

Archaeological Impact Assessment

For The Proposed PPC Lime Opencast Extension, PPC Lime Acres, Northern Cape Province.

Prepared For
Shangoni Management Services (Pty) Ltd

By



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I, Jaco van der Walt as duly authorised representative of Heritage Contracts and Archaeological Consulting CC, hereby confirm my independence as a specialist and declare that neither I nor the Heritage Contracts and Archaeological Consulting CC have any interest, be it business, financial, personal or other, in any proposed activity, application or appeal in respect of which the client was appointed as Environmental Assessment practitioner, other than fair remuneration for work performed on this project.



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EXECUTIVE SUMMARY

Site name and location: Lime Acres is an existing opencast mining (quarry) operation situated in the Northern Cape Province, in the Magisterial District of Hay. The mine is situated 25 km from Daniëlskuil, 105 km from Kuruman, 45 km from Postmasburg and 160 km from Kimberley. PPC Lime Limited proposes to extend its current opencast mining operations (open pit areas) into Portion 63 of the Consolidated Carter Block (farm Botha) and Portion 24 of the Consolidated Carter Block (farm Rosslyn).

Purpose of the study: Phase 1 Archaeological Impact Assessment to determine the presence of cultural heritage sites and the impact of the proposed project on these resources within the areas demarcated for the proposed infrastructure development.

1:50 000 Topographic Map: 2823 AD and 2823 BC

EIA Consultant: Shangoni Management Services (Pty) Ltd

Developer: PPC Lime Limited:

Heritage Consultant: Heritage Contracts and Archaeological Consulting CC (HCAC).

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Date of Report: 11 August 2015, Revised 1 October 2015.

Findings of the Assessment:

It is important to note that the entire PPC Lime mining area was not surveyed but only the footprint of the proposed quarry expansion area that was surveyed on foot and by vehicle. In terms of the built environment (Section 34 of the NHRA), no standing buildings of significance were recorded. In terms of the archaeological component of Section 35 within the study area isolated Middle Stone Age (MSA) artefacts were recorded scattered over the study area. Two contemporary middens associated with mine workers/farm labourers were also recorded. Outside of the proposed quarry area two cemeteries were recorded that will not be impacted on (Figure 3).

There were no red flags identified during the AIA and subject to approval from SAHRA there is from an archaeological point of view no reason why the development should not proceed if the recommendations as made in this report are adhered to.

General

Due to extensive sand cover, ground visibility was low on portions of the site during survey. The possible occurrence of unmarked or informal graves and subsurface finds can thus not be excluded. If during construction any possible finds such as stone tool scatters, artefacts or bone and fossil remains are made, the operations must be stopped and a qualified archaeologist must be contacted for an assessment of the find.

Disclaimer: *Although all possible care is taken to identify sites of cultural importance during the investigation of study areas, it is always possible that hidden or sub-surface sites could be overlooked during the study. Heritage Contracts and Archaeological Consulting CC and its personnel will not be held liable for such oversights or for costs incurred as a result of such oversights.*

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- The technology described in any report;
- Recommendations delivered to the Client.

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ABBREVIATIONS

AIA: Archaeological Impact Assessment
ASAPA: Association of South African Professional Archaeologists
BIA: Basic Impact Assessment
CRM: Cultural Resource Management
ECO: Environmental Control Officer
EIA: Environmental Impact Assessment*
EIA: Early Iron Age*
EIA Practitioner: Environmental Impact Assessment Practitioner
EMP: Environmental Management Plan
ESA: Early Stone Age
GPS: Global Positioning System
HIA: Heritage Impact Assessment
LIA: Late Iron Age
LSA: Late Stone Age
MEC: Member of the Executive Council
MIA: Middle Iron Age
MPRDA: Mineral and Petroleum Resources Development Act
MSA: Middle Stone Age
NEMA: National Environmental Management Act
PRHA: Provincial Heritage Resource Agency
SADC: Southern African Development Community
SAHRA: South African Heritage Resources Agency

**Although EIA refers to both Environmental Impact Assessment and the Early Iron Age both are internationally accepted abbreviations and must be read and interpreted in the context it is used.*

GLOSSARY

Archaeological site (remains of human activity over 100 years old)

Early Stone Age (~ 2.6 million to 250 000 years ago)

Middle Stone Age (~ 250 000 to 40-25 000 years ago)

Later Stone Age (~ 40-25 000, to recently, 100 years ago)

The Iron Age (~ AD 400 to 1840)

Historic (~ AD 1840 to 1950)

Historic building (over 60 years old)

1 BACKGROUND INFORMATION

<i>Kind of study</i>	Archaeological Impact Assessment
<i>Type of development</i>	Opencast Mine
<i>Developer:</i>	PPC Lime Limited
<i>Consultant:</i>	Shangoni Management Services (Pty) Ltd

Heritage Contracts and Archaeological Consulting CC has been contracted by Shangoni Management Services (Pty) Ltd to conduct an Archaeological Impact Assessment for the proposed PPC Lime Acres opencast extension that is situated in the Northern Cape Province, in the Magisterial District of Hay. The mine is situated 25 km from Daniëlskuil, 105 km from Kuruman, 45 km from Postmasburg and 160 km from Kimberley.

The current opencast mining operations at PPC Lime Acres are undertaken on the consolidated Carter Block 458 (farm Bowden). PPC Lime Limited proposes to extend its current opencast mining operations (open pit areas) into Portion 63 of the Consolidated Carter Block (farm Botha) and Portion 24 of the Consolidated Carter Block (farm Rosslyn). The Archaeological Impact Assessment report forms part of the EIA for the proposed project.

The aim of the study is to identify cultural heritage sites, document, and assess their importance within local, provincial and national context. It serves to assess the impact of the proposed project on non-renewable heritage resources, and to submit appropriate recommendations with regard to the responsible cultural resources management measures that might be required to assist the developer in managing the discovered heritage resources in a responsible manner. It is also conducted to protect, preserve, and develop such resources within the framework provided by the National Heritage Resources Act of 1999 (Act 25 of 1999).

