suitable material and the manufacture of a range of

formal tool types. Acquiring good flakeable material and the transport of end products involve organizational and behavioural strategies by the prehistoric nomadic groups who utilized the resources of this region. Extractive activities at sources of high-quality stone material influence settlement and mobility patterns.

There is a clear spatial pattern in lithic distribution at Zandkopsdrift. Artefact densities differ according to distance from raw material sourced. At the preferred source outcrops the largest concentrations of lithics are near the source with markedly lesser densities on the periphery. Whereas deposits undoubtedly also built up through hillwash, the highest densities always cluster around good sources of flakeable material. The material is not predictable in fracturing and high levels of waste material are present. Outcrops that could not deliver suitable material exhibit low levels of debitage concomitant with stone tool production. During the study, a total of 10 617 lithics that were sampled produced indices of 46% for debitage (discarded material from the reduction process and from the shaping of tools), 2% cores (or objective pieces), 46% flaked blanks (detached pieces) and 6% formal stone tools. The range of tool types and the relative frequencies between surface-collected samples and the excavated subsurface deposits from Zandkopsdrift are comparable. The presence of formal tools such as awls and scrapers in the subsurface deposit suggests that quarried chunks of material were subjected to initial stages of flaking and immediate tool production close to the source of stone extraction. The main differences between the two collections are in the higher numbers of waste material recovered from the subsurface deposit and a higher relative mass for the excavated material in relation to the number of lithics. The lithics from the lower levels of the excavation also become exponentially larger and have a more robust appearance. It is likely that this trend may reflect an earlier phase of utilization.

From the analysis of the extensive Zandkopsdrift sequence it is inferred that the surface material at this locality and at least the upper levels of the excavation can most probably be assigned to a MSA3 sequence dating to approximately 60 000 to 25 000 years ago (Mitchell 2008:52). Debitage in the form of waste from stone tool production dominates the lithics. Core types include typical MSA prepared Levallois and radial cores but multi-directional cores are more numerous. The cores were used to deliver flake and blade blanks and the characteristic MSA convergent flakes produced from prepared cores. The blanks were frequently expediently utilized. Appreciable numbers of flaked blanks were shaped through retouch to produce formal stone tool types that mainly include a range of scrapers and a surprisingly high number of awls. MSA pressure-flaked points are rare. The characteristics of the Zandkopsdrift MSA assemblage suggest a landscape-use pattern centred on the procurement of raw materials that were eminently suitable material for the manufacture of stone tools. Such visits were probably scheduled to also take advantage of seasonal locally-available food resources.

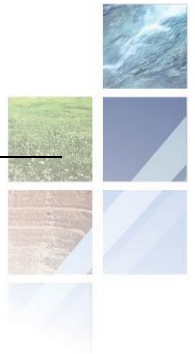


Figure 6-1: A selection of blades from the Zandkopsdrift MSA assemblages.



Figure 6-2: Selection of awls from the Zandkopsdrift MSA assemblages.

6.2.3 Zandkopsdrift in Colonial times.

The interior of Namaqualand was occupied by the Little Namaqua, a Khoekhoen pastoralist group preceding Colonial occupation of the Cape Colony. They herded sheep and cattle and lived in temporary encampments of mat houses. They are known to have moved seasonally with their livestock and historical reports indicate that they may have followed a transhumance cycle between the Kamiesberg in the summer months and the Sandveld in the winter months (Webley 1992). The Little Namaqua had no clearly defined territorial boundaries and it was easy for the colonial Trekboers to settle in the area. The earliest loan farms were granted after 1750 and some were located on the Groen and Swart-Doring Rivers. The Little Namaqua eventually retreated to so-called “reserves” such as Leliefontein, Steinkopf, Kommaggas, Concordia and the Richtersveld. The farm Zandkopsdrift was surveyed in 1843. The survey diagram for Zandkopsdrift indicates a public Outspan at the crossing of the Swart-Doring River (at the present Sandkopdrift and Syferkop homesteads) and that the “public road” between Namaqualand and the Olifants River crossed the property (Webley & Halkett 2010).