The report outlines the approach and methodology utilized before and during the survey, which includes: Phase 1, a desktop study that includes collection from various sources and consultations; Phase 2, the physical surveying of the area on foot and by vehicle; Phase 3, reporting the outcome of the study.

During the survey two contemporary middens and isolated widely scattered MSA material were identified. General site conditions and features on sites were recorded by means of photographs, GPS locations, and site descriptions. Possible impacts were identified and mitigation measures are proposed in the following report.

This report must also be submitted to the SAHRA for peer review and comment.

1.1 Terms of Reference

Field study

Conduct a field study to: a) systematically survey the proposed project area to locate, identify, record, photograph and describe sites of archaeological, historical or cultural interest; b) record GPS points of identified as significant areas; c) determine the levels of significance of the various types of heritage resources recorded in the project area.

Reporting

Report on the identification of anticipated and cumulative impacts the operational units of the proposed project activity may have on the identified heritage resources for all 3 phases of the project; i.e., construction, operation and decommissioning phases. Consider alternatives, should any significant sites be impacted adversely by the proposed project. Ensure that all studies and results comply with the relevant legislation and the code of ethics and guidelines of ASAPA.

To assist the developer in managing the discovered heritage resources in a responsible manner, and to protect, preserve, and develop them within the framework provided by the National Heritage Resources Act of 1999 (Act 25 of 1999).

1.2. Archaeological Legislation and Best Practice

Phase 1, an AIA or a HIA is a pre-requisite for development in South Africa as prescribed by SAHRA and stipulated by legislation. The overall purpose of a heritage specialist input is to:

- » Identify any heritage resources, which may be affected;
- » Assess the nature and degree of significance of such resources;
- » Establish heritage informants/constraints to guide the development process through establishing thresholds of impact significance;
- » Assess the negative and positive impact of the development on these resources;
- » Make recommendations for the appropriate heritage management of these impacts.

The AIA or HIA, as a specialist sub-section of the EIA, is required under the National Heritage Resources Act NHRA of 1999 (Act 25 of 1999), Section 23(2)(b) of the NEMA and sections 39(3)(b)(iii) of the MPRDA.

The AIA should be submitted, as part of the EIA, BIA or EMP, to the PHRA if established in the province or to SAHRA. SAHRA will be ultimately responsible for the professional evaluation of Phase 1 AIA reports upon which review comments will be issued. 'Best practice' requires Phase 1 AIA reports and additional development information, as per the EIA, BIA/EMP, to be submitted in duplicate to SAHRA after completion of the study. SAHRA accepts Phase 1 AIA reports authored by professional archaeologists, accredited with ASAPA or with a proven ability to do archaeological work.

Minimum accreditation requirements include an Honours degree in archaeology or related discipline and 3 years post-university CRM experience (field supervisor level).

Minimum standards for reports, site documentation and descriptions are set by ASAPA in collaboration with SAHRA. ASAPA is a legal body, based in South Africa, representing professional archaeology in the SADC region. ASAPA is primarily involved in the overseeing of ethical practice and standards regarding the archaeological profession. Membership is based on proposal and secondment by other professional members.

Phase 1 AIAs are primarily concerned with the location and identification of sites situated within a proposed development area. Identified sites should be assessed according to their significance. Relevant conservation or Phase 2 mitigation recommendations should be made. Recommendations are subject to evaluation by SAHRA.

Conservation or Phase 2 mitigation recommendations, as approved by SAHRA, are to be used as guidelines in the developer's decision making process.

Phase 2 archaeological projects are primarily based on salvage/mitigation excavations preceding development destruction or impact on a site. Phase 2 excavations can only be conducted with a permit, issued by SAHRA to the appointed archaeologist. Permit conditions are prescribed by SAHRA and includes (as minimum requirements) reporting back strategies to SAHRA and deposition of excavated material at an accredited repository.

In the event of a site conservation option being preferred by the developer, a site management plan, prepared by a professional archaeologist and approved by SAHRA, will suffice as minimum requirement.

After mitigation of a site, a destruction permit must be applied for from SAHRA by the client before development may proceed.

Human remains older than 60 years are protected by the National Heritage Resources Act, with reference to Section 36. Graves older than 60 years, but younger than 100 years fall under Section 36 of Act 25 of 1999 (National Heritage Resources Act), as well as the Human Tissues Act (Act 65 of 1983), and are the jurisdiction of SAHRA. The procedure for Consultation Regarding Burial Grounds and Graves (Section 36[5]) of Act 25 of 1999) is applicable to graves older than 60 years that are situated outside a formal cemetery administrated by a local authority. Graves in this age category, located inside a formal cemetery administrated by a local authority, require the same authorisation as set out for graves younger than 60 years, in addition to SAHRA authorisation. If the grave is not situated inside a formal cemetery, but is to be relocated to one, permission from the local authority is required and all regulations, laws and by-laws, set by the cemetery authority, must be adhered to.

Human remains that are less than 60 years old are protected under Section 2(1) of the Removal of Graves and Dead Bodies Ordinance (Ordinance no. 7 of 1925), as well as the Human Tissues Act (Act 65 of 1983), and are the jurisdiction of the National Department of Health and the relevant Provincial Department of Health and must be submitted for final approval to the office of the relevant Provincial Premier. This function is usually delegated to the Provincial MEC for Local Government and Planning; or in some cases, the MEC for Housing and Welfare.

Authorisation for exhumation and reinterment must also be obtained from the relevant local or regional council where the grave is situated, as well as the relevant local or regional council to where the grave is being relocated. All local and regional provisions, laws and by-laws must also be adhered to. To handle and transport human remains, the institution conducting the relocation should be authorised under Section 24 of Act 65 of 1983 (Human Tissues Act).

1.3 Description of Study Area

1.3.1 Location Data

Lime Acres is an existing opencast mining (quarry) operation situated in the Northern Cape Province, in the Magisterial District of Hay. The mine is situated 25 km from Daniëlskuil, 105 km from Kuruman, 45 km from Postmasburg and 160 km from Kimberley. The current opencast mining operations at PPC Lime Acres is undertaken on the consolidated Carter Block 458 (farm Bowden). PPC Lime Limited proposes to extend its current opencast mining operations (open pit areas) into Portion 63 of the Consolidated Carter Block (farm Botha) and Portion 24 of the Consolidated Carter Block (farm Rosslyn). The study area is located at 28° 20' 51.1004" S, 23° 29' 35.1359" E.

1.3.2. Location Map

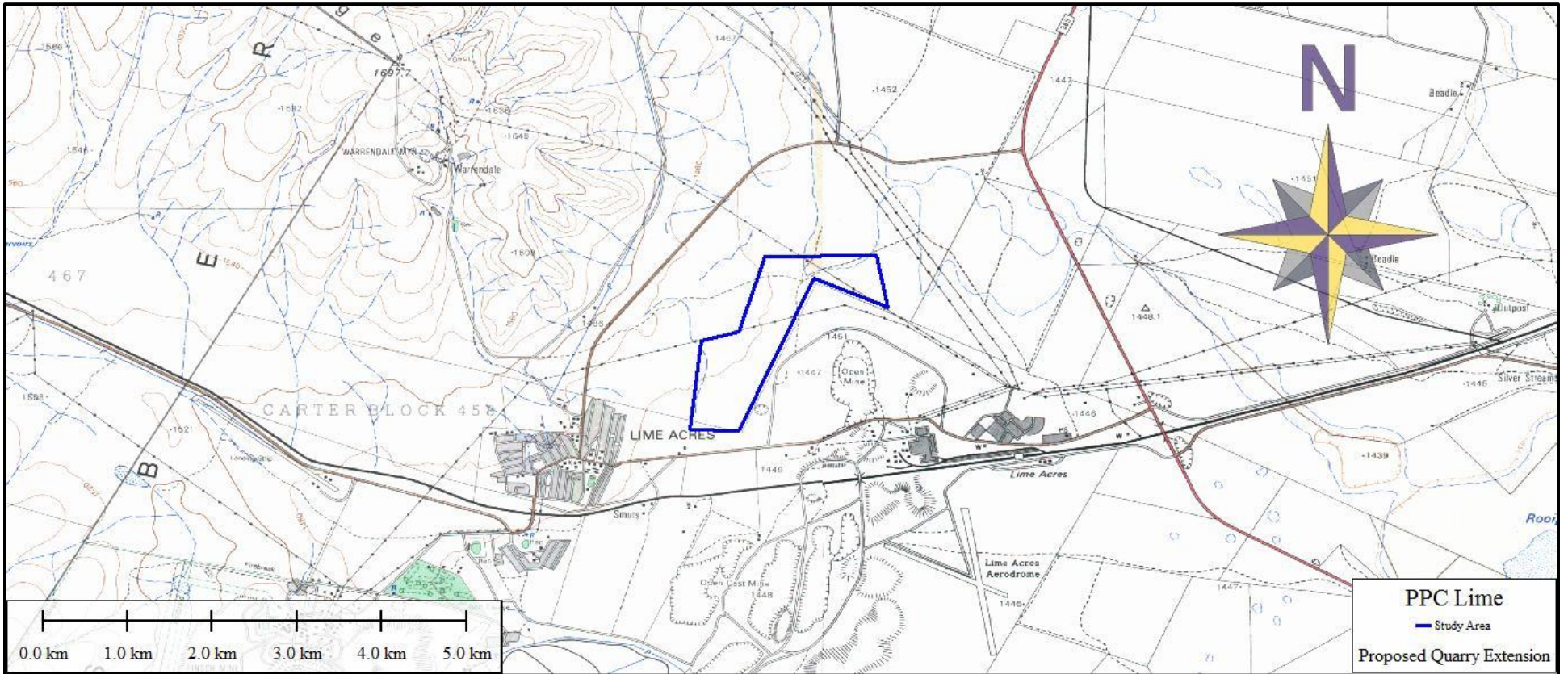


Figure 1: Location map showing the infrastructure area that was assessed.

2. APPROACH AND METHODOLOGY

The aim of the study is to cover archaeological databases and historical sources to compile a background history of the study area followed by field verification; this was accomplished by means of the following phases.

2.1 Phase 1 - Desktop Study

The first phase comprised a desktop study, gathering data to compile a background history of the area in question. It included scanning existing records for archaeological sites, historical sites, graves, and ethnographical information on the inhabitants of the area.

2.1.1 Literature Search

In addition to the desktop study the actions indicated below were also taken.

2.1.2 Information Collection

The SAHRA report mapping project (Version 1.0) and SAHRIS was consulted to collect data from previously conducted CRM projects in the region to provide a comprehensive account of the history of the study area.

2.1.3 Consultation

A Public Participation process was conducted by Shangoni Management Services for this project. No heritage concerns were raised.

2.1.4 Google Earth and Mapping Survey

Google Earth and 1:50 000 maps of the area were utilised to identify possible places where sites of heritage significance might be located.

2.1.5 Genealogical Society of South Africa

The database of the Genealogical Society was consulted to collect data on any known graves in the area.

2.2 Phase 2 - Physical Surveying

A field survey of the study area was conducted; focusing on drainage lines, outcrops, high lying areas and disturbances in the topography. The study area was surveyed by means of vehicle and extensive surveys on foot by a professional archaeologist on the 6th and 7th March 2015.

All sites discovered inside the proposed development area was plotted on 1:50 000 maps and their GPS co-ordinates noted. Digital photographs were taken at all the sites.