7 RESULTS: STATEMENT OF SIGNIFICANCE AND IMPACT RATING

7.1 Heritage resources management and conservation

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.

7.2 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.
- 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 70 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.

Table 2: Heritage Site Significance Ratings

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, augering), mapping and documentation (Phase 2 investigation); permit required for sampling and destruction
Medium significance: sites, which	3. Excavation of representative sample, C14 dating, mapping and documentation (Phase 2

require mitigation.	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.

7.3 Potential Impacts and Significance Ratings³

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. The section ultimately provides a guideline (Section 7.3.1, Section 7.3.2 & Section 7.3.3) for the rating of impacts and recommendation of management actions for sites of heritage potential in the Zandkopsdrift Road Upgrade Project area, as supplied in section 7.3.4.

7.3.1 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, 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.

³ Based on: Winter, S. & Baumann, N. 2005. *Guideline for involving heritage specialists in EIA processes: Edition 1.*

Table 3: Impact Assessment Criteria

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.

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

Table 4: Direct Impact Assessment Criteria

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: 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>		<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 - 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%)
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7.3.3 Management actions

Recommendations for relevant heritage resources management actions are vital to the conservation of heritage resources. Recommended management actions may include the following:

Table 5: Management and Mitigation Actions

<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 an intervention typically involving the adding of a new heritage layer to enable a new sustainable use. It is not appropriate when the process necessitates the removal of previous historical layers, i.e. restoration of a building or place to the previous state/period. It is an appropriate heritage management action in the following cases:</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> <p>Enhancement is appropriate where the overall heritage significance and its public appreciation value are improved. It does not imply creation of a condition that might never have occurred during the evolution of a place, e.g. the tendency to sanitize the past. This management action might result from the removal of previous layers where these layers are culturally of low significance and detract from the significance of the resource. It would be appropriate in a range of heritage contexts and applicable to a range of resources. In the case of formally protected or significant resources, appropriate enhancement action should be encouraged. Care should, however, be taken to ensure that the process does not have a negative impact on the character and context of the resource. It would thus have to be carefully monitored.</p>
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7.3.4 Site significance and impact rating

Refer to Section 7.3.1, Section 7.3.2 & Section 7.3.3 for background on the rating of impacts and recommendation of management actions for sites of heritage potential. Impact thresholds and management measures for the sites are further discussed in section 7.3.5.

Table 6: Stone Age Area SA01

1. SITE DESCRIPTION : Historical Period Structures							
1.1 General Site Description							
Isolated Middle and Later Stone Age Scatters							
1.2 Site features / artefacts / Other							
Site Location							
Province / District	Northern Cape Province			Map Number	3018CC		
Farm Name	Zandkopsdrift 356			Co-ordinates	S30.863441	E17.987321	
Site Type							
Surface sites	X			Caves and rock shelters			
Larger open-air sites				Sealed sites (deposits)			
River deposits				Other			
Site Function							
Living / habitation	X			Kill			
Ceremonial				Burial			
Trading / Barter				Art			
Quarry / Mining / Smelting				Other			
Site Placement							
Valley floor		Hill top		Vlei/swamp		River Mouth	
Dam		River Bank		Slope		Plains	X
Other / Comments							
Vegetation							
Riverine forest		Bushveld		Savannah		Mountain forest	
Thornveld	X	Grassland	X	Cultivated	X	Other	
Age Classification							
Stone Age	X	Early Iron Age		Middle Iron Age		Later Iron Age	
Historical		Other					
Material Culture							
Midden		House Remains		Stone Walling		Stone Structures	
Granary		Grinding Stone (L)		Grinding Stone (U)		Granary Stand	
Metal		Ceramics (Potter)		Ceramics (Porcelain)		Stone (non-lithic)	X
Metal slag		Tuyere		Fauna		Bead (Glass)	
Bead (OES / Shell)		Glass		Lithics	X	Smelting Residues	
Other: X – concrete structures				Other:			
1.3 Site Condition							
The context of artefacts has been distributed by natural agents and erosion.							
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.							X
It possesses unique, uncommon, rare or endangered aspects of South Africa's natural or cultural heritage.						X	