2.3. Restrictions

Due to the fact that most cultural remains may occur below surface, the possibility exists that some features or artefacts may not have been discovered/ recorded during the survey. Low ground visibility of parts of the study area is due to high vegetation cover, and the possible occurrence of unmarked graves and other cultural material cannot be excluded. Only the surface infrastructure footprint areas were surveyed as indicated in the location map, and not the entire farm. This study did not assess the impact on the palaeontological component of the project. Although Heritage Contracts and Archaeological Consulting CC surveyed the area as thoroughly as possible, it is incumbent upon the developer to stop operations and inform the relevant heritage agency should further cultural remains, such as stone tool scatters, artefacts, bones or fossils, be exposed during the process of development.

3. NATURE OF THE DEVELOPMENT

Mining is carried out by opencast methods using diesel-electric haul trucks, hydraulic and electric rope shovels. The thin topsoil cover is first removed and stockpiled for later use. Overburden and overlying waste horizons are drilled by large electric rotary drills, blasted with emulsion type explosives and loaded to waste. The limestone is similarly drilled and blasted and loaded to the primary crusher. Several benches and several quarries are mined simultaneously to optimize quality control. The policy is to extract all possible useable limestone and dolomite, hence the multi-level operation. The proposed activities will be a continuation of the current opencast mining activities.

4. HISTORICAL AND ARCHAEOLOGICAL BACKGROUND OF THE STUDY AREA

4.1 General Information

Numerous CRM projects were completed in the greater study area e.g. Henderson 2005, Morris 2008, Webley 2010 & Fourie 2011 and Hutton 2014. An assessment of Rock Art close to Danielskuil was also conducted (Morris & Beaumont 1994). Henderson conducted a study to the west of the current area under investigation for Finch mine and recorded historic structures and middens, cemeteries and a range of Stone Age manifestations. Morris conducted a study approximately 1.5 km to the south on Carter Block 458 and recorded twentieth century debris relating to mine workers but no archaeological remains. The Webley and Fourie surveys were conducted approximately 17 km to the North West and recorded historical structures, cemeteries and Stone Age material. Closer to the current area under investigation, Dreyer (2007) conducted a CRM project on Carter Block and concluded that no heritage artefacts were present in the study area.

Google Earth and 1:50 000 maps of the area were utilised to identify possible places where archaeological and historical sites might be located. The database of the Genealogical Society of South Africa indicated no known grave sites within the study area.

4.2 Archaeological Background

The archaeological record for the greater study area consists of the Stone Age and Iron Age.

4.2.1. Stone Age

South Africa has a long and complex Stone Age sequence of more than 2 million years. The broad sequence includes the Later Stone Age, the Middle Stone Age and the Earlier Stone Age. Each of these phases contains sub-phases or industrial complexes, and within these we can expect regional variation regarding characteristics and time ranges. For Cultural Resources Management (CRM) purposes it is often only expected/ possible to identify the presence of the three main phases. Yet sometimes the recognition of cultural groups, affinities or trends in technology and/or subsistence practices, as represented by the sub-phases or industrial complexes, is achievable (Lombard 2011). The three main phases can be divided as follows;

- Later Stone Age; associated with Khoi and San societies and their immediate predecessors. Recently to ~30 thousand years ago.
- Middle Stone Age; associated with Homo sapiens and archaic modern humans. 30-300 thousand years ago.
- Earlier Stone Age; associated with early Homo groups such as Homo habilis and Homo erectus. 400 000-> 2 million years ago.

The larger study area has a wealth of pre-colonial archaeological sites (Beaumont & Morris 1990; Morris & Beaumont 2004). Famous sites in the region include the world renowned Wonderwerk Cave to the north of the study area. Closer to Kuruman two shelters on the northern and southern faces of GaMohaana (in the Kuruman Hills north west of the town) contain Later Stone Age remains and rock paintings. Rock art is known to occur at Danielskuil to the north and on Carter Block itself (Morris 2008). Middle Stone Age material is on record around the study area.

Archaeological surveys have shown rocky outcrops and hills, drainage lines, riverbanks and confluences to be prime localities for archaeological finds and specifically Stone Age sites, as these areas were utilized for settlement of base camps close to water and hunting ranges. Studies in close proximity to the study area corroborate this e.g. Henderson 2005, Webley 2010, Fourie 2011.

4.2.2. Iron Age

Iron Age expansion southwards past Kuruman into the Ghaap plato and towards Postmasburg is dated to the 1600's (Humphreys, 1976 and Thackeray, 1983). Definite dates for Tswana presence in the Postmasburg area are around 1805 when Lichtenstein visited the area and noted the mining activities of the Tswana (probably the Thlaping) tribes in the area. The area of Danielskuil was named by the Thlaro as Thlaka la tlou (reeds of the elephant) and with the Thlaping they settled the area from Campbell in the east to Postmasburg and towards the Langeberg close to Olifantshoek in the north west before 1770 (Snyman, 1988).

The Korana expansion after 1770 started to drive the Thlaro and Thlaping further north towards Kuruman (Shillington, 1985).

4.3 Historical Background

A farm does not exist in isolation, and it is important to understand the social history of the surrounding area. It is essential to consider the history of towns in the vicinity of the property under investigation, since these social centres would have affected those individuals living in the rural areas.

4.3.1. Lime Acres

Geologist Digby Roberts heard of evaporating gravestones and of businessmen who had been disappointed to find that stone they quarried developed brown stains when exposed to the air. What they suspected to be poor quality dolomite, Roberts recognized as primary limestone (<http://www.greenkalahari.co.za/index.php/lime-acres>).

Roberts was employed by Corner House and they instructed him to locate new sources of limestone, Roberts investigated the area accordingly. The limestone was needed in the processing of low-grade uranium recovered from waste residues in the slime dams of gold mines (<http://www.greenkalahari.co.za/index.php/lime-acres>). Roberts investigated this and secretly prospected in the area to uncover a large block of limestone between Daniëlskuil and Papkuil. Northern Lime bought the farms and the miner Frik Scholtz opened a quarry. In 1954 the first kilns of what is now known as PPC Lime, came into operation (<http://www.greenkalahari.co.za/index.php/lime-acres>).

Alwin Austin built a village to accommodate mining employees along two parallel roads, divided by Burma Road. Each of the four halves was named the farms bought by Northern Lime – Bowden, Smuts, Shone and Adams. Northern Lime's general manager, Eric Lowther named the village Lime Acres (<http://www.greenkalahari.co.za/index.php/lime-acres>).

The area is also known for diamond mines and in 1930 H.S. Richter discovered diamonds on the farm Brits. The farm was state owned and prospecting for precious stones was illegal. Pretending to prospect for asbestos, Richter continued his investigation of the kimberlite in 1939. He was fined around R 40, 00 in the Griquatown magistrate's court for prospecting illegally after an argument with his partners.

After the law was changed in 1960, three broke partners, Willie Schwabel, Brahm Papendorf and Thorny Fincham were able to legally prospect for diamonds. In the first two hours of the first wash they found 26 diamonds. This sparked the interest of De Beers and they bought the mine in 1962. The Finch pipe opened in 1964 and a treatment and recovery plant was established. The mine is located 2km from Lime Acres (<http://www.greenkalahari.co.za/index.php/lime-acres>).

4.3.2. Postmasburg

Postmasburg has a rich history with some findings in the greater area. Blinkklipkop, meaning 'Shining Rock Hill' indicates that the Khoisan attempted mining in the area from as early as 700 AD. The Tswana and Korana travelled to "Blinkklip" (shining rock) as the town was first known, to obtain "sibilo" – specularite and hematite mined primitively. This substance was mixed with animal fat and was applied to the skin for a shiny, red look. The presence of San (Bushman) is also evident in the rock-art at Beeshoek that dates from as long as 120 000 years ago

After 1800 the Cape government sent various parties to scout the area, where the Griqua has settled in the meantime. The Griqua leader Willem Visser was given Blinkklip as a home by his captain, Andries Waterboer, and it became a permanent Griqua outpost.

After 1833 the London Mission Society started a mission station at Blinkklip. Residents were mainly involved in agriculture.

The British government took over Griqualand West in 1871 and on 14 April 1892 the name of the town was changed to Postmasburg.

Postmasburg was named after Reverend J Postma, the founding member of the Dutch Reformed Church. An old stone Reformed Church dating back to 1908 can still be found in the area. The Reverend Dirk Postma's statue can also be found in the town (<http://www.southafrica.org.za>).

Since Casper Venter and his assistant, found the first diamond on the town commonage in 1918, several different mines have been established in the area, the first of which was an open cast mine. By 1935 the mine was permanently flooded, resulting in Postmasburg's 'Big Hole', similar to the hole in Kimberley. This hole is about 45 meters deep and teeming with fish (<http://www.southafrica.org.za>).

The Army Battle School of the South African National Defence Force is situated at Lohatla outside Postmasburg since the early 1980's. A gun known as 'Howitzer Gun' is located at the civic centre and honours the men of Potmasburg who died during the Second World War. (<http://www.southafrica.org.za>)

5. HERITAGE SITE SIGNIFICANCE AND MITIGATION MEASURES

The presence and distribution of heritage resources define a 'heritage landscape'. In this landscape, every site is relevant. In addition, because heritage resources are non-renewable, heritage surveys need to investigate an entire project area, or a representative sample, depending on the nature of the project. In the case of the proposed mining infrastructure the local extent of its impact necessitates a representative sample and only the footprint of the areas demarcated for development were surveyed. In all initial investigations, however, the specialists are responsible only for the identification of resources visible on the surface.

This section describes the evaluation criteria used for determining the significance of archaeological and heritage sites. The following criteria were used to establish site significance:

- » The unique nature of a site;
- » The integrity of the archaeological/cultural heritage deposits;
- » The wider historic, archaeological and geographic context of the site;
- » The location of the site in relation to other similar sites or features;
- » The depth of the archaeological deposit (when it can be determined/is known);
- » The preservation condition of the sites;
- » Potential to answer present research questions.

Furthermore, The National Heritage Resources Act (Act No 25 of 1999, Sec 3) distinguishes nine criteria for places and objects to qualify as 'part of the national estate' if they have cultural significance or other special value. These criteria are:

- » Its importance in/to the community, or pattern of South Africa's history;
- » Its possession of uncommon, rare or endangered aspects of South Africa's natural or cultural heritage;
- » Its potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage;
- » Its importance in demonstrating the principal characteristics of a particular class of South Africa's natural or cultural places or objects;
- » Its importance in exhibiting particular aesthetic characteristics valued by a community or cultural group;
- » Its importance in demonstrating a high degree of creative or technical achievement at a particular period;
- » Its strong or special association with a particular community or cultural group for social, cultural or spiritual reasons;
- » Its strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa;
- » Sites of significance relating to the history of slavery in South Africa.

5.1. Field Rating of Sites

Site significance classification standards prescribed by SAHRA (2006), and approved by ASAPA for the SADC region, were used for the purpose of this report. The recommendations for each site should be read in conjunction with section 9 of this report.

FIELD RATING	GRADE	SIGNIFICANCE	RECOMMENDED MITIGATION
National Significance (NS)	Grade 1	-	Conservation; national site nomination
Provincial Significance (PS)	Grade 2	-	Conservation; provincial site nomination
Local Significance (LS)	Grade 3A	High significance	Conservation; mitigation not advised
Local Significance (LS)	Grade 3B	High significance	Mitigation (part of site should be retained)
Generally Protected A (GP.A)	-	High/medium significance	Mitigation before destruction
Generally Protected B (GP.B)	-	Medium significance	Recording before destruction
Generally Protected C (GP.C)	-	Low significance	Destruction

Impact Rating Methodology

The following phased approach was used to establish the impact rating as provided by the client:

Step 1: Determine the PROBABILITY of the impact by calculating the average between the Frequency of the Aspect, the Availability of a pathway to the receptor and the availability of the receptor

(Thus: Sum of the three column scores below ÷ 3)