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It has potential to yield information that will contribute to an understanding of South Africa's natural and cultural heritage.		X	
It is of importance in demonstrating the principle characteristics of a particular class of South Africa's natural or cultural places or objects.		X	
It has importance in exhibiting particular aesthetic characteristics valued by a particular community or cultural group.			X
It has importance in demonstrating a high degree of creative or technical achievement at a particular period.		X	
It has marked or special association with a particular community or cultural group for social, cultural or spiritual reasons (sense of place).			X
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.			X
It has significance through contributing towards the promotion of a local sociocultural identity and can be developed as a tourist destination.			X
It has significance relating to the history of slavery in South Africa.			X
It has importance to the wider understanding of temporal changes within cultural landscapes, settlement patterns and human occupation.		X	

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]	X
Generally Protected C [Low significance, no further action]	

2.3 Sphere of Significance

	High	Medium	Low
International			
National			
Provincial			
Local			X
Specific community			

3. IMPACT RATING AND MITIGATION

3.1 Impact assessment

APPROXIMATE DISTANCE FROM DEVELOPMENT: 0 – 100 METERS

NATURE OF IMPACT: HISTORICAL, SCIENTIFIC

EXTENT OF IMPACT: Local

SPECIALIST LEVEL OF CONFIDENCE IN DEGREE OF IMPACT AND SEVERITY: High

3.2 Direct Impact Rating

Direct impact on resource	None (the potential development does not adversely or positively affect the heritage resource)	
	Peripheral / Indirect (the heritage resource or its setting is located in proximity to the footprint of the potential development)	X
	Destruction / Direct (the heritage resource or site is physically located within the footprint of the potential development)	

Direct impact rating (Refer to Section 7.3.2)

Note that a default "no impact expected" value applies where a heritage resource occurs outside the impact matrix or applicable conservation buffers of the development.

Moderate heritage impact expected.

3.3 Recommended Management* (refer to section 7.3.3)

Monitoring

Comments on recommended management

It is necessary that the site be monitored if impact occurs, or is envisaged at any stage of development and operation the following will be required:

- Documentation of sites.
- Monitoring of impact areas.

4. APPLICABLE LEGISLATION AND LEGAL REQUIREMENTS

- National Heritage Resources Act (Act no. 25 of 1999)
- Local and regional provisions, laws and by-laws

7.4 Discussion: Evaluation of Results and Impacts

Previous studies conducted at Zandkopsdrift in this section of the Gauteng Province all infer a rich and diverse archaeological and historical landscape, representative of most phases of human and cultural development in southern Africa. The following impact assessment discussion for the proposed Zandkopsdrift Road Upgrade Project summarises the extent of heritage significance and impact on resources, cognisant of this rich larger archae-historical landscape (refer to Section 3 for infrastructure description and Table 7 for impact assessment matrix).

Stone Age occurrences in the study area at **Area SA01** are scientifically significant but similar regional Stone Age expressions have been studied in detail. Therefore, the significance of the impact on the heritage resource is considered to be **LOW** and this rating is expected to remain unchanged if the site is monitored during the course of construction and no significant additional previously undetected heritage resources are impacted on.

Table7: Impact assessment matrix for proposed footprint areas of the road upgrade during the Pre-Construction, Construction, Operation and Closure Phases. Unique weight values indicated below.

Site	Activity	Impact	P	D	S	M/S	Significance Before Mitigation	Mitigation Measures	P	D	S	M / S	Significance		
Pre-Construction, Construction, Operation and Closure								Pre-Construction and Construction Phase							
SA01	Pre-Construction, Construction, Operation and Closure	Loss of Heritage Resource and Attributes	5	5	1	2	40	Low	Monitoring	5	5	1	2	40	Low

Aspect	Description	Weight	Aspect	Description	Weight	Aspect	Description	Weight	Aspect	Description	Weight	Aspect	Description	Weight	
Probability	Improbable	1	Duration	Short term	1	Scale	Local	1	Magnitude/Severity	Low	2	Significance	Sum(Duration, Scale, Magnitude) x Probability		
	Probable	2		Medium term	3		Site	2		Medium	6		Negligible	<20	
	Highly Probable	4		Long term	4		Regional	3		High	8		Low	<40	
	Definite	5		Permanent	5								Moderate	<60	
														High	>60