Frequency of Aspect / Unwanted Event	Score	Availability of pathway from the source to the receptor	Score	Availability of receptor	Score
Never known to have happened, but may happen	1	A pathway to allow for the impact to occur is never available	1	The receptor is never available	1
Known to happen in industry	2	A pathway to allow for the impact to occur is almost never available	2	The receptor is almost never available	2
< once a year	3	A pathway to allow for the impact to occur is sometimes available	3	The receptor is sometimes available	3
Once per year to up to once per month	4	A pathway to allow for the impact to occur is almost always available	4	The receptor is almost always available	4
Once a month - Continuous	5	A pathway to allow for the impact to occur is always available	5	The receptor is always available	5

Step 2: Determine the MAGNITUDE of the impact by calculating the average of the factors below (thus: Sum of all six column ratings below ÷ 6)

Source						Receptor					
Duration of impact	Score	Extent	Score	Volume / Quantity / Intensity	Score	Toxicity / Destruction Effect	Score	Reversibility	Score	Sensitivity of environmental component	Score
Lasting days to a month	1	Effect limited to the site. (metres);	1	Very small quantities / volumes / intensity (e.g. < 50L or < 1Ha)	1	Non toxic (e.g. water) / Very low potential to create damage or destruction to the environment	1	Bio-physical and/or social functions and/or processes will remain unaltered.	1	Current environmental component(s) are largely disturbed from the natural state. Receptor of low significance / sensitivity	1
Lasting 1 month to 1 year	2	Effect limited to the activity and its immediate surroundings. (tens of metres)	2	Small quantities / volumes / intensity (e.g. 50L to 210L or 1Ha to 5Ha)	2	Slightly toxic / Harmful (e.g. diluted brine) / Low potential to create damage or destruction to the environment	2	Bio-physical and/or social functions and/or processes might be negligibly altered or enhanced / Still reversible	2	Current environmental component(s) are moderately disturbed from the natural state. No environmentally sensitive components.	2
Lasting 1 – 5 years	3	Impacts on extended area beyond site boundary (hundreds of metres)	3	Moderate quantities / volumes / intensity (e.g. > 210 L < 5000L or 5 – 8Ha)	3	Moderately toxic (e.g. slimes) Potential to create damage or destruction to the environment	3	Bio-physical and/or social functions and/or processes might be notably altered or enhanced / Partially reversible	3	Current environmental component(s) are a mix of disturbed and undisturbed areas. Area with some environmental sensitivity (scarce / valuable environment etc.).	3
Lasting 5 years to Life of Organisation	4	Impact on local scale / adjacent sites (km's)	4	Very large quantities / volumes / intensity (e.g. 5000 L – 10 000L or 8Ha– 12Ha)	4	Toxic (e.g. diesel & Sodium Hydroxide)	4	Bio-physical and/or social functions and/or processes might be considerably altered or enhanced / potentially irreversible	4	Current environmental component(s) are in a natural state. Environmentally sensitive environment / receptor (endangered species / habitats etc.).	4
Beyond life of Organization / Permanent impacts	5	Extends widely (nationally or globally)	5	Very large quantities / volumes / intensity (e.g. > 10 000 L or > 12Ha)	5	Highly toxic (e.g. arsenic or TCE)	5	Bio-physical and/or social functions and/or processes might be severely/substantially altered or enhanced / Irreversible	5	Current environmental component(s) are in a pristine natural state. Highly Sensitive area (endangered species, wetlands, protected habitats etc.)	5

Step 3: Determine the SEVERITY of the impact by plotting the averages that were obtained above for Probability and Magnitude in the table below.

ENVIRONMENTAL IMPACT RATING / PRIORITY					
	MAGNITUDE				
PROBABILITY	1 Minor	2 Low	3 Medium	4 High	5 Major
5 Almost Certain	Low	Medium	High	High	High
4 Likely	Low	Medium	High	High	High
3 Possible	Low	Medium	Medium	High	High
2 Unlikely	Low	Low	Medium	Medium	High
1 Rare	Low	Low	Low	Medium	Medium

6. BASELINE STUDY-DESCRIPTION OF STUDY AREA

It is important to note that the entire PPC Lime mining area was not surveyed but only the footprint of the proposed quarry expansion area that was surveyed on foot and by vehicle (Figure 1 & 2). The proposed quarry is bordered to the east by the existing PPC Lime mine, and the mine access road from Lime Acres to the south.

The north and north eastern portion of the property is currently fallow and is characterised by a undulating landscape with the low-lying areas covered in grass veld. The southern portion of the study area is used as a game reserve by PPC and is characterised by rising rocky ridges covered with shrubs and trees. No major landscape features exist in the study area like permanent water features or prominent hills etc. (Figure 4 -7).

In terms of the built environment (Section 34 of the NHRA), no standing buildings of significance were recorded. In terms of the archaeological component of Section 35 within the study area isolated Middle Stone Age (MSA) artefacts were recorded scattered over the study area. Two contemporary middens associated with mine workers/farm labourers were also recorded. Outside of the proposed quarry area two cemeteries were recorded **that will not** be impacted on (Figure 3).

Cemetery 1 is located approximately 1 km to the south of the proposed quarry and no impact is foreseen on the site. The cemetery is overgrown and consists of approximately 16 graves with calcrete dressings (Figure 8).

Heritage significance: Generally Protected A (GP.A)
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Cemetery 2 is located to the east of the current mining operations 1.8km from the new proposed quarry and no impact is foreseen on the site. It is a large cemetery that is fenced off with at least 80 graves. Grave dressings consist mostly of calcrete with two granite headstones (Figure 9 & 10). This site is also recorded by Dreyer 2007.

Heritage significance: Generally Protected A (GP.A)
--

Midden 1 is located within the south eastern portion of the proposed quarry. Material remains consist of industrial artefacts like metal, glass and fragments of clothing. It is assumed that the feature is associated with 20th century farm or mine workers. It is also possible that a demolished mud dwelling used to be at this location (Figure 11 & 12).

Heritage significance: Generally Protected C (GP.C)
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Midden 2 consists of two middens located approximately 20 meters apart. These are large middens (10 meter in diameter) and might be the result of a dumping site. Material remains consist of industrial artefacts like metal, glass and fragments of clothing (Figure 13). It is assumed that the features are associated with 20th century farm or mine workers debris.

Heritage significance: Generally Protected C (GP.C)
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Isolated Middle Stone Age artefacts are scattered over the eastern portion and to a lesser extent in the western portion of the study area in very low density's (less than 2 artefacts per 6m²). These artefacts are scattered too sparsely to be of any significance apart from noting their presence, which has been done so in this report. These low density scatters are of low significance and corroborates findings in the area where these isolated artefacts has been given a low significance rating (Henderson 2005, Dreyer 2007, Fourie 2014). Artefacts consist mostly of miscellaneous flakes and broken pointed flakes with faceted striking platforms (Figure 14). Raw material consists of igneous and metamorphic rocks.

Heritage significance: Generally Protected C (GP.C)
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Stone Age material found in the larger study area spans the Earlier, Middle and Later Stone Ages through Pleistocene and Holocene times although only isolated MSA artefacts were recorded in the study area similar to the study by Dreyer (2007) and the study by Morris (2008). Higher concentrations were recorded by Henderson (2005) and Fourie (2015) probably attributed to the location of these sites closer to higher lying areas and water resources that is absent within the current study area.

Carter Block is known to contain engravings on dolomite surfaces (Morris 2008). The exact location of these engravings are not clear from the Morris report but are indicated to occur outside and to the south of the proposed quarry area (red dotted area in Figure 3). Very few dolomite surfaces were noted during the survey and none of these had any engravings on them.



Figure 2: Google image of the study area (blue) and track logs (black) of areas covered in black.

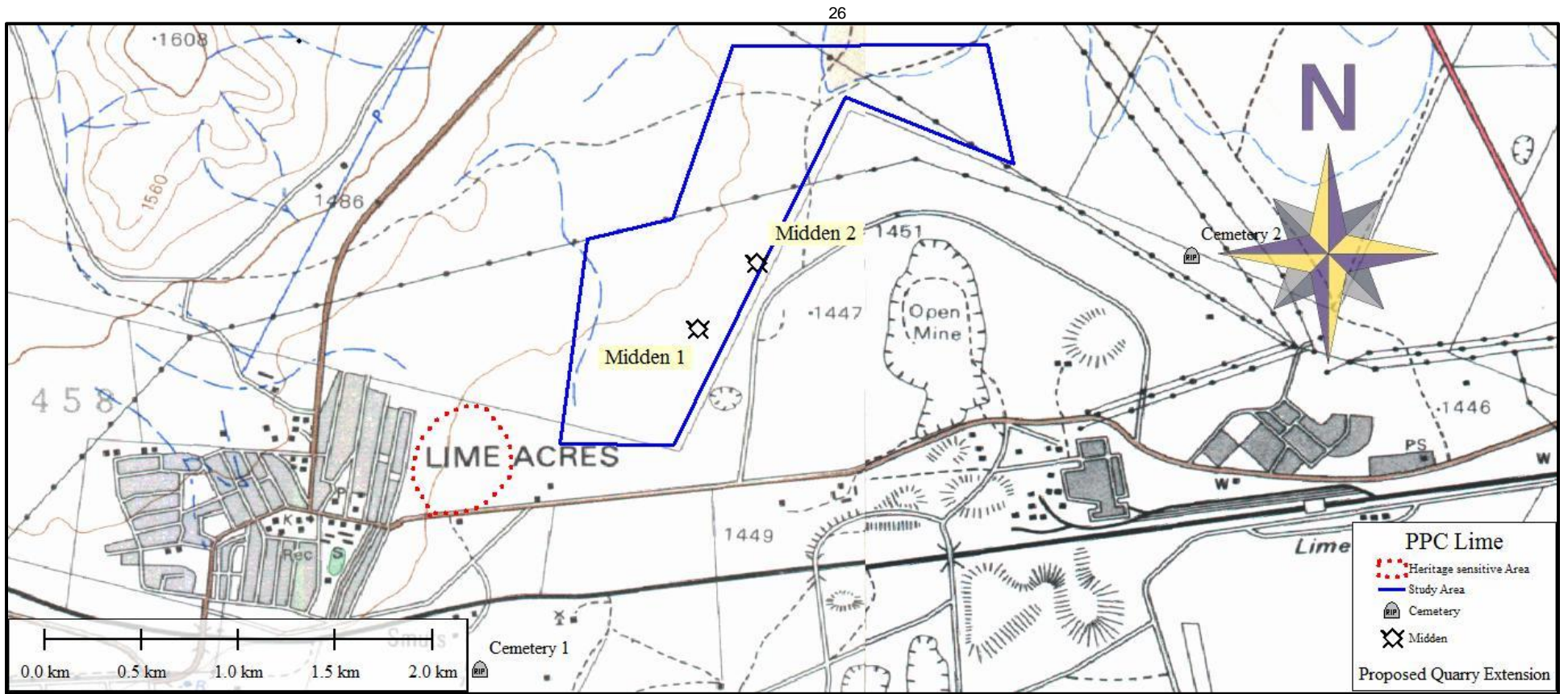


Figure 3: Showing the location of the identified features in the study area.



Figure 4. General site conditions in the eastern portion.



Figure 5. General site conditions in the north eastern portion.



Figure 6. General site conditions in the south western portion.



Figure 7. General site conditions in the southern portion.

6.3. Feature Descriptions

6.1.1 Features with Coordinates

Number	Type Site	Markers	Co ordinate
Cemetery 1	Modern	Calcrete grave dressings	23.4817050118 -28.3687370270
Cemetery 2	Modern	Calcrete grave dressing and granite headstones	23.5146899801 -28.3495820314
Midden 1	Modern/historical	Glass and metal artifacts	23.4917519800 -28.3529779594
Midden 2	Modern/historical	Glass and metal artifacts	23.4944859892 -28.3499280363



Figure 8: Cemetery 1 viewed from the east.