8 RECOMMENDATIONS

The larger landscape around Zandkopsdrift is rich in pre-historical and historical remnants. Cognisant of this historically significant landscape and the need for the conservation of its heritage resources, the following recommendations are made based on general observations in the proposed Zandkopsdrift Roads Upgrade Project area:

- Stone Age scatters identified along the proposed road upgrade routes on the farm Zandkopsdrift are significant but no other cultural material or substantial stratified archaeological deposits are associated with these assemblages. The Stone Age horizon of the Zandkopsdrift area has been extensively studied and a substantial sample of more than 10 000 pieces of lithics obtained through the Zandkopsdrift Mine Phase 2 Specialist Study is representative of the area's Stone Age legacy. It can be concluded that the mitigation of further Stone Age scatters at Zandkopsdrift will not add more qualitative data to existing knowledge of the resources. Therefore, no archaeological mitigation is recommended for these Stone Age occurrences. ***However, it should be noted that both route options will impact on Stone Age scatters but the preferred route option will have the least impact on these resources. Therefore the preferred option is considered most favourable in terms of heritage resources management.***
- A careful watching brief monitoring process is recommended for the road upgrade and construction. Should any subsurface paleontological / archaeological material be exposed during construction activities, all activities should be suspended and the archaeological specialist should be notified immediately.
- It is essential that cognisance be taken of the larger archaeological landscape of the area in order to avoid the destruction of previously undetected heritage sites. It should be stated that it is likely that further undetected Stone Age sites will occur elsewhere in the road upgrade area along water sources and drainage lines, fountains and pans would often have attracted human activity in the past. Also, since Stone Age material seems to originate from below present soil surfaces in eroded areas, the larger landscape should be regarded as potentially sensitive in terms of possible subsurface deposits. Burials and historically significant structures dating to the Colonial Period occur on farms in the area and these resources should be avoided during all phases of construction.

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

- Water sources such as drainage lines, fountains and pans would often have attracted human activity in the past. As Stone Age material seems to originate from below present soil surfaces in eroded areas, the larger landscape should be regarded as potentially sensitive in terms of possible subsurface deposits.
- As Palaeontological remains occur where bedrock has been exposed, such geological features should be regarded as sensitive in terms of impacts on fossilized resources.

9 GENERAL COMMENTS AND CONDITIONS

This AIA report serves to confirm the extent and significance of archaeological material in the Zandkopsdrift Road Upgrade Project Area. In addition to heritage resources occurring here, the larger Northern and Western Cape provinces encompasses a rich and diverse archaeological landscape and cognisance should be taken of

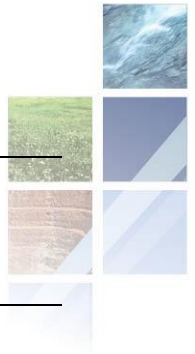
heritage resources and archaeological material that might be present in surface and sub-surface deposits. If, during construction, any possible archaeological material culture discoveries are made, the operations must be stopped and a qualified archaeologist be contacted for an assessment of the find. Such material culture might include:

- Formal Earlier Stone Age stone tools such as handaxes, choppers and cleavers.
- Formal Middle Stone Age stone tools such as points, blades and scrapers.
- Formal Later Stone Age stone tools such as microlithic blades, points and scrapers.
- Lithic residues and debris such as stone cores and flakes.
- Decorated and undecorated potsherds.
- Iron objects.
- Beads made from ostrich eggshell and glass.
- Ash middens and cattle dung deposits and accumulations.
- Animal bones and faunal remains.
- Human remains/graves.
- Stone walling or any sub-surface structures.
- Historical glass, tin or ceramics.
- Fossils.

If such site 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 SAHRA, the National Resources Act and the CRM section of ASAPA will be required. Please note that this report is an archaeological scoping study only and does not include or exempt other required heritage impact assessments.

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. The final decision rests with the heritage resources authority, which should give a permit or a formal letter of permission for the destruction of any cultural sites.



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