Figure 9: Cemetery 2 viewed from the south.



Figure 10: Cemetery 1 viewed from the east.



Figure 11: Cemetery 2 viewed from the south.



Figure 12: Grave dressings from site 2.



Figure 13: Artefacts from midden 1.



Figure 14: Artefacts from midden 2.



Figure 15: Ventral and dorsal views of artefacts found in the study area (*Scale in centimetres*).

Impact evaluation of the proposed project on heritage resources

Please note that grave sites and cemeteries have high social significance but due to the fact that the identified features do not occur in the development footprint the impact of the development will not be assessed on these features. If the features will be impacted at a later stage it is important to incorporate the correct mitigation measures into the EMP.

Middens 1 and 2 as well as Stone Age Scatter

Environmental impact, extent, duration, significance and degree to which impact will cause irreplaceable loss	Risk rating (before mitigation)			Environmental objective	Degree to which impact can be reversed and the supporting mitigatory action plan	Timeframe	Responsibility	Risk rating (after mitigation)				
	Probability	Magnitude	Severity					Probability	Magnitude	Severity		
ENVIRONMENTAL COMPONENT: Contemporary Middens and Stone age Scatter												
ACTIVITY: Preconstruction ground clearing as well as mining activities such as excavations												
PROJECT PHASE APPLICABILITY	Construction	X										
	Operation	X										
	Decommissioning											
<u>Impact description:</u> Destruction of surface indicators of cultural material. <u>Extent of impact:</u> Local <u>Duration of impact:</u> Permanent and irreversible	4	3	2	M	Ensuring that cultural sites are recorded prior to construction. The middens are of contemporary nature and are not considered to be of any significance apart from noting their presence, which has been done so in this report. The Stone age artefacts have also been sufficiently recorded through this report.	<u>Degree to which impact can be reversed:</u> The impact on the site cannot be reversed as the impact constitutes destruction of the sites that is permanent and irreversible. <u>Mitigation:</u> Through the current recording of the sites in this report, the cultural historic record of the area will be added to.	During the EIA phase	Environmental manager	4	3	1	L

7. CONCLUSIONS AND RECOMMENDATIONS

Heritage Contracts and Archaeological Consulting CC has been contracted by Shangoni Management Services (Pty) Ltd to conduct an Archaeological Impact Assessment for the proposed PPC Lime Acres opencast extension that is situated in the Northern Cape Province, in the Magisterial District of Hay. The mine is situated 25 km from Daniëlskuil, 105 km from Kuruman, 45 km from Postmasburg and 160 km from Kimberley. The study area of approximately 160 ha was surveyed over a period of two days.

In terms of the archaeological component of Section 35 of the NHRA isolated Middle Stone Age (MSA) artefacts were recorded scattered over the study area. The artefacts are scattered too sparsely to be of any significance apart from noting their presence, which has been done so in this report. Two contemporary middens associated with mine workers/farm labourers were also recorded. These sites are of low significance as they are not older than 60 years and in the case of Midden 2 probably represent secondary dumping of household refuse amongst other things. No further action is recommended for these features. Outside of the proposed quarry area two cemeteries were recorded that **will not be** impacted on.

Based on the results of the study there are no significant archaeological risks associated with the proposed expansion of the existing PPC Lime quarry. It is recommended that the following chance find procedures should be implemented:

This procedure applies to the developer's permanent employees, its subsidiaries, contractors and subcontractors, and service providers. The aim of this procedure is to establish monitoring and reporting procedures to ensure compliance with this policy and its associated procedures. Construction crews must be properly inducted to ensure they are fully aware of the procedures regarding chance finds as discussed below.

- If during the construction, operations or closure phases of this project, any person employed by the developer, one of its subsidiaries, contractors and subcontractors, or service provider, finds any artefact of cultural significance or rock engraving, this person must cease work at the site of the find and report this find to their immediate supervisor, and through their supervisor to the senior on-site manager.
- It is the responsibility of the senior on-site Manager to make an initial assessment of the extent of the find, and confirm the extent of the work stoppage in that area.
- The senior on-site Manager will inform the ECO of the chance find and its immediate impact on operations. The ECO will then contact a professional archaeologist for an assessment of the finds who will notify the SAHRA.

No cultural landscape elements were noted and visual impacts to scenic routes and sense of place are also considered to be low. No further mitigation is recommended for this aspect. In terms of the built environment (Section 34 of the NHRA), no standing buildings of significance were recorded.

7.1 Reasoned Opinion

If the above recommendations are adhered to and based on approval from SAHRA, HCAC is of the opinion that the development can continue as the impact of the development on heritage resources is acceptable as no red flags were identified during the AIA. If during construction, any archaeological finds are made (e.g. graves, stone tools, and skeletal material), the operations must be stopped, and the archaeologist must be contacted for an assessment of the finds

Due to the subsurface nature of archaeological material and graves the possibility of the occurrence of unmarked or informal graves and subsurface finds cannot be excluded. If during construction any possible finds such as stone tool scatters, artefacts or bone and fossil remains are made, the operations must be stopped and a qualified archaeologist must be contacted for an assessment of the find.

8. PROJECT TEAM

Jaco van der Walt, Project Manager

9. STATEMENT OF COMPETENCY

I (Jaco van der Walt) am a member of ASAPA (no 159), and accredited in the following fields of the CRM Section of the association: Iron Age Archaeology, Colonial Period Archaeology, Stone Age Archaeology and Grave Relocation. This accreditation is also valid for/acknowledged by SAHRA and AMAFA.

I have been involved in research and contract work in South Africa, Botswana, Zimbabwe, Mozambique and Tanzania as well as the DRC; and have conducted more than 300 AIAs since 2000.

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